

Why rail needs to embrace digital technology

The global economic outlook



The COVID-19 pandemic-induced lockdowns and related global recession of 2020 have created a highly uncertain outlook for the labour market and accelerated the arrival of the future of work. Key findings of the World Economic Forum's Future of Jobs Report from October 2020 include:

- The pace of technology adoption is expected to remain unabated and may accelerate in some areas.
- Automation, in tandem with the COVID-19 recession, is creating a 'double-disruption' scenario for workers. In addition to the current disruption from the pandemic-induced lockdowns and economic contraction, technological adoption by companies will transform tasks, jobs and skills by 2025.
- By 2025, the time spent on current tasks at work by humans and machines will be equal.
- Although the number of jobs destroyed will be surpassed by the number of 'jobs of tomorrow' created, in contrast to previous years, job creation is slowing while job destruction accelerates.
- Skills gaps continue to be high as in demand skills across jobs change in the next five years.
- The future of work has already arrived for a large majority of the online whi<mark>te-collar workforce.</mark>
- In the absence of proactive efforts, inequality is likely to be exacerbated by the dual impact of technology and the pandemic recession.
- Online learning and training is on the rise but looks different for those in employment and those who are unemployed.
- The window of opportunity to reskill and upskill workers has become shorter in the newly constrained labour market.
- Despite the current economic downturn, the large majority of employers recognize the value of human capital investment.

Early evidence suggests that, in addition to the labour market displacement caused by this health shock, employers are set to accelerate their job automation and augmentation agenda, raising the possibility of a jobless recovery. This means that the business environment in 2021 is more predisposed towards investing in automating technologies than it might have been without the Covid-19 crisis.

The infrastructure outlook



The rate of technological change is a major challenge in infrastructure, where organisational processes, behaviours and ways of working are deeply ingrained and difficult to change, and the benefits of investment in technology can often be eroded or negated because changes to processes and working practices can't be made quickly enough to support the transformation. Organisations cannot simply invest in new technology and expect it to be successful without spending time understanding the impact on people, their roles and the processes they follow.

But, even in this digital age, people remain the decisive factor.

On average, less than 20% of big companies succeed in their digital transformation initiatives, with programmes frequently failing to deliver the promised value and business benefits. History is, consequently, littered with examples of companies pouring huge amounts of expertise, time and financial investment into a digital transformation, only to discover they forgot one crucial thing: people.

It is commonly assumed that having new technologies and solutions will create value and secure competitive advantage. This is like buying a race car and no fuel. Digital technologies alone will provide little value to an organisation. What matters is whether people use those technologies correctly within their context.

Further analysis shows that, with 80% of the 2030 workforce already in the workforce today, reskilling the existing workforce will be the major challenge between now and 2030.

- The most widespread under-skilling is likely to be in basic digital skills; which are likely to look increasingly advanced, compared to what we might consider 'basic' to look like at present;
- 2.1 million workers are likely to be acutely under-skilled in at least one core management skill;
- 1.5 million workers are likely to be acutely under-skilled in at least one STEM workplace skill;
- 800,000 workers are likely to face an acute shortage in teaching and training skills

Skills are an important component of productivity, so this mismatch has important implications for the UK economy. It hampers productivity, limits the competitiveness of UK businesses, and acts as a drag on the pay progression and job satisfaction of individuals. Investing in skills development can increase output directly through raising individual capabilities, but also indirectly by facilitating technological diffusion and innovation.

It is well established that countries that experience the most pronounced skills mismatches show lower productivity levels than their peers. One academic study found that the UK could improve its productivity by 5% or more if it reduced the level of skills mismatch to that of best-practice peer nations.



These findings are crucial given the UK's recent poor productivity performance. The evidence points to skills having significant potential to boost UK productivity. For example, workforce upskilling is estimated to have accounted for about 20% of pre-crisis productivity growth.

Under-skilling impacts directly on companies' productivity. For example, the Employment Trends survey conducted by the Confederation of British Industry (CBI) shows that talent shortages are the biggest reason companies worry about their competitiveness. The 2018 Business Barometer estimates that the UK skills shortage is costing organisations £6.3 billion a year in increased salaries, training and recruitment, and temporary staffing costs.

The brutal reality is that the way that we work in 2020 has been fundamentally shaken. This has implications across the socioeconomic spectrum not just for individuals, workplaces, teams and supply chains, but for families, communities and society as well.

So what does this all mean for the rail industry?

Rail is starting to address the productivity challenge. It simply doesn't generate the returns that other sectors do and is not fully addressing key factors of productivity improvement at company or sector level. The UK Government will not allow the sector to continue in this vein.

NSAR has looked at key elements of productivity and has developed a Productivity Maturity Matrix designed to support our members in their quest for productivity improvements. Targeted measures have been assessed to deliver a 25% productivity gain by the end of CP7.

Implementing digital technologies is part of that plan as is the improvements in people sourcing, developing and deploying.

If we turn to the sector itself, and some relevant data, we will look at two key areas of the workforce where implementing better digital technologies and giving people better digital skills are perhaps the most prevalent – maintenance and corporate services. We are not highlighting operations (both Infrastructure and Train) or capital projects.

The operations side of the sector have been generating fit for purpose technology to suit timetable and passenger number demands for decades. The new technology on the East Coast Main Line is testimony to the deployment of advanced signalling technology, designed to suit greater numbers of trains, travelling further and faster.

The capital projects element of the sector is subject to slightly different funding rules, i.e. Treasury Green Book business case scrutiny for any capital expenditure and therefore the desire to innovate is inherent in that process.



Which leaves us with the maintenance and corporate services elements of the workforce.

There are approximately 72,000 people involved in maintenance in the sector, of all disciplines, of all asset types, on all types of railway. Similarly, there are 28,000 people in Corporate Services in the sector, engaged in occupations in areas such as finance, HR, IT, planning, strategy, general management and HSQE activities.



MAINTENANCE

CORPORATE SERVICES





We have looked at average salaries in each of the two work types and the following charts show the volume of salaries multiplied by the number of people undertaking those activities in each region. In maintenance, the total salary amount is approximately £2.6bn per annum and in corporate services, that number is approximately £1.1bn per annum.



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MAINTENANCE







So we are looking at a combined annual salary level of maintenance and corporate services workforce of close to £4bn per annum.

These are the two areas where we believe the impact of digital technology, and improved levels of digital deployment can lead to significant productivity savings.



Imagine how much more productive the rail sector could be by deploying better technology, more integrated software, better information dashboards (generated automatically) and using a common dataset generating useful analytics. We want to move towards a modernised railway, using contemporary tools and processes, designed to offer safe, performance driven and productive solutions

The work that the Intelligent Infrastructure programme is doing in Network Rail is an example of how technology driven solutions can support a modernised maintenance regime. Solutions such as:

- Decision Support Tools
- Digital Record Cards
- Higher levels of asset monitoring
- Greater asset management software integration
- Higher levels of remote condition monitoring through means that are not labour intensive
- More mobile apps and data sharing devices
- Better failure detection systems, particularly in parts of the network where climate change is having an impact on asset condition
- And so on

The need to improve performance, increase levels of safety, reduce human time on or near the railway, minimise railway operational downtime and increase asset reliability can only be delivered through the deployment of technology solutions, in conjunction with a shift in sector culture for the way the workforce is developed.

The introduction of technology will fail to meet business case expectations if it is not managed hand in glove with people development. Working together for the good of the sector is the only way to drive effective change.

Roles will change in the industry as a result of modernisation and the introduction of digital technology. The way maintenance is undertaken will need to be reviewed, assessed and changed. Looking at key areas such routine and cyclical maintenance, time-based standards and different rostering will play a pivotal role in how productivity can be improved. Typically, in the maintenance space, we are likely to see the following changes to skills in these key roles:



- Maintenance Operatives these roles (of which there are approximately 30,000) will require significant reskilling by the introduction of new technology.
- Maintenance Technicians Maintenance Technicians these roles (of which there are approximately 15,000) will require significant upskilling to enable them to become more predictive and analytical.
- Maintenance Fitters these roles (of which there are approximately 5,000) will require significant upskilling to enable them to become more predictive and analytical.
- Maintenance Engineers these roles will require upskilling to suit the requirements of the new technology and the prediction methodology.
- Works Planners and Schedulers these roles will require reskilling to suit the requirements of the new technology and the prediction methodology.
- Supervisors and Team Leaders these roles will require upskilling to suit the requirements of the new technology and the prediction methodology, and a much lower level of the workforce on site.

So in essence, we are looking at virtually all 72,000 maintenance roles requiring some of level of up or reskilling as a result of new innovations. The majority of these will be in the infrastructure space, given technological advancements in rolling stock and the way they are now maintained. Some jobs might disappear, but others will be developed to meet a new way of working. Increased levels of data analysis, targeted planning, works scheduling, condition monitoring, asset performance reviews will all be in higher demand.

From a corporate services perspective, we will see higher levels of software deployment, making better use of data being generated and analysed, fewer local spreadsheets or singular solutions, more use of data lakes and much more consistency in the way activities are undertaken across a company.

In particular this will affect the HR, Finance and Commercial departments most where data driven activities will replace human interventions and items such as Blockchain will become more mainstream. This will necessitate up- and re-skilling to approximately 20,000 roles, some of which will also disappear.



The potential productivity benefits are huge.

In maintenance alone we are talking of savings of 3% per annum by deploying technology solutions and 6% per annum by deploying effective and supported strategic workforce planning with comprehensive ongoing up- and re- skilling for technicians, engineers and managers in commercials skills and digital skills, as well as a clear plan for skills needs, and recruitment priorities. This is both in client organisations and in the supply chain and will reduce wage inflation, as well as inefficiency reductions from lack of skills (conflict, rework, etc). It will be done in such a way as to both deliver and evidence 'levelling up', diversity and local / regional socio-economic impact.

In an industry that spends over £7bn a year in maintenance activities, we are potentially discussing an annual saving of between £200m and £600m per annum if we took a pessimistic 3% view and an optimistic 9% view.

In corporate services we are likely to see at least a 5% productivity improvement, possibly as high as 10%. These impacts are most likely to be seen in Finance and HR, as well as general management, where we have large, multi-level management chains in our larger organisations. In real terms this is a saving to the industry of potentially £100m per annum, with greater levels of efficiency and productivity generated.

Looking at both maintenance and corporate services combined, we believe somewhere between £300m and £700m annually can be saved from the industry on an annual basis between now and the end of CP6 if more digital technology was deployed in conjunction with effective strategic workforce planning.

So what next?

So where do we start? By following the following activities below and supporting them with the right level of competent and authorised resources, this is a good blueprint for taking the first steps on the digital journey.

- Develop a digital vision how digital do we want our company to operate?
- Review the effect on people, processes and systems
- Understand the affect that digital vision has on the skills and makeup of the workforce?
- Assess where you think you might be in digital maturity now?
- Assess where you want to be in 2, 5 and 10 years' time
- Create a plan to bridge the gap difference between tomorrow and today



- Include re-skilling, up-skilling and recruitment of new talent in that plan
- Include measurements of progress and milestones what doesn't get measured doesn't get managed
- Leadership and responsibility are critical to success adopt a different culture
- Create an evolving improvement plan, the digital journey never stops.
- What are the implications if we don't?

We have proven, and evidence from around the world in many other sectors has been generated, that doing nothing leads to poor outcomes. Outcomes that can be prevented through some clear strategic thinking and a willingness to grasp opportunities at a pace that suits the organisation.

Summing up

We know the impact technology has had on our lives, both personally and professionally. We also know that this is set to continue. We also know that doing nothing is not an option.

From a rail sector perspective, there are well intended processes for whole life asset management, with maintenance and renewals based on decent understandings of condition. This is made harder by the growth in traffic. The mindset needs to be more passenger focussed though, and this has already started. Better use of asset data and more data and technology driven solutions are big opportunities, which could also help reduce renewal levels by guiding better maintenance - good for costs and passengers. Digital twinning also has potential for guiding possessions. Overall, a long-term plan is needed to create a new operating model which focusses on prevention and increases safety, repeatability and supply chain investment.

There is a compelling need to be more delivery focussed – the culture of the industry and its heritage is perceived to be a brake on this. The supply chain use too much contingent labour, which receives little or no investment. Overall, maintenance is believed to be one of the least productive parts of the sector. Fewer bigger contracts would help: these would improve productivity and safety. We need to start taking strategic workforce planning seriously and not treat it as a quick fix or by simply buying a piece of software. Again, linked to above, a new operating model would help to change culture, drive strategy and increase investment in capability.

If we don't the consequences on the sector will be severe.



Acknowledgements

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- UK Skills Mismatch in 2030 Industrial Strategy Council October 2019
- Closing the Opportunity gap The economic drivers for learning as a benefit Training Zone
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