



Department
for Transport



Transport Infrastructure Skills Strategy:

building sustainable skills
Moving Britain Ahead



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Foreword

Secretary of State for Transport



Rt Hon
Patrick McLoughlin
MP

Britain has a rich transport history. Our sailors created the first global economy and our engineers built the first railway as well as the first underground metro system.

We tend to associate our success with brilliant pioneers like Stephenson and Brunel but what's often overlooked is how we were able to mobilise a highly skilled workforce. This was just as important a resource as the coalfields which powered the Industrial Revolution.

But in the 20th century, when we stopped investing in transport, we stopped investing in that workforce. Skills were no longer handed down to the next generation and our competitors began to overtake us. We're living with the legacy of that underinvestment today.

Now we are supporting record investment in rail, roads, ports and airports. This investment won't just deliver new world-class infrastructure, it will create opportunity for people across the UK. We are ensuring that every part of Britain benefits from a growing economy and that everyone who works hard gets the opportunities they need to succeed. Transport infrastructure investment of this scale is creating thousands of jobs opportunities throughout the country.

We will need skilled people to build, maintain and operate this infrastructure once it's in use, and many of these roles will be cutting edge, highly technical and require Britain's best minds. That's why I asked Terry Morgan, the Crossrail Chair, to develop this strategy building on his outstanding track record in developing skills in the transport sector.

There is a golden opportunity to make transport the career of choice for young people, to increase the diversity of the transport workforce, to grow the number of transport apprentices and to raise skills levels throughout the sector. We are also laying the foundations for making 2018 a year to celebrate our nation's engineering achievements and to inspire the next generation of engineers.

I am immensely grateful to Terry for his work on the strategy, to my ministerial colleague Lord Ahmad for the support he has provided and to the many and varied transport stakeholders who provided ideas and advice.

A handwritten signature in black ink that reads "Patrick McLoughlin".

Foreword

Lord (Tariq) Ahmad



Lord (Tariq) Ahmad
Transport Minister
for Skills

It is a measure of a modern, successful democracy that youngsters from all backgrounds have access to the education, training and job opportunities they need to meet their potential and aspirations to allow them to succeed in their chosen career. If we achieve this we will furnish British industry and empower our country with the skilled workforce it needs to flourish in an increasingly competitive global economy. This challenge is clearly illustrated in transport and requires action now.

I have worked closely with Terry Morgan and our team in the development of our skills strategy for transport. In this we have welcomed the positive engagement of all the stakeholders across the sector and in particular our client organisations who each seconded us an expert in transport skills to assist in developing the strategy. Our particular focus has been on challenging the transport sector to embrace all sections of society by demonstrating to them the clear business case and strength of a more diverse and skilled workforce.

Our commitment to 30,000 apprenticeships is both a huge ambition and an opportunity. However, there are also wider skills challenges to address, if we consider an anticipated shortage of 55,000 skilled workers predicted by 2020. Tackling this will require a proactive approach to changing perceptions of working in transport and engineering, broadening the diversity of our workforce and upskilling existing workers to equip them to deal with the new technological challenges, they face.

I have been specifically concerned about the lack of representation of women, minority communities, as well as limited opportunities for those with disabilities to work and thrive in transport careers. I am therefore delighted that the strategy not only advocates ambitious targets in the short to medium term, but also makes the important link to engaging with school children to help prevent gender role stereotypes in the longer term. I have seen the benefit of this engagement first hand on my visits to primary and secondary schools and welcome the aim to promote careers in transport by ensuring every primary school in the UK is engaged in this initiative by 2020 as a great way of inspiring young minds.

Opening up the sector to a more diverse workforce and taking action to engage, retain, invest and develop the people we need is vital to the capacity, capability and future sustainability of the sector and to the UK's position as a leading transport nation on the world stage.

A handwritten signature in black ink, reading "Tariq Ahmad".

Foreword

Terry Morgan



Terry Morgan
CBE
Chairman of Crossrail

I would like to take this opportunity to thank the Secretary of State for the opportunity to work with Lord Ahmad, the department and its client organisations to develop this important piece of work supporting Government's unprecedented capital programme and our drive for stronger national growth and productivity.

The emergence of new technologies, with smart motorways and the Digital Railway, requires us to think carefully about the skills and capabilities needed to operate and maintain a more technically advanced and data rich infrastructure. This means that for our existing workforce we not only need to address the stark reality that in a decade over half will have retired, but those remaining will need training to gain new skills too.

Our strategy makes far reaching recommendations and sets ambitious targets that will require the whole industry to come together and play its part. Procurement plays a crucial role in delivering new apprenticeships from the public investment being made through Crossrail, HS2, Network Rail, Highways England and TfL. The pledge to create 30,000 new apprentices by 2020 is one that I am particularly passionate about, given that I started my own career as an apprentice. Today the apprenticeship landscape is rightly changing to support the needs of business, and I would like to see transport creating many more, higher level apprenticeships in the technical, engineering and construction fields as well as in crucial operational and maintenance roles.

With a scarcity of skilled resources it is imperative that our sector is promoted as an overwhelmingly positive and exciting place to work and build a career. I am immensely grateful to Lord Ahmad for his passion for improving diversity in the transport sector and for his hands-on commitment to engaging with school children so that young people from all backgrounds have access to the opportunities transport presents. Our strategy includes specific targets to encourage more women and other minority groups to enter transport.

I am also pleased and proud to have led a strong cross industry team with representatives provided to me by the Department's transport infrastructure client organisations, and I'm delighted that all the undersigned have committed to bringing this important work to life.

Andrew Wolstenholme
CEO, Crossrail

Mike Brown
MVO, Commissioner for TfL

Jim O'Sullivan
Highways England

Philip Rutnam
Permanent Secretary, DfT

Simon Kirby
CEO, HS2 Ltd

Mark Carne
CEO, Network Rail

Executive summary

"Please work with us on the skills agenda. I know it is going to be a challenge... but we all know we need a more highly skilled economy... making sure we are one of the leaders in Europe when it comes to skills, and not one of the followers".

The Prime Minister to the Confederation of British Industry (CBI), October 2015

1. Transport matters. It doesn't just help people get around, it helps them get on. We are making twice as many journeys as we did in 1970. As a result, parts of our transport network are now full. We face a choice between building the infrastructure our country needs, or transport becoming a brake on growth and opportunity.
2. We choose to invest for the future. We are ensuring that every part of Britain benefits from a growing economy and that everyone who works hard gets the opportunities they need to succeed.
3. We are supporting record investment in rail, roads, ports and airports. We are funding the biggest rail modernisation since Victorian times, and the most extensive improvements to roads since the 1970s. We are investing to bring our country together, including by creating the Northern Powerhouse of economic growth.
4. We are supporting jobs, skills and apprenticeships for people in every part of the UK. The investment being made today will help prepare our country for tomorrow. But to do this we need to have the capacity and capability to deliver our investment and this means addressing the critical skills challenges which have held the sector back for too long.
5. Challenges such as an ageing workforce and historically low staff turnover which along with a lack of a diverse workforce means an all too narrow talent pool to tap into. We will need high calibre engineers and operatives building and maintaining our future transport and infrastructure. We will need our supply chain to work with us to ensure we maximise our productivity returns through high quality apprenticeships, and finally we want to see transport become the career of choice for school children and their parents.
6. Our plan will set out how we aim to address these challenges through our ambitious recommendations and continued effort to support jobs, enable business growth, and bring our country closer together. We will leave a lasting legacy for future generations.

7. This strategy therefore is a call to action – a call to employers, to government, to professional organisations and to educational institutions, to come together to effect a real change in the transport sector. To attract the right people to meet the challenges of new technology and to deliver our ambitious infrastructure programme, we need to encourage people into transport careers both through apprenticeships and other means. It is a huge, but exciting challenge – and one which promises a high level of reward.
8. Transport is on the front foot. Our commitment to 30,000 apprenticeships is both a huge ambition and a real opportunity. Over half of these will be at level 3 and above. By trebling the number of apprenticeships we aim to improve productivity and tackle the more complex technological challenges the sector faces. Our apprenticeships will include young people entering the workforce, mid-career changers and returners to work as well as our existing workforce who will be reskilled, as apprenticeships become the norm for the 21st century.
 - where there is under-representation, support the government’s target of a 20% increase in the number of BAME candidates undertaking apprenticeships by 2020, ensuring that we meet or exceed this target to meet our goal of better representing the communities we serve.

10. We will help transport employers to come together through the Strategic Transport Apprenticeship Taskforce (STAT) to address skills challenges in a co-ordinated and collaborative way. The group will cover road and rail initially with its programme and priorities agreed by employers themselves. Industry stakeholders have suggested that early activities could include:

- reviewing the future need for apprenticeships and encouraging groups of employers to come together to develop new apprenticeship standards, where they agree they would be of benefit
- opening up training facilities to employers across the sector, so increasing the number of apprentices/trainees at little additional cost to the industry
- working together to define the training required from the sector and ensuring this is delivered effectively by training providers
- working collaboratively to promote transport as an exciting career option to young people and to improve diversity – we envisage the STAT having an ambassadorial role for the transport sector.

What will we deliver?

9. We will increase the diversity of the transport workforce with a strong focus on encouraging more women and Black, Asian and Minority Ethnic (BAME) people to work in transport.

In particular we will:

- set an ambition for at least 20% of new entrants to engineering and technical apprenticeships in the transport sector to be women by 2020 and to achieve parity with the working population at the latest by 2030

11. The sector will work with leading research and development institutions to ensure it's at the cutting edge of future innovations in transport; and create leadership and innovation development programmes for senior managers in transport organisations.

12. National transport colleges such as the National College for High Speed Rail will become specialist centres of excellence leading the delivery of world class training in collaboration with the wider network of regional centres and further education (FE) colleges.

They will:

- ensure the provision of specialist training to meet the skills forecasts of the Strategic Transport Apprenticeship Taskforce
- work in collaboration rather than in competition to provide world class teaching and teacher training, including on advanced technologies.

13. Employers throughout the supply chain need to invest in skills. We will use procurement to deliver a significant increase in the number of apprenticeships right through our supply chains, setting ambitious targets using the most appropriate approach to achieve the highest number. In particular we will:

- follow existing good practice in parts of the transport sector which suggests that wider expansion of a target of 1 apprenticeship per £3 to 5 million of contract value would be a stretching (but not unachievable) ambition for the majority of our infrastructure projects

- consider a percentage headcount target of 2.5% apprenticeships per year, where the type of contract makes this more appropriate
- ensure that all DfT local funding pots incentivise local authorities to adopt a similar model as best practice in their contracts
- include requirements for skills and apprenticeships in all rail franchises
- promote this model as good practice across public and private sectors.

14. We welcome the apprenticeship levy and the opportunity to work with the Department for Business, Innovation and Skills (BIS) to confirm transport as a high value sector. We will work with employers through the Strategic Transport Apprenticeship Taskforce to make best use of levy funding within the transport sector including to address specialist transport skills gaps including in aviation, maritime, road haulage and coastguards.

15. We will ensure that competitive DfT local funding pots incentivise local authorities to encourage skills development.

16. We will work with other government departments specifically BIS and the Department for Education (DfE) to ensure a joined up and effective approach to education and skills within schools. In addition working, via the Transport and Infrastructure Education Partnership (TIEP), transport suppliers, Engineering UK and the professional institutions we will develop a joined-up national approach to education activity to promote careers in transport, particularly technical and professional

education routes via apprenticeships, to parents, teachers and all young people. This will include groups that are currently under-represented such as women and BAME communities.

17. We will deliver a compelling and inspiring communications campaign to make 2018 the year to celebrate engineering, and promoting engineering as a career of choice to young people.

18. We will work to ensure that the recommendations on skills from the Maritime Growth Study are acted upon, delivering the outcomes that meet the needs of the maritime sector and enabling it to be competitive in a global market.

19. We will assess the value of developing an aviation skills strategy to address their future skills challenges and opportunities.

"When we're investing £70 billion in transport in this Parliament alone, we need a new generation of engineers, designers and construction professionals, as well as highly skilled people to operate the networks once they're opened".

Patrick McLoughlin, Secretary of State for Transport, August 2015



1. The challenge

Government has set an ambition to create 30,000 new rail and road apprenticeships by 2020.

Employers are working with suppliers to create a home grown workforce, equipped with the skills it needs for the long term. One that reflects the diversity of Britain's population today and attracts the brightest and best people into long-term careers in transport.

The government has less direct influence in the mostly privately owned aviation and maritime industries, but we can work in partnership to ensure they have a highly skilled workforce they need to maintain their place as a global player.

To do this we need to change how a career in transport – be it road, rail, aviation or maritime – and apprenticeships in particular are perceived. It is a huge, but exciting challenge – and one which promises a high level of reward.

While we recognise that the commitment to 30,000 apprenticeships is both a huge ambition and a real opportunity, we are also aware that there are wider skills shortages, with a shortfall of more than 55,000 in transport infrastructure by 2020. A proactive approach to changing perceptions, broadening the diversity of our workforce and upskilling existing workers to face the new technological challenges is needed.

Expanding pipeline of transport investment

Roads and rail

1.1 Across government, there is an anticipated infrastructure investment of £411 billion in 564 projects and programmes from 2015/16 onwards.¹

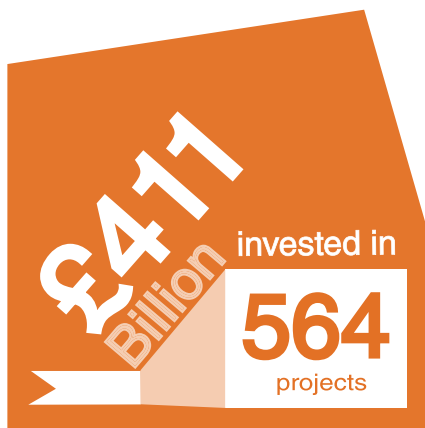


Figure 1.A Anticipated infrastructure investment

DfT, our arm's length bodies (such as Network Rail, High Speed 2 and Highways England) and our client organisations (including Crossrail and Transport for London) are responsible for the delivery of some 30% of this infrastructure investment. This will result in £61 billion of capital investment in transport infrastructure within this parliament.

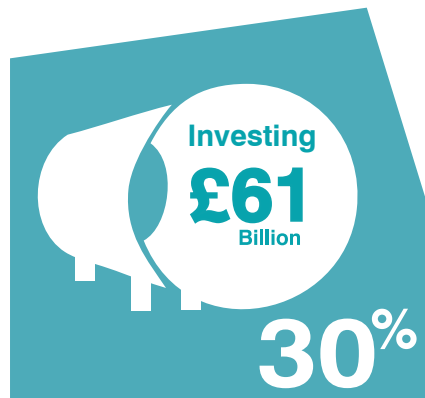


Figure 1.B Capital investment in transport infrastructure

1.2 DfT and these organisations above currently employ more than 300,000 people directly or indirectly. The road and rail infrastructure projects and programmes within the transport sector have a current labour demand of 160,000 in construction alone – people with a blend of skills from construction and engineering.

These roles have been divided into 4 core areas:

- **client and project leadership**
incorporating client leadership and head office roles such as procurement and project and commercial management roles from the supply chain
- **engineering and technical**
incorporating civil and structural, mechanical and electrical designers, architects and engineers, including specialist competencies such as Building Information Modelling
- **construction management**
incorporating site supervisors, foremen, site engineering staff and construction managers
- **skilled trade and labour**
incorporating the site work force including core skills such as electricians, welders, carpenters, scaffolders, steel fixers, fitters, tunnellers, plant operatives and labourers (see **Table 1.A**).²

1.3 In addition, around 115,000 people are employed in rail operations and maintenance, 58,000 in passenger and freight operations and the remaining 57,000 in infrastructure operations.³ There are also an estimated 40,000 working in roads maintenance and operations.



¹ www.gov.uk/government/publications/national-infrastructure-pipeline-july-2015
² www.gov.uk/government/publications/national-infrastructure-plan-for-skills
³ National Skills Academy for Rail, 2015

	Client & project leadership	Engineering & technical	Construction management	Skilled trade & labour	Totals
High Speed Rail	900	1,000	250	0	2,150
Conventional Rail	5,700	21,000	27,300	40,700	94,700
Transport for London	1,000	3,100	3,300	9,200	16,600
Road	2,700	14,000	8,700	21,600	47,000
Totals	10,300	39,100	39,550	71,500	160,450

Table 1.A Current size of sector: transport construction

Maritime

1.4 Maritime is a global industry covering shipping, ports, business services and marine technology, and is predicted to grow strongly over the next 15 years. Within this, the UK maritime sector plays a leading role, bringing significant benefits to the UK economy and contributing at least £11 billion Gross Value Added. It consists of 6,600 businesses and more than 113,000 jobs (split into shipping 17,000, ports 27,000, business services 10,000, marine 44,000, and marine leisure 15,000).

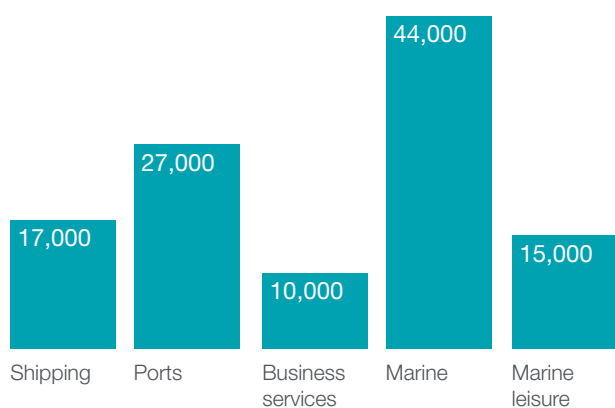


Figure 1.C UK maritime sector

1.5 There are many skills and roles in the industry such as master mariners, officers and ratings at sea. Many of these have engineering, electrotechnical and other specialist skills. These skills are also in demand from the ports, business services and marine industries with roles in many areas such as harbour masters and surveyors. Other on shore roles include stevedores and other operatives; harbour masters; engineers and mechanics; lawyers; ship managers and brokers; and financiers and arbitrators.

1.6 The Maritime Growth Study report⁴ set out a vision for the UK to be the world's foremost maritime centre with recommendations directed at government and industry. The report concluded that there is a strong skills base in the UK and high-level training offered to those wishing to join the sector. While some parts of the sector do not report difficulties with recruitment and retention of staff, others report a growing shortage of skilled individuals particularly in areas such as engineering. This is attributed to an ageing workforce, a lack of diversity, UK personnel being drawn to more lucrative jobs elsewhere and a lack of interest from young people considering career options.

⁴ By industry chair Lord Mountevans, published in September 2015

1.7 Several recommendations, directed at both government and industry, sought to attract more people to work in the sector and to continue to deliver the highly skilled workforce the UK needs to underpin its maritime industry. These recommendations included forecasting to identify and prioritise core skills issues; extending apprenticeship programmes; exploring the scope for introducing maritime examples into school teaching and creating better links to encourage ex-Navy personnel to seek careers in the maritime sector.

Aviation

1.8 The aviation industry and air transport sector, with a turnover of around £32 billion, directly generates around £11 billion of economic output provides about 120,000 jobs in the UK and supporting many more indirectly.⁵ The sector includes airports, airlines, air freight, supporting services and many aviation companies who offer services across the world.

1.9 The industry requires a broad range of skills and roles in a variety of areas including construction, maintenance, operations and services. Many of these roles, such as air traffic control, are highly skilled and lead to international careers. Training can also be a significant commercial activity in its own right, for example pilot training attracts significant international income.

1.10 Forecasts suggest that growth in the sector will continue regardless of decisions taken on airport capacity in the south-east. This means there will be more opportunities for careers in aviation. For example, both Heathrow and Gatwick have included options to increase the number of apprenticeships.

1.11 There are a variety of different apprenticeship and training programmes offered by the aviation industry encompassing soft skills such as leadership as well as the highly technical. Given the global nature of the industry, much of the training undertaken by actual and prospective employees is self-funded and international. As much of the major aviation infrastructure is privately owned, and all is privately run, the Government has less scope to intervene than in other transport modes such as road and rail.

1.12 Major airports and airlines provide a variety of work based training, upskilling and apprenticeships. For example Manchester Airport Group (MAG), Heathrow, and Edinburgh all provide onsite training in specialised airport security, fire and rescue services as well as customer service, while British Airways has developed a flagship Future Pilots Programme.

Lagging productivity

1.13 Productivity is the single most important determinant of average living standards and is an essential component of growth. UK productivity has persistently lagged behind other leading advanced nations, and if the UK matched the productivity of the US, it would raise GDP by 31%.⁶



⁵ ONS data for 2013 for the air transport sector

⁶ <https://www.gov.uk/government/publications/fixing-the-foundations-creating-a-more-prosperous-nation>

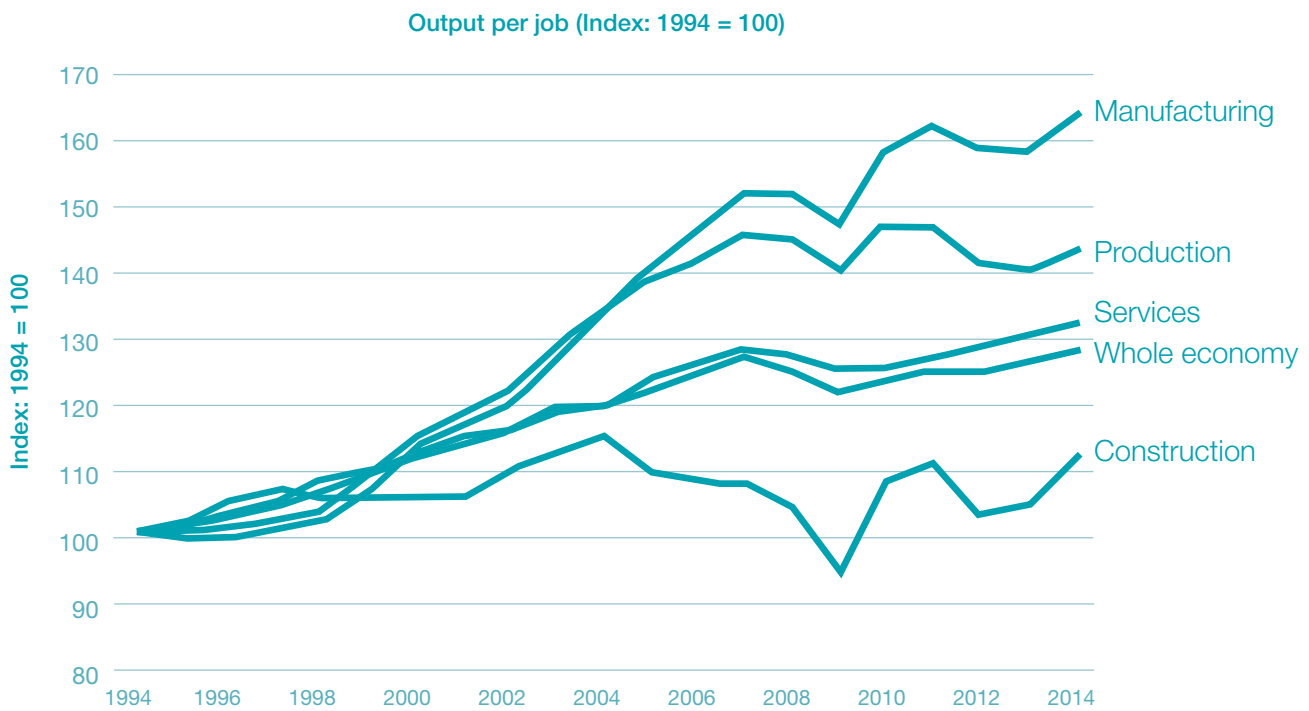


Figure 1.D Productivity by increase in output relative to employment, by output by jobs⁷

1.14 Infrastructure projects and programmes already account for about 10% of the total UK construction workforce and more than 50% of the engineering construction workforce. Infrastructure output is forecast to grow to account for between 12 and 14% of annual construction output by the end of the decade.

1.15 The Government has set a commitment to 3 million apprenticeship starts by 2020. Long term investment in skills is a core component of productivity growth, with apprenticeships delivering a high return on investment, particularly at the higher levels (see **Chapter 2** for more information about apprenticeship levels).

1.16 Within the railway industry, the shortage of critical resources such as linesmen, signalling designers, test and commission engineers will result in wage inflation, over the next 5 years, of between 25 and 40%.

Skills shortages and skills gaps

Road and rail

1.17 The future pipeline of road and rail projects and programmes present challenges, with both increasing levels of investment and a changing profile of skills required. The industry faces both skills shortages and skills gaps. Skills shortages are recruitment difficulties caused specifically by a shortage of individuals with the required skills in the labour market. Skills gaps are deficiencies in the skills of an employer's existing workforce, both at the individual level and overall, which prevent the firm from achieving its business objectives.

⁷ LPROD01 of the ONS labour Productivity stats at <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcn%3A77-393182>

Case study

Rail Supply Group (RSG) – Fast Track to the Future

The Rail Supply Group was set up by the Department for Transport and the Department for Business, Innovation and Skills to strengthen the capability of the UK rail supply chain.

The RSG's strategy Fast Track to the Future sets out an ambitious plan to increase productivity and growth in the rail sector to enable UK-based rail suppliers to win more work here and abroad.

The RSG strategy will support the delivery of the Transport Infrastructure Skills Strategy through its strong focus on investing in people and skills including plans to improve the attractiveness of the rail sector, upskill the existing workforce and deliver 20,000 new rail apprentices by 2020. Working with the National Skills Academy for Rail, RSG will produce a rail skills plan to reduce skills shortages and support the implementation of new technologies.



1.18 The skills gaps most frequently cited by employers of the operational workforce are; safety management (19%); management and leadership (19%); and team working (18%).⁸

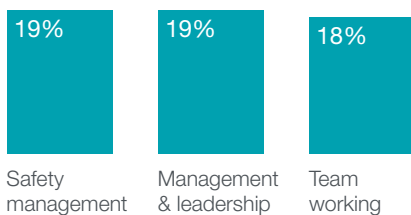


Figure 1.E Skills gap

New technology developments also create skills gaps, as existing staff are unlikely to have all the skills needed.

1.19 Away from transport construction, further skills shortages have been identified. The National Skills Academy for Rail (NSAR) forecasts core skills shortages in signalling and telecommunications, electrification and plant, traction and rolling stock of 10,000 people between 2014 and 2019.⁹

⁸ <http://www.people1st.co.uk/getattachment/Research-policy/Research-reports/State-of-the-Nation-Passenger-Transport-Travel/Rail-SOTN2012.pdf.aspx>

⁹ Cost of Not Addressing Skills Issues in the Rail Sector Report - NSAR, RSSB, Atkins

	Client & project leadership	Engineering & technical	Construction management	Skilled trade & labour	Totals
High Speed Rail (Peak 2020)	2,000	8,200	3,900	15,900	30,000
SHORTAGE	1,100	7,200	3,650	15,900	27,850
Conventional Rail (Peak 2015)	6,000	21,900	27,300	66,700	121,900
SHORTAGE	300	900	0	0	1,200
Transport for London (Peak 2020)	1,500	4,900	4,800	14,000	25,200
SHORTAGE	500	1,800	1,500	4,800	8,600
Road (Peak 2020)	3,500	18,500	11,500	28,600	62,100
SHORTAGE	800	4,500	2,800	7,000	15,100
Totals at peak	13,000	53,500	47,500	125,200	239,200
SHORTAGE	2,700	14,400	7,950	27,700	56,750

Table 1.B Transport construction peak demand and gaps

1.20 Table 1.B¹⁰ outlines the transport construction peak demands in these areas for the road and rail modes, and identifies the skills shortages where current supply does not meet anticipated demand in the labour market. The largest shortages are in engineering and technical, and skilled trade and labour.

Maritime

1.21 With growth in maritime predicted, demand for seafarers will continue to lead to a possible global shortfall of around 80,000 seafarers by 2020.¹¹ For the UK, a Deloitte/Oxford Economics report in 2011¹² forecast a potential shortfall of around 3,500 trained deck and engineer officers by 2021. Similarly, a Matchtech and Imarest report in 2014 revealed the UK's global subsea market needs an extra 10,000 skilled workers to join the sector.

1.22 In addition, onshore companies needs for seafaring skills will place further demand on the pool of experienced seafarers.

Ports

1.23 The ports sector has many broad parallels with the skills profile of other transport infrastructure and operations environments, as well as technical and heavy industrial sectors. Similarly it has also therefore experienced difficulties in recruiting the technical staff such as mechanical and electrical engineers.

¹⁰ LPROD01 of the ONS labour Productivity stats at <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-393182>

¹¹ Oxera Consulting LLP (2015)

¹² Independent Review of Economic Requirement for Trained Seafarers in the UK, Deloitte and Oxford Economics 2011

- 1.24** Ports have raised longer term concerns about the ability to find the skilled workforce they need to continue the successful growth and development of the ports sector and have therefore launched a number of initiatives aimed at raising the profile of the sector as a career option, to attract new younger recruits to the industry.
- 1.25** The ports industry is actively investing in its skills base and further industry wide development of this should be considered as part of the maritime skills strategy arising from the Maritime Growth Study.
- 1.26** However, as well as their own operations, ports have a connected interest in the wider transport infrastructure skills base. Ports are important UK infrastructure investors and while ports will often look to specialist marine engineering companies to undertake specific projects, other large infrastructure developments are likely to require the services of the major civil engineering and building companies utilised by other transport infrastructure sectors.
- 1.27** Additionally, an important issue for ports is inland access and connectivity with their hinterlands. As such road and rail enhancements are important to handle the increasing volumes of freight arriving at our ports. A shortage of skills in these infrastructure and civil engineering sectors, and any impact on project timescales, can indirectly impact on port development and growth.

Ageing workforce

- 1.28** The issues of skills shortages and skills gaps are exacerbated by other issues such as the ageing workforce and low rates of staff turnover. For example, staff turnover rate in the rail sector as a whole is 3%,¹³ well below the UK median rate of 13.6%.¹⁴ According to NSAR data, less than one-fifth of employees are under 30, and nearly half are over 45, compared to the economy as a whole with 24% and 42%, respectively.¹⁵ There is a similar story of an ageing workforce elsewhere in the transport sector.



Figure 1.F Age profile in the rail sector

- 1.29** While the ageing workforce presents significant challenges, there are also issues at the younger end of the age spectrum. The number of 14 year olds is set to fluctuate significantly, falling by 7.3% between 2012 and 2017 before jumping by 15.9% five years later. The number of 18 year olds will also decrease by 8.9% between 2012 and 2022.¹⁶

¹³ <http://www.people1st.co.uk/getattachment/Research-policy/Research-reports/State-of-the-Nation-Passenger-Transport-Travel/SOTN-PT-Summary-Rail.pdf.aspx>

¹⁴ http://www.cjpd.co.uk/binaries/resourcing-talent-planning_2015.pdf

¹⁵ Cost of Not Addressing Skills Issues in the Rail Sector Report - NSAR, RSSB, Atkins

¹⁶ http://www.engineeringuk.com/_resources/documents/EngUK_Report_2015_Interactive.pdf

Lack of diversity

1.30 Transport is not as diverse as it could or should be.¹⁷ A particular challenge facing the transport sector is increasing the female proportion of the workforce. Women represent just 20% of the rail industry as a whole and just 4.4% of railway engineering. These figures reflect the wider issue in engineering, with only 6% of the current engineering workforce made up of women.¹⁸ Maritime suffers a similar imbalance. The CoS Manpower Survey showed that just 9% of UK officers and 25% of UK ratings were women.

1.31 In aviation, the 2014 Civil Aviation Authority airline personnel costs demonstrate the gender imbalance within the sector. Just 4.7% of pilots and 5.7% of maintenance and overhaul personnel are female, but 72.6% of cabin attendants are women.

To address skills shortages, to make best use of the talent available in the country, and to deliver transport services which reflect the needs of the whole community we must achieve a real change in how we create and value an inclusive culture¹⁹ as well as how we talk about our sector to those outside it.

1.32 We therefore welcome the recent Chartered Institution of Highways & Transportation (CIHT) Routes to Diversity & Inclusion toolkit. This provides practical help and support to increase the diversity of those being recruited. Actions identified by the toolkit that make a difference include:

- reviewing the images and language used in marketing campaigns
- engaging with community organisations
- reviewing recruitment practices: Recruit for aptitude and attitude
- training your recruiters to remove bias
- diversifying recruitment panels
- insisting on a diverse shortlist
- challenging your recruitment partners
- signing up to diversity kitemarks
- promoting your commitment
- explaining opportunities for flexible working and a good work-life balance
- using role models.

¹⁷ Diversity is defined here as all the 'inherent' differences between people (eg gender, race, age, faith, socio-economic background, sexual orientation, disability and nationality) as well as the differences that people acquire in their working lives (eg inter-generational working, social mobility, cross-cultural experience, technical expertise, and language skills). CIHT, 2015, Routes to a Diverse Workforce

¹⁸ http://www.theengineer.co.uk/Journals/2013/12/06/v/x/t/EngineeringUK_Report_2014.pdf

¹⁹ The term inclusion is used to describe activities which ensure people feel genuinely included, valued and comfortable being themselves at work and proud of their inherent or acquired. CIHT, 2015, Routes to a Diverse Workforce

1.33 The toolkit also highlights the relatively poor data that employers have on disability within the workforce. We believe that improving the quality of such data is an important early step in identifying how best to recruit disabled talent and accommodate disabled workers. In addition, *Access to Work* (www.gov.uk/access-to-work) is a government scheme designed to support those who have a disability, health, or mental health condition by providing grants to help them to start and stay in work, or to set up a business. The grant can be used in a variety of ways, such as funding specialist equipment, transport to work, job coaching and disability awareness training for colleagues.

1.34 As the Women's Business Council research²⁰ shows, there are quantitative benefits to a more diverse and inclusive workforce:

"While women need work, work also needs women. By equalising the labour force participation rates of men and women, the UK could further increase GDP per capita growth by 0.5 percentage points per year, with potential gains of 10% of GDP by 2030. There are over 2.4 million women who are not in work but want to work, and over 1.3 million women who want to increase the number of hours they work. We need to unblock this mismatch and optimise the potential for the UK's economic growth".



Case study

EasyJet's female pilots initiative

In 2016, easyJet will launch a new initiative aimed at doubling the proportion of new entrants who are female over a 2 year period. This is the first phase of a long term strategy to increase the proportion of female pilots at all ranks and positions. Currently women make up 6% of easyJet's new pilot intake, as is common across the industry. The airline plans to double this to 12% over 2 years. As part of the new programme easyJet will:

- offer 10 places for women each year on a pilot training programme with the training loan underwritten by easyJet
- work with its pilot training providers to attract more women to apply for the cadet programme.



²⁰ <http://womensbusinesscouncil.dcms.gov.uk/executive-summary/>

1.35 The ‘Engineering Action: Tackling Homophobia in Engineering’ report published in December²¹ highlights that further action is required within the engineering industry to tackle homophobia and its effect on productivity. It is suggested that a potential contribution to GDP of £11.2 billion a year is currently lost due to bullying and pressures on lesbian, gay, bisexual and transgender (LGBT) engineers in the workplace.

1.36 The co-author of the report, a mechanical engineer by profession said:

“The basis of this report is to recommend that homophobic attitudes can be transformed through proactive, educational teamwork and leadership. Companies that have adopted such an approach have seen up to a 30% increase in productivity from openly LGBT

employees as a result of a happier and more cohesive workplace. This report not only highlights the prevalence of homophobia in the engineering industry, but also lays out a proactive approach for the sector to tackle this issue head-on”.

1.37 The need for a more inclusive industry to attract and retain talent and better reflect the community is clear. The transport sector needs to improve its diversity, in particular to encourage more women and people from black and minority ethnic groups to work in transport. To this end, at least 20% of new transport engineers need to be women and the sector will support the government’s target of a 20% increase in the number of BAME candidates undertaking apprenticeships by 2020, where there is under-representation.





Recommendations

We will increase the diversity of the transport workforce with a strong focus on encouraging more women and BAME people to work in transport.

We will:

- set an ambition for at least 20% of new entrants to engineering and technical apprenticeships in the sector to be women by 2020 and to achieve parity with the working population at the latest by 2030. We will deliver sustainable year on year growth in the number of women entering these apprenticeships, using the 2018's year to celebrate engineering as an accelerator and the 100 Years of Women in Transport legacy programme to support this. In the longer term we will see this ambition realised by our school interventions starting in primary school, as well as cooperation with other government departments including DfE, relevant professional institutions and skills bodies.
- support the government's target of a 20% increase on the number of BAME candidates undertaking apprenticeships by 2020, where there is under-representation. Ensuring that we meet or exceed this target to meet our goal of better representing the communities we serve.
- recommend that all organisations of over 250 employees implement a 'returnships' programme by 2020 to provide opportunities to those who have been away from the world of work and wish to return.
- require suppliers to use the 'Routes to Diversity & Inclusion' toolkit developed by the Chartered Institution of Highways & Transportation (CIHT) and the Royal Academy of Engineering, or other recognised industry diversity approach (see **Chapter 2**).
- recommend that transport organisations sign up to the 100 Years of Women in Transport Charter in 2016 (see **Chapter 8**).

Scope of the strategy

1.38 This strategy focuses primarily on the areas where DfT has most leverage to bring about change. These are the strategic road network and rail network in England, as they fall under the remit of the Department or its arm's length and client organisations.

1.39 The strategy also considers other areas where the Department has less direct control, namely local authority transport obligations, maritime, aviation, and the devolved administrations, but where we can use our influence to meet the challenges set out in this chapter.

²¹ Engineering Action: Tackling homophobia in engineering, Shelbrooke et al. December 2015

2. Entry points

"We want to build an economy where you don't go either one way with apprentices or the other way with university. The apprenticeship system needs to be flexible enough – so that many people can go on and do a degree while they are working in one of your businesses. That's what we ought to build... If we're going to compete in a global economy, then we need to make sure our young people are more highly skilled, more highly trained than our competitors: either apprenticeships or university for almost everyone."

The Prime Minister, October 2015

To meet the skills challenge, we will treble the number of transport apprenticeships by 2020. This means that in roads and rail, a third of new recruits will be apprentices, and over half will be at level 3 and above.

These apprenticeships will help to improve productivity and tackle the more complex technological challenges the sector faces. Our apprenticeships will include mid-career changers and returners to work as apprenticeships become the norm for the 21st century.

Historically, transport has lost out to other sectors in the competition to attract high calibre engineering graduates to the sector. This needs to change and we will work towards 2018 as an opportunity to showcase the exciting and well paid careers on offer to help to design, deliver, operate and maintain complex transport systems.

Ambition

2.1 In June 2015, the Government laid out its commitment to 3 million apprenticeship starts by 2020 to boost productivity and provide workers with the vital skills that they need. In the light of this commitment, the road and rail sector has set an ambition to create 30,000 new apprenticeships by 2020. However, our ambition is not just about quantity. As outlined by Ofsted in October 2015,²² there must be a return to quality. Therefore, the aim is to double the number of people taking 'higher' (level 4 and above) apprenticeships every 5 years.

Apprenticeships

2.2 Apprenticeships combine work, skills training and study toward a qualification. Employers and Further Education establishments take responsibility for delivering the training

element. Apprenticeships typically last between 1 and 4 years.

Traineeships were introduced in August 2013, for young people lacking the basic skills and experience sought by employers. They offer high quality work preparation training, together with English and maths, and work experience.

- almost 30,000 young people have already benefited from the traineeshipscheme
- 2/3 of year-one trainees have reached a positive destination since training
- 94% of employers consider traineeships an effective preparation for work.

2.3 Studies suggest that apprenticeships contribute as much as £34 billion to the UK economy.²³ Good quality apprenticeships are vital to job generation, productivity and wage growth.

Apprenticeship type	National Qual level	National Qual equivalent	Higher education equivalent
	Entry	Entry level certificate	
	1	GCSE [grade D to G]	
Intermediate	2	GCSE [A* to C]	
Advanced	3	AS and A level NVQ level 3	
Higher	4	Certificate of Higher Education NVQ level 4	Certificate of Higher Education Higher National Certificate
	5	Higher National Diploma NVQ level 4	Higher National Diploma Foundation Degree
	6	NVQ level 4	Bachelor's Degree
	7	Postgraduate Diploma NVQ level 5	Master's Degree
	8	NVQ level 5	PhD.

Table 2.A Apprenticeship equivalences²⁴

²² <https://www.gov.uk/government/publications/apprenticeships-developing-skills-for-future-prosperity>

²³ <http://www.cebr.com/reports/economic-impact-of-apprenticeships/>

²⁴ <http://www.suttontrust.com/wp-content/uploads/2015/10/Levels-of-Success3.pdf>



Higher apprentices could earn £150,000 more, on average, over their lifetime compared to those with level 3 vocational (technical professional) qualifications.²⁵

Levels

2.4 Table 2.A (page 25) shows the breakdown of each apprenticeship level and the further and higher education (HE) equivalent.

Future demand in the transport sector

2.5 To meet our ambition of 30,000 apprenticeship starts by 2020, one in three of all new entrants between 2015 and 2020 will need to be an apprentice. In addition, future strategic challenges and opportunities such as technological advances will mean that the industry demands higher level skills in construction, engineering and operations.

2.6 Therefore, both the number and level of apprenticeship starts will need to change. For example, if the HS2 forecasts of apprenticeships levels were applied to the

sector as a whole, by 2035 the number of apprenticeships at levels 4 and 5 would need to double and there would be a 20 percentage point decrease in those needed at levels 1 and 2.

2.7 Table 2.B shows the forecast breakdown of apprenticeship levels required by 2020 in order to meet demand and the 30,000 ambition.

2.8 As the table shows below, 73% of apprenticeships will need to be at level 3 and above. NSAR analysis suggests that around 6,000 (20%) of the 30,000 could be taken from the existing workforce to be reskilled at level 3 or 4. The remainder would be new entrants.

2.9 Apprenticeships can begin at any age or at any point in a career. However, entry points are typically at age 19 and under, and those currently mid-career looking to reskill or transfer to other sectors.

2.10 The transport sector needs to attract talent from all areas of the country providing opportunity and access to all abilities and potential, through multiple levels of apprenticeships from GCSE equivalents to Masters Degree level.

Apprenticeship Level	Number of new apprenticeships	% of total apprenticeship starts
Levels 1 and 2	8,106	27
Level 3	12,609	42
Levels 4 and 5	7,205	24
Level 6 and above	2,102	7
Total	30,022	100

Table 2.B Breakdown of new apprenticeships required to 2020, by level²⁶

²⁵ <http://www.gre.ac.uk/?a=847246>

²⁶ NSAR analysis on behalf of HS2 Ltd

^{27 & 28} Boston Consulting Group for Sutton Trust Oct 2013

Behaviours and culture

2.11 Although increasingly employers are looking favourably at hiring apprentices, apprenticeships are far less common in the UK than in other countries. By way of comparison, Germany has 40 apprentices for every 1,000 people at level 3; Switzerland has 43; Australia 39; the UK has just 6. As of 2013 figures, only 20% of UK employers wish to hire an apprentice, compared with 51% in Germany.²⁷

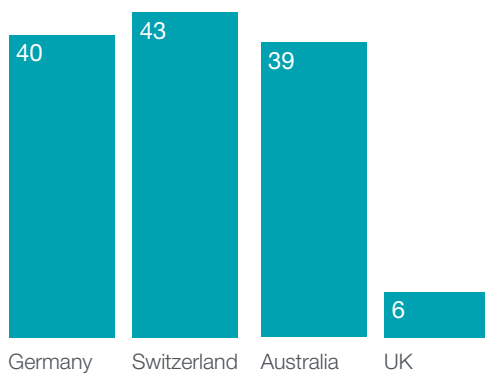


Figure 2.A Apprentices for every 1,000 people at level 3

2.12 Some of the reasons cited by employers for not hiring apprentices include the lack of demand; too expensive; prefer fully qualified staff; and too disruptive to business. This mind-set appears to be shifting within the transport industry as the demand for specialist technical skills increases.²⁸

2.13 **Figure 2.B** (page 28) highlights the reasons employers have given for not hiring apprentices. Overwhelmingly, perceived structural barriers such as wrong size firm and not recruiting at this time were the most popular reasons given. However, one third of all factors were attributed to employers actively not choosing to hire apprentices.





Figure 2.B Employer barriers to hiring apprentices ²⁹

2.14 Presenting and promoting apprenticeship training on par with academic routes could begin the real change needed to alter mind-sets. Professionalising apprenticeship qualifications, improving teaching quality and growing centres of excellence could all help to achieve this behavioural change.

Higher apprenticeships

2.15 Higher and degree apprenticeships are widening access to the professions, providing the higher level technical skills employers need to improve productivity and offering young people an equivalent alternative to going to university. Indeed,

recent research suggests that completing a level 5 apprenticeship results in greater lifetime earnings than a degree from a non-Russell Group university.³⁰

2.16 In Germany, where apprenticeships have a highly credible reputation with parents, students and industry, 90% of its apprentices are in 3 to 4 year programmes at level 3 or above.³¹ This is shown to have the most fruitful returns on investment in the long term.³²

2.17 The demand for higher apprenticeships is increasing in the UK. The rail sector, in particular, will be seeking more innovative technical skills, to enable the move to digital rail and deliver High Speed 2.

²⁹ National Apprenticeship Service

³⁰ Levels of Success, The Sutton Trust, October 2015

³¹ <http://www.suttontrust.com/wp-content/uploads/2013/10/APPRENTICESHIPS.pdf>

³² Levels of Success, The Sutton Trust, October 2015

- 2.18 There are currently a number of higher apprenticeships and degree apprenticeships available. This relatively new model will combine the best of further and higher education giving apprentices the opportunity to attain Bachelors and Masters degree qualifications.

- 2.19 To make the transition from where the workforce is today to where it needs to be, the sector needs to use apprenticeship programmes at all levels, but particularly at levels 4 and 5 for the existing workforce.

- 2.20 In the past 10 years, the number of those aged 35 and over completing an apprenticeship has steadily grown to 22%. The sector needs to create new career pathways from front line technical roles into professional engineering roles if it is to respond to the technological challenges of the 21st century.

- 2.21 Through developing new higher level and graduate apprenticeships, the existing workforce will be able to develop and progress into new engineering occupations, opening up space at the entrance level 2 and 3 for new entrant apprentices. There is also an opportunity to promote the use of apprenticeships for existing staff looking to make a mid-career move.

Degree Apprenticeships

- 2.22 Degree Apprenticeships were launched in March 2015 to provide employers with a route to get the high level skills they need and provide employees with a route to a degree.

- 2.23 There is strong demand for Science Technology Engineering and Maths (STEM) degree apprenticeships. Many of the new degree apprenticeships are in STEM occupations, such as aerospace engineer, nuclear engineer and scientist, and manufacturing engineer. There are currently 25 Degree Apprenticeship standards either ready for delivery or in development.

- 2.24 There are 2 undergraduate programmes focussing on rail, both at Birmingham University – Civil and Railway Engineering B Eng and Electrical and Railway Engineering B Eng. In addition there is a Foundation Degree course at Sheffield University and an Institution of Railway Operators' sponsored Railway Operations BSc course at Glasgow University. In total, 50 universities are involved in Rail Research UK Association, a partnership between the rail sector and UK universities.

- 2.25 Although this represents a step in the right direction, more work is needed to maximise the opportunities for employers, through levy funding, and to attract more young people into transport careers.

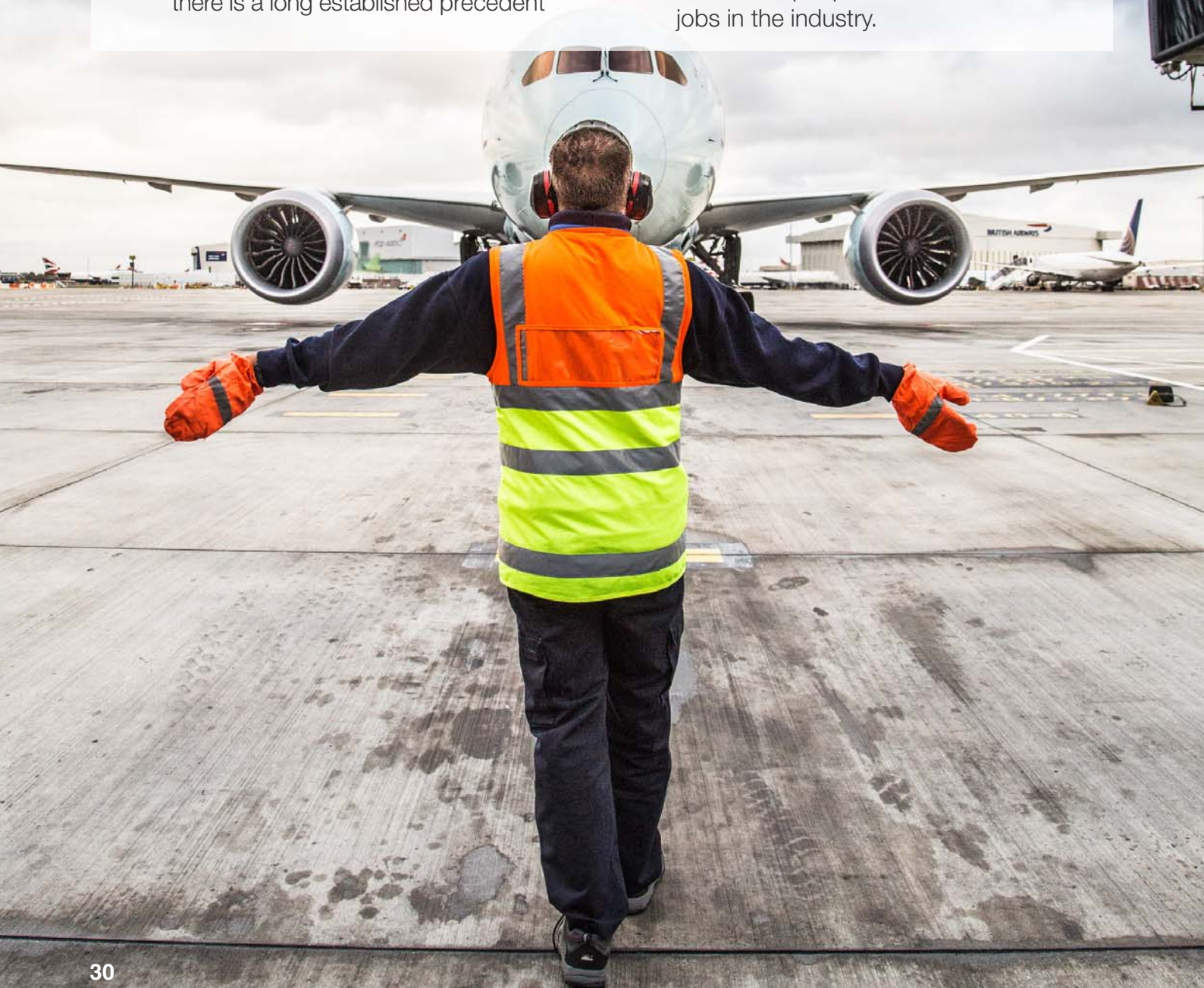


Aviation and apprenticeship challenges

2.26 The aviation sector needs to consider how it could take on more apprenticeships and support jobs and skills development. In particular it needs to consider how the wider aviation sector can take advantage of the apprenticeships offered for aerospace and how to support small businesses taking on apprentices.

2.27 The main barrier to airlines being able to bring pilots into the scope of the trailblazer standards is that there is a long established precedent

for government funding not to be made available for the acquisition of licences. This is based on delivering value for money in the use of public funds and ensuring employers meet their responsibilities for statutory requirements. For the aviation sector in particular, developing the specialised technical skills necessary to undertake a career can be very expensive. In some areas such as aviation maintenance, small employers report a reluctance to invest in training staff when bigger employers can then lure them away with larger salaries. The costs of training to be a pilot are significant and limit both the number and mix of people that can access jobs in the industry.



Graduates

2.28 The transport sector offers interesting and well paid careers for people from a wide range of disciplines. However, challenges remain in attracting high calibre engineering graduates as competition for engineering graduates is fierce. Other sectors have historically been more successful than transport at appealing to recent graduates. Consequently, one of the aims of designating 2018 as a year to celebrate engineering (see **Chapter 8**) is to ensure that graduates are made aware of the variety of engineering roles available in the transport sector.

2.29 To effectively tackle the transport skills challenges, the sector needs to develop a multi-channel approach using both higher apprenticeships and traditional graduate programmes. Transport needs to attract a wide range of graduates for both technical and general management streams, to fill the gaps in engineering, operations, construction and central functions such as commercial and finance.

2.30 More co-operation and co-ordination is needed between large employers within the sector who attract large numbers of applicants for both apprenticeship and graduate vacancies and smaller suppliers who struggle to attract sufficient numbers of suitable candidates. This will help to keep those applicants with the skills and motivation for transport within the sector. The Energy sector has such a mechanism, the 'Talent Source Network', and the automotive sector has recently launched an Invitation to Tender to develop a similar approach.

2.31 A number of UK universities now offer aviation based degree courses which include pilot training. Although trainee pilots will still have to meet the costs of flying lessons an advantage of an integrated degree is that individuals may be eligible to access student finance, which is usually denied to pilots undergoing training. However it is worth noting that these programmes are too new to have produced graduates as yet.

2.32 Middlesex University offers a BSc (Hons) Professional Aviation Pilot Practice, which is delivered through a partnership between CTC Aviation Group, Tayside Aviation, Helicentre, and the Institute for Work Based Learning at Middlesex University. The course will give students the opportunity to gain a qualification based on technical and practical flying training and early career practice. The partnership also works with wider industry support from the Aviation Skills Partnership. The programme has been designed specifically to incorporate all of the Civil Aviation Authority (CAA) regulated training leading to the award of a frozen air transport pilots licence (ATPL (F)).

2.33 A further benefit of rolling out this approach in road and rail could be to support those who have applied but are not work ready to be redirected to employability programmes run by organisations within the sector such as the London Highways Academy of Excellence and Transport for London's Route into Work programme.



Case study

Work Experience for Graduates 'Track and Train'

Track and Train was a good example of a pan rail paid work placement scheme led by Network Rail. The scheme was launched in 2012 and ran with 2 cohorts. The scheme, which received more than 2,500 applications, provided an all-round industry experience over 18 months, where graduates benefited from three 6 month placements – one at Network Rail and two at either a passenger or freight operator or another company within the rail sector. This provided the graduates with the all-important cross-industry experience to understand all aspects of the railway.

The scheme was targeted at graduates who were either unemployed or more likely under employed in a non-graduate level role. Track and Train gave them an opportunity to gain valuable practical experience to then take the next step in their careers with the transport sector.

In both schemes over 90% of participants secured permanent jobs – 80% of which were within the rail industry. 30% of the new recruits were female, which was really encouraging to see the industry attract talent from a wider pool of graduates than traditionally seen.

The opportunity exists to revitalise a pan sector scheme such as Track and Train to provide the all-important work experience needed to secure a footing in building a career in transport.



2.34 In addition, all apprenticeship vacancies should be advertised on the 'Find an Apprenticeship' site.³³ The site feeds other sites and allows candidates to be able to search by location, apprenticeship and sector type.

Mid-career transitions

2.35 The growth and investment in the transport sector means it can provide exciting and fulfilling careers to people looking for new challenges and wanting to switch careers as well as those starting out in their first role in industry.

³³ www.gov.uk/apply-apprenticeships

2.36 Not everyone makes the right career choices first time. Recent research by the London School of Business and Finance, revealed that nearly half (47%) of the UK workforce would like to change their current career and a study of over 1,000 professionals found that around a quarter (23%) regretted choosing their current occupation.³⁴

2.37 These findings help to explain the trend away from having just one career with a single organisation, with the CIPD reporting that the UK has among the lowest job tenure figures.³⁵ It also provides transport with an opportunity to attract a wide range of people from all walks of life into the sector as a second career.

2.38 For the existing transport workforce, there will be opportunities to learn new skills as the sector introduces new technology and continues to invest in new projects and programmes. As some roles become redundant, there is often

a great opportunity for experienced workers to use their wealth of knowledge of systems or processes in new roles, following retraining.

Women returners

2.39 The transport sector has a poor record of employing women in engineering and other technical roles, with just 4.4% of railway engineering roles currently being filled by women.³⁶ This is in stark contrast to other highly technical sectors such as medicine, where half (50.6%) of all UK registered GPs are female.

2.40 A significant opportunity exists to capture more talented engineers by focused effort on 'women returners'. This does, however, require a rethink in attitudes with recruiters and line managers as well as reviewing the quality of working environments to meet the demands of a diverse workforce.



Case study

From signaller to train driver

Network Rail is moving from around 800 signal boxes (which deploy a range of technologies from Victorian mechanical levers to modern day computer-based interlocking) to ten Rail Operational Centres. This change will improve capacity and performance standards, while at the same time cutting the day-to-day cost of running the railway.

It will also mean reducing the signaller workforce from approximately 6,000 to around 1,500. Network Rail is working with the trades unions to support those signallers who are displaced and provide opportunities for retraining those who would like to stay within the transport sector in other roles. This could include training as an apprentice to become a track maintenance technician or even training externally to become a train driver and utilise existing route knowledge.

³⁴ <http://www.lsbfi.org.uk/media/2760986/final-lsbf-career-change-report.pdf>

³⁵ http://www.cipd.co.uk/binaries/megatrends_2013-job-turnover-slowed-down.pdf

³⁶ Forecasting the Skills Challenge, NSAR 2013

2.41 Returnships are paid work placements pioneered by Goldman Sachs in 2008³⁷ to provide opportunities to those who have been away from the world of work and who wish to return. These structured placements can then lead to further fixed term or permanent opportunities.

Graduate skills mismatch

2.42 There is also an opportunity to help fix the recently identified problem of over-qualification and skills mismatch in the graduate labour market. The UK has the second highest graduation rate

Case study

Thames Tideway Tunnel

In April 2015, Tideway became the first company outside the financial sector to launch a 'returnships' programme, aimed at helping professionals back into work after a career break. The programme, organised in partnership with Women Returners, offered 12 week paid opportunities in areas including engineering, business planning, legal, stakeholder engagement, operations management and financial modelling. The returners received mentoring from Tideway employees, as well as support and advice to successfully make the transition back to full time work. All 7 women returners have now taken up positions in the company after completing the programme.

The programme gave access to an invaluable pool of talent which might otherwise have been overlooked, and has given a boost to Tideway's efforts to increase diversity on the project where, currently, around 35% of the 400-strong team is female. As well as this, Tideway is dedicated to raising the bar for diversity even further. All staff are required to undertake diversity training while Tideway's inclusivity forum, Encompass, was set up to understand the barriers facing minority groups within the company and develop a strategy to address these.

35%



of the project team is female

4.4%



of railway engineering roles filled by women in the transport sector

³⁷ www.goldmansachs.com/careers/experienced-professionals/returnships

in the OECD, but in 2013 the Office for National Statistics stated that more than half of graduates were in non-graduate jobs, one of the highest rates in Europe.³⁸ More recently, the Higher Education Statistics Agency reported that two-thirds of graduates from full-time degrees were now in posts classified as 'professional employment'.³⁹

2.43 Some people have argued that the UK does not have a skills shortage but more of an 'optimisation challenge'. In the same way that the large consultancy firms seek the brightest from university regardless of their area of study, the transport sector need to capture the brightest and train them with higher level apprenticeships.

Ex-military personnel

2.44 Following the UK Defence Review 2013,⁴⁰ the regular army is reducing from 102,000 to 82,000 by 2020. This provides the transport sector with an opportunity to attract a significant proportion of highly trained soldiers, officers and engineers. A new career in transport, would allow this unique talent pool to use its extensive training and transferable skills.

2.45 Following the completion of focused sector-specific training programmes, these ex-military personnel could be rapidly redeployed across a wide number of critical roles within operations, maintenance and project delivery. Additionally, as the rail and road sectors introduce more digital technology, the skill sets of military personnel increase in value.

For example, members of the armed forces receive extensive training in using digital communications systems.

2.46 To help identify these service personnel, there is a further opportunity to work with the Ministry of Defence to map the technical competences and training already received on similar telecoms, signalling, electrical and mechanical technologies. Once transport has established a sector 'skills passport' (see Mobility within transport section in **Chapter 3**) for all business and safety critical competences, the core military competences that relate to transport could be included, opening up a wide range of employment opportunities on day one of leaving the military, providing both economic and social benefits.

2.47 Although 600 placements were made within the transport sector in 2015,⁴¹ there is potential for many more ex-military personnel to be successfully placed each year. Some organisations, such as Network Rail, have already taken a positive step and created a dedicated role for 'military engagement' which has been recognised by the MOD. This has resulted in Network Rail receiving the employer recognition scheme (ERS) Silver Award.

2.48 Currently, Career Transition Partnership (CTP), the Ministry of Defence's official provider of support for those leaving the military, aims to broker and maximise the number who secure paid placements across all sectors. Transport needs a co-ordinated approach to match transferable skills and develop smart training that will provide the necessary upskilling efficiently.



³⁸ www.cjpd.co.uk/binaries/over-qualification-and -skills-mismatch-graduate-labour-market.pdf

³⁹ HESA Statistical First Release 205 - destination of leavers from high education

⁴⁰ <https://www.gov.uk/government/publications/national-security-strategy-and-strategic-defence-and-security-review-2012-to-2013-report>

⁴¹ Career Transition Partnership Analysis 2015

2.49 Specialist military affiliated charities such as C Group (Royal Marines) and the Poppy Factory offer tailored support services to either specific sections of the military or those who are leaving the military due to sickness or injury. TfL, in particular, has had great success working with these organisations.

2.50 Through the adoption of a more proactive and sustained campaign to attract and match core transferable skills, the transport sector should be ambitious and look to more than double the number of ex-military leavers successfully being placed each year.

2.51 We are aware of the good work being carried out by transport employers.

However single organisation solutions cannot be as effective as working together to meet the skills challenge we face. We have identified a need for transport employers to come together voluntarily through the Strategic Transport Apprenticeship Taskforce to address skills challenges in a collaborative way. The taskforce will focus on roads and rail in the first instance and support and build on work already underway, for example NSAR's skills forecasting activity and its development of a rail skills plan. Recommendations on issues to be addressed by the taskforce feature throughout this strategy. We intend to consult transport employers on the full remit in the spring of 2016. Ultimately it will be for employers to decide on the programme and priorities.

Case study

BT Open Reach

A BT business, Open Reach, has started to realise the benefits that ex-military personnel can offer a commercial business. With millions of pounds being invested annually in training military staff to carry out a number of electrical and mechanical, telecoms, signalling and logistics roles, this unique workforce is highly trained, highly motivated, highly productive and therefore highly desirable.

BT have found that by educating their own recruitment teams on the many sought after characteristics of ex-military personnel, they are achieving high conversion rates with up to 87% of interviewees being offered full-time employment. They have found that it is the exceptional work ethic, commitment, experience of complex engineering tasks and ability to quickly assimilate into challenging and safety critical environments that makes ex-military personnel highly desirable. These personnel require just 6 weeks training before they can be used within the business. Open Reach is now working with CTP to recruit a further 500 ex-military personnel per year to help roll out broadband internet to millions of new homes.

Case study

Transport for London

Mark Mayungu was an engineer in the Navy Fleet Air Arm for 5 years. He worked on air stations when on land and aircraft carriers on deployment, but following a traffic accident where he broke his neck, he retired from the Navy. Mark joined TfL on a six month placement scheme designed to get ex-armed forces personnel back into work, following sickness or injury. After completion of the placement, Mark successfully competed for a permanent position with TfL.

Mark, who is now a Senior Traffic Engineer at TfL, said: 'I was very lucky because 80% of people who suffer my injury do not make a full recovery. I met a lot of people with engineering skills during my time in rehab. Many of them have given up, they think their life is over and all they can do is stay at home being cared for, but I would recommend this scheme to them.'

"I have now been at TfL for over 3 years and during this time I've got to work on projects like the London 2012 Games which was a fantastic experience. I still have physiotherapy for my injury and have to see my consultant, but that doesn't stop me from doing my job effectively. It is about putting yourself on the line and the self-belief that you are capable. I now feel very integrated in my job and into the transport industry."



Recommendations

Employers to come together voluntarily through the Strategic Transport Apprenticeship Taskforce to address skills challenges in a coordinated and collaborative way.

The Taskforce's work programme will be developed and led by employers. Sector stakeholders have suggested that early activities could include:

encouraging and supporting mid-career changers and returners to work in transport. This includes a focus on ex-military personnel with a target of 20% of armed forces leavers, giving particular support to those leaving due to sickness or injury.

3. Mobility and upskilling

In addition to increasing the number of new entrants to the sector, it is vital that the existing workforce is upskilled to meet the challenges of new technology and a changing sector.

There is a clear need for the transport sector to work collaboratively to ensure that skilled staff are mobile and better able to move from project to project, or indeed across allied sectors such as power. Only by greater co-ordination can the sector avoid duplication of effort and continued wage inflation.

The changing technological landscape

3.1 The role of data is having a huge impact across the transport sector, on infrastructure providers and equipment manufacturers alike.

3.2 The future of our transport networks will be at the hands of a 21st century workforce that needs to be upskilled to deal with 'big data'. Continuous performance data for diagnostics by remote engineers transformed the aviation industry, and is set to affect road and rail in a similar way. Signalling, electrical control, telecoms, ticketing, station management and traffic management systems are all transmitting continuous flows of data. The need for upskilling will become more urgent as the digital railway becomes a reality and the workforce will need

to have the capability to manipulate, analyse and model large amounts of data in real time.

3.3 Train operating companies will have new on-board signalling equipment that will continuously send data about a train's position. Traction power engineers will continuously receive information about the performance and integrity of the train. Signalling engineers will need to be able to write code and complex algorithms, while maintenance technicians will need to interpret masses of data to diagnose faults and make repairs.

3.4 Such developments mean a significant proportion of front line technical roles will require some technological upskilling.



Case study



New Technology, Highways England

The investment in more 'smart motorways', including the use and control of hard shoulders at peak times, or their conversion to permanent running lanes, means there is a continuous flow of data that needs analysing and interpreting for crucial traffic management decisions to be made. The programme to upgrade key A roads to Expressways, where there is little existing technology and telecommunications infrastructure, has led to the development of 'last mile' telecoms connections which will utilise wireless technologies rather than digging up the verge to lay cables, and a workforce used to hard wiring with copper now needing to become competent in a wider range of computer and IT systems.

While there are some similarities in the approach being taken by the rail industry and Highways England, there are also some significant differences particularly with regard to the extent to which Highways England is now adopting the use of Internet based services to support roadside technology.



3.5 In terms of roads, despite much of the £15 billion new strategic roads network investment being focused on traditional civil engineering and construction work, there are also many new technology requirements that are shared with rail. The 7 highways regional control centres bring a high level of traffic management sophistication allowing improved efficiency in the control of signals, message boards and variable speed displays across the network. The networking of these control centres and the use of asset condition monitoring systems to predict failures and undertake preventative maintenance means there is a need to develop very similar data management, configuration, test and system integration skills as in the rail industry.

3.6 Looking ahead, Highways England is reviewing the value of new in-car services that could provide drivers with advanced warning of live traffic incidents and levels of congestion, allowing them to select alternative routes. These value added services will increase the flow and control of data and therefore the need to upskill the existing workforce.

The importance of innovation

3.7 Innovation plays a critical role in driving growth and productivity across our economy. The transport sector is playing its part through, for example, the focus in the Rail Supply Group's sector strategy 'Fast Track to the Future' on promoting innovation and identifying key technology areas in which the UK is already very strong and where we have the potential to become world-class.

3.8 The Department for Transport also provides funding support for the rail industry's Future Railway innovation programme and the Transport Systems Catapult.

3.9 However, in order to maximise the benefit from innovation, the transport sector needs new talent to manage transport research, development and innovation projects. In addition we need senior managers with the right skills to commercialise and implement new innovations. On this latter point, industry, academia and professional bodies have identified the need for continuing professional development to provide senior managers with skills around design, leadership and innovation potentially leading to a recognised qualification.

3.10 We recommend that leading companies and universities should work together to develop MSc and level 7 programmes that encompass design, innovation and leadership. As an example, WS Atkins working with University College London, has undertaken a comprehensive trial of a new MSc with three cohorts of their own candidates, and is now making it available to the wider sector.



Skills for Intelligent Mobility

The Government has established the Centre for Connected and Autonomous Vehicles (CCAV) to ensure that the UK remains a world leader in developing and testing connected and autonomous vehicles.

A cross sector group IM-pact UK (Intelligent Mobility Planning and Action Coordination Team) will build on the work of this strategy by identifying the additional skills needed to support the new emerging markets for Intelligent Mobility.



The Digital Railway

3.11 The Digital Railway is redefining the way in which the rail industry will work. As a feature of this, the introduction of European Rail Traffic Management System (ERTMS) will place vital signalling equipment on-board trains, affecting train drivers in particular but with implications for the wider rail workforce.

3.12 Sophisticated traffic management systems using Global System for Mobile Communications – Railway (GSM-R) and European Traffic Control Systems (ETCS) will provide the latest train control system. Existing staff will need greater systems engineering, advanced telecoms, software programming and crucially business change skill sets to

help the industry fully realise the benefits of a digital railway.

3.13 The rail industry is already well advanced in creating learning programmes for the development of train drivers as they will soon be using ETCS and a new driver machine interface within the cab to drive the trains.

3.14 The sector is already creating a European train driver licence and this could form the basis of a new employer-led apprenticeship standard allowing the upskilling of thousands of drivers.

3.15 Once the industry has developed full level 3 ERTMS, where no line side signalling equipment will be required, the industry will also require a range of decommissioning and recycling skills.

Upskilling the existing workforce

3.16 A typical level 3 technician will take 3 years to become competent via a high quality apprenticeship programme. A level 4 supervisor will take up to 5 years and an experienced construction manager 5 to 8 years. It can easily take 8 to 10 years to develop the full breadth of knowledge and experience to reach chartered engineer status. Therefore to meet the skills gaps that transport has today, upskilling existing staff isn't just common sense but vital.

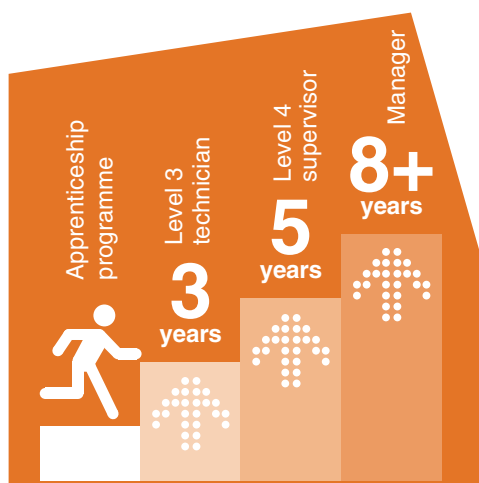


Figure 3.A Upskilling for existing staff

3.17 Higher level apprenticeships at Levels 4 and 5, degree apprenticeships at level 6/7 and Master's degrees at Level 7 provide a multi-channel framework for upskilling the existing workforce. They allow staff to learn new principles and gain the crucial workplace application experience to exploit new technologies and support the sector's digital transformation.

3.18 With an ageing workforce across the transport sector, there will be significant numbers of people lost through retirement over the next ten years. For example, NSAR analysis for this strategy suggests that 33,400 workers within the transport sector could potentially retire by 2020 of whom 53% are at Level 3 and above. This means that, in addition to replenishing lost skills with new entrants in to the sector, it becomes even more important to ensure there is a systematic and continuous process for upskilling the existing workforce.

3.19 NSAR has also estimated that 10,000 to 15,000 of the existing workforce will need some upskilling and so it is important for the sector that apprenticeships can be used to support the upskilling requirement.

3.20 As the Jubilee, Northern and Victoria underground lines have been modernised, they have also benefited from advanced automatic train control signalling systems (ATC). Now the network is a mix of old and new. There are challenges around assuring competences for a workforce that maintains and enhances both mechanical lever frame signalling technology alongside very sophisticated computer based control systems.

3.21 In the future, there will be more requirements for the latest data programming, diagnostics and modelling skills. Apprenticeships at Level 3+ can blend learning principles and then apply that knowledge back in the workplace each week. This approach can also support the upskilling of traction and rolling stock technicians to be able to maintain the complex electrical and computer controlled systems on modern trains.



3.22 Upskilling opportunities can be directed towards sections of the workforce where there is under-representation and working with staff network groups can help in this respect.

Mobility

Mobility across sectors

3.23 Transport shares certain acute skills shortages with other sectors such as energy where, for example, high voltage overhead line workers are now listed on the Home Office shortage occupation list.

3.24 These critical skill shortages have a significant impact on UK productivity. Government has identified that wage inflation is already a problem at operative and supervisor levels. Certain contractors are now paying up to six figure salaries and forecasting 6 to 8% year-on-year wage increases.⁴² The transport sector cannot act alone and could collaborate with the energy and utilities sector to exchange information on project pipelines to allow a smoothing of peak demand for critical resources. Transport should look at establishing an early cross-sectoral assessment of critical resources to better understand and mitigate the risks.

3.25 There may also be opportunities to share training facilities and identify common ground in the creation of new employer-led apprenticeships to improve mobility across infrastructure sectors where core skill shortages arise. It is hoped that this strategy will provide the catalyst to establish dialogue and sharing of ideas to reduce skill shortages.

Mobility within transport

3.26 A serious blocker for skilled workers moving across transport is the thousands of standards that have been created to manage risk and assure the safe delivery of the railway. Simplification of risk management and standards needs to take place across the sector.

3.27 The process to simplify risk management and standards has been started by Network Rail with their 'Business Critical Rules' programme. The approach will help the rail industry move away from task based competency and move towards a role based capability, which will reduce the overall level of training required by focussing on the most critical areas in managing risk.

3.28 The railway industry currently uses the 'Sentinel' scheme to provide a record on each worker's personal level of skill and the competences they hold. NSAR, Network Rail and TfL are working together to integrate the services provided by Sentinel and Skills ID in order to establish a 'skills passport' that would help facilitate greater mobility of skills across the sector and there is potential for this to be extended to Highways England as well as HS2.

3.29 The Strategic Transport Apprenticeship Task force would be well-placed to over-see this work.

⁴² National Skills Academy for Rail, 2015

Recommendations

The activities of the Strategic Transport Apprenticeship Taskforce could include:

- developing a common skills passport to facilitate mobility across the sector (roads and rail initially)
- consider opportunities for transport to collaborate with other sectors
- forecasting supply and demand of skills, including when and where needed
- working with the Home Office to review and recommend, where necessary, the inclusion of critical skills in the Home Office's Shortage Occupations list.

To meet the challenges of new technology, the sector should work with leading research and academic institutions to grow new research talent and create development programmes for senior managers in transport organisations that encompass design, innovation and leadership.



4. Standards and centres of excellence

Employers will work together to develop new apprenticeship standards in priority areas, including new technology. A network of centres of excellence for training in the transport sector will be developed. The quality of training and the efficiency of delivery will be improved by greater collaboration.

Such collaboration needs to be across the board – from developing new apprenticeship standards and trailblazers to better sharing of knowledge and resources within the sector, as well as the broader community.

Training also needs to reflect the needs of a changing workforce and evolving technological landscape, with the emergence of more intelligent transport systems through the likes of digital railways and smart motorways.

Quality

Core principles of an apprenticeship

4.1 The government has set out the core principles of an apprenticeship in *English Apprenticeships: 2020 Vision*. These principles provide the framework for high quality apprenticeship and will need to be embedded in all standards being developed. According to these principles an apprenticeship:

- is a job in a skilled occupation
- requires substantial and sustained training, lasting a minimum of 12 months and involving at least 20% off-the-job training
- develops transferable skills, and English and maths, to progress careers
- leads to full competency and capability in an occupation, demonstrated by achievement of an apprenticeship standard
- trains the apprentice to the level required to apply for professional recognition where this exists.

Standards and assessments

4.2 As part of the government's apprenticeship reforms, existing apprenticeship frameworks will be replaced with employer-led standards. These standards will make the process of assessing apprenticeships and maintaining high quality outputs more efficient and effective.

4.3 Currently there are around 230 apprenticeship frameworks with over 700 pathways within them. The inconsistent development and delivery of these has been criticised by employers for failing to equip young people with the skills required to carry out their roles competently.⁴³

4.4 The new standards will encompass a clear and concise description of the skills, knowledge and behaviours required by the employer and overall will be simpler and clearer in what competencies apprentices will need to have achieved in order to pass their apprenticeship.

4.5 There will be one standard per job family, which should allow easier transferability and mobility within and across sectors as apprentices will be expected to acquire broader skills such as communication, problem solving, self-management and creativity.⁴⁴



⁴³ BIS, *English Apprenticeships: 2020 Vision*, 2015

⁴⁴ BIS, *English Apprenticeships: 2020 Vision*, 2015

4.6 The changes include new assessment plans.⁴⁵ To date over 100 sectors have been involved in developing standards through trailblazers – these are groups of employers coming together to develop standards for their relevant occupations. Once developed, the standards are submitted to BIS for assessment which includes a public consultation.

4.7 For road and rail, it is estimated that there are in excess of 35 standards either in development or approved. Our sector bodies, including Highways England, Transport for London, Network Rail, Crossrail and HS2 Ltd, have signed up to a number of trailblazer groups to ensure there is sufficient representation from the supply chain and that the standards reflect current and future occupational needs. In addition, the aviation industry apprenticeships standards have been approved for numerous specialist roles.

4.8 In terms of other parts of the transport sector, such as maritime, training has historically been carried out outside of apprenticeships. The ports sector has traditionally delivered its own apprenticeships and seafarer training is delivered through a range of training programmes which must follow strict international standards.

4.9 The UK Major Ports Group and the British Ports Association have a joint initiative, the Ports Skills and Safety body that exists to promote and facilitate a highly skilled ports work force. As such it has developed port focussed, National Occupational Standards a framework of qualifications including National Vocational Qualifications, various Apprenticeship options and a Foundation

Degree. They have also produced a “career map” to explain the port sector jobs and the career paths this can lead to. The UK is recognised as a world leader in specific maritime training with around 24 training colleges, in addition a number of universities offer maritime related courses.

4.10 The development of new transport trailblazers is still a work in progress, and there are a number of job families which are yet to have a standard in development and approved. It is vital that transport related standards sufficiently reflect the future industry demand for skills and that the opportunities which this employer-led approach will bring are harnessed.

4.11 For instance, the transport sector should work together to identify all core job families which will require a standard and assessment and where these are not reflected in the current BIS list. It should also identify more generic occupations and ensure that standards are being developed in these areas by another sector and that these meet the needs for the transport sector.

4.12 The sector can then ensure that:

- there is sufficient flexibility and transferability of standards across the sector, eg from road to rail, where relevant
- the trailblazer groups have sufficient representation from all relevant employers and in particular from small businesses in the sector

⁴⁵ BIS, Apprenticeship reforms, 2015

- once official rollout commences, there is long term monitoring of transport led standards and that changes or additions are anticipated and actioned as needed.

4.13 The Strategic Transport Apprenticeship Task force will be well placed to carry out this work.

Apprenticeship journey

4.14 Apprentices benefit from dedicated pastoral care once they assume their roles. However this element can be compromised due to lack of resource and commitment to the development and mentoring needs of the apprentice. This can be a particular issue for small businesses who simply do not have the resource available.

4.15 The Government recognises the difficulties faced by smaller employers and will continue to look for ways to make it easier for them to employ apprentices. We have extended the Apprenticeship Grant for Employers providing additional financial support to businesses with fewer than 50 employees, and our trial reform model also includes an incentive payment. As we move forward we recognise the desire for larger levy paying businesses to support their supply chain where they can. All employers will have access to the Digital Apprenticeship Service and where employers choose not to use the funds in their digital accounts we will make these more widely available.



Maritime



Standard Trailblazers

Work is underway on 4 maritime related trailblazers, with the able seafarer standard ready for delivery and 3 others still being developed (ratings level on mechanical fitter, advanced systems engineering and boat building). There are 10 maritime apprenticeships available through BIS's apprenticeship framework system, including 4 at advanced level and 1 known apprenticeship scheme on stevedoring.

A core strength in maritime training is its strong academic foundation which produces a highly educated and well qualified workforce. In-depth maritime business training is provided through degree courses offered by many of the UK's universities and colleges.

Many individual ports have their own in-house programmes to ensure ongoing development and retention of skills and many specifically target the potential talent in their local communities. For example over the last 18 months the port of Tilbury has had over 50 apprentices directly or indirectly employed working across the port, undertaking apprenticeships and/or apprenticeship qualifications programmes.

The port also identified a local need for support to making the transition from full-time education to the workplace and set up the Port of Tilbury Traineeship to give young people the skills and experience that a potential employer are looking for.

24

Training colleges

10

Maritime apprenticeships

50

Port of Tilbury apprenticeships over the last 18 months

Professional recognition

4.16 It will be important for apprentices who have completed their apprenticeships to apply for membership of their relevant professional body. This will help to confirm the status of the apprenticeship on par with academic qualifications. Many professional bodies already recognise apprenticeship qualifications and are working with employers to ensure that

standards being developed are aligned with the professional body standards.

4.17 Transport sector leaders need to be proactive in working with relevant professional institutions such as the Institution of Civil Engineers and the Institute for Engineering and Technology to ensure that trailblazer standards being developed for the transport sector are aligned.



Case study

A14 Employment and Skills Programme

To achieve the A14 Cambridge to Huntingdon scheme's legacy objectives, Highways England has been working closely with its local stakeholders in Cambridgeshire. This has included developing a skills strategy which reflects the workforce requirements of the scheme and the local labour market.

An early success of this approach has been the identification of capital funding (£415,000 of grant), through the Greater Cambridge and Greater Peterborough Local Enterprise Partnership, to develop a training facility to support the skills needs of the roads infrastructure sector. The West Anglia Training Association will establish a new teaching environment. Apprentices and learners will take courses with practical experience of a typical highways environment. It will allow them to be trained on state-of-the-art operating equipment and experience on-site conditions and operating protocols in a way that to date has not been possible and is not available anywhere else in the UK. The academy will be one of the first centres registered to deliver the 4 new Highways trailblazer apprenticeship standards and is expected to open in April 2016.



Training provision

- 4.18** In future all apprenticeships must include rigorous, high quality training. With the growing demand for higher technical and specialist skills, particularly in the rail sector, more training at level 4 and above is needed.
- 4.19** It is critical that training facilities introduce new entrants to an inclusive culture so diversity and inclusion awareness and training in unconscious bias should be embedded, both for trainers and for those being trained. This should also be included as a measure for any external assessment of training provision.

National colleges

4.20 National colleges were proposed by government to deliver the higher level technical skills that businesses need. They will enable the UK to compete at the cutting edge of professional and technical skills development, making the UK a more attractive location for investment, and providing greater scope to export our educational expertise. National Colleges will also have a wider impact by raising the status of technical and professional careers, demonstrating that there is scope to progress to a higher level by following a technical route as an alternative to a purely academic pathway.

4.21 The government recognises that practical workplace skills are just as important as abstract reasoning abilities learnt through academic study.

4.22 Consequently the National College for High Speed Rail (NCHSR) is part of a new pathway to higher level technical skills. It is envisioned that the NCHSR will be an aspirational choice, equivalent to university. National Colleges will also have the ability to develop and accredit qualifications.

4.23 In creating national colleges, the government is seeking to create Further Education (FE) institutions that strengthen the FE sector, generating an increase in the supply and demand for technical professional training. This will be enabled through:

- increased funding for higher apprenticeships
- awarding body status
- consulting on maintenance loans for FE students
- closer work between further education and higher education institutions.



Case study

National College for High Speed Rail

The National College for High Speed Rail, supported by HS2 Ltd, directly addresses this shortfall in high-level, technical expertise. Delivered to its full potential, it will transform the future of the rail industry and of skills-based vocational training in the United Kingdom. Its mission is to train the next generation of engineers for a career in rail, and to upskill the existing workforce with skills for now and the future. It should spread socio-economic benefits around the country, but also bring them to the communities of which it is part.

The college's vision is to:

- deliver a step-change in vocational learning for the rail sector
- attract a wider pool of talent into science, engineering and technology
- build the highly skilled workforce that is needed to deliver and maintain HS2, and to meet the future requirements of the wider railway industry
- place the rail industry at the cutting edge of innovation, transforming its image
- be a catalyst for regeneration and growth in and around Birmingham and Doncaster
- the NCHSR will offer a curriculum focused on high level technical skills at level 4 and 5 in High-Tech railway engineering and digital infrastructure. Opening in September 2017 the College will offer Higher Apprenticeships and a HNC equivalent qualification. It will provide training to new entrants, workforce upskilling and CPD opportunities. It will have 1,100 new starts per annum.



Centres of excellence

- 4.24** There has been much progress in recent years in creating the right kind of training facilities which can be accessed by all, to cater specifically for transport disciplines.
- 4.25** The National Training Academy for Rail was opened in October 2015, offering specialist training in rolling stock. The National College for High Speed Rail is due to open in 2017, delivering specialist training in the higher technical skills required for High Speed Rail engineers. The Tunnelling and Underground Construction Academy has provided specialist training to over 10,000 students since opening in September 2011.
- 4.26** National colleges such as the National College for High Speed Rail will be increasingly important as specialist hubs providing the highest quality training with the latest equipment and the very best teaching staff.
- 4.27** Transport sector-led national colleges should build on the national college framework set out by BIS and go further in what they can achieve. The transport national colleges should develop into Centres of Excellence for technical professional training in the transport sector. They must set and develop the wider curriculum for the sector. It is envisaged that they will be world-class leaders in innovative teaching methods and become the epicentre of 'what work's best'.

4.28 Importantly, the national colleges should form a collaborative network through which to deliver, working with the range of rail and road regional training centres and FE institutions. Such a network will ensure duplication of the wider curriculum is minimised, best practice and teaching staff are shared and emerging gaps in skills requirements are identified in a collaborative way.

4.29 **Figure 4.A** suggests how these relationships might work. The National Colleges should also move to working with a broader range of manufacturers. This will allow a wider range of employers to recruit highly skilled apprentices for their organisational needs. NTAR offers training on a range of different manufacturer's equipment and is expanding the range of train manufacturers it works with to provide an increasingly broad cross-section of training equipment.

Sector-led regional training centres

4.30 In recent years, a number of specialist rail training centres have been developed. Network Rail is building 7 new training centres across the UK including Larbert in Scotland, York in the north, Bristol in the west and Paddock Wood in the south. This work will conclude with the completion of the 3 training centres in Basingstoke, York and Swindon in 2016. These should be accessible to the whole transport sector to make the most efficient and effective use of training provision.



Transport Centres of Excellence Network

Virtual Oversight Group

- Ensures consistency and sustainability of apprenticeships standards
- Forecasts supply and demand of skills and capacity issues
- Quality assures teaching facilities, equipment and staff



Broad STEM skills delivery

- delivering broad STEM skills set
- minimum one Institute capacity in each LEP area
- provides transport sector opportunities and collaborations to deliver wider curriculum where geographical demand is high
- works as part of skills training network with National centres and others.

Level 3+

Multiple specialist skills delivery

- delivers broader sector training
- accessible to whole sector (inc.road and rail)
- works in collaboration with centres of excellence, and other training centres to deliver curriculum
- aims to sustain high standards of teaching and teaching equipment
- regularly feeds skills supply/ demand information to national centres.

Level 2+

Specialist Centre of Excellence

- delivers core skills for specialism
- leads in innovative teaching methods/equipment for sector
- excellence in high quality teaching and providing teacher training
- wider curriculum development
- shares best practice to wider training network and abroad
- works with network of training centres to deliver efficient skills training.

Level 3+

Figure 4.A Centres of excellence network

Post-16 education and training

- 4.31** The government has announced a national programme of locally-led area reviews of post-16 education and training provision. These will assess the economic and educational needs of local areas and the impact of this on post-16 learning. This will benefit industry in being able to select and buy the best quality training for new entrants.
- 4.32** The reviews coincide with the Government announcement of ambitions to create Institutes of Technology. The objective is to build a strong cadre of skills in the STEM disciplines, at apprenticeship levels 3 to 5.

Teaching staff and raising training standards

- 4.33** Anecdotal evidence from across the transport sector suggests that high quality staff to teach a range of disciplines which are, and will be, in increasing demand to the sector are in short supply. This is supported by a recent Semta and Education and Training Foundation report, which stated that 60% of FE providers had difficulties in recruiting STEM staff. The vast majority of experienced engineers and technical experts have reached or are nearing retirement age and younger intakes lack the experience to teach at the higher technical levels required for the current and future investment programmes.

There will be particular demand for teaching staff at level 4 and above, as the numbers of specialist technical roles increase.

- 4.34** More broadly, there has been good progress in addressing the quality and quantity of teaching staff. The Perkins Review⁴⁶ highlighted the need for stronger collaboration between industry and local FE colleges to help teachers understand the changing skills needs in disciplines such as engineering. The review also pointed out the need for employers to be able to release their staff on to programmes such as Teach Too, which gives the opportunity for employees with expertise and experience to teach at FE colleges on a regular basis. This ensures that students are receiving the latest training in industry standard skills. Linked to this, Semta and the Education Training Foundation have developed the STEM Exchange website to provide a matching service bringing together individual teachers and tutors from colleges, private training providers and charities with employers within their area who have agreed to support in professional development activities. Over 1000 employers are registered including from the aviation and maritime sectors.
- 4.35** In 2011, the rail industry introduced a process to raise training standards through a unified industry scheme for training organisations, trainers and assessors. The objective was to ensure that the quality of training became 'Good' or 'Outstanding' when measured against a framework similar to Ofsted. The framework was based on continual improvement, contrasting with the previous regime that relied on compliance based audits.

⁴⁶ Perkins, J. Review of Engineering Skills, Nov 2013

The Baseline Inspection Report was published in September 2012. At that time 70% of rail training providers/assessors were judged 'Good' or 'Outstanding'.

4.36 However, the low level of qualifications held by trainers and assessors was a concern and this will become even more important with the move towards a digital transport network for road and rail.

4.37 In 2013 it was decided that new trainers would be required to hold the Certificate of Professional Development: Teaching in a Work Based Learning Sector, or another programme with

the same outcomes. Existing trainers were required to upskill to level 4. The objective was to instil a culture of continual improvement so that in the fullness of time the rail engineering sector became the accepted exemplar for work based training and assessment.

4.38 During 2014, only 25% of the rail training and assessor providers were awarded 'Outstanding' and it was suggested that the process for assurance needed to be revised and the bar reset with other aspects of teaching provision and practice considered.



Transport Training Assurance Scheme

4.39 To deliver consistent and higher quality assurance for all training activities across both road and rail, a new transport training assurance scheme is needed. The remit for a future pan-transport training assurance scheme must include trainers, facilities, equipment, systems and use of modern and new technology in training. The industry must move towards assuring the highest-risk activities on a regular basis with a lighter touch for lower-risk activities.

4.40 There also needs to be a strong focus on blending leadership and management skills training alongside the technical, with more linkage to professional standards. This will raise the overall professionalism of the technical and engineering communities and seek the same professional status enjoyed by medical, accountancy, legal and other professions.

4.41 The sector should look to use the 'Professional Standards for Teachers and Trainers in Education and Training – England 2014' as the benchmark for underpinning good teaching practice. The Learning Quality Standard should be used to reward and recognise achievement of quality training. This scheme is less reliant on written work and, where appropriate, places more emphasis on site observations and end product check.



Recommendations

The activities of the Strategic Transport Apprenticeship Taskforce could include:

- reviewing the future need for apprenticeships and encouraging groups of employers to come together to develop new apprenticeship standards, where they agree they would be of benefit
- opening up training facilities to employers across the sector, so increasing the number of apprentices/trainees at little additional cost to the industry
- working together to define the training required from the sector and ensuring this is delivered effectively by training providers
- working collaboratively to promote transport as an exciting career option to young people and to improve diversity – we envisage the STAT having an ambassadorial role for the transport sector
- helping small businesses to understand the apprenticeship landscape and making it easier for them to access training and mentoring
- overseeing the transport National Colleges' work to implement the recommendations below.

National Colleges to become specialist centres of excellence leading the delivery of world class training in collaboration with the wider network of regional centres and FE colleges.

They will:

- ensure provision of specialist training to meet the skills forecasts of the Strategic Transport Apprenticeship Taskforce
- work in collaboration rather than in competition to provide world class teaching and teacher training, including in advanced technologies
- lead the development of innovative teaching methods and tools, forging links with R&D institutes
- work collaboratively with other training establishments to make best use of available capacity, ensure consistency and minimise duplication
- engage with local schools and colleges to influence their courses and training so they are better aligned with the skills needs of the transport sector
- work with regional colleges to develop community action plans which will complement the education approach. For example through facilitating school classes and teacher training on site, and engaging with local schools and colleges to influence their curriculums.



5. Procurement and supply chain

Procurement will be used to achieve a significant increase in the number of apprenticeships right through the supply chains. Crossrail, Transport for London and others have successfully specified a requirement around apprentices per £ spent. As many contracts are construction related, with large workforces, this approach will be used more widely.

However, there is not a one-size-fits-all solution, so different approaches will be used as appropriate to maximise the number of apprentices. For example, a percentage of workforce target may be more suitable for franchises or for contracts with a high value of goods and services.

Delivering quality as well as quantity is vital to ensure that apprentices have a real route into lasting transport careers.

Delivering apprenticeships through procurement

5.1 There is huge potential to deliver apprenticeships through procurement channels. The Department for Transport (DfT) manages some of the most significant and challenging in government. **Figure 5.A** shows the proportion of spend on engineering and construction activities. This suggests a significant opportunity to create high-value apprenticeships.

5.2 **Figure 5.A** shows procurement spend by value in DfT and its infrastructure client organisations (Network Rail, Highways England and HS2).⁴⁷

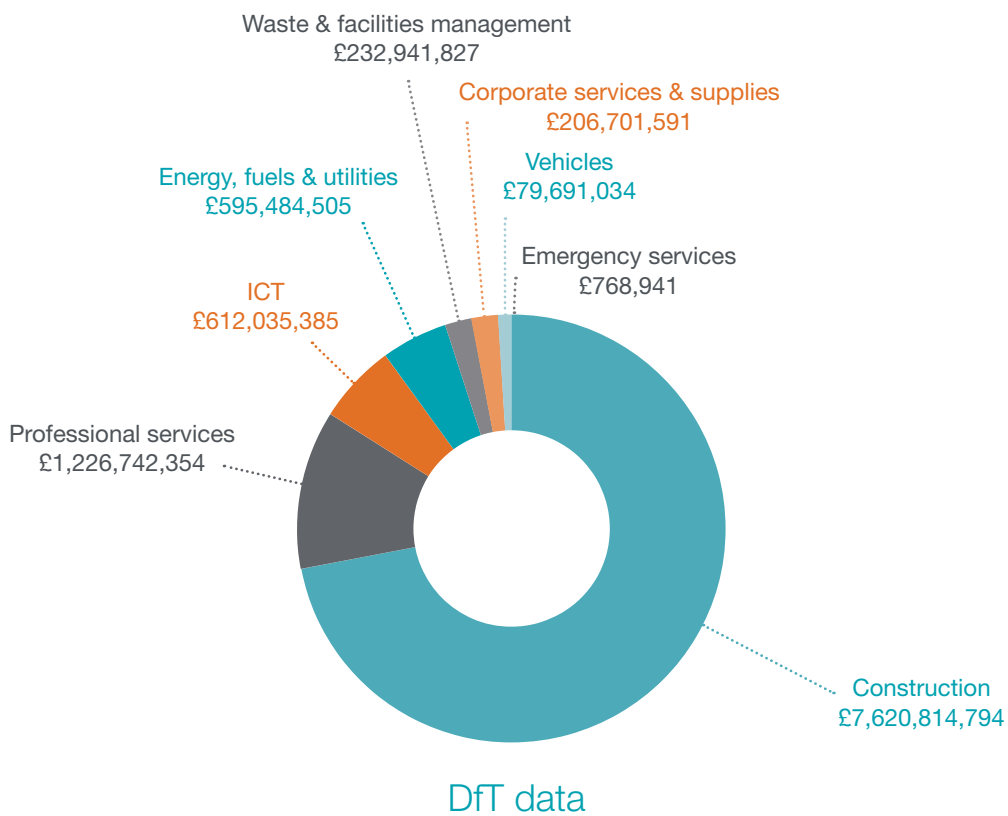


Figure 5.A Procurement spend by value in DfT (including Network Rail, Highways England and HS2)

⁴⁷ Figures do not include Crossrail or TfL



4,500

Apprenticeships
since 2009

5,000

Workless
people into
employment



Platforms 9 to 17 via



Platforms 7 and 8

Platform

Platforms 1

Station recep

Case study

Transport for London

TfL's Supplier Skills Team (SST) works in partnership with the supply chain to address skills shortages in the transport and engineering sectors, supporting our suppliers to have in place the right people with the right skills to deliver TfL's business plan.

Since the project was initiated in 2009, the SST has supported the supply chain to create over 4,500 apprenticeships and bring over 5,000 workless people into employment. In the last three years of delivery, over 40% of apprentices that have declared their background are of BAME origin, and 15% are women.

The SST implements Strategic Labour Needs and Training (SLNT) in relevant contracts, requiring suppliers to produce a number of skills and employment outputs in direct proportion to the contract value. Suppliers can select from a range of outputs including school visits and offering placements and taster positions, to promote interest in and knowledge of the industry. However, at least 50% of outputs must be in the core areas of apprenticeships or workless job starts.

"The key to the success of the programme has been in how TfL's Supplier Skills Team has worked in partnership with suppliers, supporting them to find the right, meaningful and cost effective solutions to fulfil and often exceed the skills and employment requirements in their contracts. This collaborative approach ensures that the supply chain is able to develop the skills and capacity it needs, and that TfL utilises its purchasing power to create skills and job opportunities for London and the UK and bring much-needed new entrants into the sector."

Tim Rudin – Supplier Skills Project Manager

5.3 There is already much good practice in the sector that can be drawn upon and learnt from – particularly the excellent apprenticeship schemes offered by TfL, Network Rail and Crossrail. The examples of Crossrail and TfL demonstrate the opportunity to unlock employment opportunities for those who face significant barriers including ex-offenders and the long term unemployed through procurement practices. Working within the sector we will promote more opportunities for these groups. DfT has already set up a Supply Chain Skills Network, comprising procurement skills leads from across the DfT group to work together to meet the challenge and share good practice.

The competitive tendering procedure

Making the value for money case

5.4 Investment in skills brings a high level of return. The latest research,⁴⁸ published in June 2015, demonstrates the high level of return on investment from the apprenticeship programme, indicating that adult apprenticeships at level 2 and level 3 bring £26 and £28 of economic benefits, respectively, for each £1 of government investment.

5.5 DfT will review its transport investment case guidance during 2016 with a view to ensuring that the value of skills is appropriately reflected.

The recommended procurement approach

5.6 The sector values its suppliers. Previous experience indicates that the supply chains are keen to work collaboratively on this agenda. Suppliers will not be deselected at the pre-qualification stage if they do not already have apprenticeships in place. Instead, the focus will be on what they can deliver in future.

5.7 A blanket approach will not be adopted. Each contract above £10 million must have a skills section in its procurement strategy which will consider the workforce element of the contract and its ability to support apprenticeships.

5.8 The targets will be stretching – but relevant and proportionate too. Existing good practice in parts of the transport sector suggests wider expansion of a target of 1 apprenticeship per £3-5 million contract value would be a stretching (but not unachievable) ambition for the majority of our infrastructure projects. For certain types of contract, eg where the workforce composition is less well known, a percentage headcount of 2.5% apprenticeships per year may be more appropriate.

5.9 Contract weightings will be set at a level which will make a real difference. An appropriate but proportionate weighting for tender evaluation will be set – taking into account the importance of skills in the value for money case and to the sector.



⁴⁸ <https://www.gov.uk/government/publications/further-education-measuring-the-net-present-value-in-england>

5.10 It is vital that quality as well as quantity is ensured. Invitations to tender will signpost quality requirements to the market and robust key performance indicators will be set. Compliance will be measured through the contract management regimes.

been awarded – for instance through the Network Rail Commercial Directors' Forum, which contains a 'talent tomorrow' workstream, and DfT's wider Supplier Relationship Management programme. The clear benefits will be conveyed to supply chains and their voluntary participation will be encouraged. Efforts will be recognised through an award scheme, such as the Highways England Supplier Recognition Scheme.

Improving existing contracts

5.11 Much can still be done to influence supply chains, even if a contract has already

Case study

Crossrail

Under Crossrail's Strategic Labour Needs and Training (SLNT) agenda, main contractors were required to show their plans for achieving targets for job starts, apprenticeships, work experience, work placements and graduate training in their tenders. Targets for SLNT outcomes were proportional to the value of the contract – generally 1 SLNT output for £3 million spend on a construction works contract.

In summary, the latest outcomes have been:

4,498

job starts



Locally &/or
previously
unemployed

807

work
experience
positions



416

work
placements



449

graduates
recruited



517

apprenticeships





Case study



Highways England supplier recognition awards

Highways England runs an annual supplier award scheme to recognise and celebrate success and to drive innovation. The awards are open to all companies in the extended supply chain, whatever their size, and give them the opportunity to promote the work they're doing in 8 key areas:

- managing down cost and improving value
- management of the extended supply chain
- safety, health and wellbeing – 3 awards: for the public and road users; road workers; and corporate health and wellbeing
- inclusion – valuing diversity and allowing it to thrive
- building capacity and capability – bringing in and developing talent from a more diverse pool of people
- delivering sustainable value and solutions – covering environmental, social and economic aspects of contract delivery
- customer experience – understanding customer needs and using feedback to constantly improve their experience
- communities – engaging with local communities, forums or subject area groups.

The awards are promoted in the trade media, giving suppliers an opportunity to gain wider recognition for their work.

Recommendations

Employers throughout the supply chain need to invest in skills. We will use procurement to deliver a significant increase in the number of apprenticeships through the sector.

We will:

- set ambitious targets using the most appropriate approach to deliver the largest number of apprentices. Existing good practice in parts of the transport sector suggests wider expansion of a target of 1 apprenticeship per £3 to £5 million contract value would be a stretching (but not unachievable) ambition for the majority of our infrastructure projects. For certain types of contract, a percentage headcount target of 2.5% apprenticeships per year may be more appropriate. We will consult with suppliers on a suitably ambitious but achievable model for each contract. This would apply to the entire workforce, down through the supply chain, meaning that whichever model is used requirements may need to be included in subcontracts as well as the main contract.
- include requirements for skills and apprenticeships in all rail franchises, on the percentage of workforce model (propose 2.5% per annum).
- ensure contract weightings for evaluation, post-PQQ stage, are set at a sufficiently high level to change bidder behaviour, while remaining proportionate in terms of value for money.
- support suppliers throughout the process to make sure that skills are truly embedded.
- develop a standard suite of key performance indicators and build supplier performance on skills into the contract management framework.
- provide suppliers with greater visibility of investment plans over the next 10 years to increase their confidence to invest in skills.
- encourage private sector client companies to adopt this proposed procurement model as best practice.
- ensure that the value of skills is appropriately reflected in DfT's investment appraisal guidance.



6. Policy framework

We welcome the apprenticeship levy and will work with BIS and employers to ensure the transport sector takes full advantage of levy funding to address skills needs. We will work with BIS to ensure that the funding can support higher apprenticeships, under-represented groups and small businesses.

We will encourage transport employers to work together through the Strategic Transport Apprenticeship Taskforce to ensure levy funding supports the strategic needs of the sector and provides greater visibility of results.

Making the levy work for transport

6.1 In his Budget in July 2015, the Chancellor announced that an apprenticeship levy would be introduced in 2017 for large employers. The levy would support the government's commitment to:

- 3 million apprenticeship starts by 2020
- increase the quality and quantity of apprenticeships in England, with the aim of putting high quality apprenticeship standards in place
- put apprenticeships on an equal legal footing with degrees.

6.2 The levy is intended to put investment in apprenticeships on a long term, sustainable footing. BIS has consulted on how the levy should be implemented. The rate of the levy was announced in the November 2015 Spending Review as 0.5% of paybill. Employers will receive an allowance of £15,000 to offset against their levy payment, which means that the levy will only be paid by organisations with paybills over £3 million.

6.3 Employers will be able to choose and pay for the apprenticeship training and assessment they want through the Digital Apprenticeship Service.

Bringing employers together

6.4 The introduction of the apprenticeship levy quite rightly puts employers in the driving seat both in terms of designing apprenticeships, paying for and choosing apprenticeship training.

We will work with BIS and the sector to ensure that transport employers take full advantage of the funding it will provide for apprenticeship training and supports the work of the Institute of Apprenticeships. In particular we will bring transport employers together through the Strategic Transport Apprenticeship Taskforce to encourage greater collaboration on skills issues across the sector.

The Taskforce will be a voluntary grouping of transport employers facilitated by DfT over a time limited period. It will support employers in raising the quality of training and making best use of levy funding across the transport supply chain to tackle strategic skills challenges. The Taskforce's programme of activity will be developed and led by employers. Industry stakeholders have suggested that early activities could include:

- reviewing the future need for apprenticeships and encouraging groups of employers to come together to develop new apprenticeship standards, where they agree they would be of benefit
- opening up training facilities to employers across the sector, so increasing the number of apprentices/trainees at little additional cost to the industry
- working together to define the training required from the sector and ensuring this is delivered effectively by training providers.

6.5 Working collaboratively to promote transport as an exciting career option to young people and to improve diversity. We will consult transport employers on the remit and terms of reference of the Taskforce in Spring 2016.



Department For Business, Innovation And Skills

An important manifesto commitment for the government has been to reach three million apprenticeship starts in England by 2020. The Department for Business, Innovation and Skills is seeking to set high expectations for large and small businesses in the private sector to employ apprentices and therefore wishes to ensure that the public sector (which accounts for 17% of England's workforce) is a model employer and leads by example – employing a significant proportion of apprentices. Expanding the number of apprenticeships in the public sector will support growth across all programmes and give a clear sign that Government is investing in apprenticeships.

The Enterprise Bill contains provision to amend the Apprenticeships, Skills, Children and Learning Act 2009 so that the Secretary of State can set targets for prescribed public bodies in relation to the number of apprentices working for them in England. The clause includes a duty on all public bodies which are set a target, to have regard to that target. In order to increase transparency, public bodies will have to publish information annually on progress towards meeting the target of new apprentices and send this information to the Secretary of State.

The bodies in scope will be identified using the Office for National Statistics classification and will apply to those with 250 or more employees in England. The target will be a minimum 2.3% of workforce as new starts each year, based on the headcount of employees working for a body in England.

Recommendations

We welcome the apprenticeship levy and the opportunity to work with BIS to confirm transport as a high value sector. We will work with employers to make best use of levy funding within the transport sector. We will:

- work with BIS so that the levy supports our ambitions around higher level apprenticeships, under-represented groups and upskilling
- explore with employers how apprenticeship funding can be used to address specialist skills gaps across the wider transport sector including in aviation, maritime, road haulage and coastguards
- ensure apprenticeship funding benefits the entire supply chain including small businesses
- bring employers together through the Strategic Transport Apprenticeship Taskforce to encourage the development of apprenticeship standards where employers believe they are required.

7. Local authorities and devolved administrations

The Department for Transport will use its central grants in innovative ways to work with local authorities and best support and encourage skills development across the country.

However, skills are a cross-government agenda and we will work with departments as they need to look more widely at how current national initiatives such as Northern Powerhouse and the city devolution agenda can drive forward skills and contribute to the government's commitment to 3 million apprenticeship starts by 2020.



Transport powers and responsibilities

7.1 Local transport in the United Kingdom is one area of transport policy that has already been significantly devolved to local areas.

Devolved administrations

7.2 Devolution across the UK is not uniform. The three devolved legislatures in Scotland, Wales and Northern Ireland each have different powers and responsibilities, reflecting the different circumstances and histories of each nation. However, the majority of transport functions are devolved to the respective administrations. The areas reserved to the UK government are mainly those covering transport regulation, safety and security.

Responsibilities within England

7.3 Within England, the devolution of transport powers is also not uniform. Indeed, the success of the integrated transport system within London – with the elected Mayor holding responsibilities delivered by Transport for London – has led to other cities and regions aspiring to similar increased control over transport.

7.4 This Government, through the introduction of the Cities and Local Government Devolution Bill, is committed to giving local and regional areas the levers they require to drive economic growth, innovation and improved delivery of local services. Local areas were invited to come forward with proposals on transport as part of any devolution deal, in recognition that there is no 'one-size-fits-all' approach as each area has different challenges and opportunities to address.

Role of the Department for Transport

7.5 The role of the DfT in local transport is simple and clearly defined. It sets the policy framework and provides strategic guidance, alongside allocating grant funding to local authorities through several different pots of funding.

7.6 In 2014/15 the DfT provided £2.3 billion of transport funding to local authorities outside of London, through a variety of grants for the building, improving or maintaining of transport infrastructure, with a further £1.8 billion of funding to the Greater London Authority through a transport grant.

7.7 Currently, there is no element of the DfT funding that encourages the uptake of apprentices and upskilling of the local transport workforce, as all of the transport funding that the DfT provides to local authorities is ultimately spent at their discretion.

- 7.8** Indeed, local authorities spend far more funding than the DfT provides in order to fulfil their transport obligations, with £7.9 billion being spent on transport by local authorities outside of London in 2013/14. The extra funding comes from that generated locally and grants provided by other central government departments.
- 7.9** The majority of local authority transport spending, with the greatest potential for creating new apprenticeships and upskilling the workforce, is on the management, maintenance and enhancement of the local highways network. This makes up approximately £4 billion of the £7.9 billion spent on local transport outside of London.

The local authority picture

- 7.10** In the context of constrained finances and longer term budget uncertainty, local authorities are finding it more difficult to recruit and retain skilled staff. For example, in specialist roles such as traffic signals, transport planning and engineering technicians.
- 7.11** These difficulties, combined with an ageing demographic within their existing workforces and a lack of wage competitiveness with other relevant sectors, have already made the recruitment and development of apprentices a core part of their workforce and skills solution. Through recruiting apprentices and promoting internally, local authorities and their transport supply chain can backfill the staff and skills they are losing at more senior levels.



Case study

London Highways Alliance Contract

Historically, all 33 London boroughs and TfL have managed their roads individually, giving rise to about 100 separate contracts totalling more than £500 million. With the creation of the London Highways Alliance in 2013, authorities who have joined can expect to make initial savings of between 15 and 30%. Over 8 years, the Alliance contracts could save London's boroughs and TfL as much as £450 million.

Collaboration enables members to benefit from economies of scale, share plant and equipment and be more efficient as a collective. It also means Alliance participants and neighbouring boroughs can join forces on works programmes to minimise disruption and congestion. Contractors can also combine their resources when emergencies arise and get problems sorted quickly.

The importance of creating jobs and apprenticeships is recognised in Alliance contracts. For every £3 million of expenditure, contractors are required to create opportunities such as apprenticeships and workless job starts. The Alliance, London boroughs and TfL apprentices have created a pan-London forum where level 3 apprentices provide buddying and development to the level 1 and 2 apprentices.

7.12 Local authorities are already leveraging their procurement processes in order to ensure that apprentices are provided for the transport sector. This practice is commonplace across the United Kingdom including amongst the devolved administrations and is one that DfT continues to encourage. For example Transport NI, the sole Road Authority in Northern Ireland, has a social clause within its contracts which commits its contractors to employing set numbers of apprentices.

7.13 The concerns local authorities have expressed around longer term budget certainty and financial pressures, and the corresponding difficulties in the provision and retention of skills within the transport sector, are being addressed through the devolution agenda. Through taking greater control over their own budgets, local authorities should be better equipped to take on the challenge to address the skills issues and the provision of apprenticeships. Through better and more formal collaboration across combined authorities, economies of scale can be applied through procurement processes which will help to leverage the creation of even more transport apprenticeships.

Opportunities

Guidance and support

7.14 The DfT will provide guidance and support to city and local regions on their transport apprentices and skills agenda through maintaining a regular dialogue with a variety of stakeholder organisations.

For example through:

- the Passenger Transport Executive Group (PTEG), who represent the major Metropolitan areas outside of London and agree on the importance of skills
- the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), who represent the transport interests of local authorities across the country and have skills as a core focus
- Transport for the North, which is bringing together local authorities from across the north of England to deliver an integrated, long term transport plan.

7.15 Through the network of local enterprise partnerships across the country, the DfT envisages the empowered local authorities, and their private sector supply chains, driving forward the transport skills agenda collaboratively.

7.16 However, the DfT retains an important role within the local transport skills agenda as a critical friend; a source of central funding; and a provider of guidance and sector strategy.

Local Enterprise Partnerships and the Local Growth Fund

7.17 The DfT provides over £1 billion a year to the Local Growth Fund (LGF) which is then allocated to Local Enterprise Partnerships (LEPs) for Growth Deals that will boost economic growth and deliver jobs and homes.

7.18 The very essence of the LGF is to enable LEPs to integrate investment plans to meet the needs of local economies, including joining up skills and transport investment. At least 500 transport schemes and 150 skills and innovation capital projects are already scheduled to be delivered through the LGF over the next 5 years.

7.19 The Black Country LEP is investing £4.5 million of Local Growth Funding in a very light rail innovation centre to provide a wide range of facilities to support industry networking, education, research and development, prototype vehicle design and construction.

7.20 LEPs are also very well placed to promote the spread of knowledge and skills among local partnerships, for example pooling local authority expertise in commercial skills and using private sector experience to intelligently engage with the market, secure efficiencies in procurement, and spread best practice. The DfT is supporting such efforts through the Transport Delivery Excellence project.



The Northern Powerhouse

7.21 The cities of the Northern Powerhouse in particular have taken on the mantle with historic devolution deals having been signed with Sheffield, Liverpool, Greater Manchester and the North East. These deals have all involved a major transport component, with improved integration, connectivity and local services for local residents being important, together with the concept of transport decisions being made for local people by locally elected representatives. These historic agreements show how serious the government is about devolving to local areas.

The Highways Maintenance Block

7.22 From 2016 to 2021 DfT will be providing £5.8 billion towards the local highways network as part of the Highways Maintenance Block, in instalments of £976 million a year.

7.23 Of this funding, £578 million has been set aside for an incentive fund scheme, to reward councils who demonstrate they are delivering value for money in carrying out cost-effective improvements. Each local highway authority in England (excluding London) will be invited to complete a self-assessment questionnaire, in order to establish the share of the incentive fund they will be eligible for in 2016/17.

7.24 In 2015/16, all local authorities have received their share of the £578 million. In 2016/17, only local authorities assessed as being in the top two bands – Bands 2 and 3 – will receive their full share, while those in the lowest Band 1 will receive 90% of their share. These percentages for Bands 1 and 2 decrease in each subsequent year, with only local authorities in the highest, Band 3, being awarded their full share of the funding. Local authorities are not competing with each other for funding, but are demonstrating that efficiency measures are being pursued in order to receive their full share of the funding.

7.25 As requirements for apprentices and skills outcomes become incorporated into the self-assessment and banding of local highway authorities, it will help to incentivise the inclusion of apprentices within local procurement.

7.26 DfT has also allocated £275 million of the Highways Maintenance Block for Challenge Fund projects. These are one-off major infrastructure schemes by Local Authorities, to improve life for local residents and businesses. This covers financial years 2015/16 to 2017/18.

7.27 This Challenge Fund will help generate and maintain jobs in the construction and engineering industry, providing opportunities for apprenticeships. The provision of apprentices will be built into the bidding criteria of future similar funds, along the lines of the incentive element, and will help to increase the number of apprentices and close the skills gap.

Highway Maintenance Efficiency Programme

7.28 The DfT sponsors the Highway Maintenance Efficiency Programme (HMEP). HMEP is ‘by the highways sector, for the highways sector’; working with people and organisations to enable change, so that greater savings and efficiencies can be achieved and the demand for improved roads and services can be met.

7.29 Through the provision of products and tools for the highways sector, HMEP has already made a noticeable difference. The DfT estimates that HMEP will have saved around £530 million, cumulatively, from 2012/13 to the end of the 2015/16 financial year. For financial year 2015/16 alone, that figure is estimated to be around £240 million.

7.30 In future, the HMEP will be used as a forum through which DfT could disseminate advice on how local authorities and the highways supply chain could access apprenticeships and skills funding, collaborating to the benefit of all.

Other Department for Transport funding

7.31 In the future, competitive funding provided by the Local Transport Directorate within the DfT will be used to incentivise the recruitment of apprentices and reducing the skills gaps within the transport sector.

7.32 This could be achieved through a similar approach to that of the incentive element of the highways maintenance block. The DfT will help to encourage local authorities to focus on apprentices and other skills outcomes. Local authorities publishing the number of apprentices achieved through this central funding will also help bring transparency to the process.



Recommendations

Ensure that competitive DfT local funding pots incentivise local authorities to encourage skills development.



8. Increasing the future talent pool

The sector must successfully engage with young people, parents and teachers to increase the number and diversity of those coming into the transport sector.

However this is a complex landscape with much work already underway within the sector and through broader government backed activity. Rather than developing further new initiatives or working in isolation, employers and professional institutions must come together and focus on core activities that have shown demonstrable results. Only if we change the perceptions of transport and engineering can we change the career choices of the next generation, irrespective of their gender, ethnicity or background.

8.1 There are many factors which influence a young person's decisions about their future, including their interests, the knowledge and expectations of parents and teachers, broader cultural factors and, of course, the opportunities that are open to them. It is therefore vital that the transport sector presents itself in a way that appeals to all young people. The schematic at **Figure 8.A** illustrates the influencing factors on young people.

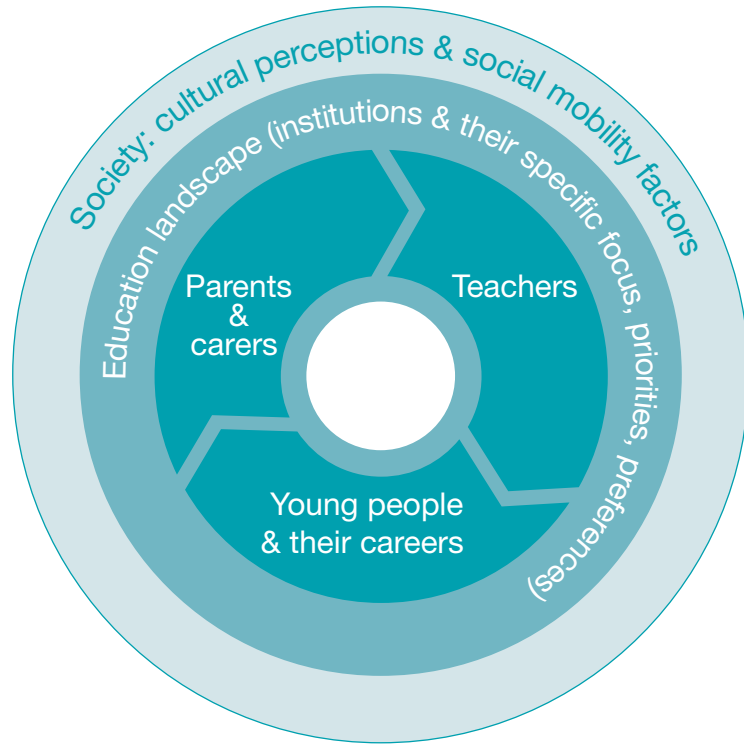


Figure 8.A Young people and their influences



Attracting all young people

8.2 Ask any 6 year old what management consultancy is, what a law firm or power plant does and compare this to asking them about transport. Even very young children know what transport is and they are often passionate about it – be it planes, trains, boats or roads with cars, bikes and buses. All children have experience of making journeys on at least some modes of transport and imaginative play often focuses on transport – from pretending to be a train or bus driver to creating journeys to a hospital, supermarket or even a castle. Our sector starts from a strong position; children understand the basic concept of what we do, that we make journeys happen and that we help people get where they want to go. However, as children get older perceptions of transport, and engineering in particular, appear to be less positive.

The issue with 'engineering'

8.3 Recent research has shown that there remain issues with the perception of engineering – particularly for girls. Engineering UK produce an annual brand monitoring report which provides valuable insight into how parents, young people and teachers see engineering. The report paints a mixed picture as outlined in **Table 8.A**.

8.4 Whilst it is very welcome that parental perceptions of engineering careers remain positive, the fact that there are gender differences is a concern. Further, given their influence on the career decision of their pupils, it is worrying that only 57% of STEM teachers felt that career in engineering was desirable to their pupils. There was significant rise in the proportion of STEM teachers linking undesirability to the perception of engineering as 'a career for men' (from 44% in 2013 to 59% in 2014).⁴⁹

Young People	Considering a career in engineering:	
	Secondary school pupils	47%
	Aged 17 to 19	33%
	Of which girls:	21%
	boys:	45%
Parents with children aged 7 to 14	Would recommend an engineering career to their children	83%
STEM teachers	A career in engineering would be desirable for their pupils	57%

Table 8.A Perceptions of engineering



⁴⁹ http://www.engineeringuk.com/_resources/documents/Dec%202014%20Engineers%20and%20Engineering%20Brand%20Monitor%202014.pdf, p1



	Negative	Positive
Girls aged 7 to 9	Too dirty and messy	Appreciated the social purpose of engineering
Girls aged 10 to 12	Dangerous and not strong enough	Responded to female role models
Girls aged 13 to 15	Unglamorous and unsocial	Opportunity to stand out with different career choice

Table 8.B Girls' perceptions of engineering⁵⁰

- 8.5 Research from Network Rail has looked at the ways in which girls respond to engineering.
- 8.6 This research suggests that when the social value of engineering is highlighted, girls in particular respond very positively and this begins to remove the gender barriers that formulate in their minds from as young as primary.
- 8.7 It is clear that continued work to address young people and teachers' perceptions of engineering are needed and it is critical that we show how transport is making a difference to people's lives.

Vocational v academic

- 8.8 The use of 'vocational' and 'academic' as reference points within the education landscape demonstrates the disconnection between skills needed by industry in the 21st century and education. The images that both terms immediately convey within the minds of educators and parents reflect decades old assumptions. With the advent of level 4, 5, 6 and 7 (Masters) level apprenticeships, these terms are even more redundant. Instead, the language used should reflect the technical professional nature of transport apprenticeships.

Vocational	Providing skills and education that prepare you for a job
Technical	Relating to the knowledge, machines or methods used in science and industry Relating to the knowledge and methods used of a particular subject Relating to practical skills and methods that are used in a particular activity
Professional	Relating to work that needs special training or education Having the qualities that you connect with trained and skilled people, such as effectiveness, skill, organisation and seriousness of manner Having the type of job that is respected because it involves a high level of education and training. ⁵¹

Table 8.C Definitions of technical professional education and apprenticeships

⁵⁰ <https://www.networkrail.co.uk/news/2015/oct/new-approach-girls-engineering/>

⁵¹ <http://dictionary.cambridge.org/>

Government's role

8.9 In addition to the recommendations in this chapter, there is also activity underway in other Government departments to increase the numbers of people with the technical skills and knowledge needed across the economy, including in the transport sector. This includes reforms to technical and professional education, both through work (apprenticeships) and classroom based study. There are also on-going reforms to increase the number of high quality providers of technical and

professional education, including the introduction of institutes of technology and university technical colleges (UTCs). **Table 8.D** illustrates key activities taking over the next 2 years.

8.10 During the development of this strategy links have also been made between the Transport and Infrastructure Education Partnership (TIEP)⁵² and the relevant government departments, providing a valuable employer/government link.

	Lead departments	Activity
January 2016	BIS, DWP, DfE	Youth Employment Campaign Government will launch an integrated communications campaign to promote apprenticeships, traineeships and work experience opportunities
December 2015	BIS/DfE	Government will publish a simple reference guide setting out the ways in which employers can engage with schools
February 2016	BIS/DfE	Careers and Enterprise Company will award funding to initiatives from its Careers and Enterprise Investment Fund
Early 2016	BIS/DfE	Government will commission research to identify where careers advice is successfully driving positive shifts in attainment, attendance, behaviour and social mobility
Spring 2016	BIS/DfE	The Independent Panel for Technical and Professional Education, chaired by Lord Sainsbury, will report to Government
From September 2016	BIS/DfE	UCAS will promote higher and degree apprenticeships and enable people to apply for them via its website
By March 2016	BIS/DfE	The Careers and Enterprise Company will roll out a national network of Enterprise Advisors
October 2016 - March 2017	DWP	Jobcentre Plus will roll out its initiative for raising awareness in schools of apprenticeships, traineeships and other local employment opportunities
By September 2017	DfE	Government will set out the minimum level of employer and provider interactions that every pupil should experience to support them to make better informed choices at important transition points
By September 2017	DfE	Government will amend existing careers legislation to improve access to information on education and training options, including introducing a duty on schools to co-operate with other education and training providers

Table 8.D Timeline of complementary activities across Government

⁵² TIEP, Chaired by Crossrail includes TfL, Network Rail, HS2, Thames Tideway Tunnel, City Airport, The London Transport Museum, National Skills Academy for Railway, STEMNET, Engineering UK

2018 – a year to celebrate engineering

8.11 In October 2014, the Secretary of State for Transport, Patrick McLoughlin, announced his intention to make 2018 a year to celebrate engineering in order to "*recognise what brilliant engineers we have in this country*" and "*excite a new generation of Brunels, Stephensons and Telfords*".

We will work with rail stakeholders to modify a working train to travel across the country and into our disadvantaged communities, showing children the wide variety of exciting careers available in the industry and inspiring a new generation of transport and engineering enthusiasts.

8.12 The train will showcase rail's heritage, its vital role in our country's economy and demonstrate cutting edge digital technologies to drive up its performance and deliver better customer satisfaction. Interactive exhibits will give children an opportunity to see what it's like to drive a train, design a new station or run a railway.

8.13 There has been widespread support from engineering companies and the professional engineering institutions for a year of events to celebrate our engineering achievements and to inspire young people to become engineers. All of these organisations are taking action to raise the profile of engineering with young people but would welcome a dedicated year backed by the government to focus and reinforce their work.

8.14 The DfT is working closely with the Royal Academy of Engineering, Engineering UK and colleagues from BIS and other departments to develop plans for the year.

8.15 There will be involvement from representatives of the wider engineering community to ensure the year is effective and leaves a positive legacy in terms of changing the perceptions of engineering and encouraging more young people to choose careers in engineering.

8.16 Industry initiatives like Tomorrow's Engineers and the Big Bang Fair are already having a positive impact on how young people view engineering. 2018 will support and reinforce these through a series of events across the country. It is likely to make use of great venues such as the National Space Centre in Leicester and the Science Museum in London, opening up cutting edge projects like Crossrail for the public to see and involving young people in major events such as the Farnborough International Air Show.

8.17 The year will also play an important role in changing wider perceptions of engineering, in particular the views of those such as parents, teachers and careers advisers who have significant influence over the educational choices that young people make.

8.18 Detailed plans for the year will be made during 2016 and promotional activity will begin in 2017.



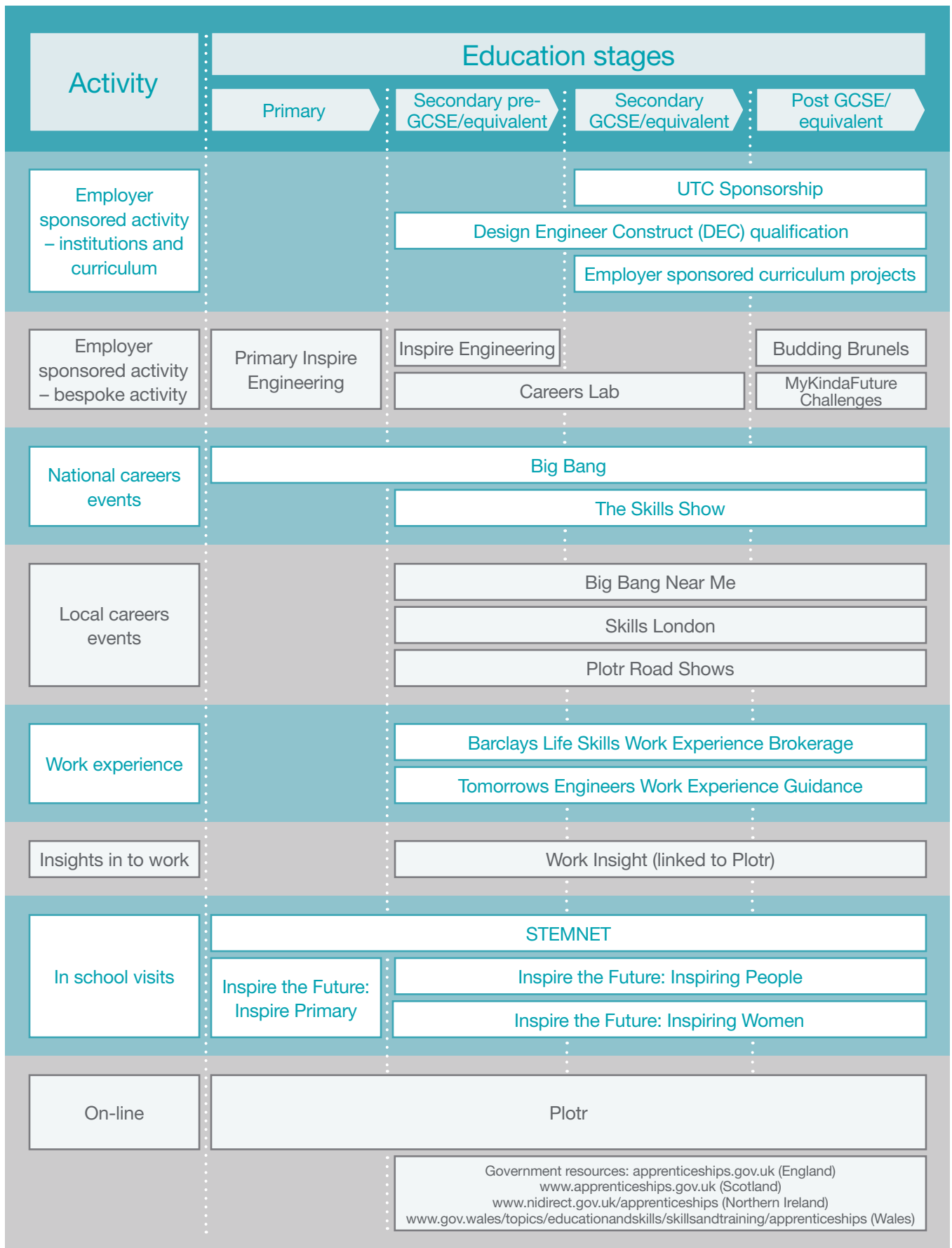


Figure 8.B Overview of activity engaging young people in schools (DfT and Client Organisations)

Overview of current schools engagement

8.19 The transport sector is engaging with education and much work is already underway by DfT's arm's length bodies and client organisations, suppliers, transport related museums throughout the country and grassroots organisations such as Young Rail Professionals and Careers at Sea Ambassadors. Many of these programmes include their volunteers registering with STEMNET, a national database of Science, Technology, Engineering and Mathematics professionals. Schools and colleges can contact STEMNET directly to request a volunteer visit. This is illustrated in **Figure 8.B**.

8.20 This experience and recent research has allowed us to look at areas of further opportunity, completing the missing pieces of a complex jigsaw as to how to influence young people, their parents and teachers.

8.21 However, in order to achieve a far greater impact, there are opportunities for the sector to work more effectively. In particular:

- encouraging engagement by a wider range of individuals and companies from the transport sector to provide careers insight from a younger age
- greater formal and informal co-ordination of activities.



Case study

London Nautical School

The London Nautical School is a London based secondary school that offers nautical studies as part of their curriculum. They have support from industry in the work that they do in encouraging the next generation of maritime professionals. The maritime sector, including the nautical studies teacher from the London Nautical School, hope to develop 3 maritime BTECs:

- level 2 maritime BTEC aimed at schools and academies to sit alongside GCSEs
- level 2 maritime BTEC aimed at industry
- level 3 maritime BTEC aimed at sixth form and FE/higher level apprenticeship study.



Encouraging wider engagement

- 8.22** For smaller organisations in the sector, the number of initiatives and activities can be a daunting landscape to navigate. Therefore, any mechanisms that make the process of engaging with schools simple and straightforward for small organisations and individuals are welcome.
- 8.23** Primary Futures, the primary arm of the Inspiring the Future programme is such a mechanism. It aims to widen the horizons and aspirations of primary school children by helping them make the connections between their learning and their futures. Through Primary Futures teachers can access a vast network of volunteers from different backgrounds and professions.
- 8.24** As Russell Hobby, General Secretary of the National Association of Head Teachers says:

"For children of primary age, making a connection between what they learn in the classroom and how it relates to the world of work isn't easy. Primary Futures is intended to change that. It is not about specific careers advice, or fixing on one path for the future at age 11. It is about raising and broadening horizons about what can be achieved."

- 8.25** The impact of having more careers advice and continuing this into secondary school specifically with contact from professionals can have a profound impact. In February 2012, the Education and Employers Taskforce found that young people who had contact at least 4 times with employers were 5 times more likely to be in education, employment or training than their peers who recalled no such contacts.⁵³

Formal and informal co-ordination

- 8.26** Engineering UK worked with the Boston Consulting Group and employers to engage with schools in the north-east and south-east regions during a pilot project. They found that by co-ordinating their approach on a regional basis they tripled the number of young people who were reached by this activity, showing the clear benefits of co-ordination.⁵⁴
- 8.27** Engineering UK have created a schools database which employers who are engaging in engineering related activities with schools can submit their data to. Additionally, employers can use the database to identify schools not currently receiving any employer engineering engagement, or look to support schools with specific characteristics such as low achieving maths and English GCSEs, higher proportions of free school meals, higher BAME populations and areas of deprivation.

⁵³ Ways into work: Views of children and young people on education and employment (City and Guilds, May 2012)

⁵⁴ http://www.engineeringuk.com/_resources/documents/EngUK_Report_2015_Interactive.pdf

8.28 The Transport and Infrastructure Education Partnership (TIEP) is a forum of schools and skills leads who come together to share best practice and identify areas where all or some can work together in the education space.

8.29 TIEP was founded by and is chaired by the Young Crossrail team and currently includes TfL, Network Rail, Thames Tideway Tunnel, HS2, City Airport, National Grid, London City Archives, the London Transport Museum, the National Skills Academy for Rail, STEMNET and Engineering UK. We would encourage greater road, aviation and maritime representation.

8.30 In addition to formal co-ordination, more informal co-ordination is possible by focusing activities around certain points of the year. By targeting educational activities around these particular days, a critical mass of transport organisations, whether large employers or small and medium-sized enterprises (SMEs), is more likely to be attained. The dates are:

National Careers Week
7 to 11 March 2016

National Apprenticeship Week
14 to 18 March 2016

Tomorrow's Engineers Week
5 to 9 November 2016 (TBC)

National Women in Engineering Day
23 June 2016



Centres of Excellence Community Hubs

8.31 The transport centres of excellence (see **Chapter 4**) network should work with schools and other local agencies to implement a community action plan to achieve:

- better engagement with under-represented groups
- engagement with non-engineering community groups, youth clubs and faith institutions
- links to local schools and colleges including hosting lessons from local schools
- continuous professional development for teachers and lecturers
- support for ex-forces personnel, disability groups and local lesbian gay bi-sexual and transgender groups.

Digital careers advice

8.32 Schools have a duty to provide careers information, including through digital channels as well as face-to-face meetings.⁵⁵ One channel is the National Careers Service. Another is Plotr.co.uk, which has been created with teachers, employer and young people's input. It offers young people a way to explore the world of work and allows schools and teachers to connect with employers.

8.33 Through using Plotr, the transport sector can benefit from co-ordination and collaboration in the digital space while teachers and students can access expert careers advice, knowledge and information from one single digital platform. Transport organisations and the civil service have already begun to adopt Plotr. The table below outlines the site's most recent usage figures.

<i>Plotr user statistics (1/9/14 to 30/9/15)</i>		
Page views	20.3 million	
Average time on site	4.29 minutes	
Gender split	Male: 32%	Female: 68%
Age profile of users	Under 11	2%
	11 to 13	3%
	14 to 16	49%
	17 to 19	36%
	20 to 24	8%
	25 and over	2%
Top 10 locations	London, Birmingham, Leeds, Manchester, Bristol, Liverpool, Nottingham, Sheffield, Glasgow, Newcastle	

Table 8.E Plotr user statistics⁵⁶

⁵⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/440795/Careers_Guidance_Schools_Guidance.pdf

⁵⁶ Period covered 1/9/14 - 30/9/15

Support for teachers

- 8.34** As highlighted by Engineering UK, the biggest threat to being able to create the engineering professionals of the future is the number and quality of STEM teachers.⁵⁷ It is also critical that teachers of Science, Mathematics and Technology – subjects that are entry requirements for engineering study – are aware of the links to engineering and can be advocates of engineering career paths in their broadest sense.
- 8.35** Transport organisations (including Crossrail and Transport for London) have been leading the way in supporting teachers gaining industry experience via the Teacher Industry Partnership Scheme (TIPS) in collaboration with the 100 Years of Women in Transport campaign.
- 8.36** The scheme offers a bursary for state-funded schools to cover the cost of teachers undertaking 2-week placements with industry. TIPS is supported by the Wellcome Trust, DfE, the National Science Learning Centre, the Institution of Mechanical Engineers, the Institution of Engineering and Technology, the Biochemical Society and Project Enthuse.
- 8.37** In addition, materials to support key stages 1 to 4 have been produced by transport organisations including Siemens, Network Rail, the London Transport Museum and Aviation Heritage (Lincolnshire). These resources support teachers and help bring their subjects to life in real world engineering and transport settings.

Parents as influencers

- 8.38** Parents are an important influencer of careers for their children and so it is encouraging that parents have a positive view of engineering. According to the Engineering UK Brand Monitor Report 2014, "Overall, perceptions of engineering careers remain positive. Parents' assessment of engineering is positive and they remain well disposed to recommending an engineering career to their children".
- 8.39** To encourage this, parents will continue to be engaged through sector wide schools engagement as well as through the Community Action Plans for the national training centres.
- 8.40** In addition we recommend the promotion of the free resource 'Your Daughter's Future' during National Women in Engineering Day and National Careers Week. This resource has been developed by the Personal Social Health Education Association, which promotes personal, social, health and economic education in conjunction with girls, parents and teacher and a range of other organisations including Girl Guiding UK and the Education and Employers Taskforce.



⁵⁷ http://www.engineeringuk.com/_resources/documents/EngUK_Report_2015_Interactive.pdf

Project-based learning and real world experience

8.41 Project based learning provides young people with real world experience and helps them to understand how the subjects they study in school are applied in the real world. In addition there is a positive correlation between project based learning and improved literacy and numeracy standards.

8.42 In such an approach, lessons and activities are organised around a single project. By tying the project to real world scenarios and integrating different subjects, the aim is to make learning more meaningful and engaging. As the Education Endowment Foundation (EEF) note, "The approach also seeks to make students more accountable (by requiring public displays of finished work) and to improve the quality of feedback that pupils receive (by requiring multiple iterations with a formal review after each)".⁵⁸

8.43 Project based learning has been widely implemented and shown to be effective in higher education. There have been fewer studies in schools, but the approach has nonetheless shown promise at this level. A recent experimental study in California and Arizona high schools found that taking a project based approach to teaching economics generated significant improvements in economic literacy and problem solving skills.

8.44 The changes to qualifications in England which aim to address employers' concerns about the disconnect between GCSE Mathematics and English and the real world are welcome. In particular, the introduction of Core Mathematics⁵⁹ at AS level in particular which supports young people to continue to study maths in a practical way.

8.45 DfT would welcome the opportunity to work with DfE to address this within the core Mathematics, English and Science GCSEs.

8.46 The Maritime Growth Study (MGS) recommends exploring how maritime examples can be worked into schools' curriculum. The route suggested for this by DfE is for DfT to choose a subject area to link it to – for example, deliver maritime educational material through the Geographical Association for teachers to use with children in geography lessons.

Experiencing the world of work

8.47 Contact with inspirational individuals as already outlined is critical to inspiring young people and helping them with their future careers choices. Equally, in order for young people to gain the skills and insight they need for the world of work, it is important to gain real world experience.

⁵⁸ <https://educationendowmentfoundation.org.uk/projects/innovation-unit/>

⁵⁹ <https://www.gov.uk/government/news/new-maths-qualifications-to-boost-numbers-studying-maths-to-age-18>

Case study

AFBE-UK's Making Engineering Hot Campaign

AFBE-UK is a not-for-profit organisation which aims to bring together Engineers from BAME backgrounds in the UK. The Making Engineering Hot Campaign (MEH), founded in 2009, is a UK wide programme. Its primary purpose is to introduce young people of school and college age to careers in engineering. The programme's success relies on building close working relationships with teaching staff to understand the needs of their students, use of role models and project focused activities. Of the 1200+ young people reached, 87% would consider engineering careers.

In 2010 Fauzia Amao, age 17, participated with her mother in a MEH workshop titled 'Contributions by African People to the Development of Science and Technology', at Croydon Supplementary Education Project. Fauzia said:

"At the time, engineering was relatively new to me so it was enlightening to hear how some ancient peoples used the same fundamental principles to build the world's earliest civilisations. The event was a great opportunity to network with engineering professionals and like-minded young people. They offered me careers advice and guidance on universities and gaining work experience. An engineer I spoke to at the event later introduced me to a consulting civil engineer and we went on to establish a mentoring relationship."

Fauzia is now in the final year of her MEng in Civil and Structural Engineering at the University of Leeds and has been offered a graduate job at Atkins. She is also a STEM ambassador.

8.48 The government's recently published a 5 year plan for apprenticeships. *English Apprenticeships: Our 2020 Vision*, sets out the importance of early engagement with young people to ensure they have all the information they need to make the right choice for their future learning and career. This strategy sets out what more can be done at school level to make careers in transport more attractive.

8.49 Good quality work experience before school leaving age can influence decisions made by young people in terms of what learning and career path they may wish to pursue. Work experience, for a period of 1 to 14 days, is a proven method of preparing young people for work, offering opportunities for them to develop relevant skills and behaviours.



Case study

Steps into Work: Remploy, Barnet and Southgate College and Transport for London

Steps into Work is a 12 month programme. It involves participants completing 3 mainly office based roles within Transport for London (TFL). Students also have the opportunity to complete an operational placement in a London Underground (LU) station. This provides them the chance to gain a unit of an NVQ level 2 in Rail Services qualification which focuses on customer services. While on the programme, participants are students of Barnet and Southgate College studying towards a BTEC level 1 in Work Skills.

Richard Cowdery, 25, had struggled to find a permanent job after leaving school and felt employers were overlooking him because of his twin disabilities, Asperger Syndrome and cerebral palsy. After completing the year-long programme, he successfully applied for a full-time post as a customer service assistant at Hammersmith Tube station. Richard said:

"I've always had an interest in railways, particularly timetabling, so I consider myself very lucky to have a job that is also my hobby".



- 8.50** As transport can provide a plethora of careers, work experience can provide a spotlight for capable young people to explore the poorly understood world of technical and engineering careers.
- 8.51** However, work experience programmes can be resource intensive and off-putting, particularly to SMEs. As the City and Guilds report into work experience states, "Smaller businesses face greater barriers to engaging in work experience programmes. CBI state that 39% of companies with 50 to 199 employees currently have no links with schools, compared to just 18% of companies with more than 5,000 employees."⁶⁰
- 8.52** Instead, there are many ways that insights in to the world of work can be gained which allow flexibility to employers and valuable experience to young people and Engineering UK have produced a Tomorrow's Engineers to support employers, which is free to access via their website.

University technical colleges

- 8.53** UTCs are academies for 14 to 19-year-olds that specialise in subjects that need modern, technical, industry-standard equipment, such as engineering and digital technologies. Pupils integrate academic study with practical learning, studying core GCSEs within a high-quality technical and professional curriculum. 60% of KS4 time is given to academic subjects and 40% on technical. These proportions are reversed at KS5.

- 8.54** UTCs work with local and national employers and higher education institutions to design and deliver a curriculum that, through technical projects and work experience, will provide pupils with the skills employers demand for their industries.

- 8.55** Transport organisations throughout road, rail, maritime and aviation continue to support UTCs through sponsorship, volunteers, work experience, curriculum and technical support.

The way forward

- 8.56** To oversee the creation of a national, joined up approach to promoting transport to young people, parents and teachers, the Transport Skills and Education Forum (TSEF), will be established. Chaired by Lord Ahmad, Minister for Skills in the DfT. The group will take the best of what the sector is already doing and, through linking to other groups, achieve the following:

- an umbrella inclusive message/brand for our sector, complementing road, rail, aviation and maritime initiatives already underway
- a clear picture of activity and gaps across the sector (age, target audience)
- co-ordinated and targeted activities to ensure all age groups of young people, parents and teachers are reached, influenced and convinced of the merits of a career in transport
- support for SMEs to engage with education

⁶⁰ Work Experience: What's in it for employers? City and Guilds, Nov 2010



- representation of transport within other government departments' education, skills and employment work.

8.57 The group itself will work across the transport sector, engaging with skills bodies, employers and third parties such as transport museums and will look to deliver through existing bodies, where possible.

8.58 Experience across our sector shows some clear opportunities to advocate transport more effectively:

- primary school careers advice is central to long term appeal for all young people to our sector because gender stereotypes set in early
- project based learning enables young people to gain skills and insight into our sector

- engagement with parents and teachers is crucial, and is enabled through our training centres as well as teacher resources and continuous professional development

- 100 Years of Women in Transport provides a platform to inspire our next generation.

8.59 In addition government is doing much to promote high quality technical and professional education routes either through work (apprenticeships) or through non-work routes.

8.60 There is a need for a strategically driven core education engagement plan to be developed in more detail in 2016 as outlined in the strategy which will complement work already underway and provide a link to other government activity.

Phase	What	Who	Funding required
Phase 1 Early 2016	Establish the Forum: - Define purpose and vision - Create terms of reference - Validate membership and links to complementary bodies	DfT, Client Organisations, Engineering UK and the Royal Academy of Engineering, Skills bodies from Road, Rail, Aviation and Maritime	No
Phase 2 Mid 2016	Strands of Work established and validated: - Social value messaging (brand transport) - Age group segmentation and priorities - Teachers - Parents - Support for advocates - SME support - Measurement	Leads to be confirmed	If further specific research required
Phase 3 By end 2016	Clarity: - Gaps identified - Solutions proposed including requests for funding - Commission solutions	Delivery partners TBC	May be required
Phase 4 Mid 2017	Roll-out		

Table 8F Timeline for the Transport Skills and Education Forum

Recommendations

We will work with other government departments, specifically BIS and DfE, to ensure a joined up and effective approach to education and skills within schools and colleges. In addition working via the Transport and Infrastructure Education Partnership (TIEP), transport suppliers, Engineering UK and the professional institutions, we will develop a joined up national approach to education activity to promote careers in transport, technical and professional education routes leading to apprenticeships, and STEM subjects to parents, teachers and all young people. This will include groups that are currently under-represented such as women and BAME communities, and will support social mobility.

This will:

- align DfT, BIS and DfE by establishing a Transport, Skills and Education forum which will include Engineering UK, the Royal Academy of Engineering and DfT Client Organisations and will be chaired by Lord Ahmad. The forum will monitor progress of education and school activities promoting STEM, apprenticeships and technical professional education routes in schools. The Forum will convene at least twice a year and enable us to work with BIS and DfE to ensure alignment with the proposals for technical and professional education reforms, following the report by the Independent Panel for Technical and Professional Education in spring 2016.
- radically increase support for primary school careers advice to break down gender stereotypes and promote careers in transport by ensuring every primary school in the UK is visited by 2020; and celebrate progress towards this during 2018's celebrations of engineering.
- radically increase the number of transport volunteers engaging with primary and secondary schools by promoting volunteering opportunities in addition to STEMNET via Inspiring the Future (Inspiring Women and Primary Futures) and celebrate progress during 2018's year to celebrate engineering. Equip our volunteers with the tools to be effective advocates. These will include existing resources and those in development such as those developed by Tomorrow's Engineers, the Women in Science and Engineering "someone like me" app, the 100 Years of Women in Transport schools videos and the CIHT Schools Toolkit which is in its design phase.
- co-ordinate schools engagement efforts via Engineering UK's schools database, and focus particular efforts at certain times such as Tomorrow's Engineers week, using these events to specifically target under-represented groups.



- advocate and support more technical and professional education routes in schools, including project based learning and technical qualifications supported by industry and based on existing learning approaches such as Design Engineer Construct!

We will embrace the once in a generation opportunity presented by the designating 2018 as a year to celebrate engineering by working with the industry to develop and roll out a compelling communications campaign. This will celebrate our engineering heritage and inspire young people to choose careers in engineering as we build towards 2018.

We will:

- ensure that careers in transport are prominently represented in this campaign.
- develop a programme of events across the country throughout 2018 to showcase the contribution that engineers make to society.
- ensure that the campaign targets all young people, their parents and their teachers, and is reflected in the educational activity we undertake.

9. Conclusion and recommendations



Conclusion

1. The transport sector is benefitting from unprecedented levels of government investment. That investment is in recognition of the value of connectivity – providing access to goods, services and jobs; helping businesses prosper; and bringing people together.
2. But, as this strategy has set out, delivering the investment programme while still maintaining and operating the existing transport system requires a significant increase in investment in people and skills.
3. The strategy has provided the opportunity to articulate the business case for diversity and inclusion, which has been embraced across the transport sector as can be seen in the case studies included in this strategy and in the CIHT and Royal Academy for Engineering's 'Routes to Diversity & Inclusion' toolkit.
4. The question remains: How does government and the sector bring about change to overcome the obstacles and barriers we face in trying to reflect the society we serve? The strategy is embracing the opportunity to link the long term approach to education with the desired outcome of embracing change.
5. The strategy aims to strike a balance between driving change by setting high level, brave aspirational ambitions and achievability.
6. The table below outlines our main recommendations. Taken together they constitute an ambitious and comprehensive set of actions. DfT, together with our client organisations including our arm's length bodies, are committed to implementing them and reporting on progress. But we cannot do this on our own: we need the help of employers, suppliers, educators and professional bodies. So we will work closely with transport stakeholders to take this skills agenda forward.
7. We also recognise that over time the skills challenges facing transport will change, for example as new technology is introduced or new projects announced. So we are committed to keeping this strategy and its recommendations under review so that it continues to be relevant. To this end, we will publish a progress report in a year's time.

Recommendations



Summary Recommendations		
What	Who	When
<p>Greater workforce diversity and inclusion.</p> <p>Increase representation of women and BAME groups in transport, with 20% of new entrants to technical and engineering apprenticeships to be women by 2020, and parity achieved with the working population by 2030. Support Government target of 20% increase in number of BAME candidates undertaking apprenticeships by 2020.</p>	<p>DfT and client organisations to implement</p> <p>Employers to deliver</p>	<p>March 2016 onwards</p>
<p>Establish Strategic Transport Apprenticeship Taskforce (STAT) – Employers to voluntarily come together to address skills challenges in a co-ordinated and collaborative way.</p> <p>Priorities to include:</p> <ul style="list-style-type: none"> • reviewing the future need for apprenticeships • encouraging groups of employers to come together to develop new apprenticeship standards • opening up training facilities to employers across the sector • working together to define the training required from the sector • working collaboratively to promote transport as an exciting career option to young people. 	<p>DfT, client organisations, employers and Trade Unions</p>	<p>June 2016</p>
<p>Grow research and innovation talent. Transport sector to collaborate with leading research and academic institutes and create development programmes for senior managers that encompass design, innovation and leadership.</p>	<p>DfT, client organisations</p>	<p>March 2016 onwards</p>
<p>Establish transport centres of excellence – National colleges to become specialist centres of excellence leading the delivery of world class training in collaboration with the wider network of regional and further education colleges.</p>	<p>STAT to steer</p>	<p>March 2016 onwards</p>

Summary Recommendations

What	Who	When
Use procurement levers – Use contracts to deliver apprenticeships right through the supply chain. 1 apprenticeship per £3 to £5m contract value or 2.5% of workforce per year as appropriate for the contract type	DfT and client organisations, employers and supply chain	March 2016 onwards
Make best use of apprenticeship levy across transport sector – Work with employers to maximise best use of the apprenticeship levy for whole sector, including SMEs and promote transport as a high value sector	BIS, DfT and client organisations working with STAT, skills organisations, professional institutions and suppliers	2016, ready for levy 2017
Maximising local opportunities – DfT funding pots to incentivise local apprenticeship growth	DfT, local authorities and Local Enterprise Partnerships (LEPs)	Spring 2016
National approach to promote transport in schools – Transport & Infrastructure Education Partnership (TIEP), suppliers, Engineering UK and professional institutions will work together to promote careers in transport to young people, parents and schools from primary age	DfT, DfE, employers, Royal Academy, Engineering UK	Spring 2016
Make 2018 a year to celebrate engineering – Deliver compelling communication campaign promoting transport as a career of choice	DfT, BIS, DfE, Royal Academy, Engineering UK	Detailed plans by end of 2016
Maritime: implement Growth Study recommendations	DfT, other government departments, industry stakeholders	January 2016 onwards
Aviation: assess value of aviation skills strategy	DfT, BIS, CAA, industry stakeholders	January 2016 onwards



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