



*Hands-on railway experience,
world class consultancy skills*

Australia



We know how to run a railway because we do it every day

Network Rail

Network Rail owns and operates Britain's rail infrastructure network – one of the world's most intensively used rail networks. Our network is the fifth busiest rail network in the world and the second busiest in Europe. We:

- ▶ Provide a safe and efficient national railway network that carries over 1.8 billion passenger journeys, 16.6 billion tonne kilometres of freight and 7 million train movements every year;
- ▶ Own, maintain and operate 20,000 miles of track, 30,000 bridges, tunnels and embankments and thousands of signals;
- ▶ Operate 20 major stations which handle 800 million passenger journeys and own 2,500 other stations, which are leased to train operators;
- ▶ Employ 42,000 people in asset management, operations, maintenance, renewals, and enhancement projects; and
- ▶ Have an annual turnover of over £8bn, with capital expenditure of over £5bn per annum.

Network Rail Consulting

Network Rail shares its expertise with the world's rail owners and operators through Network Rail Consulting (NRC). We understand the institutional, regulatory, technical, policy and strategic issues of running a railway in the 21st century. We know how to operate a network, manage its assets, and deliver renewal and enhancement programs whilst minimising the disruption to passenger and freight services.

What makes us different from other consultants is that our people have genuine hands-on experience in solving the challenges you face in the real world of rail operations. We are rail professionals operating and maintaining one of the world's leading railway systems who want to share their expertise, experience, and passion for the job.

We have been active in the Australian, the Middle East and North American markets since 2013 and have successfully delivered more than 150 consultancy contracts for government, public and privately owned organisations, and for passenger and freight owners and operators, achieving consistently excellent levels of client satisfaction.

Our advice covers the full range of the project life cycle, from concept, project development and delivery through to operations and maintenance.

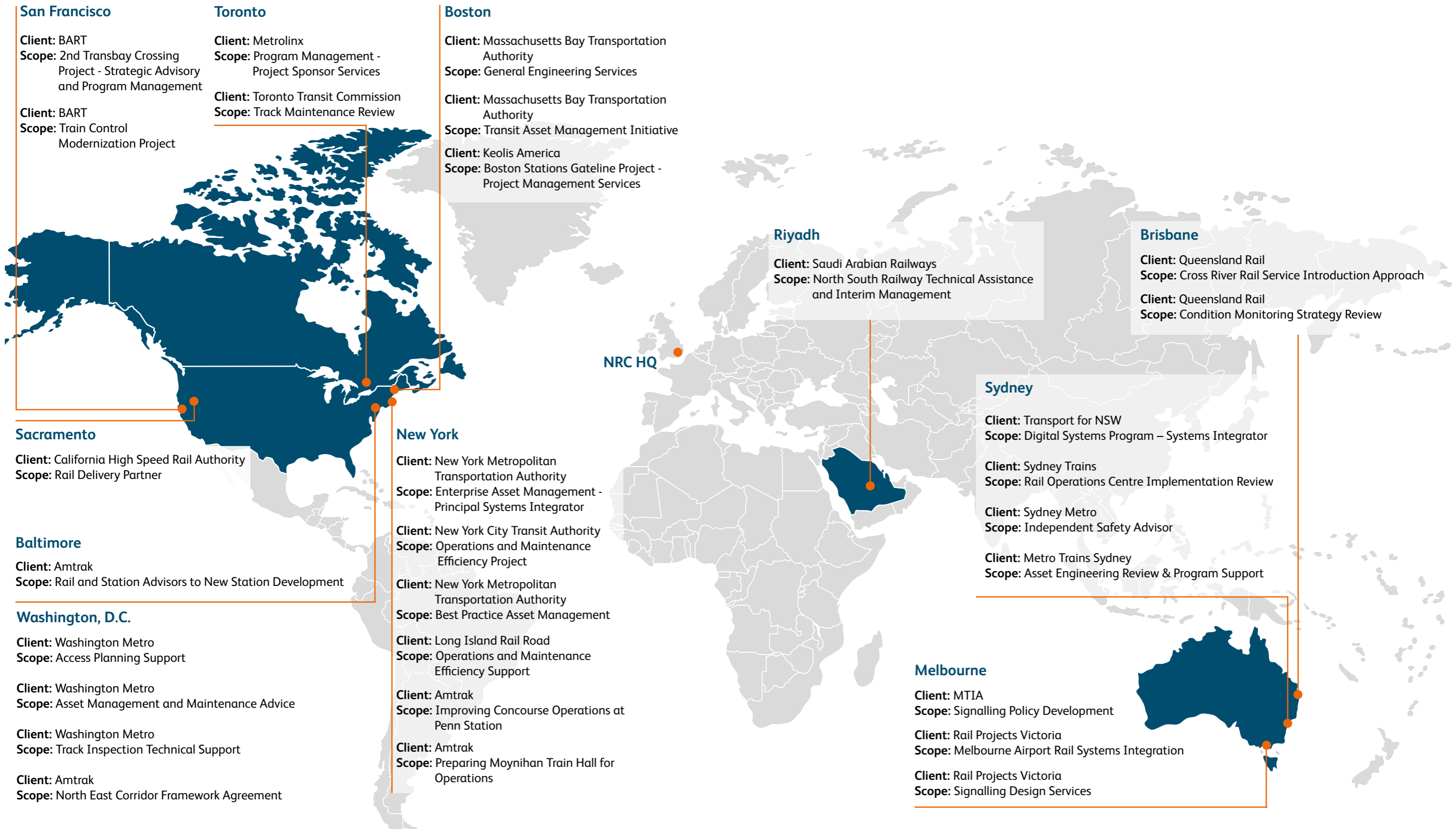
Network Rail Consulting in Australia

We have been active in the Australian market since 2013 and have successfully delivered more than 70 consultancy contracts across Australia, from the East Coast to Western Australia, for public and privately owned companies and for passenger and freight owners and operators.

In Australia, we are leaders in the roll-out of the latest digital train control systems and at helping clients navigate the complexities of integrating new systems with legacy infrastructure. We also have a strong track record of providing advisory, project and program management, rail operations, maintenance and asset management advice to passenger and freight operators.

Whilst our unique selling point is our access to Network Rail's expertise in the UK, we are committed to developing our local Australian workforce through a structured training and development program using Network Rail's award-winning training capability. We are committed to improving the diversity in our workforce, both Aboriginal and Torres Strait Islander peoples and other culturally and linguistically diverse people, to enhance our delivery. This will ensure that we continue to provide our clients with leading edge technical and management advice delivered by a blend of Australian and British experts. Network Rail Consulting acknowledges the Traditional Owners of Country throughout Australia. We pay our respects to Elders past and present.

Network Rail Consulting Around the World



Advisory and Strategic Planning

We can advise national and regional governments, rail infrastructure owners and operators and funding agencies on the best way to structure, set up and run rail services. Unlike many traditional consultants, our people have hands-on railway experience. We don't base our analysis and recommendations on how railways behave purely in theory. Instead, we use our understanding of the theory combined with our knowledge of what actually happens in practice. Our expertise extends across the strategic spectrum, to cover aspects such as industry re-structuring, change management, business planning and strategy development building on our experience of transforming Britain's rail system to become a world leader in safety, performance and efficiency over the past 15 years.

We can also help with rail service franchising (including bidding, specification and evaluation), station planning, demand and revenue forecasting, creation and negotiation of access agreements, network code

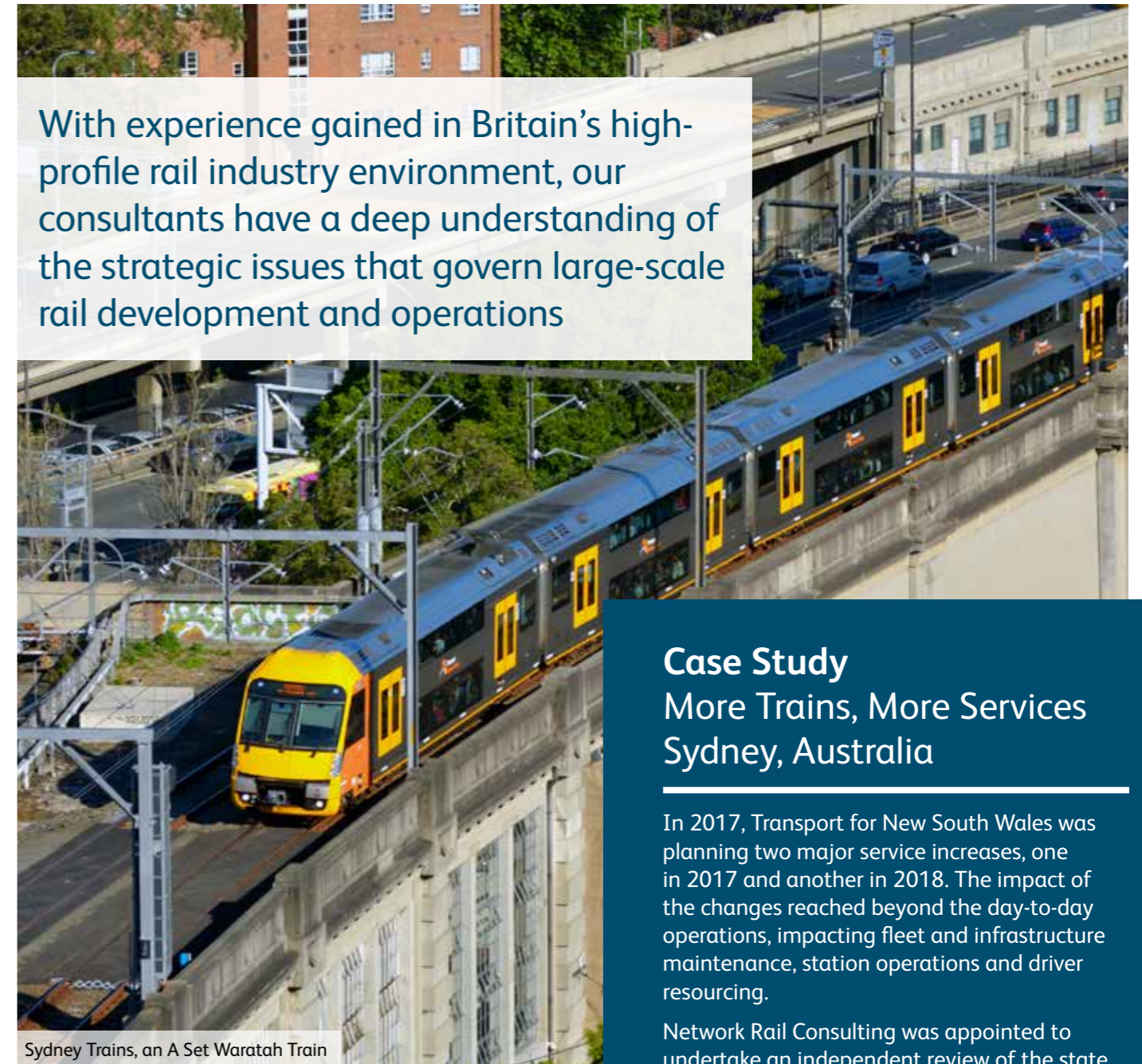
(access conditions), customer satisfaction monitoring and train performance improvement plans.

By auditing your procurement processes we can identify potential savings and work with you to implement a transparent, non-discriminatory sourcing system which complies with international best practice. We can help you set up partnering alliances with major suppliers and sustain best practice.

Benchmarking against comparable rail organisations in other countries is one of the best ways to assess the management and operations of railway systems. Our consultants are experienced in organisational change and transformation management in the rail industry. This expertise can add value if you need to implement change to improve financial performance.



Sydney Central Station



Sydney Trains, an A Set Waratah Train

With experience gained in Britain's high-profile rail industry environment, our consultants have a deep understanding of the strategic issues that govern large-scale rail development and operations

Case Study More Trains, More Services Sydney, Australia

In 2017, Transport for New South Wales was planning two major service increases, one in 2017 and another in 2018. The impact of the changes reached beyond the day-to-day operations, impacting fleet and infrastructure maintenance, station operations and driver resourcing.

Network Rail Consulting was appointed to undertake an independent review of the state of readiness for these service increases and make recommendations to Transport for New South Wales. We interviewed over 30 groups to ascertain whether all of the areas impacted by the change were adequately prepared and risks to the implementation of the program had been suitably considered and mitigated. Our findings were used to give assurance to the Deputy Secretary regarding readiness for the new services.

Project and Program Management

Legacy rail networks designed for a different era present their owners and operators with major constraints to modernisation, as we know only too well. Sometimes it's possible to make marginal system improvements, but eventually the time comes to make the big decisions.

We have successfully delivered a number of large-scale projects such as London Bridge station and creating new infrastructure that links seamlessly into the existing network such as London's Crossrail Project. Every year, our team carries out thousands of enhancements to our track, bridges, tunnels, buildings & civils, signalling, power & electrification and telecommunications network.

Our network is heavily used, so its essential to limit the disruption to train services. Works are largely undertaken during night and weekend possessions, and during holiday periods, leaving weekdays largely unaffected. The planning for these possession periods

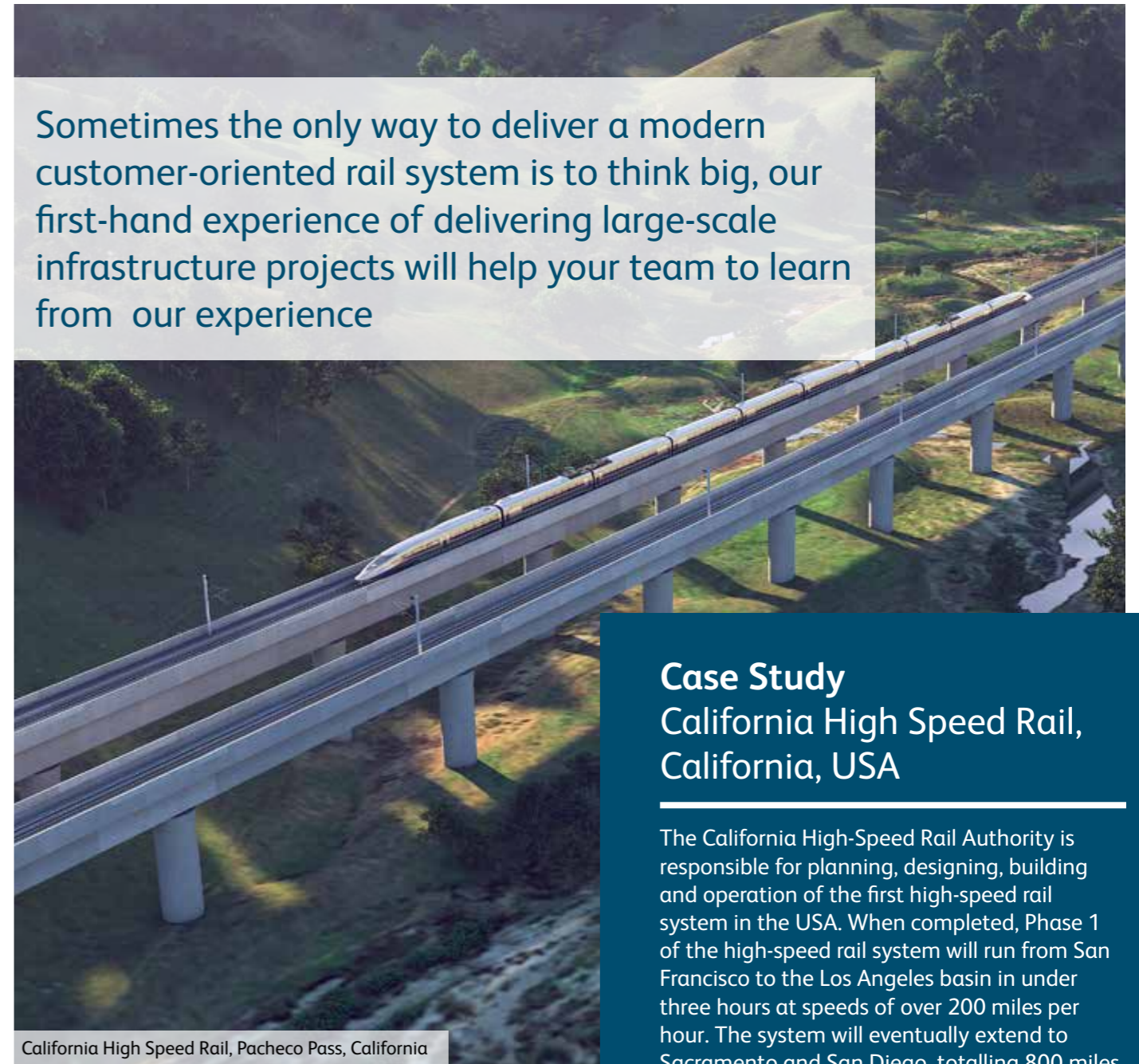
is highly complex, requiring close project management. We have been very successful at maintaining services through optimising train paths whilst keeping our customers informed about disruptions.

Unlike some other consultants, we are experienced in operating in a safety-critical environment with multiple stakeholders, within a complex regulatory regime, delivering mega projects on time and within budget.

We can provide you with an integrated team who will manage the planning, design, procurement, construction, operations and maintenance of your projects. Our focus is always on safely completing projects on time and within budget to deliver an enhanced service to customers.



Commuter Trains Flinders Street Station to Richmond Station Section, Melbourne CBD



Sometimes the only way to deliver a modern customer-oriented rail system is to think big, our first-hand experience of delivering large-scale infrastructure projects will help your team to learn from our experience

Case Study California High Speed Rail, California, USA

The California High-Speed Rail Authority is responsible for planning, designing, building and operation of the first high-speed rail system in the USA. When completed, Phase 1 of the high-speed rail system will run from San Francisco to the Los Angeles basin in under three hours at speeds of over 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totalling 800 miles with up to 24 stations.

As part of the Rail Delivery Partner consultancy team, our Sacramento office is proposing standards for operations and maintenance, proof of concept operations, assisting the client in selecting a preferred bidder for different stages of the project and providing systems integration for the holistic engineering elements of the project.

Systems Integration

Technology is enabling huge improvements in the efficiency and capacity of railway networks, but it brings with it significant challenges in specification, design, implementation and delivery of the benefits for which it was purchased.

Railway technology projects frequently involve multiple suppliers and interact with multiple parts of the railway system and the railway company's organisation across complex interfaces. Realising the benefits of new technology often involves wholesale changes to the operation of the railway, affecting everything from long-term service planning to delivery of operations on the day. The roles and responsibilities of individuals are affected, with some tasks no longer required and the need for new roles to be specified.

Making the different elements of the technology work together, and more importantly, to work with your railway organisation to deliver the service you want, requires a combination of expertise, experience

and formal techniques. Whether it is operational performance modelling to disaggregate the reliability requirements of the engineering components of a new system, or an assessment of the degraded mode operating scenarios and how the technology and the people will operate under them, we have both the tools and the experience to help you set and manage your requirements.

As well as practitioners of systems engineering, we can add subject matter experts in areas such as operating rules, signalling principles and reliability engineering, who will work together so that your project will provide the benefits you set out to achieve.



Rail technology projects are more complex than ever before and therefore delivering successful technology projects requires a combination of know-how, experience and formal methods

Case Study Supporting Digital Railway, Sydney, Australia

The Digital Systems project in Sydney is part of the More Trains, More Services program to dramatically increase the capacity of the Sydney Trains network to accommodate anticipated passenger growth by 2030. The Digital Systems program is focused on investing circa A\$800m in the implementation of ETCS level 2 digital signaling and Traffic Management, together with associated upgrades to the train Onboard units, Digital Train Radio System (DTRS) and Fixed Telecoms Network (FTN). The program is being delivered by Transport for New South Wales on behalf of Sydney Trains, who will be the end user and operator.

Network Rail Consulting was appointed as Digital Systems Integrator in 2018 and is responsible for the system specification, system integration, system assurance, system integration testing and technical oversight of the program.

Rail Operations

We run one of the busiest and fastest-growing rail systems in the world. And, despite the pressures of managing a bustling system in a turbulent real-world operating environment, we've succeeded in increasing capacity, enhancing safety and providing a better service for customers and staff alike.

Experience of the latest systems and operational practices gives us a unique perspective on how a modern railway can function. Our consultants can work with your people or as external experts to review the current status of your operations and develop strategies for optimising services.

We are currently creating a new control system for the British network, based on 12 new control centres. This will replace legacy signalling systems, some of which date back to the pre-war era.

The experience we have gained during major upgrades means that we can help you to plan, develop and safely integrate new signalling centres into your network.

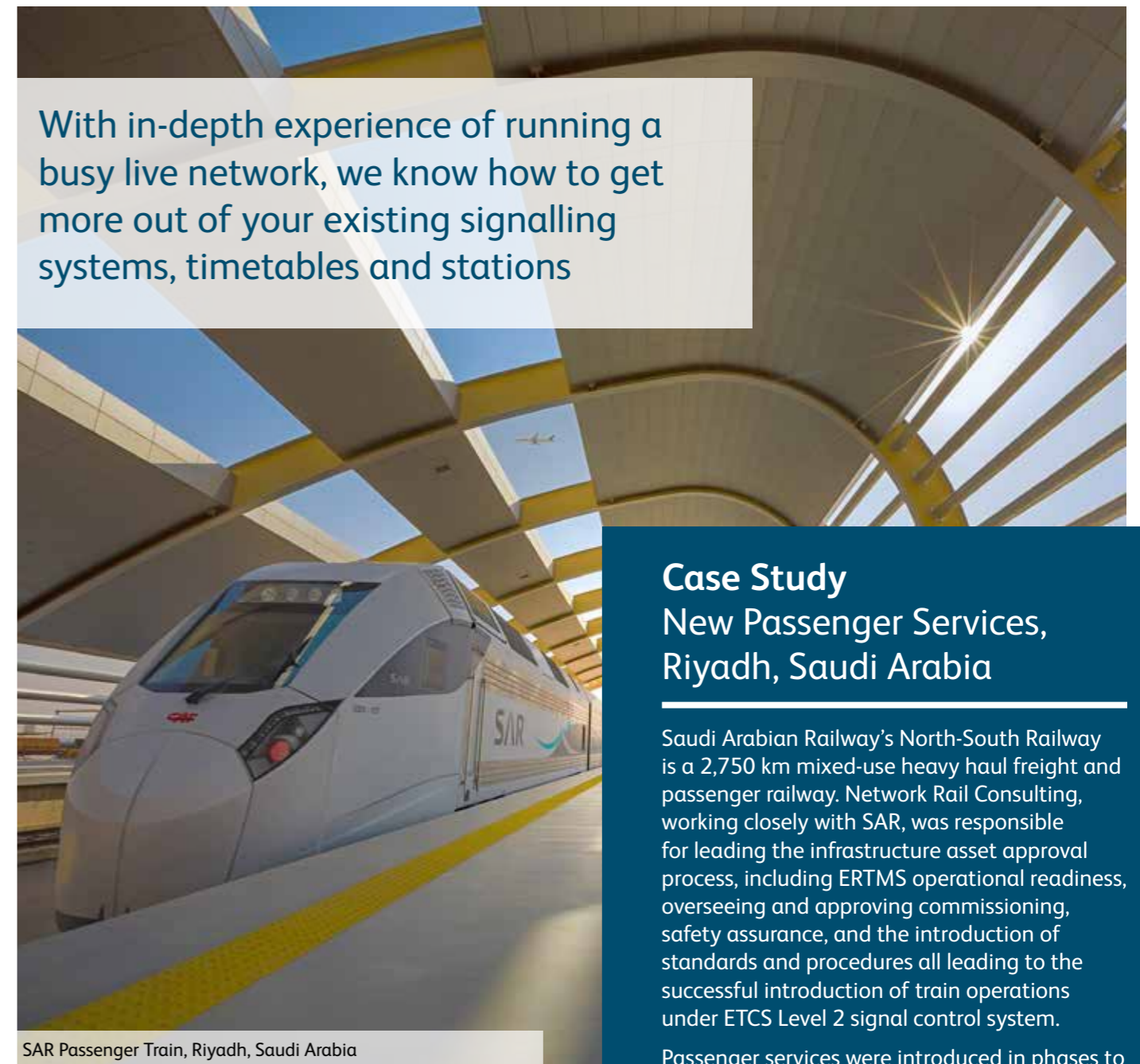
We have developed a suite of modelling services that will enable you to analyse timetable efficiency and predict the impact of service disruptions. They enable us to advise you on the best ways to accommodate train services without sacrificing the performance of the network. These tools are in daily use as we work with Britain's train-operating companies to review their proposed service patterns.

By applying modern operating techniques, we have been able to run more trains on a smaller network, reduce operating costs, increase passenger numbers, reduce track closure times, extend component/system life and achieve better integration of technology, without compromising on safety.

Our experts have been at the forefront of this work, and we can help you to transition from inefficient practices, using modern technology and processes to drive performance improvements and cost savings.



Network Rail Control Room



SAR Passenger Train, Riyadh, Saudi Arabia

With in-depth experience of running a busy live network, we know how to get more out of your existing signalling systems, timetables and stations

Case Study New Passenger Services, Riyadh, Saudi Arabia

Saudi Arabian Railway's North-South Railway is a 2,750 km mixed-use heavy haul freight and passenger railway. Network Rail Consulting, working closely with SAR, was responsible for leading the infrastructure asset approval process, including ERTMS operational readiness, overseeing and approving commissioning, safety assurance, and the introduction of standards and procedures all leading to the successful introduction of train operations under ETCS Level 2 signal control system.

Passenger services were introduced in phases to aid commissioning of the longest ERTMS Level 2 system in the world. In phase one, services ran from Riyadh station to the regional city of Al Qassim with a journey time of 2h 30min; phase two introduced services to Ha'il some 650 km north of Riyadh with a journey time of under 4 hours; and phase three we introduced overnight passenger services to Al Jouf some 920 km north of Riyadh with a journey time of 8 hours.

Maintenance

Whether you are looking to reduce maintenance costs, are constrained by limited rail corridor access or you want to get better reliability without spending more, we have the tools, techniques and experience to help advance your maintenance regime design.

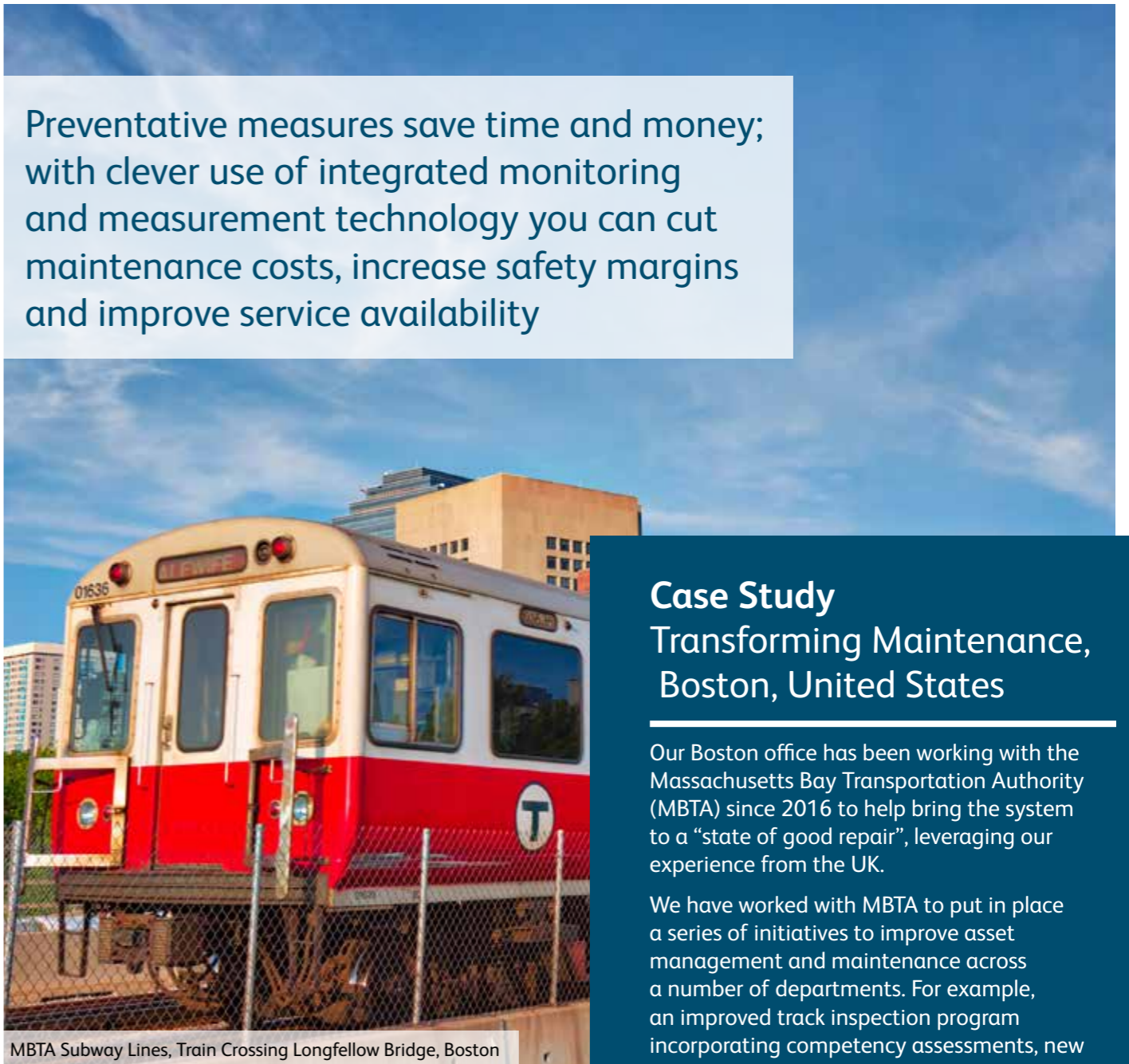
Reliability Centred Maintenance can help you optimise your maintenance, spending more time on tasks that drive reliability and less time doing tasks that add little value. With Risk Based Maintenance, you can evolve to build your maintenance plan to concentrate effort on those assets that have the biggest impact on your operation.

Technologies such as Automated Inspection and Remote Condition Monitoring can help you spot defects before they impact train services, allowing you time to plan an effective repair, saving you downtime and reducing your unplanned corridor access, meaning your staff can undertake the work more safely.

Network Rail has two decades of history not just in the technical aspects of advanced maintenance, but also in implementing changes in a unionised work environment. Our Plain Line Pattern Recognition Technology regularly inspects 4,800 miles of track, removing the need for staff to walk the line. Our Remote Condition Technology monitors over 40,000 assets from switches and track circuits to power supplies and rail temperatures and has resulted in fewer delays to train services saving millions of pounds in performance penalties. Network Rail Consulting has undertaken projects worldwide sharing our experience and helping railways like yours to deliver more effective and efficient maintenance.



Rail Track Maintenance Worker



MBTA Subway Lines, Train Crossing Longfellow Bridge, Boston

Preventative measures save time and money; with clever use of integrated monitoring and measurement technology you can cut maintenance costs, increase safety margins and improve service availability

Case Study Transforming Maintenance, Boston, United States

Our Boston office has been working with the Massachusetts Bay Transportation Authority (MBTA) since 2016 to help bring the system to a “state of good repair”, leveraging our experience from the UK.

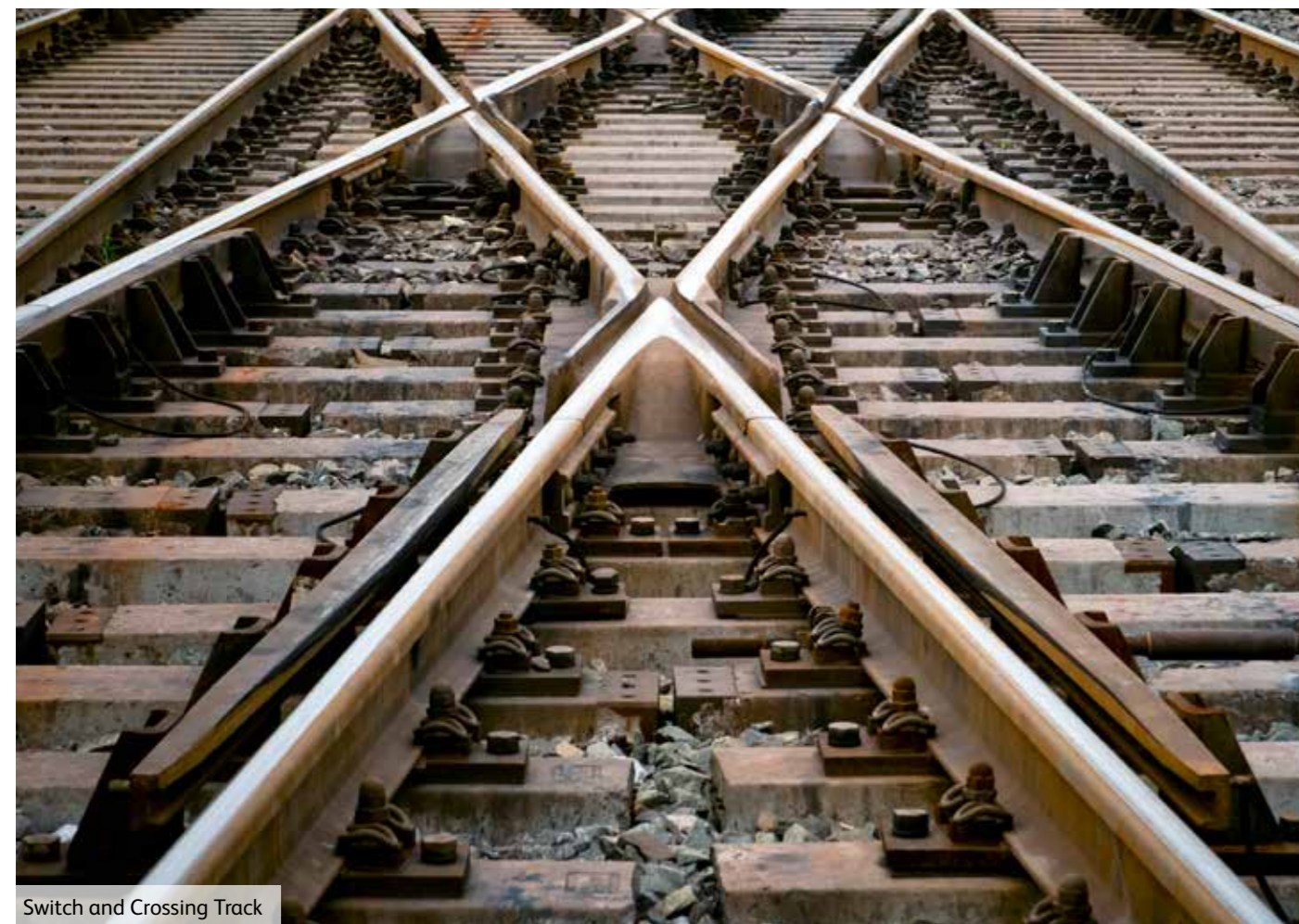
We have worked with MBTA to put in place a series of initiatives to improve asset management and maintenance across a number of departments. For example, an improved track inspection program incorporating competency assessments, new guidelines, dashboards, training videos and a mentoring program has resulted in a 77% reduction in track-caused speed restrictions over a three-year period. By working side-by-side with track supervisors to improve track maintenance management and assurance of track repair work, we have also helped MBTA reduce the number of critical track defects, improve asset condition towards a state of good repair and reduce the risk of derailments.

Asset Management

It's easy to underestimate the importance of asset management in railway operations. For many years, asset management amounted to little more than fixing things when they broke.

But our experience in renewing an entire national network has shown that a carefully planned and managed approach pays big dividends in reduced costs, improved service and increased passenger numbers.

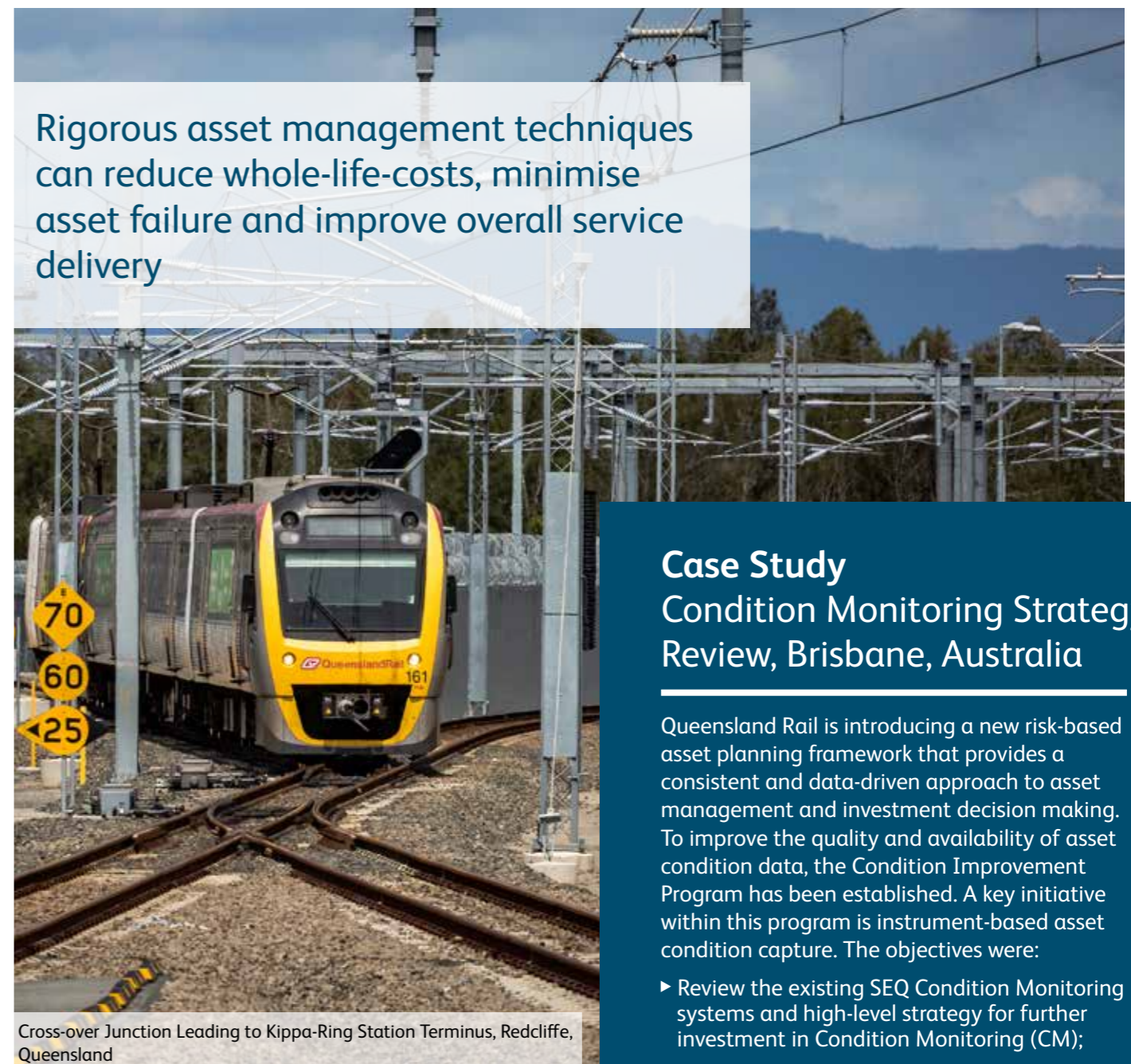
This systematic approach has made us world leaders in developing and applying integrated tools and techniques to monitor and manage rail assets. The route from asset management theory to practice is a long one and it encompasses every part of the organisation from IT and HR to finance and operations as well as the traditional engineering disciplines. We have been independently assessed as one of the most mature asset management organisations in the rail sector and in the top quartile across all the asset-based utility sectors.



Switch and Crossing Track

We have made marked improvements in our own asset management through an integrated program of enabling mechanisms. These include improvements to asset data specifications and capture, decision support tools, investment in people and competencies, integrated processes, asset policies, strategic asset management planning, reliability modelling and whole life cost tools which evaluate the trade-off between cost, performance and risk.

We can help you understand your own asset management maturity, using internationally recognised assessment models. From there we can help you develop a roadmap to deliver the benefits that good asset management brings. Most importantly, we can bring you practical, implementable solutions based on our extensive experience.



Cross-over Junction Leading to Kippa-Ring Station Terminus, Redcliffe, Queensland

Rigorous asset management techniques can reduce whole-life-costs, minimise asset failure and improve overall service delivery

Case Study Condition Monitoring Strategy Review, Brisbane, Australia

Queensland Rail is introducing a new risk-based asset planning framework that provides a consistent and data-driven approach to asset management and investment decision making. To improve the quality and availability of asset condition data, the Condition Improvement Program has been established. A key initiative within this program is instrument-based asset condition capture. The objectives were:

- ▶ Review the existing SEQ Condition Monitoring systems and high-level strategy for further investment in Condition Monitoring (CM);
- ▶ Benchmark the maturity of SEQ's existing CM systems with other railways;
- ▶ Document the recommended future state of CM systems within SEQ;
- ▶ Produce high-level cost and time estimates to implement the recommended future state and identify the expected benefits; and
- ▶ Identify process and practice changes required to realise the full benefits of the future state implementation.

Local presence - international expertise

Our approach is to provide the right blend of international best practice coupled with Australian rail experts who are familiar with Australian operating, regulatory and political context, so that we provide advice that is appropriate and implementable for local circumstances. We draw our core expertise from Network Rail, the owner and operator of Britain's rail infrastructure. Together with locally based experts in Australia a key part of our offer is our ability to reach back to our colleagues in the UK to access the latest advice, get access to world class expertise and provide additional technical resources during periods of peak workload demands.

Our Australian team is able to provide rail owners and operators a wide range of advice covering:

Advisory

- ▶ Assurance
- ▶ Auditing & Due Diligence
- ▶ Benchmarking
- ▶ Change & Transformation Management
- ▶ Fares and Pricing Strategy
- ▶ Funding
- ▶ Institutional Advice
- ▶ Performance Regime Design and Management
- ▶ Policy Development & Advice
- ▶ Procurement Advice
- ▶ Rail Franchising
- ▶ Station Retail Concession Optimisation
- ▶ Training & Competence Management

Strategic Planning

- ▶ Business Cases including CBA
- ▶ Business Planning
- ▶ Demand and Revenue Forecasting
- ▶ Pedestrian Planning & Modelling
- ▶ Route Utilisation Strategies
- ▶ Transport Policy

Major Projects

- ▶ Independent Safety Assurance
- ▶ Option Appraisal
- ▶ Project & Programme Management
- ▶ Project Development & Feasibility (GRIP 1-4)
- ▶ Project Safety & Assurance
- ▶ Project Sponsorship
- ▶ System Integration
- ▶ Technical Services

Rail Operations

- ▶ Access Planning & Optimisation
- ▶ Commercial & Operational Management
- ▶ Interim Management
- ▶ Safety Reviews
- ▶ Timetable Assurance Services
- ▶ Train Planning & Modelling

Asset Management & Maintenance

- ▶ Asset Management Assessment
- ▶ Enterprise Asset Management Development
- ▶ Infrastructure Reliability Management
- ▶ Maintenance Reviews
- ▶ Remote Condition Monitoring
- ▶ Risk Based Maintenance
- ▶ Route Asset Management Plan Development
- ▶ Standards Review & Development



International Presence

- ▶ *Boston*
- ▶ *Melbourne*
- ▶ *Sacramento*
- ▶ *Toronto*
- ▶ *Brisbane*
- ▶ *New York*
- ▶ *San Francisco*
- ▶ *Washington, D.C.*
- ▶ *London*
- ▶ *Riyadh*
- ▶ *Sydney*

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