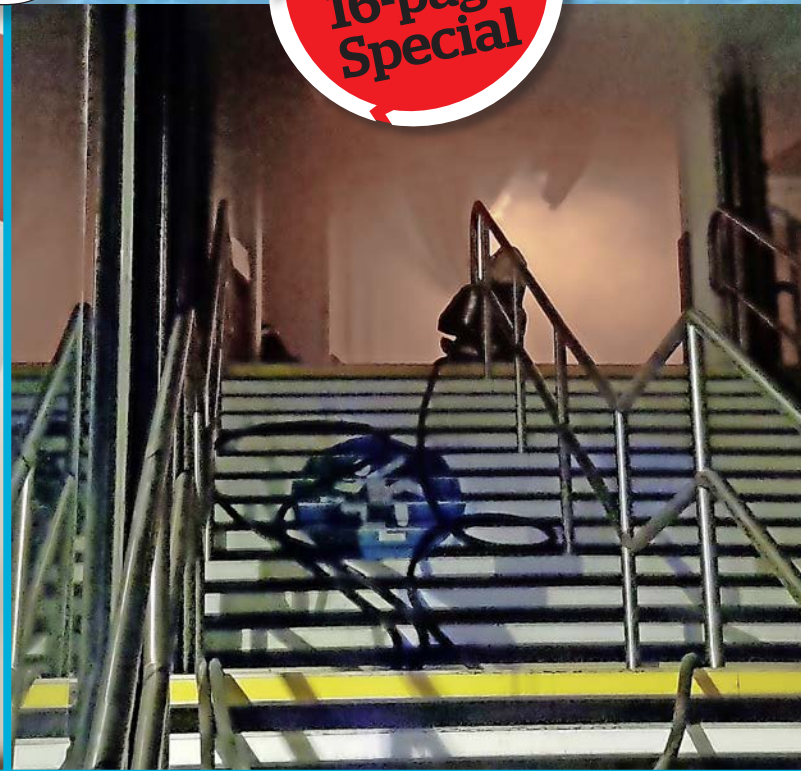


IN PARTNERSHIP WITH **RAIL**

# Collaboration & Skills

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**HS2**

## Skills, Employment and Education Strategy

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## Collaboration & Skills



PAUL BIGLAND

## Welcome

Welcome to this 16-page special on skills and collaboration, which have become not merely corporate buzzwords but two of the most critical challenges facing the industry over the next decade and beyond.

With main construction works due to commence on HS2 within the next 12 months and record levels of renewals work currently being procured by Network Rail for Control Period 6 (April 2019-March 2024), more integrated working is increasingly being seen by infrastructure clients and the supply chain as the only means to meet this increased demand, while also delivering better value for money.

Meanwhile, a five-figure skills gap still threatens the viability of these work programmes unless industry-wide and carefully co-ordinated recruitment drives can continue to gather momentum.

Published on September 13, details of HS2 Ltd's own *Skills, Education and Employment Strategy* are available on p46-47, including how Europe's largest construction project will mobilise 30,000 workers by 2022.

All parts of the supply chain that secure contracts on HS2 will be required to work in partnership to support this strategy by attracting greater numbers of school leavers and graduates into the sector, while also widening its appeal to sections of society that have traditionally been underrepresented in UK rail.

This includes whoever is chosen to manufacture a bespoke fleet of high-speed trains for HS2, and you can read on p44-45 why Hitachi and Bombardier believe that their joint bid is best placed to support these

objectives. Elsewhere, software solutions provider 3Squared demonstrates how its entry into the rail sector was born out of close collaborative working, and how it is helping redefine the traditional client-customer relationship (p52-53).

Kier Group also shows how collaboration with its supply chain is being used to deliver improved results for its clients, and how it is attracting new talent to the industry through its highly successful Shaping Your World campaign.

Finally, we celebrate this year's winners of RAIL's National Rail Awards for Major Project of the Year (p50-51) and Outstanding Teamwork (54-56), where effective and efficient team working has not only led to the Crossrail West project being completed on time and within budget, but lives undoubtedly being saved in the case of the Nottingham station fire earlier this year.

**PAUL STEPHEN**  
 Assistant Features Editor, RAIL

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# LEARNING AMBITION

**Hitachi and Bombardier make the case for their joint bid to build the next generation of high-speed trains for HS2, and why it is well placed to support the project's ambitious skills, employment and education objectives**

For any passengers travelling in or out of Birmingham's two city centre stations at New Street or Moor Street, there's tangible evidence that something big is happening.

Hoardings have now been erected and construction workers have started to move onto an adjacent site on Curzon Street, where HS2's new terminus station is due to open with the rest of Phase 1 to London Euston in 2026.

These are not the only developments around Curzon Street, however. Hitachi and Bombardier opened their new joint bid centre in the nearby Millennium Point complex on September 12.

It is from these offices that up to 50 staff, including engineers, designers, skills development and environmental specialists from the two global rail manufacturers are working up proposals to build a new £2.75 billion fleet of high-speed trains for the iconic project (RAIL 858).

The joint bid is one of five shortlisted to HS2 Ltd to take part in the formal tendering process beginning later this year, with a contract award for at least 54 'classic compatible' trains expected in March 2020.

"The decision to locate the Joint Venture (JV) bid centre in Birmingham was taken not only to reflect the city's importance as a hub on the HS2 network, but also to best support the strategic goals set out in HS2 Ltd's *Skills, Employment and Education Strategy* which was



**“We live in such a multicultural society, our workforce should reflect that.”**

**Leanne Lang,  
HR Business Partner, Hitachi Rail**

published on September 13 (see pages 46-47).

The HS2 Strategy document outlines four key objectives for the project which are:

- To leave a lasting skills legacy.
- Create sustainable skills, employment and education opportunities.
- To stimulate interest in STEM subjects in order to encourage new entrants into the rail industry.
- To maximise the project's economic and regenerative potential.

According to Bombardier's Head of Material Solutions & Services Strategy Sarah Reid, the JV is in an unrivalled position to deliver on all these objectives, given the significant respective achievements of the two companies to date.

She says: "We deliver a compelling bid because we can both show a huge amount of evidence of our previous work.

"Being here at Millennium Point places us at the very heart of HS2 and its ambitions, not least because it is part of the campus for Birmingham City University, which is a leading light in the Government's STEM agenda."

With a combined UK operation of over 4,500 people spread across a large number of UK sites, both Bombardier and Hitachi can boast considerable track records in attracting new talent to the industry.

The companies' approaches to securing young talent include partnerships with various further and higher education providers across the UK, including the University Technical Colleges in Derby and South Durham and local schools. They are both also key sponsors of the National College for High Speed Rail campuses in Doncaster and Birmingham.

Impressive results have been delivered, with Hitachi currently having 44 apprentices in the UK while its national apprentice and graduate programme is on course to deliver another 64 by 2020.

With many of these graduating to full-time positions, a total of 94 will be training at several sites, including Hitachi's rolling stock manufacturing facility at Newton Aycliffe and



**Birmingham City Cabinet Member for Transport Waseem Zaffar (centre) stands outside Hitachi and Bombardier's new HS2 joint bid centre at Birmingham Curzon Street with Karen Boswell, MD of Hitachi Rail, and Rob Davies, Bombardier's HS2 bid director. They are flanked by two of the companies' apprentices, Louis and Jaslene. HITACHI/BOMBARDIER.**

depots at Ashford, Stoke Gifford, Swansea, Doncaster and at North Pole in West London by the end of the decade.

Bombardier has a similarly large number of apprentices and graduates, 200 of whom are in current schemes working across its UK operations, while approximately 200 further apprenticeships and graduate positions are forecast to be created over the next two years to support existing projects across the company's sites including the main manufacturing facility at Derby Litchurch Lane.

All participants are actively involved in the company's annual Graduate & Apprenticeship Leadership Conference and are encouraged to engage with peers across the business, meet with senior colleagues and develop innovative ideas, such as efficiency improvements.

Within its 2018 intake, Bombardier has also implemented Higher Apprenticeships for the first time in its engineering function, in order to attract the wider pool of talent that has traditionally fallen foul of the gap between apprentice and graduate levels.



**“This will help create a skills legacy not just at Bombardier but across the whole of the UK.”**

**Nina Atwal, Responsible Business Lead, Bombardier**

Both companies also champion the Trailblazer apprenticeship standard. Trailblazer produces content for courses that is currently being used, while degree-level content is in production.

Nina Atwal, Responsible Business Lead UK for Bombardier, says: "At Bombardier we're looking at having more than 200 new trainees across our UK business by 2020 based on current contracts, which gives you clear visibility of our ongoing commitment.

"These are existing commitments and we will both extend our programmes even further if our HS2 bid is successful.

"To showcase the value of new talent in our organisation we hold a Graduate & Leadership Conference each year, which our trainees are involved in planning and then speaking at to give them maximum 'buy-in'." "This is important because they are our future leaders and this will help create a skills legacy not just at Bombardier but across the whole of the UK as they continue to build their careers.

"This year we added to our offering and recruited at Higher Apprentice level within our Engineering function. Whichever level apprentices choose they are all allocated a mentor for their wellbeing and development throughout their career. It isn't just about bringing in people but nurturing and growing them, giving them a sustainable career path."

Having a sustainable workforce is of equal importance to Hitachi and Bombardier, who both work closely with customers and charities to provide training and employment opportunities to groups in society that have, historically, been underrepresented in the rail industry.

For example, Bombardier recently

collaborated with Transport for London on a Women in Transport programme to offer five work placements at its London depots where female applicants were selected for their passion and proactivity, despite having no previous experience of rail.

Hitachi has run a number of targeted women's days at Newton Aycliffe which has generated multiple successful candidates.

The company's 2018 graduate intake featured more females than males for the first time. Hitachi HR Business Partner, Leanne Lang says: "We believe this was a result of using bespoke attraction methods such as a marketing app, which allowed us to promote our opportunities more widely and enable increased inclusivity. This resulted in seven times the number of applications from the year before, and in turn the number of female applicants."

Adding to the large amount of external recognition received by the two companies, Hitachi Rail Managing Director Karen Boswell won RAIL's National Rail Award for Outstanding Personal Contribution in



**“We're moving from finding talent to enabling it as we open up opportunities to all sections of society.”**  
**Sarah Reid, Head of Material Solutions & Services Strategy, Bombardier**

2015, for her own commitment to improving diversity. Bombardier's Sarah Reid is another high-profile figure in industry-wide efforts to increase the number of female entrants, in her role as Vice Chair of networking group Women in Rail for the East Midlands.

She adds: "We're moving from finding talent to enabling it as we open up opportunities to all sections of society. Commitments to recruit certain numbers of apprentices and people from unemployed backgrounds have now become embedded across our organisations, and we're keen to drive that forward."

As part of their commitment to improve in these areas, both companies are identifying Equality, Diversity and Inclusion (EDI) leads to build on progress already made.

Hitachi will also draw upon the lessons learned from a roundtable it held earlier this year with the Skills and Apprenticeship minister Anne Milton, along with industry and education bodies such as the Federation of Small Businesses and the National College of High Speed Rail. The event was held to identify best practice and find tangible ways of creating the dynamic, diverse and highly skilled workforce needed for 21st century opportunities.

Hitachi HR Business Partner Leanne Lang adds: "We live in such a multicultural society, our workforce should reflect that and so we would commit, as a JV, to champion the agenda through an EDI lead.

"We are keen to address the industry skills shortage and ensure we promote our opportunities to all, focusing on awareness and equal access for diverse groups."

Atwal adds: "EDI isn't just a box-ticking exercise for us, we recognise it should flow through everything we do and should be lived through our employees creating an inclusive workplace. We're looking more and more at our practices to champion inclusivity, which is already resulting in an increase in applications from applicants from diverse backgrounds..

Promoting STEM subjects in schools and tackling stereotypes is also recognised by Hitachi and Bombardier as a key mechanism in attracting sufficient numbers of apprentices and graduates to the rail sector.

Both companies actively support schools and colleges with mentorship programmes, by providing STEM ambassadors and by attending careers fairs and open days to help influence young people in their career choices.

Lang says: "We also talk to parents - we believe that changing perceptions of rail starts at home. Parents are often the first role models. We also ensure careers advisors and teaching staff are supported in showcasing our industry to their students and are working towards removing stereotypes."

Atwal adds: "Our partnerships and sponsorship of colleges and organisations such as UTC and NCHSR are not just about funding, they are about getting students and parents involved in order to showcase the great opportunities available to them, and the exciting future that lies ahead with projects such as HS2." ■





# BRITAIN NEEDS TALENT

The construction of HS2 will support 15,000 jobs in the engineering, design and building sectors by 2020, rising to 30,000 just two years later. That is according to the HS2 Skills, Employment and Education Strategy (SEES), which was published on September 13.

The document confirms that with construction on Phase 1 between Birmingham and London due to begin next year, the project is already supporting some 7,000 roles at more than 2,000 businesses which have won contracts with HS2 Ltd.

This includes 100 apprentices, a figure that's expected to rise to 2,000 over the project's lifetime between now and when Phase 2 is scheduled to open in 2033.

But behind these headline numbers it is important to note that labour requirements will not be evenly spread between now and 2033, with a peak of 30,000 being reached in 2022 to coincide with peak construction of Phase 1, and a second peak of 25,000 in 2032 before Phase 2 is wound down for completion.

Meeting these requirements while delivering the project on time and within budget would be a significant logistical challenge for any project, but HS2 Ltd must also contend with the further problem posed by the conflicting demands being placed on the supply chain over the next decade by other flagship infrastructure projects, such as the construction of a new nuclear power station at Hinkley Point B and a third runway at Heathrow Airport.

This is exacerbated further by the well-publicised skills gap in UK construction, with

## HS2 Ltd unveils its programme of skills, employment and education initiatives, to ensure the nation not only has the skills to deliver Europe's largest construction project, but can also become a world leader in high-speed rail

the Chartered Institute of Building reporting that the wider industry will need to find 157,000 new recruits by 2020 in order to satisfy demand.

If no action is taken then this situation will only deteriorate with around a quarter of the UK's rail engineers aged over 55 and due to retire within the next ten years. The rail sector

construction workforce is also one of the least diverse in the UK: only 8.4% of its members are female, with an even lower percentage within senior management and at board level.

Set against this backdrop, the SEES sets out how HS2 Ltd must work with its supply chain, the National College for High Speed Rail and other regional stakeholders to help the next generation develop the skills needed to design and build the £55.7 billion railway, and the project pipeline of other future UK infrastructure.

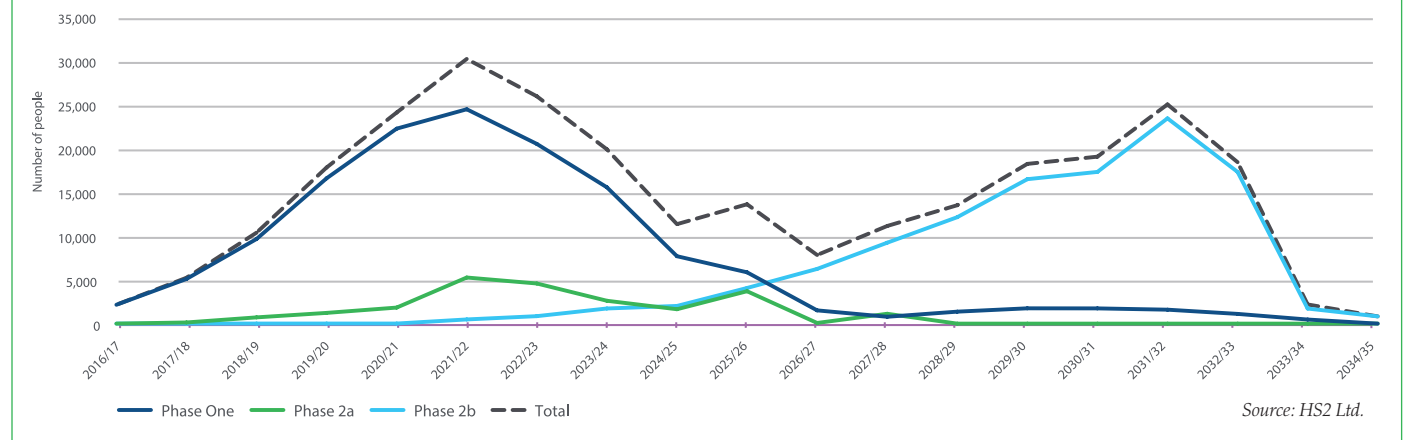
By linking eight of the UK's ten largest cities, the SEES also addresses how HS2 can act as the catalyst for an estimated £92bn in economic benefits while also helping rebalance the national economy away from London and the South East.

Chief Executive of HS2 Ltd Mark Thurston says: "Our skills strategy shows how we will create a sustainable pipeline of jobs and skills for companies across the whole country, which boost regional economies and help Britain compete internationally."

"Our programme will tackle the skills



Construction and rail engineering workforce demand, by phase



Source: HS2 Ltd.

challenges faced by the wider transport infrastructure sector, and ensure the UK has the best skills to deliver HS2, as well as major infrastructure projects in the future."

HS2 Minister Nusrat Ghani MP adds: "HS2 will provide the backbone of our future rail network and is already driving jobs and economic growth across the country. The ambitious programme of skills, employment and education set out will see the economic benefits of HS2 fully realised across the UK, boosting productivity and sharing prosperity across the country."

The SEES sets out an action plan for how the following four key objectives will be met: 1) Having the skills to deliver the HS2 programme and leave a legacy for the transport infrastructure sector; 2) Creating sustainable skills, employment and education opportunities throughout the supply chain; 3) Stimulating interest in STEM subjects to encourage new entrants; and 4) Maximising the economic benefits along the line of the route and across the UK.

In support of Objectives 1 and 2, HS2 Ltd is currently developing a Future Talent Strategy to address specific skills shortages, as well as the skills and competency requirements, for HS2 Ltd as the client. Equality, diversity and inclusion will be enshrined in the strategy to ensure the workforce reflects the communities that HS2 services more fully.

The National College for High Speed Rail (NCHSR) also has a key role to play in providing an industry-led curriculum while acting as a flagship facility for training, and in attracting talent needed by the sector.

HS2 Ltd will also work with other stakeholders and industry groups, such as the Department for Transport's Strategic Transport Apprenticeship Taskforce (STAT) and the National Skills Academy for Rail (NSAR) to help meet the labour challenges, and will use other tools, such as introducing contractual requirements via its procurement process, regular monitoring of its skills and labour forecasts, sharing information with partners, such as Jobcentre Plus, to develop a jobs brokerage service, and coordinating its approach with other strategic infrastructure

projects via the National Infrastructure Commission and STAT.

Chief Executive of NCHSR Clair Mowbray says: "Our college sits at the heart of a growing movement to upskill the national workforce that will deliver HS2 and its associated projects. As the SEES testifies, there will be literally thousands of opportunities to work on HS2, and ultimately to benefit from its legacy."

"The state-of-the-art facilities [opened in October 2017] that we have available at our Birmingham and Doncaster campuses offer students the best possible environment to get ahead, and to gain the world-class skills they will need to deliver major national transport and infrastructure projects like HS2."

A requirement for apprentices to account for 4% of contractors' workforces on main construction works will be further supported by a range of initiatives. To be launched within the next 12 months, they will stimulate interest in STEM subjects (objective 3), and encourage more school-leavers to consider transport infrastructure-related careers as either apprentices or graduates.

This includes a Secondary Education Engagement Programme to help combat an annual shortfall of 20,000 engineering graduates in the UK and the low proportion of females (12.5%) in the existing engineering workforce.

As well as engaging and informing young people of the opportunities available via online resources, there is a commitment within SEES to engage with schools and further education providers to provide 'meaningful encounters' with employers and employees, such as worksite visits.

**“Our college sits at the heart of a growing movement to upskill the national workforce.”**

**Clair Mowbray, Chief Executive, NCHSR**

HS2 ambassadors will also play an important role by attending schools and events to talk about their careers and to inspire young people to follow in their footsteps.

Last but not least, objective 4 will be met by providing direct economic benefits to the UK, such as long-term employment opportunities within the construction and engineering sectors along the route of HS2 and at key station hubs, with a key focus on socio-economic disadvantaged areas.

HS2 Ltd has also pledged to work closely with agencies engaged in delivering indirect economic growth, such as Local Enterprise Partnerships, which are well placed to use the HS2 programme as a catalyst for growth.

Examples of this include the West Midlands Combined Authority's Regional Skills Plan and the Curzon Station masterplan, which are designed to capitalise on the opportunities presented by the arrival of HS2 to create growth for more than 52,000 jobs and £1.25bn in Gross Value Added per year. A second example is the draft Crewe HS2 masterplan, which identifies a vision to create almost 40,000 new jobs over the next 30 years and additional economic growth in Crewe, and across Staffordshire and Cheshire East.

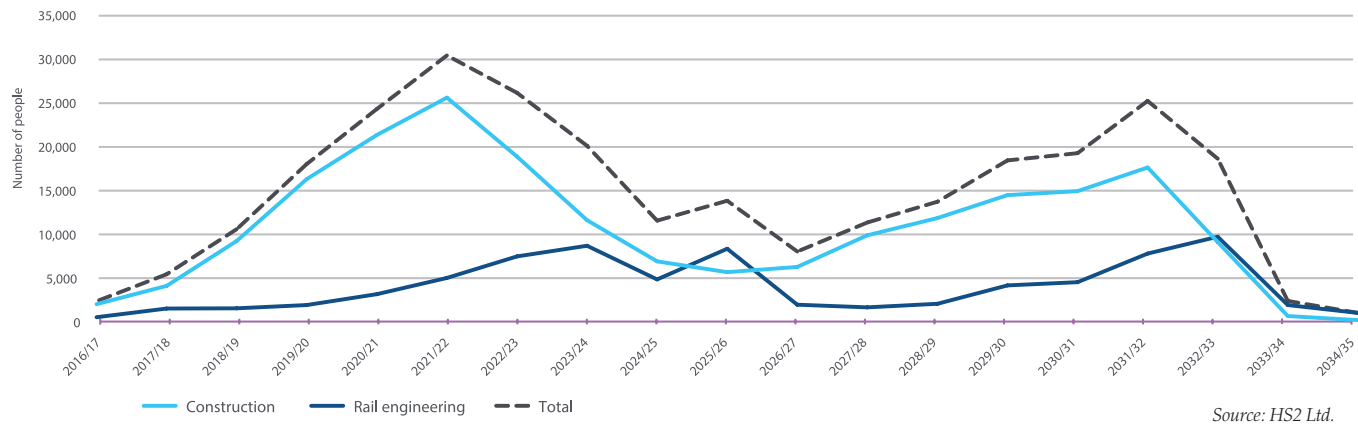
Similar plans are being worked up to maximise opportunities for Phase 2 in Manchester, Leeds, Sheffield and the East Midlands.

The SEES has already been well received by the supply chain, which has pledged its support for the fulfilment of its four key objectives.

Railway Industry Association Chief Executive Darren Caplan says: "This exciting news from HS2 shows that major infrastructure projects don't just enhance the rail network for its customers - whether passengers or freight - but they also provide a huge boost to jobs and GVA in local economies and around the country."

"The rail supply community is already actively working on HS2 and we stand ready - working in partnership with HS2 Ltd, the Government and all rail industry members and stakeholders - to deliver even more for this transformational project in the months and years ahead." ■

Construction and rail engineering workforce demand, by activity type



Source: HS2 Ltd.



# CATCH THE TEAMWORK VIBE

**K**ier has big ambitions for Control Period 6 (April 2019-March 2024), with its rail business currently bidding for large parts of the £10 billion renewals portfolio being tendered by Network Rail (NR) in signalling, civil engineering, power supply and other disciplines.

Having already established itself as a major player in the sector with an annual turnover in excess of £50 million, the rail business has set an ambitious target to double this revenue over the next five years.

But it is also well aware of the significant challenges ahead, should it be awarded any of the framework contracts that are being procured to work in partnership with NR. Not least is the infrastructure operator's desire for the supply chain to deliver increased volumes of work more cost-efficiently, and with less disruption to passengers.

## **RAIL finds out how greater collaboration with clients and the supply chain is helping Kier deliver projects more effectively, and how the company is attracting more people into the industry**

Following close behind is also the urgent need to close a gap in the supply of skilled workers, predicted by the Department for Transport to be as high as 55,000 by 2020.

According to Kier Senior Operations Manager Duncan Hall, greater collaboration within the supply chain will be key to driving the further improvement, innovation and development that is needed, while also helping change perceptions of the sector to attract potential new recruits.

He says: "It's important that CP6 is delivered effectively, and in the coming years I think the industry will see a number of challenges it needs to overcome in order to do this. For it to be a success we need to ensure we continue to work collaboratively as a sector, that we're delivering more efficiently and we're closing the skills gap."

"When working collaboratively, we need to make sure all decisions are taken together, ensuring the project is a success from start to finish."

Kier works with a diverse range of subcontractors of varying sizes and is leading the industry by example, in terms of the support it provides and the barriers it is removing to closer co-operation.

This includes collaborating with the three largest accreditation companies in the UK to make it much easier for subcontractors to prequalify to work with Kier.

Mark Ramessa, Commercial Director for Kier, explains: "We've asked our subcontractors what we can do to improve and they told us to reduce the amount of paperwork involved in pre-qualification and to improve consistency across the business. We listened and have standardised pre-qualification across the business and are now the first UK contractor to offer multiple pre-qualification with Construction Line – Gold (Level 3), CHAS – Premium Plus, and Building Confidence (Achilles).

"This has just gone live and reduces bureaucracy, making it easier for SMEs which struggle with pre-qualification and Kier more open for business."

Kier also collaborates with its supply chain on projects in a number of ways, including co-locating key staff and encouraging all team members to get involved in various community and social impact projects (RAIL 861). The benefits of taking this approach have included more effective decision-making and improved safety.

Hall says: "We put a lot of effort in to ensure we work as a team with our supply chain. Having shared offices allows us to be more efficient and to build relationships - we've



**“Views of the industry can be quite negative, but we’ve tried to combat that by putting real people into the classroom where kids will have a much better response to an apprentice talking to them.”**

**Mark Ramessa, Commercial Director for Kier**

initiatives such as STEM, *Shaping Your World* aims to dispel these myths by arming Kier employees with a wide range of age-appropriate resources to undertake volunteer school visits.

Kier made a pledge that 1% of its workforce from all grades (approximately 200 employees) would visit one or two schools each year, but with the scheme now celebrating its first anniversary that target has been comfortably exceeded with 360 ambassadors.

Each ambassador is supplied with a range of creative materials to help convey their message, often based on 'gamification' and social media centred around a dedicated website called VIBE (Virtual Interactive Built Environment). The VIBE website now receives around 10,000 visitors per month and visitors have created more than 8,000 avatars.

The website also features profiles and blogs from serving employees, and lots of other multimedia content, including short animated 'pride and passion' testimonials.

Printed pocket guides to careers in construction can also be downloaded, for those looking to take the next step.

The VIBE website also acts as an eye-catching showcase of all the projects Kier and its partners have worked on together, pinpointed on an interactive map. Each 'pin' links off to a subsection of the site that presents information about the project in an eye-catching, consumer-friendly way. Partners can then display these 'mini-presentations' at their own premises, and use it as a recruitment tool.

Ramessa says: "This campaign represents industry-leading engagement which has reached more than 15,000 kids in the last year. Views of the industry can be quite negative, but we've tried to combat that by putting real people into the classroom where kids will have a much better response to an apprentice talking to them, as opposed to a man in a suit."

Hall adds: "There are lots of areas of construction, and it's not only about laying bricks. There's a huge variety of exciting careers people can consider; we know we need to reach out to students when they're making educational decisions that will have an impact on their future, and that's why we reach out to schools and educate kids to what we can offer them."

"The industry is facing this issue together, and for us, it isn't about convincing the next generation to come to Kier, it's about convincing them to join the built environment - it is important to work collaboratively as an industry to overcome this crisis." ■

**“When working collaboratively, we need to make sure all decisions are taken together, ensuring the project is a success from start to finish.”**

**Duncan Hall, Senior Operations Manager, Kier**



established a modern way of working which enables us to share ideas, discuss risks and costs. You wouldn't recognise it against the traditional adversarial office arrangement!

"I'm very proud to say that for the past 24 months we haven't had any RIDDORS [Reporting of Injuries, Diseases and Dangerous Occurrences Regulations], proving that since changing our ways of working we've not only seen cost benefits, we've also improved safety for our workforce."

Kier also runs annual supplier conferences across its Group, including its rail business. This is where best practice is shared and feedback is gathered on how supply chain relationships can be improved further.

The events are kept deliberately informal and conversational in order to provoke constructive debate, while innovative methods of participation are used to increase engagement, such as the use of Kier's own board game. Called the *Balanced Business Network Game*, it throws up scenarios related to various topics for discussion that suppliers may not be familiar with, and challenges them to think differently.

Ramessa says: "To the Rail Suppliers Day we invite the top 50 companies we work with. It started off with quite a traditional format, but it soon developed into more of a workshop

scenario where we support them and show them how we can work together to improve best practice for our clients. There's lots of networking and the engagement has been really useful for us.

"We've had some good discussions around safety and quality, and continuity of work through peaks and troughs. We're strengthening relationships but it's very much a two-way street and the feedback from suppliers is that they get a lot of added value, people have fun and they will remember it."

Hall adds: "In my experience, I've found that the supply chain is often forgotten, but it is more important than ever to share lessons with them. There is such a focus on delivering more for less and reducing costs, and sharing this with them is a great way to add value and strengthen relationships."

Another Kier initiative to benefit its whole business, including rail, is the *Shaping Your World* campaign, which was launched in September 2017 to help attract new talent to the construction industry. It followed the publication of a report commissioned by Kier into the views of 2,000 parents, teachers and career advisors, which confirmed a widely held perception that the industry was 'muddy, manual, male-dominated and poorly paid'.

Designed to complement other ambassador







# PARADIGMS OF PARTNERSHIP

With the Central section of Crossrail that runs beneath central London being delivered by Crossrail Ltd, it has been the responsibility of Network Rail to upgrade existing sections of main line to the east and west of the Capital in support of the introduction of Elizabeth Line services from next year.

Works on Crossrail's Western section covered a 26-mile stretch of Brunel's iconic Great Western Main Line (GWML) from Paddington to Maidenhead, and were formally completed at the end of September.

With a budget of £1.4 billion (increased from £1.1bn to reflect scope changes necessary to accommodate an extension of Crossrail services to Reading and the Intercity Express Programme), Crossrail West has taken more than eight years and 13 million work hours to complete.

Despite the changes, all stages of the project have been delivered on time or ahead of schedule.

Main elements included the extension of overhead line equipment on 12 miles of railway from Hayes & Harlington station in west London to Maidenhead, which required the installation of over 1,400 piled foundations and 140 miles of overhead line equipment - equivalent to the distance between London and Sheffield.

To accommodate the new OLE, more than ten bridges were rebuilt to provide sufficient

**An impressively high degree of collaboration while delivering Crossrail West has led to Network Rail, Bechtel and the supply chain winning the National Rail Awards category for Major Project of the Year. PAUL STEPHEN reports**

height clearance, a 132kV electricity supply from overhead pylons was diverted through a new 1.5km twin-bored tunnel, and signalling was completely renewed between Stockley and Maidenhead to prevent interference.

Energised in spring 2017, the extended OLE enabled the introduction of three new sets of rolling stock within a 12-month period, which created more than 4,000 extra seats into Paddington each morning.

Great Western Railway now operates a new fleet of Class 387 electric multiple units (EMUs) to Maidenhead, while Class 800 Intercity Express Trains have begun entering service to destinations as far west as Penzance.

Nine-car Class 345 EMUs are also now running from Paddington to Hayes & Harlington in advance of full Elizabeth Line services commencing next year.

Other elements of the programme included

the largest signalling data upgrade ever undertaken on the network on a three-mile approach into Paddington known as 'Stage M'. After three years of data rewiring and testing, the interlocking data for all 500 routes on this section of track was uploaded last Christmas Eve, and paves the way for the overlaying of ETCS (European Train Control System) digital in-cab signalling technology, due to be installed in 2019.

Elsewhere, up to a mile of platform extensions have been built to accommodate 200-metre Class 345 Elizabeth Line trains, and four miles (6.5km) of new track has been laid at Westbourne Park to connect Crossrail's Central section with the GWML.

New electrified sidings were also opened 18 months ahead of schedule in Spring 2017 at Maidenhead, West Ealing and Royal Oak to stable the new fleets of Great Western Railway and Elizabeth Line.

NR worked with Bechtel as the programme



Network Rail has worked jointly with Bechtel as the programme delivery partner on Crossrail West to lead, integrate and manage the programme, while building strong collaborative relationships with stakeholders, contractors and communities. NETWORK RAIL.

delivery partner, while the scale and complex nature of the works required the expertise of more than five primary contractors, including Alstom and Amey (signalling), Balfour Beatty (OLE and track) and Telent (telecoms).

Judges commended the programme for its extraordinary culture of collaboration, not only with contractors but also communities and a complex network of stakeholders in order to mitigate disruption while working on and adjacent to one of the fastest and busiest stretches of main line in the UK.

These stakeholders included multiple passenger and freight train operators, nine local authorities, 30,000 lineside neighbours and passengers who take 36 million annual journeys across the work site.

With limited physical access, many contractors had to share worksites, possessions and even resources in order to deliver their works within tight timeframes.

Other challenges included the need to modernise some of the network's oldest infrastructure, including the Grade 1-listed

Paddington station in preparation for installation of 21st century signalling and OLE technology.

The works programme was further challenged in January 2018 following the collapse of Carillion, which was the primary contractor delivering critical track and OLE works around the Crossrail tunnel portal and Westbourne Park.

Other achievements included significant investment in skills and the community with 700 volunteers from the programme having touched the lives of 3,500 local people since 2014. 116 schools and community groups were visited, 80 work experience placements provided, and a further 40 additional work placements for young people in the London area who were not in education, employment or training and from a diverse background.

Additional highlights included the Paddington Science Club, held weekly at local primary schools, and the Budding Brunel programme, run in conjunction with the Construction Youth Trust and Career Ready

**“With limited physical access, many contractors had to share worksites, possessions and even resources in order to deliver their works within tight timeframes.”**

Paddington Academy.

Judges also noted the programme's safety record, which was the best within NR's Infrastructure Projects division, and NR's commitment to retain knowledge and skills gleaned from the project to change the way it approaches such major projects in future.

Rolling Lost Time Injury Frequency Rate was just 0.1740 per 100,000 work hours, while the programme consistently reported above-average numbers of Close Calls under its 'no blame' culture, demonstrating high levels of understanding throughout the workforce.

Integrated safety teams included representatives from each contractor and NR to undertake joint reviews of work methodologies and to drive best practice, while Crossrail West also benefited from Bechtel performing an annual Bechtel Environmental Safety and Health audit.

This has allowed the programme to receive best practice advice drawn from other major projects across the globe, such as the Riyadh, Sydney and Athens metros.

To ensure that best practice is retained and transferred, representatives from the programme are taking part in 'lessons learned' workshops to pass on their findings to other national infrastructure projects currently being mobilised, such as HS2.

Many members of the Crossrail West team are also currently moving to NR's Paddington to Reading (P2R) programme to work on upgrading other sections of track and stations on the GWML. ■

(Left to right) John Rife (Bechtel), Gary Stevens (Bechtel), Dave Corkett (Network Rail) and Darren Coleman (Network Rail) collect the National Rail Award for Major Project of the Year at London's Grosvenor House Hotel on September 13. Far left is the evening's host, BBC presenter Steph McGovern and far right is RAIL's Managing Editor & Events Director Nigel Harris. JACK BOSKETT/RAIL.



## JUDGES' COMMENTS

This is a project that has been delivered to time and on budget with a good safety record, and which is already benefiting passengers. A clear winner in our view.

Although delivered under a traditional 'hub and spoke' contracting model, Bechtel as delivery partner recognised at an early stage that a different mindset was required and separate target price contracts were amended to a collaborative approach, with sharing of worksites, possessions and expertise.

The entry stressed the engagement with TOCs and NR Operations to manage access effectively.

## HIGHLY COMMENDED

**The Northern Hub Alliance for Ordsall Chord**  
The Ordsall Chord has created a direct link between the three major Manchester stations for the first time.

The 300-metre rail link forms a central part of Network Rail's Great North Rail Project, which will ultimately enable 2,000 extra services to run on the local network each week, carrying 40,000 extra passengers per day and bringing up to £46 billion worth of wider economic benefits to the region per annum.

Delivered on time and just under its £317 million budget in December 2017, the project was completed using a 'pure alliance' model, which contributed to a shorter build programme and reduced risk. It allowed each participant a stake in budget setting,

securing funding, managing change and ensuring delivery, while a single target cost was developed with a shared pain/gain mechanism to make every individual united in the goal of delivering the best value for money.

Around 25% of the contract value was awarded to local businesses.

It was important for the project to create a statement, given its proximity to the original Stephenson Bridge opened as part of the world's first passenger railway from Manchester to Liverpool in 1830, so a 'network arch' bridge style was used (the first of its kind on UK railways).

The judges were impressed with the delivery of the project, as well as the knowledge and enthusiasm of those who worked on it.



# COLLABORATION PERIOD ONE

**3Squared Managing Director TIM JONES reveals how the traditional customer/supplier relationship is giving way to a new era of closer collaboration in the UK rail sector**

“Collaboration hasn’t just benefited our business - 3Squared was positively built on it, and it has become part of our DNA.”

This is the view of 3Squared Managing Director Tim Jones on the award-winning technology consultancy he co-founded with Commercial Director James Fox in Sheffield 16 years ago.

Having begun life as a two-man digital and creative agency, 3Squared’s rapid growth to become one of the rail sector’s leading software solutions providers was to be underpinned by taking a more collaborative approach with clients.

Recognising that forming longer term partnerships with clients was the best way for it to respond to the changing needs of the sectors in which it operates, the company’s ethos was well received in the business community and 3Squared soon required larger premises and a much bigger team.

With a growing portfolio of software solutions for major blue chip clients in the construction sector, including Skanska and Costain, entering the rail market seemed a logical next step.

But with little knowledge of the industry, Jones and Fox once again adopted a more collaborative approach by seeking a forward-thinking client to partner with until 3Squared could establish a firmer foothold, and build up a more detailed understanding of the problems it was trying to solve.

Jones explains: “I say that collaboration is in our DNA because our entrance into UK rail was born of it and we recognise that to continue being successful, it is the way forward. We work very closely with clients on creating a solution to their problems because

we think it’s much better to leverage their knowledge of the sector in order to build the best products possible, rather than us doing it in isolation.

“We did this for the first time in 2010 with Stagecoach to try and transfer our management competency programme from construction into rail. We said to them ‘we have the competency but you have the knowledge - let’s work together to create something for the industry.’”

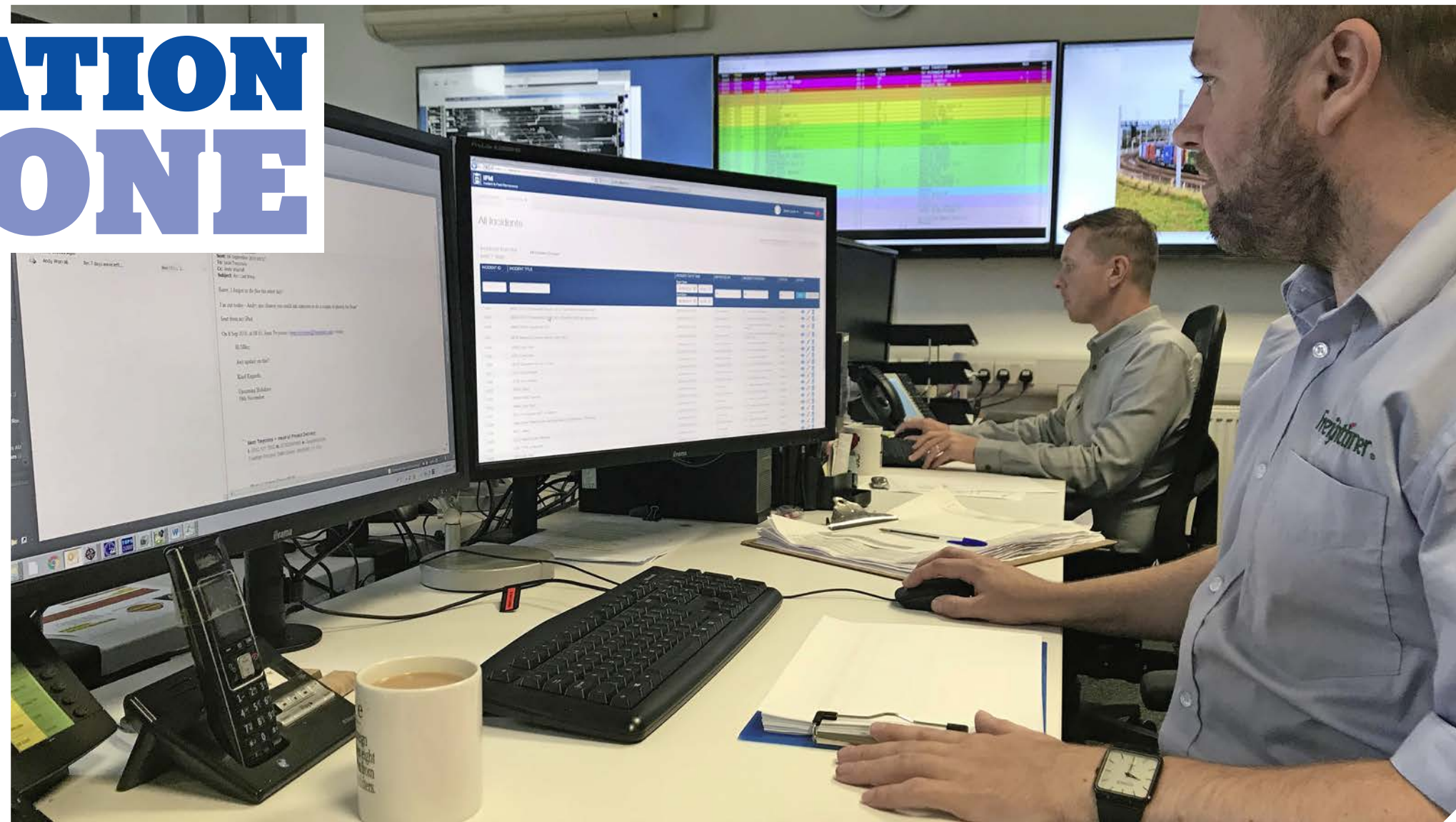
3Squared’s collaboration with Stagecoach-owned train operating companies (TOCs) East Midlands Trains and South West Trains, plus freight operating company (FOC) GB Railfreight, would eventually yield the first of its flagship RailSmart suite of products in 2014.

RailSmart EDS (employee development system) would also earn 3Squared a Queen’s Award for innovation due to the safety and cost benefits that stem from its ability to reduce the administrative burden of compliance, and to manage competencies such as route and traction knowledge while being integrated with crew-planning tools.

The RailSmart platform has grown since 2014 to help streamline other automated processes, such as document distribution (RailSmart DOCS), to improve the visibility of operational information and to help geographically dispersed teams work together more effectively.

Such has been the success of the RailSmart platform that 55% of all TOCs now use at least one of its products and almost 12,000 staff competencies are now managed by RailSmart EDS, helping the rail sector to become the largest part of 3Squared’s business.

Clients include not just TOCs and FOCs but also Network Rail and companies from other



parts of the supply chain, such as Bombardier and Colas Rail.

3Squared also works closely with rail standards body RSSB, which awarded it a customer excellence award in 2013 for its station wayfinding concept ‘Station Master’.

RSSB has since awarded funding to 3Squared to develop an innovative software solution that helps improve disabled access to the railway as part of RSSB’s Rail Accessibility Challenge.

The company is also closely collaborating with the Meteorological Office to develop a predictive tool for low rail-adhesion sites, which contains a crowdsourcing element that encourages drivers coming off a shift to report locations where they’ve encountered poor adhesion.

According to Jones, partnerships such as these are becoming more commonplace in the rail industry as consensus continues to shift among major players towards more joined-up working as the best means to reduce cost and increase innovation.

He points to Network Rail in particular, which is embarking on a new procurement strategy for Control Period 6 (April 2019-

March 2024) that seeks to foster more integrated working with the supply chain.

It will also facilitate larger amounts of third-party funding, finance and delivery so that financial benefits and risk are shared more equally between the taxpayer and supply chain.

This could mean trials of new procurement methods and longer term customer/supplier relationships over the next few years, such as NR’s current collaboration with signalling and train control specialist Resonate on the Great Western Main Line, where the Luminare traffic management system has been installed at Resonate’s expense.

If delays are reduced by the system as predicted, then the reduction in compensation paid by NR to train operating companies will be shared between the two parties.

He adds: “To begin with, collaboration was much harder, and many businesses were stuck in the traditional customer/supplier relationship. But in the last three to four years more and more people have realised that we will only see improvements from closer collaboration, and are changing their attitudes accordingly.

“We saw evidence of this in Control Period 5 (April 2014-March 2019) with NR collaborating with Resonate to come up with a new fully funded business model instead of following the traditional route to finding a single-source supplier. That was an early sign of what we’re seeing increasingly today in the pain-and-gain relationships offered by alliances and early contractor involvement.”

Looking ahead to CP6 and NR’s fledgling Digital Railway programme, Jones is hoping that 3Squared will be at the vanguard of the industry’s efforts to increase capacity and reduce operating costs on the network through the deployment of emerging technologies.

The company has, arguably, already begun to do just that, following the success of its latest product in partnership with previous East Coast franchise operator Virgin Trains East Coast (VTEC), and current operator London North Eastern Railway (LNER).

3Squared’s driver interface application is a familiarisation and training tool for drivers switching from traditional lineside signalling to digital in-cab signalling provided by ETCS (European Train Control System) technology.

It is now being offered free of charge to other

**Sheffield-based 3Squared has been providing advice, guidance and software solutions to customers in the construction and rail sectors for almost two decades. 3SQUARED.**

operators as NR considers which routes will receive upgraded signalling in CP6.

“There is an inherent belief that nothing is free,” adds Jones. “The app will obviously help raise the profile of the business, but we mainly want to help people understand that it is important to collaborate for the benefit of the wider industry, and not everything costs as much to bring to market as people think.

“What NR is realising too is that given the vast and complex set of systems we have inherited from the Victorians and British Rail, and to tackle 21st-century problems, we need a more joined-up approach. In CP6 the traditional model has been broken - collaboration will be the way forward.

“We’re a digital business and collaborate very closely with clients for the benefit of the wider industry, so we’re looking forward to what CP6 will bring and helping turn Digital Railway into a reality by adding value in that space.” ■



**“The traditional model has been broken - collaboration will be the way forward.”**

**Tim Jones, Managing Director, 3Squared**







# TRIAL BY FIRE

**PAUL STEPHEN** examines how the rapid and highly co-ordinated response to a major fire at Nottingham station earlier this year earned East Midlands Trains and its partners the 2018 National Rail Award for Outstanding Teamwork



East Midlands Trains, Network Rail and the emergency services across Nottinghamshire have been recognised at RAIL's National Rail Awards for their efficient and effective joint response to the fire which occurred at Nottingham station on the morning of January 12.

Having detected the blaze in ladies toilets on the southern concourse at 0620, staff from the station's operator East Midlands Trains swiftly effected a safe and controlled evacuation of 200 people from six trains.

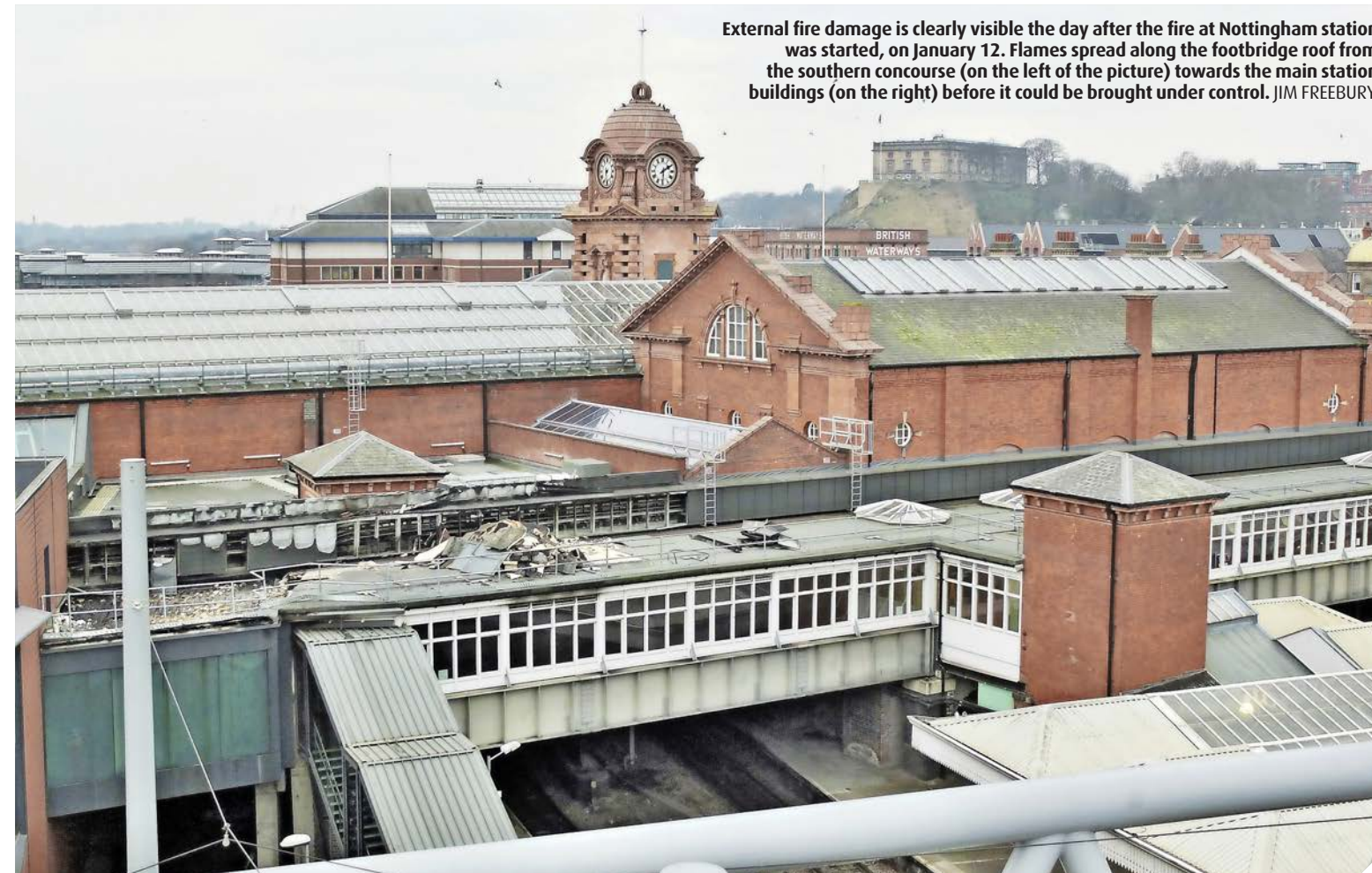
Tram and bus services were also suspended, while Nottingham City Council's Traffic Management and Community Protection teams worked quickly to close surrounding roads.

Having reviewed its evacuation procedures just three months earlier, the speed of this first

response by EMT ensured that no major injuries were sustained while the flames began to spread rapidly into the roof space, and an adjacent ticket office and footbridge.

As attention swiftly turned to bringing the fire under control, by 0800 a multi-agency structure was in place comprised of EMT, Network Rail, British Transport Police, Nottinghamshire Police, East Midlands Ambulance Service, Nottingham City Council, Interserve and Nottinghamshire Fire & Rescue Service.

Having already generated significant amounts of attention from national and regional news outlets, 60 firefighters from eight fire stations took more than 12 hours to extinguish the flames which had threatened to destroy much of the historical fabric of



External fire damage is clearly visible the day after the fire at Nottingham station was started, on January 12. Flames spread along the footbridge roof from the southern concourse (on the left of the picture) towards the main station buildings (on the right) before it could be brought under control. JIM FREEBURY.

the Grade 2-listed station - which is an outstanding example of Edwardian Baroque Revival-style architecture.

Used by some 7.5 million passengers per year, the closure of such a vital transport hub affected services across a large part of the regional network, including in Lincolnshire, the Midland Main Line, Liverpool to Norwich, and local services to Worksop, Newark and Grantham.

As the morning went on, teamwork

between EMT and NR helped minimise disruption as far as possible with some services being diverted or replaced by buses.

Following an inspection of the building and railway infrastructure by structural and track engineers, EMT and NR staff then worked through the night (some voluntarily) to reopen five of the station's seven platforms at 0500 the next morning.

Close teamwork and relentless effort over the days that followed meant that further parts

of the station could be reopened, and water, electricity and IT connectivity all restored after suffering significant fire damage.

Network Rail's London North Eastern and East Midlands Route Managing Director Rob McIntosh was among the first industry leaders to praise the work of station staff and emergency services. He told RAIL: "There are lots of phone calls you dread to receive as a Route MD, and that was certainly one of them. We didn't expect the fire to take hold in the

**“There are lots of phone calls you dread to receive as a Route MD, and that was certainly one of them”**

**Rob McIntosh, London North Eastern and East Midlands Route Managing Director, Network Rail**

way it did, but the response was phenomenal.

"My first thoughts were for the welfare of staff and passengers, but I have a very capable team who stepped up to the mark alongside colleagues from EMT. I have enormous pride in the whole team at Nottingham, who dealt with it swiftly and brilliantly."

Jake Kelly, EMT Managing Director adds: "This is a fantastic achievement and one that really marks just how much can be achieved by working as one team."

"From our frontline staff at EMT, who played a remarkable role in looking after customers, to the firefighters who tackled the fire, to the BTP who took control of the site with detailed forensic investigations, and to all the other partners who played a crucial role in our response to this major incident, this [National Rail Award] is deserved recognition of your work during extremely challenging circumstances."

"We remain truly grateful for the hard work and support of everybody involved."

Three days after the fire, only the most seriously fire-damaged areas of the station remained closed to the public, including the main footbridge span between platforms 6 and 7, and part of the southern concourse, which was opened in 2014 as part of a £60 million redevelopment which had itself won a National Rail Award in 2016.

These areas remained a crime scene as British Transport Police began its investigation into the cause of the fire, which was being treated as arson. →



(Left-right) EMT employees Paul Rushton, Graham Catton, Ian Dobson, Sam Clements, Jeni Redfean, Jono Todd, Karen Pirrie, Glyn Williams (Network Rail), Sarah Turner, Bryn Coleman (Nottinghamshire Fire & Rescue Service), Kim Wheeler, Stuart Middlemas (British Transport Police), Carly Symes, John Simpson, Ashley Wynder and Martin Ward collect the National Rail Award for Outstanding Teamwork at London's Grosvenor House Hotel on September 13. Far left is the evening's host, BBC presenter Steph McGovern. JACK BOSKETT/RAIL.



Repairs cost approximately £2 million, including the replacement of these charred wooden roof beams inside the main station footbridge. RAIL HERITAGE TRUST.



More than 60 firefighters fought for 12 hours to extinguish the blaze. NOTTINGHAMSHIRE FIRE & RESCUE SERVICE.





Evacuated staff and passengers gather on Carrington Street as smoke begins to fill the station's newly pedestrianised *porte cochère*. PRESS ASSOCIATION.

→ CCTV evidence and other items of interest were quickly collected, while an extensive appeal was made for witnesses and members of the public to come forward with footage recorded on mobile phones or dash cams that might help identify the guilty party.

Further appeals were also jointly co-ordinated between all organisations involved in order to maximise coverage.

A 33-year-old woman from Derby was arrested in connection with the incident before being released. No further arrests have been made.

Repair work costing some £2 million has been taking place since January, with the

final piece being the toilets on the southern concourse, which reopened on September 17.

All those involved are now actively working to build on their response to the fire to help the wider industry learn from the incident and to help better prepare for similar incidents.

EMT, Nottinghamshire Fire & Rescue Service, Nottinghamshire Police and BTP have developed a multi-agency training exercise to support emergency planning and incident management preparation, and are engaging with other train operating companies and industry stakeholders to share best practice. ■

## JUDGES' COMMENTS

Nottingham had a bad day on January 12, with a murder closing part of the tram system, a power outage at the other end of it, a major fire in the station and, in the middle of it, two buses colliding outside the station.

The teamwork was built on the competence of the EMT contribution, desktop exercises with the emergency services and the application of agreed [Joint Emergency Services Incident] protocol with support from NR and BTP.

The initial report to the emergency services was calm and concise and as they arrived and saw the efficiency of the evacuation, chose to include the railway agencies in the joint command structure. This is a rare statement of confidence in the competence of a site owner and indicates fresh thinking and behaviour.

Having established that the only casualties were two railway staff who had inhaled smoke, the objective became avoiding disruption and communicating with the public to assist with travel plans. Cordons were established but access was kept reasonable through cooperative partnership, rather than a site ownership hierarchy.

As a result of this and other intensive cooperation within the team, the station opened for traffic at 0500 the following morning, minimising disruption.

The whole exercise has been written up for the learning of others, to reduce the risks associated with any similar incidents.

## HIGHLY COMMENDED

### Southeastern and NR

Southeastern and Network Rail were highly commended by the National Rail Awards judges in the Outstanding Teamworking category, owing to the innovative cross-industry partnership they formed with South Western Railway over the August 2017 Bank Holiday weekend.

During this period there was a four-day closure of Waterloo East, Charing Cross and London Bridge stations to enable rebuilding work on London Bridge, as part of the Thameslink programme.

In order to limit disruption to passengers and avoid overcrowding at Cannon Street station, Southeastern, NR and SWR worked closely together to create a one-off timetable that provided enough seats to get people in and out of central London using an alternative route, despite the closure of three of Southeastern's busiest stations.

The scale of the task was significant – around 7,000 journeys per day were re-routed to Waterloo, where the station's former International platforms were specially re-opened (the first time in 100 years that Southeastern services would run through and terminate at Waterloo station).

This part of the project involved the use of driver managers as 'pilot' drivers who had been trained for three weeks prior to the work so they could drive through



Waterloo, and additional staff to dispatch the Southeastern trains terminating at the station.

It was also necessary to re-energise the Linford Street Curve to enable Southeastern to run its Class 375 trains into Waterloo, and for an extensive communications campaign to be developed in order to engage with passengers about the timetable change. This campaign contributed to a passenger awareness score of 87%, and much positive

A diversionary route implemented over the August 2017 Bank Holiday weekend meant that 6,000-7,000 passengers could make their journeys in and out of London, despite the temporary closure of London Bridge. NETWORK RAIL.

feedback being received on social media in the days that followed the four-day closure.

Judges were impressed with the extent of planning and liaison with operations in both Southeastern and NR, in addition to the scale of the task, and felt the overall project was a major success.