RAIL SAFETY AND STANDARDS BOARD

Train Protection Strategy

The industry strategy for the intervening enhancement of train protection systems

Foreword

The safety of Britain's railway depends on our ability to manage risk effectively—not just today, but throughout the long transition to comprehensive train protection using systems like the European Train Control System (ETCS).

This Train Protection Strategy addresses a critical challenge: how we manage the risks of signals passed at danger (SPADs) and overspeeding during the decades before ETCS deployment is complete. These are low-probability, high-consequence events that demand our sustained attention and action.

This strategy calls for targeted enhancements to train protection systems, addressing the overspeed limitations of TPWS while maintaining robust SPAD protection. It encourages intervening enhancements which enables industry to improve safety outcomes without waiting for the complete rollout of ETCS.

In addition, the strategy proposes the use of other technologies, such as adaptive sanding equipment, and operational processes where these will contribute to the fundamental reduction of risk associated with travelling too far and too fast.

This strategy allows industry to be confident that interim train protection risk is being managed effectively. This approach strikes a balance between technological advancements and fiscal responsibility, enabling intermediate safety improvements while paving the way for a secure and efficient future for our railway network.

It reflects industry's commitment to safeguarding passengers, meeting industry standards, and fostering the sustainable development of our rail system.

Mark Phillips
Chief Executive, RSSB

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Executive summary

This industry strategy to enhance train protection on Great Britain's (GB's) mainline network aims to mitigate risks from derailments and collisions to as low as reasonably practicable (ALARP).

The safety record of the GB mainline railway is among the best in the world. Currently, Great Britain uses a range of train protection systems. The most prevalent of these systems in use is the Train Protection and Warning System (TPWS). TPWS is fitted across approximately 40% of the GB mainline network, largely at high-risk locations such as signals protecting junctions. This has reduced the risk from SPADs, overspeeding, and buffer stop collisions by 60%. However, it does not currently provide continuous speed monitoring.

TPWS is, therefore, not regarded as an Automatic Train Protection (ATP) system.

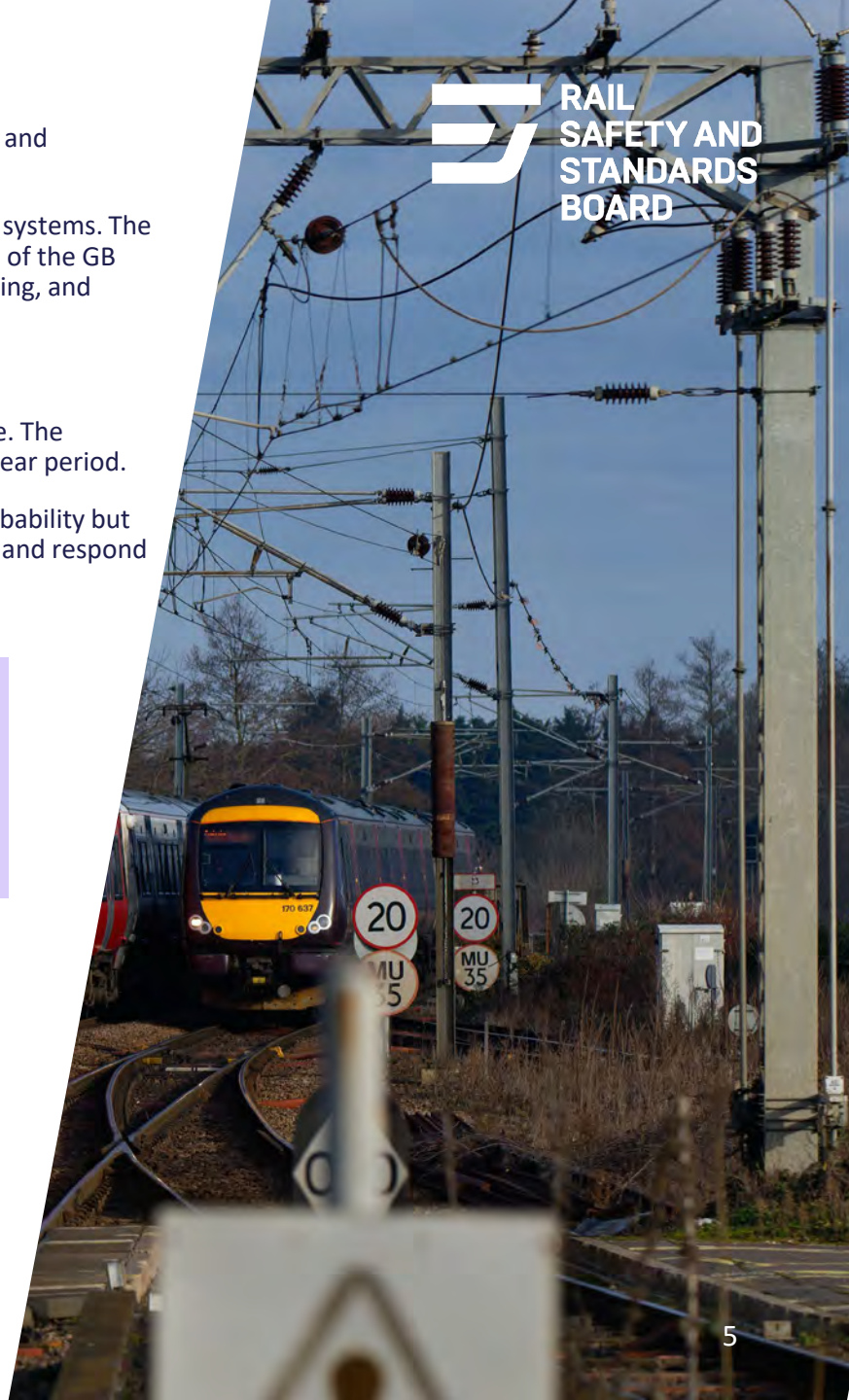
There are existing deployments of ETCS and other ATP systems on sections of the GB mainline network, but these are limited in scale. The migration plan for ETCS balances safety enhancement with financial viability by targeting a transition from TPWS to ETCS over a 30-year period.

Understanding the risk in relation to train overspeed and SPADs presents a unique challenge. These incidents are typically low in probability but high in consequence. Additionally, there is less data available about the occurrence of incidents, it is more difficult to identify trends and respond accordingly.

In the intervening period, there is a need to understand and manage the risk of overspeeding and SPADs, and assess what measures are reasonably practicable to be taken to manage this.

There are further challenges because of the shared nature of the risk. While the direct risk of an operational incident such as a SPAD or overspeed is largely owned by the railway undertaking, the infrastructure manager is responsible for supporting the railway undertaking in managing this risk.

Important external factors that can adversely impact the effectiveness of train protection systems also need to be considered. For instance, low adhesion affects the ability of the train to decelerate as required in response to driver or system brake demands. The contribution of low adhesion as a causal factor of SPADs was highlighted by two recent collisions (Salisbury Tunnel Junction, 31 October 2021; Talerddig, 21 October 2024).



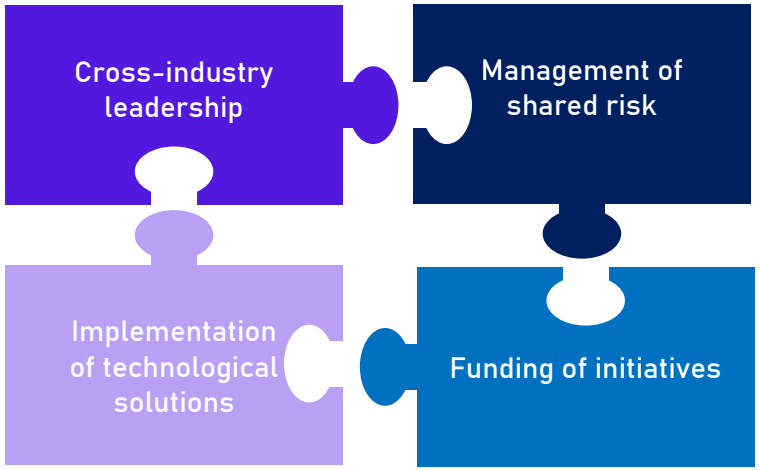
The Train Protection Strategy (the Strategy) operates within a suite of hierarchical strategies already adopted by industry. Both the Rail Technical Strategy and the Rail Health and Safety Strategy call for an industry-agreed approach to manage train protection risk while setting out their frameworks for other risk areas. This Strategy proposes exploring enhancements to existing train protection systems installed on the GB mainline network and focuses on seven strategic objectives:

- Mitigate the risk from train derailment or collision to ALARP
- Ensure systems are cost-effective to implement, operate, and maintain
- Improve the overall performance and safety of the railway system
- Improve the overall efficiency of railway operations
- Realise benefits earlier than deployment of comprehensive train protection
- Facilitate the migration towards European Train Control System (ETCS), where relevant
- Facilitate automation of train operations, where relevant.

These objectives have 13 key deliverables, providing a roadmap on the workstreams necessary to achieve the objectives and collective vision. The deliverables are based on the themes of this Strategy, such as the need to mature the industry's understanding of the risk through data gathering and risk assessment.

The Strategy establishes a baseline industry position on what is reasonably practicable and promotes the development of technical solutions which can be implemented without the proliferation of bespoke design. It recommends the creation of a prioritisation matrix of lines to determine where enhancements can provide the greatest benefit. It identifies the shared responsibility for risk management between railway undertakings and infrastructure managers and argues that a coordinated approach to mitigate risks from SPADs and overspeeding is fundamental.

The Strategy has two separate phases that prioritise the delivery of workstreams. The first phase focuses on the gathering and analysis of data that supports the decision-making in the latter phase. The timeline associated with the first phase is founded on a previous commitment in the Rail Health and Safety Strategy, acknowledging that industry's resources and funding may pose barriers. Nonetheless, delivery of these workstreams at the earliest opportunity is encouraged.



With innovative technological solutions readily available, such enhancements are needed to manage risks during the interim period before widespread implementation of ETCS. Improved operational processes also offer industry an opportunity to reduce the risk of SPADs and overspeed events.

Success hinges on industry collaboration and proactive leadership, requiring stakeholders to work together to enhance train protection systems.

Funding focus and alignment is essential. It is imperative that resources already earmarked for ETCS implementation must remain intact and not be diverted to interim solutions unless they directly support ETCS goals. Notwithstanding, reprioritisation of funding for safety interventions may be required subject to a robust, evidence-led case being made.

Successful realisation of the Strategy requires strategic collaboration, clear leadership, and a commitment to investing in technologies that enhance existing train protection systems to mitigate current train protection risk. This needs to be achieved in the period before ETCS becomes ubiquitous.

Problem statement and vision

Problem Statement

Managing the risks associated with SPADs and overspeeding is critical to ensure network safety and operability.

Recent incidents have heightened the industry's concerns over the capability of existing train protection systems to manage these risks.

The implementation of ETCS is managed through a plan with at least a 30-plus year deployment period. However, this plan is not fully funded nor comprehensive in scope, and the transition is gradual.

Therefore, SPADs and overspeed risks are not wholly mitigated in the intervening period before comprehensive train protection is in place.

Vision

"To always safeguard trains on the GB mainline network through the use of train protection systems and enhancements, which mitigate risks so they are as low as reasonably practicable and are proportionate in cost and time to realise"

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Introduction

Current landscape

Train protection is a train control function that is independent of the train driving function. It is applied to initiate a brake application to mitigate the risk of a train going too far or too fast. It should be considered in the context of a train protection system which is a configuration of known integrity that is implemented to deliver the train protection function.

Train protection is a fundamental element of ensuring the safety and efficiency of the GB mainline railway network, enabling the sustainable growth of the industry.

The industry must continuously address the risks associated with SPADs and overspeeding incidents. Such incidents could give rise to collisions and derailments. These events are typically low probability, high consequence.

These events are fortunately rare, but they remain a concern for the industry, which is evidenced through recent incidents at Spital and Grantham South Junctions (refer to Appendix B). Some of these incidents have been the subject of investigations by the Rail Accident Investigation Branch (RAIB).

The Strategy also acknowledges external factors that may impact the effectiveness of the train protection system. For example, managing low adhesion to enable the train to reduce its speed when commanded to do so.

The Railway Safety Regulations (RSR) 1999 prohibits the operation of a train on a railway unless a train protection system is in service for that train and railway.

Various train protection systems are in place on the GB mainline railway, with the majority of protection being provided by TPWS since the mid-1990s. Other less-used systems also feature on parts of the railway network.

The '*PR23 final determination: supporting document – health and safety*' to the Office of Rail and Road's final determination for Network Rail in Control Period 7 (CP7) includes reference to train protection and speed management. It highlights its desire to see more commitment towards speed management systems.

RSSB research project T1169 'Review of the Uff-Cullen Recommendations related to train protection systems' provides insights into how the GB rail industry has progressed in meeting Uff-Cullen's recommendations concerning train protection. The findings of this research should be considered in the pursuit of this Strategy to ensure lessons from the past remain central in today's decision making.

While the Strategy provides a roadmap of activities to understand and mitigate the risk of SPADs and overspeeds, it remains for industry to establish a mechanism through which it can implement the necessary programmes.

Challenges

Managing the risks associated with SPADs and overspeeding incidents requires cooperation. Usually, the railway undertaking is responsible for the safe driving and stopping of trains through the driver's actions. The infrastructure manager is responsible for the provision of correct information to the railway undertaking and, ultimately, the drivers. This makes it a shared interface risk.

Where there is shared risk, leadership becomes critical. It is vital that the industry collaborates with a unified vision, where the collective effort can ensure challenges are mitigated.

Challenges include the implementation of technological solutions, where potential barriers can exist from a rolling stock, infrastructure or operation perspective, for example. Cooperation on the chosen technology is imperative.

Without the appropriate funding, these initiatives cannot progress. There are often competing projects requiring funding, and it is important that any funding assigned to alternative train protection workstreams does not adversely impact other agreed schemes, such as the rollout of ETCS.

Benefits

Train protection systems seek to mitigate the risk from collisions and derailments as a result of travelling too far (beyond the movement authority) and too fast (above the permitted line speed). However, they can also offer wider benefits to the whole industry.

Operational performance can be significantly improved through some enhanced train protection systems, for example, through optimising brake applications and providing greater track worker protection.

Technology

The Strategy provides a high-level summary of the technologies currently in use and those being explored for use. Notwithstanding, the Strategy does not specify which systems should be used in each location. Rather, it sets the framework to enable industry to decide which system best mitigates risks to ALARP and are proportionate in cost and time to realise.

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Strategic Objectives

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- Facilitate automation of train operations, where relevant.

Mitigate the risk from train derailment or collision to ALARP

SPADs and overspeeding incidents are typically low frequency, high consequence events. The industry needs to demonstrate that it has mitigated the risk such that it is ALARP.

Derailment can arise from going either too far or too fast, while collisions are more likely from travelling too far. Existing train protection systems provide a degree of risk mitigation, but the industry must assure itself that it is appropriately mitigating the risk from trains derailing or colliding due to a SPAD or overspeeding. In addition, TPWS is not mandated at level crossings, which are typically closer to protecting signals than conflicting train movements.

Promoting a reporting culture

Key deliverable: Launch a programme to actively encourage the fair reporting and understanding of overspeed incidents, including the recording and management of incident data, as well as monitor SPAD reporting.

Being data-rich is vital to determine the risk level posed by SPADs and overspeeding. This is reflected within the fatalities and weighted injuries figure. This can impact the business case for the installation of enhanced train protection systems.

The use of tools such as Global Positioning System (GPS), and signalling data will assist with identifying overspeed occurrences, as well as driving a culture of compliance through enhanced monitoring. This work aligns with the Overspeed Data Strategy (ODS) that is being developed. The ODS considers the severity of events and the need for a fair reporting culture.

Understanding risk

Key deliverable: Complete an assessment of the risks associated with SPADs and overspeeding for critical locations on the GB mainline network.

Crucial to understanding what mitigations are necessary is assessing the risks, particularly from derailment or collision, in the context of the train stop and overspeed functions.

There are certain geographical locations where the risk from overspeed is greater, such as where there is a larger speed differential. This can include tight radius curves after high-speed sections of track or turnouts at junctions, which commonly have more stringent speed restrictions. These locations must be prioritised so that any appropriate interventions can be prioritised.

Likewise, SPADs can have varying degrees of associated risk. Signals protecting junctions or other conflict points are more likely to result in derailment or collision if passed at danger than plain line signals. Where signals are protecting conflict points, such locations must be assessed for all risks relating to travelling too far, whether that is from approaching too fast or from other operational factors.

Determining ALARP

Key deliverable: Establish a baseline, industry agreed position on what is reasonably practicable.

The mitigations determined as a result of a risk assessment must be reasonably practicable. This means the mitigation solution(s) must be decided in balance of the risk against the sacrifice such solution(s) would provide. The Health and Safety Executive highlights in its guidance on ALARP that the decision should be weighted in favour of health and safety and that any avoidance of making the sacrifice should be supported with evidence that it would be grossly disproportionate.

Legislation: Allows industry to demonstrate that it is actively managing high consequence risk.

Ensure systems are cost-effective to implement, operate, and maintain

Cost is fundamental to understanding what is reasonably practicable. Train protection systems can have varying costs depending on their integrity level and the degree of bespoke design that may take place.

The proliferation of solutions can drive costs upwards and complicate installation and maintenance, again creating an unnecessary burden of cost.

The Strategy promotes a unified approach that allows industry to collaboratively work within set parameters so that solutions can be developed, implemented, and maintained more effectively.

Ensure value for money

Key deliverable: Agree a suite of common solutions, which can be implemented without the proliferation of bespoke design.

Bespoke solution design can inflate costs through additional time during the design stage, increased complexity at the manufacture and maintenance stages, and necessitating more involved training of unique systems before operation. Each of these areas can be reduced through industry collaborating on shared solutions which can be widely adopted. This embeds better value for money.

There are other technical and policy benefits which can be realised through a unified approach to train protection systems, such as industry standards supporting the requirements of a system, as well as operational rules. These contribute to a reduction in costs later in the lifecycle of the solution.

Planning for the future

Key deliverable: Analyse the full lifecycle cost of installation, operation, and maintenance of potential train protection solutions to determine what is in the long-term best interest for the whole industry.

Solutions can have a high initial cost at the point of design and installation. However, this must be analysed in the context of its whole lifecycle.

The asset life of TPWS equipment is limited, and as its obsolescence increases, so too will its cost to operate and maintain. Continuing to maintain legacy systems can increase the whole lifecycle cost of managing the risk for which it was originally intended, so it must be considered in wider decision-making.

Some technology can be relatively inexpensive to operate and maintain beyond the point of installation and can then provide benefits which deliver far beyond the initial burden of cost. Some technology can also be enablers for future systems (such as the Network Model), and intermediate enhancements may help to reduce later costs to the industry.

Therefore, the industry must analyse the whole lifecycle cost of the chosen solutions in connection with the benefits that will be attained in that same period.

Value: Cost-effective systems allow the industry to apply a wider risk mitigation across the network.

Mitigate the risk from train derailment or collision to ALARP

Ensure systems are cost-effective to implement, operate, and maintain

Improve the overall performance and safety of the railway system

Improve the overall efficiency of railway operations

Realise benefits earlier than deployment of comprehensive train protection

Facilitate the migration towards European Train Control System

Facilitate automation of train operations

Improve the overall performance and safety of the railway system

Britain's railway is one of the safest in the world because risks are generally managed well. However, pockets of risk exist. The number of SPADs and overspeed incidents are a concern for many in the industry. 288 SPADs were recorded on the GB mainline in the 2023/24 financial year, 71 of which had a risk ranking greater than or equal to 16. Incidents of this ranking or greater have either a potentially 'significant risk' or 'severe risk' classification.

The Rail Health and Safety Strategy for 2024 to 2029 refers to the Train Protection Strategy within the 'Train Operations' topic, setting out various strategic initiatives relevant to understanding and mitigating overspeed and SPAD risk. Some of the strategic initiatives include:

- A strategy to improve SPAD investigations and reporting
- Delivery of Red Aspect Approach to Signals toolkit 2 (RAATS2) functionality
- Understanding of overspeed risk consistent with SPAD risk understanding
- Piloting of the speed risk ranking tool.

Improve performance and safety

Key deliverable: Complete an assessment of the level of integrity of potential train protection solutions, relative to emergent risk, to optimise benefit.

Some train protection systems offer additional performance enhancements in the form of maximised braking potential. They can be used to enhance track worker protection, possession management, and level crossing management. These additional performance benefits have links back to safety and ultimately increase the business case for implementing such solutions. Therefore they must be considered as part of identifying the solutions to be taken forward.

Optimum human performance is a key barrier in the occurrence of operational incidents. Human factors are an integral part of the solutions taken forward by industry, and solutions such as vigilance systems may be considered as part of the risk mitigation.

A reduction in these incidents will ultimately lead to a reduction in delay minutes accrued through SPAD and overspeeding events. SPAD incidents can often accumulate a considerable amount of delay minutes, which have financial penalties.

System implementation

Key deliverable: Implement solutions that reduce the number and consequence of SPADs and overspeed incidents.

The crucial driver behind any enhancement of a train protection system must be to further reduce the chance of overspeeding and SPADs, as well as mitigate the risk should an incident happen.

Existing processes, tools, and systems must be used optimally. For example, the consequences of certain SPADs may be further reduced by using the Railway Emergency Call (REC) or by enhanced braking capability in low adhesion with the better use of sanding systems. In both cases, these interventions have the ability to reduce the consequences of an incident.

Optimisation: Data required for train protection systems can be exploited to approach overall system risk.

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The industry has an opportunity to maximise capacity within the existing network through the enhancement of existing train protection systems, which can enable train braking to be optimised, paving the way for dynamic signalling in the form of ETCS.

Blanket and emergency speed restrictions can cause significant amounts of delay minutes, as well as having an adverse impact on workload.

More targeted application of blanket emergency speed restrictions can increase the number of trains able to operate, which increases the capacity of the network in times of disruption.

The use of real time data as part of a technical solution can reduce the likelihood of key information being misinterpreted or being invalid.

Streamlining operations

Key deliverable: Simplify and embed notification of speed restriction information within a technological solution and inform speed restriction information using real-time data sources.

Most blanket and emergency speed restrictions are notified through written notices, which are then given to drivers at the start of their duty. Blanket speed restrictions can be geographically applied in response to extreme weather events. This process can often entail significant delays.

The Proportionate Risk Response to Implementing Mitigating Speeds to Assets (PRIMA) tool being developed and trialled will help optimise the implemented restrictions and ensure their proportionality. Nonetheless, the provision of that information to drivers in real-time can further enhance its benefit. By aligning workstreams and ensuring that train protection systems are able to use data in real-time, drivers will be equipped with better information that responds more dynamically to the source of the speed restriction, realising performance benefits through a reduction in delays.

Blanket and emergency speed restrictions have been increasingly causing concern following various overspeed incidents involving both types of speed restriction. It is often reported in such incidents that the driver was either unaware of the restriction or misunderstood its location. The means of notifying drivers of blanket and emergency speed restrictions is often done through written notices or Global System for Mobile Communications – Railway (GSM-R) location-based broadcasts.

There are technological solutions, driven by live data, which can be provided to drivers in real-time. Newer rolling stock is often designed with equipment which can display such information, so it is imperative that technology is used to its fullest potential.

Simplification: Streamlining of processes and procedures enables more efficient operations.

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Realise benefits earlier than deployment of comprehensive train protection

The rollout plan for ETCS is largely based on replacement of legacy infrastructure as part of asset renewals at the end of their lifecycle. The expected lifespan of most signalling assets is between 30 and 40 years, meaning any renewals with legacy train protection systems could delay fitment of an automatic train protection system by a similar timeframe.

Some benefits can take longer to be realised, especially where there are other contributing factors such as the rollout of technology and any associated training.

Expediting benefit impact

Key deliverable: Establish a prioritisation matrix of lines where the fitment of automatic train protection is imminent and where legacy train protection is to be renewed, to determine where enhancements can provide the greatest benefit.

Realising the benefit of enhanced train protection requires strategic planning to maximise the benefit of its fitment. Where lines are programmed to be equipped with an automatic train protection system such as ETCS within a reasonable timeframe, it may not be proportionate to enhance the legacy train protection system for the intervening period.

However, where the fitment of an automatic train protection system is not likely within the lifecycle of a given asset renewal, it is necessary to review the benefit of intervening enhancements. An analysis must be undertaken of the cost of installation and maintenance against the benefits, which can be attributed to that asset within its life span, before either renewal or transition to an automatic system. This must include the analysis of how existing technology can be better used.

The risk assessment of each location will determine the level of benefit that can be attained and must be compared with the route prioritisation matrix which will provide a multiplier for the amount of time that benefit will be realised.

Continuous monitoring

Key deliverable: Continuously monitor the implemented train protection measures to ensure the benefits are being delivered and incorporate improvements where necessary.

Demonstration of benefits being delivered by the enhancement of train protection systems can best be measured through the continuous monitoring of post-implementation change.

Monitoring must go beyond SPAD and overspeeding statistics and look at the wider operational and workforce safety improvements and the performance enhancements. Continuous monitoring will further ensure that the benefits are not only being realised sooner but that their full potential is obtained.

Prioritisation: Targeted roll-out of systems allows industry to achieve earlier risk mitigation across the network.

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Facilitate the migration towards European Train Control System

ETCS is an automatic train protection system capable of significantly reducing SPAD risk, enhancing safety, and improving performance. Full fitment of ETCS is more than a generation away and may not be justifiable in some locations of the network, so there is a need to assess what is reasonably practicable in the intervening period. However, there is a finite amount of funding available to the industry, so these enhancements require assessment in the context of long-term deployment of ETCS.

Gathering data

Key deliverable: Complete delivery of data projects, such as the Network Model and the Speed Management Programme (SMP), which could support future train protection enhancements and ETCS fitment.

Although the enabling projects associated with the SMP are not delivering an onboard signalling system, a replacement for ETCS or the long term deployment plan, they are fully aligned with the aspects of the East Coast Digital Programme and the wider ETCS deployments. Therefore, they are capable of providing the backbone for managing speed restrictions on the network.

Since the data provided by projects such as the SMP and Network Rail's Network Model offers both intermediate enhancements, as well as facilitating ETCS functionality in the future, these projects must be delivered and implemented as soon as is practicable.

Seek to preserve existing ETCS funding

Key deliverable: Reduce the cost of ETCS, such as by pursuing the Target 190 programme, and budget for the enhancement of train protection systems without significantly impacting the scope of ETCS fitment.

Work is in progress to support the optimisation of existing budgets under the Target 190 programme. This will reduce the cost of ETCS fitment so that it becomes the cost-effective alternative to the like-for-like replacement of existing train protection systems. Network Rail's budget for CP7 sets out its funding commitments for the period between 2024 and 2029. Within that, there has been funding allocated to the SMP workstreams and to various ETCS programmes.

Further cross-industry saving opportunities need to be exploited, particularly on the fleet fitment and roll out of ETCS. New vehicles are fitted with some of the equipment required for ETCS at the point of manufacture. However, for legacy rolling stock, this fitment can often be complicated and costly, so every opportunity to reduce this needs to be pursued.

It is vital that projects undertaken to analyse and develop intervening enhancements to train protection do not result in funding being diverted from agreed ETCS fitment programmes. This does not preclude reprioritisation of funding for safety interventions subject to a robust, evidence-led case being made in line with safety decision-making principles.

Transition: Systems that enable rapid, cost-effective migration to ETCS reduce cost, complexity and resource demands.

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In the digital age, there is growing focus on how technology can support the automation of different activities, particularly in train operations.

Automation of some operations can help to achieve improvements in performance and efficiency, as well as have overarching safety benefits, by reducing manual input and the inherent risk of human error.

Automation must be viewed in the context of the whole lifecycle of the asset and in line with the criteria set out regarding efficiency of operations. Principally on high-capacity networks, automation can help the industry meet its performance targets and potentially enhance capacity further, helping to achieve growth.

Analysing automation potential

Key deliverable: Investigate how train protection systems can directly or indirectly support the automation of certain train operation functions.

Several projects are already being undertaken to enhance train protection. Therefore, the industry must use the opportunity to investigate how such systems and technologies can enable the increased automation of operations while still optimising the task and operator performance.

Automation can include the provision of information to staff, data used in decision-making, and use of digital signalling. The latter is more relevant to automatic train protection. However, early analysis of its feasibility, and how intervening enhancements can support it, is a significant opportunity to lower cost, reduce duplication, and accelerate the realisation of benefits.

Automation: Systems that enable future autonomy offer cost benefits, a reduction in energy use and encourage sustainable growth.

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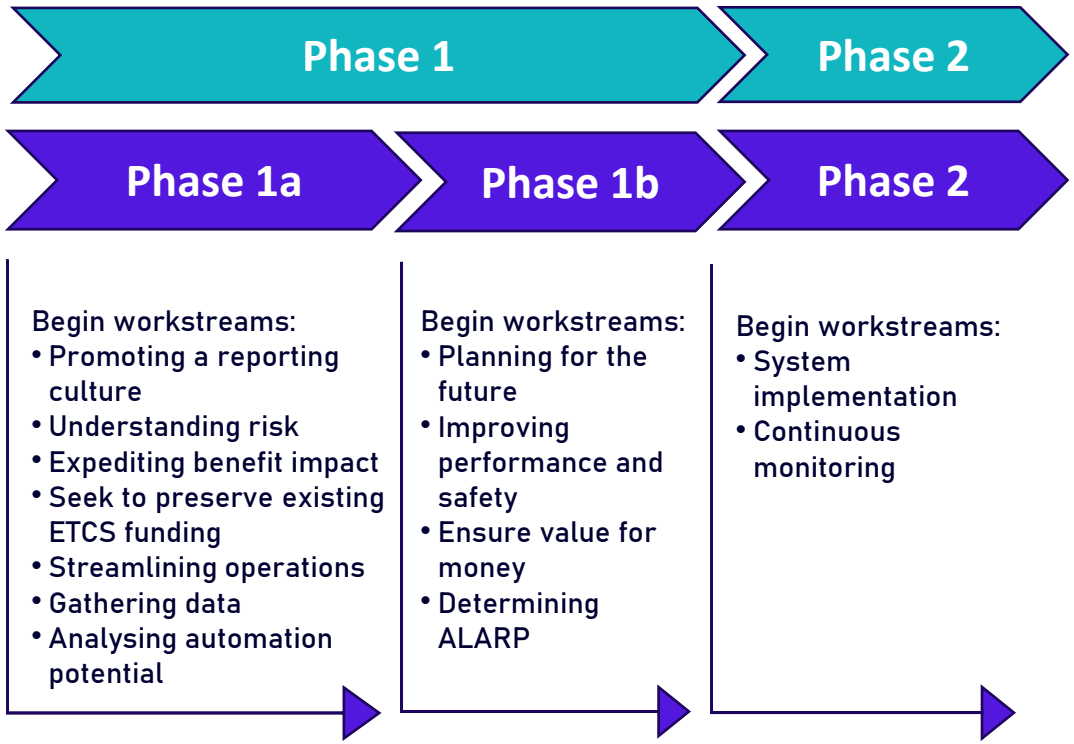
Delivery roadmap

The seven objectives of the Strategy set out 13 key deliverables, each with measurable outputs. These deliverables require the industry to proactively collaborate. Therefore, it is upon the whole industry to action them.

The deliverables need to be monitored to ensure their successful delivery and that the outputs lead to a constructive outcome. If delivered, they will contribute to enhancing the safety, efficiency, and long-term sustainability of the railway.

Industry has committed to the Strategy being in full flight by 2028. This roadmap segments the process of implementation into phases, such that evidence-based decision-making can be made by this time.

Phase 1 enables the industry to better understand the level of risk posed by too far and too fast events. The data gathered and analysed in this phase will allow informed discussions around the determination of what is ALARP, which will drive the later phase of the Strategy.



Multiple workstreams are ongoing which support the realisation of Phase 1. These have been forecasted for delivery through 2025 and 2026.

Other workstreams under Phase 1 that are not already ongoing will be scheduled in line with these dates to support beginning Phase 2.

At the completion of Phase 1, the industry will review the outputs and develop an implementation plan for the delivery of Phase 2, commencing in 2027/28. This will be accompanied by a timeline and targets for the industry to meet based on factors such as the industry's fiscal position.

Phase 1 timeline

Example workstreams

Delivery date	Project
2025	• Junction Overspeed Risk Assessment Tool (2024-SSH-009) – **Ongoing** • Feasibility of identifying overspeed events using Train Describer train movement data (COF-UOH-85) – **Ongoing** • Phase 1 of Speed Management Programme – **Ongoing** • Industry Speeding Data Strategy – **Ongoing**
2026	• Proactive speed data gathering (2025-SSH-001) – **Planned** • Version 2 of the Red Aspect Approach to Signals toolkit (RAATS2) – **Ongoing** • Publication of RIS-3772-TOM issue one 'Rail Industry Standard for Speed Restriction Management' – **Ongoing** • Analyse sample data and report on the scale of overspeeding – **Planned**
2027	• Develop industry implementation plan for the Train Protection Strategy – **Planned**
2028	**Phase 2 of the Train Protection Strategy in progress**

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Enabling the strategy

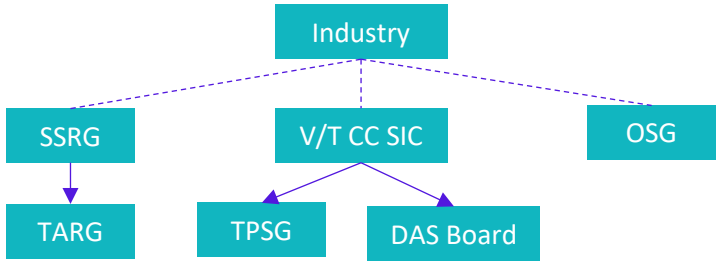
Enabler: Cross-industry leadership

Each of the key deliverables will require input from different organisations within the industry. The successful enhancement and ultimate deployment of comprehensive train protection is hinged on alignment between workstreams.

This principle extends to other programmes under way across the industry, where the outputs have potential to align. This alignment should not undermine other strategies, rather it will increase the benefit of all the workstreams to the whole industry.

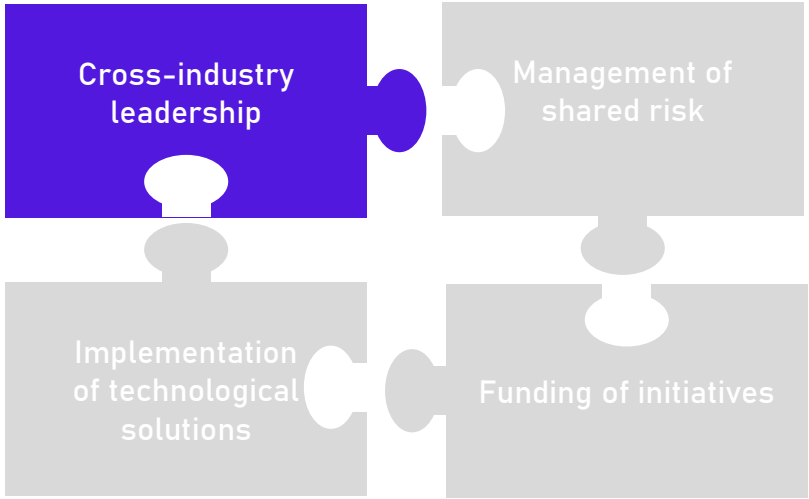
Such alignment can only be ensured if the industry effectively establishes its own leadership for these initiatives, with the development and outputs from each continuously monitored by a dedicated task force.

There are numerous industry groups and committees, that have been involved in aspects of train protection, including system research and development to risk and data analysis. It is therefore possible that some of that task force function could be performed within these forums.



- System Safety Risk Group (SSRG)
- Train Accident Risk Group (TARG)
- Overspeed Management Group (OSG)
- Driver Advisory System Board (DAS Board)
- Vehicle Train Control & Communication Signalling Interface Committee (V/TC&C SIC)
- Train Protection Strategy Group (TPSG)

The speed management programme being developed by Network Rail has previously been supported by these leadership groups, so it is critical that these groups are kept abreast of developments so that these programmes continue to garner their support.



RAIL SAFETY AND STANDARDS BOARD

Action:

Foster collaboration among industry stakeholders, including regulators, operators, and suppliers through establishing a platform for knowledge sharing and cooperative efforts to promote leadership within train protection, for the benefit of the whole industry.

Enabler: Management of shared risk

Railway undertakings, as the duty holder responsible for the operation of a train, typically own the majority of risk for SPADs and overspeeding.

On the other hand, most technological mitigations require infrastructure to support them, which necessitates the infrastructure manager to provide the relevant information and, in some cases, lineside equipment.

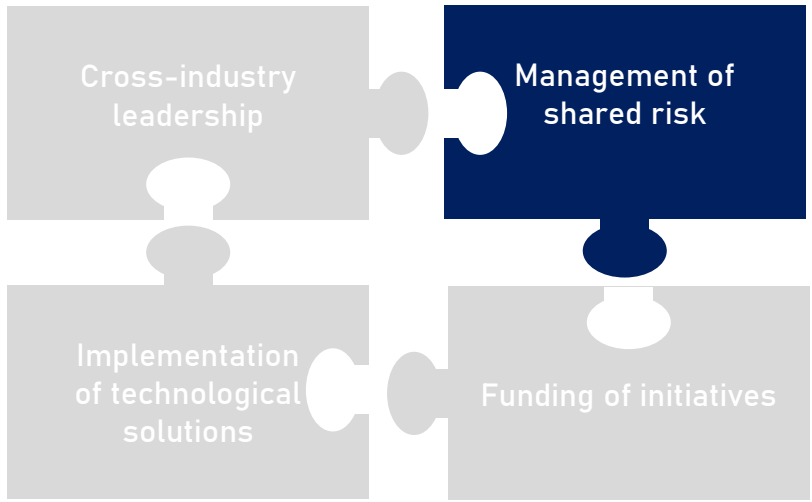
The key deliverables of the Strategy seek to manage the shared risk, so that the outputs from each realise benefits to both parties.

Many of the deliverables also contribute to the demonstration of managing the risks associated with train protection to ALARP, as required by the Railway Safety Regulations (RSR) 1999.

There are further requirements placed upon the infrastructure manager for the provision of some information used by railway undertakings in the Operation and Traffic Management National Technical Specification Notice (OPE NTSN).

These requirements include the establishment of agreed procedures for the communication of information used by drivers, including real-time changes to the line. These may include an imposed blanket or emergency speed restriction.

Given that some management of shared responsibility has been demonstrated, it is reasonable that the industry continues to align and agree a similar understanding between duty holders about the enhancement of train protection systems.



RAIL SAFETY AND STANDARDS BOARD

Action:

Realise the boundaries of responsibility in the management of shared risk through the development of an industry-backed agreement for the unified approach to mitigating the risks associated with SPADs and overspeeding.

Enabler: Funding of initiatives

The industry faces financial pressures and uncertainties, requiring a balance between safety improvements and fiscal prudence.

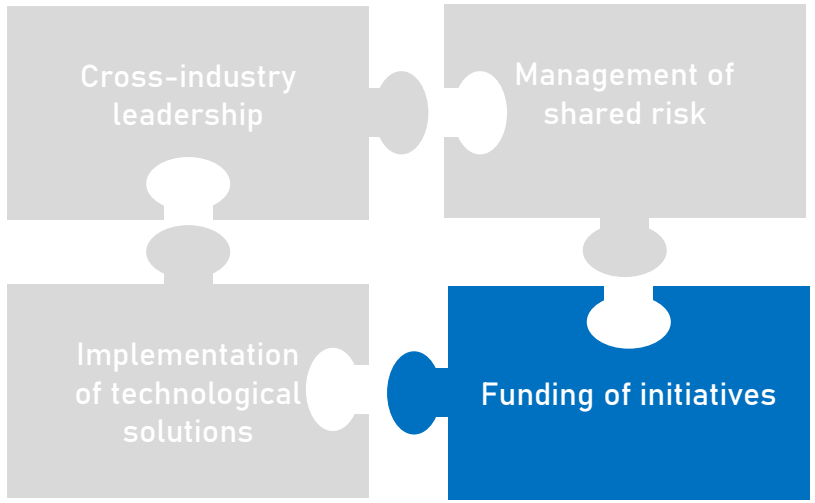
Conventional cost benefit analysis is often ineffective at accurately demonstrating and generating business cases for funding for solutions to alleviate low probability, high consequence events. This is because evaluation methods are often applied to constituent parts of the rail system such as specific incident findings, rather than considering the overall functioning and whole-system risk.

Where technology can be readily developed or configured to address other system risks, or enable performance and efficiency benefits, the cost versus benefit case is noticeably improved. Such an approach is practicable to apply and should be pursued given the marginal effort and positive benefits offered from enhancements to existing train protection systems.

It is vital that funding already allocated for workstreams related to the enhancement of train protection is not diverted for other activities.

The Department for Transport and the wider Government will be fundamental in policy setting for the industry, which can help facilitate the phased implementation of enhanced train protection systems and the transition to ETCS.

However, other investors will also play a pivotal role in maximising the funding available to industry. The industry must adopt a strategic approach to funding, including exploring opportunities for private investment.



RAIL SAFETY AND STANDARDS BOARD

Action:

Advocate for the allocation of sufficient funding and resources to expedite the implementation of enhanced train protection systems through collaboration with the Department for Transport and other key industry investors.

Enabler: Implementation of technological solutions

In the intervening period before comprehensive train protection is widespread, the industry has an opportunity to enhance safety, performance, and efficiency through the implementation of various technologies.

The key deliverables seek to ensure the use of data and automation to improve in these areas, but the wider benefits of intermediate enhancements will only be realised if the technological solutions are effectively implemented across the industry.

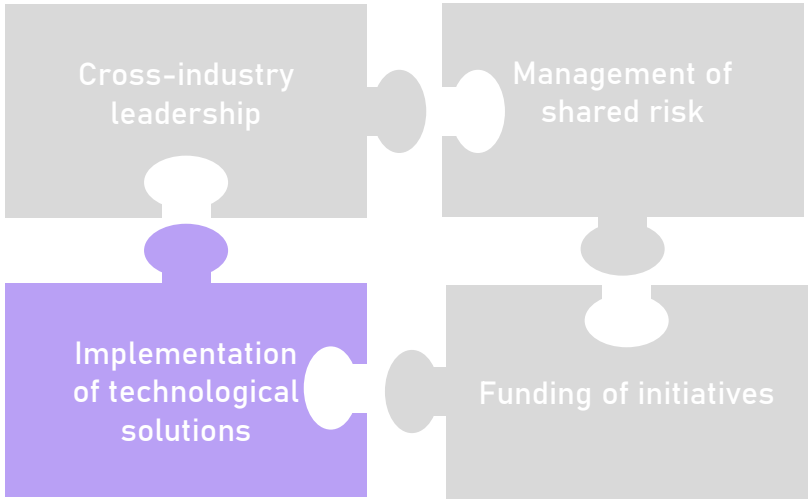
Lessons and experience from pathfinders of ETCS implementation will enable programmes to deploy design, development, and installation resources more efficiently. This will result in reduced fitment costs.

The Control Command and Signalling National Technical Specification Notice (CCS NTSN) provides technical information on the features that are required to ensure compatibility between different CCS systems and the key interfaces needed between equipment on the train and equipment fitted to the infrastructure.

This includes a national requirement to implement ETCS when installing the train protection part of a CCS subsystem for the first time or when upgrading the train protection part of a CCS subsystem already in service, where upgrading changes the functions or the performance of the subsystem.

The law, through the Railways (Interoperability) Regulations 2011, requires that all new vehicles and high-speed infrastructure will need to be fitted with ETCS. This includes where an upgrade or renewal is made to the train protection element of the subsystem.

A high-speed line, in relation to the CCS NTSN, is defined within GEGN8611 Issue One '*Guidance on the Application of the Control Command and Signalling TSI*' guidance note.



RAIL SAFETY AND STANDARDS BOARD

Action:

Explore and invest in innovative train protection solutions which have capabilities beyond that of TPWS and support the implementation of cost-effective and efficient technologies.

RAIL SAFETY AND STANDARDS BOARD

Through our collective action, we can positively boost the safety and efficiency of the GB mainline network by implementing innovative train protection systems.

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