Safety first: rail’s record shows the way forward

For the ninth consecutive year, no passenger has died as a result of a rail accident in the UK. Is it now time for other sectors to benefit from the lessons that rail has had to learn the hard way? TOM INGALL reports

Five! Pick any day - the day I sat down to write this, or the day you read it. Five is the number of people who left home in the morning and did not return. They died in road accidents.

It is, of course, an average figure, but it is still a sobering one. The number of people killed on our roads in 2015 was 1,732... 54 of them children. Often we never even know their names. They slip through the cracks of our lives, their deaths perhaps not even reported in the local press. Yet their loss ripples outwards - an empty desk at school or work, or a loved one gone.

To be crude but frank, the loss is also financial. From the accident scene and the resulting congestion, to the work of the emergency services and hospital doctors, and finally the investigation and possible prosecution. The Department for Transport estimates the value to the UK economy of preventing these deaths is more than £16 billion every year. Each is thought to cost £1.8m. And beyond the death toll, official statistics suggest 22,000 people were seriously injured in 2015, and 162,000 were slightly injured. Both of those latter categories are of course somewhat subjective though. Lives are changed forever in accidents, long after doctors and the physical healing process have done their work.

By contrast, in the 2015-16 period no one died as a result of a train accident - for the ninth consecutive year. The number of fatal accidents involving the rail workforce also declined to zero, for the first time since records began at the turn of the century, although for the sake of balance there were still a handful of passenger fatalities (mostly at the platform edge - but not related to boarding or alighting), three pedestrians killed at level crossings, and almost 300 suicides or suspected suicides.

To be very clear, this is not some deeply inappropriate point-scoring exercise. A rail safety record which is globally admired is only earned and sustained by hard work and by lesson learning.

For example, towards the end of 2016, the deaths of seven passengers on the Croydon Tram network was a shocking reminder that good records can be undone in a moment. It was significant enough in the national psyche that the names and photographs of the victims shared the front pages of national newspapers with the election of an American President.

Yet in the past few years, the steady decrease in road fatalities has slowed. Between 2005 and 2010 the number practically halved. Now, the DfT acknowledges in statistical terms it has remained unchanged since 2011. The lack of outcry from society might imply we have accepted the risks of personal motoring. Yet the devastation to lives and the financial cost continues.

Professor Richard Allsop is an Emeritus Professor of Transport Studies at University College London. He has worked on aspects of transport policy research since the 1960s.

“The roads have never been a free-for-all,” he says. “When motor vehicles first arrived, if you wanted to drive a car you had to have a man walking in front of you with a red flag. There have always been elements of regulation, which have progressively become more complex over the years.

“As motorisation increased in the post-war period, the number of deaths on the road went up until 1966, when it reached effectively 8,000 people. The introduction of the breathalyser in 1967 had a marked effect. By the early 1970s the number of deaths per year was on a downward trend. It is now around 1,800 a year, and that is in the context of traffic having multiplied five times since 1967.”

Allsop describes himself as a constructive critic of Vision Zero, a global campaign to eliminate all road injuries. It began in 1997 in Sweden, and has been taken up by some British cities and towns. “People make mistakes,” says the Vision Zero website. “Vision Zero supporters say policies must aim to protect them from fatal errors on roads.”

“Some people believe in total elimination in death and injury,” continues the professor. “As a scientist I know, we don’t know how to achieve that. My suspicion is it won’t be achievable. The [Vision Zero] concept has done tremendous good, and I’m sure it has accelerated the rate of reduction of deaths on the road, but I don’t buy it.

“I don’t find it credible, with any kind of automation or any kind of improvement in behaviour - when you have 65 million people and 40 million motor vehicles circulating in a reasonably free society in a country where the amount of space available is what we have - that you can eliminate accidental death from the road system. But with determination we should be able to reduce it by a factor of (say) something like four from where we are now.”

Allsop argues a case for reintroduction of national targets motivating effort at local authority levels. “Until May 2010 we had a positive allocation of money and positive requirements on local authorities to have a plan in place for their next steps in reducing death and serious injuries on the road. All of that was dismantled in the summer of 2010. The Coalition Government was confident the numbers would keep coming down, but in fact the decrease ceased and the number of deaths has levelled off - there are some local authorities where there are no specialist staff and no budget for explicit road safety work.”

“There needs to be a long, hard look at our present arrangements for roads to take advantage of learning from the experience in the rail and aviation sectors.”


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The Government now frames its policy on road safety through the previously mentioned British Road Safety Statement. It has set priorities for tougher enforcement against drivers who speed, drink drive, take drugs or use their phones behind the wheel. There is also still an aim to protect vulnerable road users (cyclists and pedestrians) through infrastructure and vehicle improvements.

The Parliamentary Advisory Council for Transport Safety (PACTS) is a registered charity which aims to inform MPs and Lords on air, rail and road safety issues. It set up an independent Transport Safety Commission which, in March 2015, published a report into the various legal framework and institutional responsibilities in the UK for transport safety across roads, railways and aviation. The executive summary is stark.

“There needs to be a long, hard look at our present arrangements for roads to take advantage of learning from the experience in the rail and aviation sectors and in the road safety management practices of other leading countries,” it says.

“There is currently no national casualty reduction target for local roads in England. The balance of opinion we received was strongly that national targets are helpful and necessary.”

PACTS Executive Director David Davies says: “We’re connected to Parliament, and our focus is working with and advising MPs and the House of Lords to keep safety - mostly road safety - on their agenda. We’re not trying to speak to the public.

“Our overriding priority is to reinforce the message that road safety is not fixed or solved - it is still the biggest risk most of us face in our daily lives. It’s the biggest killer for young people aged 15 to 25. Although the UK has a good record, we absolutely need to do a lot more.”

In mid-March this year, PACTS was due to host a conference to discuss current collision investigation practice. The Chief Inspector of the Rail Accident Investigation Branch was one of the speakers. The agenda seems set to promote the notion of a more coordinated approach to investigation of serious road accidents and possibly a road accident investigation branch, to parallel those for rail, air and maritime.

Says Davies: “It’s on the cards. There is now a sort of regulator for the trunk road network. The Office of Rail Regulation is now the Office of Rail and Road. It encompasses a safety brief for trunk roads. Although the Department for Transport doesn’t have a UK-wide or even England-wide road safety casualty reduction target, it has set targets for Highways England in relation to the trunk road network. It’s quite a demanding target.”

In the British Road Safety Statement, the DfT outlines a number of activities to “help Highways England to move towards its target

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David Davies, Executive Director, Parliamentary Advisory Council for Transport Safety
of reducing the number of people killed or seriously injured on the strategic road network by 40% by the end of 2020, and its aim of bringing that figure as close as possible to zero by 2040”.

“They probably aren’t going to meet that,” says Davies. “I’ve heard senior police collision investigators say: ‘What we do is essentially with a view to prosecution – has someone been speeding or drink driving? What we are not doing is gathering information across the piece. We’re not gathering these investigations together and saying ‘look, if only this vehicle was designed differently, or this road was designed differently, or information had got across to drivers, then we could prevent casualties’.

“We feel there needs to be a more systematic rigorous learning process, at least from the fatal accidents. We’re not suggesting every bump and shunt should be investigated – a bit like air and rail, in that they don’t investigate every accident. They look at what happened and ask if there is something special about it, some learning we can get out of it.

“We are now getting to the numbers where that is feasible. 1,700 deaths on the road each year, which is around 1,600 fatal accidents - it is not impossible to investigate all of those. Indeed, the police do, so if we could have some kind of process of transferring the information from the police to a learning centre…”

The DfT already runs a scheme called Road Accident in-Depth Studies (RAIDS). Phase 1 began in 2012, during which more than 1,000 collisions were investigated. A second phase is now under way which will run until 2019. Investigators attend accident scenes while the emergency services are still present, with the aim of using the data gathered to inform effective policy-making.

“RAIDS is good and all about learning, but we’d like to see that bigger and more systematic,” continues Davies. “I think we should be getting down to 1,000 [deaths], certainly by 2025.

“Driver behaviour is difficult to influence. Exhorting people to be more careful doesn’t work unless it is backed up by enforcement. It is therefore about safer vehicles, safer road designs, segregated cycle routes, safer junctions. The new mantra is safe system - the thinking behind that is: it is really difficult to kill yourself even if you make a mistake. You accept people will make mistakes, and you design around the frailties of the human body.

“We do see really good practice in the railway industry. We are trying to spread some of the rail safety mentality and standards to road. In rail it is not acceptable to think ‘a whole bunch of people will die this year’, and live with that. The assumption is you will try and prevent them all. In road there is still an assumption that ‘1,700 might all die next year and we hope it will come down a bit’.”

Why?

“Most drivers on the roads are individuals who are not under the control of an employer or anybody. If you have a licence, you can drive. Even for those driving for work, health and safety standards are much less rigorously applied. On the railways someone is accountable - there is a human psychology that comes into it. Our attitudes to risk are not necessarily consistent. People are prepared to tolerate risk when they think they are in control. If they are in a train or a plane and someone else is in charge, they expect absolute safety.”

Investigations are, of course, only part of the story. Once the data has been gathered, and the causes and consequences identified, the lessons then have to be acted upon.

Over their history the railways have become used to this process. Improvements to braking, signalling, the installation of the Advanced Warning System, and many other developments in technology have emerged in the aftermath of major accidents.

For example, the horrific and all-too-recent accident at Ladbroke Grove in 1999, which cost 31 lives and injured a further 520 people, prompted another major change. The Rail Safety and Standards Board was established in April 2003, following the >

### Road deaths per million population in selected countries

![Graph showing road deaths per million population in selected countries](image-url)

Source: British Road Safety Statement, Department for Transport, December 2015.

“The deaths of seven passengers on the Croydon Tram network was a shocking reminder that good records can be undone in a moment.”
recommendations of Lord Cullen in the Public Inquiry into the accident. The RSSB is a not for profit company owned by key stakeholders in the industry themselves. Len Porter was its Chief Executive until 2014.

“Most of my life was spent in the oil and gas sector. Most industry sectors managed their safety based on compliance with standards. You set standards, you comply with them diligently, and it was considered you were safe.

“In truth the best way to manage safety is to identify hazards, quantify the risk associated with them and their precursors, and then reduce the risk to as low as practicable. Only one of the ways of managing that risk down is compliance with standards.”

Again it took an accident to drive change. In 1988 the North Sea oil platform Piper Alpha was destroyed by an explosion and the fire that followed.

“The report into that completely changed the industry - from one which managed safety based on compliance with standards, to one that did so based on understanding of risk,” recalls Porter.

Was it a large job to bring that thinking to the railways?

“When I joined the rail sector, it was an industry that was broad but old, and still managed safety in compliance with standards. It was a huge job. Fortunately, it started to happen quickly and we had willing participants in Network Rail and the train operators. They sat on the board of RSSB and allowed us to move them towards a risk-based approach.

“It is a matter of defining the data, spending the money on the systems, getting them much better than before, populating the risk models. Anybody working on the railway was called to supply the data to RSSB, and they did.” The data was fed into SMIS (Safety Management Information System). SMIS in turn was used to populate the SRM (Safety Risk Model) and the PIM (Precursor Indicator risk Model). The PIM in particular allowed the industry in Porter’s words, “to get underneath” accidents and examine what the precursors to them were.

“The biggest one was, of course, SPADS (Signals Passed at Danger), but also for example infrastructure failures. The industry managed that risk, very hard, down - and it tumbled quite considerably. It was about identifying incidents that could have led to accidents. Like looking after the pennies, and the pounds - in this case the big accident problems - looking after themselves.

“I think it is more difficult for roads. Railways are much more rigidly controlled, but there are still things you can do to quantify the primary risks. To be fair I think they are moving in the right direction, but it is still controlled by Government. It is very large and it is slow.”

Backing up the industries’ own proactive approach to safety is of course the statutory regulator. The Office of Rail Regulation was established in 2006. In late 2015 it picked up a brief to monitor and hold Highways England to account, in the process transforming into the Office of Rail and Road.

Ian Prosser, the Chief Inspector of Railways and Director of Railway Safety, is another ‘transferee’ - he came to the railways after decades in the chemical, pharmaceutical and automotive industries.

“He describes ORR as a “medium touch regulator”, where inspectors in the field still work closely alongside the industry, but are fewer in number than a decade ago. They do however spend more time on proactive inspections resulting in a more efficient operation.

“The whole issue of culture and management maturity is something we have been pushing,” he says. “It’s what we have to build on to get to the next level. Increasing [the rail sector’s] management maturity so there is less intervention from the regulator and fewer and fewer enforcement notices and prosecutions, so that slowly but surely - well they won’t put us out of business, but we’ll be doing less reactive inspections, in particular.”

ORR’s brief between rail and road is subtly different. It monitors Highways England (so therefore has no say in the trunk roads of the devolved nations), rather than enforces safety policy.

Given the combining of steel and tarmac into one office, does Prosser envisage a progression towards a situation one day where he has an equivalent… a chief inspector of roads?

“We are trying to help our colleagues in highways monitor where we can,” he continues. “Where we can we share some good practice - we do that already to give our expertise in terms of health and safety in general. It is important we are not complacent. If there are things we can learn from the highways sector, we will try and do that as well. Co-operation works both ways - that’s very important.”

Prosser acknowledges that the job is also far from done for the railways, with the next decade bringing fresh challenges to be met in four key areas.

“One is managing growth as it continues. That will become more
difficult with constrained infrastructure - managing people through stations and platforms, for example.

“The second one is maintaining and renewing a safe, sustainable and reliable infrastructure. We have HS2 coming. That’s very important to create capacity, but we still have our main line railway, which is still in the main built on Victorian infrastructure. Going forward, we have to think about extremes of weather that can have an impact on earthworks and structures.

“The third one is around the culture, and I include in that a big push further on health management. That will help improve the culture - if people think you care for them they will start to engage more effectively. That’s both physical and mental health. It is important what the industry is doing on suicide prevention, but we also need to do more about the mental health care of our own staff. There are over 200,000 people working in this sector... they are in some stressful situations, in some cases on the front line, especially as growth has improved. That has had a knock-on effect of more congestion and sometimes more difficult passengers to deal with.

“The fourth one is something we have pushed a lot... safety by design. We’re building more than we have been used to in the past. Thinking about the risks you have to manage beforehand is an important area.”

The Strategic Road Network witnesses 85 billion miles of journeys a year, according to Highways England’s own strategic plan. It carries a third of all traffic and two-thirds of all freight.

Freight on Rail - a partnership between the rail trade unions, the rail freight industry and Campaign for Better Transport - works to promote the economic, social and environmental benefits of rail freight, both nationally and locally. However, according to CBT’s Freight on Rail Manager Philippa Edmunds, modal shift is hampered by the differing safety regimes.

“The safety is much more stringent on rail, and it makes it harder to compete. The road sector is not paying for external costs like safety impacts, which are considerable,” she says.

Edmunds points to problems with enforcement on the roads.

“Government figures show that 82% of articulated heavy goods vehicles exceeded their 50mph speed limit on dual carriageways, and 73% exceeded their 40mph limit on single carriageways (prior to 2015). The road lobby pushed for the speed limit to be put up. So instead of enforcing existing HGV speed limits, the Government put the limits up, even though its own figures showed HGVs were five times more likely than cars to be involved in fatal crashes on local/urban roads at the time.”

The lorry speed limit on a single carriageway road is now 50mph. “Since then, HGVs were over six times more likely than cars to be involved in fatal crashes in 2014, and almost six times in 2015.”

Furthermore, roadside checks revealed UK HGVs had a 61% overloading rate in 2011, 60% in 2012, and 59% in 2013 and 2014.

Says Edmunds: “We did some research using the Government’s own figures [the criteria used when awarding grants to take lorries off roads] - so essentially the costs they attributed to the congestion costs of HGVs, the safety costs and the pollution costs, and we analysed those against fuel duty. HGVs are only paying about 30% of the costs they impose on society. They are getting a massive subsidy. That’s why it is so difficult for rail to compete.”

Edmunds thinks a lorry charging system, similar to the one introduced in Germany, might be part of the answer. Since October 1 2015, the toll applies to HGVs with a total permissible weight of more than 7.5 tonnes. The charge is per kilometre, and is based upon axle classes and emissions.

The UK introduced a daily charge based on the type of vehicle, the number of axles and the total weight in April 2014, in part to ensure that foreign hauliers made some sort of contribution to UK infrastructure. But according to Edmunds, it is not as effective.

“If you charge lorries for the distance they travel you get more efficiency. They are going to make sure they are not running around half empty. Road freight is competitive, but not efficient. The German system has reduced the amount of empty running, because people don’t want to pay for a truck that isn’t properly filled. In Germany, rail was a beneficiary of the system.

“A combined regulator would help. We think that when you are calculating rail freight charges you have to take into account the distortion of what HGVs pay. Road and rail need to work together - they can complement each other and they should. Rail is good at long haul and bulk, but it is not a level playing field.”

A final thought is that the current state of regulation and enforcement is not just hurting other modes, but roads themselves. Edmunds adds: “It isn’t just hard on the rail sector, hauliers who abide by the rules are effectively subsidising those who don’t.”

“A combined regulator would help. We think that when you are calculating rail freight charges you have to take into account the distortion of what HGVs pay. Road and rail need to work together - they can complement each other.”  

Philippa Edmunds, 
Freight on Rail Manager, Campaign for Better Transport
The Strategic Road Network

“Everything that happens to a train on the railway is the responsibility of someone in a tightly managed system with high levels of training and discipline. Regulating that situation is different to the road network, where every citizen, every day, is a participant and has their own share of responsibility.”

Professor Richard Allsop, Emeritus Professor of Transport Studies, University College London

Meanwhile, voices from inside other parts of the road industry are pushing to make themselves heard. An anonymous blogger - "bus driver X" - wrote to the Transport Committee at City Hall in London at the end of January, describing what they called a complacent attitude to safety. One extract from the letter: “BusCos are not asking basic questions about fatigue of their drivers. It's the driver's responsibility to turn up fit to work, even if the shifts themselves make drivers unfit. The assumption is that the shifts are not the problem, the drivers are.”

‘Bus driver X’ blogs anonymously for fear of dismissal. In January 2016, London buses joined CIRAS (Confidential Incident Reporting and Analysis System). CIRAS is designed to be independent and comprises representatives from the rail and light rail sectors and other transport modes. The focus is on making all transport safer.

In the future, automation in vehicles will have a growing influence on the safety of our roads. The oft-quoted figure is that 90% of accidents are caused by driver error. In future that may fall, bringing down road fatality statistics. However, to reach that point we will have to go through a mixed economy of newer, more self-thinking vehicles sharing the roads with older cars and lorries that have much less automation. Experts believe this transition period brings potential for complication. How then might we progress towards Professor Allsop’s four-fold reduction in deaths? To find out, let's promote him temporarily to Secretary of State for Transport. Alterations to the legal blood alcohol limit are on the cards, as is further speed limit enforcement - just two of a range of measures.

“I think I would look for a close analogy between the regulations between road and rail. Everything that happens to a train on the railway is the responsibility of someone in a tightly managed system with high levels of training and discipline. Regulating that situation is different to the road network, where every citizen, every day, is a participant and has their own share of responsibility for what is going on, be it as a pedestrian or a cyclist or a driver.

“What I would do as Secretary of State is reinstate the capability of the local authorities to investigate collisions. It is a dead letter in a number of authorities at the moment. I would restore a modest channel of funding - and I am not talking about hundreds of millions here - and a reporting system. I would rally everyone to contribute, because there are all sorts of stakeholders involved. I would challenge them to say, by 2025, we should be able to reduce casualties to a target. Let's get together and work on it.”

For the sake of the five people who didn’t make it to the end of the day, surely we ought to heed the rallying call. 

Britain's rail safety record, as Tom Ingall points out, is only earned and sustained by hard work and by learning from past errors. There are lessons which could translate into roads: collecting and analysing incident data and developing a system approach to improving safety.

Road driving accidents involving rail workers have been identified as one of the top risks in the industry's safety strategy. While not immediately obvious, rail staff use roads every day and the dangers from this are very evident. Many staff, contractors, BTP officers and other people working for the industry have to drive to reach their workplace. Drivers and guards often use taxis or buses to pick up their train, and bus replacement is often the only alternative for passengers navigating engineering works.

At RSSB we have sought to assess this level of risk, but the research project was not easily able to quantify it due to a lack of reliable data for rail replacement bus service accidents. What we do know is that there has been one fatality of a railway worker on the roads reported in the past 12 months - although it could be higher if road commuting to work is included, where data has not been provided to us.

Risk tolerance is low on trains and aeroplanes, but much higher on roads because of the perception of control. This tells us that human behaviour is a key factor in terms of tolerance of risk and the behaviours which influence it. Rail industry road fatalities have root causes linked to human behaviours as well as fatigue. As a first step, educating colleagues and empowering them to think about road safety, and then act every time they get into a vehicle, will put us in a much better place. After all, as an industry we don’t allow train drivers to work when they are tired, so it should not be acceptable for road drivers either. We all share the roads with other road users who will have varying skill levels, experience and perceptions to risk, and their vehicles may not be maintained to high or even legal standards. These all play a part when we are looking at how, as an industry, we can develop strategies to reduce risk.

By working with industry to understand the risk profile, supported by sound data analysis and developed strategies to address our identified key areas, we will seek to further improve safety in the sector.

Working in partnership with cross-sector organisations such as the Parliamentary Advisory Council for Transport Safety, we can provide a starting point for others to develop local, regional and national strategies to make greater gains in reducing the now static road fatality figure of about 1,700 - rather than just hoping it comes down a bit.

Mark Phillips
Chief Executive Officer, RSSB
Tom Ingall’s article provides a very good example of how safety on the railways has continued to improve, particularly in comparison to road safety. But is it fair to compare apples and oranges?

Different interfaces
Since the early days of the railways, one of the main safety features has been the imposition of a physical barrier between people and the moving objects we call trains. There are limited places where there is an interaction between the two, such as stations and level crossings (whether for public roads, farm tracks or footpaths).

In the case of roads, with the exception of motorways and some trunk roads, there are few physical barriers between pedestrians, cyclists and vehicles. And even in the case of the motorways and trunk roads, there is no strict divide between lanes. A few key places where risk has to be managed, compared with myriad places.

As Tom notes, the railway’s strong safety culture comes from analysing the main safety failings and putting in place schemes to reduce those as much as possible. For the railway as a workplace, it is possible to apply a rigorous safety culture - those who do not comply can be removed or do not receive the relevant accreditation.

Staff can be trained to deal with managing passengers at stations, and do a particularly good job at maintaining safety despite ever-increasing numbers of passengers. The main unmanaged areas of crossing the line are also being looked at, with proposals to close level crossings where possible.

Failing standards or errors of judgement?
The imposition of industry standards, and their enforcement for the freight industry and passenger service vehicles, is one way of trying to provide a level playing field between rail and road, and to ensure that those playing by the rules are not subsidising those who don’t.

But of the five people per day who don’t come home, how many are due to a failure by someone to meet relevant standards, and how many are due to an error of judgement? While the former are easier to police, and people consider that doing so is a “good thing”, how do you place controls on what are considered to be reasonable freedoms?

With the road system, is it really possible to do more without impinging on how people go about their lives? I strongly believe that the answer is yes. As the article reports, the improvement in safety in both the oil and rail industries came about through understanding risk rather than simply enforcing compliance with standards. We all undertake a significant number of risk management decisions every day, it’s just that most are subconscious. It would be helpful to bring some closer to the conscious surface.

Dealing with perceived risks
A good example of personal risk management being applied is around the operation of the UK’s tram systems. Most have limited segregation and fencing along part of their length, and none in the busy city centres. Pedestrians are free to wander across the tracks, and cars cross and re-cross the tracks in busy streets.

Until the accident at Sandilands Junction on the Croydon system on November 9 2016, no passenger had been killed on a UK tram system since January 28 1959. While some may consider that light rail has limited coverage, there were 252 million passenger journeys and 21 million vehicle miles operated in the year to March 2016 - therefore many, many opportunities for interactions between trams, passengers, vehicles and members of the public.

So why so few accidents? Arguably people are more aware of the trams, or at least the dangers that they bring. This is partly because they see them being built in their cities, but also because of the signage and actually seeing the tram moving through the streets themselves - big beasts sitting at the top of the road hierarchy.

Those people who saw the tram systems being built remember the new dangers arriving, and pass the information on through family groups. “Watch out for the tram” seems to have more resonance than “Watch out for the car”.

Car drivers appear less likely to accelerate to get across a tram track than to beat the red lights flashing at a level crossing, and members of the public are more likely to step back when they hear the tram approaching. Is that because the slow-moving city centre traffic means there is no perceived benefit from beating the tram across the rails, or does the sound of the tram’s bell raise awareness of the approaching risk? Arguably, yes, but maybe it is also getting into the heads of the pedestrians, cyclists and car drivers.

Don’t dilute the message
If members of the public appreciate the risks posed by trams, can they be persuaded to apply the same thought process to other vehicles and road risks?

A level of education can only go so far, and too many messages (or too wide a message) may be lost. In the past a single message campaign backed up with tough sanctions - such as the wearing of seat belts campaign in the early 1980s - has proved the most successful, and information from the RAIDS scheme could be used to help the industry focus on where most benefits could be obtained. The Department for Transport and the Office of Rail and Road should be looking to take the lead here, but they must also secure the involvement of local authorities, given the latter's involvement with the provision of the UK’s road system.

So can rail’s safety record be used to help improve safety on the roads? The answer has to be yes, but it needs to be done in a managed and focused way. Also, look at what other parts of the transport sector, such as tram systems, have achieved. Producing a downward trend is arguably better than simply setting a target, as there is a tendency to focus on the target itself and not why the reduction is required.
Profit before safety? 
Or: does nationalisation kill?

CLIFF PERRY, former Chairman of IMechE Rail Division, 
examines the reasons behind rail’s improving safety record

“By three methods we may learn wisdom: 
first, by reflection, which is noblest; 
second, by imitation, which is easiest; 
and third, by experience, which is the bitterest.” 
[Confucius]

The answers to the above questions are shrouded in politics, dogma and prejudice, so a quick look at the evidence might throw a little light, provoke a debate, or even generate some noble reflection.

The context is that we have just passed a landmark anniversary. The tragic and avoidable death of Margaret Masson at Grayrigg is now a decade ago. In the history of our railways, such a gap has never been achieved before. Until the turn of the 21st century, a single year without fatalities in a train accident or collision had been achieved just twice in over 150 years - in 1993 and 1998. The improvement is paralleled in staff safety - the financial 2015-16 had been achieved just twice in over 150 years - in 1993 and 1998. The century, a single year without fatalities in a train accident or collision was the first in our railway’s history that not a single railway worker was killed on duty. This is in stark contrast to the 247 killed in 1945.

Graph 1 (page 50) shows that railway operating safety has been continuously improved over the past 50 years, although in the 1980s the rate plateaued. The current improvement slope appeared in the 1990s and was well established under BR ownership. This suggests that the post-Clapham focus on active Risk Management, coupled with the principles of ALARP (as low as reasonably practicable) enshrined in the Health and Safety at Work Act, have combined positively. Learning from failure has been the bitter process until now - the time has come to learn from success.

So what happened to ‘Profit before Safety’ then? Let us be clear: this is not a strategic approach to safety that afflicts the private sector; it is a strapline that came from politically motivated scaremongering put forward by those with vested interests in the status quo. Put simply, the evidence from the chart overleaf is that the improvement was driven by those with vested interests in the status quo. My nomination for the three top drivers are:

- People - Competence Management.
- Plant - The digital revolution.
- Process - Funding, Risk and Interface Management.

PEOPLE - COMPETENCE MANAGEMENT

Our private sector railways have, in the main, continued to be managed by railway specialists deeply committed to safe operations, bolstered by the clear understanding that poor safety is bad business.

Springing from this has been a significant effort in staff training, with a proliferation of Academies and TOC training programmes. As ‘Duty Holders’ in safety governance terms, TOCs have also been motivated by a focus on the customer, and the improvement of performance in terms of reliability and punctuality.

The basic requirements of the Health and Safety at Work Act with the underlying principle of ALARP have clearly been a key driver of staff safety improvement. It has driven a level of risk awareness and evaluation that has in some quarters become ‘OTT’, and given rise to the ‘Safety Mafia’ label and a negative aura. The overall result, however, has been a complete shift in the safety culture. Looking at the European picture in Graph 2 (page 51) we can see, with exceptions, a high level of correlation between staff and operational safety.

The causal link is also clear - safe working becomes the “way we do things around here”. The safety training and competence management come as part of the necessary Safety Management System that must pass the regulator’s standards for an operating licence to be awarded. Franchising at seven to ten-year intervals refreshes this process, and raises the ‘reasonably practicable’ bar to current (rather than historic) levels.

To some economic commentators, privatisation of the railways is seen as a failure because wages and unit costs have risen. An alternative perspective is that the rates have risen to market-sustainable levels, where the need is for staff of sufficient quality to be competent in safety-critical roles.

My own experience in managing under BR was that recruiting warm bodies, let alone quality staff, could often be a struggle - especially in the London area in a booming economy. We simply did not pay an attractive rate. Compared with 20 years ago, we have a different railway run by highly trained and competent people. The privatisation influence has been wholly positive.

PLANT - THE DIGITAL REVOLUTION

Investment in our modern railway is characterised by...
improvements in trains and infrastructure, modern designs, modern materials and the digital revolution. In every railway activity our knowledge and capability has been enhanced by the march of IT. From the training of drivers on simulators, to the modelling of the wheel/rail interface and the automation of signalling (including TPWS), understanding and capability have marched forward. CCTV, forward-facing cameras, level crossing control... the list is long.

Computing has brought the ability to model what is happening, and to allow the analysis of key relationships which has enhanced our knowledge of railway fundamentals.

The work by BR Research in wheel and rail dynamics allowed the understanding of Rolling Contact Fatigue to deepen significantly post-Hatfield. It also gave the ability to understand the mechanism of previously mysterious derailments. The same programme (Vampire) can now be applied to give a safety index in real time, as the New Measurement Train (surely the cleverest train in the world) evaluates the track it is running on.

Analysis of vehicle body strength and secondary safety has driven the concept of crashworthiness to the position where inside a modern train body in the UK is one of the safest places on Earth.

In many technology-driven spheres, such as asset engineering and maintenance, judgement is still required. But it is backed up by better knowledge of the asset, its maintenance history, and objective monitoring of its condition.

In signalling, although the application of TPWS is probably the single biggest improvement in the avoidance of train collisions, it is but one small step in the march of improved traffic control and management technology.

With the proven reliability of modern automated systems has come the realisation that the human is the weak link in the safety chain. Post-Harrow and Wealdstone, BR managers argued with the Inspecting Officer that AWS would take away responsibility from the driver and create danger. We fundamentally reject this now, although the man/machine interface remains an area of risk.

**PROCESS - FUNDING, RISK AND INTERFACE MANAGEMENT**

All the potential from technology would be useless without someone investing in it. Governments find lots of other claims on the tax pound ahead of railway investment - the NHS, defence, policing and education to name just a few.

The processes that underpin investment in the railway have been completely changed with the industry structure. The High Level Output Specification and Control Period process has given longer-term focus to government infrastructure spending, with significant projects delivered on time and budget. Meanwhile, private sector involvement in the train supply and funding regime has sustained record levels of new train delivery, depot investment, and reliability improvement.

The railway has realised it is a system, and has built a strong co-operative regime around safety - typified by the existence of RSSB. Co-operation is enforceable through the ORR, if a lack of it is seen to threaten safety.

To those whose rose-tinted view of the past leads them to promote more integration, I point to the fact that BR (in all its joined-up glory) delivered onto its system a whole generation of trains that had no adhesion enhancing capability. I know, because five fleets (Classes 465, ‘466’, ‘165’, ‘166’ and ‘159’) were delivered into Network SouthEast service over the signature of Project Managers who reported to me.

The deficiency was demonstrated early through station overruns and the Slough buffer stop collision, while the drivers of the Class 159s rightly registered their disapproval in a way which led directly...
CONCLUSION

Fragmentation, a dirty word to some, has (with some exceptions) turned a large and complicated mixed-traffic railway into manageable slices where staff can know the boss and the interests are aligned. Small and simple is beautiful, which is why c2c and Merseyrail lead the performance stakes.

We are therefore in a better position to tackle the changing risks as they emerge. My guesses as to where tomorrow’s risks lie would include growth, resilience in the face of extreme weather, and the man/machine interface.

In 2009, the EU Commission received a report from a respected consultancy that identified just three of the larger railways in the EU as having separated their infrastructure from operations, and opened the market to private entrants.

In 2015, the same three railways (UK, Netherlands, Sweden) were numbers 1, 2 and 3 among the safest railways in Europe. Coincidence? I don’t think so.

My three Golden Rules for a safe railway are therefore:

- Disaggregate and simplify.
- Get real money crossing the key boundaries between private companies.
- Focus on the customer, not the costs.

“Reliability improvement has a financial incentive for companies through the operation of the compensation regime, as well as the need for TOCs to maintain credibility in the competitive franchising scenario.”

Graph 2: Safety performance – Europe’s ten largest railways

- Normalised workforce fatalities
- Normalised passenger fatalities
- EU - 25 average (26.8)

Source: RSSB.
Identifying a role for rail in the retail revolution

The railways were born of the industrial revolution, but it is the internet revolution which is shaping the future. As passengers we are accustomed to online ticket sales, and on trains and at stations WiFi is fast becoming a ‘must have’ rather than a ‘nice to have’, as we browse the web on our way to work.

E-commerce is a booming business. Online sales in 2016 were recorded at £60.4 billion - a 14.9% rise on 2015 (which itself was 16.2% up on 2014). Internet penetration is high, with around 92% of the population now online, and around 75% of those making online purchases during 2015, accounting for almost 17% of total sales. This makes the UK the third largest e-commerce market globally, behind only China and the US.

This trend is making waves across freight and logistics. Over the past five years or so, businesses have struggled to adapt to the new norm, and to find the most successful ways of delivering to customer expectations. The situation is fast-moving and customers are fickle, further exacerbating the issue. So within the macro-level trend, we have also seen changes, such as:

- A move from megastore to local convenience shopping - particularly for supermarket shopping, which places additional demands on HGV deliveries into urban space.
- A move from home delivery to click and collect - now representing up to half of online retail, which requires appropriate facilities in stores and elsewhere.
- A growth in parcel networks such as CollectPlus - helping to consolidate volume and to reduce missed home deliveries, but which can be sub-optimal in customer experience.
- A consumer demand for free returns - particularly in clothing sales, which means that high proportions of stock can be ‘lost’ in the network or returned in an unfit condition for future sale.

Delivery terms are becoming a key differentiator for shoppers, rather than brand loyalty. This means that retailers are having to rethink store layouts to become more like showrooms, and look at new ways to relate to (and retain) customers.

These changes have caused equivalent changes in freight and logistics, with many companies struggling to cope at first. In response new warehousing designed for e-commerce has been developed, and supply chains have been redesigned to suit. John Lewis, for example, has opened new bespoke warehouses in the Midlands to service its e-commerce business, which now represents almost 50% of its sales. The new sites also rely on high levels of automation - the much commented-on Amazon drone trial may be a step too far, but technology within warehousing is developing at pace.

Changes have not been without their downsides, however. Go to any conference or seminar on freight at the moment, and the challenges are palpably clear: the additional cost of ecommerce for retailers; the demand for new warehousing space; loss of industrial land to housebuilding; challenges of missed home deliveries; and air quality concerns. All of this is set against a backdrop of consumers who will walk away from an online shopping basket if they don’t like the delivery terms!

To those observing this change from the sidelines, at times it has felt like an explosion rather than a process. It has been hard to see direction of travel, and to identify those trends that will persist and those which will quickly be overtaken. Recently, however, there has been the early sense of consolidation, and of an understanding of the key features which are likely to be necessary in any solution.

This is now starting to highlight where there might be opportunities for rail to play a role.

To date, rail’s participation in the market has been relatively limited - if you ignore the inbound supply of product from port to warehouse. However, there have been some successes.

InterCity Rail Freight has re-established a small parcels business on passenger services, starting with East Midlands Trains and now also Great Western Railway. This uses marginal space, mainly on HSTs, to convey time-sensitive parcels into London. The parcels are then transported to end destination by cycle couriers. This service has proven itself over several years of operation, with little or no reported delay to passengers, although it is proving challenging to roll out on a larger scale despite support from the Department for Transport.

Separately, there have been two trials into London Euston of roll-caged supermarket products on a bespoke overnight train from the Midlands. The unloaded cages were then distributed by electric vehicle to the many convenience stores in central London. This worked well as a trial, but constraints on the long-term use of Euston for freight (as part of the HS2 development) have prevented any further development at that location.

Perhaps most successful has been the establishment by Doddle of parcel stores in a number of railway stations, and now other locations such as supermarkets and offices. To date, these have not been rail-served, but that is set to change, with the announcement by GB Railfreight that it is looking to start a service (in conjunction with Doddle) transporting parcels by rail.

“Over the past five years or so, businesses have struggled to adapt to the new norm, and to find the most successful ways of delivering to customer expectations.”
The concept will use HSTs that will become surplus to requirement with the arrival of Intercity Express Programme trains, enabling 125mph freight services to run. Quite rightly, this has captured the imagination of the media and of a rail freight sector eager for new markets and opportunities for growth. However, exploiting this and other similar projects will come with challenges, and will require a whole industry approach to make it happen.

The starting point is identifying where rail has a place in the retail, parcels and e-commerce market. There are probably three areas where we have key advantages. Firstly, speed and frequency, where we can offer a service which is better than road freight. Could this open up markets where consumers might pay more for a faster delivery?

Second is scale, for major trunk haul of products into city centres. This is particularly attractive for a roll-cage market.

The third is unrivalled urban penetration through the network of railway stations, which will become even more attractive if road freight is restricted for reasons of air quality or congestion.

In each case, rail has the potential to provide a service that road cannot match, and for which we therefore have an advantage. Operationally, however, this requires some clever thinking. Freight is not accustomed to 125mph, and nor is it accustomed to non-stop operation, so while there is no reason why this cannot change, it will require some different approaches to network planning terms.

Royal Mail services routinely run at 90+mph, so it can be done, but Network Rail will have to get behind how best to achieve the necessary outcomes. 125mph paths on the network are also in short supply, certainly during the day, so finding suitable paths might be challenging.

We also need to ensure that any new services are not priced off the network before they have even begun! The track access charges will need to reflect the vehicle type and speed, but attempting to charge premium rates in newly emerging markets will kill the project. Station access charges will also need to be set at affordable levels.

With freight coming into passenger stations there will need to be new levels of collaboration over the use of space, albeit that any services will necessarily have to avoid the peaks. Concerns over damage, security and delay need to be addressed, although the trial services have shown that these can be managed effectively. Working with passenger operators can make this a success if they are persuaded of the merits - or indeed can work in partnership, as on the existing East Midlands/InterCity Rail Freight services.

Perhaps most importantly there will be a role for Government and city administrations in making the case for developing these services, and in supporting them. Given air quality concerns, as well as road congestion issues which are compounded by delivery vans, there is every reason to look at alternative solutions. But it will only work with advocacy and support.

A final thought is HS2. In response to a recent Parliamentary question about the new train designs, Lord Ahmad answered: “...the interior design of the trains will reflect consultation with stakeholders including the parcel logistics industry.” Can we make the case for flexible space in these new trains for parcels at 250mph?

What is clear is that the demands of e-commerce are here to stay, and that there are opportunities for rail - both freight and passenger - in helping to deliver for business. Let’s now work together to deliver.

“Track access charges will need to reflect the vehicle type and speed, but attempting to charge premium rates in newly emerging markets will kill the project.”

About the author

Maggie Simpson is executive director of the Rail Freight Group. Previously she worked in a range of passenger and freight roles at the Strategic Rail Authority and Office of Passenger Rail Franchising, including freight strategy development and franchise management. She has also worked in consultancy.
Rebuilding of London Bridge in July 2015 as part of the Thameslink Programme. Thameslink has largely been progressed efficiently via blockade and closures of sections of the route. ALAMY.
Defining efficiency... and meeting the targets

Rail is under constant pressure to meet capacity, satisfaction and value for money targets. But with so many different criteria, is it even possible to accurately measure rail’s performance? asks PHILIP HAIGH

Ask ten people what defines an efficient railway and you’ll receive a dozen answers… at least!

At its heart, efficiency is a relationship between inputs and outputs. Those inputs are generally time or money, whereas outputs are many and varied. You might measure punctuality or customer satisfaction. You might measure capacity used and compare it with capacity available. But even capacity is open to debate - do you measure it in terms of trains or seats? Or for freight, container spaces or wagon capacity?

A view of railway efficiency depends enormously on viewpoint - what matters to one person may not matter to another. Passengers might measure rail in terms of value for money. So might governments, but what represents good value to one might not be good value to another.

Nowhere is this better illustrated than today’s debate over fares. In the past few years the Government has raised those fares under its control by more than inflation, as it continues a policy of shifting the burden of rail away from taxpayers and more towards passengers.

Rail efficiency can be further divided. Users generally concentrate on efficient operation, but there is also efficiency in delivering maintenance, renewals and enhancements. Here Network Rail is under constant pressure from the Office of Rail and Road to become more efficient - to deliver as much (or more) work for a lower or similar cost.

NR has made progress in this area, yet its funding appears to be ever-rising. Increasing efficiency in one area may be masked by rising costs elsewhere. Yet those parts with rising costs could still be efficient, because their budgets may have been set with too much optimism or too early to properly know what costs were involved.

That was evident from ORR’s decision in 2013 to subject NR enhancements to a process called ECAM (Enhancements Cost Adjustments Mechanism). This took a project, checked its figures before and after delivery, and then allowed NR to add the efficient cost to the regulatory asset base against which NR could borrow money. This process derailed when NR was reclassified as a public body and no longer allowed to borrow money from private markets.

Part of ORR’s ECAM process was to compare NR’s costs with others. It’s tempting to compare efficiency levels between companies, but this is fraught with difficulties - you have to be sure that you’re comparing like with like. This was one of the challenges Sir Roy McNulty faced in his 2011 report, which concluded that Britain’s railways were 30% more costly in unit terms and could reduce by this much by 2018-19.

McNulty compared Britain with France, the Netherlands, Sweden and Switzerland. He found that NR’s costs were a significant part of the gap, but also that train operator and rolling stock costs were higher than they might be because of Britain’s lower level of train use in terms of passenger-kilometres per train kilometre (see graph, page 56, which shows a gradual improvement for Britain).

France, for example, does well in that latter category by running high-capacity TGV trains on high-speed, long-distance services and making sure they are full. Demand can be concentrated by running as few trains as possible, whereas Britain runs frequent services on some long-distance routes. Trains from London Euston to Manchester run every 20 minutes, whereas Paris-Lyon’s TGV service is roughly hourly. Both journeys take around two hours. Running fewer trains helps each train load more efficiently, but reduces track efficiency in terms of loaded trains per track mile.

If Paris-Lyon demand grows, SNCF could respond by increasing frequencies if it has spare track. But if it does, this means that it’s currently using its fleet inefficiently compared with Britain’s intensively-worked London-Manchester trains.

SNCF and London-Manchester operator Virgin Trains take different views on their business models and on what efficiency means, which makes comparing the two very difficult. Virgin uses heavily discounted fares to attract passengers to quieter trains at less convenient times, but while demand lags behind supply (as it must if there are empty seats), then this means a less efficient operation than might otherwise be possible.

Comparing UK operators with each other is similarly prone to pitfalls. The first to avoid is any assumption that one operator is like another. Take Virgin Trains again (its West Coast operation). Dividing passenger-kilometres by its staff costs gives a measure of how much it delivers per pound of staff costs (see table, page 60). Using 2015-16 accounts, this gives a result of 39.14. Do the same for East Midlands Trains and the result is 24.83. For Great Western Railway it’s 18.78.

From this you could conclude that Virgin is the most efficient of the three. But it runs far fewer trains so needs fewer drivers and guards when compared with GWR and EMT, both of which run quieter rural and regional routes using short trains in addition to their inter-city routes. Also, GWR maintains its trains using its own staff. Alstom maintains the trains that Virgin leases from Angel Trains, so those staff costs appear under a different heading and cannot easily be found.

Of more relevance would be to compare the same company in different years, which could show whether a company is becoming more or less efficient. Using 2014-15’s accounts, Virgin rates 40.79, EMT 25.52 and GWR 20.34. So according to this measure, all have become less efficient over the year.
"An operator could shed staff. This could make it look more efficient, up until the point at which the loss of the work those staff were doing begins to affect the business."

However, it’s not as bad as it looks, because these figures are not adjusted for inflation over the year. Converting 2014-15’s financial figures into their equivalents for 2015-16 gives VT 40.38, EMT 25.27 and GWR 20.14.

Imagine another operator has similar figures, but has a franchise commitment that reflects a Department for Transport requirement for all its stations to be staffed from first train to last train. Many of its stations do not currently have full-time staff, and so the switch will sharply worsen its passenger-kilometre figures per staff pound. But this cannot be seen as becoming less efficient on its own terms - in strict terms it is less efficient, but the extra staff may well contribute to a reduction in complaints. This is another measure that could be used to judge efficiency (when set against the number of passenger journeys).

Equally, an operator could shed staff. This could make it look more efficient, up until the point at which the loss of the work those staff members were doing begins to affect the business.

If you want a railway to support a country’s economy, you should not expect to hold it accountable for not being cost-effective. The DfT is mandating capacity improvements in London and South East England while holding season ticket prices down. This increases the railway’s overall costs while holding its income steady, which makes it less cost-effective.

British Rail used a variety of measures to gauge efficiency: passenger miles per member of staff employed; net tonne miles per member of staff employed; passenger-miles per loaded passenger train-mile; net tonne-miles per wagon; loaded train-miles per total route mile and average wagon load.

Such measures are rarely reported today. Instead, NR reports a bewildering array of statistics, of which only one mentions efficiency (see chart, page 62). This is a financial performance measure which shows “total efficiency generated excluding enhancement”. For Q2 of 2016-17 this was -£10m, with NR predicting full-year efficiency gains of -£180m.

Comparing (or benchmarking) one railway with another is very difficult because of the challenge of eliminating the inherent differences between those railways. In an International Transport Forum paper about railway efficiency written in 2013, Civit Management Consultants Arne Beck, Heiner Bente and Martin Schilling say: “Each nation and railway is subject to unique characteristics that will undoubtedly impact efficiency. For one, a nation’s history has shaped the organisational structure of the railway as well as the physical network. Subsidies for rail and annual deficits may be acceptable in some nations and not in others.”

“Wars and its repercussions have impacted rail infrastructure. Topography is another factor. Switzerland and Japan both are nations with high concentrations of mountainous terrain, which makes the construction and maintenance of infrastructure more expensive. Settling patterns and population density also impact efficiency and utilisation of trains. France, Sweden and Canada all have low population densities when compared with Belgium,
Efficient delivery? Tram-trains

It's almost nine years since Northern, Network Rail and the Department for Transport announced that they would conduct a trial of tram-trains in Britain.

This trial was to have entailed tram-trains using the Penistone Line between Sheffield (a city with a suburban tram network) and Huddersfield. The two-year trial was to have started in 2010.

The Department for Transport then announced in 2012 that the trial would take place between Sheffield and Rotherham from 2015. To allow this to happen, Network Rail would need to build a 400-metre stretch of line at Tinsley, electrify it and the rest of the route to 750V DC, make signalling alterations, and build suitable platforms.

It took DfT until November 2015 to formally authorise the new 400-metre line. The first physical tram-train, built by Vossloh, arrived at Sheffield's tram depot the following month. Meanwhile, the start date had slipped to 'early 2017'.

Fast forward a year to November 2016, and that date was now 'summer 2018'. If that date is kept, it will have taken a decade to deliver to Britain a pilot programme to test something that happens every day in countries such as Germany.

Germany or Switzerland, which may impact utilisation of costly rail assets."

They go on to say that benchmarking can have value in stimulating debate between railway companies about what improves and what harms efficiency. Such benchmarking formed a key part of ORR’s 2008 Periodic Review that set NR’s goals for 2009-14. It led ORR to conclude that NR was at least 35% less efficient in maintenance and renewals spending than the best of Europe.

ORR set NR efficiency improvement targets of 16% in operating spending, 18% in maintenance spending, and 24% in renewals spending - giving an overall figure of 21%. As a result, NR rewrote its policies, which led to a reduction in renewals work. It also reorganised staff, cut its fault teams and created a backlog of maintenance work. Its general reaction was to cut costs, but that is not the same as becoming more efficient because it causes outputs to decline.

NR lost ground over Control Period 4, and entered CPS having achieved around 18%. For CPS (2014-19), ORR proposed 19% efficiencies to NR spending with 25% in support, 17% in operations, 16% in maintenance and 20% in renewals. An ambitious plan to switch signalling control from small individual boxes to a dozen Rail Operating Centres promised savings but has not occurred as quickly as expected, while lack of access has challenged NR in achieving its expected efficiencies in renewals work.

An element of this failure comes from the flaws of benchmarking, although optimism from ORR about NR’s abilities plays a part. Nevertheless, ORR is taking benchmarking forward into CP6 (2019-24), by splitting NR’s efficiency targets into geographic routes in line with NR’s devolution plans.

This means ORR will be comparing routes that are very different, which could work provided ORR manages to neutralise those differences to arrive at valid comparisons. If it’s looking at track >

“For all the talk about devolution helping make Britain’s railway more efficient, the Department for Transport is the body that can do most to achieve rail efficiency. If it can clearly specify what it wants from the railway and then stick to it, then NR, train operators and their contractors have the best chance of delivering.”
costs, it will need to separate the costs of track maintenance and renewals on sections of line with and without third-rail. If it’s comparing London and North Eastern with London and North Western, it will need to account for the increased spending on the latter during the West Coast Route Modernisation, compared with the LNE’s East Coast modernisation that took place in the late 1980s and early 1990s.

For all the talk about devolution helping make Britain’s railway more efficient, the Department for Transport is the body that can do most to achieve rail efficiency. If it can clearly specify what it wants from the railway and then stick to it, then NR, train operators and their contractors have the best chance of delivering.

If DfT were to keep changing its mind, or keep developing plans having already announced what it wants, then delivery would always be less efficient than it might. And current processes make it very easy for the DfT to keep changing its mind.

Every five years the DfT must announce formally what it wants from the railway. This is the High Level Output Specification, which ORR takes as the basis of its Periodic Reviews that set Network Rail’s income and spending for a five-year period.

Separately, DfT sets what it wants from train operators through its franchising process. The franchise Invitation to Tender usually sets a train service specification in terms of minimum train service and capacity requirements.

These two specification processes rarely work in synchronisation, which can mean that ORR is working to deliver one thing while bidders are working towards something else. The common players are DfT and NR, with the latter in the invidious position of being pushed by ORR to deliver what the DfT wanted a couple of years ago while at the same time being pushed by train operators to deliver what DfT wants now.

There is no better example of this than the trans-Pennine electrification project. DfT’s 2012 HLOS specified electrification of the Manchester-Huddersfield-Leeds-Colton Junction (York) route. It specified the number of morning seats to be delivered into Manchester and Leeds by 2018-19 as 34,300 and 30,500 respectively for the peak three hours. But it did not specify any linespeed or journey time improvements for the route. Nor did it specify the train service, although it included an illustrative one as a suggestion.

**Efficient delivery? Thameslink**

Dig into a library and look for Railtrack’s 1999 Network Management Statement. Turn to page 102 and you’ll find details of a project called ‘Thameslink 2000’.

This project planned to increase capacity on train services to central London, give an expanded range of cross-London journeys, alleviate congestion on part of London Underground, and give an extra means of dispersing passengers from continental trains at St Pancras.

It planned major works as follows:

- A grade-separated junction at Bermondsey to separate Thameslink 2000 and Charing Cross trains.
- An extra two lines between London Bridge and Metropolitan Junction.
- Signalling works to provide sufficient capacity.
- A link to the East Coast Main Line north of King’s Cross.
- Extensive reconstruction and refurbishment of London Bridge, Blackfriars and Farringdon stations.
- Construction of St Pancras Midland Road station.

“Thameslink 2000 should be operational in 2006,” the entry concludes.
Fast forward three years to publication of the ITTs for the Northern and TransPennine Express franchises. Now the DfT says it wants 7,708 morning peak seats from TPE by December 2018, and 29,566 from Northern by December 2019 for Leeds. That total of 37,274 compares with the 30,500 that ORR has funded Network Rail to deliver in line with DfT’s 2012 demands. For Manchester the figures are TPE 7,285 and Northern 52,192, making a total of 59,477, compared with HLOS’s 34,300. (Further seats will be delivered by other operators, such as those running long-distance services.)

The DfT then introduced a desire for journey times of around 60 minutes between Manchester Victoria and York, taking advantage of electrification.

As a result, the trans-Pennine upgrade grew from the electrification project that DfT specified in 2012 and which was estimated at £200 million, to one that needed resignalling (another £200m) and other improvements. With funding only to deliver 2012’s HLOS, NR’s project team was placed in an impossible situation trying to deliver a much bigger project. The root cause was DfT changing its mind and pursuing a more ambitious programme that, on ORR’s funding, could not be afforded.

The result? In March 2015 Secretary of State for Transport Patrick McLoughlin was forced to suspend the trans-Pennine electrification programme. That September, NR advised him to resume the plan with a possible delivery date of 2022, but there is still considerable doubt that wires will be strung along the Leeds-Huddersfield-Manchester route. Even if they are, it’s hard to see the project being able to claim it’s efficient, given the amount of money (not known, but surely millions) spent over the past few years.

Even if the revised and enlarged project offered better value for money than one that delivered HLOS’s specification, the story of this project does not shout efficiency. It speaks more of order, counter-order and disorder followed by delays and disappointment.

To what extent devolution to NR’s routes will solve the problem of DfT changing its mind remains to be seen. NR now plans to present revised trans-Pennine plans at the end of this year.

Today’s railway collects a vast amount of information. Look on ORR’s data portal and you’ll see masses of it. Network Rail will have even more… so will train operators and rolling stock owners.

From this information they can plot and analyse trends, and discover the differences between actual and planned performance. This data is the lifeblood of statistical process control, and sits at the heart of process industries. From repair information, managers can see if faults are being fixed or merely the symptoms of a fault.

Take wet beds. They’re often obvious from a section of silted ballast or a distinct point at which ballast becomes covered in a light-brown slurry, formed by water contaminated with powdered ballast being pumped upwards as wheels push the track down. They are treated by digging out the ballast and replacing it with new. However, they can be caused by a variety of track faults, which can include dipped joints, poor quality welds showing dips and humps, ballast or drainage deficiencies, loose or missing fastenings, missing rail pads or rail surface irregularities. Without fixing these problems at source, the track gang will soon be wasting their time digging out clogged ballast once more. High levels of rework point toward inefficiency.

Drivers regularly traversing a route will know whether their train’s performance matches the timetable. They may be consistently late or early at a particular point, which shows that the timetable is inconsistent or less efficient than it might be.

Lateness matters more in some places and at some times than others - late trains in peak hours will naturally delay more people than late trains at quieter times. This is why London Underground measures ‘lost customer hours’, because it’s a combination of delay and passengers. The national network should adopt this measure >

### Number of passengers to be accommodated into major cities

<table>
<thead>
<tr>
<th>Major Cities</th>
<th>Peak Three Hours</th>
<th>High-Peak Hour</th>
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<tbody>
<tr>
<td></td>
<td>Forecast demand in 2013/14</td>
<td>Extra demand to be met by 2018/19</td>
</tr>
<tr>
<td>Birmingham</td>
<td>37,500</td>
<td>3,900</td>
</tr>
<tr>
<td>Leeds</td>
<td>25,400</td>
<td>5,100</td>
</tr>
<tr>
<td>Manchester</td>
<td>28,100</td>
<td>6,200</td>
</tr>
<tr>
<td>Others</td>
<td>34,800</td>
<td>4,900</td>
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### Passenger complaints and satisfaction

Note: Complaints rate is per 10,000 passenger journeys for franchised operators. Satisfaction is taken from Transport Focus autumn National Rail Passenger Surveys. Source: ORR.

<table>
<thead>
<tr>
<th>Complaints rate</th>
<th>Passenger satisfaction</th>
</tr>
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<tr>
<td>1999/00</td>
<td>65</td>
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Source: ORR.
“If NR is to cut its central functions as it devolves control to its routes, then it must ensure it allows those routes the freedom to employ analysts so that they can direct scarce resources to where they will have most benefit.”

because it can help concentrate effort to where it will have most effect.

These measures of timetable consistency and lost customer hours both feed into an assessment of a line’s operational excellence. However, it takes staff and effort to find, collate and analyse statistics, and when money is tight it’s all too easy to cut such posts. If NR is to cut its central functions as it devolves control to its routes, then it must ensure it allows those routes the freedom to employ analysts so that they can direct scarce resources to where they will have most benefit.

How efficiently NR and train operators use the network is hard to ascertain. NR publishes annual route plans, and these contain maps that show capability in terms of linespeed, axle load (as route availability), gauge and electrification. They do not contain maps that show capability in terms of train paths per hour or per day. Nor do they contain maps that show how much capability is already consumed.

Granted, this can be difficult to calculate, but it would show where pinch points exist along a line or at a junction. Such a map would show where the network is being used efficiently and where it is not. It would show where capacity was at or approaching its maximum, and thus where reliability was most important for the service.

At ORR, Rail Safety Director Ian Prosser is taking an interest in how performance is managed and benchmarked in order to give a better view of rail’s efficiency. He argues that measurement should incorporate customer service, asset reliability, operational excellence, staff (absenteeism, training days per year and turnover) and safety. The latter has benefited from much measurement and focus over the past few decades, such that in February 2017 the railway marked the tenth anniversary since a passenger was killed in a rail accident.

Customer service is measured twice a year in Transport Focus surveys. It’s also measured by the complaint rate figures that ORR publishes. Yet as the graph on page 59 shows, since the turn of the century complaints have fallen sharply while satisfaction scores have remained broadly constant.

Another measure of customer service could be ‘on-time, in-full’ delivery. If you order something from a supplier, you expect your order to be delivered on time and in full. If you buy a ticket from a rail company, you expect that company to transport you from the right place to the right place at the right time. If you order a seat reservation as well, you don’t expect to be standing. The railway already holds this information.

Process industries measure asset reliability through overall equipment effectiveness (OEE). It compares actual output with that which could be produced if the process runs flat out, always produces a perfect product, and never breaks down. These three elements are product rate, quality rate and availability.

Prosser argues that for rail, the product rate could be the

<table>
<thead>
<tr>
<th>Company</th>
<th>Virgin Trains</th>
<th>Great Western Railway</th>
<th>East Midlands Trains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger kilometres</td>
<td>7,059.8m</td>
<td>5,973.8m</td>
<td>2,389.3m</td>
</tr>
<tr>
<td>Staff costs</td>
<td>£180.1m</td>
<td>£318.1m</td>
<td>£96.2m</td>
</tr>
<tr>
<td>Result</td>
<td>39.14</td>
<td>18.78</td>
<td>24.83</td>
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</table>

Source: RailReview analysis of ORR statistics and company accounts.
Efficiently delivering major projects

Key to delivering major projects effectively is to create and then stick to a credible delivery strategy and schedule. That’s the view of Simon Blanchflower, Network Rail’s project director running Thameslink’s upgrade programme.

From his office close to Metropolitan Junction and Blackfriars Junction, and overlooking the tracks to Charing Cross, he explains that the schedule for delivering Thameslink’s second phase was set in October 2012. It included contingency to allow it to be kept on track, but Blanchflower argues that incorporating contingency into a schedule is more efficient than having to reschedule.

He has a variety of contractors (Balfour Beatty for track, Costain for stations and Siemens for signalling), with the project’s schedule the common factor that binds their efforts together. They will only reap the rewards of hitting milestones if they work together and stick to the schedule.

But what makes a schedule efficient? Blanchflower says there’s no single algorithm that identifies an efficient schedule. Thameslink’s followed dialogue between NR, DfT, train operators and their subject matter experts, and he describes the result as “acceptable, not necessarily comfortable”.

What is efficient for one partner may not be for another. Had the project been delivered for most efficient construction cost, it would likely have had a disproportionately negative effect on passengers, and damaged train operator earnings and (in turn) the DfT’s finances.

Delays are the enemy of major projects. They can come from rework, which means that doing the job properly first time is important. They can come from stakeholders blocking progress, so keeping effective relations is important. “It’s amazing how quickly money runs through your fingers,” he comments.

For Thameslink, prefabrication has driven cost efficiencies. Almost 80% of the testing for Automatic Train Operation took place before Siemens delivered Thameslink’s first Class 700 train. Instead, the project created a system integration laboratory and used a quieter stretch of track on the Hertford Loop rather than lines running under Central London.

Blanchflower’s team used larger REBs (Relocatable Equipment Buildings) to house signalling equipment away from the tracks, rather than smaller location boxes close to lines. These REBs could be assembled in factories, increasing the quality of the product and cutting the chance of rework being needed after installation.

Even some of the civil engineering was delivered from off-site construction, with pre-fabricated concrete being used for the Bermondsey dive-under. In addition, the team reused piers built many years ago because they were still fit - this saved the cost of demolishing them and building new.

Finally, there were opportunities to hone techniques on tasks that were repeated. Rebuilding London Bridge station’s platforms in turn was one place in which this delivered more efficient work as the project continued.

percentage of a route’s maximum passenger or freight capacity. For passenger trains this would be the combination of maximum number of trains multiplied by the maximum length multiplied by the number of seats per coach (some routes might also account for standing capacity). The maximum number of trains depends on the headway (time between trains) that the signalling provides, and the maximum length of train by the shortest platform at which it stops.

For quality rate, the measure should be punctuality to the minute. And availability would be the time the line is open for traffic, including planned and unplanned closures.

These calculations will not be simple for lines with several tracks - those with a mix of fast and slow trains. To illustrate the principles, take the Hexham-Carlisle line. It’s largely twin-track (save for a short section of single line approaching Carlisle, which is discounted for ease of calculation here). It’s an absolute block line, so the overall headway depends on the longest block section, which is Haltwhistle to Low Row.

A typical passenger train takes 10½ minutes, to which NR’s timetable planning rules add two minutes to calculate a headway of 12½ minutes. This gives a capacity of 4.8 trains per hour, or 806 per week. (Freight takes slightly longer, which cuts capacity. Although a handful of freight trains run every day, the calculations here assume no freight because it makes them easier.)

Northern typically runs two-car Class 156s with 150 seats per train, which would deliver 120,900 seats per week. However, the stations can accommodate a four-car Class 142 (they are too short for a four-car’156’), which seats 242. That would be 195,052 seats per week maximum.
# Network Rail’s scorecard: Quarter 2, 2016/17

## Area & Performance measure

<table>
<thead>
<tr>
<th>Safety</th>
<th>AIP % weighting</th>
<th>Current period</th>
<th>Prior period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workforce safety</td>
<td>5.0%</td>
<td>0.467</td>
<td>0.478</td>
</tr>
<tr>
<td>Lost time injury frequency rate (LTIR)</td>
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<td></td>
<td></td>
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<tr>
<td>Workforce close calls raised</td>
<td>2.0%</td>
<td>13.514 actual</td>
<td>92.553 YTD</td>
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<tr>
<td>Workforce safety</td>
<td>3.0%</td>
<td>0.752%</td>
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<td>YTD close calls closed within 90 days (%)</td>
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<td>four period in arrears (MAA)</td>
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<tr>
<td>Passenger safety</td>
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<td>Train accident risk reduction measures</td>
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<tr>
<td>Level crossing risk reduction</td>
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<td>Top 10 milestones to reduce level crossing risk</td>
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## Financial performance

<table>
<thead>
<tr>
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<th>AIP % weighting</th>
<th>Current period</th>
<th>YTD</th>
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<tbody>
<tr>
<td>Total efficiency generated excluding enhancement</td>
<td>10.0%</td>
<td>-£110m</td>
<td>-£66m</td>
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<tr>
<td>Financial performance measure Enhancement only</td>
<td>5.0%</td>
<td>-£8m</td>
<td>-£20m</td>
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<tr>
<td>Cash compliance Income and expenditure</td>
<td>5.0%</td>
<td>£52m</td>
<td>£405m</td>
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## Investment

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<tr>
<td>Top 10 IP renewals and enhancement milestones</td>
<td>5.0%</td>
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<tr>
<td>Key milestones of top 10 renewals and enhancement projects</td>
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<tr>
<td>All delivery plan enhancement milestones</td>
<td>5.0%</td>
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<td>95.0%</td>
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<td>Interim and completion milestones of all enhancement projects</td>
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## Asset management

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<tr>
<td>CRI Total</td>
<td>5.0%</td>
<td>14.6%</td>
<td>14.6%</td>
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<tr>
<td>Renewals (seven key volumes) Volumes (period and YTD)</td>
<td>5.0%</td>
<td>99.9%</td>
<td>96.1%</td>
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## Train performance*

<table>
<thead>
<tr>
<th>Train performance*</th>
<th>AIP % weighting</th>
<th>Current period</th>
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<tbody>
<tr>
<td>PPM Aggregate of route performance</td>
<td>9.3%</td>
<td>5/24</td>
<td>4/24</td>
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<tr>
<td>CaSL Aggregate of route performance</td>
<td>3.5%</td>
<td>4/18</td>
<td>4/18</td>
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<tr>
<td>Right time arrivals Aggregate of route performance</td>
<td>1.6%</td>
<td>2/14</td>
<td>1/14</td>
</tr>
<tr>
<td>FDM Aggregate of route performance</td>
<td>4.0%</td>
<td>6/8</td>
<td>5/8</td>
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<tr>
<td>Others Aggregate of route performance</td>
<td>1.6%</td>
<td>1/4</td>
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## Locally driven measures*

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<th>Prior period</th>
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<tbody>
<tr>
<td>People measure Your Voice action plans and local people measures</td>
<td>3.2%</td>
<td>3/8</td>
<td>4/8</td>
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<td>Passenger satisfaction Survey results</td>
<td>5.8%</td>
<td>2/8</td>
<td>2/8</td>
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<tr>
<td>Reduction in railway work complaints Count of complaints received by routes</td>
<td>2.2%</td>
<td>2/8</td>
<td>1/8</td>
</tr>
<tr>
<td>Others Various measures</td>
<td>8.8%</td>
<td>3/8</td>
<td>2/8</td>
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*Currently close out only calculated for non-IP close calls

**Performance represented by number of metrics hitting target

Key to performance colours:
- ‘Worse than target’ or below
- Between ‘worse than target’ and ‘target’
- Between ‘target’ and ‘better than target’
- ‘Better than target’ or above

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Signalboxes along the route open for 151.3 hours per week (there are 168 hours in a week, so that's 90% of the week).

Northern’s timetable has 15 trains a day from Monday to Saturday and 11 on Sundays. That’s a weekly total of 101 (or 15,150 seats).

Performance-to-the-minute figures are not available, so the service group’s PPM of 96.4% is used.

Plugging these numbers into the percentage capacity by percentage on-time by percentage availability calculation gives an overall figure of 6.7%. This relates to the capacity Northern uses in seat terms compared with what’s available. If the calculation was done using average seat occupancy across a week, then the result would be much lower.

A manager in a factory might expect a rate of over 85%. He would not run his factory at maximum rate unless there was matching demand for his product - it’s not efficient to fill a warehouse with unsold product. However, he might take steps to mothball facilities that were not needed, so cutting his outgoings.

Network Rail has few options to cut spending on the line, but it could close or switch out signalboxes (as it has already done with Bardon Mill) to more closely match capacity with demand. Northern could cut the service further to match passenger demand, but it has to comply with the DfT’s minimum requirements.

If Northern could marshall a day’s demand for travel between Hexham and Carlisle onto a single train, it could run a very efficient service in terms of staff and rolling stock used. But this would leave the line empty for the rest of the day, which in turn would make Network Rail’s efficient use figures terrible. Northern might be able to use the stock elsewhere for the rest of the day, making its use efficient, but NR can hardly shift the track to a busier section of line.

BR was adept at trimming costs and capacity towards demand. It rationalised track layouts and removed signals. This took place on the Settle-Carlisle route, such that when demand grew with long-distance coal trains in the early 2000s, Railtrack and Network Rail had to add extra signalling. That demand has now fallen again. ROBERT FRANCE.

Benchmarking maintenance costs typically relies on comparing them with their replacement value. In other words, as you spend more every year maintaining something, you reach a point where it’s cheaper to replace it. Prosser argues that this is a better measure than comparing maintenance costs with other European railways, because it’s hard to know the state of their assets.

Costs could be compared on similar lines across different NR routes, for example, comparing busy sections of mixed-traffic, twin-track lines that are electrified and use continuously welded track.

You might compare the northern end of the East and West Coast Main Lines, but you wouldn’t compare them with a quieter main line still laid with jointed track.

Renewals costs and efficiencies are greatly driven by the time available to do a job. High-output equipment can prove very efficient provided it’s given a good run at a job. If it takes an hour to get going and an hour to stow away, there’s little point in letting it work for just an hour - letting it work eight hours would be much more efficient.

Here, NR is up against TOCs’ desire to run trains, particularly later into evenings. It might be more efficient to curtail services early on the first couple of days of a week, in return for running trains later into the night on Fridays, for example, when there might be more demand.

These decisions are best made with good data, which could come from the next generation of trains fitted with better passenger counting equipment.

As with maintenance, renewal costs and efficiencies could be compared provided they were similar in nature.

Delivering an efficient railway demands a clear view of what that railway exists to do. It needs skilled managers working with good information. It needs an openness between its parts about what helps or harms efficiency in those parts. If it plans to change, it needs those plans to be properly developed and fully accepted.

Britain’s railway has a way to go.

Until next time...

When they last met, RailReview’s Editorial Board expressed a desire to hear the views of Lord Prior of Brampton (Parliamentary Under-Secretary of State for the Department for Business, Energy and Industrial Strategy).

Lord Prior has offered to write an article on efficiency, which will appear in the next issue (Q2-2017).
Defining efficiency

As an engineering student, I used to know what ‘efficiency’ meant. We had a formula. It was quite simple when applied to engines or lamps. It could even be applied to power plants. It did not have any units, because it was just a ratio or a percentage - we simply divided the use we got out of something by the energy expended on it and the number was (hopefully) meaningful. But when you learn that a light bulb is around 2% efficient at producing light and around 98% efficient at heating a room, you do start to wonder at the value of the exercise.

Is this ever going to work for a complicated system such as a railway, or a capital investment programme? The answer has to be ‘yes’, or we will surely all end up in chaos. It must be true that, as they say: “If you cannot measure it, then you cannot manage it!”

But we do have to continually check our conclusions and use a basket of intelligent measures. In fact, some will surely be better described as measures of effectiveness, or cost, or waste, or output productivity, or safety.

Philip Haigh’s article helps us to appreciate the complexity and the pitfalls in this area. Take the line from Carlisle to Hexham - if we take a logical approach to the application of efficiency, as Philip has illustrated, we prove the need to reduce train service levels. We encourage passengers onto fewer trains. We improve the ratio between passenger-miles and track-miles. We reduce operating costs and we cut rolling stock numbers. And we end up with one train a day in each direction.

But wait a moment, that would not be a ‘railway service’ at all. It would simply be a ‘daily excursion’! In other words, it would not serve the purpose for which the line was built, and certainly would not provide an effective solution to the transport needs of the north of England, improving connectivity between Carlisle and Newcastle and supporting the objectives of the Northern Powerhouse.

Philip’s wide-ranging discussion looks at the definition of efficiency from a number of different standpoints, and provides credible evidence that there is room for improvement across all aspects of the railway industry. With reference to the Thameslink project and the contribution from Simon Blanchflower, he highlights that efficient delivery of infrastructure projects is particularly relevant at this moment in time, and where it is generally recognised that there is room for improvement.

There were also echoes of the themes raised in RailReview’s interview with Sir Peter Hendy last year, particularly “the biggest mistakes have been when the railway has tried to do something which is not properly scoped, planned or costed”.

There is, it seems, an ever-present challenge of projects that are destined not to hit the ground running through ill-defined scope, poor knowledge of existing assets, unforeseen interfaces and a lack of buy-in by end users. Add in a shortage of experienced project management resource, and it is no wonder that the sums budgeted prove to be inadequate as they fail to allow for the inefficiencies already locked into the process in its early stages.

I have been lucky to be involved in the delivery of some exciting and complex multi-disciplinary projects in the rail sector, frequently with an operational interface. The best of those projects have had strong leadership, a desire to foster good working relationships at all levels and across all stakeholders, and a unity of purpose through clear consistent communication. Coupled with well-established competent stable resources in all the right places, including end-user representatives in the build phase, the foundations for success were laid.

On one of these projects, the client’s project director explained to me how he saw his key role as the enabler, working upstream of the designer and contractor teams to sort out scope, get stakeholder buy-in, agree an access strategy, and get budgets (including suitable contingency) approved. The project team was then empowered to deliver within its agreed remit. It wasn’t all plain sailing, and there were scope gaps, unforeseen interfaces and a few unexpected situations on the way, but because decisions were made and relationships were strong it was possible to work out the solutions and implement them.

I believe that the ability to make decisions quickly is an important
The McNulty Review in 2011 challenged the industry by asking why our costs remain so high and levels of innovation remain so low, relative to safety-critical work in the aerospace industry. A look back at his ‘barriers to efficiency’ makes interesting reading - how many of these are valid today? “...the principal barriers are fragmentation of structures and interfaces, the ways in which roles of Government and industry have evolved, ineffective and misaligned incentives, a franchising system that does not encourage cost reduction sufficiently, management approaches that fall short of best practice in a number of areas that are cost drivers, and a railway culture which is not conducive to the partnership and continuous improvement approaches required for effective cost reduction”.

Harsh, perhaps! We are making progress in a number of these areas. And we are all part of an endless endeavour to improve and enhance our service for our public and freight customers. But we need to choose our indicators with care. It’s a complex system.

And we have to value defining what we are trying to achieve at least as much as we value measuring whether or not we are achieving it.

Bill Free
Business Development Director, Carillion Rail

The maintenance, renewal and upgrade of the underlying railway infrastructure is a significant area of expenditure, and the way this is carried out clearly has a large influence on what users pay.

The earlier part of Philip’s article describes how intensively the UK’s rail service is operated, and how this has the consequence of severely limiting the available time to carry out infrastructure work efficiently. We are always told that booked services must run and that passengers and freight users will go elsewhere if there is any significant decline in the rail service, but is this true?

In most areas of life, there are times when you cannot use assets continuously. Take an example from everyday life, such as decorating your lounge. You could do this by creeping in every night and doing a little bit of preparation or repainting - you could even say that there should be no noise made, no dust left and no smell of paint. Alternatively you can decamp to the kitchen, cover your furniture with dust sheets and get the work done. If you were paying people to do the work you would never dream of choosing the first option - and I don’t suppose many DIYers would either.

Similarly, motorways are upgraded by reducing speeds, narrowing lanes and creating safer environments for work to be carried out in the closed-off space - the M1 between Junctions 15 & 19 seems to have been in this state for most of my lifetime! Generally the roadworks are lifted for major holiday periods - the opposite of the railways, where Bank Holidays are one of the few times we get decent access.

It is interesting to see the references to Simon Blanchflower’s Thameslink project, which has largely been progressed efficiently via larger blockades and closures of sections of the route. I live near the Thameslink line, and as a regular user I can vouch for how well the closures have been communicated to passengers, and how the need for this has largely been accepted. The exception seems to be at London Bridge, where Southeastern users were not (initially), so well-informed. Another aspect of Thameslink’s success was the communication of the end benefits resulting from the scheme. South West Trains is also taking this approach with planned works at Waterloo, scheduled for August.

Also affecting how efficiently we can carry out our work is the lack of knowledge about (and underlying poor condition of) the railway infrastructure, coupled with a reluctance to adopt innovation. These issues are improving, but tend to be amplified by the lack of access - if you are using more old-fashioned technology in short-access windows, finding underlying faults in the historic infrastructure can be more disruptive than in a greenfield environment.

So for those of us working on the infrastructure it’s the lack of reasonable access that prevents us being more efficient. We have a highly trained workforce, trained to work safely and effectively, and unsurprisingly these people expect to make a career of working on the railway and earn regular pay. Major upgrades will require improved access if we are to deliver them efficiently. The Thameslink programme demonstrated how to achieve this without upsetting the customer.

for measuring output efficiency of track staff. It was way ahead of its time. The Computer-Assisted Maintenance Planning System (CAMPS) derived its logic from a veritable telephone directory of timed track-based tasks. Factors could be applied for various site conditions and circumstances. One member of each track gang had the task of completing the timesheets using a special propelling pencil, so that the figures could be optically recognised by the mainframe computer.

The system had merit but offered very little capacity for innovation, as any significant change to the status quo simply resulted in recalibration. There was no link to local investment in plant or more efficient equipment, and completing the forms was (quite literally) a full-time job. There was a revamp just before privatisation in 1994, but it eventually gave way to the incentives of the private sector. Then Railtrack failed, and Network Rail took the inspection and maintenance regime back in house, to re-start the painstaking work of improving the efficiency of an undeniably complex system.

The McNulty Review in 2011 challenged the industry by asking why our costs remain so high and levels of innovation remain so low, relative to safety-critical work in the aerospace industry. A look back at his ‘barriers to efficiency’ makes interesting reading - how many of these are valid today? “…the principal barriers are fragmentation of structures and interfaces, the ways in which roles of Government and industry have evolved, ineffective and misaligned incentives, a franchising system that does not encourage cost reduction sufficiently, management approaches that fall short of best practice in a number of areas that are cost drivers, and a railway culture which is not conducive to the partnership and continuous improvement approaches required for effective cost reduction”.

Harsh, perhaps! We are making progress in a number of these areas. And we are all part of an endless endeavour to improve and enhance our service for our public and freight customers. But we need to choose our indicators with care. It’s a complex system.

And we have to value defining what we are trying to achieve at least as much as we value measuring whether or not we are achieving it.

factor in the efficient delivery of projects. Inevitably change occurs - even the best-planned projects can find unexpected circumstances to be dealt with. But integral to success is a governance regime that has empowered the project team to make the right decisions at the right time. The creation of an agile environment is vital for efficient use of the project resource.

Too often, decisions are taken away from the project for significant periods of time, and in the meantime the resources are not utilised effectively. This situation is also counter-productive in that it leads to frustration among teams who are no longer being focused on driving on a clear road ahead, but instead are waiting for the direction of the next tiny step forwards.

It is in the interest of any organisation operating in the rail sector to demonstrate efficient delivery, in order to maintain confidence in funding organisations that their money is being spent wisely and to best effect.

In my recent experience, efficient and effective delivery has a direct correlation with the effectiveness of the working relationship between the design, construction and client teams - in particular, how much those teams have invested in three key areas: getting to know and understand the project; establishing a clear scope, specification and interfaces; and getting the buy-in of key stakeholders including the end-user. I concur with Philip’s conclusion: we still have some way to go.
Katie Tingle  
Completed a Network Rail apprenticeship in 2012

Mohammed Isa  
Started a Network Rail apprenticeship in 2015

Dave Rayner  
Network Rail apprentice from Kent

Network Rail apprentices in the Computer Room

Apprentices in the workshop

Thameslink apprentices at London Bridge

Erin Henderson  
A Siemens telecoms engineer Thameslink apprentice

Gervaise McKinnon  
A Balfour Beatty apprentice on site at London Bridge

Gabrielle Bishop  
The first woman to join Sudbrook pumping station as an apprentice in 2012
It will be news to nobody that there is a skills shortage in the rail industry. This well-trodden ground has been the subject of many a conference speech and magazine article over the past few years.

But there comes a point when admitting we have a problem and quantifying the size of it can only get us so far. Continued investment in the railway will only be worthwhile if we take action now to ensure that the workforce and expertise is put in place to deliver on our ambitions.

We’re suffering from the legacy of past underinvestment in transport and its workforce, preventing skills from being handed down to the next generation and stifling the flow of new and young people onto the railway.

In more recent years, rail has enjoyed significant Government investment, but will this continue?

National Skills Academy for Rail Chief Executive Neil Robertson warns that our skills shortage could create a vicious circle here: “The Treasury is very reluctant to invest in rail because they think we are overheated. They think we have skills shortages and wage inflation. I’ve been saying this for six months, and I think the Autumn Statement and recent Budget proves it.

“So there is a really, really important job for rail to do, which is to acknowledge the problem and then do two things: firstly, tell a very convincing story about what we’re doing on skills to make things better, which is primarily training lots of apprentices; and secondly, how we are working together as an industry to smooth peaks and troughs in demand to give companies a longer-term view, so they are incentivised to invest in people and innovation.”

Rail has a higher wage inflation than any other sector - a fact that Robertson says the Treasury is well aware of. But why is this more prevalent in our industry?

“Three reasons: shortage of people; unions (getting above inflation pay increases); and a good thing (which makes us look bad in the figures) is what the economists call the concentration effect - we’re already starting to see a move higher up the skill levels. There are fewer of the Level 2 jobs and more of the Level 3/4 highly-skilled jobs [see panel, page 72], so those people are naturally more expensive. We’re moving up the value chain, which in many ways is a good thing, but it looks bad in the figures.”

In the railway’s favour is that we have the best data on skills of any sector at the moment. And there is significant evidence that people in rail are not only keen to act on this, they are actually getting on with it. There is goodwill towards solving the skills shortage, which is half the battle.

Robertson explains: “We’ve got the bit between our teeth and, to mix metaphors, our husky dog sledge is starting to move. But it needs to move further and faster. We’re doing the right things, but we’ve got to do more of them and more quickly. So get on with it, because telling a good story and showing some early green shoots will only take us so far. The Treasury will only believe it when they see it in the figures. So, by the end of 2017, we need to have lots of new people signed up on apprenticeships.”

Essentially, the only thing rail can do to improve the story to the Treasury is to take on more apprentices - they earn less, bring the average wage down, and reduce the wage inflation caused by skills shortages (which is probably about a third of the inflation issue). Our relationship with the unions also plays a big part in this.

The Government is taking its own action to resolve some of these issues, and Robertson is optimistic about this involvement: “It’s unusual because the Government is really getting alongside industry and really getting involved in terms of skills. I can’t fault it, and I’m a man that says when it’s good and when it’s terrible!”

“In the Autumn Statement, the Office for Budget Responsibility prediction showed that the EU workforce will approximately halve. That means we could lose a quarter of our workforce. That’s both bad and good. It’s good because it creates opportunities for local youngsters to get good, well-paid work. It’s bad because we’re not training local youngsters at anything like the rate.”

Neil Robertson, Chief Executive, National Skills Academy for Rail
The biggest change this year is the introduction of the Apprenticeship Levy (see panel, page 73), which begins at the start of the new financial year in April. For many big companies this brings huge costs, but one of the main areas on which NSAR is currently focusing is providing advice and assistance to show businesses how they can optimise their levy and achieve the best return from it.

In many ways rail is leading in this area - NSAR’s bespoke levy planner has already been bought by other industries. The aim is to help businesses understand how much of the levy they can get back and how to create a high-level plan for using it.

However, encouraging businesses to invest in skills is easier said than done in an environment where there is a lack of clarity and certainty over future demand and investment in rail. Resolving the skills shortages in the industry cannot just be about what individual companies can do to help - there is an onus on Government to play its part more effectively.

In a report released in February (Staying on Track), Balfour Beatty claimed that the lack of an industrial policy for the railways will drive skilled engineers into other sectors, and that this is preventing the supply chain from investing in technology that would increase productivity, because of the uncertainty about future available work.

The knock-on effect is that rail loses or fails to develop the skills required to deliver projects such as HS2 and Crossrail 2. Says the report: “The ambitious upgrade and enlargement of the UK’s rail infrastructure has the potential to drive economic expansion and provide employment opportunities for thousands of people for years to come.

“However, the future success of the rail industry is inextricable from the continuity of funding - and thus project flow - provided principally by Network Rail. This is because the investments required of its supply chain partners in existing and future skills, as well as in R&D and critical strategic equipment, cannot be justified without greater demand visibility and certainty.

“The projected stop-go pattern of the project pipeline - a function of Network Rail’s funding model and, in a way, its perceived...”

The biggest thing Robertson encourages is to make the best of the Apprenticeship Levy, and stop it from becoming a ‘nasty tax’.

Apprenticeship Levy

The biggest thing Robertson encourages is to make the best of the Apprenticeship Levy, and stop it from becoming a ‘nasty tax’.

NSAR has created a Levy Planner, to help employers to easily and quickly model the apprenticeships programmes that best fit their needs and immediately see how much of their levy contribution has been recovered. Beyond that, NSAR will help you to spend your vouchers in the most effective way for your business.

Says Robertson: “I’ll help them spend their vouchers. Imagine going to the market with your three vouchers for £27,000 and saying ’I’d like some rolling stock engineers please’. It’s not great - you’ll be harshly treated in the market. But if you come to me, I’ll put your three together with other people’s vouchers. It’s brokerage, economies of scale.”

For larger companies with a levy bill of more than £600,000 a year, Robertson encourages you to consider becoming an employer provider.

“If you have a levy bill of £4 million, for example, you can get back at least £3m - probably £3.5m - by becoming an employer provider. So you basically become a trainer. If your bill is £5m a year, it’s a no-brainer.”

What can you do?

![Current size of sector: transport construction](#)

<table>
<thead>
<tr>
<th></th>
<th>Client &amp; project leadership</th>
<th>Engineering &amp; technical</th>
<th>Construction management</th>
<th>Skilled trade &amp; labour</th>
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<td>3,300</td>
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<tr>
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<td>14,000</td>
<td>8,700</td>
<td>21,600</td>
<td>47,000</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
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<td><strong>39,100</strong></td>
<td><strong>39,550</strong></td>
<td><strong>71,500</strong></td>
<td><strong>160,450</strong></td>
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The consultation for this with NSAR is free of charge.

Robertson says that one of the important things to consider with the levy is that it does not all have to be spent on new employees. It can be spent on upskilling the current workforce. So vouchers can be used for moving current employees up a skill level through an apprenticeship, that could even be at Masters degree level.

You can even outsource the entire process to NSAR. It will spend your vouchers for you to the best effect for your needs, and then manage the ongoing apprenticeship process.

NSAR-Connect

This is like a dating agency for recruiting apprentices. Network Rail receives 5,000 applicants for 200 apprenticeships, and of these about 800 are good.

NR will give jobs to the top 200 applicants, but has spent a lot of money checking that all 800 are good. So the other 600 go on the NSAR-Connect system, allowing others to find a candidate who has been quality-assured by NR.

This system is still being fully developed, but the idea is to make it easier for companies to find suitable candidates for their roles by matching them to appropriate candidates in the system. It will also be linked to universities for students looking for work experience, and to companies that want to offer work experience to suitable students.

Longer term, the idea is that a prospective apprentice could apply directly through the system and be quality-assured by NSAR - providing one route into the rail industry for those wanting to join.

“The Treasury is very reluctant to invest in rail because they think we are overheated. They think we have skills shortages and wage inflation.”

Neil Robertson, Chief Executive, National Skills Academy for Rail
Rail Sector Skills Delivery Plan

Future Sector Skills Shortage

Identified Priorities of Delivery

Resourcing Rail

- Right People
- Right Place
- Right Time

Training & Assurance
- World class quality assurance
- Fit for purpose trainers and assessors capability
- Optimization of sectoral training provision

Standards & Qualifications
- Develop sectoral apprenticeships strategy
- Develop common modern curriculum
- Focus on new technologies and management development

Recruitment & Retention
- Develop sectoral career path
- Upskilling workforce
- Setup a sectoral clearing house

Promotion & Attraction
- Positive industry image
- Provide Regional engagement
- Increase diversity

Intelligence
- Develop strategic forecasting tool
- Agree KPIs for monitoring progress

Leadership
- Close industry group to deliver plan and vision
- Develop agreed sectoral pledges
- Integrate skills into commercial contracts

© 2016 Illustration by WillBaxter.com for NSAR
### Transport construction peak demand and gaps

<table>
<thead>
<tr>
<th></th>
<th>Client &amp; project leadership</th>
<th>Engineering &amp; technical</th>
<th>Construction management</th>
<th>Skilled trade &amp; labour</th>
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<tr>
<td>SHORTAGE</td>
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<td>4,500</td>
<td>2,800</td>
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<td>15,100</td>
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<tr>
<td>Totals at peak</td>
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<td>47,500</td>
<td>125,200</td>
<td>239,200</td>
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<tr>
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<td>14,400</td>
<td>7,950</td>
<td>27,700</td>
<td>56,750</td>
</tr>
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</table>

> performance - must be addressed and resolved as a matter of urgency. This will require the examination of better partnership ways of working, which are already proving more efficient, as well as potentially more innovative sources of funding.

“Otherwise, skilled engineers - be they about to retire, much in demand by other industries, aspiring recruits or foreign workers - will be lost to sectors with more reliable, steady pipelines of work. The same forces will also restrict investment in new innovation and productivity.

“Such loss would intensify the already serious constraints facing the rail industry and put in question the efficient delivery of the Government's intended infrastructure enhancements, with all their benefits.”

Robertson is in agreement with this. He says that we have a problem in this industry investing in our people and innovative technologies because we lack the confidence - there are too many peaks and troughs in work, and this is exacerbated further down the supply chain. For Robertson, this is a key area where he wants NSAR to help, by providing data.

NSAR has been tasked by the industry with setting up a strategic forecasting model to measure, monitor and manage the national skills supply and demand, and provide intelligence by business unit, project, skill set or geography to inform investment needs.

This will allow the industry to establish a baseline, factoring age, gender and the skills profile of the current workforce. It will analyse expected rail investment, changes in technology and productivity gains, to understand future demand.

The Government has set a challenge to create 30,000 new jobs.

> “Uncertainty around the free movement of labour in the EU could increase the industry’s recruitment and staffing difficulties, as it may no longer be able to handpick highly-skilled engineers from other EU countries as is currently the case.”

_Stay On Track, Balfour Beatty report, February 2017_
apprenticeships in transport by 2020 (20,000 of them expected to be from the rail sector). Achieving this will require a proactive approach to changing the perceptions people have of the industry, particularly to encourage a more diverse intake than our current make-up. So what is this baseline study, and how will it help to achieve this goal?

“It is the biggest ever skills study,” explains Robertson. “This is a report which will be a cut of the data as of today. There are very few surprises, which is good because we’ve validated that a lot of our assumptions are correct.”

At the time of speaking to RailReview the baseline was not yet published, so Robertson would not be drawn on the finer details of its content. But he did say that it will contain some encouraging signs - it is certainly not all ‘doom and gloom’, with positive indications on gender and skill levels.

The baseline will give us the best database we have ever had, allowing us to answer just about any question on today’s workforce and our future needs. The idea is that every year, we measure ourselves against the baseline to establish how far we have come and how much further we have to go.

The accuracy with which future demand can be identified will tail off through the years, because projects tend to be signed off five years in advance, but even allowing for that, the rail sector already has more clarity on future demand than any other industry.

Understanding where the peaks and troughs are in demand for skills across different sectors would allow the Treasury to build a picture of the whole construction industry, enabling it to commission work for a sector experiencing a trough while there is a peak elsewhere. Of course, this will only help with the non-specific skills - it will make little difference to the ebb and flow of demand for rail-specific skills.

This becomes all the more important because the roads, energy, telecoms and house building sectors are also experiencing growth and skills shortages. The concrete pourers, welders, plant drivers, bridge builders and road builders of this world will all be needed… by all of us. And Brexit is only going to make that worse.

Says Robertson: “Up to half the workforce (around 46%) in the southern half of the country are from a non-UK EU background. The ambitious upgrade and enlargement of the UK’s rail infrastructure has the potential to drive economic expansion and provide employment opportunities for thousands of people for years to come.”

Staying On Track, Balfour Beatty report, February 2017

Crossrail employees on the day they met then-Rail Minister Claire Perry in October 2015. There are positive indications that diversity on the railway is improving.
Some have already gone. How many of them are going to go or stay after Brexit? Who knows.

specialist engineer. Because it can take a decade or more to train a highly-skilled person. He believes the Apprenticeship Levy will incentivise this. Because it presents a real opportunity provided we train more people. He believes the Apprenticeship Levy will incentivise this. But he is surprisingly optimistic about this, not training local youngsters at anything like the rate. “In the Autumn Statement, the Office for Budget Responsibility (OBR) prediction showed that the EU workforce will approximately halve. That means we could lose a quarter of our workforce. That’s both bad and good. It’s good because it creates opportunities for local youngsters to get good, well-paid work. It’s bad because we’re not training local youngsters at anything like the rate.”

Robertson says we are therefore likely to lose about an eighth of our total workforce. But he is surprisingly optimistic about this, because it presents a real opportunity provided we train more people. He believes the Apprenticeship Levy will incentivise this. Balfour Beatty’s report raises the same concerns about loss of skills from the EU, but is less optimistic about the short term because it can take a decade or more to train a highly-skilled specialist engineer.

Skill levels explained

In England, Wales and Northern Ireland qualifications are allocated a level within a national framework.

**Level 1** = GCSEs grades D-G, NVQs level 1, BTEC awards, certificates and diplomas at level 1.
**Level 2** = GCSEs grades A*-C, NVQs level 2, BTEC awards, certificates and diplomas at level 2.
**Level 3** = AS/A levels, NVQs level 3, BTEC Nationals and awards, certificates and diplomas at level 3.
**Level 4** = NVQs level 4, BTEC professional diplomas, certificates and awards.
**Level 5** = HNCs, HNDs and Foundation Degrees.
**Level 6** = Bachelor degrees, BTEC advanced professional diplomas, certificates and awards, graduate certificates and diplomas.
**Level 7** = Masters degrees, postgraduate certificates.
**Level 8** = Doctorates.

This has been confirmed by all kinds of construction surveys. How many of them are going to go or stay after Brexit? Who knows. There are some that have already gone.

A supplier view on driving skills and technology in rail

1. Delivery of the Government’s commitment to improve UK railways is critically dependent on the industry having the right skills and technology, both immediately and over the medium term.
2. For the rail industry, the need to create certainty of a project pipeline is pressing. The current funding (debt) restrictions on Network Rail are driving unintended consequences (exemplified by the delay of CP5 projects into CP6). The resulting stop-go pattern of rail contracts exacerbates not only the haemorrhage of skilled engineers to other industries, but also destroys the investment case for suppliers contemplating R&D, critical equipment and training programmes.
3. Given the central position of infrastructure in the Government’s Industrial Strategy, this requirement for continuity of funding represents an opportunity. Against a backdrop of low-cost borrowing and the (private) finance community’s appetite for infrastructure assets, the proven immediate take-up on successful projects - passenger and freight - demonstrates the demand drivers which underpin the investment proposition for funding.
4. Where Network Rail has used a supplier-partnership model with clear accountabilities for overall project delivery (Abby Wood/West London; Maidenhead electrification are examples where Balfour Beatty has been involved), the resulting delivery on time and to agreed budget delivery demonstrates a route to greater efficiencies which will reassure potential investors.
5. Continuity of project flow is also essential to retention of existing skills (for example, the preservation of the successful Maidenhead electrification team). It is critical to future delivery to prevent high-calibre engineers drifting into other, more stable industries in the 2018-2020 “gap”, when the industry needs to be building capability for such programmes as the Digital Railway, Brighton Main Line upgrade, Crossrail 2 and HS2.
6. The pausing/unpausing of large schemes discourages contractors from recruiting and training new workers (apprentices, graduate engineers). This stream of new talent not only takes time to come on stream, but needs the invaluable handover interface with experienced workers.
7. Retirements are forecast to peak during CP6 and should be addressed proactively by deferment schemes, which in turn require continuity of project flow to justify.
8. The current significant reliance on non-British EU skilled workers and recruits must be assured over the short to medium term by Government commitment to an efficient and effective VISA scheme or equivalent.
9. In competing for both investors and talent, the rail industry urgently needs to tackle its image problems head-on in terms of poor perception of performance, diversity and career development within cutting-edge disciplines - for example, asset management using the latest digital technology, improved design productivity through the development of new software, and the latest BIM techniques across the asset lifecycle.
If you would like more information or help with skills and training in your own organisation, contact Neil Robertson (neil.robertson@nsar.co.uk).

“Uncertainty around the free movement of labour in the EU could increase the industry’s recruitment and staffing difficulties, as it may no longer be able to handpick highly-skilled engineers from other EU countries as is currently the case.

“In November 2016, more than 10% of the Balfour Beatty workforce held non-British EU passports, and around 11% of new recruits in 2016 held non-British EU passports. Around 100 of our 2016 recruits came to us via a proactive campaign targeting Greece and Portugal, with a further 40-50 expected in 2017.

“In our supply chain and the people who actually build tomorrow’s infrastructure, the proportion of non-British EU workers is even higher. Only 0.2% of our 2016 recruits come from outside the EU, due to the complexity, cost, administrative burden and time delays required in managing the current points-based sponsor licence system. There is also currently a global shortage of engineers.”

The latter point makes Robertson’s view that we have an opportunity to ‘grow our own’ even more vital - perhaps we need an element of pain to incentivise change.

Technology advancements such as the implementation of the Digital Railway and the introduction of new trains will require us as an industry to have more highly-skilled people, either by training new people to a higher level (something that is already under way by the creation of new apprenticeship standards) or by the upskilling of the existing workforce. So signalling engineers become digital signalling engineers, for example.

Digital skills are also in short supply, so this is not an easy task. Robertson’s advice on this is simple - we need to increase the skill levels of the current workforce because the current levels will not serve us well in the future.

However, he thinks that Brexit could have a negative impact on rail’s wage inflation issues: “Immigration has kept wages lower than they otherwise would have been in the construction and semi-skilled sectors (not in the rail specialist sectors). It has been easier to take on Eastern Europeans rather than innovating and trying to do things differently. So in many cases we have continued to do the same thing, the same old ways, but we’ve got Polish people to do it. Brexit will mean they have to do something differently.

“Many are now working to create the long-term view through the Industrial Strategy - because you will not invest in new ways of doing things or in training people unless you have a reasonably confident view of the future. That’s the most important question - how can we create long-term confidence so that people can invest in kit and people?”

NSAR’s baseline study will give the industry the best springboard it has had in a long time to incentivise and assist credible action on skills. But it will be just that - a springboard - for others to take action from.

“We’ve been doing this sort of stuff in different sectors for a long time, and it is the most exciting time I’ve had in a long time. Because we’re really making a difference,” says Robertson.

“The framework is in place. The strategy is in place. People just need to roll up their sleeves and just bloody get on with it.”

Neil Robertson, Chief Executive, National Skills Academy for Rail

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**How does the Apprenticeship Levy work?**

Starting from April 2017, a levy will be introduced of 0.5% of a company’s annual wage bill. It will be collected by the HMRC via the PAYE system, and placed into a Digital Account.

There will be an allowance of £15,000 to offset against the planned Levy Payment - this, in effect, offsets the payment of an employer with a PAYE bill of less than £3 million.

An example of how to calculate your levy is below:

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<thead>
<tr>
<th>A. Employer of 250 employees, each with a gross salary of £20,000</th>
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<tbody>
<tr>
<td>Wage bill: <strong>250 x £20,000 = £5,000,000</strong></td>
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<tr>
<td>Levy Sum: <strong>0.5% x £5,000,000 = £25,000</strong></td>
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<tr>
<td>Allowance: <strong>£25,000 - £15,000 = £10,000</strong> annual Levy Payment</td>
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<th>B. Employer of 100 employees, each with a gross salary of £20,000</th>
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</thead>
<tbody>
<tr>
<td>Wage bill: <strong>100 x £20,000 = £2,000,000</strong></td>
</tr>
<tr>
<td>Levy Sum: <strong>0.5% x £2,000,000 = £10,000</strong></td>
</tr>
<tr>
<td>Allowance: <strong>£10,000 - £15,000 = £0</strong> annual Levy Payment</td>
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</tbody>
</table>

For a full guide on how this works, including how to access the funds available through the Levy, visit: [http://bit.ly/NSARLevyGuide](http://bit.ly/NSARLevyGuide)
Research and reports

Here’s RailReview’s digest of documents and reports released by industry bodies during the past quarter. All those listed can be downloaded from the Rail Hub database on www.railreview.com. If members would like to submit a report for inclusion, please email: stefanie.browne@bauermedia.co.uk.

London Business Survey

CBI/CBRE - February 2017
Respondents to this business survey gave a positive view of Crossrail 2, with 84% saying the potential north-south line was “very important” or “important” to London’s success.
That was a higher percentage than those who named a third runway at Heathrow as “vital to London’s attractiveness” (80%) - although the same figure believed “new river crossings to the east of the capital would benefit London’s growth enormously”.
Some 44% of respondents “believe Crossrail 2 will benefit their business”, the survey reported.

The Urban Transit Evolution

The Economist Intelligence Unit - March 2017
Quoting the International Energy Agency, this report says that between 2000 and 2010 worldwide travel “by road and rail increased by 40%”. The expectation is for the figure to double in the 40-year period from 2010 to 2050.
The report’s recommendations include making long-term commitments, using pilot projects as well as early collaboration, and “drawing clear lines between transport investments and economic vitality”.

Independent international connectivity commission report

Transport for the North - February 2017
Although its focus on international connectivity means that it is more wide-ranging, recommendations in this report include: connecting Manchester Airport to HS2, Northern Powerhouse Rail and the West Coast Main Line; that Liverpool and Newcastle airports should have rail access; and that Leeds Bradford Airport should be served by a Parkway station.
Other things called for include better East-West rail across the Pennines, and a review of public transport between stations and cruise/ferry terminals.

Rail franchising: Ninth Report of Session 2016-17

House of Commons - February 2017
This Transport Select Committee report recommends an independent review of the Department for Transport’s franchising functions.
The wide-ranging paper also recommends: reform of track access charges for Control Period 6; that the DfT “publish updates on the financial losses to the taxpayer from the TSGN franchise and set out the options available to recoup these losses”; and “that, as franchises expire, the Department considers whether they can and should be restructured to align better with the specific market they serve”.

Freight, logistics and supply chain priorities for EU exit negotiations: recommendations to Government

The Chartered Institute of Logistics and Transport - December 2016
The CILT is calling on Government to “engage with the freight transport and logistics industry to form a vision for the UK to challenge for leadership of the WTO’s logistics rankings, and establish the requirements to achieve it”.
It is among a series of recommendations that also includes changing the national curriculum to “include modules on transport and logistics”, as the CILT argues its case after the Brexit referendum.
This report asks questions such as whether autonomous vehicles will lead to more congestion, or contribute to the “regaining of urban space”. Studies from MIT (New York), ITF (Lisbon) and VDV (Stuttgart) show that “it would be possible to take every citizen to their destination with at least 80% fewer cars!” However, it also reports that public transport “offers the quickest development path to full autonomy because it can start operating in a limited area.”

This report says the UK’s quality of infrastructure was 24th on an international scale in 2016 - although that had improved from 27th the previous year. In terms of productivity, it takes a UK worker five days to achieve what a German worker does in four. “The projected stop-go pattern of the project pipeline - a function of Network Rail’s funding model and, in a way, its perceived performance - must be addressed and resolved as a matter of urgency.”

Greengauge 21 has previously noted the opportunity to use high-speed infrastructure to “address challenges in related infrastructure areas” such as energy and water networks. This paper argues, among other things, for a line between High Speed 1 and HS2, “so that Heathrow has high-speed direct access from Paris, Brussels, Amsterdam and Frankfurt”. It also says that “it is time to recognise Heathrow’s role as a rail hub”.

Greengauge 21 argues: “The best value from high-speed rail is not being achieved because of the lack of a longer-term (2050) plan set at a national level.”

While this paper argues that the “ambitious upgrade and enlargement of the UK’s rail infrastructure has the potential to drive economic expansion”, it also says that “future success of the rail industry is inextricable from the continuity of funding”.

It adds: “The projected stop-go pattern of the project pipeline - a function of Network Rail’s funding model and, in a way, its perceived performance - must be addressed and resolved as a matter of urgency.”

“Fundamentally, the Institution of Mechanical Engineers believes that society should expect interconnected sustainable transport,” says this report. Although it accepts that there is now a focus on expanding capacity, it further says that: “GB Rail is in heavy catch-up mode.” The paper argues that investment must continue. Recommendations include pushing ahead with moving block signalling, pushing forward with innovation, and building new infrastructure to cope with bottlenecks.

This report asks questions such as whether autonomous vehicles will lead to more congestion, or contribute to the “regaining of urban space”. It says studies from MIT (New York), ITF (Lisbon) and VDV (Stuttgart) show that “it would be possible to take every citizen to their destination with at least 80% fewer cars!” However, it also reports that public transport “offers the quickest development path to full autonomy because it can start operating in a limited area”.

This report says the UK’s quality of infrastructure was 24th on an international scale in 2016 - although that had improved from 27th the previous year. In terms of productivity, it takes a UK worker five days to achieve what a German worker does in four. The paper considers “four main factors that should be looked at to boost output and dramatically speed up delivery”. They are: real collaboration, innovation, skills, and community support.
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**The Times**  
January 24 2017

**Page 3: Can’t tell if a commuter is pregnant? There’s an app for that**  
An innovative new app has been developed by a British company that alerts commuters within 15 feet if a pregnant woman would like a seat.

The Babee on Board app uses Bluetooth so it will work on the London Underground, where there is no signal or WiFi, and can be downloaded for free. Expectant mothers must download a second £3.99 ‘request a seat’ app to send alerts when they are travelling by public transport.

*The Times*’ technology correspondent Mark Bridge writes that one obvious drawback is why people who are not pregnant would bother to download the app, but developer 10x is apparently speaking to other technology providers in order to integrate it into existing and widely-used apps.

**International Railway Journal**  
February 2017

**Page 6: China sets $115bn budget for 2017**  
State-owned national operator China Railway (CRC) has been handed a budget of $115 billion to expand its network this year, following record-breaking passenger numbers in 2016, reports the IRJ.

CRC carried 2.7 billion passengers last year, registering an 11.2% year-on-year rise, while opening 3,281km of new main line railway. Freight volumes also rose to 2.65 billion tonnes.

Passenger traffic is expected to exceed the three billion mark in 2017. CRC has plans to electrify 4,000km of railway and construct 2,100km of new railway within the next 12 months to cope with increased demand.

**Transport Times**  
Jan/Feb 2017

**The digital railway debate must widen its horizons**  
Gavin Devine, from Newgate Communications, says autonomous vehicles could rival rail in providing a comfortable and safe travelling environment, and that backers of the Digital Railway must factor this into their thinking.

“Rail won’t have a future at all if we don’t start thinking big now,” says Devine. He argues that the Digital Railway debate ought to focus on what the railway will look like in 50 years, not in ten years. His belief is that autonomous vehicles would be marketed in much the same way as the railway, so: “Why would you ever need trains at all?”

Devine does not at any point consider how likely this is in reality, given that the technology is not yet there for autonomous vehicles to function in the way he describes.

**Passenger Transport**  
January 27 2017

**Page 18: UITP gives its view on an autonomous future**  
Autonomous vehicles will lead to a “dystopian” future of even more private vehicle traffic and increasing congestion on roads, unless they are employed as shared fleets and integrated into traditional public transport networks, according to a positioning paper from the International Association of Public Transport (UITP).

The paper states that despite the risk of increased congestion, due to car travel becoming even more comfortable and attractive, an alternative exists. It suggests that the vehicles be put to use in shared fleets as ‘robo-taxis’, mini-buses or in car-sharing fleets.

“Autonomous vehicles offer the chance for a fundamental change - as a key part of tomorrow’s integrated transport systems with public transport as a backbone - but if we do not act now vehicle automation might even further increase the volume and use of private cars with all of the associated negative externalities,” said UITP Secretary Alain Flausch.

**Transport Times**  
Jan/Feb 2017

**Page 12: Low-carbon vehicles: why we need a bold approach**  
Transport Minister John Hayes says that active government support for low-emission transport will improve air quality and encourage a successful industry. He says the plan is that by 2040 all new cars and vans sold in this country will produce no exhaust emissions: “Charging an electric car should be as easy as filling up with petrol or diesel.”

Hayes points out that the UK’s low emissions vehicles industry is a huge success and a strength in our economy. But he does not mention how the increased electricity supply required would be delivered.

**Financial Times**  
February 21 2017

**Page 2: Mace threatens to sue HS2 after missing out on contract**  
Mace has reportedly written to HS2 Ltd, notifying it of its intention to challenge the decision to award a £170 million contract to US engineer CH2M.

Mace alleges a conflict of interest, after Mark Thurston (an executive at CH2M), was appointed HS2 Ltd Chief Executive in January. He replaces HS2 Ltd’s acting Chief Executive Roy Hill, who is on secondment from CH2M.

The company declined to comment when contacted by the Financial Times, although Mace’s partner in the bid, Turner & Townsend, said it would not be taking any legal action.
Treasury eyes raid on NR property sales

It is unclear whether Network Rail will be allowed to retain ‘some, all or none’ of the £1.8 billion it plans to raise from property sales. Passenger Transport points out that this could mean work on politically sensitive projects has to be deferred, and that a senior industry executive has told the magazine that this has been pointed out to the Treasury.

“It’s got to be pushed up and escalated to a level where, hopefully, someone will be able to understand the political consequences,” he says. According to the article, NR is planning to raise the issue at higher levels in government.

A new dawn for global trade?

The Freight Transport Association broadly supports the Prime Minister’s vision of “frictionless trade” with the EU and ambitious free trade with global trading partners.

Chief Executive David Wells admits, however, that it is an unsettling time for the organisation’s members, and urges them to contribute to the thinking and understand how to grasp the opportunities that lie ahead.

The FTA was running an event on March 15 to examine in detail Britain’s future trading relationship with the EU.

Massive order for new Paris EMUs

David Haydock and March Caremantrant report on a 3.75 billion euro deal for new commuter trains in Paris. These represent a significant change to the usual trains in the French capital, and form part of a plan to modernise (eventually) 700 trains.

Meanwhile, on the same page, Haydock reports on a 46 billion euro plan for track renewals in France, and how this is being achieved through budgeting and changes to legislation - something that sounds all too familiar to the UK rail industry.

More urgency is needed in reforming planning

Derek Halden (secretary of Scotland’s transport think tank STSG) says the latest proposals to co-ordinate development and infrastructure provision must be matched by a different mindset if long-sought objectives are to be achieved.

The proposals promise an “infrastructure first approach”, and an infrastructure levy that Halden says could provide a fairer way to ensure that new development pays for its supporting infrastructure.

“The latest planning proposals are a step in the right direction, but the pace of change seems glacial,” he concludes.

Heathrow trial for autonomous vehicle

French-based autonomous vehicle pioneer Navya (part-owned by Keolis) has demonstrated its Navya Arma fully autonomous and driverless shuttle at Heathrow Airport. Since the Arma was first deployed in France in late 2015, more than 100,000 passengers have travelled in it, and more than 30 of the type are now in use in seven countries around the world.

“Autonomous technology will certainly be a part of the airports of the future. Autonomous vehicles will allow airports to deal with certain flow issues currently experienced and thus improve the passengers’ airport experience,” it says.

FTA says clear plans for Apprenticeship Levy are vital for logistics industry

Clear plans detailing how those paying in can access Apprenticeship Levy funds are being called for by the FTA.

“It is important that the Apprenticeship Levy does not become another business tax and that levy payers have access to suitable, fully-funded apprenticeships for all age groups.”

Page 1: Treasury Eyes Raid on NR Property Sales

Page 3: A New Dawn for Global Trade?

Page 6: Massive Order for New Paris EMUs

Page 16: More Urgency is Needed in Reforming Planning

Page 18: Heathrow Trial for Autonomous Vehicle


Page 7: Thrifty Football Fan’s 56 Rail Tickets to See One Game

Ministers and Secretaries of State usually have a shortish shelf life. Alistair Darling (Labour, May 2002-May 2006) and Patrick McLoughlin (Conservative, September 2012-July 2016) were unusual in having four years; normally they get around 18 months.

They are consequently easily forgettable, unless they are dire and/or obnoxious or pretty good/easy going. Labour Rail Minister Tom Harris (September 2006-October 2008) is one whose name sticks in the mind because he was both effective and popular.

His ministerial career ended in 2008 when he was sacked by Gordon Brown. Returning to the back benches, he joined the Transport Select Committee and kept his Glasgow South seat in the 2010 General Election. He served a further five years before being swept away by the Scottish National Party tsunami of 2015, which destroyed Labour in Scotland, leaving it with a single Parliamentary seat.

As a minister, Tom was always good to deal with: engaged and engaging, but also candid and direct. He also showed up in lots of places, always apparently eager to find out more about the industry that he had had a good grounding in, during his pre-parliamentary career as Chief PR & Marketing Officer for Strathclyde Passenger Transport.

“I absolutely loved every second of it,” he says with real warmth. “Being a minister was the best job I ever had. It was the busiest I ever was in my 14 years as an MP.

“I loved it because I love the industry. The people who I met every day were just really interesting and committed - and they knew so much about the industry. Every day I was meeting people who had forgotten more about the railway than I could have ever learned. I love that kind of commitment.

“I didn’t always agree with them either politically or administratively, but it was fascinating to speak to them. It was great to be able to DO something! As a backbench MP you can help with individual cases and you can raise issues in Parliament, but when you’re a Minister you can actually make decisions to change things.”

He’s proudest of three things: saving the Blackpool trams when the civil service was to recommend denial of modernisation funding; the provision of unfunded Sunday services on the Robin Hood line; and the BTP 61016 text warning system.

“I was meeting people who had forgotten more about the railway than I could have ever learned.”

He is especially proud of the last, because there’s an ongoing and direct passenger safety benefit.

“It came out of a conversation that I had with British Transport Police Chief Constable Ian Johnston. I figured that if you’re a passenger on a train you don’t want to pick up your phone and start speaking into it, reporting thugs that are sitting in the same carriage. I thought of a text system where someone can discreetly send information to BTP. He agreed it was a great idea and it has since become a successful system. I am very proud of this so yes, I am absolutely taking credit for that!”

The Robin Hood line Sunday service was an interesting example of representative democracy in action: “There was no budget and no provision in the franchise. That’s what I was told by my officials, but this woman - who I think was a Labour councillor - gave me such a good presentation and was really convincing. By the end of her presentation I thought: ‘I am not going to send these people away with a no’.”

So one person saying the right thing in front of the Minister made the difference?

“It did, and you could tell from the way that other people were chipping in that this was a community that was determined to make the service work. So we made it work.”

Given how much he loved the job, it must have been a real sense of loss when he was sacked. As ever, he is disarmingly candid.

“I deserved to get the sack because I was briefing against… there were a lot of us who were really very anxious about the next General Election. I knew - and events proved that we were right - we couldn’t win a General Election. And I paid the price.

“Gordon led us to a massive defeat, but some of my colleagues felt that defeat under Gordon was preferable to victory under anyone else. Go figure…”

A further relatively unhappy five years as an MP ended (with some relief, he concedes) in the SNP takeover of Scotland in 2015. But he wasn’t sorry - it was time.

“The low point came when my dad - a working class boy from a council estate - told me that he had got involved in a conversation with a man on a train up from Stockport one day. He said to me that when the man asked what his son did, he didn’t want to tell him, That was the point where I thought: maybe I should just chuck this…”

Since 2015, Harris has established a fast-growing PR and executive training company of his own, most of whose business is in railways. He was also active in the ‘Better Together’ campaign to keep Scotland as part of the UK, in the independence referendum of 2014. He describes this as a “horribly awful, negative experience” because of the vicious daily, highly personal, abuse.

He also writes a successful - and sharply witty - column in the Daily Telegraph, where he is relentlessly critical of the Labour Party. And he is contemptuous about Jeremy Corbyn, whose leadership he likened to “…singing a few verses of John Lennon’s Imagine”. Does the party ever bite back?

“No. I think Diane Abbott once made a complaint about something I had written about her, but nothing serious from anyone serious.”

He recalls how after he lost his seat after 14 years as an MP, he received “a single brief note from the Labour Party commiserating - and that was it. Nothing else.”

“What, no post-MP counselling or help rebuilding your life?

“No. The party didn’t offer any of us any kind of support. Some of my colleagues had been MPs for longer than I had and the party just washed their hands of us. They haven’t been in contact with us, they didn’t offer any support or advice… nothing.”

His new business is doing well, not least with clients from the rail industry.

“The industry has a long memory and there’s still a lot of people who remember my time as a Minister. Rightly or wrongly, I have a good reputation as a Minister. When Gordon Brown took over I made it clear that I wanted to stay with DfT rather than be moved on again. Traditionally you spend a year in a job and then you move on and I wanted to stay on railways. I still do.

“I wouldn’t go back to politics, but I do enjoy being involved in the railways. It’s always changing and I understand the dynamics in it, and it’s fascinating from a political point of view. It’s a big success and it frustrates me that people don’t celebrate the success - all they do is focus on its failings.”