

# Global Railway REVIEW

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ISSUE  
03

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2018

EXPERTISE

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## GLOBAL RAILWAY REVIEW

### VOL 24 | ISSUE 03 | JUN 2018

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Published by Russell Publishing Ltd, Court Lodge, Hogtrough Hill, Brasted, Kent, TN16 1NU, UK

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Registered Office as above.  
 Russell Publishing Ltd is registered as a Limited Company in England, Number 2709148 VAT Number GB 577 8978 47



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*Global Railway Review can guarantee its circulation is 7,500 for the 6 issues distributed between 1 January 2017 and 31 December 2017. The publication is ABC audited. This is an independent verification that our circulation is genuine.*

*Global Railway Review is available by subscription worldwide at £130 per annum or a two year subscription at £190*

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 Published June 2018

# Why is the message still not clear?

Recent headlines and statistics suggest that many pedestrians and motorists do not understand the dangers of level crossings. Is the rail sector doing enough to help educate the public?



**CRAIG WATERS**  
 EDITOR  
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EVERYONE should know that level crossings are dangerous, yet so many people continue to cause accidents at these road/rail junctions that result in serious injury and, too often, fatalities. It's surely simple: Be sensible and adhere to warnings at level crossings.

According to Operational Lifesaver Inc. few people are aware of the worrying statistic that in America, a person or vehicle is hit by a train roughly every three hours. And it's not only happening in the 'States; in 2015, according to the European Union Agency for Railways, there were 469 collisions at level crossings in the EU, resulting in 288 fatalities and 239 serious injuries.

Although the precise nature of level crossing accidents differ, it is generally recognised that human behaviour is the main factor.

So why is the message still not clear? Many road and rail organisations around the world acknowledge that more needs to be done and they are sharing responsibility for addressing level crossing safety issues by organising informative events to raise public awareness and promote safe behaviour at and around level crossings. One such successful project is the International Level Crossing Awareness Day (ILCAD) in which over 40 countries take part. The 10th edition is taking place on 7 June 2018 where, among the many safety messages being announced, the focus will be to educate young level crossing users, as they represent the category that displays the riskiest behaviour at road/rail junctions.

Furthermore, rail organisations are adopting their own level crossing accident prevention campaigns, and the supply industry is developing innovative engineering solutions such as warning lights and obstacle detection devices to improve safety.

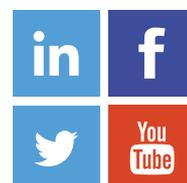
With so many active campaigns and events taking place around the world, and action being taken within the industry displaying a commitment to improve safety, hopefully the number of level crossing accidents will radically drop in the years to come. But will we ever live in a world where there are no level crossing accidents at all? Probably not: The only way to ensure the complete elimination of such accidents would be to remove all level crossing junctions, which is surely a feat too onerous to achieve – at least in the foreseeable future.

Please join our groups on social media platforms and engage with like-minded industry professionals – just search online for *Global Railway Review*.

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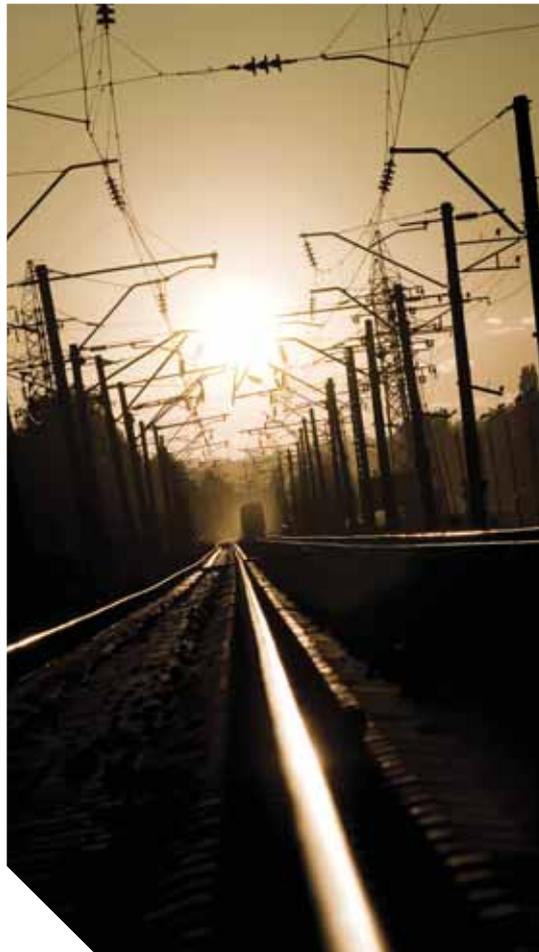
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“...high-speed rail represents a truly transformative proposition, worthy of major federal and state investment in America’s bright future”

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President & CEO, US High Speed Rail Association (USHSR)

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# ROUND UP

THE EDITOR'S PICK OF THE MOST INTERESTING DEVELOPMENTS WITHIN THE GLOBAL RAILWAY INDUSTRY



## A report claims Britain's rail strategy should focus on national productivity

### HIGH-SPEED RAIL

COMPRISED by Greengauge 21, the 'Beyond HS2' report concludes that Britain's rail strategy should, for the first time, have a specific objective to transform national productivity.

There is a long-standing productivity gap in the UK, meaning that the output per worker employed in the UK is well below most of the major international competitors. Britain's productivity continues to fall behind, with ONS figures showing a gap of 16.3 per cent.

The UK's productivity is lower than Italy's by 10.5 per cent, lower than France by 22.8 per cent and lower than Germany by 26.2 per cent.

Detailed in the report is a proposal for the re-orientation for Britain's railway, transforming to a fully national railway network that links a set of upgraded city centre 'hub' stations.

HS2 would be turned from a 'Y' to an 'X' shaped railway, with a new connection in the West Midlands meaning HS2 trains could operate from Bristol and Cardiff to destinations in the Midlands, the North and Scotland.



## Network Rail's level crossing research has shocking results

### SAFETY

REVEALED in Network Rail's recent research, almost a quarter (22 per cent) of 18-24-year olds have admitted that if they were in a rush, they would ignore level crossing warning lights and try to cross the railway.

This worrying statistic is coupled with a quarter of UK adults admitting they do not know the guidance on using a level crossing safely. Young people are even less aware, with over a third of 16-24-year olds not confident on the safety procedure. When asked how to safely use a crossing, only four per cent of people mentioned 'stop, look, listen'.

Allan Spence, Head of Public and Passenger Safety at Network Rail, explained: "We are investing more than £100 million to improve level crossing safety across Britain as part of the Railway Upgrade Plan, but we also need everyone who uses level crossings to do their bit too. By understanding how to use a crossing safely and paying attention to the warnings, we can all keep ourselves out of harm's way."

While Britain does have the safest rail network in Europe, level crossings are one of the biggest public safety risks as Network Rail's 20,000 miles of track directly interfaces with approximately 6,000 road and footpath crossings.

Since 2013, on average, one person has been killed on a level crossing every eight weeks. Within the last year there has been a 12 per cent rise in the number of incidents at level crossings.

To help increase awareness of level crossing danger, Network Rail is leading a national safety campaign targeted at pedestrians during the summer months. Safety messages will be shared on social media and a series of virtual reality films which can be used to educate key user groups, including young adults, will be released.

Network Rail's army of over 100 level crossing and community safety managers will continue to work with British Transport Police (BTP) officers and raise awareness of level crossing safety across the rail network. They will hold safety events, offer briefings in schools and encourage young people to stay alert and avoid distractions when using the railway.

### Further reading:

Turn to page 59 in this issue for our In-Depth Level Crossing Safety supplement and also go to [globalrailwayreview.com](http://globalrailwayreview.com) to find more news and articles covering international developments to improve level crossing safety.

## Further measures focus on preventing Australian rail fatalities

### SAFETY

THE AUSTRALASIAN Railway Association (ARA) and the TrackSAFE Foundation have approved the Western Australian Government's proposed measures that focus on ensuring serious incidents are reduced on Western Australia's (WA) rail networks.

"By endorsing the increase in penalties for those offenders who trespass on public transport authority property, including activities such as train surfing, we are sending a clear message – it will not be tolerated," said Bob Herbert AM, Chairman, ARA and the TrackSAFE Foundation.

Bob continued: "We are seeing far too many incidents and near hits across the network. Every



single one can cause severe and lasting trauma to the train driver and other rail employees involved. These incidents are avoidable if members of the public obey the rules that are in place to keep them safe. These proposed measures, including an increase in penalties for those that choose to take dangerous and illegal risks on the network, will hopefully act as a deterrent and help us in our mission of reducing incidents."

## Siemens to equip Hungarian railway line with ETCS

### SIGNALLING & TELECOMMUNICATIONS

THE NATIONAL Infrastructure Developing Private Company Limited has commissioned Siemens to equip the Hungarian line Százhalombatta–Pusztaszabolcs with European Train Control System (ETCS).

Along the 26km-long two-track line, the new signalling technology is expected to be in service by December 2020.

Siemens will provide control system type Trainguard 200, including installation of ETCS

Level 2, one radio block centre (RBC) and two electronic signal boxes type Trackguard Simis IS. This order encompasses six railway crossings type Wayguard Simis LC, the entire electricity supply, assembly and telecommunications.

The two-track line is an extension of the Kelenföld–Százhalombatta line. The Hungarian railway is undergoing an important modernisation and is part of a global project in order to upgrade and develop the Budapest Kelenföld–Croatian border railway line; eliminating an important bottleneck along the Mediterranean corridor.

The development of the overall network will be reflected in the optimisation of travel times and the modernisation of approximately 280km of lines in the rail network.

## Virgin Trains and Uber encourage people to leave cars at home

### INTERMODALITY

AS PART of their ambition to provide customers with a smooth and seamless journey from door-to-door, Virgin Trains in the UK has launched a new partnership with Uber; encouraging more people to leave their own cars at home.

The partnership will enable passengers to easily request a ride to the station and on arrival at their destination. When purchasing a train ticket on the Virgin Trains website, there will be an option to receive an SMS reminder with a link to book an Uber trip.

There will be a two-week testing period, in which customer feedback will be used to refine and optimise the service.

This partnership will initially be available for customers travelling from London Euston to Birmingham New Street or from Birmingham New Street to London Euston. Within the coming months there is a plan to deploy the scheme at locations including Birmingham International, Glasgow Central, Milton Keynes Central, London Euston, Manchester Piccadilly, Edinburgh Waverley and Edinburgh Haymarket.

This builds on other Virgin Trains innovations and industry-firsts such as the ability to buy tickets via Amazon Alexa, mobile ticketing, automatic compensation for delays and the free on-demand entertainment service, BEAM.



## Brightline partners with ride-sharing company Lyft

### INTERMODALITY

BRIGHTLINE has named Lyft as an exclusive ride-share partner; the first-of-its-kind for Lyft in Florida.

Brightline's three current stations will have Lyft branding and wayfinding signage indicating the location of designated Lyft pick-up and drop-off zones, where Brightline passengers can wait for their ride in a lounge-style environment.

The apps from both companies will enable users to easily connect with their driver, view the

car's estimated arrival time and an estimated fare.

Brightline and Lyft have shared commitments to offer travel options that ease the stress of driving and affect positive change through transportation. These co-located stations will help close the gap between transit and passengers' doorsteps.

To begin the partnership, both organisations advertised special promotions and discounts for users.



## High-speed rail: Now it's America's turn

**Andy Kunz**, President and CEO of the US High Speed Rail Association (USHSR), shares the top 10 reasons for bringing high-speed rail to America.

**A**MERICA stands at one of the most important crossroads in history. Climate change and peak oil are both coming into focus with the uncomfortable awareness that America is the world's largest contributor to both problems (mainly from our very inefficient transportation system), while doing the least of any nation to address either problem. At the root of this situation is the fact that many of America's largest corporations' entire businesses are related to the supply and burning of fossil fuels. Their heavy influence over our national and state politics, the media and shaping public opinion has held America back in a time warp from the 1950s – big oil, big autos, and big roads. America is still spending \$200 billion each year expanding roads, while starving its rail systems.

**↑ ABOVE:** Japan's high-speed network began in 1964 and has since transported 10 billion passengers without a single fatality

This is quite a conundrum for America. It's now a case of 'American capitalism versus the planet'. However, in reality, capitalism is dependent on the planet for much of the raw materials and services it provides (our food, water, air, energy, resources, raw materials, regulating services, etc.). The sooner American leaders wake up to this simple fact, the better off we will be as a nation.

Since transportation is the single largest consumer of oil (and producer of carbon), USHSR has launched our 'Top 10 Reasons to Bring High-Speed Rail to America' to address the transportation problem head on. High-speed rail is truly a miracle technology that could solve many serious problems simultaneously.

The reasons are as follows:

## 1. Congestion relief

America faces epic congestion in every major metropolitan region of the country, costing \$124 billion per year in wasted time and fuel. Road widening projects – justified by claims they relieve congestion – have only made congestion worse across America. High-speed rail is transformative and can reverse this situation – delivering 200mph transportation for every train, every day – without delays or congestion, ever.

## 2. Alternative to flying

High-speed rail delivers +200mph transportation as an alternative to the flying nightmare, offering no hassles, no security lines, no delays and plenty of room to work or play. Flight delays cost America more than \$31 billion per year in wasted time – a cost that high-speed rail can help alleviate.

## 3. Safety

Approximately 43,000 people are killed every year in car accidents in America and another million more seriously injured. High-speed rail is the world's safest form of transportation proven by decades of safe operation. Japan was the first nation to build high-speed rail in 1964 and has since transported 10 billion passengers without a single fatality! France has a similar record with their 30 years of high-speed rail operations, as do several other countries.

## 4. Energy/national security

America is in deep trouble due to our extreme oil dependency for 98 per cent of our transportation; consuming some 20 million barrels of oil every day, 70 per cent of which is for transportation. Maintaining this enormous flow of oil requires America to dig up oceans, protected national forests and the arctic tundra; risking our clean drinking water, our health and our safety – without forgetting the expensive consequential wars. None of this is sustainable or desirable.

High-speed rail is the world's greenest form of transportation and can be 100 per cent powered by renewable energy, bypassing the entire global-oil-military-supply chain. The California HSR system under construction in the Central Valley will be powered 100 per cent by renewables.

## 5. Light freight solution

High-speed rail offers an alternative light freight shipping infrastructure in combination with its passenger transport, lowering the cost (and increasing reliability) of shipping light freight goods and perishables throughout the country. This would replace our inefficient light freight shipping network – consisting mainly of long-distance trucks and airplanes – which has an enormous carbon footprint and clogs our highways.

## 6. Carbon solution

Transportation is the single largest source of carbon causing climate change. The American transportation system is the most inefficient on earth, with most of the country driving gas-guzzling, single-occupant SUVs hundreds of miles a day around sprawling communities. Whereas, on the other hand, high-speed rail can be zero carbon transportation.

## 7. Housing affordability

High-speed rail helps solve the affordable housing crisis by providing access to a wider housing market and taking pressure off the high price 'hot spots' by levelling out pricing at the regional scale. High-speed rail also spurs the development of additional rail systems including light-rail and streetcars, thereby opening up additional possibilities for affordable living and the ability to live without a car or less cars per household – saving the huge expense of car ownership.

## 8. City revitalisation and sprawl redirection

High-speed rail redirects regional land development patterns into TOD (Transit Oriented Development) – compact, walkable, mixed-use and focused around rail stations. Feeder rail systems spur additional corridors of redirected development into compact, walkable forms.

## 9. Economic development tool

High-speed rail has the power to attract major real estate development around its stations, while also creating whole new industries due to its extensive manufacturing needs. It will also initiate a nationwide construction boom, followed by a new travel boom that will continue for decades.

## 10. Job creator in manufacturing and construction

A national high-speed rail system will create millions of well paid jobs building the infrastructure and system components, managing the rail systems and operating the stations and related real estate development.

Given all these incredible benefits, high-speed rail represents a truly transformative proposition, worthy of major federal and state investment in America's bright future. Proof of such is evident all around the world where high-speed rail has been solving problems and providing great mobility and access to billions of people. Now it's America's turn to modernise its transportation for the 21st century. 

**“High-speed rail is the world's safest form of transportation proven by decades of safe operation”**



**ANDY KUNZ**, President and CEO of the US High Speed Rail Association (USHSR), sets their vision and direction. He brings 30 years of successful business experience to USHSR and provides senior leadership and an ambitious vision for sustainable transportation in America. This vision includes a 17,000-mile national high-speed rail network built in phases and slated for completion by 2030. Andy holds a Bachelor of Fine Arts degree and a Master of Architecture in Town Design from the University of Miami. He has served as an expert in a number of forums, speaking extensively at leading conferences and events on transportation and planning topics and providing keynote presentations on high-speed rail and sustainability at numerous international conferences.

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# Infrabel's commitment to a smarter railway

Infrabel, the Belgian rail infrastructure manager, is working hard on smarter maintenance and digitalising its rail infrastructure to ensure rail traffic in Belgium becomes even safer and of higher quality. For *Global Railway Review*, [Luc Vansteenkiste](#), Director-General Asset Management, overviews the challenges and benefits of this gigantic transformation.

## Smarter maintenance as the basis of maintenance

The Belgian railway network is one of the busiest in Europe, with 4,000 trains (passenger and freight) in operation every day. To guarantee safe and punctual rail traffic, Infrabel must regularly check, maintain and, where necessary, replace its rail infrastructure.

Smarter maintenance aims at more efficient and targeted maintenance of assets (rails, catenaries, points, signals and level crossings) by making maximum use of digitalisation in combination with new operational working methods and resources. To be able to manage all maintenance in a more targeted manner, we are working on the development of a gigantic digital platform.

## Digitalisation via sensors and measuring trains

At the beginning of 2014, Infrabel began the step-by-step digitalisation of the entire Belgian railway network. This is our 'Smart Railway' project. We are making our localised infrastructure (points, signals and level crossings) 'smarter' by installing sensors everywhere. This infrastructure lends itself perfectly to the application of 'embedded intelligence' because it often concentrates on a specific location.

Special trains equipped with sensors and measuring equipment are also used to identify the maintenance requirements of the linear infrastructure (rails and catenaries). These trains and sensors collect all the data in a central database. On this basis, it can be predicted when the rail infrastructure will need to be maintained and renewed. Predictive maintenance is where we try to anticipate problems even before they arise.

## Focusing on the safety of staff while working

An additional advantage is that the use of sensor-equipped trains means that Infrabel staff no longer have to manually check 6,500km of tracks, which naturally benefits safety. Of course, our railway staff will still need to intervene in the field to carry out the maintenance or to solve the problem.

The focus on increased efficiency is only possible if we make full use of modern tools, such as our 'Mobile Maintenance Unit'. This is a work train consisting of two wagons: One for the transport of the tools and a second (without a floor) that is equipped as a fully-fledged workshop. This last wagon has laterally removable walls to increase the work space while ensuring safety in relation to train traffic on the adjacent track. Our staff can work in complete safety, even in harsh weather conditions. ➤



**LUC VANSTEENKISTE** has a Bachelor's degree in Information Science and has been Director-General of Asset Management at Infrabel since 2011. Luc's career has seen him be Administrator-Director of Eurostar Group Ltd. & Eurostar UK Ltd. (1998-2000), Managing Director of RMF (2002-2004), General Manager of ICT of the SNCB (2000-2004), Managing Director of Rail Access at Infrabel (2004-2011), Chairman of RailNetEurope (2005-2012) and Administrator at TUC RAIL.



ABOVE: Infrabel's 3D simulator for training 'lookout' staff



**One central database and tablets for use in the field**

Smart Railway is implemented in close consultation with Infrabel's maintenance teams and is designed to support them. All the information our maintenance staff need is sent to their tablets. Teams in the field can use their tablets to view component information, consult the required tasks,

enter measurement data and take photos of any damage to the railway infrastructure.

In this way, Infrabel creates a single, large database that is a collection of all assets and their components, indicating, among other things, their age, condition, previous maintenance information and installation date. By digitally and centrally managing all information, we are able to monitor and therefore predict maintenance better and quicker. At the touch of a button, components that are nearing the end of their service life can be identified and integrated into a renewal programme.

**European leader in innovation**

Smart Railway is one of the largest digitalisation projects in Belgium and we are fully committed to smarter maintenance and digitalisation. We are one of the European leaders in this field. A recent international study by PricewaterhouseCoopers and Mainnovation showed that Infrabel is at the forefront of best practices and innovation in the field of rail infrastructure maintenance.

At the end of 2017, Infrabel received the Trends Digital Pioneers Award for Smart Railway, with the jury rewarding the innovative and progressive character of this digitalisation project. And at



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RailTech 2017, Infrabel received the Public Transport Innovation Award for the use of a simulator that works with virtual reality (3D) and is used to train so-called lookouts. These are employees who monitor the safety of their colleagues while they are carrying out track work.



**ABOVE:** Specially-equipped sensor and measuring trains help to predict problems before they occur

### New rail pads halve the noise nuisance from train traffic

In addition, Infrabel has also developed a new generation of rail pads. These are small rubber pads that are placed between the concrete sleepers and the rails. They reduce the noise produced by a combination of trains and rail infrastructure by an average of three decibels. Compared with the previous rail pads, these new pads reduce the noise nuisance from rail traffic by 50 per cent.

The aim is to equip 100-150km of track a year, which corresponds to approximately 300,000 sleepers a year. With the new rail pads, Infrabel is proactively taking noise-reducing measures, and as a public company at the service of society, this is one of our priorities.

### Digitalise fully and continue to evolve

Knowledge is power and to innovate is to progress. Digitalisation really does contribute towards improving the effectiveness and efficiency of maintenance and thus to a safer, more reliable and better-quality rail network.

In order to continue evolving, we are looking at other industries – such as the maintenance of wind farms in the North Sea – to permanently gain inspiration. By resolutely playing the digitalisation, Infrabel has entered the 21st century and is trying to set an example for other European rail infrastructure managers. 

 @GlobalRailway



*The future of digitalisation will be under discussion at*

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## DIGITAL RAIL REVOLUTION

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# Building a case for cost reductions in the electrification of UK infrastructure

The cost of electrification in the UK is substantially higher than in other countries. *Noel Dolphin*, Director of Furrer+Frey, discusses how this is hindering the rail sector's progress, and highlights a successful European case study that the UK could learn from.

**T**HE UK mainline rail electrification programme has been a frequent feature of the news over the past five years. Cost increases have attracted intense public controversy and resulted in a U-turn by the UK Government with cancellation of several projects throughout 2017. The subsequent investigation, coordinated by the National Audit Office of the UK, highlighted that many decisions were based on cost.

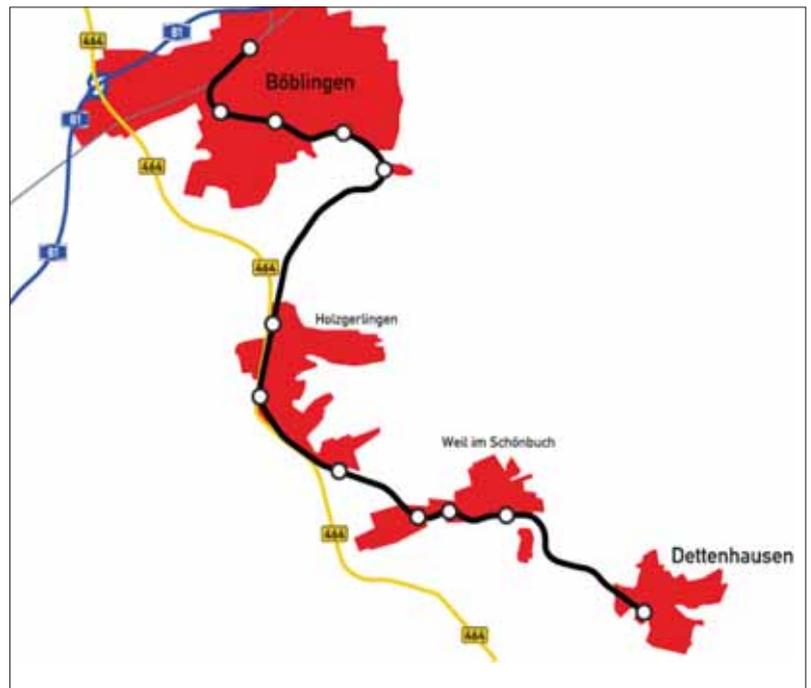
During this time, across Europe, electrification projects have ploughed on with no sign of the cost overruns experienced in the UK. In early spring 2018 the UK Government stated their determination to decarbonise the railway by 2040. We now have an opportunity to step back and look at the way electrification infrastructure projects have been managed and learn lessons from the success of other countries. Costs must be reduced in the UK if electrification is to survive.

The Rail Industry Association (RIA) is currently collating case studies and benchmarking costs from across Europe. From suppliers it is now clear that UK electrification costs are out of kilter with European norms. At Furrer+Frey we have been electrifying railways for almost 100 years, so in order to support the work of the RIA we have looked at some recent European projects.

Our most recent project, in Germany, finished not long ago and provided an ideal case study representing a successful and cost-effective electrification project. This story is not unique: Electrification projects are regularly delivered successfully by companies across Europe. The experience of our own work – and knowledge of the projects of others – has forged an understanding that the answer lies not in complicated algorithms, but in good railway project management fundamentals.

In Germany there is a rolling electrification programme that aims to electrify 200km of track a year, every year, which creates a stable work bank and leads to companies investing in machinery and people. However, most importantly, a rolling programme of electrification reduces unit rates (the cost per kilometre).

The Schönbuchbahn is a railway branch line near Stuttgart that links regional suburbs and villages to the South West of Stuttgart to the town of Böblingen. In turn, Böblingen links to the centre of Stuttgart.



The Schönbuchbahn was a single-track railway, but as passenger numbers have increased significantly since the mid-1990s, the regional government decided to upgrade the entire route. The route upgrade project included removing level crossings, canting the curves, upgrading the route's speed to 100km/h, double-tracking on parts of the route, installing new depots, electrifying the route and providing new electric trains.

The aim was to significantly increase line speed and introduce a metro-style service with trains every 15 minutes.

### Why electrification?

The regional government chose electrification for several reasons:

- To tackle local air pollution issues and support wider climate change goals
- Electrification has improved reliability compared to diesel trains
- They believed only electrification could support their new metro service, which required faster trains, faster acceleration and more frequent trains for a new timetable
- They wanted to attract people out of cars and onto the railway by providing a modern, reliable railway with good connections.

These are all arguments that clearly resonate with our own urban and inter-urban transport aspirations and the initial reasoning behind other recent electrification projects in the UK. ▶

 **ABOVE:** Route map of the Schönbuchbahn



**NOEL DOLPHIN** is a Director at Furrer+Frey. Noel has worked on infrastructure projects for 20 years, with the past 10 focused on delivering electrification projects – both renewals and new build. Noel is currently focused on Furrer+Frey's Engineering Consultancy business and emerging markets projects.



**ABOVE:** Machinery used on the Schönbuchbahn



## Cost of electrification

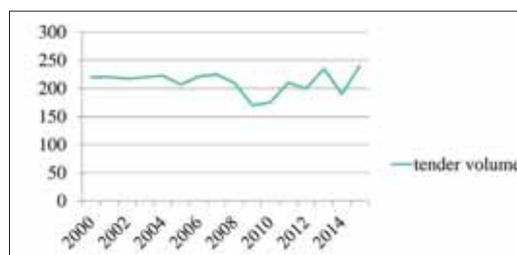
However, electrification costs on the Schönbuchbahn project are a fraction of UK electrification costs.

The overall project cost £89.82 million, including the electrification construction and materials which were £8.11 million. The electrification was for 29.60 STKM and the majority of the 17.9km-long route was two-track with only some sections single-track. The costs equated to £273,810 per kilometre per STKM for materials and construction. This includes the materials and installation of foundations, structures, small part steelwork and registration equipment, plus conductors. Project management by the client and design costs were budgeted separately, but when included, the total costs for electrification of the Schönbuchbahn was £9.85 million, or £290,000 per kilometre per STKM.

Of course, a note of caution is required when making any comparisons – particularly with the UK. Each project often cuts budgets and funding differently and experiences different challenges. For example, the Schönbuchbahn project encountered the following:

- No grid or additional feeding connections were needed, as Böblingen is already connected to the regional overhead line network (these are often the most significant costs on an electrification project)
- There were no substantial support works for clearances needed – such as bridge rises, track lowering and parapet raising

**RIGHT:** German electrification tender volume by year, measured in single track kilometres



- There are no Schedule 4 costs in most of Europe (possession access charges to train operating companies) and, unlike in the UK, there is no separate infrastructure owner that needs to pay a train operating company for the cost of cancellations or loss of tickets sales
- The overhead line system used is 15kV, which is standard in Germany. If a UK 25kV system had been used, there would have been a slight cost increase (less than 10 per cent)
- The Schönbuchbahn is a semi-urban branch line, passing through substantial amounts of countryside, but for a multi-track railway in a dense urban railway, the costs would be greater.

Notwithstanding the aforementioned caveats, it is still clear that the costs are substantially less than any achieved in the UK in recent years. At £290,000 per STKM, it is less than a third of the UK aspiration and an even smaller fraction of current UK costs.

## Questions raised

How has this been achieved and how can this be replicated in the UK – in particular, to allow for branch line electrification?

### An appropriate electrification system

The electrification system used was appropriate for the route and line speeds. As the route was being upgraded to 100km/h, a suitable low-speed system was used. This has lower tensions and lighter weight equipment than a higher speed system.

### Sequenced construction

The construction was sequenced to allow one activity at a time. For instance, the double-tracking contract was let two years before electrification. This meant track work was complete and the track position known before work began. Furthermore, detailed electrification design was finished before the electrification tender, based on actual track data, meaning a fixed price contract could be issued for electrification.

### Incentivisation

Construction was competitively tendered based on a fixed price and known remit, completed track works and finished detailed designs. Installation tenderers were thus priced on materials from a known bill of quantities. The limited risk of unknown factors meant that there were few subsequent changes and variations and, furthermore, the installation contractor was incentivised to complete the work in a minimal number of visits. This meant that they planned and executed efficiently to ensure a profit on a fixed price tender.

### Alignment of goals

The railway is operated by the Württembergische Eisenbahn-Gesellschaft (WEG) who operate the trains and maintain the track. This close alignment of work means there is also an alignment of goals and all parties work congruently. While the UK operates a different model, the alignment of goals by all parties would still make projects more efficient.

### Streamlined communications and reduced overall costs

Project teams within the construction contractor, design contractor and client have deliberately been kept small to make them lean and more efficient. Clearly the Schönbuchbahn route upgrade project is a small project compared to large UK mainline route upgrades; however, as a percentage of costs, the project management/central team is very small compared to UK electrification projects. We believe this leads to streamlined communications and reduced overall costs.

### Skilled installation staff and machinery investment

Installation staff are primarily full-time, directly paid and highly skilled employees. The skills gained over

the 30-year rolling programme of electrification across Germany has enabled the industry to develop a stable, highly trained workforce. It has also led to long-term investment in plant and machinery.

The Schönbuchbahn project demonstrates that it is possible to electrify a route at a low cost.

Electrification was chosen as it is proven technology, with a high reliability that can be delivered affordably. Delivering to cost is achieved through railway project fundamentals, such as:

- Incentivising contractors correctly
- Sensible programme sequencing
- Applying appropriate simple rules and systems
- Aligning goals
- Keeping communication lines short and project teams small
- Using a skilled workforce
- Maintaining a rolling programme of electrification.

Establishing a steady rolling programme of electrification is the only way to reduce costs as it allows the aforementioned project fundamentals to be implemented. 🚆

**“ We now have an opportunity to step back and look at the way electrification infrastructure projects have been managed and learn lessons from the success of other countries ”**



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## Koralm Tunnel: The first breakthrough is imminent

Work on the Koralm railway between Graz and Klagenfurt in Austria is running at full throttle with 90 per cent already under construction or completed. The next big upcoming milestone is one of the most important to date – the first breakthrough in the Koralm Tunnel.

**ABOVE:** Visualisation of the western portal of the Koralm Tunnel



**T**HE 130km-long Koralm railway is one of the most important transport infrastructure projects in Europe. It is part of the new Southern line and thus an essential section of the Baltic-Adriatic corridor. From an Austrian point-of-view, the Koralm railway represents a decisive structural improvement, especially for southern Austria as a business location. The shortest travel time between Graz and Klagenfurt will be reduced from almost three hours at present to just 45 minutes.

### Ninety per cent under construction

The heart of the project is the 33km-long Koralm Tunnel. In addition, the new high-performance line consists of 12 new stations, over 100 bridges and numerous other tunnels. Approximately 90 per cent of the high-performance line is now under construction or completed. With the exception of one section between Feldkirchen and Weitendorf, all sections are either under construction or complete. In particular, the

tunnelling work on the Stein, Lind, Peraschitzen and Srejach tunnels in Carinthia, some of which have very difficult geology, and the tunnelling work on the Granitztal tunnel chain, have been successfully completed. The structural engineering work for the future high-speed train station in Western Styria has been in full swing since 2017.

### First breakthrough in the Koralm Tunnel

In addition, one of the most important milestones of the project of the century is expected this year – the first tunnel breakthrough in the southern tube of the Koralm Tunnel. There are fewer than six kilometres to go to the second breakdown in the north tunnel. A special feature here are the very different rock variants in the mountain. Kora – the Carinthian tunnel boring machine in the north tunnel – was therefore designed so that it can be converted. After having driven the first five kilometres as a soft stone machine, the rest will be done as a hard stone machine. ➤



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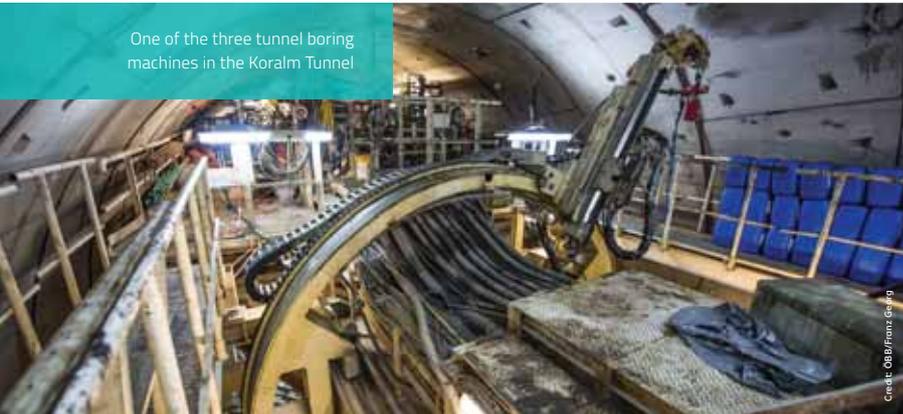
*la passion du rail*

## Pioneering achievements

More than 800 people and three tunnel boring machines are employed in the construction of the Koralm Tunnel. It is a world-first for a tunnel boring machine to be in continuous use in hard rock for more than 17km – and 1,200m below the summit cross. The logistical challenges are

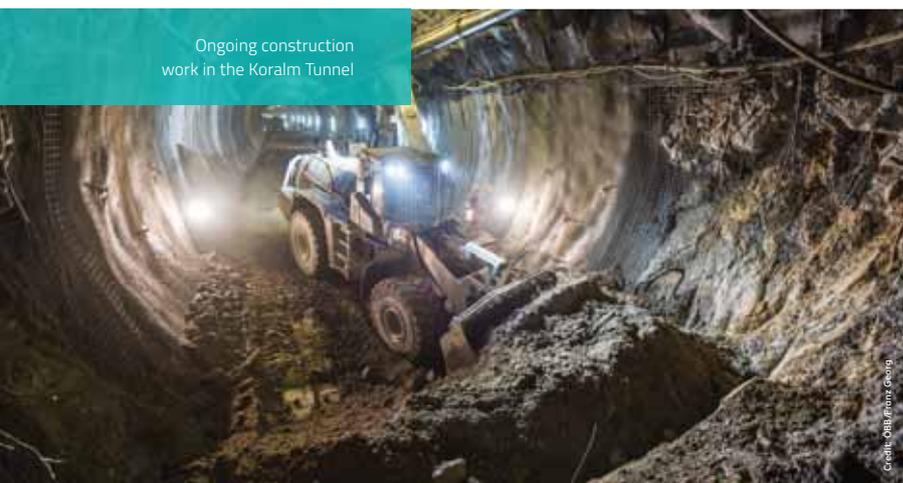
therefore considered pioneering work. After all, six million cubic metres of excavated material have to be removed from the mountain, which corresponds to the volume of two Cheops pyramids. Most of this volume is natural, largely recyclable construction material. Approximately four million cubic metres are used as bulk material for noise barriers, railway embankments, filter gravel or aggregate for concrete.

One of the three tunnel boring machines in the Koralm Tunnel



Credit: ÖBB/Thomas Gump

Ongoing construction work in the Koralm Tunnel



Credit: ÖBB/Thomas Gump

Construction site of the Koralm Tunnel in Leibenfeld (Styria)



Credit: ÖBB/Leibenfeld

## Outlook for the technical equipment

Completion of the shell will be followed by installation of the technical equipment. The trains along the Koralm railway are supplied with environmentally-friendly electrical energy. An innovative power rail which enables speeds of up to 250km/h is thus also used in the Koralm Tunnel. However, numerous other facilities are required in addition to the overhead line and the track system in order to complete the railway. Modern train safety technology, the European Train Control System (ETCS), controls aspects such as the speed and direction of the trains and data is continuously transmitted via a dedicated radio network (GSM-R). If the speed limit is exceeded, the system can automatically brake and bring the train to a stop before a hazardous point is reached.

## Part of the Baltic-Adriatic corridor

In a European context, the Koralm railway – together with the Semmering Base Tunnel and Vienna Main Station – is considered to be a key project along the Baltic-Adriatic corridor. The aim of the corridor is to connect individual regions and up-and-coming economic areas between the Baltic and the Adriatic with each other. At the hub in Vienna, for example, it meets other TEN (Trans-European-Networks) corridors in the EU's core network, such as the Rhine-Danube corridor. 

## ABOUT ÖBB-INFRASTRUKTUR AG

With around 18,000 employees, ÖBB-Infrastruktur AG plans, develops, maintains and operates the entire ÖBB rail infrastructure which includes train stations, routes, buildings, terminals, telecommunication systems and plants for environmentally-friendly railways. They manage the total property assets and are therefore one of the largest property owners and developers in Austria. Within the company, the majority of ÖBB apprenticeships and the railway-specific, operational and technical training are integrated. On behalf of the federal government, ÖBB-Infrastruktur AG invests more than €2 billion into the Austrian rail network each year and provides state-of-the-art railway technology. ÖBB-Infrastruktur AG is a 100 per cent subsidiary of ÖBB-Holding AG and wholly-owned by the Republic of Austria.

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## INTERNATIONAL RAIL DEVELOPMENT 2018

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# The top five things we learned at the International Rail Development conference

The **International Rail Development** conference took place on 22-23 May in Brussels and brought together attendees from all corners of the rail sector to discuss some of the biggest developments currently impacting the industry.

FROM large-scale infrastructure projects, to technological developments and even developing ties within the sector itself, the conference explored various aspects of how rail is developing today and in what ways these developments will impact the future.

In fact, the day began with an opening panel to discuss that very topic: What is the future of rail? So, did we answer that question? Here are five things we learned at the International Rail Development conference...

### 1. Multi-modality

A key element at the International Rail Development conference when discussing future rail developments was the industry's need to focus on multi-modal travel to ensure rail is a viable and efficient mode of the transport today and in the future. As Jean-Pierre Loubinoux, Director General of the International Union of Railways (UIC) said during the opening plenary: "The word 'intermodality' has become opti-modality [and] today we're even talking about modal integration.

"Rail is interoperability, or the integration of modes between regions, countries and continents. This means long distances and international links. [For the rail sector to develop further] all modes will have to adjust quicker and together."

### 2. Digitalisation

There were several sessions within the conference that focused on digitalisation and its importance in developing the railway sector to be more sustainable and efficient.

From smart assets and artificial intelligence to digitalised CCTV and even using 3D printing to make parts, digitalisation is fundamental in the future of transport.

"Digital is the big buzzword," Simon Fletcher said during his closing speech. "The future is digital [and] data is rich. People like to say that 'data is the new oil', but we have to harness this together."

### 3. Financing

With the World Bank attending the conference, financing was a key issue, with Martha Lawrence from the World Bank discussing the topic from its basics – "financing is not free money. It's important that investments [that are] made are profitable enough that they can pay for themselves over time" – to taking this further and exploring methods on how to get financing: "The key to accessing [various] sources of financing is to be credit-worthy."

Financing is a fundamental element when discussing the future of rail, as large-scale rail projects require a high level of investment, with a very long-term return on these investments. It is a topic that is rarely discussed within rail events and it was clear that this is something that needs to be explored further in the future.

### 4. Connections

The topic of 'connecting' was explored on multiple levels throughout the conference; from the fundamental idea of rail connecting areas and countries, to actually connecting together as an industry. "Our main objective is to break down the

barriers that still exist amongst EU member states to create a unified single railway market," said Elisabeth Werner, Director Land Transport, Directorate General Mobility & Transport at the European Commission. "[The EU's] rail networks are growing worldwide, and that's why connectivity, making sure the European network is linked into this, is very important. We want to ensure the European networks are linking effectively into international routes."

The idea of connection was also explored with the ideas of rail alliances and the need for the industry to work together to create large-scale rail projects and explore new technologies to ensure the industry develops further.

### 5. Learning

The idea of connecting as an industry also brought together the idea of the industry learning from each other to become more efficient. This is especially relevant when it comes to new innovations and ideas.

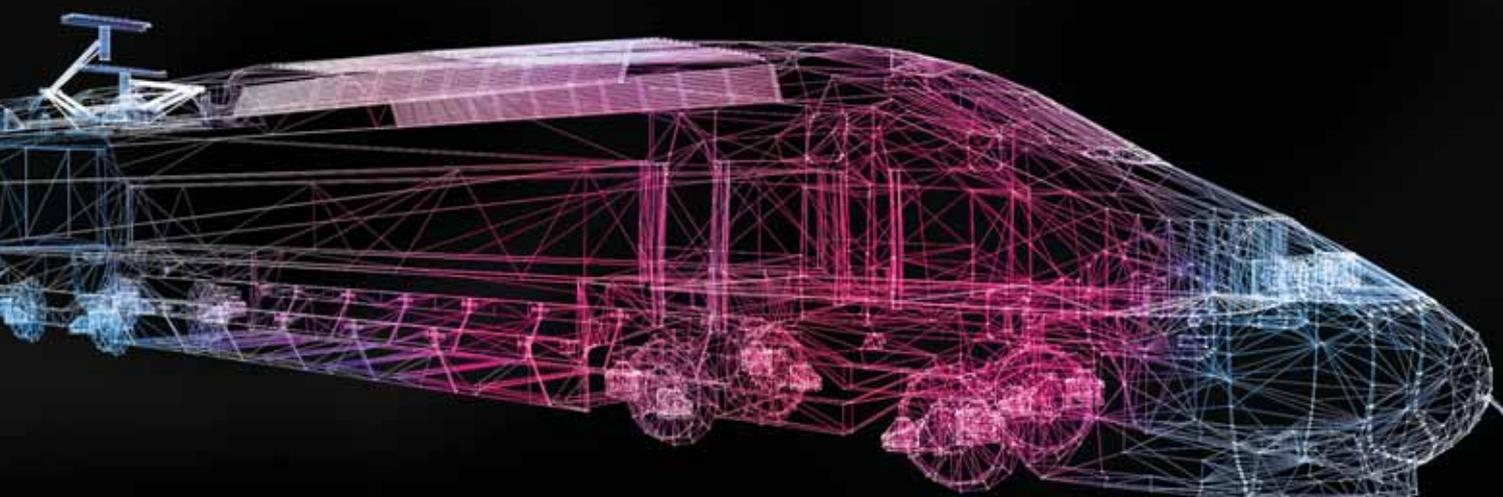
As Simon Fletcher concluded in his closing speech: "It's quite clear we cannot [develop] in splendid isolation, each in our own little areas or worlds... we must be efficient, and we've talked about efficiency drives. We must maximise opportunities and above all be smart. We need to be clever. The future is bright. The future is rail as a system and it can only be run as a system if it's going to be efficient." ■



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# ROLLING STOCK DEVELOPMENTS

The rail sector is changing at rapid pace with numerous innovative digital technologies now playing a crucial role in how tracks are run and maintained. Among these modern infrastructure changes, the development of rolling stock should not be overlooked – the comfort and performance of trains is just as important as developing the tracks they operate on.





## Designing rolling stock of the future with new materials and smart designs

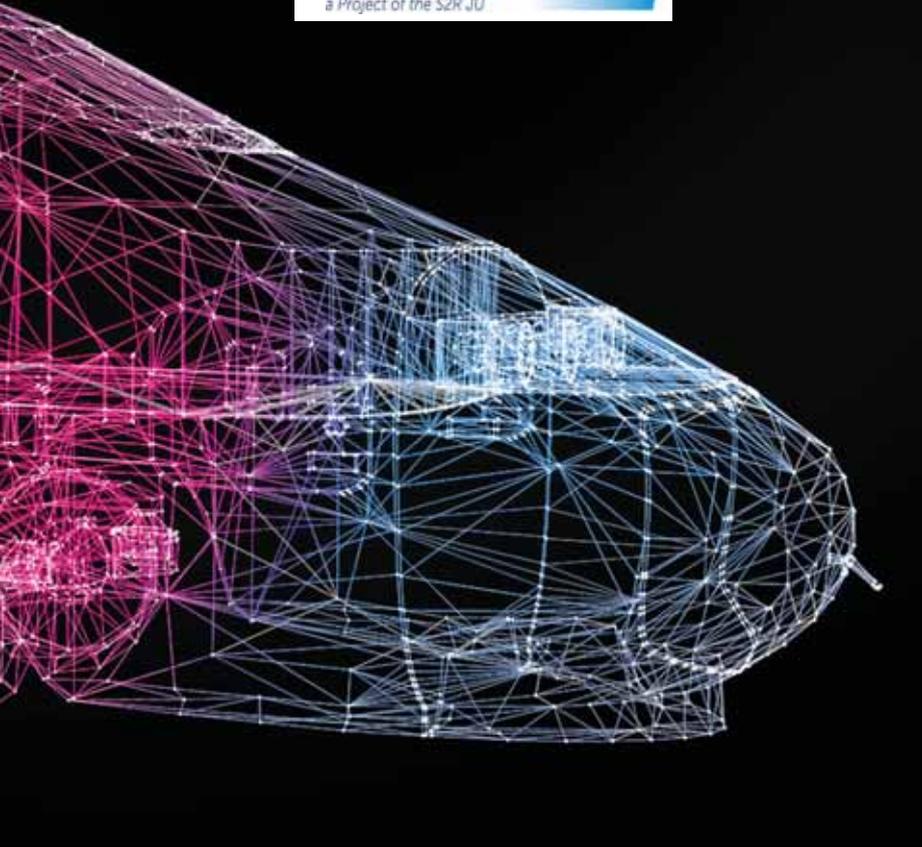
If the rail sector is to remain globally competitive, Europe's rail industry requires a step change when it comes to the technology and design of the next generation of rail vehicles. The use of innovative materials and modular designs are key for success. Safety Department colleagues at the RISE Research Institutes of Sweden, *Per Blomqvist* and *Johan Sandström*, look at the Mat4Rail project, which aims to reduce train weight by replacing metal parts with fibre-reinforced polymers (FRPs) and increase train capacity and comfort with a built-in modular interior design.

**C**OMPOSITE materials that contain light, repairable and corrosion resistant properties have demonstrated a high potential for lighter, more energy- and cost-efficient structural components for sectors such as the aeronautic and automotive industries. However, many structural composites that are currently available do not meet the Fire, Smoke and Toxicity (FST) requirements of the railway sector and thus cannot be used for the manufacturing of rolling stock car body shell parts. Furthermore, the structural design and testing of mechanical properties are more complicated, worsened by the lack of experience that is present in the rail sector.

The Mat4Rail<sup>1</sup> EU project, under the Shift2Rail programme, consists of a multi-disciplinary consortium of seven SMEs, three large industries, five RTDs, one university and the experience and skills required to deliver innovations that can, and will be, used by the European railway industry.

### Shift2Rail Joint Undertaking

The Shift2Rail Joint Undertaking (S2R JU), one of the public-private partnerships (PPP) within the European Horizon 2020 research programme, was created to coordinate and drive innovation in the railway sector, improving the costs, capacity, reliability and punctuality of trains



and infrastructure. Shift2Rail comprises of five innovative programmes, the first of which applies for Mat4Rail, and aims at improving performance and reliability, increasing capacity and energy efficiency and reducing life-cycle costs.

### The Mat4Rail project

As one of 31 running projects under S2R JU, the Mat4Rail project has been granted €3.5 million to address these challenges and initiate a step change in the technology and design of the next generation of rail vehicles; securing the global competitiveness of Europe's rail industry.

Necessary for success are innovative materials and modular designs of rolling stock, to which Mat4Rail is devoting its efforts. This two-year project takes a first step towards reducing train weight; replacing metal parts with fibre-reinforced polymers (FRPs) that are fire tested and mechanically approved. The project also presents new innovations that increase capacity and passenger comfort via built-in modularity of train interior design.

Mat4Rail will benefit several stakeholder groups, including the rail supply industry, rail operators, passengers and the European economy. The project will enable new composites with improved performance to be introduced to the market – making them available for the rail supply >

**“ Mat4Rail will benefit several stakeholder groups, including the rail supply industry, rail operators, passengers and the European economy ”**

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**ABOVE:** Members of the Mat4Rail project consortium 

industry, reduce the weight of rolling stock car body shell sections by up to 30 per cent with developed lightweight FRPs and optimise access door systems in terms of architecture and materials. Furthermore, new functions will be integrated in the rolling stock car body shell with increased interior space and new joint concepts for composites developed. Innovations for seats and the driver's stand will improve capacity, performance and comfort, and in the long run, Mat4Rail will evidently create commercial opportunities for the rail supply industry.

The Mat4Rail project consortium comprises of leading scientists from five research institutions and market leaders from 10 relevant industries and highly innovative SMEs. Assembling experts in engineering and materials research, as well as industrial and product design from seven European countries, enables an efficient industry-academia collaboration which can make a significant contribution to the railway of the future.

### Workstreams

The project is divided into two workstreams: Materials and Interior Design. In the Materials Workstream, new modified polymeric resins (benzoxazine respective epoxy based) will be developed for producing fire safe FRPs. Joining technologies for the FRPs will be established and both structural elements of FRPs and joints will be characterised, regarding fire and mechanical safety properties. The Interior Design Workstream includes the design and conceptual demonstration of

a new innovative 'plug and play' system for wagon interiors, innovative seats and a new driver's desk.

### Fire safety

The Safety Department within the RISE Research Institutes of Sweden<sup>2</sup> directs the testing work and characterisation of FRPs and joints. Fire tests are conducted by RISE Fire Research with a focus on both reaction-to-fire and fire resistance, ensuring the composite materials created fulfil the requirements posed by the European standard for materials in trains (EN 45545).

Reaction-to-fire is a product's properties regarding the production of heat, smoke and toxic gases. Reaction-to-fire requirements are given in EN 45545-2 for materials and products that are used for interior and exterior applications in a railway vehicle. As FRPs are combustible, as well as the adhesives used for joints, it is important to characterise the reaction-to-fire properties throughout the development chain of a new FRP material to design a fire safe and approved product.

Fire resistance is a construction's properties regarding fire insulation, smoke and flame tightness and structural integrity under a fire load. In a railway vehicle there are specific areas that are associated with fire resistance requirements. Examples are divisions between the passenger and driver's cab, critical underfloor appliances and luggage compartments. The requirements are given in EN 45545-3 where tests are conducted using full-scale fire resistance furnaces (a vertical



**JOHAN SANDSTRÖM**

works as a Researcher in the Safety Department at RISE Research Institutes of Sweden. Johan has a PhD in Applied Mechanics where he worked with fatigue issues in rails and wheels and is an expert in mechanical analysis and durability. He has participated in different European research projects related to mechanics, fatigue and reliability and is currently responsible for the testing programme of mechanical properties of composites in the Mat4Rail EU project.

furnace has a 3m x 3m opening). However, EN 45545-3 gives room for using a reduced scale furnace. Demonstration tests will be conducted by RISE using reduced scale furnaces up to a size of 1m x 1m characterising the fire resistance of FRP elements and joints of FRPs and aluminium.

### Mechanical characterisation

Mechanical testing of materials, in regard to both fatigue and static strength, are being performed by RISE Mechanics Research. Structural strength of railcars is regulated by several EN-standards. For passenger trains, the most important is EN 12663-1: 'Railway applications – structural requirements of railway vehicle bodies'. It specifies which loads are to be designed with requirements on the strength of used materials. Various load cases are given, for example, static cases where loads due to gravity, normal operations and accidental loads of moderate magnitude are included. Also fatigue load cases are of importance, constituting of loads that are repeated frequently due to vibrations and frequent operations.

The structural design is divided in two parts: Calculation of loads and determination of material strength. In the Mat4Rail project, the partner IMA (IMA Materialforschung und Anwendungstechnik GMBH) performs the load analysis and stress calculations for rail vehicles with composite materials. Material testing, focused on joints between composites and other materials, is led by the University of Bremen. RISE performs testing on the composite materials.

Of the mechanical elements, the fatigue properties of the materials and components are the most demanding to determine through testing. Fatigue testing is performed by applying a load on a sample multiple times, which is then repeated for different load levels to account for the large scatter in fatigue testing. According to EN 12663-1, designing should be performed for load repetitions up to 10 million, implying several tests need to be repeated up to 10 million times. For metals, fatigue properties and testing methods are well known and established compared to the case of composites. For composites, only static testing is standardised in standards such as EN and ASTM. A major objective in the Mat4Rail project is thus to perform and develop fatigue testing that works for composites. 



**PER BLOMQVIST** works as a Senior Research Scientist in the Safety Department at RISE Research Institutes of Sweden. Per has a PhD in Fire Technology and is an expert on reaction-to-fire properties of materials and products. He has participated in different European research projects related to fire protection of rolling stock including the TRANSFEAU project on smoke toxicity and the Fire Resist project on lightweight materials for transport applications. Per is currently the Work Package Leader for testing and characterisation in the Mat4Rail EU project.

### REFERENCES

1. [www.mat4rail.eu](http://www.mat4rail.eu)
2. [www.rise](http://www.rise)

## MAT4RAIL FACTS AND FIGURES

Mat4Rail<sup>1</sup> is a research project that has received funding from the Shift2Rail Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No. 777595. It involves 16 organisations from seven European countries with CIDETEC, Spain, as the Coordinator. With a total project budget of €3.5 million, the project started on 1 October 2017 and will end on 30 September 2019.



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# On track:

## Refurbished trains for Grand Central

As the first of Grand Central's refurbished trains rolls into service in England, Fleet Director, [David Hatfield](#), gives us an insight on upgrading the open access train operator's entire fleet of rolling stock in 2018 – part of a multi-million-pound investment programme.

“ Our whole company ethos is built around understanding what is important to our customers and it's critical that investment in our rolling stock is part of our overall offer ”

**A**FTER nearly two years of planning, it was extremely satisfying to see the first of our fully refurbished Class 180 Adelante trains roll onto the tracks en route to London and into daily service.

The Adelante fleet is around 15 years old and over the next 12 months we will be fully refurbishing and upgrading the interiors and exteriors of our trains – part of a £9 million investment programme. This includes the five trains that were recently transferred from Great Western Railway (GWR).

As Grand Central<sup>1</sup> enters its second decade in business, we're delighted to bring this first refurbished Adelante train back into service and show our customers what we have been working on behind the scenes.

With the first train now in service, our renovation programme is well underway and over the coming months more and more trains will come into service as the upgrades continue throughout 2018.



Credit: Andy Brown

At Grand Central we have a genuine commitment to provide the best possible passenger experience and connect communities along our North East and West Riding routes with London.

In the planning and design stages of the project, we've given much thought to the interior and exterior of these trains, always focusing on potential benefits for the passenger. Working closely with our suppliers, our overarching design focus has always been the comfort and convenience of both our leisure and business travellers.

We have examined in detail the best way to bring these aspects up-to-date and deliver a better travel experience, whilst retaining the elements we know are valued in Grand Central, such as plenty of leg room and table seating.

This includes everything from a full interior refresh to refurbishing the seats with new cushions, fabrics and leather edging in standard class. We've also laid new flooring throughout the train and carried out a full refit of our toilet facilities, ▶



As Fleet Director for Grand Central for the last seven years, **DAVID HATFIELD** has responsibility for maintenance of the Class 180 fleet. Previous roles include Programme Manager for the tram-train pilot scheme and Professional Head of Engineering for Northern Rail. Dave has 40 years' industry experience, including managing the introduction of new-build rolling stock.

▶ @GlobalRailway



## REENGINEERING SOLUTIONS



EXAMPLE:  
NS1 RELAY SOCKETS

### WHAT IS REENGINEERING?

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**ABOVE:** Interior refresh: Refurbished seats in standard class 

as well as improved disabled access and baby changing facilities.

Again, with passenger on-board comfort and customer experience front of mind, we've upgraded a full suite of facilities. This includes making improvements to an array of elements such as revamped catering facilities with barista coffee machines, installation of energy efficient LED lighting and relocating the power sockets to enable the charging of mobile phones, laptops and other electrical devices.

We've also given our train a full repaint inside and out for a brighter, fresher look and feel. The rest of our fleet will also receive the same treatment over the coming months –including our five newly acquired trains from GWR, which will be rebranded in Grand Central livery as part of the improvement programme.

The refurbishment work is being undertaken by Arriva TrainCare (ATC) at their depot in Eastleigh, enabling Grand Central to benefit from Arriva Group's extensive train refurbishment capability.

This is a complex project and the planning, logistics and implementation of the upgrade has, of course, not been plain sailing. As often happens on refurbishment programmes of this type, unexpected problems arise. However, we are working closely with ATC and eagerly anticipate the arrival of more trains coming into service over the next few months. It's an exciting time and the whole refurbishment programme is part of Grand Central's wider ongoing investment programme, making enhancements to the customer experience on-board, online and at stations.

Our whole company ethos is built around understanding what is important to our customers and it's critical that investment in our rolling stock is part of our overall offer.

I'm certain that passengers using this, and forthcoming, trains will experience their journeys on Grand Central in greater comfort, smart surroundings and with enhanced on-board facilities. We happily await the arrival of more refurbished trains into service throughout the next few months.

We pride ourselves on listening to our passengers and taking on board their feedback. They've told us what is most important to them and that's why we're investing £9 million to improve the comfort and reliability of our entire fleet and services.

Our customer focus-led approach has already paid dividends and we're looking forward to seeing continued success – for the benefit of both passengers and us as a business. Grand Central was recently rated number one train operator for overall journey satisfaction, as well as being voted best value long-distance train operator for the sixth year running in the National Rail Passenger Survey (Transport Focus, Autumn 2017).

In January 2018, Grand Central was also named the highest rated train operator among British leisure and commuter travellers by consumer champion Which?

We will continue to invest in our fleet and services and will explore opportunities for further growth for the benefit of our current and future customers. 

**“ After nearly two years of planning, it was extremely satisfying to see the first of our fully refurbished Class 180 Adelante trains roll onto the tracks en route to London and into daily service ”**

## DID YOU KNOW...

Grand Central Railway Company Limited is an established train operator that provides direct rail connections from towns and cities in Yorkshire and the North East of England with London. Established in 2007, Grand Central's customer satisfaction levels are consistently high. In the National Rail Passenger Survey (Autumn 2017), the rail company was named Britain's

best value rail operator for the sixth year in a row, as well as top operator for overall passenger satisfaction (96 per cent).

Grand Central operates West Riding services between Bradford Interchange, Low Moor, Halifax, Brighouse, Mirfield, Wakefield Kirkgate, Pontefract Monkhill, Doncaster and London King's Cross. The rail operator also

operates North East services between Sunderland, Hartlepool, Eaglescliffe, Northallerton, Thirsk, York and London King's Cross. Grand Central is part of the Arriva group, one of the leading providers of passenger transport in Europe. Arriva employs more than 60,000 people and delivers over two billion passenger journeys across 14 European countries each year.

## REFERENCE

1. [www.grandcentralrail.com](http://www.grandcentralrail.com)



# VIA Rail's modernisation: Reimagining the Canadian journey

Four years ago, *Yves Desjardins-Siciliano* was appointed President and Chief Executive Officer of VIA Rail Canada with a clear objective: To ensure that inter-city passenger rail continued to play a key role in the economic prosperity of Canada. Since then, Yves tells *Global Railway Review*, that with the support of an exceptional and dedicated team, they have laid the groundwork for attaining their renewed vision of a more relevant and modern VIA Rail.

**O**VER THE past four years, on a regular basis, I visited every VIA Rail regional office and maintenance centre. On each train trip, I spoke with those best placed to know – our passengers and crews – and amassed significant feedback involving different views and perceived opportunities for improved travel on VIA Rail trains. Their first-hand input is reflected in several of our profitable service enhancements that have led to the successes we've recorded since 2014. Moreover, they've provided us with a roadmap to our future.

The end of 2017 marked our 15th straight quarter of revenue growth and eighth consecutive quarter of increased ridership. This illustrates that greater numbers of Canadians are recognising our service value and making the smart choice to take the train. Meanwhile, internally, we increased our employee engagement score by

22 per cent compared to 2015; placing us six points over the average score for Crown Corporations and only five points below the Canadian average. This phenomenal increase in employee engagement is the direct effect of listening to and empowering employees so that they can continue to exemplify all that is good at VIA Rail: Commitment to the task at hand, respect for customers and teammates, dedication to public service and resilience in the face of challenges beyond one's control.

### Trains: The more environmentally-friendly option

Our efforts to increase our ridership, not only for the good of the Canadian economy and the Canadian population, but also for the good of the environment, are vital to both our vision to be the smarter alternative for moving people and our inclusive growth strategy heading towards 2025. ▶

**RIGHT:** The Honourable Marc Garneau, Canadian Minister of Transport, at the announcement of the fleet renewal programme



**“ The new fleet will allow us to pursue our commitment to remaining the most accessible national and inter-city mode of transportation in Canada ”**

In 2015, the transportation sector was the second largest source of GHG emissions, accounting for 24 per cent of total national emissions. Of that, 37 per cent was specifically attributable to the use of personal vehicles. In order to shape Canada’s evolution towards a more sustainable future it is imperative that we provide an accessible and affordable alternative to cars and support the necessary shift towards a more sustainable transportation system.

To stimulate this shift away from car use and toward taking the train, we must meet the needs of our passengers by providing a reliable service with more frequent and shorter trips. These needs can only be met through greater access to rail infrastructure, in areas where markets can justify dedicated passenger rail corridors.

The results we have achieved since 2014 are impressive, but we are reaching a plateau

within the current constraints of our operating environment. For this reason, in December 2016 we submitted a plan to the Government of Canada to build a dedicated passenger rail, termed High Frequency Rail (HFR), within the busiest Toronto–Ottawa–Montreal–Quebec corridor. Our HFR project would lead to a reduction of 98 per cent of VIA Rail’s GHG compared to our current emissions. It would reduce the carbon footprint of Canadian travellers by over 13 million tonnes, make train travel more convenient and, according to conservative estimates, triple our ridership. It would create inclusive growth for all Canadians through universal accessibility, job creation, economic stimulus and access to property for young families, while eliminating VIA Rail’s current operating subsidy for the corridor.

As we mark our 40th anniversary, we have many accomplishments to celebrate and our vision is clearer than ever.

**BELOW:** Modern trainsets will provide better amenities and improved comfort for travellers



**Fleet renovation**

Thanks to the funds granted by the Government of Canada in both the 2017 and 2018 budgets, our transformation plan aimed at engaging Canadians in a more sustainable future is continuing to materialise. This plan includes renovating our fleet’s stainless-steel cars and acquiring a new fleet for the Quebec City–Windsor corridor. New modern trains will provide our travellers with a safer, faster and more environmentally-friendly service. In addition, the new fleet will allow us to pursue our commitment to remaining the most accessible national and inter-city mode of transportation in Canada. Budget 2018 also marked an important milestone as it provided \$8 million for Transport Canada to complete its analysis of our HFR proposal to enable our shareholder to make a decision this year.



**LEFT:** Engines with the latest technology will be more fuel-efficient resulting in air quality improvements and a reduced environmental impact

We are extremely grateful to the Government of Canada for this vote of confidence. It signals clear recognition of Canadians' renewed interest in intercity passenger train service. It's also a sign of appreciation of our employees' dedication to exemplary service.

At the age of 40, VIA Rail is in its prime. It is growing thanks to its solid historical roots and

the exceptional work of its employees. All of us at VIA Rail are dedicated to offering a safe and sustainable travel option across Canada, connecting over 400 communities economically, socially and ecologically and asserting the collective project we are all a part of: Keeping Canada at the top of the list of best countries to live in. That is our commitment for the years to come. 



Prior to his current appointment, **YVES DESJARDINS-SICILIANO** was the Corporation's Chief Corporate and Legal Officer and Corporate Secretary from 2010. An experienced lawyer and seasoned executive, he is a member of the Quebec Bar Association. He holds a law degree (LL.B.) from l'Université de Montréal and he completed Graduate Studies in Law (GSD) at McGill University. He also has a designation from the Institute of Corporate Directors (ICD.D). With proven experience, Yves has held several previous positions in legal, regulatory and government relations, business and corporate development, marketing communications and finance. In Montreal and Toronto, he worked for private and publicly held companies, in the information technology, telecommunications, marketing and entertainment industries. Past President of the Canadian Bar Association, Quebec Division, Yves was also Chief of Staff to the Federal Minister of Labour and Minister of State for Transport from 1989 to 1991.

## VIA RAIL'S FLEET RENEWAL PROGRAMME

### BENEFITS OF THE PROGRAMME:

- Improving the customer experience: Modern trainsets will provide better amenities and improved comfort for travellers
- Improving accessibility: New trainsets will provide universal accessibility to all Canadians and their caretakers and allow VIA Rail to remain the most accessible mode of transportation
- Reducing environmental impact: Engines with the latest technology will be more fuel-efficient, resulting in air quality improvements and a reduced environmental impact of four to five times less pollution than cars or other modes of transportation
- Increasing operating efficiencies: Bi-directional trains will allow for more efficient use of the fleet, optimise operating costs and provide greater capacity for passengers
- Ensuring customer safety: New trains will be designed to ensure they continue to meet or exceed the latest safety standards.

### KEY FLEET REQUIREMENTS:

- To replace the cars and locomotives currently in service along the Quebec City–Windsor corridor, 9,100 passenger seats provided by 32 bi-directional trainsets are needed

- Enhanced universal accessibility features for passengers with reduced mobility, including multiple accommodations for wheelchairs and other mobility devices on the trains
- More fuel-efficient, Tier 4 Diesel engines, with the option to operate on electrified rail infrastructure as it becomes available
- Capability of trainsets to operate in either direction (push-pull) to reduce the turnaround time for trains at stations in urban centres, thereby reducing operating costs.

### PROCUREMENT PROCESS:

- VIA Rail intends to proceed via its new fleet procurement a fair, open and transparent bidding structure and process
- The call for proposals will be placed on the MERX system and will be open and accessible to all qualified companies wishing to make a proposal
- The procurement process will comply with the highest industry standards and regulations, including provisions outlined in international trade agreements
- An independent 'fairness monitor' will follow the entire procurement process
- Ethics Commissioner to be appointed.



## A world first: Removing the variability of human nature in rail

*Global Railway Review's* Junior Editor, [Tara Nolan](#), spoke with [Jim Doughty](#), Systems Integration Manager at Govia Thameslink Railway (GTR), regarding how train automation has leapt into the future and how the success of the industry 'world first' will influence the rail sector.



**“Driving consistently optimises acceleration and deceleration rates, which facilitates the operation of a greater number of trains”**

**A**UTOMATION is at the forefront of the transportation industry, with frequent technology developments, new innovations and of course the unfortunate events – including Uber in Arizona – grabbing the headlines. However, although the progression of the automated car is widely known, not many people are aware of automated train operation.

### A world first

Operating with European Train Control System (ETCS) is now a mundane procedure; however, coordinating it alongside Automatic Train Operation (ATO) is an exceptional and unique achievement. On 17 March 2018, an eight-car Thameslink train did just that; automatically stopping at London St Pancras International after transitioning into ETCS Level 2 Full Supervision and then ATO, for the first time in the world.

“This is the culmination of a programme that we have been involved in since the start of our franchise three years ago and it has been running continuously since the £7 billion Government-sponsored Thameslink Programme,” says Jim Doughty, Systems Integration Manager at GTR.

On the mainline railway during passenger service, the train travelled through Farringdon, City Thameslink and London Blackfriars under automatic control, transporting many passengers (unaware of the test) who, according to Jim: “Would find it difficult to distinguish between a train operating in ATO and one not.”

This technological success represents a milestone in the rail industry’s digital journey and will not only help build industry confidence in the system but, as Jim explains: “Will allow us to run our final high intensity Thameslink service, providing 70 per cent more seats, through the centre of London.”

Increasing the number of trains running into the capital will better the passenger journey; delivering more space, more availability and a better-quality travel experience. The time it takes

to return to normal service following a disruption will be reduced, thanks to the ability to increase the throughput to 30 trains per hour; essentially “managing the backlog of trains,” summarises Jim.

### The technology

ETCS is the Automatic Train Protection (ATP) system that provides the train with the maximum distance that it can travel, the speed profile of the track ahead and any other route information that is required. Jim explains: “It removes the need for lineside signalling with a Driver Machine Interface (DMI) that is normally located in the cab.”

ATO is a system that operates akin to a driver, controlling acceleration and braking along with necessary functions, such as opening the doors. “It does all this within the secure framework defined by ETCS,” says Jim. “ATO is only available when operating in ETCS (Level 2 or above, and in Full Supervision Mode).”

The benefits of pairing ETCS and ATO technology are expansive, with the removal of driver variability being a key advantage. Driving consistently optimises acceleration and deceleration rates, which facilitates the operation of a greater number of trains. Jim explains: “ATO over ETCS is the only means by which throughput greater than 20 trains per hour through the Core (St Pancras–London Bridge) can be achieved.”

The technology within ATO has been intensively tested and GTR had to demonstrate to the Office of Rail and Road (ORR) that the necessary amendments to the Health & Safety Management System had been made before operation during passenger service could be trialled.

When considering risks, train protection is maintained through ETCS, not ATO, therefore the ETCS system will always intervene in an emergency. In doing so, Jim explains: “ATO would be dis-engaged if a risk had been perceived. ATO has a Safety Integrity Level (SIL) of zero, meaning it is not classed as a safety system.”▶



**JIM DOUGHTY**, Systems Integration Manager at Govia Thameslink Railway, is currently overseeing the introduction of the world’s first application of ATO over ETCS on mainline infrastructure. He has worked within the rail industry for approximately 31 years, joining as an apprentice at British Rail Engineering Limited (BREL). Having worked in the key areas of the sector he has a holistic view of the industry and the way in which it operates.

**RIGHT:** One of the benefits of pairing ETCS and ATO technology is the removal of driver variability



### Infrastructure for the future

It can be easily argued that the era of automation is nearly upon us and its arrival will bring an onslaught of changes. Consequently, our infrastructure will need to be significantly altered. Jim's biggest challenge during the testing of ATO and ETCS was: "Not the system itself but the availability of, and access to, infrastructure upon which the system could be tested."

Surely an automated future will demand the application of technology to spread across all lines. This would require the use of ATO over ETCS to be accepted and used by differing operators. Jim comments: "The potential exists to increase the use of ATO technology geographically, but this is wholly dependent on the implementation of ETCS Level 2 or above. The responsibility of such a decision resides with Network Rail and the Department for Transport (DfT)."

In terms of infrastructure change, the most substantial would be the removal of conventional lineside signalling, that would be replaced by ETCS; in-cab signalling.

There is also the potential to develop the ETCS system to a Level 3 or Level 3 Hybrid system, the latter of which is currently being tested by Network Rail on their test track – the Hertford Loop (ENIF). Similarly, the Grade of Operation system (GoA2) is currently a Semi-Automatic Train Operation and could be upgraded to GoA3 (driverless) or GoA4 (unattended). Presently, "Thameslink has no plans to move away from the GoA2 system" confirms Jim, but the option exists for the future.

It is not just the signalling technology that will need to be adapted but also the trains themselves. Jim details: "All new rolling stock will be delivered ETCS ready, be that with an ETCS onboard unit

already installed or provisions for the ETCS to be fitted."

Contracts have already been scheduled for the retro-fitting of ETCS on existing vehicles in the UK, ensuring operation on lines identified for ETCS implementation is feasible. "The deployment of ATO, on the other hand, may be a little different due to the lack of legislation," says Jim.

### Legislation

Until legislation for the operation of ATO is created and introduced to the authorities, each application of the technology will be bespoke.

Currently, there is no legislation that governs the implementation or use of ATO systems. At Thameslink, Jim says: "Its application is being managed through both a suite of specific signal box instructions developed by Network Rail and GTR, and GTR's Health & Safety Management System."

"The lack of legislation is being tackled through the development of a Technical Specification of Interoperability (TSI) for ATO and is planned to be introduced around 2022," assures Jim.

### A British success

GTR's success has demonstrated how an industry approach is the best method to solve future railway capacity issues.

David Waboso, Managing Director of Digital Railway, commented on the ATO project at Infrarail 2018, labelling it "an innovation" and the completion "really important".

"Thameslink is a huge British success," David continued. We should all view the combined efforts of GTR, Network Rail and Siemens as the first automated step towards the rail sector of the future – for Britain and for the world. 



**TARA NOLAN** is Junior Editor for two magazines: *Global Railway Review* and *Intelligent Transport*. She holds a B.A. in English Literature and Creative Writing, attained from the Open University.

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Global Railway Review

# SBB's integrated and collaborative approach for improving energy efficiency

Switzerland's railway energy consumption is estimated to increase by a further 30 per cent by 2030 in comparison to 2010's figures. To ensure optimal environmental and financial performance, Swiss Federal Railways (SBB) is determined to reduce the forecasted annual energy consumption by a total of 20 per cent by 2025 as part of its energy saving programme. *Oliver Johner*, Head of the energy saving programme and *Rudolf Büchi*, Head of Operations and a Member of the Infrastructure Management Board at SBB AG, explain the close collaboration between railway undertakings and SBB infrastructure in using and further developing the adaptive control (ADL).

**T**HE RAILWAY is the backbone of sustainable mobility in Switzerland. With around 10,000 trains running each day, Swiss Federal Railways (SBB) operates the busiest rail network in the world. In addition to the challenges associated with mixed traffic, the rising network utilisation also places major demands on rail services. Even minor deviations from the timetable can have a negative impact on operational stability, with significant knock-on effects.

The railway is also one of the largest power consumers in Switzerland. The railway undertakings involved in passenger and freight traffic pay approximately CHF 250 million each year for rail power. SBB's energy consumption is set to increase by a further

30 per cent by 2030 compared to 2010 due to the expansion of services.

However, in order to ensure environmental and financial performance, SBB is striving to reduce the forecasted annual energy consumption by 20 per cent by 2025 as part of its energy saving programme. The programme was commissioned by the management board in 2012 and during 2017 300 GWh were saved, meaning that SBB is already halfway to achieving its ambitious goal.

Some of the key pillars in this programme are technical innovations in rolling stock, fixed installations and buildings, an energy-efficient service structure and innovations in rail services. The most powerful measure is adaptive control (ADL), which is vital for ensuring both a precise and energy-efficient rail service.



“ SBB is striving to reduce the forecasted annual energy consumption by 20 per cent by 2025 as part of its energy saving programme ”

### Traffic control system and adaptive control: Key to punctual and energy-efficient operations

SBB Infrastructure Operations is responsible, in cooperation with the railway undertakings, for the infrastructure side of rail services such as traffic control, customer information and intervention. The locations of this business unit are centralised in four train-control centres and the Operation Center Infrastructure for network management. The Rail Control System (RCS) is a central dispatching tool developed in-house by SBB.

Included within the RCS is ADL – a system that enables rail services to operate with minimum energy and maximum capacity. ADL has two core functions:

1. Reducing the impact of signals through conflict optimisation: ADL identifies scheduling clashes between trains and calculates the ideal speed for trains to travel at, allowing them to get to their destination without unscheduled stops ('green wave')
2. Reducing ahead-of-schedule train operations through energy-efficient driving (EcoDrive): ADL detects when a train is set to arrive ahead of schedule and calculates the most energy-efficient speed for it to travel at to ensure that the train arrives at its next stop on time.

The dispatcher in the train-control centre approves the driving recommendations that are calculated by ADL, which are then immediately communicated to the locomotive crew. These are only

recommendations, not firm instructions. Track signals are still the top priority for engine drivers.

### Using adaptive control in daily operations

The ADL system has been used network-wide in the very core of rail services since 2015 and enables dispatchers and locomotive crew to work together more effectively. They share the common aim of precise and energy-efficient rail services in line with the relevant priorities: Safety, punctuality and economic efficiency – in that order.

Successful control is contingent upon precise forecasting and the resultant dispatching decisions for conflict-free dispatching. Through interaction with RCS, ADL covers the following processes executed on the server side:

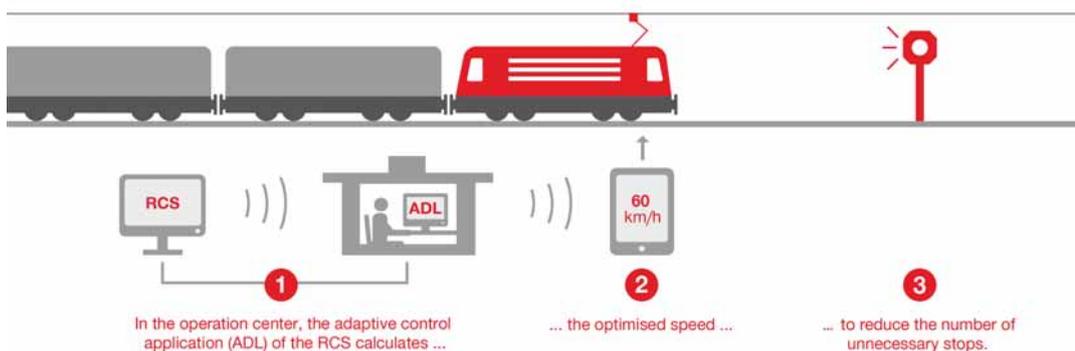
- Logging the locations of trains
- Network-wide forecasts and conflict identification
- Forecasting unscheduled stops at signals and their duration
- Calculating the corridor on which an energy-optimised driving profile can be used without affecting other trains
- Producing messages to provide the engine driver with information about the energy-optimised driving profile
- Promptly communicating driving recommendations to the engine driver's cab via LEA, smartphone, laptop or GSM-R CabRadio.

As illustrated in **Figure 1**, ADL thus bridges the gap between the dispatcher and the engine driver in



**OLIVER JOHNER** obtained an MSc in Geography from the University of Bern, Switzerland. His professional experience is in the areas of corporate responsibility, sustainability strategy and resource management as a consultant at the United Nations and in the industrial sector. Oliver has been Head of SBB's Energy Saving Programme since 2015.

FIGURE 1



LEFT: Functionality of adaptive control (ADL)



**ABOVE:** The backbone of sustainable mobility in Switzerland: Approximately 10,000 trains run each day



the rail services control circuit by transmitting the speed recommendation to the engine driver's cab. The recommendation is communicated through a data connection – this is usually the locomotive crew's tablet:

- The engine driver is made aware of the driving recommendation with a 'beep' and views it in a window that appears on screen – i.e. the ADL panel
- Every ADL message has a 'time to live' (TTL), i.e. a duration, indicating how long the message will be shown for
- If the time is up, the message and the ADL panel will be hidden. The message will only be shown again if the driving recommendation changes or is cancelled, meaning the driver is not distracted by an inactive window.

**BELOW:** Energy and financial savings achieved thanks to ADL in 2017



**Success thanks to close collaboration between railway undertakings and SBB Infrastructure**

Network utilisation for mixed traffic, which is already at a high level and continuing to rise, is posing major challenges for SBB. Maximising utilisation of capacity and energy efficiency are inter-dependent aspects within rail services. With ADL, rail services are making a meaningful contribution towards lowering energy costs and skilfully managing the increasing traffic on the network, even within the context of exacting punctuality standards.

**Major savings achieved due to conflict optimisation**

In practice, it is clear that ADL conflict optimisation works particularly well from a technical perspective in dealing with mixed traffic. Network-wide conflict resolution based on a central calculation leads to the optimisation of all railway undertakings' vehicles, reducing the number of conflicts arising from operational situations and thus improving both punctuality and energy efficiency.

In 2017, energy savings of some 74 GWh across a total of 635,000 driving recommendations were achieved thanks to ADL (conflict optimisation and EcoDrive), as displayed in **Figure 2**. This represents an increase of 48 per cent compared to 2016. Depending on the operational situation and the resultant conflicts, this figure is set to rise further in the years to come.

**Continuous further development of ADL**

Even during the development phase of ADL, the SBB Passenger Division, SBB Cargo and other railway undertakings were closely involved in testing. In current operations, the close cooperation between the individual organisations on further developing and fine-tuning algorithms has proved successful. For example, the user representatives of

**FIGURE 2**



locomotive crew, dispatchers and IT attend monthly meetings to explore further opportunities for optimisation. In addition to technical optimisations, initial and further training of dispatchers and engine drivers on the topic of ADL are also organised collaboratively.

**Joint test conducted by BLS and SBB Infrastructure to optimise ADL EcoDrive**

When it comes to ADL EcoDrive, however, the available energy-savings potential has not yet been fully exploited. One of the reasons for this is the current rule that only trains that are ahead of schedule by more than one minute receive driving recommendations. Likewise, the accumulation of messages to the locomotive crew can lead to a certain sense of ‘tuning out’, meaning not all controls are actually executed.

This is why SBB examined and worked out the possibilities for further developing EcoDrive as part of a study run in 2017, by an interdisciplinary team consisting of experts from SBB Infrastructure, SBB Passenger Division and SBB Cargo as well as Energy and IT.

BLS previously tested three driving recommendation systems in a pilot project with SBB Infrastructure. The test runs and analyses show that the net energy consumption in regional train operations can be reduced by up to 15 per cent as a result of driving recommendations, providing that deviations from the operational timetable are permitted in intermediate stations and the driving recommendations for the locomotive crew are displayed ergonomically. If implemented carefully, the driving recommendations continue to guarantee a high level of punctuality and contribute to reducing the variation in driving styles.

**Outlook**

A lot has already been achieved with adaptive control when it comes to conflict optimisation and energy efficiency. However, there is still further potential for optimisation to be exploited at human, technological and organisational levels. The ADL tool is being developed collaboratively by SBB Infrastructure and the railway undertakings, serving as a link between control centres and the engine driver’s cab.

**ADL is improving the real-time communication between control centres and the engine driver’s cab**

In Swiss freight traffic, more than 30 per cent of the trains deviate from their scheduled train path by more than 30 minutes. In these cases, the dispatcher controls the train’s forecast down to the minute, but the locomotive crew are unaware of the issue. They only receive the daily timetable with target times together with their working timetable. With the further development of ADL, the

**FIGURE 3**



locomotive crew will be given the same information as the dispatcher in the control centre.

**Static driving recommendations for normal operations, ADL messages in the event of a conflict**

It is important for the locomotive crew to receive the necessary information as soon as possible so that they can settle on a driving strategy. The driving recommendations should also remain as static as possible, with minimum distractions in the engine driver’s cab. This will be taken into account in the further development of ADL EcoDrive in the following ways:

- For every train, an optimised driving profile (Veco: economic and ecological speed) will be calculated and displayed as an additional column on the engine driver tablets (LEA) alongside the speeds permitted for each route
- With this Veco information, the engine driver will know the ideal speed to travel at to get to the target destination in an energy-optimised and punctual manner, shown in **Figure 3**. Driving variation can be reduced through standardised recommendations.

**ADL as the core of digital rail services**

The digital operational management tools RCS, ADL and HOT (Hub Optimisation Technology) are already integral within modern rail services. In a digital future, the degree of automation for repetitive tasks within rail services will rise further. The human factor will primarily display its strengths in evaluating alternative dispatching options, while the determining of all possible options given by the dispatching system on the basis of actual data and forecasts will increasingly be carried out autonomously. The professional depiction of future mobility in traffic, which is efficient in terms of both capacity and energy, is a ground-breaking innovation for modern railway services on extremely busy mixed traffic networks.

**ABOVE:** Example visualisation of the Veco display in LEA for the engine driver

**BIOGRAPHY**



**RUDOLF BÜCHI** holds an MAS in International Logistics Management and General Management. His career began in 1980 when he worked as a Rail Operations Dispatcher. After working in timetable planning, he managed various SBB Cargo units, including the International Business Unit and went on to head-up Production Switzerland. Rudolf has been Head of Operations and a Member of the Infrastructure Management Board at SBB AG since May 2015.



# INTERVIEW SPOTLIGHT



GAI-Tronics – a division of Hubbell Ltd – provides systems, products and services that improve on-board and trackside communications for the railway industry. **Neal Wright**, Business Development Manager, talks about GAI-Tronics' strategic development plans and gives greater insight into what they can offer the rail industry.

## What are the main aims for GAI-Tronics and are you a global player in the rail sector?

Our main aim is to get our products into more European rail markets, as we already have a strong foothold in the UK rail market. We are also very interested in pushing forward on our Train Comms products – that have not previously been actively promoted – and seeing them utilised in new rolling stock, rather than just refurbished rolling stock.

## What solutions can GAI-Tronics offer the rail industry when it comes to making level crossings safer?

GAI-Tronics provide a variety of products that assist in making level crossings safer. Often these products are designed and built to include bespoke elements to suit our customer's needs, such as specific aesthetic features and functions. We currently supply three main types of phones that can be used at level crossings. Where there is

an AHB crossing (Automatic Half Barrier), we offer PETS (Public Emergency Telephone System) or KETS (Kestral Emergency Telephone System) telephones, and now also a VoIP illuminated crossing. For UWCs (User Worked Crossings) we have our solar powered GSM-R phone, which is a completely standalone phone offering wireless communications for either permanent or temporary installations. At GAI-Tronics our expertise lies in creating innovative, ruggedised communication solutions that our customers can rely on to work in any environment, regardless of the conditions.

## How does your experience in the rail industry assist in your role at GAI-Tronics, and what motivates you?

My 14 years' experience working for Transport for London (TfL) in various roles has enabled me to have a greater understanding of what is required in the rail industry, as well as what they require from their suppliers. I know that there are many processes in place to ensure that Health

and Safety are paramount for both customers and staff. I can identify the processes that people must follow to perform critical activities around the railway. Having worked in the industry for many years, customers can communicate with me directly, without having to worry about using esoteric language that perhaps someone outside of the industry wouldn't understand.

## What makes GAI-Tronics stand out from your competitors?

Primarily, I think GAI-Tronics' experience and diversity are what separates us from the competition. The company was founded in 1946 and since that time we have seen products change, our company change and indeed the world around us. But whatever the challenges we have faced, we have always found ways to adapt to these new environments and develop products and services that not only meet, but also exceed the expectations of our customers. The range of companies and sectors

we service has also grown over the years. We treat every order as its own unique project and being able to understand the specific needs of our customers is crucial to delivering solutions people can rely on. We've come across almost every problem imaginable over the years and we haven't been beaten yet. As part of a larger group of brands that all fall under the Hubbell umbrella, we also have the benefit of being able to share knowledge and sometimes products from our sister companies. This means we can often supply complete solutions, even if part of the project falls outside of the GAI-Tronics product range. 🚂

With nearly 20 years in the rail industry and almost 30 within sales, **NEAL WRIGHT** has worked for some of the leading companies within the field, including London Underground and Transport for London (TfL). Neal joined GAI-Tronics in January 2018 as Business Development Manager, bringing his vast knowledge, experience and passion to a well-established team, with the goal of taking GAI-Tronics' extensive range of products in to new markets, including Europe and the Middle East.



# IP ON-BOARD TRAIN COMMS

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# Transforming the railway and unlocking potential

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The UK's rail sector is one of the safest in the world, but to maintain efficiency and remain a key mode of transport for the country it must adapt and change in many areas. This regional debate involving some key industry leaders explores the importance of embracing modern technologies, the role rail will play for the next generation, the key challenges the sector faces and also the opportunities that lie ahead. ▶

PARTICIPANTS



**MARK CARNE**  
Chief Executive,  
Network Rail



**PAUL PLUMMER**  
Chief Executive,  
Rail Delivery Group (RDG)



**JOANNA WHITTINGTON**  
Chief Executive Officer,  
Office of Rail and Road (ORR)



**DAVID PITT**  
Head of UK,  
SilverRail



**JAMES QUINNELL**  
Chief Commercial Officer,  
Colas Rail Ltd

Rail is entering the digital age. How will technology and new ‘intelligent’ solutions impact the performance of the UK’s rail sector, and how will the industry need to adapt to embrace change?



**CARNE:** The number of passengers using the rail network has doubled since the mid-1990s and is set to double again over the next 25 years. We need to plan now to ensure the network can meet that soaring demand, and a digital railway is right at the heart of that.



The industry is working together to modernise the network and improve the passenger experience. With limited scope for building new railways, introducing digital technology will make sure we get more from the existing infrastructure.

Digital signalling and train controls will increase capacity, improve performance, enhance safety and reduce the long-term cost of running the network.

Digital Railway will also help us to better manage our physical infrastructure through the continued rollout of intelligence infrastructure, providing data to proactively predict and prevent asset failures rather than let them fail, then fix.

It isn't only rail passengers who will benefit from the digital railway; it will enable more freight trains to run on the network too – meaning even more goods can be transported in a more environmentally-friendly way than road travel.

**PLUMMER:** The industry's Digital Railway programme will be vital in creating extra capacity to support future growth using new technologies to enable trains to run closer together while

maintaining safety. Passengers will benefit through more reliable and more frequent services.

Great advances in technology gave rise to the railway in the first place and we are continuing this tradition by developing a Rail Sector Deal to enable businesses – collaborating with other complementary industrial sectors – to sell innovative products and services to rail in both the UK and export markets. This will help accelerate the delivery of the Digital Railway to reduce overcrowding and connect communities, which in turn will boost productivity and support the government's Industrial Strategy.

Working together, the sector is responding to the way in which customers access information and use data to plan their journeys. This puts customers in charge of their journeys and means more time for rail colleagues to help those who need a more tailored service.

The network-wide rollout of smart ticketing, allowing passengers to buy and keep their tickets online, will be a key milestone in improving the passenger experience on the railway. By the end of 2018, customers will be able to use their mobile devices to store their tickets on seven out of 10 journeys. Increasing customer satisfaction through these improvements, and others, is part of the rail industry's plan to come together and work in partnership to secure growth across the country.

**“ Digital signalling and train controls will increase capacity, improve performance, enhance safety and reduce the long-term cost of running the network ”**

MARK CARNE

**PITT:** Rail is effectively a retail service and like any other retail experience, customers want good information; assurance that they are buying something of value and quality; and for the service to be fulfilled as efficiently and easily as possible. The way in which UK rail currently operates is almost at a tipping point and technology and pricing are two key factors. Customers are struggling to pay for rail travel; and this will soon become an issue for the government and rail operating companies.

Eighty per cent of rail tickets in the UK are still purchased offline, which, in 2018 with the continuous growth of online retailing, is somewhat indicative of the problem. When compared to online grocery shopping, for example, the channel shift to online and mobile for rail remains a struggle. Although online ticket purchasing is available, in many cases the customer must still collect a ticket at the station – either at the ticket office or from a ticket vending machine. Whilst we are now seeing the general rollout of digital fulfilment to barcode on smartphones and smartcards, it will take some time for the orange ticket to become redundant unless the customer's retailing experience becomes easier. Unfortunately, with a rather confused approach to rolling out digital ticketing over the last few years, this has only compounded the problem with no single fully interoperable solution being promoted centrally, which the train operating companies could then get behind.

Looking ahead, we're investigating how the physical ticket can be removed, and how digital technology can be used to hide the complexity of ticketing media, operators and product offers into a single mobile app. After all, the concept of a 'ticket' is for the benefit of the train company, not the customer. With the right kind of relationship between the train company and the customer, supported with suitable technology, the customer could have a continuous right to travel and simply settle up at the end of the day. The concept of buying a ticket in advance will always have its place with longer, more expensive journeys, but on the average daily commute when costs, etc. are generally understood by the customer, they probably value flexibility alongside value pricing. In fact, with modern working habits the customer needs flexibility – the ability to turn up at any station, get on a train without knowing the timetable and be charged for the journey they make. This is what we should be aiming for and over the next 18 months I believe that we will start to see account-based ticketing (ABT) with both pre-pay and post-pay options introduced. Chiltern Railways is already trialling an ABT system, which works in a similar way to the Oyster card in London; automatically calculating the

best value fare for a national rail journey, and giving travellers real-time information. Within the next three to five years this will likely become normal. ABT doesn't mean we have to do away with pre-paid tickets, but they won't be the only option and as a result the customer should start to see much more flexibility in their retailing and travel experience. Minor changes to industry rules could see this same digital technology easily deliver flexible season tickets together with a daily, weekly, monthly and annual price promise across the UK rail network, encouraging us all to make better use of trains.

**QUINNELL:** The demand on the UK's rail network will continue to intensify, with a growing need for more capacity. In turn, access for contractors to get onto the network, which enables them to complete the work, will decrease and consequently result in cost increases. Furthermore, the industry is reaching a tipping point where there simply isn't going to be enough time to carry out much-needed work.

Therefore, I think we need to move forward in a 'smarter' way. Digitalisation will, amongst all its other benefits, allow us to reduce the amount of lineside signalling equipment from a contractor's perspective. This progress means there will be less intervention so less time working out in the live environment. Going digital will be expensive initially, but it should pay for itself in time, particularly if access is reduced. I'm sure there will be teething issues, but it is financially sensible in the long-term. Companies must adapt and be able to deliver projects in a smarter, more digital way.

Further potentials within technology – for example blockchain – might deliver a technological solution to how we understand data in real-time and enable us to revolutionise several ways of doing things. Companies which might be market leaders now, whilst doing things conventionally, will need to adapt, adopt and embrace new technologies if they want to be market leaders in the future. And companies who can deliver on this will prosper.

The future five years ago was to electrify our network, which no longer seems to be a Government priority. My point here is that restoring, renewing and maintaining a lot of lineside electrification equipment is actually the opposite of what is trying to be achieved with the digital railway, namely taking lineside equipment away. Perhaps the Government is right and more focus should be on our trains – hydrogen trains for instance – which means a lot less lineside equipment. This certainly makes our networks less vulnerable to theft and harsh weather, together with less exposure to risk for our teams.

There will be significant change over the next 15 years – but lots of equipment needs replacing now anyway, so let's replace it in a smart way with digital technology that will pay its way in the future. ▶



**“ Companies which might be market leaders now, whilst doing things conventionally, will need to adapt, adopt and embrace new technologies if they want to be market leaders in the future ”**

JAMES QUINNELL



## Rail faces growing competition from other modes of public transport, so what can the UK rail sector do to ensure it retains a large share of the transportation market?



**PLUMMER:** Rail has an important part to play in the end-to-end journeys for many different markets and remains a preferred mode of choice for many customers. The growth of the railway has been extraordinary with commuting by train increasing by 73 per cent since 2002, compared to an eight per cent increase in car travel to work. To continue to enable growth in our economy by connecting businesses and communities, the railway needs to continue to improve and invest.



**PITT:** It's not just about competing with other modes of public transport, but competing with private-use cars, autonomous vehicles and even video conferencing; do we really need to travel at all? There are many different mini revolutions happening at the moment. Obviously, the smartphone has changed the landscape for many industries over the last 10 years and we may well be facing a similar revolution in the 2020s with self-driving cars and, subject to legislation, the wider (positive) sharing of data to enhance services and experience. All too often we hear and see the headlines about data being shared without our knowledge, but data-sharing (if managed properly) will enable multiple services to be delivered to us seamlessly. A good example of this is a rail journey. We don't board the train at our front door, it's typically part of a multi-step and multi-modal journey, which normally requires a number of tickets from different suppliers. In the future, rail providers must embed themselves in the middle of the door-to-door journey, which will require different service providers coming together for the benefit of the customer. This can only be a good thing helping both the railways and the wider economy. If done right, people will always want to travel by rail. It's only when the barriers to entry for rail travel become too great – such as price, poor information and ticket-related stresses – that people choose not to travel. Rail companies must always consider the customer experience, and this is where the greatest challenge will be. If rail doesn't step up and do things better, there are others out there who are more accustomed to providing an excellent digital and customer experience that can, and will, move in to satisfy the customer's needs.

The rail sector has a long-term plan for change, utilising the very best of the public and private sectors, to deliver improvements for passengers, taxpayers and local communities. Working in partnership, we are investing to deliver new trains, better services and improved stations. Customers will see enhancements to the network that will strengthen reliability and mitigate congestion. These improvements will mean the railway can remain competitive with other modes of travel.

In addition to this, the rail industry is seeking a 'root and branch' reform of rail fares regulation. Decades of well-intentioned but outdated regulation have led to a range of fare options that have not kept pace with technology or how people work and travel today. So, the industry is launching a public consultation to establish a road map for change to update fares regulation and look at an easier-to-use range of fares. This will aim to maximise the benefits to customers, businesses and the economy by improvements in ticket-buying technology. The consultation will run throughout the summer and a final report is due in the late autumn.

“*To continue to enable growth in our economy by connecting businesses and communities, the railway needs to continue to improve and invest*”

PAUL PLUMMER



## Will the construction of High Speed 2 (HS2) solve the challenges around network capacity and economic growth?

**PLUMMER:** HS2 will add much-needed space on the railway for more and faster trains. The rail industry is working hard to ensure HS2 will be seamlessly integrated into the existing rail network when the new line opens. The line will form an important part of a bigger and better railway, giving a boost to north-south rail links.

HS2 is part of the additional £85 billion in economic benefits that the rail industry is delivering and will provide significant improvements to customers by cutting journeys, tackling overcrowding and improving connectivity. This strategic and targeted investment supports businesses across all sectors improving access to customers and new opportunities at home and overseas. As we prepare to leave the European Union, investment in rail infrastructure projects such as HS2 will be more important than ever. As part of the railway industry's plan to secure growth for the country, the railway is committed to backing British-based businesses, enabling them to succeed and grow.

While HS2 is being built, rail operators and infrastructure providers working together as one railway will continue to deliver billions of pounds worth of improvements for customers. Other major

improvements in the pipeline include Crossrail, Thameslink, the Great North Rail project and the Edinburgh to Glasgow line. The industry is investing to deliver 6,400 extra services per week and 5,700 new carriages by 2021.

**PITT:** I used to work in transport planning from a highways perspective and a frequent argument was: If a new road is built, new traffic will always be created to fill the new capacity. But, actually, that traffic is being created because there are new jobs and wider economic growth that causes the traffic to be generated. So, in the case of HS2, it certainly won't solve all capacity problems, but it will help dilute them in the short term. More importantly, however, it will help to fuel wider economic growth and the country's future prosperity. HS2 will be hugely important for the nation's progression and allow changes to the public's longer distance travel habits in the UK. High-speed rail has been around for some time in Europe and is now starting to seriously challenge the short-haul air passenger market. Consumer choice in this area can only be a good thing and having a viable rail option for visiting the continent from the North and the Midlands will be hugely beneficial to the economy. ▶



“HS2 will be hugely important for the nation's progression and allow changes to the public's longer distance travel habits in the UK”

DAVID PITT

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## What do you think are the main opportunities presented by further route devolution in the UK?

**CARNE:** We have seen major benefits since devolving day-to-day responsibility for railway businesses to the geographical routes in 2014. Crucially, devolution has enabled us to work much more closely with train operators, freight operators and passengers, and ensure that each route is more customer-focused and responsive.

We are also now more accountable through the route scorecards we introduced, which comprise targets and incentives set by our customers to measure how the railway is performing as a whole in each region. From Control Period 6 (2019-2024) our devolved route businesses will each have their own regulatory settlement.

At the heart of our devolution agenda is the principle that empowered leaders can focus more precisely on the needs of their customers, make decisions faster and innovate more effectively. Devolution remains a key aspect of Network Rail's plans to meet the challenge of unprecedented growing customer demand and congestion.

**WHITTINGTON:** The transformation of Network Rail's business has the potential to deliver a more efficient and better-used railway, with improved service for passengers and other rail users. Our ongoing Periodic Review (PR18) is built around better, closer engagement with local stakeholders and comparative regulation between routes – with an element of rivalry developing between management teams to help realise this potential.

From the outset, we required Network Rail to engage with stakeholders in the development of its route Strategic Business Plans, to ensure that the plans were informed by extensive consultation with Network Rail's customers.

We are monitoring that process and reviewing each plan to see whether stakeholders' priorities are reflected. Our continued monitoring throughout

CP6 will include looking at how well routes engage local stakeholders.

Route devolution can also lead to a better understanding of Network Rail's efficiency, enabling comparison between the routes and highlighting areas of best and worst performance. Office of Rail and Road (ORR) will be placing greater emphasis on reviewing and reporting on each route's efficiency. We will be increasing our route level reporting in our Network Rail Monitors; that transparency will help drive improvements by providing more detailed insights into the challenges facing individual routes, and also harnessing the potential for rivalry between the routes as a mechanism to drive improvements for passengers, freight customers and funders.

**QUINNELL:** For me, accountability is critical and devolution allows greater accountability. But capability should not be overlooked. Pure rail system capabilities cannot be achieved with high levels of confidence in an overly devolved model. Network Rail's proposed CP6 model is just right. Straight forward civils-led activities should be organised locally, which makes sense. Complex activities which are more nationally-led and organised into geographical groupings can still benefit from local engagement – more so than what's happened in the past.

Nationally organised signalling and track projects makes a lot of sense, but the opportunity is to have greater use of one or the other of these nationally delivered programmes, to work with the more devolved regional activities in more strategic alliance-type relationships, such as the method used to successfully deliver the capacity enhancement works at London's Waterloo Station. Having all the stakeholders in one room and understanding what everyone's concerns were worked brilliantly.



## What is needed to improve the UK's current rail franchise model, and do you think more competition is needed?

**PLUMMER:** Competition is an essential ingredient in Britain's rail industry and we have witnessed the success that its introduction has had on the market. We have gone from a railway making a £2 billion-a-year operational loss to a £200 million surplus today, keeping running costs in the black, freeing up taxpayers' money to invest and improve, and delivering significant value to the wider economy. Private sector investment in the industry reached a record high last year, with at least £13.8 billion being invested in new trains; many of which come as a direct result of innovation through the private sector.

We accept that the franchising system needs to evolve to ensure it continues to be effective and sustainable. We must learn lessons from where the

system hasn't delivered and ensure that there is the right balance of financial risk between the parties involved. Putting passenger service contracts to the market regularly is an important part of this model, driving value and innovation, but there is also a role for 'on rail' competition and we support the role that open access services fulfil. As part of our plans for a changing and improving railway, we've already begun sharing our proposals with government on delivering a more flexible system that enables train companies to better meet the changing needs of customers. It requires a clear definition of roles and responsibilities across the industry, thus enabling the market, in partnership with public specification, to deliver great outcomes; connecting customers, communities, employees and businesses.



## How do you consider the introduction of a rail ombudsmen will benefit rail passengers?



**WHITTINGTON:** ORR exists to protect the interests of rail users, now and in the future. We see the introduction of an ombudsman as supportive of this objective.

Our surveys show that the majority of passengers are dissatisfied with the way their complaints are handled. An ombudsman scheme will give passengers certainty, consistency and clarity in how their complaints are handled. An ombudsman that is free for passengers, independent and able to make binding decisions, can lead to better outcomes and service for individual passengers and drive up overall standards across the industry.

In the autumn of 2016, we consulted on the changes needed to the processes for handling rail

complaints, to ensure the smooth and effective introduction of an ombudsman scheme.

The Rail Delivery Group has made good progress with the rail companies on developing the scheme, which they intend will meet the high standards required by the Ombudsman Association and by legislation.

We have announced that we intend to require all rail companies to participate in the rail ombudsman scheme. To achieve this we must modify the licences of rail operators, specifying that they are required to join and remain in the ombudsman scheme. We consider this change necessary to provide assurance for all passengers that their complaint will always have independent scrutiny if desired. ▶



Next Fastest Train	
East Croydon	Pit 4
Falmer	Pit 8
Gatwick Airport	Pit 3
Haywards Heath	Pit 7
Hove	Pit 1
Lewes	Pit 8
London Bridge	Pit -
London Victoria	Pit 4
Preston Park	Pit -
Worthing	Pit 1

Subsequent Departures	
1610	Seaford - On time
1614	Hove - On time
	for Worthing and Littlehampton
1619	London Victoria - On time
	Formed of EIGHT coaches
1622	Lewes
1624	Redbridge

## What more must train operators do to meet and surpass passenger expectations?



**PLUMMER:** Not only is Britain's railway one of the safest in the world, it also has one of the highest rates of customer satisfaction. Customers in the UK score rail services higher on a number of measures when compared to those in France, Germany, Spain and the Netherlands. Since surveys began in 1999, UK customer satisfaction has increased from 76 per cent to 83 per cent. To build on this progress, the industry is working together to deliver an even better railway for tomorrow.

As part of the partnership railway's plan for change, passengers will see improvements to punctuality and performance. We will be more open, accountable and transparent with our customers by improving the compensation claim process, developing a new National Rail Enquiries website and supporting the establishment of a new and independent ombudsman.

We must also meet the expectations of all passengers, including those with disabilities. Between 2014 and 2019 passengers will see the number of step-free railway stations increase from 110 to 450. We have also made improvements to the assisted travel scheme by launching a single phone and text phone number, making it easier for people to book assistance. The partnership railway will continue to focus on tackling barriers to travel so the railway is accessible for all.

“Not only is Britain's railway one of the safest in the world, it also has one of the highest rates of customer satisfaction”

PAUL PLUMMER



## What will be the greatest challenge or opportunity for the UK rail sector as it enters Control Period 6 (CP6)?

**CARNE:** There are two significant changes to our Strategic Business Plan for CP6, compared to the CP5 plan.

Firstly, over the past few years Network Rail has radically changed its structure from a very large monolithic centralised company to the one we see today that is divided into eight geographically-based devolved businesses – called routes – that are close to local customers, passengers, stakeholders and funders. Our ninth route – Freight and National Passengers Operators – is a virtual route that looks after nationally-focused customers whose interests extend across our geographical routes' boundaries. Our CP6 Strategic Business Plan has been built from the ground up, by regional teams with expert local knowledge, building realistic and challenging plans rather than the centre taking the lead and making their best estimates of what was needed.

Secondly, big projects – enhancements – are also mainly excluded from this control period process. For CP5 a 'wish-list' of projects was included in the funding settlement and a lump sum attached to that list. However, the majority of those projects were at a very early stage of development and as their definition and scope was explored and the projects matured it became clear that the money available could not hope to fund everything on the list. This led to significant financial issues and pressure for the company and for Government. This mistake won't be made again as the settlement for CP6 will focus on funding the day-to-day costs of running, maintaining and renewing the railway network, and projects will be funded and treated

on a case-by-case basis, outside the control period process – and once those projects are sufficiently mature, they will be presented to funders for a funding decision.

**WHITTINGTON:** We are well on our way to producing the final determination in the autumn, which will apply to Network Rail from April 2019. Throughout the last two years we have supported the work of Network Rail in transforming its business into eight geographical routes. The periodic review will set out significant changes to how we regulate Network Rail, with a greater use of comparison between the groups and a specific focus on the performance of the system operator responsible for network-wide planning.

The five-year funding settlement that Network Rail has received provides certainty for planning and investment. That is particularly important for the next Control Period, where a fresh emphasis on renewals is necessary, as well as proactive work to reduce risk and improve safety for everyone using and working on the railways.

A key challenge for each route, which will have a huge impact on the overall success of CP6, is their ability to deliver in year one of the new Control Period. This is both in terms of carrying out the work as planned but also in terms of the quality of the relationships they create with their route stakeholders. It is the relationships with their operators as well as the supply chain that will help ensure our overall objective for the review of a safer, more efficient and better used network for passengers and freight customers will be met. ▶



*“The five-year funding settlement that Network Rail has received provides certainty for planning and investment. That is particularly important for the next Control Period, where a fresh emphasis on renewals is necessary, as well as proactive work to reduce risk and improve safety for everyone using and working on the railways”*

JOANNA WHITTINGTON



**PLUMMER:** CP6 provides a new opportunity to ensure the railway delivers on its commitment to boost local communities through localised decision-making and investment. The sector is in the process of establishing local supervisory boards, or equivalents, made up of Network Rail in partnership with operators and suppliers, train operators and passenger groups to ensure that customers and communities have a stronger voice in rail decision-making. These will be in place across all routes in England and Wales by the spring of 2018 with a similar arrangement already in place in Scotland. This will help to ensure decisions around rail serve the interests of local communities.



Much of Network Rail's work is now approved at a local level, which will speed up decision-making. Working in partnership with train operators will help to ensure rail remains focused on improving services for passengers and supporting local economies. As well as local collaboration, we must continue to join these local teams up nationally to ensure the network is planned and delivered as one railway. This will enable the industry to identify the best solutions for communities across the country, which together with transparent analysis can help to inform investment and planning decisions. As we approach CP6, bringing decisions closer to home will transform the railway, unlocking the potential of our communities to grow and thrive.

**QUINNELL:** On a global perspective, I think what we do in the UK is world class. We're absolutely at the cutting-edge of delivering rail projects. We work to challenging constraints – other countries simply

close their lines, but we work in a way that keeps our rail network moving. That's a real talent and something the UK rail sector can certainly, and should be, exporting.

The UK's Minister of State for Trade and Export Promotion at the Department for International Trade (Baroness Fairhead) has been actively seeking to help the industry export our experience, but we need more government help in pushing forward. Alliances are now delivering near-perfect handback with virtually no safety criticism and this level of performance is astounding and far better than witnessed in previous control periods or other sectors.

We need to play to our capabilities rather than dwell on certain well-publicised challenging schemes, the costs of which are publicly known and therefore give the industry a bad name. We must look at what enhancement-type activities can be best served by existing framework holders. A lot of the work at Waterloo Station, for example, wasn't delivered by the project team per se, but by the fully-embedded Track Alliance in the region. Going forward we need to look at better developed designs and understanding of projects before we let the work and publicise the costs – but also look to utilise national frameworks and ensure experts complete projects without getting bound in procurement processes which fail to deliver the expected end results.

The UK's rail construction sector is leading the way within the wider UK construction space. We really are leaders and the UK is showing the rest of the world what can be done. We just need to get better at publicising our strengths. 

**“ On a global perspective, I think what we do in the UK is world class. We're absolutely at the cutting-edge of delivering rail projects ”**

JAMES QUINNELL

# INTERVIEW SPOTLIGHT



**Scott Kelley**, Market Director, Strategic Rail, UK and Europe at SNCL Atkins discusses how the UK's rail sector is sprinting into a digital future and addresses some of the challenges the industry might face as these modern changes start to take shape.

THE FUNDAMENTAL challenge facing UK rail is as simple as it is stark: As passenger numbers increase – approximately 40 per cent forecast by 2040 – to address the capacity challenge we need new methods that go beyond the traditional approach of building more platforms, tracks and trains, due to the cost of infrastructure. In the future, greater capacity and performance will need to come from a step-change in how the industry integrates digital technologies across track, train, control systems and wider digital infrastructures.

Against this backdrop we must challenge old perceptions of an industry unwilling, or slow, to modernise with a series of ambitious changes that not only ensure better performance for customers but position the industry at the heart of a newly connected UK transportation network.

This means driving the continual development of digital capabilities across the sector. The announcement of the Digital Rail Strategy in May 2018 by Secretary of State, Chris Grayling, is a start. The plan provides a commitment and an impetus, favouring a sensible approach in phasing the implementation of digital technologies, but there are limitations. There are challenging questions about what the correct regulatory and contractual environment needs to look like in a devolved structure of routes where control for decision-making sits with the operating companies.

The other challenge will be ensuring the digital systems work to complement each other in delivering new capacity but, more importantly, make the most of

what we already have. As Network Rail's Mark Carne pointed out: "A like-for-like replacement would cost circa £20 billion and deliver very little in terms of passenger benefits. New digital signalling offers a more cost-effective alternative that also brings significant benefits for rail users, such as more capacity, speed and reliability."

But moving into the digital age, realising these benefits, means making difficult implementation decisions. All parties within the industry need to align against a common set of objectives in a system that allows effective compromise.

One way to achieve this would be digital strategies and a delivery plan that encompasses all elements of train control including traffic management, conventional signalling and all associated data and telecommunications networks under a single controlling mind.

A key objective of this is to accelerate the development and funding for the strategic business cases currently being developed by the Digital Railway Programme team, ensuring they can be consistently applied across the network, driving out the benefits of digitalisation in a faster more efficient way and considering the benefits to the system as a whole, rather than the individual benefits of one scheme. This could lead to a benefits-driven agreed implementation plan between industry and government, taking into account broader issues such as supply chain capacity and capability to focus attention on those schemes that would deliver the greatest economic benefit and improvement in passenger experience.

The implementation of a digital rail strategy, whilst continuing to operate a network functioning largely on conventional technology, will create both opportunities and challenges for infrastructure and train operators as the two technologies co-exist for a considerable time. Ensuring that the focus is on delivering system-wide economic benefits and improved passenger experience will ensure that any challenges will be easier to overcome, in comparison to a less focused piecemeal implementation.

With passenger experience at the top of the agenda in the rail sector, adopting these new technologies and delivering transformational change quickly will be key to securing rail's future position in the evolving transport ecosystem. Adopting digital technologies will undoubtedly deliver huge passenger and operator benefits and underpin the future of rail across the UK.

Whilst incredibly exciting, a range of new challenges might appear along the way. But working together as an industry will ensure a huge success and deliver a transformational change that lasts for a generation. 

**SCOTT KELLEY** is Market Director for Strategic Rail at SNCL Atkins in the UK, leading the delivery and winning of work for key clients in the sector. Scott has worked for Atkins for 15 years in a variety of senior roles including key positions on Jeddah Airport, Doha Gold Line, Metronet and AWE. Prior to joining Atkins Scott held roles in Railtrack and the SRA. Scott is Chartered Mechanical Engineer and holds a Master's Degree in Construction Engineering from Cambridge University.



## Rail and tech collaboration is key for growing the international market

Travel technology companies and rail companies have a common goal: To provide the best possible customer experience and access to tickets. This in turn boosts distribution and sales and ultimately encourages more people to travel by train – one of the most sustainable forms of public transport. **Daniel Beutler**, General Manager for travel technology company Trainline International, says there are many ways in which the rail sector can work as one to achieve this, resulting in benefits for the entire industry.

### Creating a standard

The first and potentially most important way we can work together is to implement standardised rail data internationally, meaning customers can receive the same booking experience wherever

they travel in the world. The lack of a unified data standard on distribution holds the industry back, as unnecessary complexity creates a barrier to seamless journeys for travellers throughout Europe and beyond. Too often, rail travellers find it challenging to navigate international rail systems to locate information on ticket prices, let alone identify the correct route, the best price and the most convenient journey. There will be greater opportunity for the rail industry to attract more customers if the complexity associated with rail travel is removed, particularly for cross-border journeys.

“ We want to put global rail travel in our customers' pockets, making the train the transport mode of choice, whether at home or abroad ”

When it comes to creating a first-rate rail booking system, technology companies are well placed to inject valuable expertise and innovative solutions. These are elements that Trainline<sup>1</sup> has focused on for many years – we've created an industry-leading digital platform that simplifies complex systems, creating a standardised way to book tickets, with the capacity to connect every rail network in the world. We currently connect more than 100 rail carrier partners across Europe and beyond – each with a different standard – and our technology brings these standards together in one simple user experience that enables customers to book with ease. The reason we've been so focused on creating a standardised system is simple: We want to put global rail travel in our customers' pockets, making the train the transport mode of choice, whether at home or abroad.

### Delighting our customers

By removing the complexity of booking for travellers, we're providing an enjoyable experience in whichever country they need to travel in, which encourages them to continue using rail. I experienced this myself recently on a trip to Milan. As I walked to the train station, I opened the Trainline app and booked my ticket whilst on the move. I had instant access to all the information I needed for my journey, such as which platform to head to and whether my train was running on time – giving me no reason to opt for a flight instead. All the unknown factors of the journey were removed and the travel experience matched the one I'm used to at home.

A simple booking process is what every customer expects and it's what we should consistently deliver, to ensure we don't lose them to another form of transport. Technology and rail companies should always look for new ways to further enhance the customer experience. When seamless booking is combined with digital ticketing, for example, the experience is taken to the next level. Add to this exciting artificial intelligence-led innovation and the experience becomes heightened. This is the main focus of our company: We invest heavily in our technology to provide rail travellers cutting-edge innovation, designed to keep customers coming back. In the last few months alone, we've launched a price prediction tool and a voice app in the UK and are continually improving our offering with around 200 updates to our apps every week. Constant innovation, resulting in technology that empowers the users, delivers added value and drives more customers into the rail system. Our technology is designed to complement the carrier offering and we're always looking for ways to work ever closer with carrier partners – genuine collaboration will benefit the entire industry.

### Disseminating data

Travel technology companies and rail carriers that work hand-in-hand benefit all parties. To achieve maximum impact, carriers are required to open up retail and journey data to everyone. Timetables and real-time data are key to nurturing seamless multi-operator journeys, which is proven to drive demand. A great example of this is Transport for London's (TfL) open data policy, which generates an economic benefit of up to £130 million<sup>2</sup> for the city each year. All stakeholders in a modern transport ecosystem should take note of this and encourage industries to replicate.

Trainline serves customers in 173 countries, in 14 different languages and connects more than 170 transport partners globally. The company is focused on encouraging the public to opt for rail whilst travelling abroad, for leisure or business. Access to real-time data, on a trusted platform known well, increases the likelihood that travellers will journey by rail when visiting a new country. Returning to the TfL example; by opening up data to third-party apps, the transport authority found that customers could better plan their journeys. This enabled them to use TfL services more regularly and these additional journeys were valued at (a conservative) £20 million per year. Opening up data is in the best interest of the customer – and what's good for the customer is good for the rail industry.

### Supporting newcomers

As well as working closely with all major rail carriers, it is the mission of established travel technology companies to provide the public with all possible options – including journeys provided by new carriers – in a transparent and easy way. Trainline operates on the understanding that competition in rail benefits the customer greatly, as it increases innovation, resulting in more choice and a better-quality experience. The Swedish rail market is a great example of this, a recent increase in market competition has resulted in healthy organic growth for both the incumbent and the new railway. For this reason, we're committed to partnering with new carriers to offer customers the choice they want and to help grow the overall market. Our role is to help the challenger become established in the market by connecting their inventory to that of other rail networks around them – it's great for all parties involved.

An effective way for new rail operators to thrive is to leverage the capabilities of trusted third-party retailers, which can provide instant reach well beyond the means of a brand in its infancy. We have seen this work well in countries such as Austria, where we are working with all operators to increase additional demand for the country's trains and growing the market for everyone. 

**“Opening up data is in the best interest of the customer – and what's good for the customer is good for the rail industry”**



**DANIEL BEUTLER** leads Trainline's international business and is responsible for the growing number of commercial relationships with Europe's rail companies. He has extensive experience in the rail industry, with previous roles at Captain Train, where he was COO, and Deutsche Bahn, where he held roles including CEO of France, Director of Western Europe Sales and Marketing and Director for Emerging Markets. Daniel studied transportation and tourism in Lüneburg, Dresden and at McGill University in Montreal, Canada.

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## INTERVIEW SPOTLIGHT

*Dr Jochen Holzfeind*, voestalpine's Chief Technology Officer of Railway Systems, explores the company's methods in environmental protection through performance and explains why voestalpine Railway Systems recently exhibited at Europe's largest transport research conference.

### Why did voestalpine participate at the recent Transport Research Arena (TRA) event in Vienna, Austria?

TRA is co-organised by the European Commission and attracts many of the decision-makers who set policy direction. The motto of this year's event was: 'A digital era for transport – solutions for society, economy and environment', reflecting precisely our own understanding of mobility and our role as a mobility enabler. This was reason enough for our strong presence.

### So, your expectations were quite high?

Of course. And they were more than fulfilled. Our companies are recognised as technology leaders and pioneering innovators in rail transport, which is why they have the ear of European Institutions. However, that means we are expected to not only offer advanced products and system solutions, but also to make a strategic contribution to the sustainability of railway systems.

### Does this include corporate social responsibility, such as environmental considerations?

voestalpine has been at the forefront of environmentally aware innovation for many years. For example, in the H2Future Project, we research breakthrough technologies in view of the EU's 2030 climate and energy goals. Already today ecological aspects are an important part of our corporate identity; a reason why voestalpine's main turnout plant is completely CO<sub>2</sub> neutral. We also operate our own hydropower plant. Even the waste heat from our rail rolling mill is fed into voestalpine's heating network which supplies Styrian towns with clean energy. These are examples, but they express a new approach. Not only that, we are confident that future public procurement is to be based on best bidder criteria in terms of system performance and lifecycle economics and so ecological factors should also be considered.

### Isn't this slightly utopian?

Not at all! Still too often

public procurement follows the principle of the cheapest provider, ignoring ecological criteria and factors such as availability, performance, and costs, not only during the initial purchase but over the entire lifecycle. However, rail operators need an efficient and competitive infrastructure if they are to compete with other modes of transport.

Our interactive Rail LCC Tool, which calculates and visualises the relationship between initial investment and maintenance expense for various forms of rail transport, attracted visitors to our TRA stand. They saw how system costs decrease substantially with the use of highly developed products, while track performance and availability rise drastically.

Politics is well advised to focus on rail transport if only to meet the EU's own climate goals. The European Institutions understand that railways, metros and trams hugely benefit from comprehensive digitalisation, diagnostic and monitoring systems, data analytics and preventative maintenance regimes, so they steer public procurement in this direction and we welcome and support that development.

### Your presentation at TRA gave a track system supplier viewpoint on the procurement and operation of smart complex networks, considering the total cost of ownership and ecological factors. Why?

In my previous employment, I was responsible for the track asset management of Swiss Federal Railways (SBB). I know both sides of the coin, so I can call on infrastructure managers and system suppliers to cooperate closely. Our spheres of activity fundamentally complement each other and should be geared in the common interest of the whole sector. Shift2Rail was one of the first lighthouse examples and I hope there will be a continuation after 2020. 

**DR JOCHEN HOLZFEIND** studied civil engineering at Graz University of Technology. After working at Austrian Federal Railways (ÖBB) in the field of planning and building new railway lines, Jochen developed and led the Asset Management Track of Swiss Federal Railways (SBB) between 2010 and 2017. In September 2017, Jochen joined voestalpine as Chief Technology Officer of Railway Systems.

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### Company Type

- Academia/Research Institution
- Association
- Construction/Engineering
- Consultancy
- Financial/Legal
- Government/Regulatory Body
- PR/Marketing/Advertising
- Rail Infrastructure Manager
- Train Operating Company
- Supplier of Access Control Systems
- Supplier of Data/Information
- Supplier of Rolling Stock
- Supplier of Rolling Stock Components
- Supplier of Rolling Stock Maintenance
- Supplier of Track/Infrastructure Maintenance
- Supplier of Safety Systems
- Supplier of Security Systems
- Supplier of Telecommunications/IT
- Supplier of Signalling/Telecommunications

- Supplier of Ticketing/Fare Collection
- Supplier of Track Systems
- Supplier of Traction & Control
- Other \_\_\_\_\_

- North America
- Oceania & ASEAN
- South America
- UK & Europe

### Job Function

- Academic
- Engineering
- Financial/Legal
- Information Technology
- Sales/Marketing/Business Development
- Purchasing/Procurement
- Research/Development
- Safety/Security
- Infrastructure
- Maintenance
- Other \_\_\_\_\_

### Areas of Interest

- Construction/Engineering
- Digitalisation
- Electrification
- High-Speed
- Infrastructure
- Infrastructure Maintenance
- Projects & Funding
- Regulation & Legislation
- Rolling Stock
- Rolling Stock Maintenance
- Safety & Security
- Signalling & Telecomms
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# LEVEL CROSSING SAFETY

Unfortunately, injuries and fatalities occur too often at level crossings around the world, but they could be prevented. With industry campaigns, educational programmes, infrastructure projects, numerous obstacle detection technologies and anti-trespassing measures available, the rail sector is actively working to reduce risks and prevent accidents. Read on to find out more...



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# Safety at level crossings: **A worldwide issue**

Severe collisions at level crossings, happening every day around the world, remind us that the battle to increase safety has not yet been won. As *Isabelle Fonverne*, Projects Officer for Safety and Interoperability at the UIC writes here, several efforts are still yet to be made.

**O**NE OF the major safety risks for the railways, outside collisions with non-authorized persons walking on or around the tracks, are collisions with obstacles at level crossings. These obstacles are mainly vehicles, particularly buses, coaches and trucks but also vulnerable road users.

Some examples of recent level crossing accidents resulting in fatalities include:

- 14 December 2017: South East France, six children killed in a collision with a school bus at a level crossing protected by barriers and flashing lights
- 26 April 2018, India, Uttar Pradesh: 13 children killed in a collision with a school

bus at an unprotected level crossing (there are still 3,479 unmanned level crossings on Indian Railways broad gauge network)

- 27 April 2018, South Africa, Cape Town: Seven workers killed at the Buttskop Level Crossing, protected by barriers and flashing lights.

Collisions with school buses are particularly sensitive, because they involve children, and collisions with trucks seem to be very present in the media. This is perhaps less the case with the collisions that occur on roads every day.

The causes of collisions at level crossings can be very different, but it is recognised that human behaviour is the main factor. The vast



“ The causes of collisions at level crossings can be very different, but it is recognised that human behaviour is the main factor ”



**ISABELLE FONVERNE** joined the International Union of Railways (UIC) in 1992 and has worked in an international environment for activities including environment, high-speed, economics, technology and research and safety. From early 2010, Isabelle started working on level crossing safety, taking over the Secretariat of the European Level Crossing Forum (ELCF) and of two UIC Safety Groups: SSMG (Systems Safety Management Group: ERA/CER/UIC) and IRSN (International Railway Safety Network). Isabelle is a Member of the UNECE Working Party 1 on Road Safety, this is how the UIC initiated active discussions with the UNECE to create a group of experts on level crossing safety hosted by UNECE in Geneva. Isabelle has been the UIC Coordinator of ILCAD (the International Level Crossing Awareness Day) which has been growing year-after-year with 45 countries now on-board.

majority of level crossing collisions are caused by drivers not observing the highway code, whether deliberately or unintentionally. Drivers' errors can result from tiredness, stress, consumption of pharmaceutical products or other substances or simply from speeding – but they can also be caused by the inappropriate use of electronic devices. Most 'hyperconnected' individuals are young people (aged between 15 and 35).

These behaviours can lead to serious injuries and even death whilst also endangering others – not only other road users but railway staff and passengers.

Unfortunately, there are several examples around the world where collisions with heavy haul vehicles have led to derailments of trains and fatalities of train drivers and passengers – caused by either the impact or heavy goods transported on the trucks. Danger can also stem from around the level crossing environment with objects that were removed/teared and consequently landed on the trains during the collision.

Tackling this issue with the road sector, in developed countries and particularly in the EU, is not an easy task for the railways due to the small number of killed and injured persons within the statistics. For example, the one per cent of fatalities at level crossings in the EU can seem ▶



The vast majority of level crossing collisions are caused by drivers not observing the highway code, whether deliberately or unintentionally



**ABOVE:** There are approximately 37,000 level crossings in Canada



very insignificant in comparison to all the road traffic fatalities. However, they represent about 28 per cent of all railway fatalities and 26 per cent of all significant railway accidents. In 2015, in the EU, there were 469 collisions at level crossings, with 288 fatalities and 239 serious injuries<sup>1</sup>.

These figures are quite high for the rail sector, but the industry has been trying to tackle this issue with other sectors' stakeholders for many years.

To better address risks at level crossings, soft or harder measures have to be taken by the railways, but also by the road sector and authorities.

To find the best solutions, there is the need to:

- Better evaluate the risks at each level crossing
- Better engage stakeholders from different sectors, local authorities, communities and users' associations
- Take engineering measures and find innovative solutions

- Take educational and awareness measures: Collaboration of rail and road sectors with Ministries of Education and Transport
- Take enforcement measures: Work with the police and legal authorities.

The railway and road sectors need to evaluate together the potential risks at each level crossing, such as poor profiles (bumps, curves,) right or left turns just before or after a crossing, road and rail traffic density, potential traffic jams, visibility (bad weather conditions, railway signalling, road signs and signals) and changing environments (new buildings – shopping centres, industries, housing) and consider upgrading non-protected level crossings with protection measures (barriers, lights).

There should be a high engagement of all stakeholders from the rail and road sectors to local authorities to work together to ensure more effective communications about safety at level crossings.

More effort should be made in developing innovative engineering solutions and tools to promote level crossing safety, considering the fact that level crossings are used by a wide-spectrum of users (private car drivers, professional drivers, pedestrians, cyclists etc.) and that these requirements are not homogenous. Specifically, the analysis of user requirements should focus on:

- Motorised road users: Transport professionals, heavy vehicles and farm vehicles
- Vulnerable road users: Cyclists, pedestrians, rambles, horse riders, people with reduced mobility, users with impaired vision/hearing, and users with different cultural and language backgrounds.

## ACCORDING TO THE WORLD HEALTH ORGANISATION<sup>11,12</sup> (WHO):

- Seventy-three per cent of all road traffic casualties occur among young males under the age of 25 – who are almost three times as likely to be killed in a road traffic accident compared to young females – most road fatalities involved males between the ages of 10 and 19
- Most young people killed by the top cause (crashes) are 'vulnerable' road users: Pedestrians, cyclists and motorcyclists
- Males aged 15-19 make up the biggest share of the annual 115,302 fatalities, mostly in poorer countries within Europe, the Americas and the Eastern Mediterranean region
- Although far fewer in number, road injuries are still the leading cause of adolescent death in high-income countries.

The European Commission-funded SAFER-LC project, coordinated by the International Union of Railways<sup>2</sup> (UIC), has already analysed a certain number of existing level crossing safety measures in the EU and will give further recommendations<sup>3</sup>.

The UIC contributed in setting up a group of experts on improving safety at level crossings at the UNECE in 2014. The final recommendations were endorsed by the UNECE Working Party on road traffic safety (WP1) in March 2017<sup>4</sup>. The UIC, UNECE and FOT also produced a video at the occasion of ILCAD 2014<sup>5</sup>.

The UIC Safety Platform hosts a European Level Crossing Forum (ELCF) working group that has been exchanging best-practices for level crossing safety since 2005.

### The International Level Crossing Awareness Day (ILCAD)

As far as education is concerned, the most successful project is probably the International Level Crossing Awareness Day<sup>6</sup> (ILCAD), launched in 2009 and complementary to already existing national initiatives.

The UIC, together with railway industry stakeholders, road authorities, academics and

international institutions, will celebrate the 10th edition of ILCAD on 7 June 2018.

Every year, ILCAD partners select an overarching theme for their awareness campaign and this year the message will focus on young level crossing users who represent the category of riskiest behaviour both on roads and at road/rail interfaces.

Safety can be improved not only through education and engineering but also thanks to enforcement measures such as CCTV cameras, which legally prove offenders' misbehaviour, red light misuse and speed disobedience. Such enforcement cameras are widely installed in the UK and France. 

## DID YOU KNOW...

- Over 40 countries<sup>7</sup> take part in the International Level Crossing Awareness Day<sup>6</sup> (ILCAD)
- There are around 600,000 level crossings in the world, with 213,000 in the USA, approximately 37,000 in Canada and 114,000 in the EU
- There are numerous safety reports, statistics and data online<sup>8-10</sup> detailing significant rail-related accidents resulting in fatalities and analysis of safety performance at level crossings in UNECE member states.

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# Development of level crossing safety at West Japan Railway Company

The Japanese National Railway (JNR) was privatised in 1987 and divided into six passenger railways and one freight railway. Over the last 30 years, each company has developed their own operational activities, which includes level crossing safety procedures. For *Global Railway Review*, West Japan Railway Company (JR-West) colleagues **Katsuaki Hiromoto**, Senior Manager of Level Crossing Safety, and **Ryutaro Uenishi**, Senior Manager of International Affairs, explain the safety features they have deployed at level crossings to significantly reduce the number of accidents and help save lives.

**T**HE NUMBER of accidents at level crossings under JR-West has consistently fallen since the implementation of numerous safety measures (see **Figure 1**). During FY2016<sup>1</sup>, only 14 cases were recorded – 90 per cent fewer than in FY1987<sup>1</sup> when 144 accidents took place, in the year that JR-West was inaugurated after privatisation.

In a bid to further enhance levels of safety, JR-West group developed the 'Safety Think-and-Act Plan 2017' and implemented it over five years. In terms of level crossing accidents, our target was to reduce numbers by 40 per cent from the 41 cases that occurred in FY2012<sup>1</sup>. By implementing additional safety measures, we reached this target of just 25 cases in FY2017<sup>1</sup>.



**RYUTARO UENISHI** is Senior Manager for International Affairs at West Japan Railway Company (JR-West). Since joining the company in 2007, he has worked within human resources and corporate communication positions and has been in his current position since June 2016. Since August 2016, Ryutaro has been based in Paris and is a delegate of the UIC safety platform.

### Specific methods to decrease level crossing accidents

The most effective way to prevent level crossing accidents is to abolish level crossings completely, in favour of, for instance, a multi-level structure that JR-West has already implemented in almost 15 per cent of level crossings since 1987 (6,914 in FY1987<sup>1</sup> and 5,927 in FY2016<sup>1</sup>).

In view of the cost and length of time that such an enterprise would entail, it would be difficult to abolish all level crossings immediately. Therefore, additional cost-effective methods of accident prevention have been employed following analysis into root causes. These include installing more effective warning lights, obstacle detection devices and disseminating level crossing awareness activities.

We consider the following examples to be good practices, that are relevant globally for level crossing safety.

#### 360° level crossing warning light

A standard warning light is visible in only one direction, so to enhance clarity we have installed 360°-visible warning lights (see **Figure 2**). As of March 2017, we had installed these lights in approximately 3,100 locations.

#### Enhance the visibility of special warning signal

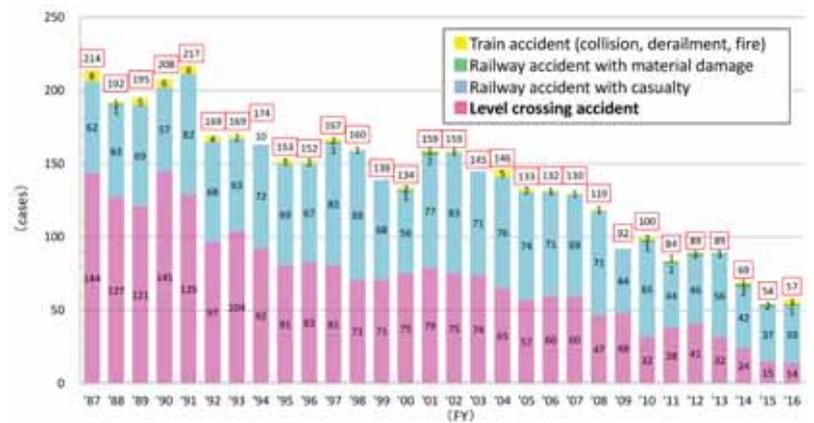
In the event of an emergency at a level crossing, the signal notifies the train driver that there is an abnormal situation. We have increased the number of such signals and made them bigger so that they are more eye-catching for train drivers.

#### Obstacle detection device

This device detects the presence of an obstacle, such as a pedestrian, wheelchair user, cyclist, car, etc., on a level crossing after the barrier has closed. For instance, if a car has been left on a level crossing then the obstacle detection device immediately alerts the train driver to the irregularity by means of the special warning signal. Between 1987 and 2016, we installed this technology at approximately 2,000 locations.

In the last couple of years, we have been installing 3D laser radar railroad crossing obstacle detection systems which enhance the detective function effectively for more accuracy (see **Figure 3**).

FIGURE 1



ABOVE: Transition of level crossing accidents since company inauguration

FIGURE 2



ABOVE: 360° level crossing warning light

**Device with audible warning signal**

To enhance the action of the warning signal, we developed a device to support drivers' awareness of displayed signals by supplementing telecommunications with a warning voice.

This device is effective within a 1km radius of a level crossing and repeats an on-board voice recording every second.

Due to the successful demonstration of this device during an experimentation period, it was accredited effective and we are now scheduled to install more.



**KATSUAKI HIROMOTO** is Senior Manager of Level Crossing Safety within the Transport Safety Department of West Japan Railway Company (JR-West). He joined JR-West in 1997 and has since gained a lot of experience in engineering works and its related internal audits. Katsuaki has also been the Assistant Manager of the Inquiry and Auditing Department for engineering works, and Head of the Wakayama Track Maintenance Office.

**Level crossing accident prevention campaign**

This should be an indispensable tool for level crossing users to help prevent accidents. We have therefore been conveying the importance of adhering to level crossing rules by carrying out level crossing awareness campaigns at theatres, televised TV commercials, on-board displays and CP-wrapped buses and via social media channels.

We have also been targeting key groups by providing safety classes for various ages – from senior groups to nurseries and preschools – as well as informing teachers of driving, elementary and secondary schools.

Furthermore, we provide key information by means of a movie on our official website.

**JR-West Group railway 'Safety Think-and-Act Plan 2022' and the future**

In February 2018, JR-West Group announced their railway 'Safety Think-and-Act Plan 2022' for the next five years.

In order to ensure safety in the future, it is important to consider the railway system's hardware and software management as well. As such, we continuously work to improve the safety management of our organisation.

In terms of level crossing accidents, for instance, according to our analysis during the last five years 60 per cent of accidents were due to unavoidable conditions created by over 70s and around 79 per cent in FY2016<sup>1</sup> occurred through unsafe crossing behaviour.

Finally, our new target in terms of level crossing accidents, shall be lessened by 10 per cent from FY2017<sup>1</sup>. In an effort to achieve this we shall deepen the focus of current level crossing-specific risks. For example, in order to prevent older people from missing the warning lights, due to their lower-level eye-tracking, we are considering a new method and device to be installed at a level crossing pedestrian road.

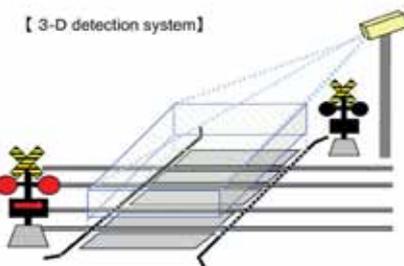
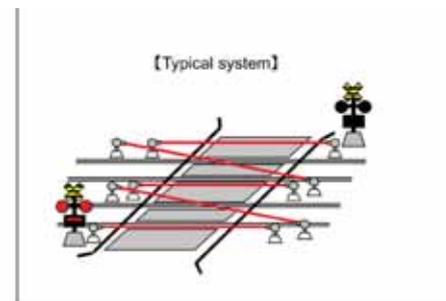
We will also continue to implement a variety of countermeasures and strategies to increase safety as all employees adopt an inclusive style of safety management. In particular we will highlight two things:

1. The effective arrangement of safety measures for the whole JR-West Group
2. The promotion of the 'decision and action' strategy, which should prioritise safety aspects first.

Our 'Think-and-Act' practice prioritises human life and helps establish safe procedures within the company.

**RIGHT:** 3D laser radar railroad crossing obstacle detection system

**FIGURE 3**



REFERENCE

1. In Japan, FY starts in April and ends the following March.

# EXPERT PANEL

As part of our Level Crossing Safety In-Depth Focus, *Global Railway Review* asked this question to our Expert Panel: If we are to see a significant drop in the number of injuries and fatalities that occur at level crossings around the world, in your opinion what area should be the main focus to prevent accidents and collisions?

**WARREN:** At the British Transport Police (BTP), we know all too well that level crossings can be dangerous when used incorrectly. That is why we are committed to working with Network Rail to spread our safety messages – we want people to be sensible, cautious and adhere to warnings. There are several ways we work with the industry to prevent level crossing misuse and educate motorists and pedestrians on the potential dangers.

Part of this includes making sure that those who misuse level crossings are identified and prosecuted. Many level crossings have CCTV cameras and mobile safety vehicles, both of which capture deliberate crossing misuse. We use this essential evidence to identify perpetrators and bring them before the courts.

BTP has also been successful in introducing a Driver Awareness Course for those motorists who deliberately misuse level crossings. These courses are designed specifically to educate motorists, demonstrating what happens when someone ignores warning signs and consequently puts their life, and the lives of others, in danger. Level crossings are safe when they are used correctly, and we'll continue to work hard with Network Rail and train operating companies to make sure that misuse is deterred.

**KNIGHT:** Despite significant progress from rail authorities across the globe, level crossings remain the biggest source of risk for most rail networks. The majority of collisions are due to users' behaviour.

To change this behaviour, the biggest impact for most networks will be achieved by focusing on the deployment of effective physical, visual and audible on-site solutions. Implementing cost-effective solutions such as signage, barriers, solar powered audible warning units and Rosehill Rail's Anti-Trespass panels will change users' behaviour, significantly reducing accidents and collisions.

Quick and simple to install, to clean and to remove for maintenance, with a life of 25 years, Rosehill Rail's Anti-Trespass panels are a proven visual and physical on-track and off-track deterrent to people attempting to access the track or prohibited areas.

Pre- and post-implementation studies have shown them to reduce the number of unauthorised people trackside by up to 78 per cent, with associated reductions in delays and costs.

By adopting proven, cost-effective on-site solutions, rail networks can significantly reduce trespassing and the resulting personal injuries and unfortunate deaths.

**ANDERSON:** Level crossings have always been a source of accidents and in the 1970s British Rail embarked upon a series of crossing closures as part of specific projects, such as the introduction of 125mph trains running on the East Coast Main Line. Clearly, mitigating against the possible risk of injury and/or death at level crossings can only be achieved with more closures or rationalisations. Education and soft measures to raise awareness amongst vehicle drivers and pedestrians have helped, but despite great efforts around the world, it's not enough. Installation of control measures such as red-light enforcement cameras or Obstacle Detectors (OD) are not long-term solutions. The supply market can develop many safety measures and innovations but in reality, these are just tackling the symptoms, not the cause.

Likewise, for pedestrians, alternative means of crossing the tracks must be provided if deaths and injuries are to be avoided. More bridges, compliant with disability regulations, are now regularly being designed into projects.

It is acknowledged that targeted removal of crossings (wherever possible) will contribute to a reduction of deaths and injuries, whilst at the same time producing operating and maintenance savings through their closure. 

## PARTICIPANTS



INSPECTOR  
BECKY WARREN

British Transport Police (BTP)



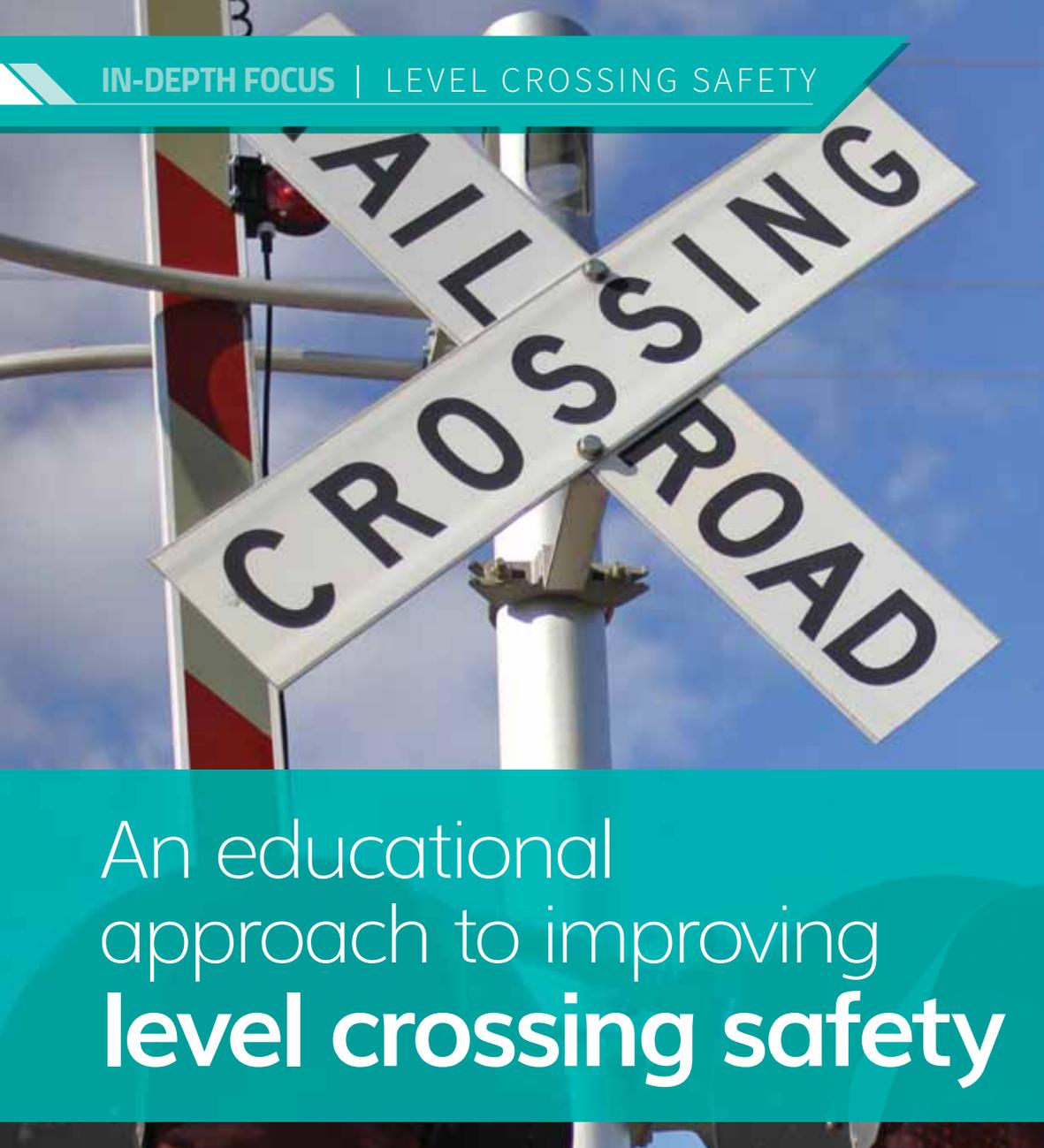
ANDREW KNIGHT

Export Manager, Rosehill Rail



PETER ANDERSON

Managing Director,  
Prime Rail Solutions Ltd.



# An educational approach to improving level crossing safety

Reducing incidents, deaths and injuries at intersections where roads cross train tracks is an important public safety issue around the world. In America, a person or vehicle is hit by a train roughly every three hours – a stark reality that Operation Lifesaver, Inc. (OLI) is determined to change. Interim President, *Wende Corcoran*, explores OLI's efforts to educate the public of the dangers of level crossings with a series of safety education campaigns.

**M**Y GROUP, the U.S.-based rail safety education non-profit Operation Lifesaver, Inc. (OLI)<sup>1</sup>, promotes public safety education and awareness in its mission to reduce collisions, fatalities and injuries at railway level crossings and prevent trespassing on or near railway tracks.

On 7 June 2018, OLI will join more than 40 countries worldwide for the 10th annual International Level Crossing Awareness Day

(ILCAD)<sup>2</sup>. We will also celebrate Rail Safety Week<sup>3</sup> with Operation Lifesaver Canada<sup>4</sup> on 23-29 September 2018. These strong international partnerships help to raise awareness of rail safety and support our shared goal to eliminate deaths and injuries around tracks and trains.

Operation Lifesaver (OL) was formed 46 years ago and has expanded throughout both the U.S. and internationally. Along with Canada, Argentina<sup>5</sup> and Estonia<sup>6</sup> also have OL programmes:



**WENDE CORCORAN** was named Interim President and CEO of Operation Lifesaver, Inc. (OLI) in November 2017, having previously served as OLI Vice President. She manages the operations, funding, staffing and strategic partnerships of the nation's non-profit rail safety education organisation. Before joining OLI in 1999, Wende was an educational resource specialist for gifted and talented students in Loudoun County, Virginia Public Schools, where she managed teachers and students in a specialised educational programme. Wende holds a Master's in Curriculum Development and Training from George Mason University in Fairfax, Virginia and a B.S. in Education from Indiana University, Bloomington, Indiana.

Mexico and South Africa have similar initiatives. Through these partnerships, the mission of the programme remains paramount: Saving lives and reducing injuries at level crossings and on and around railroad property.

In 1972 there were approximately 12,000 level crossing collisions in the U.S. As a result, Union Pacific Railroad launched OL as a six-week public relations campaign in the state of Idaho. That year, level crossing-related fatalities in Idaho dropped by 43 per cent. Word of this success spread to other states which began introducing their own public education safety programmes. Today there are functioning OL programmes in 47 states. OLI was established in 1986, serving as the programme's non-profit national support centre.

Today in the U.S., OL reaches millions of people through presentations customised for school groups, driver education classes, community audiences, professional drivers, law enforcement officers and emergency responders. The programmes are co-sponsored by federal, state and local government agencies, highway safety organisations and America's railroads. OL promotes the three e's – education, enforcement and engineering – to keep people safe around the tracks and railway crossings within communities.

OL's efforts have contributed to an amazing success story, as crossing collisions have declined by more than 80 per cent over the last four decades. Those gains came from closing unnecessary crossings, improvements in crossing warning devices, increased enforcement of traffic laws and the educational efforts of OL and its safety partners.

However, pedestrian-rail trespass incidents have not seen the same level of improvement. In fact, every year since 1997, more people have been killed while trespassing on tracks in the U.S. than from vehicle-train collisions at railroad crossings. Unintentional deaths and injuries resulting from illegal trespassing continue to reach close to 1,000 each year. A recent U.S. Congressional Research Office report<sup>7</sup> reviewed the issues at stake. Clearly, challenges remain for rail safety advocates, particularly in preventing trespassing on railroad rights-of-way.

With our continuing 'See Tracks? Think Train!'<sup>8</sup> safety education campaign, which first started in 2014, OL encourages drivers and pedestrians to make safety an automatic habit near train tracks.

### Reaching professional drivers and first responders

There are free e-Learning programmes available online for professional truck drivers<sup>9</sup>, school bus drivers<sup>10</sup> and, our newest programme, for first responders<sup>11</sup>. First responders and emergency vehicle drivers are an extremely important target

audience because of the high consequences of an emergency vehicle-train collision.

The e-Learning for first responders programme brings attention to the choices first responders often make around tracks and trains and is intended to help them safely traverse level crossings. While it can take extra caution to navigate a level crossing while heading to an emergency, ambulance drivers, law enforcement officers, firefighters, EMTs and dispatchers can mitigate the risk by knowing what to do. This e-Learning programme, developed with input from fellow first responders, has four interactive sections to familiarise response personnel with the rail environment and puts the user behind the wheel for a virtual trip to an incident, respond to safety risks and manage an emergency on railroad tracks.

### Rail safety education for students aged five to 22

Through funding from our U.S. government safety partners, we are continuing to develop engaging materials to reach important audiences in two main ways. First is through free, in-person safety presentations by our trained volunteer speakers or at large public events. Second is by inviting specific audiences to access, free-of-charge, our materials electronically on our website<sup>1</sup>. Whether in person or online, all our materials have consistent safety messages specially designed for different age groups or audiences.

Our newest educational materials were developed to appeal directly to students aged five to 14 and new drivers and students aged 15-22. Every year, more than 900 trespassers and over 1,000 motorists in the U.S. are involved in incidents along train tracks or at level crossings, so reaching school-aged students with free materials that are interesting, fun and convey lifesaving information is an important part of our multi-faceted approach to reducing those numbers. Materials for children aged five to 14 include: ▶

“OL's efforts have contributed to an amazing success story, as crossing collisions have declined by more than 80 per cent over the last four decades”

↓ **BELOW:** Screenshot: Safety video messages appealing to inexperienced drivers – especially young adults – can help raise level crossing safety awareness



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**'Trains & Tracks'**

This presentation for children aged five to eight introduces them to basic safety messages and train attributes, emphasising the importance of using caution around trains and tracks. The information is presented in a story called 'Train and the Whateveritwas' which incorporates key safety messages in an entertaining and engaging format.

**'Train Safety Savvy'**

This presentation is for children aged eight to 11 and covers general safety messages, signs, signals and trespass prevention messages using information and interactive games sequences to keep the attention of this age group.

**'Main Line Middle School'**

This presentation uses emoji-like characters in a colourful, yearbook-style storyline to appeal to smartphone-savvy students aged 11-14. It covers general safety messages, signs, signals and trespass prevention messages.

These new educational tools are available for viewing on the OL for Kids<sup>12</sup> section of the OLI website. We are excited to share these new educational materials with students, educators and schools across the U.S.

To reach inexperienced drivers – especially teens and young adults – with critical information on how to drive safely near train tracks, we recently released a new 10-minute driver training video<sup>13</sup> and a 30-second public service announcement inviting them to watch the video and enter a competition. The video demonstrates how to drive safely near railroad tracks, highlights consequences of unsafe behaviour and raises awareness of the need for caution and alert driving behaviour near level crossings.

OLI's passion is preventing deaths and injuries near rail tracks and level crossings. Our new 'Drive Safe Near Trains'<sup>14</sup> programme is intended to be entertaining for inexperienced drivers while helping them safely navigate level crossings. With lesson plans created especially for driving educators to accompany the video, our goal is to help today's new drivers make the right choices at level crossings. A digital ad and social media outreach campaign is also underway to alert a broader audience of 15-22-year-olds to the competition and generate interest in the videos and safety messages.

**Sharing rail safety messages through social media**

Our social media accounts provide further platforms for us to engage with audiences across the globe. Rail safety advocates can help spread our message by following, liking, retweeting and sharing our posts on these platforms<sup>15-18</sup>.

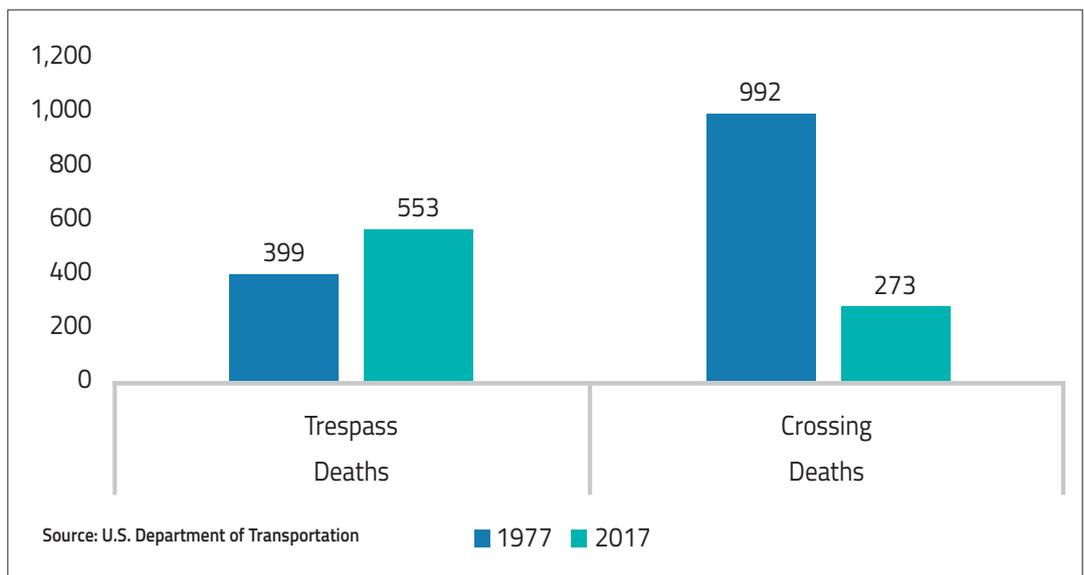
**Rail Safety Week (RSW)**

RSW is a key part of our ongoing mission of reducing collisions, fatalities and injuries at level crossings and preventing trespassing on or near railway tracks, reinforced by our 'See Tracks? Think Train!' campaign.

RSW 2018 will be observed by OL programmes and partners in the U.S. and Canada from 23-29 September. The goal is to raise awareness of the need for rail safety education and to empower the public to keep themselves safe near level crossings and railroad rights-of-way. We are grateful to the sponsors, partners and state OL programmes who made RSW a success in 2017 by helping to spread lifesaving messages to millions of people.

Together, we are making communities safer across the U.S. – and all around the world. 

**RIGHT:** U.S. rail-related fatalities comparison – 1977 vs. 2017 



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  - Bogies & Wheelsets
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- 
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Published: July 2018

**Global  
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# EVENTS DIARY

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june

**Transport Security Congress**  
 Date: 11-12 June 2018  
 Location: Washington DC, USA

july

**SafeRail**  
 Date: 11-12 June 2018  
 Location: Washington DC, USA

**Africa Rail 2018**  
 Date: 12-13 June 2018  
 Location: Johannesburg, South Africa

**Singapore International Transport Congress and Exhibition**  
 Date: 9-11 July 2018  
 Location: Singapore

september

**InnoTrans 2018**  
 Date: 18-21 Sept 2018  
 Location: Berlin, Germany

october

**Rail-Volution**  
 Date: 21-24 October 2018  
 Location: Pittsburgh, USA

november

**Intelligent Transport** HOSTS  
**INTELLIGENT TRANSPORT CONFERENCE**  
 QEII CENTRE | LONDON  
 CONFERENCE | NETWORKING | 1-2-1 MEETINGS  
 01-02 NOVEMBER 2018  
[intelligenttransport.com/intelligent-transport-conference](http://intelligenttransport.com/intelligent-transport-conference)

**Global Railway Review** IN PARTNERSHIP WITH **UIC** HOSTS  
**DIGITAL RAIL REVOLUTION**  
 UIC, PARIS, FRANCE | 21 NOVEMBER 2018  
 CONFERENCE | NETWORKING | PRODUCT DEMONSTRATIONS  
[globalrailwayreview.com/digital-rail-revolution](http://globalrailwayreview.com/digital-rail-revolution)

**AusRAIL 2018**  
 Date: 27-28 November 2018  
 Location: Canberra, Australia

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# Wheelset of the Future: an Integrated System.

The International Wheelset Congress is among the most influential and vibrant worldwide conferences in the railway sector.

The theme of this event is to look not only to wheels and axles, but to consider also those components that interact with them, generating an integrated system to be taken into account as a whole during activities like design, production, testing and maintenance.

Manufacturers, assemblers, integrators, users and maintainers of components like brake discs, bearings, housings, sensors, gearboxes and suspension systems are warmly invited, along with Universities and Research Centres, to join in the conference and to share their experience with wheel and axle experts.

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