



Optimised train operations

GOALS	WHY?	STATUS IN 2024	STEPPING STONES OVER THE NEXT 5 TO 8 YEARS				VISION FOR 2040
Infrastructure and train capabilities to overcome capacity constraints 1	<p>There is the need to cater for reliable high-frequency services on parts of the network where capacity is constrained either because of headway lengths or bottlenecks at nodes.</p> <p>In progressing the roll-out of digital signalling, there is an opportunity to extract early value from this investment.</p>	<p>ETCS is being implemented on the southern section of the East Coast Main Line and on the Transpennine Route Upgrade, with planned further expansion on the West Coast, Midlands, and Brighton Mainlines.</p> <p>New rolling stock is increasingly equipped to support in-cab signalling, and CP7 will see ETCS fitment across fleets ramping up. Nationwide deployment of the infrastructure supporting these advanced systems remains a long-term plan, therefore in many locations train capabilities won't be fully exploited for some time.</p>	<p>Plan the migration to Automatic Train Operation (Grade Of Automation 2) including accelerating the introduction of targeted aspects of automation in train operations to improve system reliability and capacity (for example by implementing ABD0, CSDE and C-DAS).</p> <p>Keep a watching brief on the development in Europe's Rail toward Automatic Train Operation (Grade Of Automation 4).</p> <p>Adopt improved methodology for train planning rules to exploit ETCS. 1,4</p> <p>Remain involved in the System Pillar of the Europe's Rail Joint Undertaking (EU-Rail) which is set to deliver a unified operational concept and a functional, safe and secure CCS system architecture. 1,2</p> <p>Update the long-term deployment plan for ETCS.</p> <p>Undertake analysis at key bottlenecks to prioritise specific, targeted improvements to existing signalling designs to enable capacity enhancements.</p>				<p>Capacity constraints have been overcome in effective and efficient ways.</p>
Simpler and safer real-time operations and decisions 2	<p>A simpler-to-operate railway enables better and safer service delivery at lower cost.</p> <p>Short-term solutions to improve and support operational tasks and decisions exist. The migration to new solutions, including digital signalling, must not add complexity and risks, and must strive to deliver early benefits.</p>	<p>Traffic Management has been deployed on the Western Route to minimise service disruption, provide accurate passenger information, and enhance operational performance.</p> <p>The deployment of C-DAS has seen limited progress due to challenges around the complexity of integrating the various systems required for its operation.</p> <p>Technical solutions to enable more informed and / or automatic interventions have started to be explored; for example, in the space of speed control and AI-powered review of safety-critical communications.</p>	<p>Develop and deploy solutions to make full use of operational data to generate and share insights, feedback and learning opportunities for front-line staff (for example automated indicators for driver performance, automated review of safety critical communication). 2,3</p> <p>Develop, test and introduce alternatives to the traditional approach to pilot working in degraded conditions so that this can be deployed faster and more effectively following an incident.</p> <p>Fully deploy and continue to improve data-driven, risk-based approaches to the introduction and removal of speed restrictions to minimise performance impact without compromising safety. 2,3</p> <p>Improve data and insights available to staff in Control rooms to better understand issues (such as loading data, or front-facing CCTV).</p> <p>Improve and make greater use of decision-support tools and dynamic risk assessments to enable continuation of train movements and minimisation of service stoppages or restrictions.</p> <p>Develop and assess solutions to augment staff competency during, and in preparation for disruptions.</p> <p>Develop predictive modelling capabilities powered / strengthened by AI to inform near real-time service recovery interventions by Control.</p>				<p>Operational tasks and decisions are optimised and automated through technology that makes the rail system easier to operate with customers at its core.</p>
Improved recovery from incidents and disruptions 3	<p>The ability of staff in Control and on the ground to safely, effectively and quickly manage and recover from incidents and disruptive events is critical to limiting disruption to customers.</p> <p>This requires a combination of new technologies and changes in current processes.</p>	<p>Recovery from incidents and disruptions remains a challenge across the network. High-profile incidents have raised questions about how to improve operational decision making in these challenging circumstances.</p> <p>The Industry Train Service Recovery (ITSR) framework has been rolled out across control centres and provides a common approach to incident recovery within Control.</p> <p>Setting up degraded working procedures continues to take time and, once in place, these significantly reduce the throughput of trains.</p>	<p>Strengthen links between train planning and traffic management systems to move towards seamless integration that reduces task duplication and shortens communication chains. 2,3,4</p>				<p>Rapid recovery from disruptions that minimise the adverse effects on railway customers is routinely achieved.</p>
Reliable and flexible train planning 4	<p>Timetabling plays an essential role in making the most of existing network capabilities and delivering a reliable railway.</p> <p>Having easier, agile and robust ways to change and add train paths allows greater responsiveness to changes in network availability, and in passenger and freight demand.</p>	<p>The timetable remains based on train planning rules (TPR) and contingency within them to deliver timetable resilience limits capacity, particularly at nodes.</p> <p>Demonstrators to make 'very short-term planning' processes less manual and more robust using a 'track section occupancy' approach have been developed. These techniques could also be used to achieve seamlessness between 'very short-term planning' and 'short-term planning', and be applied earlier in the planning cycle.</p>	<p>Establish clear and formal links between long and short-term asset planning (infrastructure and rolling stock) and timetabling to ensure the capacity needed is built and existing capacity is exploited. 1,4</p> <p>Progress toward the adoption of the demonstrators created to deliver greater automation and shorten the timescales when adding / changing train paths at 'short' and 'very short' notice. 1,4</p> <p>Review the need and rationale for the boundaries between 'short-term planning' and 'very short-term planning'.</p> <p>Develop and demonstrate options for smart management of power supply and demand during train planning and real-time operations with the aim to accommodate the maximum number of electrically powered journeys within the capability of the power supply. 1,2,3,4 Low emissions</p> <p>Establish common reference data for train crew availability, to underpin increased integration between traffic management and stock and crew. 2,3,4</p> <p>Improve insights on actual usage of allocated train paths and their associated value.</p> <p>Improve insights on actual usage of possessions.</p>				<p>Underpinned by greater automation and use of data, timetabling and train planning optimise the use of the network in a flexible and reliable way.</p>
More affordable solutions for lower-use lines 5	<p>The long-term viability of lines with low traffic is at risk. Their future economic sustainability requires reducing capital and operational costs, while offering safe, reliable services.</p>	<p>Radio Electronic Token Block (RETB) has been enhanced on the Far North line to enhance asset reliability and functionality.</p> <p>New low-cost systems are being developed for light rail and lower-use lines.</p>	<p>Explore new solutions to extend the life of conventional signalling on branch lines.</p> <p>Assess enhancements made to RETB in Scotland to understand the case for similar solutions on low-volume traffic routes, enabling the removal of conventional signalling.</p> <p>Establish sets of requirements for signalling solutions on lower-use lines which can drive down costs and deployment time.</p> <p>Explore solutions for co-existence of different types of rail vehicles and operations.</p> <p>Keep a watching brief on the regional railway system demonstrator (Europe's rail FA6) to consider the insights generated in a timely fashion.</p>				<p>Lower-use lines are affordable to serve their societal and feeder function to the main rail network.</p>