Report of the Independent Panel on Technical Education

April 2016

The Independent Panel on Technical Education

The Independent Panel on Technical Education was established by the Minister for Skills, on behalf of the Secretaries of State for Education and for Business, Innovation and Skills, in November 2015. It was tasked with advising ministers on actions to improve the quality of technical education in England and, in particular, to simplify the currently over-complex system and ensure the new system provides the skills most needed for the 21st century.

The Panel was chaired by David Sainsbury and its members were:

- Simon Blagden (Non-executive Chairman, Fujitsu UK)
- Bev Robinson (Principal & Chief Executive, Blackpool and The Fylde College)
- Steven West (Vice-Chancellor & President, University of the West of England, Bristol)
- Alison Wolf (Sir Roy Griffiths Professor of Public Sector Management, King's College London)

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Foreword

It is over a hundred years since the first report was produced which highlighted the failures of technical education in the UK, and since the Second World War there have been very many attempts to reform the system. These have all been unsuccessful because they tinkered with technical education, and failed to learn from the successful systems in other countries.

As a result we have today a serious shortage of technicians in industry at a time when over 400,000 16-24 year olds are unemployed. It is hard to believe that none of these young people have the ability and motivation to train as technicians if given good opportunities to do so.

If one looks at successful education systems elsewhere in the world it is clear that a central feature of them is a well-understood national system of qualifications that works in the marketplace. Young people will only work hard to get a qualification, and value it highly when they get it, if employers when recruiting give priority to individuals who possess it.

In our report we have, therefore, set out the four key features of such a labour market-orientated system of technical education, and what the Government needs to do to put such a system in place:

(i) While Government has to design the overall system, industry experts must lay down the knowledge and skills, and methods of assessment, for each qualification.

(ii) The system should provide young people with clear educational routes which lead to employment in specific occupations, and must be sufficiently clear and simple that career advisers can easily explain to young people what options they have. Currently there are 13,000 qualifications, many of them of little value, available to 16-18 year olds and this makes career guidance extremely difficult.

(iii) Short, flexible bridging provisions should be developed to enable individuals who come to believe they have made the wrong decision to move between the academic and technical education options in either direction, and to support adults returning to study.

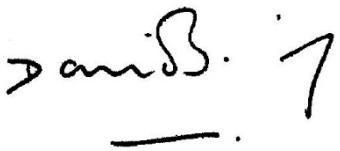
(iv) Individuals who are not ready to access a technical education route at age 16 (or older if their education has been delayed) should be offered a flexible transition year tailored to their prior attainment and aspirations.

We believe that the development of such a national system of qualifications, together with the introduction of the new apprenticeship levy, provides a unique opportunity to equip the UK with a world-class system of technical education whose costs are fairly shared among employers and the state.

But it will only work if industry takes ownership of the content and standards of technical education, and makes certain that companies adhere to them. It is also essential that the Government makes certain that the educational infrastructure exists to provide a world-class system of technical education, including high-quality teaching and access to industry-standard facilities and equipment. A reason why our system of technical education has not been of high quality or respected in the past is that it has not been properly funded.

We believe that the introduction of the system of technical education we have proposed, together with the widespread availability of comprehensive career guidance, should make it possible to produce the technical workforce that the country desperately needs, and significantly increase our national productivity. But it will not be successful if it is not effectively implemented and supported over more than one parliament.

I would like to express my gratitude to a number of people who have contributed to this report. Above all I am immensely indebted to the Panel members, each of whom brought their expert knowledge, experience, passion and good humour to our meetings and the task of preparing this report. I would also like to pay tribute to the professionalism of the secretariat, drawn from officials at DfE, BIS and my Gatsby Foundation, and thank the hundreds of employers, professional institutions, college staff and students, and other individuals who gave their time to attend stakeholder events and meetings around the country.



DAVID SAINSBURY

Executive summary

Our Panel was established in November 2015 by the Minister for Skills, Nick Boles MP, on behalf of the Secretaries of State for Education and for Business, Innovation and Skills and with strong endorsement from the Prime Minister. We were asked to advise ministers on measures which could improve technical education in England. Since November we have considered best practice in this country and across international systems and consulted hundreds of employers, providers and young people.

Clearly there are serious problems with the existing system. In particular, it is over-complex and fails to provide the skills most needed for the 21st century. By 2020, the UK is set to fall to 28th out of 33 OECD countries in terms of developing intermediate skills, and the size of the post-secondary technical education sector in England is extremely small by international standards. This adversely affects our productivity, where we lag behind competitors like Germany and France by as much as 36 percentage points.

Unless we take urgent action we will be left even further behind. This is not just an economic imperative, but a social one: we need to offer everyone the chance of a lifetime of sustained employment and the opportunity to progress to the highest skills levels. The current system fails on this count as well. Currently over 13,000 qualifications are available for 16-18 year olds, yet these often hold little value for either individuals or employers, although that may not be obvious until too late. At higher levels, too, technical education qualifications have too often become divorced from the occupations they should be preparing individuals for because there have been no, or only weak, requirements that they meet such needs.

Our recommendations call for a fundamental shift. This is a chance to systematically reform technical education for the long term: ensuring individuals can develop the technical knowledge and skills that industry needs through their education and training.

Technical education within the education and training system

The first step is framing and setting up technical education in the right way within the wider education and training system. It needs to work for individuals and employers and it needs to fit coherently with other forms of provision.

The majority of individuals starting on a college-based technical education route will be young people aged 16-18. **We recommend the Government develops a coherent technical education option which develops the technical knowledge and skills required to enter skilled employment, which leads from levels 2/3 to levels 4/5 and beyond, and which is highly valued because it works in the marketplace.**

The technical option should be recognised as having two modes of learning: employment-based (typically an apprenticeship) and college-based:

(i) Employment-based – this is most commonly delivered via an apprenticeship, usually at level 2 or level 3, and includes a combination of on-the-job learning of skills (in the workplace) and at least 20% off-the-job learning of knowledge (in a college or private training provider).

(ii) College-based – this is typically a two-year, full-time study programme which should include work placements appropriate to the technical education route and individual student.

While it is necessary for Government to design the overall national system of technical education, employer-designed standards must be put at its heart to ensure it works in the marketplace. A single, common framework of standards should cover both apprenticeships and college-based provision. These standards must be designed to deliver the knowledge, skills and behaviours required to perform successfully in specific occupations, not the narrower job role-focused needs of individual employers.

This technical option – pursued through either mode of learning – needs to be clearly delineated from the academic option, as they are designed for different purposes. But, at the same time, movement between the two must be possible: routes should not cut off movement to undergraduate study at university, and young people who follow A levels may choose to move directly into skilled employment. **We recommend the Government incentivises the development of short, flexible bridging provision to enable individuals to move, in either direction, between the academic and technical education options and to support adults returning to study.**

The system must work for adults as well as young people. Many of the principles that make the system work well for young people will apply, and adults with the necessary prerequisite knowledge and skills should be presented with the same choices as young people. Adults already in skilled employment who want to pursue a new career or progress higher in their chosen career will want to ensure they can join a technical education route at the highest possible point. Adults who have achieved at level 2 (GCSEs or equivalent), but not significantly higher, will be looking to enter technical education at effectively the same point as a typical 16 year old. In all these cases, standards need to be the same, but support and provision should be appropriately tailored and differentiated.

A system of technical education routes

Both employment- and college-based learning need to be closely integrated. Across both options, it is vital that young people and adults have clarity about which programmes to follow in order to target particular careers. **We recommend that a common framework of 15 routes is established which encompasses all employment-based and college-based technical education at levels 2 to 5.** We are proposing routes defined through analysis of labour market information regarding the size and nature of

occupations grouped together to reflect shared requirements for occupationally-related skills and knowledge. The proposed routes are set out in Chapter 3.

We recommend that the 15 technical education routes provide training for skilled occupations where there is a substantial requirement for technical knowledge and practical skills. We are clear that occupations which require little or no technical knowledge and skill fall outside the scope of technical education.

Governance and standards

A key aim is that, as far as possible, an individual following a college-based technical education route will be able to develop the same or equivalent technical knowledge, skills and behaviours as someone on a comparable apprenticeship. In achieving that aim, it will be important for a common framework of standards to rest with a single organisation to ensure close integration across college-based and employment-based technical education.

We recommend that the remit of the Institute for Apprenticeships is developed and expanded to encompass all of technical education at levels 2 to 5. The Institute should be responsible for assuring standards and bringing relevant experts together to agree the technical knowledge, practical skills and behaviours to be acquired in each route for both apprenticeships and college-based provision. This will allow the Institute to maintain a single, common framework of technical education standards, qualifications and quality assurance.

We welcome the Government's intention to establish the Institute for Apprenticeships as a body with a large degree of autonomy. However, it is important that government should remain responsible for managing the design of the overall national system. **We recommend that, while it is right for the Institute for Apprenticeships to be delegated wide-ranging autonomy across its operational brief, responsibility for key strategic decisions must be reserved for the Secretary of State. Crucially these decisions must include those relating to the shape of the overall national system of technical education (such as adding new or removing existing routes, or changing the title of a route) if we are to ensure the new system remains coherent and stable over time.**

We want to give employers a much stronger role in setting standards and specifying the knowledge, skills and behaviours an individual needs in order to perform well in an occupation. Specifying the standards for college-based provision within each technical education route is not a role for officials in central government but for professionals working in, or with expert knowledge of, the relevant occupations, supported by experienced education professionals.

We recommend the Institute for Apprenticeships convenes panels of professionals to advise on the knowledge, skills and behaviours to be acquired for the standards

in each route and on suitable assessment strategies. These professionals should be appointed in an individual capacity, not as representatives of their employers.

We recommend that Institute for Apprenticeships panel members are remunerated from the public purse. Such remuneration is appropriate because panel members would have to commit a significant amount of effort to their panel duties.

Standards need to stay high quality and current: **we recommend that, at the earliest opportunity, the Institute for Apprenticeships reviews all existing apprenticeship standards to satisfy itself that there is no substantial overlap between standards, and that every standard is occupation- rather than firm-specific and contains sufficient technical content to warrant at least 20% off-the-job training. Standards found to be overlapping or wanting in terms of breadth or technical content should be revised, consolidated or withdrawn.**

The qualifications market

As well as standards which reflect the needs of industry, we need an efficient and effective mechanism for developing qualifications for college-based technical education which meet these standards.

Currently, we have a market-based approach to qualifications, which has led to huge numbers of competing qualifications. In September 2015, there were over 21,000 qualifications on Ofqual's Register of Regulated Qualifications, offered by 158 different awarding organisations. Individuals aiming for a future in plumbing, for example, have to choose between 33 qualifications. This kind of proliferation is a serious issue because it makes the system very confusing for individuals and employers.

Levels 2 and 3

We recommend the Government moves away from the current awarding organisation market model, where qualifications which deliver similar but different outcomes compete with one another, and instead adopts a licensing approach. Any technical education qualification at levels 2 and 3 should be offered and awarded by a single body or consortium, under a licence covering a fixed period of time following an open competition.

Levels 4 and 5

At levels 4 and 5, many of the same issues exist, and onward progression in technical education at age 18 has traditionally been under-provided and poorly articulated. But provision is different at these levels for a number of reasons – for example, the balance of funding sources is very different. Reform of technical education provision at these levels is still needed, and we believe there is real value in simplifying the current

landscape. The starting point needs to be designing qualifications against requirements defined by panels of industry professionals – convened by the Institute for Apprenticeships – and directing public subsidy only at qualifications which meet these independently-set standards reflecting industry need.

We recommend the Institute for Apprenticeships maintains a register of approved technical education qualifications at levels 4 and 5 that meet the standards set by its panels of professionals. Only those qualifications appearing on this register should be eligible for public subsidy.

There is also a compelling need to ensure clear progression routes exist from levels 4 and 5 to higher levels of training. **We recommend the Government undertakes further work to examine how to ensure clear progression routes develop from levels 4 and 5 to degree apprenticeships and other higher education at levels 6 and 7. This work should be carried out in the context of existing and proposed structures and funding rules for higher education provision in England.**

Route content

Routes through the best international technical education systems begin with a broad curriculum, then increasingly specialise as an individual progresses to higher levels of knowledge and skills. Building on that approach, **we recommend that every college-based route should begin with a two-year programme suitable for 16-18 year olds (although some individuals may take more or less time to complete it). Each of these two-year programmes should begin with a 'common core' which applies to all individuals studying that route and is aligned to apprenticeships.**

We are recommending that after the common core, individuals should specialise to prepare for entry into an occupation or set of occupations. Beyond the age of 18 we also anticipate that many individuals will continue to study technical education at a higher level – full-time, part-time alongside work, or through a higher or degree apprenticeship.

English and maths

English and maths will remain vital skills, and **we recommend that, in addition to any separate requirements as a result of the English and maths funding condition, there is a single set of maths and English 'exit' requirements governing college-based technical education and apprenticeships. These should be seen as the minimum level of maths or English which all individuals must achieve ahead of securing technical education certification, as is already the case for apprentices.**

We recognise that current requirements are still low by international standards, and we believe individuals should have higher aspirations. **In the longer term, as the quality of pre- and post-16 maths and English teaching and associated learner outcomes**

improve, government should raise maths and English requirements to reflect those of higher-performing international technical education systems.

We would want the Institute for Apprenticeships' panels of professionals to include relevant maths and English standards where these directly relate to occupational requirements; indeed many occupations will require higher standards. **We recommend the Institute for Apprenticeships encourages its panels of professionals to incorporate additional, occupation-specific maths and English requirements into the standards for each route.**

Work placements

For students on college-based technical education routes, work placements can offer the opportunity to gain practical skills and behaviours which would be more difficult to learn in an educational setting. We believe these students need a radical shift in emphasis from short-duration work experience to structured work placements lasting much longer and with an employer in an industry relevant to the student's study programme.

In addition to work taster or short-duration work experience opportunities in their first year, every 16-18 year old student following a two-year college-based technical education programme should be entitled to a high-quality, structured work placement. Successful completion of this work placement should be a requirement for full certification at the end of the study programme. As part of the work placement, the student, college and employer should complete a log book – ideally online – that evidences the key tasks that the student has undertaken and what they have learnt.

We recognise that delivering this recommendation in practice is far from trivial. We are suggesting that up to 250,000 17 year olds could require work placements. **We recommend the Government makes additional funding available to colleges to support work placements for technical education students on college-based study programmes. We suggest the most straightforward way of doing this is to increase the base rate per student for each 16-18 year old technical education student who successfully completes a work placement. Initial evidence suggests that such an uplift might need to be around £500 per placement, but further work will be required to set the precise figure.**

Qualifications and certification

It is vital that technical education qualifications and our certification system signal to employers what an individual is able to do. To be effective, certification must have genuine labour market currency – evidenced by employers choosing to employ someone who has the technical education certificate over someone who has not. Equally, individuals must be confident that the certificate they work hard to achieve, and which

either they or the public purse pays for, will be recognised wherever they seek work in the future.

We recommend that, for both employment-based and college-based technical education at levels 2 and 3, there should be a single, nationally recognised certificate for each technical education route.

Each certificate is likely to include achievement of a qualification, and we want to reform the qualifications market. **For college-based technical education at levels 2 and 3, we recommend that the system of qualifications is simplified dramatically, with only one tech level qualification approved for each occupation or cluster of occupations.** As discussed earlier, we are recommending that only one awarding organisation (or consortium) should be licensed to offer each of these tech levels.

Government should ensure that employers and individuals are clear about which qualifications have been developed to meet the national technical education standards. A key lever is funding. **We recommend the Government restricts public subsidy for college-based technical education to that leading to qualifications approved by the Institute for Apprenticeships. This includes funding for 16-18 year olds and advanced learner loans available for adults aged 19 and over.**

Qualifications approved under the new system are likely to include multiple forms of assessment, with each tech level looking different depending on the content to be assessed. The Institute for Apprenticeships should work with its panels of professionals to agree how the knowledge, skills and behaviours described in the standards should be assessed. **For college-based technical education we recommend the Institute for Apprenticeships publishes guidance on the use of a range of common assessment strategies, makes assessment expertise available to the panels of professionals, and sets overarching quality criteria to apply to all tech levels.**

Regardless of the forms of assessment used, all qualifications used in college-based technical education should assess both the common core for the relevant route and the specialist / occupation-specific knowledge and skills. The assessment of every technical education qualification should include realistic tasks as well as synoptic assessment which, together, should be designed to test a student's ability to integrate and apply their knowledge and skills. All qualifications should include external assessment to ensure comparability and reliability.

Transition year

All young people should have the opportunity to benefit from technical education – including those with special educational needs and disabilities (SEND) – but in practice we know that there will be some who will not be ready to access technical education when they complete compulsory schooling at age 16.

Individuals who are not ready to access a technical education route at age 16 (or older if their education has been delayed) should be offered a 'transition year' to help them to prepare for further study or employment. The transition year should be flexible and tailored to the student's prior attainment and aspirations.

We recommend the Government commissions additional work into the design and content of a transition year, while ensuring that the key objective for the year remains to provide tailored provision that has a sharp focus on basic skills and on progression. Such work should be undertaken in good time to ensure the new transition year is available to students alongside first teaching of the technical education routes.

Wider systemic requirements

While not strictly in the Panel's remit, there are other criteria which are equally essential if England's technical education system is to be put on a par with the best in the world.

Careers education and guidance will play a vital role in the success of the reformed technical education system. In 2014, the Gatsby Foundation published its report 'Good Career Guidance' which distilled academic literature and good practice overseas into a set of eight benchmarks which identify different dimensions of good careers guidance. **We recommend the Government adopts the Gatsby benchmarks as the basis of a common national approach for careers education and guidance, and sets an expectation for schools and colleges to use the benchmarks when developing their careers provision.**

Government should also support schools and colleges to embed into careers education and guidance, from an early age, details of the new 15 technical education routes, so that young people and their parents understand the range of different occupations available and how to reach them.

We also recommend the National Careers Service reviews how it presents its career information and guidance in the light of our recommendations for reform of the technical education system.

It is important the labour market data used to form the routes provides information relevant to the current and likely future labour market. Currently, in the UK, information about the workforce is managed by the Office for National Statistics (ONS), which uses the Standard Occupation Classification (SOC) for information about what jobs people do. **We recommend that the ONS examines how to make the Standard Occupation Classification (SOC) more relevant for stakeholders – including expanding it to 5-digits. We further recommend that the Government explores how to make more occupational information available to the Institute for Apprenticeships, colleges and individuals by supplementing the nationally collected datasets with information from the American O*NET system and other sources.**

Good technical education requires expert teachers and lecturers. It also requires industry-standard facilities which are costly to develop and maintain. A rationalisation of specialist technical education facilities is required, concentrating them in a smaller number of high-quality, financially-stable institutions which are easily recognisable to both employers and prospective students. **We recommend that, when national and local decisions about the provision and funding of technical education are being taken, consideration is given to restricting funding to colleges and training providers which meet clear criteria of quality, stability and an ability to maintain up-to-date equipment and infrastructure.**

It is vital that reforms are supported by adequate funding. **We recommend the Government reviews what constitutes sufficient funding for technical education to deliver on its aims of meeting employer needs. This work should benchmark expenditure in England against that of other countries and be used to set appropriate funding levels for technical education when the new routes system is introduced.**

Next steps – implementation

Finally, effective implementation is essential to securing successful delivery of our proposals. We outline in Chapter 9 a series of factors which are essential prerequisites for successful implementation of our proposals: securing investment; adopting appropriate timescales which ensure extensive stakeholder engagement but put firm and coherent governance in place quickly; aligning systemic reforms; communicating the changes effectively; and establishing a stable policy environment to allow the reforms to take root. There exists now an opportunity to reform technical education for the long-term. If the key stakeholders – employers, the Government, and colleges and training providers – all commit to these reforms and are willing to play a full role in implementing them, England will finally benefit from a technical education system which can justifiably be called world-class.

Recommendations

Recommendation 1: We recommend the Government develops a coherent technical education option which develops the technical knowledge and skills required to enter skilled employment, which leads from levels 2/3 to levels 4/5 and beyond, and which is highly valued because it works in the marketplace.

Recommendation 2: The technical education option should be recognised as having two modes of learning: employment-based (typically an apprenticeship) and college-based.

Recommendation 3: While it is necessary for government to design the overall national system of technical education, employer-designed standards must be put at its heart to ensure it works in the marketplace. A single, common framework of standards should cover both apprenticeships and college-based provision. These standards must be designed to deliver the knowledge, skills and behaviours required to perform successfully in specific occupations, not the narrower job role-focused needs of individual employers.

Recommendation 4: We recommend the Government incentivises the development of short, flexible bridging provision to enable individuals to move, in either direction, between the academic and technical education options and to support adults returning to study.

Recommendation 5: We recommend that a common framework of 15 routes is established which encompasses all employment-based and college-based technical education at levels 2 to 5.

Recommendation 6: The 15 technical education routes should provide training for skilled occupations where there is a substantial requirement for technical knowledge and practical skills. We are clear that occupations which require little or no technical knowledge and skill fall outside the scope of technical education.

Recommendation 7: The remit of the Institute for Apprenticeships should be developed and expanded to encompass all of technical education at levels 2 to 5. The Institute should be responsible for assuring standards and bringing relevant experts together to agree the technical knowledge, practical skills and behaviours to be acquired in each route for both apprenticeships and college-based provision. This will allow the Institute to maintain a single, common framework of technical education standards, qualifications and quality assurance.

Recommendation 8: While it is right for the Institute for Apprenticeships to be delegated wide-ranging autonomy across its operational brief, responsibility for key strategic decisions must be reserved for the Secretary of State. Crucially these decisions include those relating to the shape of the overall national system of technical education (such as

adding new or removing existing routes, or changing the title of a route) if we are to ensure the new system remains coherent and stable over time.

Recommendation 9: We recommend the Institute for Apprenticeships convenes panels of professionals to advise on the knowledge, skills and behaviours to be acquired for the standards in each route and on suitable assessment strategies. These professionals should be appointed in an individual capacity, not as representatives of their employers.

Recommendation 10: Institute for Apprenticeships panel members should be remunerated from the public purse.

Recommendation 11: At the earliest opportunity, the Institute for Apprenticeships reviews all existing apprenticeship standards to satisfy itself that there is no substantial overlap between standards, and that every standard is occupation- rather than firm-specific and contains sufficient technical content to warrant at least 20% off-the-job training. Standards found to be overlapping or wanting in terms of breadth or technical content should be revised, consolidated or withdrawn.

Recommendation 12: We recommend the Government moves away from the current awarding organisation market model, where qualifications which deliver similar but different outcomes compete with one another, and instead adopts a licensing approach. Any technical education qualification at levels 2 and 3 should be offered and awarded by a single body or consortium, under a licence covering a fixed period of time following an open competition.

Recommendation 13: The Institute for Apprenticeships should maintain a register of approved technical education qualifications at levels 4 and 5 that meet the standards set by its panels of professionals. Only qualifications on this register should be eligible for public subsidy.

Recommendation 14: The Government should undertake further work to examine how to ensure clear progression routes develop from levels 4 and 5 to degree apprenticeships and other higher education at levels 6 and 7. This work should be carried out in the context of existing and proposed structures and funding rules for higher education provision in England.

Recommendation 15: Every college-based route should begin with a two-year programme suitable for 16-18 year olds (although some individuals may take more or less time to complete it). Each of these two-year programmes should begin with a ‘common core’ which applies to all individuals studying that route and is aligned to apprenticeships.

Recommendation 16: After the common core, individuals should specialise to prepare for entry into an occupation or set of occupations.

Recommendation 17: We recommend that, in addition to any separate requirements as a result of the English and maths funding condition, there is a single set of maths and English 'exit' requirements governing college-based technical education and apprenticeships. These should be seen as the minimum level of maths or English which all individuals must achieve ahead of securing technical education certification, as is already the case for apprentices.

Recommendation 18: In the longer term, as the quality of pre- and post-16 maths and English teaching and associated learner outcomes improve, government should raise maths and English requirements to reflect those of higher-performing international technical education systems.

Recommendation 19: We recommend the Institute for Apprenticeships encourages its panels of professionals to incorporate additional, occupation-specific maths and English requirements into the standards for each route.

Recommendation 20: In addition to work taster or short-duration work experience opportunities, every 16-18 year old student following a two-year college-based technical education programme should be entitled to a high-quality, structured work placement. Successful completion of this work placement should be a requirement for full certification at the end of the study programme. As part of the work placement, the student, college and employer should complete a log book – ideally online – that evidences the key tasks the student has undertaken and what they have learnt.

Recommendation 21: We recommend the Government makes additional funding available to colleges to support work placements for technical education students on college-based study programmes. We suggest the most straightforward way of doing this is to increase the base rate per student for each 16-18 year old technical education student who successfully completes a work placement. Initial evidence suggests that such an uplift might need to be around £500 per placement, but further work will be required to set the precise figure.

Recommendation 22: For both employment-based and college-based technical education at levels 2 and 3, there should be a single, nationally recognised certificate for each technical education route.

Recommendation 23: For college-based technical education at levels 2 and 3, we recommend that the system of qualifications is simplified dramatically, with only one tech level qualification approved for each occupation or cluster of occupations.

Recommendation 24: We recommend the Government restricts public subsidy for college-based technical education to that leading to qualifications approved by the Institute for Apprenticeships. This includes funding for 16-18 year olds and advanced learner loans available for adults aged 19 and older.

Recommendation 25: For college-based technical education we recommend the Institute for Apprenticeships publishes guidance on the use of a range of common assessment strategies, makes assessment expertise available to the panels of professionals, and sets overarching quality criteria to apply to all tech levels.

Recommendation 26: Regardless of the forms of assessment used, all qualifications in college-based technical education should assess both the common core for the relevant route and the specialist / occupation-specific knowledge and skills. The assessment of every technical education qualification should include realistic tasks as well as synoptic assessment which, together, should be designed to test a student's ability to integrate and apply their knowledge and skills. All qualifications should include external assessment to ensure comparability and reliability.

Recommendation 27: Individuals who are not ready to access a technical education route aged 16 (or older if their education has been delayed) should be offered a 'transition year' to help them prepare for further study or employment. The transition year should be flexible and tailored to the student's prior attainment and aspirations.

Recommendation 28: We recommend the Government commissions additional work into the design and content of a transition year, while ensuring the key objective for the year is offering tailored provision with a sharp focus on basic skills and progression. Such work should be undertaken in good time to ensure the new transition year is available to students alongside first teaching of the technical education routes.

Recommendation 29: We recommend the Government adopts the Gatsby benchmarks as the basis of a common national approach for careers education and guidance, and sets an expectation for schools and colleges to use the benchmarks when developing their careers provision.

Recommendation 30: Government should support schools and colleges to embed into careers education and guidance, from an early age, details of the new 15 technical education routes, so that young people and their parents understand the range of different occupations available and how to reach them.

Recommendation 31: The National Careers Service should review how it presents its career information and guidance in the light of our recommendations for reform of the technical education system.

Recommendation 32: We recommend that the ONS examines how to make the Standard Occupation Classification (SOC) more relevant for stakeholders – including expanding it to 5-digits. We further recommend that the Government explores how to make more occupational information available to the Institute for Apprenticeships, colleges and individuals by supplementing the nationally collected datasets with information from the American O*NET system and other sources.

Recommendation 33: We recommend that, when national and local decisions about the provision and funding of technical education are being taken, consideration is given to restricting funding to colleges and training providers which meet clear criteria of quality, stability and an ability to maintain up-to-date equipment and infrastructure.

Recommendation 34: We recommend the Government reviews what constitutes sufficient funding for technical education to deliver on its aims of meeting employer needs. This work should benchmark expenditure in England against that in other countries and be used to set appropriate funding levels for technical education when the new routes system is introduced.

Chapter 1: Introduction

The UK has a long-term productivity problem. Although some sectors such as the automotive industry have enjoyed stronger productivity growth in recent years, in 2014 we had a productivity gap of around 30 percentage points with countries such as France and the USA, while the gap with Germany was 36 percentage points and UK productivity was 18 percentage points below the average for the rest of the G7 economies.[1]

This productivity gap is holding our economy back. Across the globe, countries have realised that investing in the development of technical skills, especially at intermediate and post-secondary levels, is essential to enhancing productivity and improving living standards.[2] Yet, by 2020 the UK is predicted to rank just 28th of 33 OECD countries in terms of developing intermediate skills.[3] Furthermore, the size of the post-secondary technical education sector in England is extremely small by international standards.[4] As a result of years of undertraining at these levels, we face a chronic shortage of people with technician-level skills: in engineering and technology alone, Engineering UK data[5] show an annual shortfall of 29,000 people with level 3 skills and 40,000 with skills at level 4.[6] Furthermore, among 16-24 year olds, England and Northern Ireland together now rank in the bottom four OECD countries for literacy and numeracy – key prerequisites for access to intermediate and higher level skills training.[7]

In short, our education and skills system is failing to develop the skills employers seek. Unless we take urgent action, our economic competitors will leave us even further behind.

Economic need alone is not driving the urgency to act. The social need is equally pressing: we need to offer everyone the chance of a lifetime of sustained employment and the opportunity to progress to the highest skills levels.

Whatever their background, individuals need access to a national system of technical qualifications which is easy-to-understand, has credibility with employers and remains stable over time. Our current system fails on all these counts. Instead, individuals and

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[1] ONS (2016), International comparisons of productivity – final estimates: 2014. Productivity measured on an output per hour worked basis.

[2] NIESR (2015), UK skills and productivity in an international context

[3] UKCES (2015), UK Skill Levels and International Competitiveness 2014. 'Intermediate skills' corresponds broadly with levels 2 and 3 of the Regulated Qualifications Framework (RQF).

[4] OECD (2013), A Skills beyond School Review of England. 'Post-secondary' in this context refers to levels 4 and 5 of the RQF.

[5] Engineering UK (2016), Engineering UK 2016: Synopsis, recommendations and calls for action

[6] Throughout this report we refer to 'levels' of skills and qualifications. These are defined with reference to qualifications on the Regulated Qualifications Framework (RQF) and Framework for Higher Education Qualifications (FHEQ), which describe formal qualifications by their level of difficulty. A table giving the types of qualifications which feature at each level is given in Annex A.

[7] OECD (2013), OECD Skills Outlook 2013: First Results from the Survey of Adult Skills. Figure 2.3b (literacy among young adults adjusted) and figure 2.7b (numeracy among young adults adjusted).

employers must navigate a confusing and ever-changing multitude of qualifications: currently over 13,000 are available to 16-18 year olds. Many of these qualifications hold little value in the eyes of individuals and are not understood or sought by employers, but too many people do not realise this until it is too late. Evidence shows that parents/carers, teachers and the general public have long regarded technical qualifications as inferior to academic qualifications and tend to believe that they are most suited to less able learners.[8] [9] [10] At higher levels, too, technical education qualifications have too often become divorced from the actual occupations they should be preparing individuals for because there have been no, or only weak, requirements that they meet such needs. This has been compounded by the fact that, as the OECD acknowledges, one of the biggest challenges facing the development of fit-for-purpose qualifications at levels 4 and 5 in England is weak employer engagement.[11]

Successive UK governments have spent much of the last 50 years tinkering with vocational education. An almost continuous agenda of reform and remodelling has been pursued without a clear vision or sufficient commitment to ensure reforms took root. As a result, the vocational system has remained insufficiently dynamic and responsive to the changing economic environment, and the prestige of vocational education has suffered.

Recently, however, there have been encouraging signs that government has accepted the need to adopt a systematic and long-term approach to reforming the skills system, focusing squarely on ensuring individuals in education and training develop the technical knowledge and skills that industry needs.

In recent years, government and others have started to refer less frequently to 'vocational education' and increasingly to 'technical and professional education' or simply 'technical education'. This report follows this convention and uses 'technical education' throughout. It would be easy to suggest that the move away from 'vocational education' is nothing more than a change in terminology; simply a rebranding exercise. But we believe it must be much more than that. In the past in this country the vocational option has often been defined not by what it is, but by what it is not: the academic option. Despite its dictionary definition, the word 'vocational' in policy terms has often been treated as a catch-all term for everything other than GCSEs, A levels and degrees. We need to make a decisive break from this flawed approach, and we believe that shifting the emphasis to discussing technical education can help.

Technical education is not, and must not be allowed to become, simply 'vocational education' rebadged. Rather, the Government must be explicit that to be described as technical education, a programme must focus on progression into skilled employment and require the acquisition of both a substantial body of technical knowledge and a set of

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[8] OnePoll (2014), 'Children labelled 'too clever' for vocational education'

[9] City and Guilds (2011), What young people think about vocational education in England

[10] Unwin, L. et al. (2004), What Determines the Impact of Vocational Qualifications? A Literature Review

[11] OECD (2013), A Skills beyond School Review of England

practical skills valued by industry. Technical education covers provision from level 2 (the equivalent of good GCSEs) to higher education but it differs from A levels and other academic options in that it draws its purpose from the workplace rather than an academic discipline. Obviously technical education will involve some knowledge of an academic discipline, in the same way that the academic option will provide knowledge which is useful in the workplace. Nevertheless a distinction can usefully be drawn. Ultimately, we must communicate consistently and more effectively the truth that technical education leads to rewarding, skilled jobs and opens doors for individuals to progress to the most senior of roles.

Beyond this clarification in terminology, the last few years have also seen some important policy changes. The Coalition Government commissioned four key independent reviews to look at specific aspects of the technical education system. The Wolf Review focused on vocational education at 14-19.[12] The Commission on Adult Vocational Teaching and Learning report examined what makes excellent vocational teaching and learning.[13] The Whitehead Review looked at adult skills.[14] The Richard Review considered apprenticeships.[15] Each addressed specific problems and resulted in improvements to the technical education system. In particular, significant investment in apprenticeships has brought them into the mainstream, and we have seen a welcome streamlining of the number of technical education qualifications. The challenge for future reform is to build on these developments and to integrate them to produce enduring, system-wide change. What is needed is a national system of technical education that provides industry with a world-class cadre of highly productive and skilled individuals and gives individuals a clear and attractive pathway from education into skilled occupations at the highest levels.

We can build on examples of excellent college-based[16] technical education, as well as on recent reforms of apprenticeships which have given employers a much stronger role in specifying the knowledge, skills and behaviours an individual needs to perform well in an occupation. We can also draw on international evidence. For instance, it is striking how in many countries with high-performing technical education systems – including Norway, the Netherlands and Switzerland – there is widespread integration across the two modes of technical education learning: employment-based, such as an apprenticeship; and college-based, such as a full-time study programme at a college. In England these two modes of learning already overlap to a significant degree: all apprenticeships, for example, are required to include at least 20% 'off-the-job' (college-based) training. However the two systems have largely been designed to operate separately. More

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[12] Wolf, A. (2011), Review of Vocational Education - The Wolf Report

[13] Commission on Adult Vocational Teaching and Learning (2013), It's About Work… excellent adult vocational teaching and learning

[14] Whitehead, N. (2013), Review of Adult Vocational Qualifications in England

[15] Richard, D. (2012), The Richard Review of Apprenticeships

[16] "College-based" is used throughout this report as shorthand for any post-16 programme taught in an educational setting such as a general further education or sixth form college, UTC, university or private training provider, rather than an in-work programme such as an apprenticeship. It is not intended to be limited to FE colleges.

broadly, having examined practice in other countries, we are clear that all high-performing systems of technical education require:

- a well-understood, national system of qualifications that are genuinely respected by employers and so have value for the individual in the labour market
- widespread availability of comprehensive career guidance – including accurate and up-to-date labour market information and institutional performance data – so that all individuals can make informed choices between the education and training options on offer
- stable institutions with appropriate infrastructure for the delivery of technical education, including high-quality teaching and access to industry-standard facilities and equipment
- a system of adequate funding that incentivises individuals and employers to participate in education and training that results in productivity gains

Our Panel was established largely to consider actions required to deliver the first of the above requirements: how we can ensure that technical education is well understood by all key stakeholders and delivers outcomes that employers value. Our discussion focused on this, and therefore so does this report. However, although outside the scope of this report, we are clear that further action is required to deliver all four of the above characteristics if England is to benefit from a world-class system of technical education. We return to this in Chapter 8.

Chapter 2: Technical education within the education and training system

Any high-performing system of technical education must have labour market currency and work for young people and adults. This chapter discusses how these two groups will access and move through our proposed system and be able to move between the academic and technical education options.

Young people

The majority of individuals starting on a college-based technical education route will be young people aged 16-18.[17] We believe the vast majority of 16 year olds should be presented with two main options:

(i) An academic option, for those who are aiming to progress to a full-time undergraduate course at university at age 18. These are young people predominantly choosing study programmes comprising qualifications designed explicitly to meet the needs of universities: typically A levels and/or applied general qualifications.[18] Reform of this option falls outside the Panel's remit, although it clearly must be borne in mind when considering how technical education reform dovetails with the wider educational system.

(ii) A technical option, for those wishing to gain the technical knowledge and skills required to progress to skilled employment, either directly at 18 or after further, higher-level technical education such as a higher or degree apprenticeship. There are two possible modes of education and training within the technical education option; both should form part of a quality technical education route and both must be designed to meet standards set by employers:

- employment-based – this is most commonly delivered via an apprenticeship, usually at level 2 or level 3, and includes a combination of on-the-job learning of skills (in the workplace) and at least 20% off-the-job learning of knowledge (in a college or private training provider)
- college-based – this is typically a two-year, full-time study programme which should include work placements appropriate to the technical education route and individual student

As discussed in the previous chapter, college-based technical education in England currently suffers from a lack of clarity and prestige, and the qualifications on offer too

[17] Although of course some young people, for instance those studying at a UTC, will begin their technical education earlier.

[18] Applied general qualifications are level 3 qualifications for post-16 individuals who wish to continue their education through applied learning. The courses equip individuals with transferable knowledge and skills and the Department for Education requires that they have public backing from universities.

often fail to focus on equipping individuals with the knowledge and skills that industry needs.

Recommendation 1: We recommend the Government develops a coherent technical education option which develops the technical knowledge and skills required to enter skilled employment, which leads from levels 2/3 to levels 4/5 and beyond, and which is highly valued because it works in the marketplace.

Recommendation 2: The technical education option should be recognised as having two modes of learning: employment-based (typically an apprenticeship) and college-based.

Recommendation 3: While it is necessary for government to design the overall national system of technical education, employer-designed standards must be put at its heart to ensure it works in the marketplace. A single, common framework of standards should cover both apprenticeships and college-based provision. These standards must be designed to deliver the knowledge, skills and behaviours required to perform successfully in specific occupations, not the narrower job role-focused needs of individual employers.[19]

Not all young people at age 16 will be ready to access either the academic or technical education option. Those with low prior attainment, some of whom will have special educational needs and/or disabilities (SEND), or who took time out from education due to illness, will need appropriate support as a stepping-stone to further education and training or to employment. In Chapter 7, we discuss how anyone not ready to access academic or technical education should be offered an additional 'transition year'. The transition year would be tailored to an individual's prior attainment and aspirations and focus on developing basic skills, with the aim of progression to academic or technical education, or to employment with training, by the end of the year.

Young people with complex SEND, or those who have disengaged from education, will need highly tailored provision. Understanding the heterogeneous needs of individuals with SEND and facilitating appropriate provision for them is a task best undertaken by professionals with deep expertise in this area. In the absence of such expertise among Panel members, we do not attempt to make specific recommendations regarding this provision. Instead, we restrict ourselves to reiterating the importance of ensuring that all young people are adequately supported to access and progress in education and training appropriate to their aspirations and abilities.

Figure 1 shows, in simplified form, typical progression pathways through the academic and technical education options.

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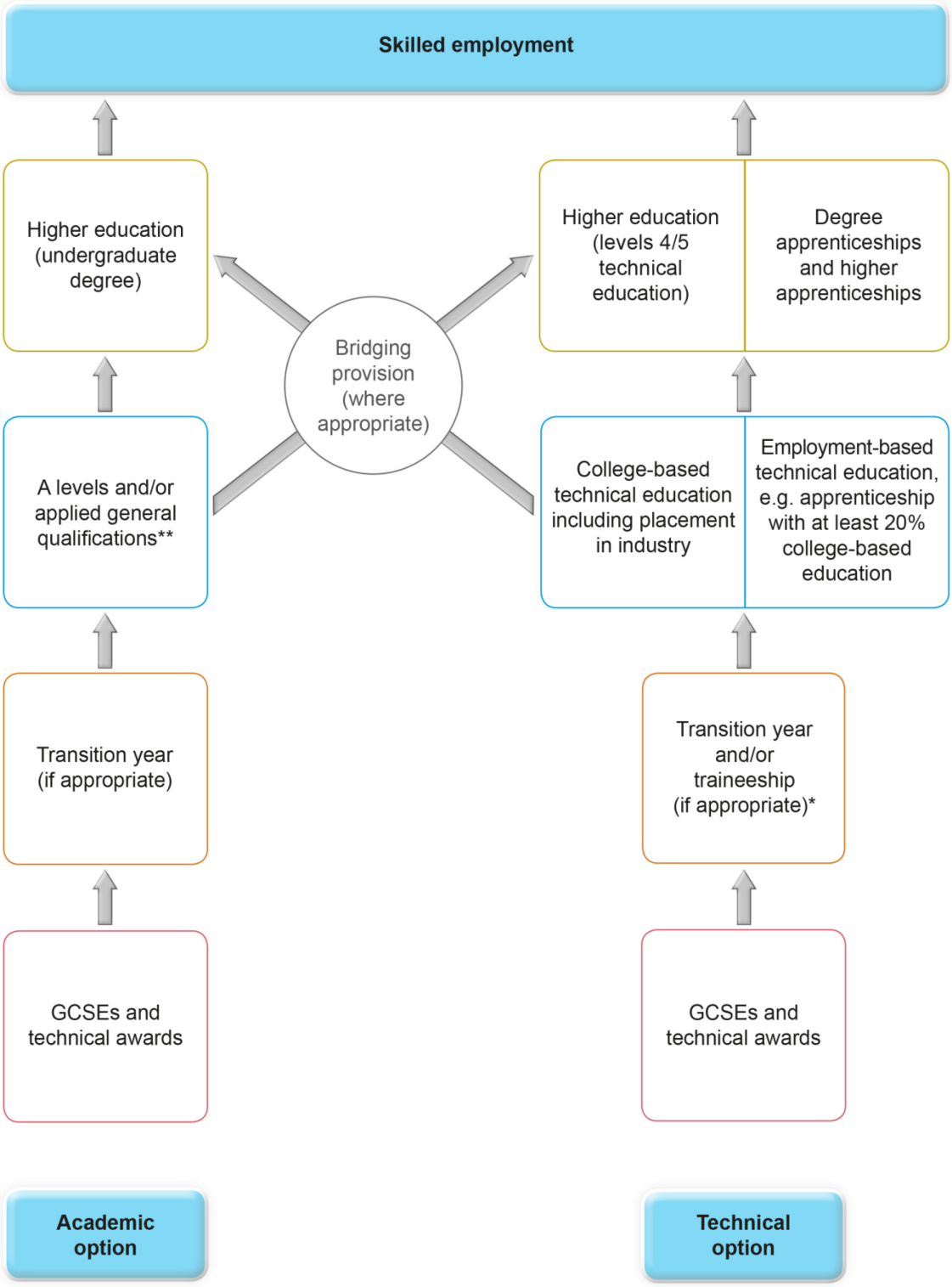
[19] We considered whether the current National Occupational Standards (NOS) could form the basis of technical education. However, NOS have been derived through a functional analysis of job roles and this has often led to an atomistic view of education and a rather 'tick-box' approach to assessment. As such we do not consider them to be fit-for-purpose for use in the design of the technical education routes.



* Where a student does both, the traineeship will follow the transition year. Students doing both the transition year and a traineeship may progress directly to employment.

** Some students will move directly from A levels and/or applied general qualifications to degree and higher apprenticeships.

Figure 1: Progression pathways through education

The diagram reflects the overarching design principles for each option, rather than attempting to capture every single pathway that an individual might take. Some individuals, for example, will move directly from A levels and/or applied general qualifications to degree and higher apprenticeships. Equally, individuals may choose to enter skilled employment without (or before) progressing through higher education at levels 4, 5 or 6.

It is important to reiterate the purpose and design principles of each option. The technical education option (employment-based and college-based) must be designed to meet the needs of employers and thus prepare individuals to enter skilled employment, including via higher-level technical education. Equally, the academic option must be designed to meet the entry requirements of university full-time undergraduate degree courses. Looked at this way it follows that universities should take the lead in specifying the standards to be met by the academic option, while the needs of employers should drive the design of the technical education option.

With the purpose of the two options clearly delineated in this way, it would be disingenuous to pretend that any student choosing to start on one option at age 16 will be able to move seamlessly to the other option at any time of their choosing. Attempts to design either option – academic or technical education – for 16-18 year olds which properly meets the needs both of employers and undergraduate degree admissions will be unsuccessful.

But this is not to suggest that movement between the two options is not possible or desirable. Quite the reverse. Young people who wish to move to the academic option at age 18 having completed two years of technical education or from the academic option to technical education must have open pathways. We should not accept an education system which shuts off the potential to access higher education and training of either option and therefore results in individuals being unable to achieve their full potential.

Some individuals who have completed two years of academic or technical education at age 18 will be judged as already possessing the necessary abilities to successfully change between the two options without additional 'bridging' provision by the university or college they wish to study at. But while some courses will be willing to admit 18 year olds who are switching options, others will not. It is therefore essential that clearly signposted 'bridging provision' exists so that individuals can move between academic and technical education options.

Some bridging courses to academic education are already well established. Access to Higher Education Diploma courses, for example, are available to individuals who lack the qualifications required to enter undergraduate study – in 2013/14 over 23,000 individuals holding these Diplomas entered higher education in England and Wales.[20]

[20] QAA (2015), Access to Higher Education: Students in Higher Education 2013-14

It is important to stress that bridging provision is not just required to allow movement from technical education to the academic option. At age 18, some individuals who have successfully completed two-years within the academic option may choose to apply to a higher apprenticeship. However, several employers we spoke to bemoaned the lack of practical skills possessed by individuals who had followed the academic option. We therefore need a suite of practically-focused bridging courses that equip individuals who have followed the academic option with the practical skills developed through the technical education option.

Recommendation 4: We recommend the Government incentivises the development of short, flexible bridging provision to enable individuals to move, in either direction, between the academic and technical education options and to support adults returning to study.

These bridging courses should include part-time and short courses which might, for example, be delivered in the evenings or at summer schools.

There must also be flexibility for individuals to move between the two modes of learning within the technical education option, for example from college-based technical education to an apprenticeship or vice versa. In the technical education system we are proposing, many of the knowledge and skills outcomes gained through a college-based programme will be very similar, if not identical, to those gained on an apprenticeship. This will allow individuals to transfer between employment-based and college-based provision with relative ease, enabling them for instance to have their prior learning accredited so they are not required to repeat education and training they have already undertaken.

Adults

Any system of education and training must work for adults as well as young people. Many of the key points discussed above are equally relevant to both groups. Well-signposted, flexible bridging provision, for example, is needed by all. Yet adults will access routes from a range of starting points, with different skills and experience and with different needs and aspirations. The system must recognise these differences and respond to adults' varied needs.

Adults with low levels of knowledge and skills (below level 2) will often be unable to access technical education directly. We believe many of the low level vocational qualifications currently on offer for this group do little to enhance career prospects. Provision for low-skilled adults should instead focus on developing the necessary basic knowledge and skills to access technical education, as well as providing 'tasters' of the different technical education routes available.

We believe adults with the prerequisite knowledge and skills should have the same two choices as young people: an academic option for those seeking to gain an undergraduate degree through full- or part-time study, and a technical option for those

seeking to gain the knowledge and skills required to progress into or within skilled employment, which may include higher technical education.

Clearly the population of adults who are able and wish to access technical education is diverse but, in very broad terms, one can conceive two key groups.

The first group has achieved at level 2 (GCSEs or equivalent) but not significantly higher, and so are looking to enter technical education at effectively the same point as a typical 16 year old. Individuals in this group should have access to equivalent provision as that offered to 16-18 year olds, although recognising that many adults will need to study part-time or otherwise flexibly to fit in with their employment. While many education and training providers will choose to deliver college-based technical education provision for adults separately from that for young people, standards for both groups must be the same. As discussed later, standards for technical education must be defined as the knowledge and skills required to perform well in an occupation; these requirements are the same regardless of the age of the person applying for a job.

The second broad group of adults may be characterised as those who are currently in skilled employment (and likely possessing knowledge and skills at level 3 or above), but wish to pursue a new career or progress higher within their chosen career. These individuals want to join a technical education route at the highest possible point – typically at levels 4 and 5 – and need to understand how they can 'bank' their previous experience where possible and then focus on retraining where necessary. Bridging provision will be particularly important for adults, allowing them to take the skills and knowledge they have gained and count this towards their learning in a new occupation.

Government has an important role in considering what financial support should be offered to adults pursuing college-based technical education. Adults on an apprenticeship can typically access support, via their employer, towards their training costs. However, adults who already hold a qualification at level 2 or 3 but want to access college-based technical education will need to fund the costs of the training themselves, directly or by accessing an advanced learner loan. Advanced learner loans will be expanded from this year to cover provision up to level 6 and will be available to those aged 19 and over for the first time. We return to this issue in Chapter 8.

Chapter 3: A system of technical education routes

There are two modes of learning in technical education: employment-based and college-based. Both should be promoted as valid preparation for skilled employment and both must be designed to equip individuals with the knowledge, skills and behaviours necessary to perform well in an occupation. This is why we have recommended (as recommendation 3) that employer-designed standards are put at the heart of technical education and that a single, national framework of standards is put in place encompassing both apprenticeships and college-based technical education. But individuals, especially those considering college-based technical education provision, must be able to identify clearly which study programme (for those aged 16-18) or qualification (for adults) will best prepare them to enter their targeted occupation(s). Such clarity is a key plank of successful technical education systems in other countries.

Recommendation 5: We recommend that a common framework of 15 routes is established which encompasses all employment-based and college-based technical education at levels 2 to 5.

The design of these 15 routes should – initially – focus on the education and training required for individuals to progress into occupations which typically require qualifications at levels 2-5. Progression into undergraduate study at level 6 is well-served by the academic option and, as described in the previous chapter, individuals who wish to move between technical education and the academic option will be supported to do so through flexible bridging provision. Degree apprenticeships will offer an additional path for technical education students to progress directly to level 6, and we have also been encouraged by recent moves within some of the professions, such as law and accountancy, to develop apprenticeship systems allowing individuals to progress to the top of a profession without studying for an undergraduate degree.

Echoing the trailblazer apprenticeship reforms, we propose a framework of routes based around related occupations rather than sectors. This will ensure individuals gain skills and knowledge that is transferable across a range of industries.

In the UK, 'job' is sometimes used interchangeably with 'occupation'. But the term 'job' has a much more limited meaning because it is connected to an employment contract in a specific workplace: hence a 'job description' lists the tasks an individual is required to perform. In contrast, 'occupation' is a more all-encompassing term for individuals' employment, and is not restricted to a particular workplace. The use of occupation also points to opportunities for progression, both within the occupation but importantly also to related occupations with similar skill requirements.[21] Equally, training for those

[21] Used in this way the concept of occupation is close to one of the central concepts of German technical education: Beruf. The term Beruf combines notions of skills, knowledge and professionalism and drives education and training to develop all of these facets. This contrasts with a sector-based approach, which tends to lead to the development of broad qualifications – covering knowledge about a sector rather than the knowledge and skills required for a particular occupation – which are less valued by employers.

occupations which are found across many different sectors (such as IT support technician) have sometimes suffered from being driven by the narrow needs of just one sector (in this example the IT sector) rather than the requirements of the employers in many other sectors who will employ them in far greater numbers. We are therefore convinced that the concept of occupation is central to creating a high-value and credible technical education system.

Technical education must require the acquisition of both a substantial body of technical knowledge and a set of practical skills valued by industry. However, not all occupations require technical training in college or as part of an apprenticeship. Unskilled and very low-skilled occupations[22] do not have sufficiently large knowledge requirements to warrant a technical education route. Rather, these occupations can be learnt entirely on-the-job, often within a matter of weeks.

Recommendation 6: The 15 technical education routes should provide training for skilled occupations where there is a substantial requirement for technical knowledge and practical skills. We are clear that occupations which require little or no technical knowledge and skill fall outside the scope of technical education.

Defining the routes

On the following pages is a summary of the 15 proposed technical education routes. The routes have been defined through analysis of current labour market information (LMI) and projections of future skills needs. The routes were reviewed with employers, academics and professional bodies. The occupational groupings were tested for alignment with apprenticeship standards and current tech levels and technical certificates.[23] The Technical Annex describes the process we followed in more detail. In Chapter 8 we also discuss related issues regarding the availability and granularity of LMI in the UK, especially around what knowledge, skills and behaviours are required for different occupations. Our analysis confirms the proposed routes encompass the vast majority of, if not all, technical occupations at levels 2 to 5. However, these routes will continue to develop as employers and educational experts begin to design the standards for each route.

[22] Unskilled occupations have been defined as those included in SOC major group 9. Some occupations in SOC major group 8 have also been defined as unskilled on the basis of the low knowledge and skills requirements of the occupations.

[23] Tech levels (level 3) and technical certificates (level 2) are qualifications designed to equip students aged 16-plus with the specialist knowledge they need to enter a specific, recognised occupation. To be recognised as a tech level or technical certificate, a qualification must have public support from professional bodies or from at least five employers. A list of tech levels and technical certificates approved by the Department for Education can be found on the gov.uk website.

The 15 technical education routes

Table 1 – Proposed technical education routes

Agriculture, Environmental and Animal Care
Numbers employed: 454,726 **Typical job roles:** Conservationist, park ranger, farmer, horticulturalist, agricultural manager, agricultural technician
Business and Administrative
Numbers employed: 2,204,478 **Typical job roles:** Human resources officer, office manager, administrative officer, housing officer
Catering and Hospitality
Numbers employed: 568,998 **Typical job roles:** Chef, butcher, baker, catering manager, events manager
Childcare and Education
Numbers employed: 1,060,804 **Typical job roles:** Nursery assistant, early years officer, teaching assistant, youth worker
Construction
Numbers employed: 1,625,448 **Typical job roles:** Bricklayer/mason, electrician, building/civil engineering technician, carpenter/joiner, construction supervisor
Creative and Design
Numbers employed: 529,573 **Typical job roles:** Arts producer, graphic designer, audio-visual technician, journalist, product/clothing designer, upholsterer, tailor, furniture maker
Digital
Numbers employed: 351,649 **Typical job roles:** IT business analyst/systems designer, programmer, software developer, IT technician, web designer, network administrator

Engineering and Manufacturing
Numbers employed: 1,319,645 **Typical job roles:** Engineering technician, vehicle mechanic, aircraft fitter, printer, process technician, energy plant operative
Hair and Beauty
Numbers employed: 293,004 **Typical job roles:** Hairdresser, barber, beauty therapist
Health and Science
Numbers employed: 915,979 **Typical job roles:** Nursing assistant, pharmaceutical technician, sports therapist, laboratory technician, dental nurse, food technician
Legal, Finance and Accounting
Numbers employed: 1,325,482 **Typical job roles:** Accounting technician, paralegal, financial account manager, payroll manager, finance officer, legal secretary
Protective Services
Numbers employed: 398,400 We expect this route will primarily be delivered through apprenticeships. **Typical job roles:** Police officer, fire service officer, non-commissioned officer (NCO), maritime operations officer (coastguard)
Sales, Marketing and Procurement
Numbers employed: 957,185 We expect this route will primarily be delivered through apprenticeships. **Typical job roles:** Buyer, procurement officer, sales account manager, market research analyst, estate agent
Social Care
Numbers employed: 865,941 We expect this route will primarily be delivered through apprenticeships **Typical job roles:** Care worker, residential warden, home carer, probation officer, welfare counsellor
Transport and Logistics
Numbers employed: 589,509 We expect this route will primarily be delivered through apprenticeships **Typical job roles:** Ship’s officer, railway signalling technician, HGV driver

Chapter 4: Governance

Technical education only works in the marketplace if it is well understood and genuinely valued by employers, as this leads to it being perceived as high-value among individuals, politicians and society more generally. The trailblazer reforms enacted following the Richard Review aim to ensure this is the case for apprenticeships. Giving employers a stronger voice regarding the content of apprenticeships has led to renewed enthusiasm for apprenticeships in several industries and should lead to improved employment outcomes for apprentices. Equally, the stronger focus on occupational competence should avoid the trap of providing narrow, job-focused training specific to an individual employer. By focusing on broader occupational skills – an approach characteristic to successful apprenticeship systems in other countries – apprentices should be provided with transferrable skills that will stand them in good stead for the rest of their careers. Apprenticeships are increasingly seen as being an excellent way for a person to develop the knowledge, skills and behaviours necessary to perform well in an occupation.

However, even in the light of the Government's commitment to 3 million apprenticeship starts by 2020, the vast majority of apprenticeships on offer will be for adults. Only around 6% of 16-18 year olds were participating in an apprenticeship at the end of 2014[24] and, despite some large employers' intentions to expand apprenticeships, it is clear that there will continue to be a pressing need for high-quality college-based provision. To take just one example, the Transport Infrastructure Skills Strategy predicts a shortfall of over 55,000 skilled construction and engineering workers in transport infrastructure by 2020.[25] This will partly be addressed by a Government commitment to creating 30,000 apprenticeships in the rail and road industries, but there remains a sizeable role for college-based provision in training the remaining 25,000 workers.

It is important that policy-makers, employers, and colleges and training providers ensure that all college-based technical education and apprenticeships deliver outcomes of equally high quality. This is vital so that people who do not wish to pursue, or are unable to find, an apprenticeship have a coherent college-based offer open to them which allows them to develop the equivalent technical knowledge, skills and behaviours. Individuals must be confident that devoting time and effort to succeed on a college-based technical education route will deliver significantly improved employment prospects – this will only be the case if employers, when recruiting, value the courses and qualifications sufficiently to give priority to individuals who possess them.

This is not to pretend that employment-based and college-based provision are the same: for many occupations there are some outcomes (such as some specialised practical skills, or the requirement to demonstrate competence in a range of real-world settings)

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[24] Department for Education (2015), Participation in education, training and employment: 2014

[25] Department for Transport (2016), Transport Infrastructure Skills Strategy: building sustainable skills, Moving Britain Ahead, London: DfT

which are likely to be delivered only through a period of employment. But, by ensuring employers are intimately involved in setting the requirements and standards for college-based provision, and through the carefully-targeted use of high-quality, structured work placements, we are convinced that college-based technical education can deliver outcomes that are well understood and respected by employers – and so have greater value for the individual in the labour market.

Standards

Despite previous reforms, employers continue to report that many individuals who have successfully completed qualifications remain poorly equipped to enter skilled work. Government has tried many times to require awarding organisations to design qualifications around employer needs, but it has not worked. We believe we need to change the way qualifications are designed and delivered and change the behavioural incentives which, in our current system, threaten quality. In countries with successful technical education systems it is the role of government and its agencies to define and quality assure a single, national system of technical education standards and a single national framework of approved qualifications. We believe this is an essential component for any effective education and training system.

As discussed above, a key aim of these reforms is that an individual following a college-based technical education route will, as far as possible, be able to develop the same or equivalent technical knowledge, practical skills and behaviours as someone on a comparable apprenticeship. This requires development of a common system of standards encompassing all technical education. Responsibility for these standards should rest with a single organisation to ensure integration across apprenticeships and college-based provision. The new employer-led Institute for Apprenticeships, due to begin operations in April 2017, is well placed to carry out this role in England.[26]

The trailblazer apprenticeship reforms are already well under way and have secured the support and involvement of a large number of employers. Therefore elements of the standards already set by a trailblazer apprenticeship group for an occupation should, wherever appropriate, be used for the corresponding college-based technical education route. The trailblazer standards provide a helpful starting point for identifying the key knowledge, skills and behaviours individuals should develop on a college-based route. However, while the concise nature of trailblazer standards is appropriate for apprenticeships, the standards are likely to prove insufficiently detailed for college-based provision if we are to ensure a college or training provider develops a curriculum that matches the expectation of employers. But, while standards for employment-based and college-based provision may be slightly different to account for the difference in teaching

[26] The Institute for Apprenticeships is currently being created through the Enterprise Bill. Its operations will be wholly publicly-funded, with funds coming from general taxation rather than the new apprenticeships levy.

mode, over time we envisage standards for both modes of technical education being developed in a fully integrated manner.

Recommendation 7: The remit of the Institute for Apprenticeships should be developed and expanded to encompass all of technical education at levels 2 to 5. The Institute should be responsible for assuring standards and bringing relevant experts together to agree the technical knowledge, practical skills and behaviours to be acquired in each route for both apprenticeships and college-based provision. This will allow the Institute to maintain a single, common framework of technical education standards, qualifications and quality assurance.

A common framework of technical education standards will bring a range of benefits. A single, integrated system will be far simpler for all the main stakeholders – including young people, adults and employers – to understand, helping them to make informed choices. It will also be more effective, allowing individuals to transfer between modes of technical education to best prepare for employment. Construction employers, for example, told us they would welcome a college-based programme for 16-18 year olds which could act as a foundation for progression to higher apprenticeships; integrated routes can help facilitate this kind of approach.

An integrated approach should bring greater efficiency in a number of ways. The specialist expertise required – for instance on assessment models – is very similar for apprenticeships and college-based provision and it will be more straightforward for these functions to be carried out under the aegis of a single body. There are efficiencies for colleges and training providers too, since similar expertise will be needed to deliver both modes (indeed delivery will often involve the same staff).

Finally, without a focus on alignment, the two modes of technical education will diverge, leading to a fragmented system, which is never seen in the leading international examples. Having a single decision-making body overseeing apprenticeships and college-based provision will enable the system to be managed for the long-term, ensuring the two modes stay closely integrated and guaranteeing longevity for the system as a whole.

As discussed above, in countries with high-performing technical education systems such as Norway, government retains overarching responsibility for the definition and development of the national education system, only delegating operational responsibilities, such as the development of standards, to other public bodies. We believe this is the correct approach to take in England.

We welcome the Government's intention to establish the Institute for Apprenticeships as a body with a large degree of autonomy. This should encourage the Institute to be responsive to the needs of employers and the economy while feeling empowered to ensure that quality and maintenance of standards remain paramount. However, we

reiterate that the design, creation and management of the overall system of national qualifications must remain a core governmental responsibility.

Recommendation 8: While it is right for the Institute for Apprenticeships to be delegated wide-ranging autonomy across its operational brief, responsibility for key strategic decisions must be reserved for the Secretary of State. Crucially these decisions include those relating to the shape of the overall national system of technical education (such as adding new or removing existing routes, or changing the title of a route) if we are to ensure the new system remains coherent and stable over time.

A key lesson from educational reform in recent decades is that stability and consistency of language are critical prerequisites for any system to be well-understood by employers and individuals alike.

Panels of professionals

We are clear that the Secretary of State and the Institute for Apprenticeships should retain responsibility for maintaining the national system of technical education. But the task of specifying the standards for college-based provision within each technical education route is a role not for government, but for professionals working in, or with expert knowledge of, the relevant occupations, supported by experienced education professionals. It will be important that these panels of professionals understand that their duty is to consider the interests of the relevant occupations, profession and industry as a whole, rather than the needs of individual employers.

Recommendation 9: We recommend the Institute for Apprenticeships convenes panels of professionals to advise on the knowledge, skills and behaviours to be acquired for the standards in each route and on suitable assessment strategies. These professionals should be appointed in an individual capacity, not as representatives of their employers.

Experience of apprenticeship reforms has shown that standards development can be time-consuming for the professionals involved, which can be a particular issue for SMEs. This time commitment and the associated cost must not be allowed to become a barrier to expert involvement in development of standards.

Recommendation 10: Institute for Apprenticeships panel members should be remunerated from the public purse.

Such remuneration is appropriate because the Institute's panel members will need to commit a significant amount of effort to their panel duties and will be appointed in an individual capacity rather than as a representative of their employer.

Some specialist providers, such as the National Colleges currently being developed, are leading the way in the design and delivery of higher level technical skills and so are well placed to inform the content of the new technical routes. With this in mind, we would expect a National College to be represented on the Institute for Apprenticeships panel of professionals setting standards for occupations within the College's footprint.

Professional bodies also have a role to play. For occupations where there are well-recognised professional bodies, for example in accountancy, law, HR, engineering, and IT, the outcomes from a technical education route, whether college- or employment-based, should align to professional registration standards, as is already the case with trailblazer apprenticeships.

Vocational qualifications in Denmark

'Trade committees', with representation from labour market organisations, play an important role in defining and developing vocational qualifications and stipulating training conditions in Denmark. But it is the state – through a combination of government departments – that is responsible for administering certificates, and the Ministry of Children, Education and Gender Equality is responsible for qualification standards. The requirements of each qualification (around 110 in total) are stipulated under: purpose, duration, admission requirements, qualification competence and work experience requirements.

The panels of professionals convened by the Institute for Apprenticeships will be charged with specifying the knowledge, skills and behaviours required in relevant occupations and how these would be most suitably developed and assessed. A panel's remit might cover a whole route (such as Construction) or a group of aligned occupations within each route (such as Electrical, Plumbing, Bricklaying, etc). These panels would also be well placed to peer review proposals for new apprenticeship standards, informing the Institute's Board about which proposed apprenticeship standards should be developed, which developed standards should be approved for funding, and – through a regular review process – which existing apprenticeship standards require amending or withdrawal.

A regular review cycle will be important for ensuring standards are high quality and remain current, reflecting the latest economic needs and technological changes. Earlier we mentioned the need for college-based technical education to include substantial technical knowledge and skills. This is not confined to the development of new college-based standards: we are equally concerned that some existing apprenticeship standards, at least at face value, seem to overlap significantly with others, be firm- rather than occupation-specific, and/or contain insufficient technical content. If this is indeed the case, it risks a proliferation of low-value or niche standards, creating complexity and recreating all the problems of the previous system. Reviewing all existing apprenticeships standards must be an early priority for the Institute for Apprenticeships.

Recommendation 11: At the earliest opportunity, the Institute for Apprenticeships reviews all existing apprenticeship standards to satisfy itself that there is no substantial overlap between standards, and that every standard is occupation- rather than firm-specific and contains sufficient technical content to warrant at least 20% off-the-job training. Standards found to be overlapping or wanting in terms of breadth or technical content should be revised, consolidated or withdrawn.

The qualifications market

We believe the approach outlined above would robustly ensure the Institute for Apprenticeships holds standards for technical education which reflect the needs of industry. The next requirement is for an efficient and effective mechanism for developing qualifications for college-based technical education which meet these standards.

Currently in England, Wales and Northern Ireland we have a market-based approach to qualifications. This system is inherently unfit for purpose and has two structural failings. Firstly, awarding organisations are not incentivised to seek market share by designing demanding qualifications which meet the needs of industry because employers are rarely able to remain up-to-date on the value and standards of multiple, competing qualifications. Instead, a 'race to the bottom' can develop in which awarding organisations compete to offer less demanding qualifications which are easier to teach and easier to pass, driving down standards and rewarding poor quality.[27] Secondly, there is a lack of clear accountability, with neither awarding organisations, nor sector skills councils, nor Ofqual being ultimately accountable for ensuring that qualifications meet employers' needs. Awarding organisations may develop good qualifications in spite of the current system, but they do not do so because of it.

The market-based system has driven the development of large numbers of competing qualifications. In September 2015 there were over 21,000 qualifications, excluding GCSEs and A levels, on Ofqual's Register of Regulated Qualifications, offered by 158 different awarding organisations. Over 12,000 of these qualifications were eligible for public funding for teaching to 16-18 year olds, including 3,000 qualifications at level 3.[28] [29] Individuals aiming for a future in plumbing, for example, have to choose between 33 qualifications offered at 3 different levels by 5 different awarding organisations. From our examination of international technical education systems, this type of market-based approach appears to be unique. The resulting proliferation of qualifications is a significant issue because:

[27] OECD (2013), A Skills beyond School Review of England
[28] Ofqual (undated), Register of Regulated Qualifications Search
[29] Department for Education (undated), Section 96 qualification downloads

- it is harder for any regulation process to ensure rigour and quality is maintained, or that qualifications are genuinely comparable to others with similar titles
- qualifications inevitably become overly narrow – reflecting specific job roles for particular firms rather than broader occupations in the labour market – or too broad, where awarding organisations try to produce a qualification which meets the needs of every student
- employers struggle to identify which qualifications are appropriate for their skills needs
- it is impossible for education and training providers such as FE colleges to provide the full range of qualifications, given the sheer number and complexity, and it can be difficult for them to identify which qualifications will offer the best outcomes for their students
- there is a strong incentive for awarding organisations to compete on price, potentially reducing the quality of qualifications
- conveying meaningful career information to individuals and teachers which distinguishes between the different (and overlapping) qualifications is extremely difficult

> 'The current system of awarding bodies which operate in many parts of the UK (but works differently in Scotland) has very serious drawbacks. The proliferation of competing qualifications in England and Northern Ireland undermines the labour market value of vocational qualifications, and prevents employers from engaging effectively in the construction of qualifications.'
>
> OECD – A Skills Beyond School Brief on the United Kingdom[30]

We can address these shortcomings and significantly simplify the system through the reforms we are proposing to college-based technical education. Introducing technical education routes will shift the focus from a skills system driven by qualifications, which relies on an awarding organisation market to deliver these, to a system that develops and certifies the technical knowledge, practical skills and behaviours that employers seek and industry needs.

Our favoured solution to the problems associated with the current dysfunctional system is to move to an arrangement in which the Institute for Apprenticeships issues separate invitations to tender for contracts to develop all qualifications associated with the college-based provision for each technical education route at levels 2 and 3. Bidders for such contracts might be individual awarding bodies or consortia of organisations (for example

[30] OECD (2014), A Skills Beyond School Brief on the United Kingdom

including relevant professional bodies, sector bodies, and/or National Colleges). The winning contractor would be awarded an exclusive licence to develop the national qualifications for a specified technical education route for a fixed period of time, perhaps five or even 10 years. Our expectation is that the choice of regulated qualifications which could be included within level 2 and 3 apprenticeship standards would also be restricted to these national qualifications.

We see many advantages of this licensing approach, not least the simplicity and clarity it will bring for employers and individuals alike.

Recommendation 12: We recommend the Government moves away from the current awarding organisation market model, where qualifications which deliver similar but different outcomes compete with one another, and instead adopts a licensing approach. Any technical education qualification at levels 2 and 3 should be offered and awarded by a single body or consortium, under a licence covering a fixed period of time following an open competition.

To ensure such a licensing approach works effectively will require significant expertise in procurement and contract management – this must be borne in mind when resourcing the Institute for Apprenticeships. Equally, this approach will have significant implications for the future regulation of technical qualifications, and the Government will need to work with Ofqual to consider a revised regulatory model.

Technical education at higher levels

Many technical occupations exist at levels 4 and 5 and above, and individuals need to have a clear line of sight to these from level 2 upwards. Yet onward progression in technical education at age 18 has traditionally been poorly articulated and provided for. As the CBI notes in its 2015 education and skills survey: "the delivery of levels 4 and 5 qualifications in our skills system is currently confusing and, perhaps as a result, there is insufficient emphasis on delivery of these types of qualifications despite their being at the heart of the new labour market."[31] So reform of technical education qualifications at these levels is needed, but the detail of such reform is not straightforward.

Provision of technical education at levels 4 and 5 differs from level 3 and below in a number of ways. Training at levels 4 and 5 is undertaken exclusively by adults, (whereas young people account for much of the provision at levels 2 and 3), and we can expect learners aged 19+ to make choices based on considered research about employment prospects in a way we cannot always expect of 16 year olds. This also means the balance of funding sources for training is different at these levels: funding may come from employers, but it will often come from the student themselves, perhaps with government-backed loan assistance. Funding regimes are further complicated by the

[31] CBI/Pearson (2015), Inspiring Growth: CBI/Pearson Education and Skills Survey 2015

fact that, alongside Foundation Degrees, HNCs and HNDs (proprietary qualifications of one awarding organisation, Pearson) are treated in a similar way as undergraduate degrees and so are eligible for higher education student finance. In contrast level 4 and 5 qualifications developed by other awarding organisations are not. The provider base for levels 4 and 5 training is also different. It extends beyond colleges: universities are active and new forms of providers, notably National Colleges and Institutes of Technology, are developing. Some professional bodies are active at these levels as well, delivering professional qualifications which are typically well-respected among employers in the relevant industry.

While this context is different, we believe there is real value in a simplification of the current landscape at levels 4 and 5, which currently includes 3,500 regulated qualifications. Just as with levels 2 and 3, the starting point needs to be designing qualifications against requirements defined by panels of industry professionals – convened by the Institute for Apprenticeships – who will be best placed to judge what is needed to move to skilled employment at these higher levels.

At higher levels, many employers will want to develop bespoke training and government needs to ensure the system is flexible enough to respond to specific employer needs. But, we also see merit in developing a system where technical education qualifications only attract public subsidy if they can demonstrate they genuinely meet the needs of a range of employers across an industry and can equip individuals – from a range of different local areas and backgrounds – with the knowledge and skills required to perform well in a skilled occupation. Government has few levers to encourage a drive for quality in this space. We feel it is right that taxpayer funds are used only to support take-up of qualifications which meet independently-set standards reflecting industry need. The most straightforward way for this to happen is for the Institute for Apprenticeships to hold a register of qualifications which meet the standards set by its panels of professionals and are thus eligible for public subsidy, including via government-backed loans. To indicate to individuals and employers which qualifications had met the Institute's national standards there would be value in developing an appropriate kite-mark or logo which could be used to promote qualifications which appeared on the register.

Recommendation 13: The Institute for Apprenticeships should maintain a register of approved technical education qualifications at levels 4 and 5 that meet the standards set by its panels of professionals. Only qualifications on this register should be eligible for public subsidy.

The Institute for Apprenticeships holding national standards for technical education qualifications at levels 4 and 5 will ensure all qualifications receiving public subsidy meet the requirements of employers. But there is also a compelling need to ensure clear progression routes exist from levels 4 and 5 to higher levels of training. Degree apprenticeships at levels 6 and 7 are still in their infancy, but we must assume, as with all other apprenticeships, they will be based on employer-led standards held by the Institute. This should mean degree apprenticeships can dovetail easily with technical education

provision at levels 4 and 5, but this will not occur automatically and must be designed into the system. Similarly, we must ensure individuals completing a level 5 qualification can 'top-up' their qualification to a level 6 undergraduate degree in a related discipline. In such cases, an individual should not be required to repeat education and training they have already successfully completed: the duration of top-up provision should be limited to that needed to bridge the gap between the level 5 qualification and the undergraduate degree, and to meet the requirements of the relevant higher education institution.

Recommendation 14: The Government should undertake further work to examine how to ensure clear progression routes develop from levels 4 and 5 to degree apprenticeships and other higher education at levels 6 and 7. This work should be carried out in the context of existing and proposed structures and funding rules for higher education provision in England.

Chapter 5: Route content

As outlined in the previous chapter, we propose the Institute for Apprenticeships, using panels of professionals, sets standards for college-based technical education that capture the technical knowledge, practical skills and behaviours required by industry. Qualifications would then be developed against these standards, for delivery by colleges and training providers. In this chapter we discuss in more detail the components and shape of the college-based technical education routes.

Core content

The best international technical education systems begin with a broad curriculum, then increasingly specialise. In Norway, for instance, the first year of upper secondary vocational education provides a broad education in one of eight technical education routes before individuals specialise to prepare for entry into a particular profession, where up to a further 3 years' study might be required. Similarly in Denmark, all technical education programmes start with a basic course of typically 40 weeks, allowing individuals to study a broad programme to test out their skills and interests and incorporating increasingly specialised technical content in preparation for their next course. Individuals then move on to the main course to study a specific vocation. Moving to our proposed system of technical education routes gives us an opportunity to do the same.

Recommendation 15: Every college-based route should begin with a two-year programme suitable for 16-18 year olds (although some individuals may take more or less time to complete it). Each of these two-year programmes should begin with a 'common core' which applies to all individuals studying that route and is aligned to apprenticeships.

This common core will allow individuals to develop a broad set of knowledge, skills and behaviours common to the range of occupations within the route. It will give them a firm understanding of their chosen field as well as transferable knowledge and skills, increasing their adaptability, resilience and ability to work effectively in multi-disciplinary teams. It will also help individuals make informed career choices before specialising, and could include numerous opportunities for individuals to experience a range of occupations and employers, for instance through work tasters or employer talks.

At the end of this core content, some individuals may decide to apply for an apprenticeship in their chosen field. The core content should therefore be closely aligned with apprenticeship standards to enable smooth transition between the two modes. Employers we consulted felt this core content could be excellent preparation for individuals wishing to begin a level 3 apprenticeship.

Example: Construction

A student opts to study the construction route at a local college. At the start of the route, the student studies a broad construction curriculum, including core construction standards, engineering principles and sustainability methods, alongside more specific skills including health and safety compliance, project management, and how to design, plan and organise works. The health and safety training allows the student to apply for a CSCS (Construction Skills Certification Scheme) card, essential for gaining access to construction sites. With this, they are able to visit local construction sites and gain insight into the range of construction occupations on offer.

Specialisation

On completing the core content, individuals should begin to specialise towards an occupation or group of occupations. Along each route there will be a series of 'branches', enabling individuals to focus on an occupation or set of occupations – with greater specialisation as individuals progress to higher levels, to level 5 and beyond. As with the core content, the occupation-specific content will have been specified by the Institute for Apprenticeships panels of professionals so that, at the end of their programme, individuals have acquired the knowledge, skills and behaviours necessary for entry to skilled occupations.

Recommendation 16: After the common core, individuals should specialise to prepare for entry into an occupation or set of occupations.

Beyond the age of 18 we anticipate many individuals will continue to study technical education at a higher level – full-time, part-time alongside work, or through a higher or degree apprenticeship for example. As discussed in the previous chapter, onward progression in technical education at age 18 in England has, for a long time, been poorly articulated. The design of the new technical education routes will need to enable better articulation between 16-18 and adult education, and the further work we call for in recommendation 14 will need to ensure reforms deliver this.

Example: Construction (continued)

The student decides to specialise by taking a tech level in stonemasonry in their second year, developing specific knowledge and skills including understanding the theories behind brick masonry, trade terminology, applying maths, calculating proportions and understanding blueprints. They also learn how to use tools and masonry equipment to industry standards, the safety aspects of the trade, bonding methods, laying bricks and blocks, establishing foundations and safe bricking.

The student is able to complete a number of practical activities as part of a work placement and is assessed by a professional assessor, receiving feedback from the assessor and the college.

On passing their final assessment, the student receives a certificate summarising their achievements. It includes the grade achieved for the qualification as well as naming the standards they have been assessed against during their practical assessment and interview. They also have a log book that was completed throughout the activities which can now be shown to future employers.

Maths and English

Maths and English skills are vital to economic growth, and to helping individuals to progress to further study, training and skilled employment. Employers consistently report the importance of these skills in the workforce but England continues to underperform compared to international standards of literacy and numeracy. The OECD reports that England is the only country in the developed world where the youngest adults are no more literate and numerate than the generation approaching retirement.[32] This is both damaging to the individuals involved and to the national economy as a whole, and requires decisive action from government.

The 2015 CBI/Pearson Education and Skills report identifies that many businesses are concerned about school leavers' capabilities in literacy and use of English (37%), basic numeracy (38%) and communication skills (49%). The survey also found that basic literacy and numeracy ranks among the top three most important factors for employers in recruiting school and college leavers, and is of equal importance to the qualifications obtained by an applicant (39%).[33]

International technical education systems scrutinised by the Panel require continued mathematics and own-language study for all young people until 18, and typically make

[32] OECD (2013), OECD Survey of Adult Skills First Results 2013 – England and Northern Ireland Country Note

[33] CBI/Pearson (2015), Inspiring Growth: CBI/Pearson Education and Skills Survey 2015

attaining a level of mathematics and own-language proficiency a requirement of passing the upper secondary education phase.

> In **Denmark** general subjects like English, maths and Danish are taught as part of technical education programmes; however the balance of these subjects is adapted to the particular programme so that, for example, mathematics for carpenters will be quite different to mathematics for veterinary nurses.
>
> This approach is also applied in **Norway**, where subjects such as Norwegian, English, maths and natural and social sciences are adapted to the different education programmes in upper secondary education. Individuals will typically study core subjects in both the first and second year of their technical education.

Employers routinely use maths and English qualifications as a sifting device, so without them young people struggle to even get an interview for a good job. Given the value employers place on maths and English, technical routes must provide all people the opportunity to gain recognised qualifications in these subjects.

Since 2013 in England, college-based 16-19 year olds who have not already achieved A*-C GCSEs in maths and English have been required to continue studying towards achieving them as part of their 16-19 study programme. From 2014, this has been a funding condition. Given the impact this has had on take-up, it is right that this funding condition continues. We see no compelling reason to change the way it works, although while the focus is rightly on GCSEs for any young people who can pass them, it is worth noting that Functional Skills qualifications are being reformed. After GCSE, Functional Skills qualifications are the most prevalent maths and English qualification available at level 2 and below. Over 800,000 certificates were awarded in 2013/14.[34] Following a review undertaken by the Education and Training Foundation last year, the Government is reforming maths and English Functional Skills qualifications to improve their relevance and content, as well as their recognition and credibility in the labour market. We also note that last year Ofqual intervened to require awarding organisations to improve assessment materials and strengthen standard-setting materials. This should make Functional Skills at level 2 a more reliable indication of secure literacy and numeracy. Government should consider how the funding condition should operate in light of these improved qualifications.

But this funding condition is based only on an individual's enrolment on a course. For apprentices however, maths and English requirements are expressed as a concrete exit requirement and allow for achievement of Functional Skills and/or GCSEs: an apprentice must achieve, as a minimum, maths and English at one level below that of their substantive study as specified in each apprenticeship framework. Apprentices studying

[34] Ofqual (2015), Improving Functional Skills Qualifications

at level 3, for example, must achieve level 2 in maths and English before their end-point assessment in order to receive certification. So, while continued study of maths and English features in government requirements both for apprentices and college-based individuals, there are notable differences in how the requirements are expressed and the standards are set. We see no good reason for these differences.

Recommendation 17: We recommend that, in addition to any separate requirements as a result of the English and maths funding condition, there is a single set of maths and English 'exit' requirements governing college-based technical education and apprenticeships. These should be seen as the minimum level of maths or English which all individuals must achieve ahead of securing technical education certification, as is already the case for apprentices.

This will ensure employers can be confident that every student holding technical education certification has achieved a specified minimum standard of maths and English, irrespective of whether the student has followed a college-based or employment-based path. Initially, the standard should reflect that currently required of apprentices, e.g. maths and English should be achieved one level below that of their substantive study, either Functional Skills or GCSEs.

It must be recognised that these requirements are still low in comparison to international standards, and we believe England should have higher aspirations for its individuals. However, introducing any exit requirements to technical education is a significant change and will be challenging for both individuals and providers to achieve in practice. We therefore believe a phased approach to increasing standards in maths and English is appropriate in the short-term.

Recommendation 18: In the longer term, as the quality of pre- and post-16 maths and English teaching and associated learner outcomes improve, government should raise maths and English requirements to reflect those of higher-performing international technical education systems.

We also recognise that one of the reasons young people in other countries are more literate and numerate is because of the way technical education curricula build on essential skills and knowledge, enabling people to apply and consolidate them. We would expect the panels of professionals established by Institute for Apprenticeships to include relevant maths and English standards where these directly relate to occupational requirements. Indeed, many occupations will require higher standards in maths or English. The Engineering and Manufacturing route, for example, might require achievement of maths at level 3.

Recommendation 19: We recommend the Institute for Apprenticeships encourages its panels of professionals to incorporate additional, occupation-specific maths and English requirements into the standards for each route.

Education and training providers should be free to decide how the maths and English requirements of a route are best achieved.

We do not recommend the setting of maths and English entry requirements for technical education routes or apprenticeships. Rather, colleges and training providers should be free to determine their own admission procedures and requirements, mindful of the standards that a student will need to achieve to secure technical education certification.

Work experience and work placements

We distinguish sharply between the concepts of 'work experience' and 'work placements', stressing that the purpose and outcomes of each are, and should be, different.

We define work experience as the opportunity for a student to spend time – typically a week or two – in a workplace with the aim of gaining some sense of the world of work and perhaps the type of occupation s/he might wish to work in. Work experience is already an integral part of study programmes for 16-19 year-olds. It is valuable because it can open the eyes of individuals to the realities of the workplace (such as the need to dress and act in the expected way and to arrive promptly), while beginning to equip them with important employability skills (for example to communicate information concisely, follow instructions accurately etc). As defined here, work experience need not take place at an employer in an industry relevant to the student's study programme. Equally, for some individuals, the aims and outcomes of work experience might be delivered through other types of enrichment activity, for example National Citizen Service, participation in a community project, or extended team-based activities which require individuals to solve 'real-world' challenges set by employers. But current provision is too patchy. While 66% of employers surveyed by UKCES rated work experience as being of critical or significant value [35] – a higher importance rating than academic skills – a recent CBI/Pearson survey found 55% of employers are dissatisfied with the level of their young recruits' work-related experience.[36]

We believe what is required for college-based technical education is a radical shift in emphasis, from short-duration work experience to structured work placements lasting much longer and with an employer in an industry relevant to the student's study programme. Work placements may take a variety of forms. They may be full-time (perhaps for 6-12 weeks or longer) or part-time (for example one or two days each week for a sustained period), and undertaken in either a single or small number of blocks. However, regardless of the form they take, work placements must be well planned and clearly structured to ensure the student has appropriate opportunities to learn pre-defined knowledge, skills and behaviours. For individuals on college-based technical education

[35] Shury et al. (2014), UKCES Employer Perspectives Survey 2014
[36] CBI/Pearson (2015), Inspiring Growth: CBI/Pearson Education and Skills Survey 2015

routes, work placements can offer opportunities to gain practical skills and behaviours which would be more difficult to develop in an educational setting. All the employers we consulted were clear that high-quality work placements provide individuals with essential, valuable exposure to the working environment. We believe such placements are crucial, and this is supported by experience in countries such as Canada, Finland, Germany and Ireland.

Work placement example – Junior Design Engineer

Work placements provide a valuable opportunity to develop technical skills in real-life environments. For instance, a student training to become a design engineer might spend a month with a local engineering company. In that time, they might be expected to:

- demonstrate some of the technical knowledge, such as CAD/CAM skills, they have learned in college, for example through a specially developed project to produce software design material for colleagues
- travel to project sites to examine land ahead of planning and design procedures
- develop an understanding of the day-to-day behaviours expected in the workplace

Their experience would be recorded in a log book, which would include an assessment of their performance from the employer.

We expect the duration of work placements to vary from route to route. It will be for the Institute for Apprenticeships – drawing on the advice of their panels of professionals – to set minimum durations. Equally, the Institute will need to agree criteria for allowing relevant part-time jobs and employer-led projects to count towards the work placement requirement for certification.

Recommendation 20: In addition to work taster or short-duration work experience opportunities, every 16-18 year old student following a two-year college-based technical education programme should be entitled to a high-quality, structured work placement. Successful completion of this work placement should be a requirement for full certification at the end of the study programme. As part of the work placement, the student, college and employer should complete a log book – ideally online – that evidences the key tasks the student has undertaken and what they have learnt.

Use of log books

Young people need to be able to evidence the employability skills and the experience gained on their work placements. All technical education students should complete a log book for this purpose.

Various log book styles and templates are available. The log book should be 'owned' by the student and they should take full responsibility for ensuring their work placement supervisor completes the employer's review before they leave the placement.

Ideally, the employer assessment should be integral to the log book and employers should be asked to rate the student on timekeeping, attendance, enthusiasm, personal presentation, communication, teamwork and the ability to solve problems. Employers should be able to add comments related to these specific areas of the individuals' performance.

Employers should also have the opportunity to expand on their feedback and outline any particular strengths and weaknesses to aid the student's development.

We recognise the task of delivering this recommendation in practice is far from trivial. We are suggesting that up to 250,000 17 year olds could require work placements. Discussions with employers and college principals have led us to conclude that the most effective and simple way of supporting an increase in work placements is to provide additional government funding directly to colleges. This funding can then be used by the college in a flexible way appropriate to its local environment.

We expect many colleges will choose to use the additional funding to support dedicated staffing resource. Such a member of staff might typically be charged with:

- engaging with local employers to understand what each employer can realistically offer, provide guidance on what represents a 'high-quality' work placement, and act a single point of contact
- liaising with equivalent staff in nearby colleges to share best practice and coordinate approaches to local employers
- sourcing suitable placements for students
- ensuring students understand before the placement begins what is expected of them
- helping employers make objective assessments of a student's performance
- undertaking on-going evaluation and continual improvement of the college or training provider's work placement activity

We are clear that the desired results – widespread, locally-brokered expansion of work placements – will only be delivered if colleges and employers know that facilitating funding will continue in the long-term. High-quality work placements must be a cornerstone of our new, reinvigorated technical education system. As such this additional funding should be seen as an essential long-term cost – not a one-off cash injection.

Recommendation 21: We recommend the Government makes additional funding available to colleges to support work placements for technical education students on college-based study programmes. We suggest the most straightforward way of doing this is to increase the base rate per student for each 16-18 year old technical education student who successfully completes a work placement. Initial evidence suggests that such an uplift might need to be around £500 per placement, but further work will be required to set the precise figure.

Chapter 6: Qualifications and certification

The main purpose of our technical education qualifications and certification system should be to signal to employers what an individual can do. To be effective, certification must have genuine labour market currency – evidenced by employers choosing to employ someone who has the technical education certificate over someone who has not – in turn leading to individuals and parents understanding the value of technical education. Equally, individuals must be confident the certificate they work hard to achieve, and which either they or the public purse pays for, will be recognised wherever they seek work in the future.

Employers told us the current system is confusing, with unnecessary, overlapping qualifications – often with multiple optional elements making it impossible to judge what an applicant can do. Alison Wolf's 2011 report has led to major progress in reducing the range of qualifications available to count in performance tables, but we believe the Government now needs to go further.

Recommendation 22: For both employment-based and college-based technical education at levels 2 and 3, there should be a single, nationally recognised certificate for each technical education route.

For apprenticeships, the certificate should state the level, occupation and grade of the apprenticeship completed, as is the case at present.

Individuals successfully completing a college-based technical education route should receive a certificate which captures their attainment and experience in the round. It should include:

- a qualification in the form of a graded, externally-assessed tech level (see below) which indicates their specialism
- grades for maths and English qualifications (whether these were completed prior to the start of a route or not)
- confirmation of successful completion of a work placement

The certificate should be supplemented by a log book, possibly online, which describes what the student did and learnt during their work placement and a statement by the employer assessing their general performance.

Additional route-specific information may be added to the certificate by the Institute for Apprenticeships on the advice of the panels of professionals for that route. For example, level 2 food hygiene qualifications are seen as essential in catering and hospitality, so it may be appropriate to indicate whether a student holds such a qualification on the Catering and Hospitality certificate.

Recommendation 23: For college-based technical education at levels 2 and 3, we recommend that the system of qualifications is simplified dramatically, with only one tech level qualification approved for each occupation or cluster of occupations.

Under this new system, employers presented with a prospective employee with a Health and Science certificate with a specialism in dental nursing, for example, will know the individual has mastered all the core content in the Health and Science route, and demonstrated the specialist knowledge, skills and behaviours to meet the Institute for Apprenticeships' standards for the dental nurse tech level. Employers will be able to compare applicants against each other fairly using their respective tech level grades. Furthermore, individuals will be assured the qualification they are studying for will be understood and valued by employers. This assurance is critical both to a 16 year old who as yet does not know their first employer and to an adult choosing to take out a learning loan in order to gain the skills to transition to a new occupation.

Government should use its levers, such as the funding system, to ensure employers and individuals have clarity over which qualifications have been developed to meet the national technical education standards and are thus valued in the broader labour market.

Recommendation 24: We recommend the Government restricts public subsidy for college-based technical education to that leading to qualifications approved by the Institute for Apprenticeships. This includes funding for 16-18 year olds and advanced learner loans available for adults aged 19 and older.

Individuals, perhaps supported by their employers, who wished to undertake qualifications other than those approved by the Institute for Apprenticeships would be required to cover the cost without public subsidy.

Designing assessment models

Mirroring the current practice with trailblazer apprenticeships, in addition to agreeing the standards for each occupation, the Institute for Apprenticeships should ask its panels of professionals drawn from industry and education to play a role in agreeing how the knowledge, skills and behaviours described in the standards should be assessed. However, some employers involved in the trailblazer process told us they sometimes found it difficult to design effective assessment plans for apprenticeships, because such design requires specialist skills. Education professionals can help here, with the Institute facilitating the process.

Recommendation 25: For college-based technical education we recommend the Institute for Apprenticeships publishes guidance on the use of a range of common assessment strategies, makes assessment expertise available to the panels of professionals, and sets overarching quality criteria to apply to all tech levels.

Tech levels are likely to include multiple forms of assessment, and each tech level could look different depending on the content to be assessed. It could, for example, include assessment of a portfolio of work for individuals on the Creative route, or a practical building task on the Construction route. What is of overarching importance however is that employers have confidence in the qualifications and what they mean. Employers repeatedly told us that, although applicants may look good on paper, they often struggle to apply knowledge and skills in the workplace. Employers were also clear that, for qualifications to be credible, they must be externally assessed so that employers can have confidence that quality standards have been met and judgements applied consistently.

Recommendation 26: Regardless of the forms of assessment used, all qualifications in college-based technical education should assess both the common core for the relevant route and the specialist / occupation-specific knowledge and skills. The assessment of every technical education qualification should include realistic tasks as well as synoptic assessment which, together, should be designed to test a student's ability to integrate and apply their knowledge and skills. All qualifications should include external assessment to ensure comparability and reliability.

We do not believe it is meaningful to assess behaviours through a tech level. However, employers can and should comment on behaviours in their employer assessments of work placements. We considered whether external verification of employers' assessments of work placements was needed to ensure consistent judgments. However, this would create a large bureaucratic burden on employers which could deter them from offering high-quality placements. We believe the support from colleges and training providers, which will be delivered by the additional funding for work placements described in Chapter 5, should be sufficient to guide employers on making objective judgements of individuals.

Chapter 7: The transition year

All young people should have the opportunity to benefit from technical education, and be encouraged to do so. However in practice we know there will be some who will not be ready to access technical education when they complete compulsory schooling aged 16. This could be for many reasons, for instance because they have special educational needs and/or disabilities (SEND), because their education was interrupted by illness or family circumstances, because they learn more slowly than their peers, because English is not their first language, or because they do not have the maturity or behaviours needed to study or to start an apprenticeship.

Recommendation 27: Individuals who are not ready to access a technical education route aged 16 (or older if their education has been delayed) should be offered a 'transition year' to help them prepare for further study or employment. The transition year should be flexible and tailored to the student's prior attainment and aspirations.

Colleges and training providers should set their own entry requirements for technical education, and are therefore best placed to identify students who would benefit from a transition year.

The objective of the transition year should be to equip individuals with the knowledge, skills and behaviours they need to progress. We would expect English and maths to be offered to all those without GCSE A*-C, but – beyond this – the content of the transition year would need to reflect both the individual's needs and their longer term aspirations. It might include:

- experience of the world of work to inspire young people and put their learning in context – early exposure to the workplace might be though a mix of work tasters, voluntary work, employer-led projects or via a traineeship
- development of digital skills
- other development activities which might include shorter taster courses to help a student decide which route to pursue and work on softer skills like study skills, problem solving or team building – these could be embedded into the provision above, or tailored to meet individual need
- personalised support to help students remain motivated and address any barriers that emerge – this should be delivered in conjunction with specialist services (such as those for students with SEND and looked after children) where appropriate
- assessment and guidance to make decisions about the next stage of education / employment

The content suggested above is not so different to the study programmes that many lower attaining students follow now. But we want to see a much sharper focus on

progression, on work experience or placements, and on basic skills and behaviours rather than low-value qualifications. In particular, we should aim to reduce the number of young people who 'churn' between different level 1 qualifications between ages 16 and 19, or who leave education and become NEET (not in education, employment or training). To achieve this, we must prioritise ensuring all individuals completing a transition year are supported in finding suitable progression routes.

Colleges should feel enabled to offer a tailored transition year programme which prepares the individual for progression. For instance, those aiming for an apprenticeship or employment, but who are not quite ready, may undertake a traineeship from age 16. A student who wants to take A levels and has the ability to do so, but who missed much of their secondary education through illness, may spend their transition year studying GCSEs.

The transition year should not be considered an end in itself, but positioned as a stepping stone to further study or employment. With this in mind, we do not believe a national qualification attesting to the completion of the transition year is necessary. Instead we would expect the college or training provider to issue a certificate on successful completion.

The path a student followed on completing the transition year would reflect their progress during the year and their aspirations. To progress to technical education, individuals would need to have acquired the basic skills necessary for entry to their chosen route. We believe colleges or training providers should be trusted to take the lead in identifying young people who have – and do not have – the ability to progress to technical education, and to support them in making applications for the next stage of their education.

Those individuals who are not able, or do not want, to choose either the technical or academic options on completion of the transition year should be supported to progress to employment with training, a Traineeship[37], or a supported internship (for those with an education, health and care plan). This would not preclude a return to technical education at a later date; indeed, traineeships are an important feeder into apprenticeships. But for many others the aim would be to prepare for employment where they could continue to 'learn on the job'.

We have outlined thoughts on the aim and content of a transition year. However, we recognise the full development of a fit-for-purpose transition year requires careful consideration by DfE, specialist expertise, and consultation with a range of stakeholders to ensure it works for the full cohort of young people who might benefit from it.

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[37] We understand consideration is being given to extending the maximum duration of traineeships from 6 to 12 months for those aged 16-19. This would fit well with our model of progression from a transition year for those who did not continue in education, potentially allowing up to two years of tailored education and training for some of the most vulnerable young people to prepare for employment.

Recommendation 28: We recommend the Government commissions additional work into the design and content of a transition year, while ensuring the key objective for the year is offering tailored provision with a sharp focus on basic skills and progression. Such work should be undertaken in good time to ensure the new transition year is available to students alongside first teaching of the technical education routes.

Finally, regardless of the final detail of its content and design, key to the success of a transition year will be its presentation to young people. All communications around the transition year must have a positive focus on what it is – an opportunity for individuals to progress and fulfil their potential – and be presented in a way which attracts young people, and where appropriate can be distinguished from the experience of compulsory schooling.

Example: transition year

A student wants to work in childcare but struggled at school so needs some additional support to catch up before starting a technical education route. The student's college works with them to agree a study programme including a qualification in Work Skills alongside foundation-level maths and English and group activities to improve his/her confidence. An allocated Key Worker monitors the student's overall progress and provides additional pastoral support, including preparing for a work placement.

Towards the end of the transition year, a traineeship opportunity at a local Day Nursery becomes available and the student is accepted. S/he will continue to study maths and English as part of their traineeship, along with an approved childcare qualification. On completing the traineeship, the student can choose between progressing to employment, or to an apprenticeship to study at a higher level.

International comparisons

In considering our approach, we have also examined practice in other countries. While evidence is limited, we have found that:

Sweden offers a transitional year of individualised programmes for those not eligible for academic or vocational study, or apprenticeships at age 16. Around 13% of young people take this route which aims to prepare them either for vocational or academic tracks or the labour market. In addition, there are programmes aimed specifically at SEND individuals, focused on work-based learning.

Young people with learning difficulties in the **Netherlands** are offered practical, labour market programmes between ages 13 and 18. This provides a stepping stone to the lowest level (1 year) vocational qualifications, although these can in turn support progression to higher level vocational routes.

Chapter 8: Wider systemic requirements for high quality technical education

In Chapter 1 we discussed how examining practice in other countries convinced us that a high-performing system of technical education requires four elements:

- a well-understood, national system of qualifications that are genuinely respected by employers and so have value for the individual in the labour market
- widespread availability of comprehensive career guidance – including accurate and up-to-date labour market information and institutional performance data – so that all individuals can make informed choices between the education and training options on offer
- stable institutions with appropriate infrastructure for the delivery of technical education, including high-quality teaching and access to industry-standard facilities and equipment
- a system of adequate funding that incentivises individuals and employers to participate in education and training that results in productivity gains

In line with our terms of reference, this report focuses primarily on the first of these points. But the other three criteria are equally essential if England's technical education system is to reach par with the best in the world. In this chapter we briefly discuss these criteria.

Careers education and guidance

Careers education and guidance will play a vital role in the success of the reformed technical education system. We know that a comprehensive and planned programme of careers education and guidance, including exposure to the world of work, gives young people the knowledge, skills and confidence to make informed choices, and to manage transitions to succeed in learning and work. For example, evidence suggests that young people who recalled having had several encounters with employers while at school were less likely to become NEET (not in education, training or employment) and earned more than their peers who did not recall such encounters.[38]

The 2014 report, 'Good Career Guidance'[39], published by David Sainsbury's Gatsby Foundation, reviewed the academic literature surrounding career guidance and examined good practice in other countries and in the independent and state sector in England. The Gatsby report suggests there is no single 'magic bullet' for good careers education and

[38] Mann, A. (2012), It's who you meet: Why employer contacts at school make a difference to the employment prospects of young adults. London: Education and Employers Taskforce.
[39] Gatsby Foundation (2014), Good Career Guidance

guidance but that it is about doing a number of things consistently and well. The evidence collected during the study informed a set of eight benchmarks which identify different dimensions of good careers guidance.

The Gatsby benchmarks

1. **A stable careers programme.** Every school and college should have an embedded programme of career education and guidance that is known and understood by individuals, parents, teachers, governors and employers.

2. **Learning from career and labour market information.** Every student, and their parents, should have access to good quality information about future study options and labour market opportunities. They will need the support of an informed adviser to make best use of available information.

3. **Addressing the needs of each student.** Individuals have different career guidance needs at different stages. Opportunities for advice and support need to be tailored to the needs of each student. A school's careers programme should embed equality and diversity considerations throughout.

4. **Linking curriculum learning to careers.** All teachers should link curriculum learning with careers. STEM subject teachers should highlight the relevance of STEM subjects for a wide range of future career paths.

5. **Encounters with employers and employees.** Every student should have multiple opportunities to learn from employers about work, employment and the skills that are valued in the workplace. This can be through a range of enrichment activities including visiting speakers, mentoring and enterprise schemes.

6. **Experiences of workplaces.** Every student should have first-hand experiences of the workplace through work visits, work shadowing and/or work experience to help their exploration of career opportunities, and expand their networks.

7. **Encounters with further and higher education.** All individuals should understand the full range of learning opportunities that are available to them. This includes both academic and vocational routes and learning in schools, colleges, universities and in the workplace.

8. **Personal guidance.** Every student should have opportunities for guidance interviews with a career adviser, who could be internal (a member of school staff) or external, provided they are trained to an appropriate level. These should be available whenever significant study or career choices are being made. They should be expected for all individuals but should be timed to meet their individual needs.

Recommendation 29: We recommend the Government adopts the Gatsby benchmarks as the basis of a common national approach for careers education and guidance, and sets an expectation for schools and colleges to use the benchmarks when developing their careers provision.

Sadly, current careers education and guidance in this country fails too many young people and often only promotes technical education as second best to academic study. Careers education and guidance needs to be reformed in line with the changing nature of the labour market, which demands ever closer interaction between the worlds of work and education.

Recommendation 30: Government should support schools and colleges to embed into careers education and guidance, from an early age, details of the new 15 technical education routes, so that young people and their parents understand the range of different occupations available and how to reach them.

The Careers and Enterprise Company, established by the Government to improve careers education and guidance for young people by strengthening links between employers and schools and colleges, will have an important role to play in this regard. However, we must not forget that adults as well as young people need high-quality careers education guidance. This will be no less important as implementation starts on the reforms that we are recommending around the new technical education routes and qualifications up to level 5. The National Careers Service is publicly funded (through the Skills Funding Agency) to provide adults with access to independent, professional advice on careers, skills and training. Our proposed reforms will create much clearer lines of sight to skilled occupations, highlighting qualifications and training which deliver the knowledge and skills that employers value. It is important that the National Careers Service, especially through its website, reflects this new approach.

Recommendation 31: The National Careers Service should review how it presents its career information and guidance in the light of our recommendations for reform of the technical education system.

Labour market information

In developing the system of 15 technical education routes discussed in Chapter 3, we used a range of Labour Market Information (LMI) sources, details of which can be found in the Technical Annex. A particularly important source of data was the Office for National Statistics (ONS), which produces LMI based on the Standard Industry Classification (SIC) and Standard Occupation Classification (SOC) systems which describe the sectors people work in and the job roles they undertake.

In conducting our data analysis we used 4-digit SOC codes to explore which occupations were relevant to technical education and group occupations with similar knowledge and skills requirements. However, we found that when we discussed occupations with

employers they often did not recognise the SOC codes used in this country as occupations. In part this is because, in order to achieve statistical validity, the SOC codes have grouped job roles into quite broad occupations. This has led to a situation where official data in the UK is based on 369 occupations, while in America a more granular system of 821 occupations is used.

By increasing the level of detail of the SOC codes system, from 4-digit to 5-digit, it would be possible to have more granular descriptions that are much closer to the way that employers conceive occupations. The Higher Education Statistics Agency has already completed this work for some sectors of the economy. For example, the 4-digit SOC code 3421 'Graphic Designers', when expanded to 5-digits becomes:

34212 Commercial artists

34213 Exhibition, multimedia designers

34214 Desktop publishing assistants and operators

34219 Graphic design copyists and setters-out

This sort of increased granularity would be extremely useful for the Institute for Apprenticeships. It would certainly allow the Institute to more easily engage employers in discussions regarding occupations and their standards. It would also help the Institute ensure that every proposed apprenticeship standard related to a distinct occupation and did not overlap to an unnecessary degree with other standards; one of the problems with the current system is that several apprenticeship standards fall within each 4-digit SOC code, making it harder to judge whether they are genuinely distinct. Collecting data at the 5-digit level would also make it much easier to capture emerging occupations and their educational requirements. Currently, these occupations are frequently lumped together within a 'not elsewhere classified (nec)' 4-digit SOC code.

Beyond the lack of granularity in the current SOC system, in undertaking our analysis we were also struck by how little information is collected in England about what knowledge, skills and behaviours are required for different occupations. Instead, we used the extremely useful American occupational database O*NET.[40] O*NET provides much more information than the SOC system on the knowledge and skills requirements of occupations. In the future we must ensure technical education in England is able to make use of up-to-date LMI to inform standards. In addition to using O*NET, there is potential for using data obtained by 'scraping' online job advertisements or social media sites.

Recommendation 32: We recommend that the ONS examines how to make the Standard Occupation Classification (SOC) more relevant for stakeholders – including expanding it to 5-digits. We further recommend that the Government

[40] O*NET OnLine

explores how to make more occupational information available to the Institute for Apprenticeships, colleges and individuals by supplementing the nationally collected datasets with information from the American O*NET system and other sources.

Institutional accountability

Information and data in this reformed system will be more important than ever before. None of the changes proposed in this report will diminish the need for a national accountability system which informs individuals about providers' performance and drives informed choice. Clear accountability highlights where performance can be improved, relatively and absolutely, and allows the public and stakeholders to challenge providers.

The accountability system will need to change to allow individuals and parents to compare different options and providers on the same basis, for example to compare college-based technical education outcomes with apprenticeship outcomes. Any performance measures will need to apply to all new technical education routes, allowing a focus on completion and progress. More than ever before, it will be crucial that government ensures labour market information, post-16 course information, and destination and educational outcomes data are available in easily digestible form.

Infrastructure

Good technical education requires expert teachers and lecturers and access to industry-standard facilities.[41] College principals have told us that recruiting technical education teachers with well-developed pedagogical skills, mastery of their field, and up-to-date industry experience can be a significant challenge in the competitive labour market.

Accessing high-quality professional development, including industrial updating, throughout their teaching career, is essential for technical education teaching staff to remain current. Furthermore, developing and maintaining the industrial standard technical facilities which are a prerequisite for high-quality technical education is costly. It is not surprising therefore that employers report it can be a struggle to source high-quality technical provision, particularly in niche fields where class sizes are unlikely to be viable for every provider.

A rationalisation of specialist technical education facilities is required, concentrating them in a smaller number of high-quality, financially-stable institutions which are easily recognisable to both employers and prospective students. Government is increasingly recognising this, and one aim of the strategic area review programme currently under

[41] Commission on Adult Vocational Teaching and Learning (2013), It's About Work… excellent adult vocational teaching and learning

way in England is to remove curriculum duplication across further education and sixth form colleges within reasonable travel-to-learn areas.

If fully realised, area reviews have the potential of bringing learners together, creating viable group sizes and developing specialisms which will in turn lead to greater financial stability, including the ability to invest more in learning. For example, rather than hundreds of colleges around the country struggling to maintain industrial standard engineering facilities as is the case at present, within a specific travel-to-learn area only a small number of institutions – perhaps even just one per area – would specialise in engineering. This approach would support high-quality teaching, ease issues of staff recruitment and concentrate resources, permitting higher quality facilities without necessitating a substantial overall increase in funding. Such specialism should also deliver a less fragmented landscape for learners, employers and other stakeholders to deal with. Any employer, for example, should be clear where local expertise for a particular route sits, allowing them to more easily engage with the technical education system, including by providing work placements and collaborating on curriculum design and teacher training.

We note ongoing work by the FE Commissioner to support this direction of travel and the devolution of greater commissioning powers to local areas. The local landscape for technical provision varies considerably across the country, with institutions including UTCs, FE colleges, private and third sector training providers, emerging National Colleges and Institutes of Technology each playing a part. It is also shifting as the area reviews secure a range of restructuring changes and local areas take on new devolution powers. It is therefore right that, while national standards for technical education are set centrally through the Institute for Apprenticeships, local decision makers develop a coherent plan for technical education provision in their locality.

Recommendation 33: We recommend that, when national and local decisions about the provision and funding of technical education are being taken, consideration is given to restricting funding to colleges and training providers which meet clear criteria of quality, stability and an ability to maintain up-to-date equipment and infrastructure.

In considering coherent specialisation for technical education in local areas it is impossible not to note the large number of independent training providers that receive government funding to deliver education and training. While the bulk of 16-19 year olds attend not-for-profit institutions, such as FE colleges, it has been estimated that at least 30% of the adult skills budget pays for provision delivered by independent training providers.[42] These providers are a highly heterogeneous group of institutions, ranging from not-for-profit companies such as Group Training Associations that provide training for a range of local companies, or those that specialise in working with learners with

[42] Wolf, A. (2015), Issues and ideas. Heading for the precipice: can further and higher education funding policies be sustained? The Policy Institute at King's College London.

major physical or learning disabilities, to a large array of private, for-profit organisations offering work-place training.

In her 2015 report, Alison Wolf noted it is challenging to calculate the exact number of independent training providers or the sum of public funding they receive.[43] Given what appears to be the highly unusual nature of this arrangement compared to other countries and the high costs associated with offering world-class technical education, we see a strong case for public funding for education and training to be restricted to institutions where surpluses are reinvested into the country's education infrastructure.

Ideally, all publicly-subsidised technical education – notably college-based courses and the off-the-job component of apprenticeships – should be delivered under not-for-profit arrangements. This means delivery in a dedicated not-for-profit educational institution, such as a college or university, in a bespoke training centre established by an employer to train its own employees (or those in its supply chain companies), or in a private or third sector training provider where any surplus is reinvested rather than taken as profit. In line with this aim, we suggest that funding recently announced by the Government to support the implementation of the area review findings – to be made available through a time-limited restructuring facility[44] – is prioritised towards colleges and training providers who intend to reinvest all surpluses into education infrastructure.

Funding

The reforms we have proposed can only be successful if they are supported by adequate funding. There have been some positive developments in recent years: the move from per-qualification to per-student funding for 16-19 year olds has reduced perverse incentives in the system, and there was considerable relief that the 16-19 base rate was protected in the recent Spending Review. With the expansion of Advanced Learner Loans and the introduction of part-time HE maintenance loans and new postgraduate loans, there will soon be a comprehensive student finance offer for designated qualifications across academic and technical education.

However, published evidence shows technical education in England is underfunded in comparison to other international systems. Funding per 16-19 year old in England pays for, on average, 20 hours per week[45], compared to, for example, 28 hours per week in

[43] Wolf, A. (2015), Issues and ideas. Heading for the precipice: can further and higher education funding policies be sustained? The Policy Institute at King's College London.
[44] For further details of the restructuring facility, see: HM Government (2016) Reviewing post-16 education and training institutions: updated guidance on area reviews
[45] Department for Education (2016), Funding guidance for young people 2016 to 2017

Norway.[46] This limits programme size, teacher contact time, tailored support and advice, enrichment and the take-up of higher cost subjects.

This particularly impacts the highest quality technical education, where individuals learn practical skills, use specialist equipment and visit employers to learn skills on the job. All these activities are more expensive than academic provision: they require costly equipment, larger facilities and a lower teacher-student ratio (because practical work requires more supervision and in-class assessment).

Recommendation 34: We recommend the Government reviews what constitutes sufficient funding for technical education to deliver on its aims of meeting employer needs. This work should benchmark expenditure in England against that in other countries and be used to set appropriate funding levels for technical education when the new routes system is introduced.

[46] Norwegian Directorate for Education and Training (2013), The knowledge promotion reform – Distribution of teaching hours per subject in primary and lower secondary education and programme structure in upper secondary education and training

Chapter 9: Next steps – implementation and timescales

This report has set out our proposals for reforms to put the technical education system in England on par with the best in the world. In making our recommendations we have taken account of the significant reforms that have already been – or are in the process of being – implemented on apprenticeships, qualifications, accountability and funding, together with research from around the world. We wanted to build on these reforms and put them at the heart of a new, simplified technical education system with qualifications that employers genuinely respect and which thus have real value for individuals in the labour market.

We are confident the proposed reforms will deliver a system that is flexible enough to respond to an evolving economy while being sufficiently robust to remain in place for decades, not just an electoral cycle or two. This is important because a key lesson from the best technical education internationally, and from past educational reform here, is that stability and consistency are critical prerequisites for any system which is to be well-understood by everyone, employers and individuals alike. To deliver this stability and consistency in the technical education system also requires government to commit to long-term policy stability in this area. We discussed in Chapter 1 how the last 50 years have seen almost continuous reform of technical education in this country, to little positive effect. Too often in the past we have seen governments change direction before a set of reforms could possibly have borne fruit, simply because the problems the reforms were designed to address still exist. To deliver stability of the type required inevitably requires a degree of cross-party support, and we hope that all political parties will feel able to back, for the long term, the policy agenda we are proposing.

We recognise that, taken together, our recommendations are far-reaching. We are also aware that previous reforms have often floundered not at the point of conception but rather during implementation. While the nature of education reform is such that it can rarely be implemented quickly, this leaves it exposed to the political winds of change and susceptible to cherry-picking by successive ministers charged with its implementation. Holistic proposals for systemic reform – including those we propose in this report – cannot be delivered in a piecemeal fashion if they are to have the required impact.

Beyond the need to consider our proposals as a single package of reform, rather than a list of discrete recommendations, we outline below other factors which we consider prerequisites for successful implementation.

Investment

If we are truly to secure a step-change in the quality of technical education in this country, significant but targeted investment is required. Putting in place an easy-to-understand, national system of qualifications that will stand the test of time must be a priority for investment. Not only does it make economic sense – our competitors

recognised years ago that investing in technical education is essential to enhancing national productivity – but it is also essential if we are to equip people with the knowledge and skills they need to obtain rewarding and skilled employment in the future and compete in a globalised labour market.

That is why we have put forward stretching recommendations in terms of funding: not just additional funding for work placements, but a review of current funding for technical education overall. We are aware these will not be easy recommendations to take forward in such a challenging financial context, but they are critical. Investment in other forms will be required as well, not least the prioritisation of these reforms within the agendas of future governments, deep commitment and engagement from a wide range of key stakeholders, and continued and sustained effort from those responsible for delivering this reformed system.

Appropriate timeframes

Ministers are always eager to roll-out ambitious reforms in the shortest possible timeframe. We share this eagerness, but note that countless attempts at education reform in this country have shown that successful implementation cannot be rushed. Later in this chapter we give a list of suggested milestones for implementing the proposed reforms. Implementation should begin immediately, including putting in place appropriate governance arrangements at the Institute for Apprenticeships, consulting on the content of specific routes, and devising a communications strategy. Piloting of the routes will undoubtedly be required but we believe that, subject to this piloting work, a small number of routes could be taught from 2019/20. A phased approach to introducing the remaining routes should then be adopted, with perhaps five or six routes coming on-stream each year from 2020.

Stakeholder engagement

Although as part of our work we engaged with hundreds of employers, college principals, students and other stakeholders, much further engagement is obviously required when implementing changes as significant as these. An early priority will be a structured programme of stakeholder engagement on a route-by-route basis to understand at a more granular level the particular characteristics which will ensure each route meets the needs of employers. This process should get under way immediately.

Throughout the process of stakeholder engagement, the Government needs to strike the right balance. We have been struck by the enthusiasm among employers and other stakeholders for this reform – this momentum can be maintained and built upon. We need to learn from further discussions with stakeholders who will often bring valuable perspectives. However, some of our recommendations (such as those around reform of the qualifications market) are inevitably challenging for some organisations in particular,

and the Government needs to balance listening to stakeholder views with a strong resolve to implement the proposed recommendations for the good of the wider system.

Governance

The new technical education system requires a simple and coherent governance model. We have set out our proposals, and rather than repeating them here, we simply stress these need to be given particularly high priority. There will be a range of pressures on the system as it develops. Strong governance will help it remain focused on the key principles described in this report. With that in mind, the remit of the Institute for Apprenticeships should be expanded as soon as possible. We recognise this will require a change to legislation, which will take time. Therefore suitable interim arrangements – including ministers tasking officials in DfE and BIS to lay the appropriate groundwork – should be put in place immediately.

Alignment with wider systemic reforms

A strong technical education system cannot be introduced in isolation. Throughout this report we have identified a range of ways it needs to join up with other parts of the education and skills system, some of which will be changing at the same time. Any report such as this cannot possibly include every interdependency and linkage and, instead of attempting to do so, we urge the Government to consider any parallel or future changes in light of our key principles and the spirit of our report. Changes elsewhere, such as to funding, can have unintended consequences that distort behaviours – we need to avoid this wherever possible.

Communications strategy

A further lesson from previous attempts at education reform is that a strong, coherent and consistent long-term communications strategy is essential if all stakeholders are to understand and embrace the changes. This is particularly true in technical education, which, as we describe in Chapter 1, has been exposed to an almost continuous agenda of reform for decades. We have asserted that a change in emphasis in policy discussions, from the catch-all 'vocational education' to the more precise 'technical education' will be helpful in focusing action where it is required. But this will only be the case if the nature of technical education is accurately and consistently conveyed to all stakeholders. Government must put in place a clear communications plan.

Timeline and milestones

Taking everything above into account, the Government needs to set out an implementation plan for whole system reform that is ambitious but realistic. Phasing is

likely to be required, and for delivery of at least the first routes, we expect the Government to be able to meet the following milestones:

- October 2017: Standards developed for approval by the Institute for Apprenticeships
- October 2018: Procurement exercise begins for new qualifications against approved standards
- February 2019: New routes qualifications approved by the Institute for Apprenticeships
- September 2019: First teaching of new Institute for Apprenticeships approved routes qualifications
- September 2021: First certificates issued on successful completion of the routes
- September 2022: All 15 technical education routes being taught (assuming a three-year phased introduction beginning in 2019)

Conclusion

Our recommendations call for a fundamental shift: a decisive move away from our current technical education system which is failing to develop the skills our industry needs. We now have the opportunity to reform technical education for the long-term. But we will only be successful if all the key stakeholders play their role to the full. Employers must commit to articulating clearly the standards of knowledge and skill that their industries – not just their companies – need now and in the likely future, and participate in training the next generation of employees by offering work placements alongside apprenticeships. Colleges and training providers must redouble their efforts to understand and deliver on employers' needs, engage positively with efforts to concentrate specialist technical education facilities in a smaller number of institutions, and support their students with clear, accurate and up-to-date careers education and guidance.

In return, the Government must commit to implementing all the changes we propose in this report – resisting any temptation simply to cherry-pick those which are easy or cheap to deliver – and put in place a clear and consistent communication strategy to convey, to all stakeholders, the need for change and the purpose and value of technical education in the 21st century. It is also the Government's role to ensure the infrastructure exists to deliver high-quality technical education, including excellent teaching and access to industry-standard equipment. It is an unavoidable truth that high-quality technical education requires significant government investment, but it is an investment that pays handsome dividends in the form of increased national prosperity and improved social mobility.

Finally, politicians and policy makers from across the political spectrum must commit to a long-term, stable policy environment in which these reforms can take root and thrive. The constant tinkering must end. It is time now to focus on actually delivering what has been called for so many times in the past: a system of technical education in England that is the match for any in the world.

Annex A: Qualification levels

Throughout our report we refer to 'levels' of skills and qualifications. The table below gives the types of qualifications which feature at each level.

Table 2 – Qualification levels

Level	Example Qualifications
Entry	• Entry level awards, certificates and diplomas • Entry level Functional Skills • Entry level Foundation Learning and employability skills • Entry level awards and certificates in ESOL (English for speakers of other languages)
1	• GCSE (grades D-G) • Level 1 Technical Awards (Key Stage 4 performance tables category) • Level 1 Functional Skills • Level 1 awards, certificates, and diplomas • Level 1 Foundation Learning • Level 1 awards and certificates in ESOL • NVQ level 1
2	• GCSE (grades A*-C) • Level 2 Technical Awards (Key Stage 4) • Level 2 Technical Certificates (16-19 performance tables category) • Level 2 Functional Skills • Level 2 awards and certificates in ESOL • Level 2 awards, certificates, and diplomas • NVQ level 2
3	• AS and A level • International Baccalaureate • Tech levels (16-19 performance tables category) • Applied general qualifications (16-19 performance tables category) • Access to Higher Education Diplomas • Level 3 professional awards, certificates and diplomas • NVQ level 3
4	• Certificate of higher education • HNC • Level 4 professional awards, certificates and diplomas
5	• Higher diploma • HND • Diploma of higher education • Foundation degree • Level 5 professional awards, certificates and diplomas
6	• Bachelor's degree • Graduate certificates and diplomas • Level 6 professional awards, certificates and diplomas
7	• Postgraduate certificate • Postgraduate diploma • Master's degree • Level 7 advanced professional awards, certificates and diplomas
8	• Doctorate • Level 8 advanced professional awards, certificates and diplomas

Annex B: Technical annex

This annex sets out the analysis undertaken to support the development of the proposed technical education routes. Labour market data were used to formulate the routes, and a number of analytical checks were applied to ensure the proposed routes would meet the principles agreed for the reforms. The various analytical stages of the routes development are outlined below and summarised in this annex:

- using Standard Occupational Classification (SOC) 2010 codes to produce initial occupational groupings which could be refined into effective technical education routes
- testing the routes for alignment against apprenticeship standards, tech levels and technical certificates
- testing the homogeneity of skills and knowledge requirements between occupations within routes, using the United States occupational database, O*NET
- testing the industry coverage the routes provide, using industry-level labour market data and Standard Industrial Classification (SIC) codes
- testing the future viability of the routes using the UK Commission for Employment and Skills (UKCES) Working Futures data

The supporting analysis outlined above formed only one strand of a broader process for reaching the proposals. Alongside the analysis, there has also been extensive engagement with stakeholders such as employers, academics and professional bodies.

The proposed routes

Table 3 sets out the proposed routes, with detail on the proportion of the total labour market that the occupations within the routes cover, as well as the number of apprenticeship standards, tech levels and technical certificates mapped to each route. The following sections then set out the analysis that supported the development of these proposals.

Table 3 – Summary of the proposed routes

Route		Examples of jobs in the route	Number of people employed in the occupations within the route[1]	Proportion of the total labour market accounted for by occupations within the route[2]	Number of apprenticeship standards mapped to route[3]	Number of tech levels and technical certificates mapped to route[4]
1	Agriculture, Environmental and Animal Care	Conservationist, park ranger, farmer, horticulturalist, agricultural manager, agricultural technician	454,726	1%	15	99
2	Business and Administrative	Human resources officer, office manager, administrative officer, housing officer	2,204,478	7%	9	11
3	Catering and Hospitality	Chef, butcher, baker, catering manager, events manager	568,998	2%	16	22
4	Childcare and Education	Nursery assistant, early years officer, teaching assistant, youth worker	1,060,804	3%	3	9
5	Construction	Bricklayer/mason, electrician, building/civil engineering technician, carpenter/joiner, construction supervisor	1,625,448	5%	37	66
6	Creative and Design	Arts producer, graphic designer, audio-visual technician, journalist, product/clothing designer, upholsterer, tailor, furniture maker	529,573	2%	20	40
7	Digital	IT business analyst/systems designer, programmer, software developer, IT technician, web designer, network administrator	351,649	1%	8	19
8	Engineering and Manufacturing	Engineering technician, vehicle mechanic, aircraft fitter, printer, process technician, energy plant operative	1,319,645	4%	57	80
9	Hair and Beauty	Hairdresser, Barber, Beauty therapist	293,004	1%	4	47

Route		Examples of jobs in the route	Number of people employed in the occupations within the route[1]	Proportion of the total labour market accounted for by occupations within the route[2]	Number of apprenticeship standards mapped to route[3]	Number of tech levels and technical certificates mapped to route[4]
10	Health and Science	Nursing assistant, pharmaceutical technician, sports therapist, laboratory technician, dental nurse, food technician	915,979	3%	19	29
11	Legal, Finance and Accounting	Accounting technician, paralegal, financial account manager, payroll manager, finance officer, legal secretary	1,325,482	4%	17	7
12	Protective Services	Police officer, fire service officer, non-commissioned officer (NCO), maritime operations officer (coastguard)	398,400	1%	3	1
13	Sales, Marketing and Procurement	Buyer, procurement officer, sales account manager, market research analyst, estate agent	957,185	3%	3	9
14	Social Care	Care worker, residential warden, probation officer, welfare counsellor	865,941	3%	0	0
15	Transport and Logistics	Ship's officer, railway signalling technician, HGV driver	589,509	2%	14	4
		Total	13,460,821	43%	225	443
		Total number of people employed in the labour market	**30,950,304**	100%		

Notes:

1 This figure gives an indication of the labour market coverage of the occupations within the routes by people of all ages. It *does not* indicate the number of people that will undertake a technical education qualification in that route. Figures are at the UK level, not for England only.

2 Number of people employed in the occupations within the route divided by the total number of people employed in the labour market.

3 Apprenticeship standards as of December 2015 were used for this mapping exercise. As the apprenticeship standards are developing continually, this may not reflect the most recent list.

4 This mapping was based on the lists of tech levels and technical certificates approved for inclusion in the 2017 performance tables.

Sources: For employment numbers: Labour Force Survey (LFS), August 2015.
For apprenticeship standards: List of all apprenticeship standards published by the Skills Funding Agency, accessed December 2015.
For tech levels and technical certificates: Performance tables, technical and vocational qualifications, July 2015.

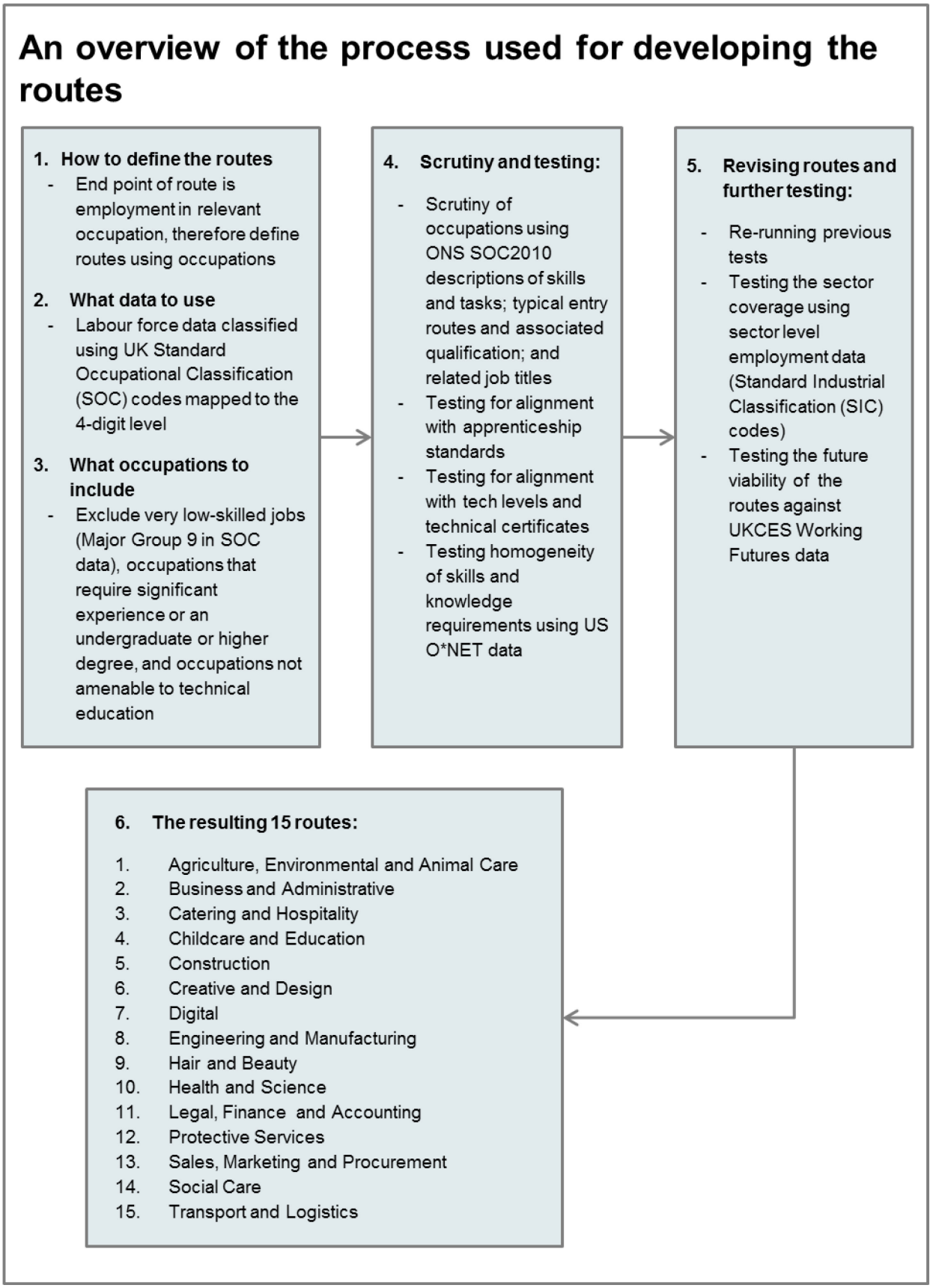

Figure 2: The process for developing the routes

Defining the routes

As set out in the report, the routes are designed to provide individuals with the education and training required to progress into a skilled occupation. Labour Force Survey (LFS) data on occupations in the UK economy were used to explore which occupations the routes should lead to.

The Office for National Statistics (ONS) Standard Occupational Classification (SOC) 2010 was used as the tool for identifying occupations. SOC is a system for classifying occupations and is designed to cover all occupations in which work is performed for pay or profit. SOC codes are developed in a hierarchical format; at the highest level are 1-digit SOC codes ('Major Groups'[47]), at the most granular breakdown of the occupational categories are the 4-digit SOC codes ('Unit Groups'). 4-digit SOC codes were used to determine which occupations were included within technical education and then to assign them to a route.

Using ONS information on typical entry routes and associated qualifications for occupation types, occupations deemed to be either too low-skilled or to require higher level qualifications (for example an undergraduate degree) or significant experience were removed.

The remaining occupations were scrutinised using in-depth information from ONS on skills and tasks, as well as job titles captured by the occupation categories, to develop an initial clustering of occupations deemed homogenous in their requirements.

The next stage was to test the robustness and feasibility of the routes.

Testing the routes for alignment against apprenticeship standards, tech levels and technical certificates

The first test checked the alignment of current apprenticeship trailblazer standards[48], tech levels and technical certificates with the proposed routes. The aim was to understand the spread of existing training provision across occupations in scope for the routes, and to identify any gaps in provision (that is if there were any apprenticeship

[47] The 9 major groups are as follows:
Major Group 1: MANAGERS, DIRECTORS AND SENIOR OFFICIALS
Major Group 2: PROFESSIONAL OCCUPATIONS
Major Group 3: ASSOCIATE PROFESSIONAL AND TECHNICAL OCCUPATIONS
Major Group 4: ADMINISTRATIVE AND SECRETARIAL OCCUPATIONS
Major Group 5: SKILLED TRADES OCCUPATIONS
Major Group 6: CARING, LEISURE AND OTHER SERVICE OCCUPATIONS
Major Group 7: SALES AND CUSTOMER SERVICE OCCUPATIONS
Major Group 8: PROCESS, PLANT AND MACHINE OPERATIVES
Major Group 9: ELEMENTARY OCCUPATIONS

[48] Apprenticeship standards as of December 2015 were used for the mapping exercise.

standards, tech levels or technical certificates that were mapped to occupations not included in the routes).

Apprenticeship standards are created by groups of employers from various industries and they describe the activities an individual would undertake in an apprenticeship, as well as the skills required.

UKCES mapped apprenticeship standards to 4-digit SOC codes. Using this, the apprenticeship standards were mapped to the proposed routes to identify the spread across the routes. With the exception of one route, all other routes had at least three (and up to 57) apprenticeship standards that aligned to them, suggesting that appropriate types of occupations were being considered for the routes.

Tech levels and technical certificates were also mapped to the routes. Again with the exception of one route, this mapping showed that all other routes had at least one tech level or technical certificate mapped to them. Some routes had considerably more – for example, the Agriculture, Environmental and Animal Care route had a total of 99 tech levels and technical certificates mapped to it.

Table 3 presents the total number of apprenticeship standards, tech levels and technical certificates mapped to each of the final 15 routes proposed.

Testing the homogeneity of skills and knowledge requirements between occupations within routes, using the United States occupational database O*NET

To develop the initial proposal, ONS information on tasks and skills requirements in occupations was used. The breadth and depth of information provided in the ONS publication[49] is, however, limited. To enhance the understanding of the skills and knowledge requirements within occupations, the US occupational database O*NET was used.

O*NET provides a rich source of information on both the level and importance of skills and knowledge required in occupations. O*NET data is based on employee surveys and is linked to US occupational classifications. These US classifications have been mapped to UK SOC codes[50], which were then used to analyse the routes.

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[49] Office for National Statistics (ONS), SOC2010 volume 1: structure and description of unit groups

[50] All statistics from the O*NET database reflect occupational information based on US survey data. The information that populates the O*NET database is collected from three primary sources: job incumbents, occupational experts, and occupational analysts. Job incumbents represent the source for much of the information in the O*NET database, including knowledge. Skills data are produced by occupational analysts, based on questionnaire responses. Because the data comes from the US and has been subsequently mapped to UK SOC codes, it is possible that it does not accurately represent UK occupations.

Within the O*NET database, different SOC codes are assigned various different scores for both skills and knowledge. There are 35 different 'skills' which encompass developed capacities that might enable an individual to carry out a particular activity – they are broadly transferable and might be used in a range of different occupations. Examples of skills include 'critical thinking' and 'speaking'. There are 33 different 'knowledge' categories which refer to an organised set of principles and facts applied in general domains. Knowledge categories tend to be more specific than the skills – examples include 'geography' and 'clerical'.

Each skill and knowledge category is assigned both an 'importance' and a 'level'. The importance denotes the extent a particular skill or knowledge category is emphasised within an occupation. The level denotes the degree of competence needed. The level indicator may be particularly useful for helping determine progression within routes, as it specifies the degree of competence required for a particular skill or knowledge area.

While the same skill can be important for a variety of occupations, the amount or level of the skill needed in those occupations can differ dramatically. For example, the skill 'speaking' is important for both barristers and paralegals. However, barristers (who frequently argue cases before judges and juries) need a high level of speaking skill, while paralegals only need an average level.

Using the O*NET data, the homogeneity of the SOC codes grouped together within each route was tested, in terms of the skills and knowledge compositions. This ensured the highest possible homogeneity between the occupations within each route, thus making it possible to develop meaningful training programmes.

Figure 3 illustrates the use of O*NET data to analyse the importance of knowledge for the initial occupations proposed for the Information Technology (IT) route.[51]

[51] Renamed to 'Digital' following later changes to the occupations within the route.

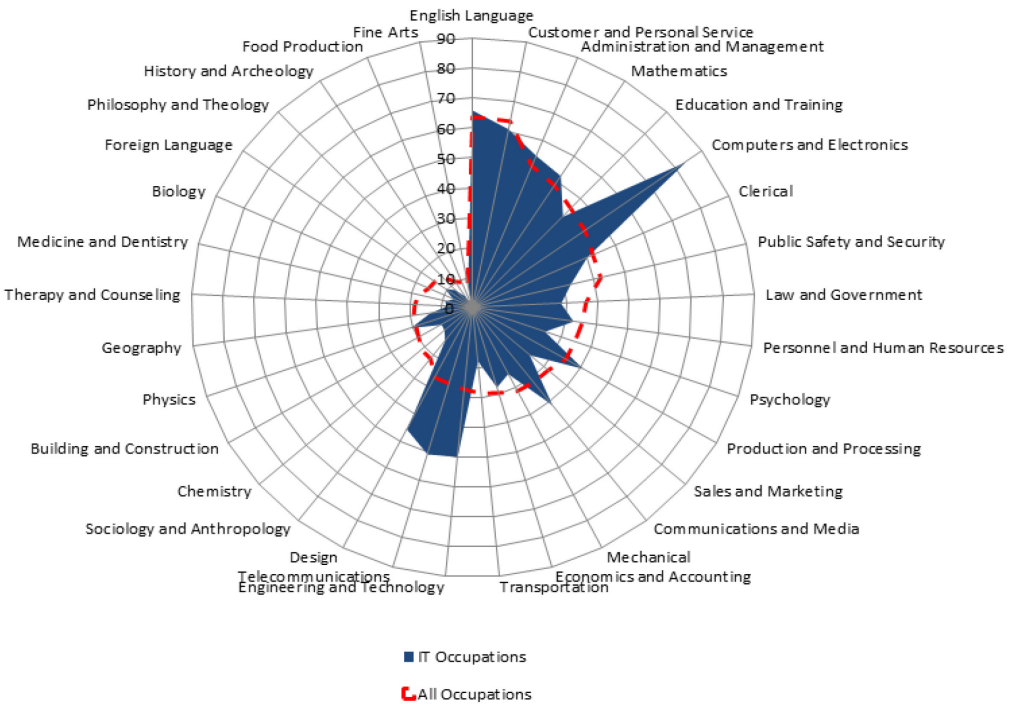

Figure 3a: Radial chart showing the importance of knowledge areas for the initial occupations in the IT route compared to the average for all occupations

Source: O*NET

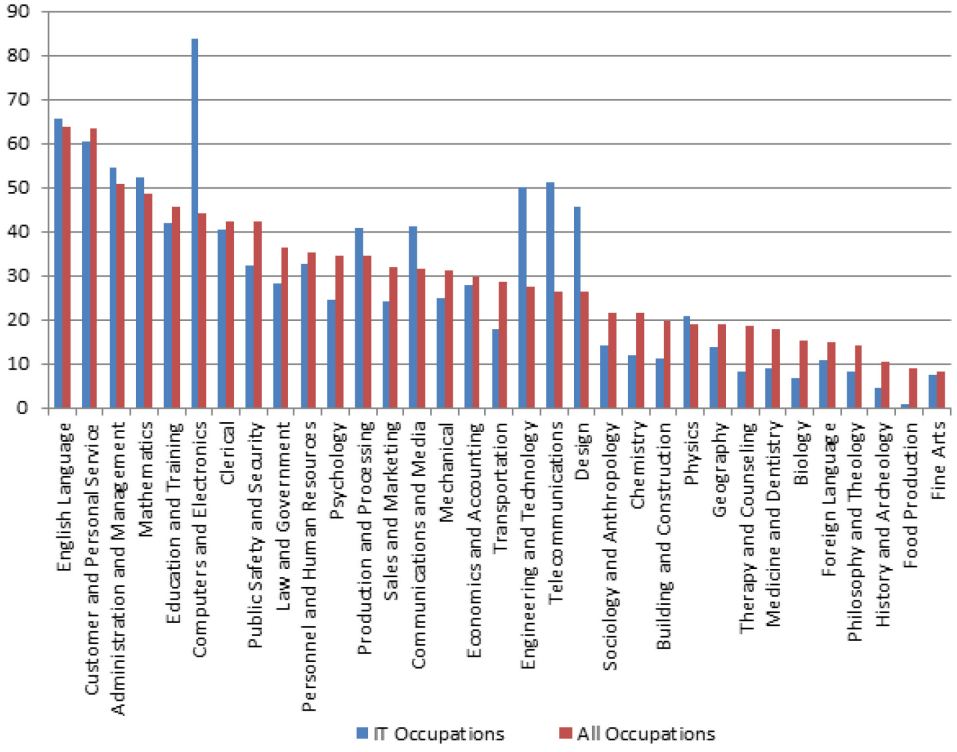

Figure 3b: Bar Chart showing the importance of knowledge areas for the initial occupations in the IT route compared to the average for all occupations

Source: O*NET

Notes: In the O*NET questionnaire, respondents were asked: “How important is the knowledge area to the performance of your current job?” Scores are rated out of 100.

The five most important knowledge areas for IT were found to be:

- Computers and Electronics: 84
- English Language: 66
- Customer and Personal Service: 61
- Administration and Management: 55
- Mathematics: 52

The five biggest differences from the overall average occupation were:

- Computers and Electronics: +39
- Telecommunications: +25
- Engineering and Technology: +23
- Design: +20
- Transportation: -11

Testing the industry coverage of the routes

While the routes are designed around occupations, not sectors, it is important that the new system provides good sector coverage and does not exclude key industries for future growth.

To test this, Standard Industrial Classification (SIC) codes were used, which classify businesses and other statistical units by type of economic activity. This data was mapped to the SOC data used to define the routes, in order to assess the level of coverage.

Table 4 presents the proportion of employment in each industry (as defined by ONS SIC data) covered by the proposed routes.

Table 4 – Proportion of industry sectors covered by routes

Industry	Total number employed in industry	Proportion of industry covered by routes
Agriculture, forestry and fishing	2,815,968	51%
Electricity, gas, steam and air conditioning supply	143,727	54%
Water supply, sewerage, waste management and remediation activities	168,822	44%
Construction	1,814,758	66%

Industry	Total number employed in industry	Proportion of industry covered by routes
Wholesale and retail trade, repair of motor vehicles and motorcycles	3,277,824	27%
Transportation and storage	1,263,826	39%
Accommodation and food service activities	1,182,826	25%
Information and communication	1,057,900	39%
Financial and insurance activities	1,030,119	47%
Real estate activities	290,612	47%
Professional, scientific and technical activities	1,893,135	46%
Administrative and support service activities	1,181,690	36%
Public administration and defence; compulsory social security	1,493,698	59%
Education	2,682,575	35%
Human health and social work activities	3,304,721	51%
Arts, entertainment and recreation	639,788	34%
Other service activities	737,673	60%
Activities of extraterritorial organisations and bodies	36,291	58%
Totals	**25,015,953**	**44%**

Source: ONS SIC data

Testing the future viability of the routes

As well as testing the routes against current labour market requirements, ‘future proofing’ was also considered to ensure they had longevity. This was explored through the UKCES Working Futures data and the cross-Government ‘future of work’ project data, with a view to developing routes that would serve the needs of the UK economy both now and in the future.

The Working Futures data provide a quantitative assessment of the employment prospects in the UK labour market over a ten year horizon (2012-2022). While the Working Futures data provide some useful indication of possible labour market changes, projections are based on the assumption that past patterns of performance and behaviour in the economy and labour market will continue into the future. Furthermore, Working Futures is mapped to 2-digit SOC codes, not 4-digit. 4-digit SOC codes are therefore assumed to have the same predicted growth rates as their 2-digit constituents.

As a result, any conclusions drawn from this data are only indicative and not precise predictions of what will happen in the future.[52]

The Working Futures data predict there will be a net decline in employment in five of the proposed routes over the 10-year period:

- Engineering and Manufacturing
- Business and Administrative
- Protective Services
- Agriculture, Environmental and Animal Care
- Legal, Finance and Accounting

However, as well as net change in employment, Working Futures also considers replacement demand. Replacement demand is the projected number of jobs in an occupation resulting from departures from the labour market as a result of: retirement, death or temporary withdrawals (such as maternity leave).

Based on the analysis, all routes are projected to see significant replacement demand over the 10-year period (Figure 4). In all cases replacement demand, rather than net growth, is predicted to be the main source of job openings. In the case of the five sectors expected to see net decline over the period, replacement demand is expected to be more than enough to offset the scale of decline.

[52] A detailed description of approach can be found in main report and technical report for Working Futures.

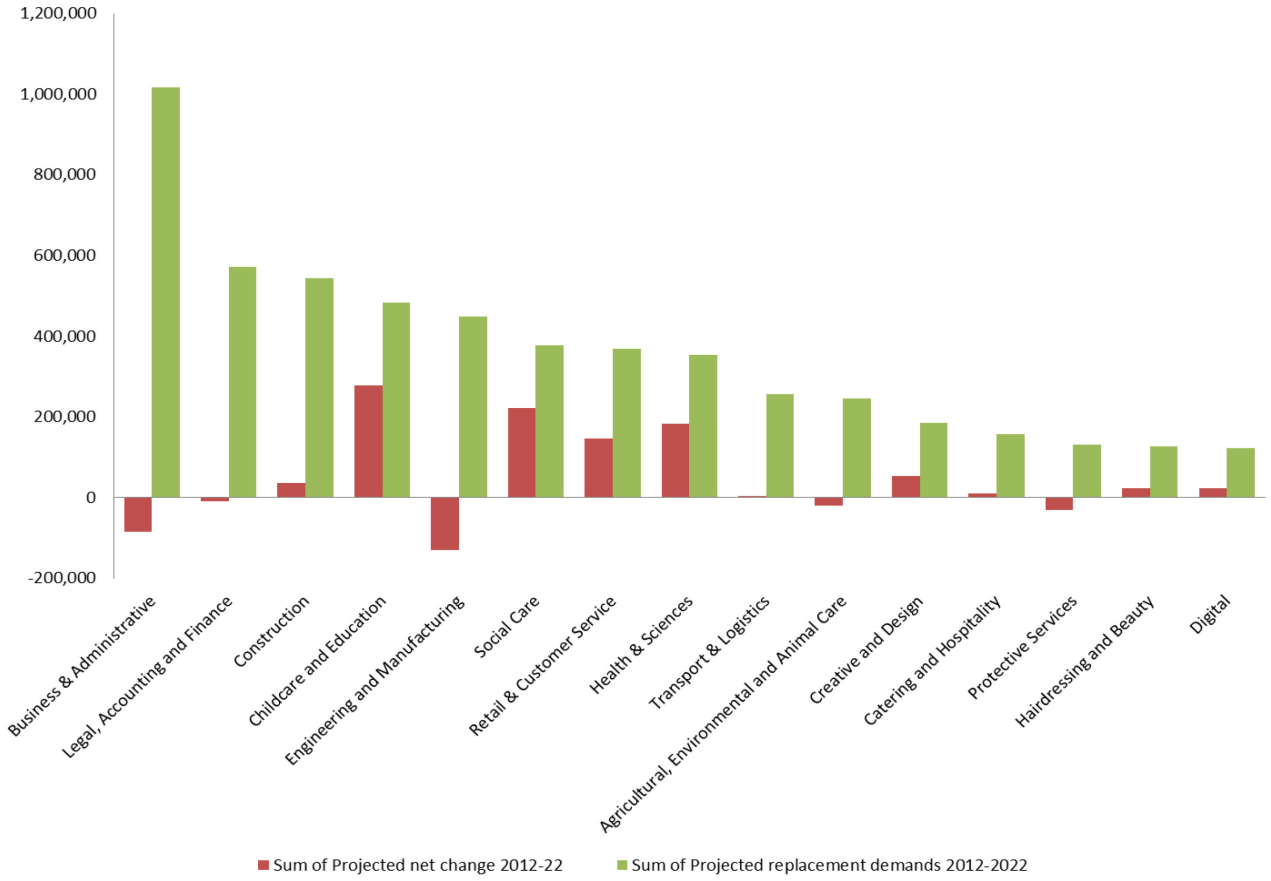

Figure 4: Working Futures predictions of net change in employment, and replacement demands, for occupations within the proposed routes, between 2012 and 2022

Source: Working Futures 2012 to 2022, March 2014

Notes: Projections are based on assumption that past patterns of performance and behaviour in the economy and labour market will continue into the future. The results are therefore indicative and not precise predictions of what will happen. Employment estimates at the 4-digit SOC level are affected by statistical 'noise', therefore Working Futures applies the projected growth rates for 2-digit sub-major groups to their constituent 4-digit unit groups. Adjustments are made to take account of unit groups that are known to perform differently to their parent sub-major groups.

Annex C: International annex

In undertaking this work the Panel has considered international exemplars of routes-based technical education systems. We recognise that jurisdictions vary in their economic and social contexts, and thus comparisons must be made with care. However, we do not view this as a barrier to learning from principles that underpin strong technical education elsewhere. The following notes summarise background information from each of the countries.

Note: The terminology used to describe technical education systems, as defined in this report, varies across jurisdictions and translations. Thus the outlines below include a range of terms, such as vocational education and training ('VET'), vocational training, technical training, vocational schools (colleges), and so on.

Denmark

Table 5 – Example of routes-based technical education system from Denmark

Feature	Notes
There is a national system of routes for technical education standards. The outcomes and assessment model for each standard are specified by experts in the relevant occupation.	The Ministry of Children, Education and Gender Equality (hereafter referred to as Ministry of Education) governs the general framework for the vocational education and training system and supervises vocational colleges. An advisory council for initial vocational training ('REU') is appointed by the minister and provides guidance, for example, on the structure of routes, framework for content and assessment, and accreditation of colleges. The Council is made up of industry sector experts nominated by social partners, and representatives of employers, teachers and students. The Ministry of Education is responsible for approving new programmes based on recommendations from the Council, and for approving colleges that provide 'basic' and 'main' VET courses. Following a major reform in 2015, Denmark has moved to four broad 'basic' vocational education routes, leading to around 110 'main' programmes. The Council works with around 50 trade committees, which describe the standards for each VET programme: determining the outcomes, assessment methodology, and programme durations. The committees typically comprise 10 to 14 individuals, with parity of membership between employer and employee representation. Trade committees review students' progress to employment alongside labour market demand. They recommend the

	introduction of new standards, and adjustments or ending of existing standards, as required. In addition, the Ministry of Education can establish development committees to swiftly investigate emerging occupations and, if appropriate, develop new standards. This typically takes place in new areas of the labour market where there are no existing trade committees.
College-based and work-based options for technical education at upper secondary are developed to the same standards.	At age 16, young people may choose to follow either an academic or vocational upper secondary pathway. Approximately 20% of students opt for the vocational pathway at this time. However, VET students are on average older than those in general education thus the VET cohort accounts for about half of all upper secondary student enrolment. (While the average age for beginning general upper secondary is under 17, for VET it is 23. Individuals also take longer to complete VET programmes: the average age for completing general upper secondary education is 20, compared to 28.5 for VET.) The VET upper secondary pathway combines college-based and work-based learning for all students. Expected outcomes are defined by the standard for each occupation set by the trade committees. Towards the end of their main course students take an examination with theory and practical components. The practical test is assessed by external examiners drawn from the trade committees and employers. Adults aged 25 or older with at least two years of relevant work experience may study the college-based components of a main programme in a VET school in preparation for the same examination.
Transition support is provided for young people not yet ready to access a route.	To enrol on a VET route, students must fulfil criteria based on prior achievement in Danish and mathematics. Individuals who do not meet these criteria at grade 9 (age 15) can study a vocationally-orientated grade 10 option, 'VET10', which is designed to support them in gaining the required qualifications for entry to their VET route. Alternatively, if a young person obtains a training agreement with an employer straight after lower-secondary school, they can be admitted to a VET school and have catch-up classes in Danish and mathematics alongside their VET programme. Young people who enrol in VET more than one year after completing secondary schooling will not be required to complete the first half of the basic programme.

The early curriculum for each route is typically broad, with increasing specialisation as an individual progresses.	An upper-secondary VET programme typically lasts 4 years, although this varies from 2.5 to 5 years. Initially students follow a one-year 'basic' course, comprising 20-25 weeks of general education and a common core of vocational education and training, which introduces young people to the occupations within their route. This is followed by 20 plus weeks of more specialised VET in preparation for their chosen main programme. The point at which increasing specialisation occurs varies as appropriate across the four routes. Basic courses alone do not provide students with the necessary qualifications for entering the labour market. Students progress to a main VET programme, during which education and training alternates between college-based and work-based learning. The proportion of time spent in each mode varies across programmes, but typically 30-50% is college-based. The majority of students enter into a training agreement with an employer who provides the work-based components of the programme. Trade committees appoint local education committees to work directly with accredited colleges and local employers to plan coherent technical education curricula, and obtain sufficient internships to meet demand. Students who are not able to source a training agreement are offered college-based practical learning as an alternative for their internship. A minority of students enter into a training agreement with an employer immediately following secondary education, and work for a year rather than undertaking a basic VET course. After this year these 'apprentices' may enrol at VET school with an individual education plan including the same assessment requirements as the main programme for their occupation. Main programmes lead to a specific vocational qualification, for example flight mechanic or multimedia animator. The majority of programmes have one or two stepping off points in order to increase their flexibility; a student may step off at a well-defined point that gives professional competence in a lower-level occupation, and choose to resume education and training at a later date, without prolonging the overall duration of their study.
Guided learning hours	Full-time VET provision is 40 weeks per year. A minimum number of teacher-supervised lessons is specified – for example, from August 2015 for the basic programme this is 25 hours per week (increasing to 26 hours from August 2016).

Germany

Table 6 – Example of routes-based technical education system from Germany

Feature	Notes
There is a national system of routes for technical education standards. The outcomes and assessment model for each standard are specified by experts in the relevant occupation.	Responsibilities for technical education are shared between the federal government (mainly the Federal Ministry for Education and Research, and Federal Ministry for Economic Affairs and Energy), which oversees content of employer-based programmes, and the federal states (Länder) for college-based education and training (for the apprenticeship off-the-job component and the full-time college-based pathway). The prevalence of the apprenticeship model in Germany is evident in the national regulation of VET standards. The federal government has a legal framework for governance of apprenticeship training, administered through the Federal Institute for Vocational Education and Training (BiBB), a tripartite organisation that also conducts labour market research to underpin VET decision making. BiBB prepares a single national standard for each apprenticeship training occupation, which provides transparency and supports mobility in the labour market. Germany has six main routes for dual apprenticeships, with more than 320 national training standards. A small number of standards for recognised professions in the health and elderly care fields are regulated by other federal laws but are not trained for through the dual apprenticeship system. There are also a range of assistant professions and professions in the social science fields that are regulated by Länder Ministries of Education, some of which can only be trained for in full-time college-based education and training, with others having comparable dual apprenticeship training standards. Responsibilities for apprentice training are shared across the federal government, Länder, employers, unions, and self-governing industry sector expert bodies (‘Chambers’). Chambers establish vocational education and training committees with representatives of trade unions, employers, and teachers drawn from vocational schools. Chambers and social partners input into decisions regarding the development and maintenance of standards for regulated occupations in their industries. A standard stipulates the length of training, name of the occupation, outcomes for knowledge and skills that should be acquired, the

	work-based training curriculum, and an assessment plan. Chambers are also tasked with continuous development of quality for vocational training. As part of this process, employers and unions draft proposals for updating existing standards and defining new occupations, and submit these to the Chambers. Federal law mandates that companies operating in the vast majority of sectors must be members of the Chambers. Employers develop their work-based training programmes in conjunction with Chambers based at the regional level, against the national standards set by BiBB. The Chambers oversee assessment and quality assurance for the work-based training element of dual apprenticeship training. Off-the-job education for apprentices is the responsibility of the Länder governments. This system necessitates close cooperation between the Länder and the federal government, together with employer representatives and trade unions.
College-based and work-based options for technical education at upper secondary are developed to the same standards.	From age 15 or 16, students may choose an academic or vocational pathway. Approximately half of students follow the vocational path, predominantly through the work-based 'dual track' apprenticeship system, with full-time vocational college-based education undertaken by a smaller proportion of students. Education and training for other occupations is offered only through apprenticeship or college-based paths, while other occupations may be studied through either mode. VET leads to either a Chamber certificate (for dual apprentices) or vocational-college certificate. Off-the-job education and training for dual-track apprenticeships is provided by vocational schools that work solely with apprentices (Berufsschulen). Usually different institutions offer the full-time college-based pathway (Berufsfachschulen). These vocational colleges specialise in different areas, for example, agriculture, business administration, technology. In addition, specialist schools provide training for health professionals (such as nursing, midwifery). The Länder governments are responsible for education provided by schools and universities in their region. Ministries establish state training regulations for the vocational-school element of dual apprenticeships against the national BiBB standards. The Länder Ministries also establish standards and assessment for state-recognised professions where education and training is provided by full-time vocational colleges. Examinations for all college-based education and training are set by the Länder.

	For those professions where VET is offered both through dual apprenticeship and full-time vocational college, the Länder, federal government and other relevant institutions collaborate to harmonise the curriculum. Standardisation of college-based learning for both apprentices and students at technical colleges is achieved through collaboration of Länder Ministries, which produce a framework statement of agreed curricula (following the Standing Conference of the Ministers of Education and Cultural Affairs). The detailed curriculum can vary between Länders.
Transition support is provided for young people not yet ready to access a route.	Young people who are unable to source a vocational training place (either an apprenticeship or entry to vocational school) are offered transition provision, which aims to support their entry into VET. The public employment system offers support and guidance to employers who offer internships for young people on the transition programme. The transition programme incorporates preparatory vocational training, a focus on numeracy and literacy skills, and internship opportunities. In 2012, about 267,000 young people, representing 27% of the total cohort entering VET, followed the transition programme; however, this proportion is noted to be diminishing.
The early curriculum for each route is typically broad, with increasing specialisation as an individual progresses.	Technical education programmes are typically 2 to 3.5 years, with some programmes 4 years and a few 1 year standards. Students take general education courses (for example, mathematics, languages, sports) alongside the technical component of their programme. The balance of components in the curriculum varies depending on the student's chosen occupation.
Guided learning hours	For full-time technical education programmes guided learning hours are mandated by the Länder curriculum and vary by programme.

Netherlands

Table 7 – Example of routes-based technical education system from the Netherlands

Feature	Notes
There is a national system of routes for technical education standards. The outcomes and assessment model for each standard are specified by experts in the relevant occupation.	The national system for qualifications is governed by the Ministry of Education, Culture and Science. Supporting central government in vocational education regulation is the Cooperation Organisation for Vocational Education, Training and the Labour Market ('SBB'). There is strong employer involvement in determining the content of routes and standards for occupational qualifications. All bodies of the SBB have wide representation of social partners (employers, employees), VET colleges and private schools. The Netherlands is currently reducing the number of technical programmes to approximately 170 main qualifications with 450-500 specialisations ('profiles'), which are organised under eight 'Sectoral Chambers'. The SBB convenes panels of industry and teaching experts which draft the expected knowledge, skills and behaviours for each standard in their route, although overall responsibility for defining these outcomes rests with the SBB. The SBB is also responsible for certifying and training employers who provide work placements; publishing labour market information to feed into design of the vocational routes and standards; and providing the Ministry a unified voice on skills policy and system reform.
College-based and work-based options for technical education at upper secondary are developed to the same standards.	After primary education, young people may choose to follow either an academic or pre-vocational (VMBO) pathway. (Note in larger schools, secondary education usually starts with a broader 'bridging' curriculum of one to two years, at the end of which students receive further guidance about the most appropriate pathway for them.) At age 16, young people completing the pre-vocational pathway may choose to continue onto upper-secondary VET or move to the academic pathway. At age 17 or 18, students from the academic pathway typically move to a university programme, or a course at tertiary professional level. Overall, about half of students follow the vocational path at upper-secondary level, which offers a college-based option (taken by approximately 80% of VET students) and a work-based (apprenticeship) model.

	Upper-secondary VET may take up to three years to complete depending on the chosen occupation. While students following the college-based mode will spend the bulk of their time in vocational school, substantial work placements must be provided to enable students to acquire competency in a work environment. On average students spend three-four days per week in school, and one-two days working with an employer. This proportion is reversed for students on an apprenticeship – they typically work four days and attend school for one day per week. Alignment of the college-based and apprenticeship option provides flexibility for either path to expand depending on economic demand. Both pathways are equally integrated in the national certification system. Final certification for students on the college-based and apprenticeship pathways is common, with a single qualification standard for each occupation specifying expected outcomes. There are national examinations for mathematics and languages. For VET programmes the standards ('qualification files') serve as benchmarks for assessment. Responsibility for setting examinations and assessing students' progress has been devolved to vocational schools. By law employers providing work-based learning must be involved in this process, and the education inspectorate supervises examination quality.
Transition support is provided for young people not yet ready to access a route.	Upper-secondary VET in the Netherlands is offered at different levels (from level 1 to 4 of the European Qualifications Framework). The majority of students enter the programmes at level 3 (equivalent to A levels in the UK) or level 4. About 20% of students follow a one to two-year level 2 programme, from which they can enter the labour market or progress to further education and training. At age 16, a small number of students (about 3% of the VET cohort) do not achieve the required qualification from lower-secondary education to enable them to move directly into upper-secondary VET. These students are offered a one-year preparatory programme which aims to support their progression to technical education, and includes work orientation and practical training.

The early curriculum for each route is typically broad, with increasing specialisation as an individual progresses.	The qualification system has recently been revised. From August 2016, all standards within a route are clustered to aid transparency and functionality. Outcomes comprise a general component (Dutch, numeracy, citizenship and career management skills, and English for the highest level programmes), plus a technical component with some training common across the cluster and some tailored to the occupation. Further optional specialist modules will be offered by colleges to meet labour market needs.
Guided learning hours	Full-time upper-secondary VET provision is for 40 hours per week and 40 weeks per year. Recent reform has seen the number of direct teaching hours for the full-time college-based option increase to 1,000 per year.

Norway

Table 8 – Example of routes-based technical education system from Norway

Feature	Notes
There is a national system of routes for technical education standards. The outcomes and assessment model for each standard are specified by experts in the relevant occupation.	The Ministry of Education and Research (Kunnskapsdepartementet) has overarching responsibility for the development, relevance and quality of education and training, including technical education. Operational responsibilities for development of standards, assessment, delivery of training, and quality control are mandated to other public bodies. From 2016 Norway has eight technical routes, and five general study routes. The National Council for VET has established expert panels of employees and employers (Vocational Training Councils) for each technical route. These panels advise the Ministry on the expected learning outcomes for each stage of technical education. Each of these standards (referred to as a 'subject curriculum') describes the knowledge and skills a student will develop, and the principles for assessment in a particular route. The panels also monitor labour market needs to inform review of routes and standards.
College-based and work-based options for technical education at upper secondary are developed to the same standards.	At age 16 young people choose to follow either an academic or vocational upper secondary pathway. Approximately half of students opt for the vocational pathway, which typically comprises two years at school – including practical training in workshops and short work placements in industry – followed by two years of apprenticeship. During the latter two years, the apprentice is an employee, described as engaging in one year of training and one year of productive work. The '2+2' model for vocational school + apprenticeship years is common across routes, but for some occupations it may vary and follow either a '1+3' or '3+0' (ie entirely school-based) model. Students may find an apprenticeship placement individually but in most cases county authorities or local training agencies help source this provision. Local training agencies are owned by a group of employers. They develop quality assurance systems and training curricula for the companies, and manage administration of the apprenticeships. Approximately two-thirds of students begin an apprenticeship place immediately after their

	VET school years. The schools must offer a third year of technical education to those students who do not secure an apprenticeship, preparing them for the same final assessment taken by an apprentice in their chosen occupation (the 'craft' or 'journeyman's' certificate). A small proportion of students take up this provision; some move immediately into employment, or to another mode of education. Upper secondary VET is completed by a practical-theoretical examination. During the exam apprentices demonstrate their skills and explain and justify the methods they have chosen to solve the test assignments. Successful candidates are awarded a 'trade certificate' for industrial and service trades, or a 'journeyman's certificate' for traditional crafts. The two types of certificate are awarded by the county authorities. A county-appointed, industry-specific examination board, on which the social partners are represented, prepares and assesses the examination. In 2012, 93% of the cohort gained a certificate.
Transition support is provided for young people not yet ready to access a route.	Young people are entitled to three years of upper secondary education. They are supported in making informed choice regarding their upper secondary education; for example, during their lower secondary education, students select an optional programme to 'try out' their proposed upper secondary route. Local areas are responsible for following-up with students who do not enter, or drop out of, upper secondary education and training, and working to reengage them.
The early curriculum for each route is typically broad, with increasing specialisation as an individual progresses.	The first year of upper secondary technical education includes general education (English, mathematics, Norwegian, physical education, natural science), and a common introductory technical education core for the student's chosen route. In the second year students choose a more specialised programme of technical education. All students continue with general education (English, Norwegian, physical education and social science) throughout this year. The two-year apprenticeship takes place with an employer, where students continue to work towards the national standard for their occupation.
Guided learning hours	Around 980 guided learning hours are required for each of the college-based years.

Singapore

Table 9 – Example of routes-based technical education system from Singapore

Feature	Notes
There is a national system of routes for technical education standards. The outcomes and assessment model for each standard are specified by experts in the relevant occupation.	The Ministry of Education is responsible for pre-employment education and training. The Ministry oversees a range of post-secondary institutions: junior colleges (offering an academic pathway for university preparation); polytechnics and the Institute of Technical Education colleges (a vocational pathway); and universities. It is also responsible for a number of other specialist institutions, including arts institutions. The Institute of Technical Education comprises three colleges with different foci. The geography of Singapore is such that individual post-secondary VET institutions develop their own qualifications. The Institute of Technical Education colleges and polytechnics collaborate closely with industry partners to define the desired outcomes for each of their programmes, working to a set framework for curriculum design and assessment. Professional bodies may also play a role in co-development of programmes. The syllabus for each qualification is submitted to the Ministry of Education. Continuing-employment training for adults in work is overseen by the Ministry of Manpower through the Workforce Development Agency. Amongst its responsibilities the Agency maintains 34 skills qualification frameworks with pathways to recognised qualifications for occupations, either designing these qualifications directly or endorsing valued qualifications offered by providers such as polytechnics and the Institute of Technical Education. The Ministries operate quality assurance mechanisms, and maintain an overview of available qualifications. A major reform of regulation for technical education in Singapore is currently being introduced. ‘SkillsFuture’ will see the distinction between pre-employment and continuing employment training phased out, and a single Ministry will take oversight of all vocational education and training. The current Workforce Development Agency’s skills frameworks, which encompass low to higher level occupations within an area of the labour market, will form the basis of a single system of standards for VET qualifications at any level. This change is intended to support lifelong learning and upskilling across the country’s workforce.

	The National Manpower Council, with representation including the Ministry of Manpower and Ministry of Education, analyses and projects Singapore's employment requirements. Level of provision in different institutions and fields is aligned to these projections. Note despite the Council's title, this analysis is predominantly to inform resource planning, rather than a traditional perception of 'manpower planning'.
College-based and work-based options for technical education at upper secondary are developed to the same standards.	At age 12, young people enter one of several types of school offering a different curriculum balance across mathematics and sciences, languages, humanities and the arts. For example, academic pathways for students intending to progress to a junior college; a technical pathway that prepares students for progression typically to the Institute of Technical Education. A range of specialist schools offer tailored curricula – for example, an 'integrated programme' direct to university. At age 16 or 17, young people apply for places at post-secondary institutions offering vocational or academic options. About two-thirds of students follow a post-secondary VET pathway provided at one of five polytechnics or the Institute of Technical Education colleges. Following their Institute programme, students may enter the workplace and/or progress to further study at a polytechnic. An academic pathway is provided at the university-preparation schools (predominantly junior colleges). Throughout the education system there are defined opportunities for young people to move between academic and vocational pathways depending on achievement of particular entry criteria. Although the term 'apprenticeship' is not commonly recognised in Singapore, work-based learning opportunities are available. For example, 'Traineeship' programmes offered at the Institute of Technical Education are a formal training agreement between the trainee, sponsoring employer, and the Institute. Trainees spend 20-40% of their time at college, achieving the same certificate qualification as full-time students. For students on full-time college-based programmes the Institute of Technical Education uses its strong employer links to source extended work-placements ('internships') as part of a student's curriculum. A relatively new 'Master' qualification is awarded to students who have gained an Institute of Technical Education certificate plus three years of relevant work experience, in a programme run in collaboration with participating employers.

Transition support is provided for young people not yet ready to access a route.	Entry criteria for different programmes at the Institute of Technical Education vary. Students can enter a certificate programme and work towards progression to higher certificates. A small minority of young people will enter the labour market at age 16 or 17, with opportunity to take up continuing-employment training provided through the Workforce Development Agency at a later age.
The early curriculum for each route is typically broad, with increasing specialisation as an individual progresses.	The Institute of Technical Education currently offers 58 certificate programmes and 45 higher certificate programmes, which are typically two years in length. The curriculum for each programme comprises technical modules followed by all students ('core'); 'elective' modules (from a choice of technical modules specific to their programme, and general modules such as mathematics); and 'life skills' modules followed by all students. Students specialise through their choice of elective modules, and by progression from certificate to related higher certificate level courses and/or courses offered at polytechnics.
Guided learning hours	Credit requirements and teaching hours vary across the Institute of Technical Education programmes.

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