

Maximising Employer Engagement

Guidance for awarding bodies on strategic employer engagement

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1. Maximising Employer Engagement

1.1. INTRODUCTION

Employer-led technical education and training is a guiding principle and prime objective for IfATE. To achieve this, employers must play a central role in identifying skills needs and developing qualifications which accredit training and confer competence.

Awarding bodies have the right expertise to translate employers' skills requirements into education and training. They should work collaboratively with employers throughout all stages of the qualification development cycle to ensure technical qualifications reflect employer requirements. Employers and employer representative organisations should be involved in:

- considering and evaluating sector developments/trends
- identifying current and future skills needs or gaps; deciding what qualifications should be developed to meet those needs
- determining their format and content
- deciding on valid and fit for purpose assessments
- participating in qualifications review and revision

Engaging employers directly in the design and development of qualifications means these products are more likely to meet employer and learner need and therefore are likely to be better received and have greater longevity. However, IfATE and awarding bodies know that beneath the term 'employers' lies a range of organisations with different requirements, ranging from small local companies to large multinational corporations. Addressing these diverse needs is complex. It often falls to awarding bodies to meet this challenge when planning their qualification offers and presenting them in a way that is understood by different employer types, as well as students from a range of backgrounds and educational starting points.

This guidance, developed with employer insight, provides a framework awarding bodies can use to maximise employer engagement. It offers strategic advice on involving employers in qualification development and signposts to resources awarding bodies can use to inform engagement activities.

1.2. PURPOSE

This guidance advises awarding bodies how to maximise engagement with employers. Employers have provided insights, via IfATE's route panels and employer networks, to inform the writing of the guidance, which functions in two distinct but complementary ways:

1. As a good practice guide for awarding bodies on using strategic approaches which will help maximise engagement
2. As a library of data and information sources that can be used to inform employer engagement, aid business planning and help awarding bodies access the insights and information needed to develop fit for purpose technical qualifications

In any field, good practice can be widely known but inconsistently or partially applied. Bringing together and applying the elements of good practice that relate to each part of an activity or process will impact positively on outcomes and outputs.

Although this guidance relates to the [employer demand test](#), it is not a blueprint for meeting those requirements. However, although IfATE cannot pre-empt decisions on meeting the employer demand test, adopting the approaches in this guidance is likely to strengthen the employer engagement functions of most awarding bodies.

1.3. DRIVERS

Employer engagement is essential for technical qualification development. In 2016, the government's [Post-16 Skills Plan](#), based on the findings of the [Sainsbury Review](#), recommended that 'increasing the level of employer engagement with training and development was a central plank of the reform process.' The review stated: 'Getting employers more involved in design and delivery... will reinforce the value of training to employers, while also ensuring that the education system delivers the skills employers need.'

IfATE requires awarding bodies developing new or redeveloping existing qualifications to provide evidence of employer engagement to prove there is demand. Awarding bodies must provide evidence which sets out their rationale for engagement, shows they have engaged with a range of employers, and that they have a plan for continuing relationships with employers. More information on IfATE's requirements for employer engagement can be found [here](#).

Awarding bodies can draw on drivers to motivate employers to engage. Successful strategies are likely to draw on more than one driver and will help employers understand how their contribution directly influences the development and provision of high-quality technical qualifications, leading to the development of a skilled workforce.

Drivers for engagement can include:

- That employer of all sizes get the chance to input into a qualification which will provide the skills most needed by the sector
- The opportunity to influence qualification content means employers can be confident the workforce will have the training, knowledge and skills they require
- By being involved in the development of assessment products, employers are more aware of the value/currency of the qualification
- That employers who have been involved in the development of qualifications are significantly more likely to report more positive perceptions about them ([Ofqual, 2017](#)).
- The opportunity to play an essential role in improving the technical skills system and increasing national productivity
- Fit for purpose, internationally recognised and respected qualifications are essential for multi-national corporations in promoting a world-class skills base

2. Strategic engagement with employers

2.1. EFFECTIVE EMPLOYER ENGAGEMENT

Qualifications development is often strategic. Awarding bodies know how to identify sectors where qualifications will be both useful and commercially viable. They make a vital contribution to creating a qualifications system that is clear, coherent and fit for purpose.

IfATE is aware of the degree of employer engagement awarding bodies currently facilitate. Whether this is specialised sector-specific engagement or the higher-level engagement with employer organisations that helps define strategic direction, awarding bodies provide a channel for employers to feed into the technical education system. However, there is always potential for variations in the extent, quality and timeliness of engagement across and within sectors and organisations. Where there is divergence from good practice, IfATE aims to provide advice on how awarding bodies can address it.

Awarding bodies should take a strategic approach which ensures a collaborative relationship between themselves and employers from the outset. Employers should be purposefully involved and not solely consulted towards the end of a development process to meet regulatory requirements. A strategic approach to employer engagement shouldn't just relate to qualification development. If done effectively, it will have a positive impact on all aspects of an awarding body's technical education activity.

IfATE recognises that every awarding body has different levels of maturity in their employer engagement functions. IfATE have shaped this guidance so every awarding body should find something of use, such as advice on enhancing existing approaches or trialling a new approach. How the guidance is used will vary between organisations. IfATE believes that the approaches in this guidance will be useful to most at points during their development activities, helping to maximise the benefits of engagement.

2.2. BARRIERS TO EFFECTIVE EMPLOYER ENGAGEMENT

IfATE understands that engagement with employers is not straightforward. Responses from IfATE's level 3 consultation and work with sector route groups identified issues associated with engagement. These include:

- High volume of messages in engagement channels. One employer commented that formerly popular channels, such as social media and LinkedIn, are becoming less effective due to the volume of messages users receive.
- Not knowing where to begin. One employer said: 'There are numerous interest groups. The challenge is for awarding organisations to know which they should engage with.'
- Resource constraints. Employers are often time-poor. One employer stated: 'Employers are busy and often quite small.'
- Resource required to build and maintain effective relationships.
- Funding constraints. An employer said: '(Employers) often can only contribute when time is paid for.'

Employers also reported barriers when engaging with technical qualifications generally. Understanding these may help awarding bodies when building relationships with employers. Barriers included:

- Complexity of the system and/or too many qualifications
- Qualifications becoming out of date within the sector, or a lack of qualifications which respond to new technology
- Qualifications that are too long to complete or too classroom-based
- Complexity of contracting with a provider
- Inability to release employees for studying or training
- No local provision.

2.3. STRATEGIC EMPLOYER ENGAGEMENT

This section looks at how to take a strategic approach to employer engagement, using data and information. It addresses barriers and establishes how strategic engagement can benefit qualifications development, employers and students.

Strategic employer engagement means taking a planned approach to engaging with employers, including setting objectives and establishing the steps required to achieve them.

2.3.1. Identifying workforce skills and qualifications needs

Awarding bodies understand the requirement for a business case for a qualification or qualifications suite before beginning development. Establishing demand prior to beginning development has a commercial benefit but also ensures we have a technical qualifications system that meets employer and student requirements. It also helps to evidence [employer demand](#), for example, as part of the level 3 approvals process.

Awarding bodies talk to employers regularly to identify industry/sector needs. To maximise the effectiveness of these contacts, conversations should be informed by current evidence. Awarding bodies should gather available information and data to inform engagement with the relevant sector. This helps ensure that any qualifications they develop represent the needs of different employers, occupational roles and specialisms. Gathering evidence to ensure technical accuracy, alignment to occupational roles and wide industry applicability has two purposes:

It can help awarding bodies build capacity and expertise within their employer networks. Many employers would like to be involved in qualification development but don't have confidence that they understand the issues, evidence and processes well enough to contribute. A knowledgeable awarding body can work collegiately with these employers to build their capacity and confidence.

A strong grasp of the evidence can provide checks and challenges in awarding bodies' relationships with employers. IfATE is keen for awarding bodies to play an active role in ensuring employer requirements are compatible with wider system needs. 'Employer-led' in this context doesn't mean doing everything an employer suggests. It can mean supporting an employer to see the benefits of doing things in a way that might be different to its original idea, especially where this supports applicability and transferability within an occupation. A well-informed and confident awarding body should perform this function in a collaborative relationship with employers.

2.3.2. Using data and information

Using a range of evidence, such as data, information and research, is valuable in developing qualifications. Workforce data sources like the [Office for National Statistics database](#), [Unit for Future Skills database](#) and the [Edge Foundation website](#), along with industry-specific reports and intelligence, can help ensure there is employer and student demand for proposed qualifications. Evidence can also help inform the focus of a qualification development initiative, setting strategic direction and determining content reflective of employer needs. Reviewing data can highlight market conditions and competition in specific sector areas, informing decisions about where or whether to develop qualifications. Research on innovative assessment practices can help to focus assessment strategies on what students need to do to demonstrate workplace competence. In general, command of the evidence base enables informed and effective collaborative working.

2.3.3. Facilitating an engagement community with employers

This section is about forming sector-specific communities of employers and employer organisations that inform qualification development. It highlights the benefits this can bring, from the perspective of:

- devising an engagement strategy which informs and positively influences qualification developments through interactions with employers and employer organisations; and
- helping to meet IfATE's requirements to establish employer demand, a key test forming part of the technical qualification approvals process.

It suggests the types of organisation an awarding body might consider approaching to be part of its community, including:

- different employer types
- professional/statutory bodies and employer representative organisations
- Chambers of Commerce / Local Skills Improvement Plan (LSIP) authors
- Mayoral Combined Authorities, Local Enterprise Partnerships and Local Authorities
- Federation of Small Businesses
- training providers
- student alumni

The section also describes an approach in which measurable strategic objectives are set when engaging with employers. It sets out the benefits of:

- co-creating objectives of engagement from the outset
- jointly setting terms of reference/ground rules

- clearly agreeing roles and time commitments
- knowing how the objectives will translate into benefits to the qualification development process, including meeting the IfATE [Employer Demand Test](#)

It describes how having a collective set of goals can aid collaborative working and relationship-building. Finally, the section suggests a review/evaluation of engagement activities against initial objectives.

The following sections describe some of the things to consider when establishing and running an engagement community. They are based on the qualification development cycle and provide a basis for engaging with employers strategically.

This guidance is not intended to define what an engagement community should be and how one should be operated and constituted. This will vary across different organisations and sub-sectors. Instead, this approach demonstrates how an engagement community can perform some of the functions that aid the development of qualifications.

2.3.4. Which type of organisation could be involved?

Diversity is important. Access to a range of views from a representative group of organisations has benefits for developing in-demand, accessible qualifications. Below is a list of organisation types with a rationale for engagement and some of the potential challenges.

Large/national employers: Large employers are likely to have a depth of expertise, and, potentially, time and capacity to participate in an engagement community. They may be tuned into national policy and sectoral trends that affect their business, in a way that smaller employers might not. However, they may attempt to influence in a way that reflects their own needs above wider sector needs, for example, wanting qualifications to accredit their pre-existing in-house training programmes.

Small to Medium-sized Enterprises (SME): Smaller employers can have great insights and it's vital to represent their views as well as those of larger employers. However, SME can find it difficult to play a full role. They often have limited time to engage in activities they might not see as their core business. It's possible they won't have dedicated staff to engage in wider learning and development issues. They may not initially have the policy, qualifications or wider sectoral knowledge to be confident about their role in an engagement community.

Professional or statutory bodies: These organisations can provide vital information on license to practice or statutory requirements for working in a sector, particularly how

these influence qualifications development. They are a good source of technical and job market expertise.

Employer representative organisations: National or local groups will have insights on technical and workforce matters. Employers have told us they would like these organisations to take an active role in identifying and synthesising sector insights and priorities, particularly given individual employers are not always aware of wider issues.

Chambers of Commerce, including in their role as Employer Representative Bodies (ERB) for Local Skills Improvement Plans: Local Chambers of Commerce and their national oversight body, [British Chambers of Commerce](#), hold invaluable information on local and national skills needs. Local Chambers also have a new statutory role as [Employer Representative Bodies](#) responsible for developing Local Skills Improvement Plans (LSIP). They are tasked with:

- setting out the priorities and changes needed in an area to make post-16 technical education and training more responsive and closely aligned to local labour market needs
- providing a representative employer view of the skills most needed to support local economic growth and productivity

Federation of Small Businesses: The [Federation of Small Businesses](#) offers advice on addressing skills gaps, bringing together employers and providers to share expertise.

Mayoral Combined Authorities, Local Authorities and Local Enterprise Partnerships: The devolution of adult education budgets to Mayoral Combined Authorities has led to their development as leaders of local technical training strategy and initiatives. They are centres of expertise on local skills needs and provision of adult training. Many are operating innovative programmes based on accredited and non-accredited training, and they are integrated with local employer and provider networks.

- One aspect of Mayoral Combined Authorities' work is to attract inward investment to enhance their areas. Because of this they are likely to be a proactive partner in identifying and seeking to service new and emerging skills needs.
- [Local Enterprise Partnerships](#) (LEP) 'are business-led partnerships between local authorities and local private sector businesses. They play a central role in determining local economic priorities and undertaking activities to drive economic growth and job creation, improve infrastructure and raise workforce skills within the area. LEP boards are led by a business Chair and board members are local industry, education and public sector leaders.
- Local Authorities, especially large unitary authorities with autonomy to develop their own local skills strategies and initiatives, are an excellent source of

expertise on technical education and employers.

Training providers: Consider including training providers that have close employer links and know how to develop flexible, responsive training programmes. Training providers can perform an important function in engagement, for example, in debates around delivery modes and innovative assessment methods which meet employer and student needs.

Student alumni: Students can provide useful insights on a range of topics including:

- qualification accessibility and relevance
- relevance of assessments
- relevance of qualification to occupation.

Consider having recent student alumni who have recently progressed into a relevant occupational area as standing or advisory members of an engagement community.

2.3.5. Establishing employer capacity and knowledge

Employers in an engagement community will be from organisations of varying types, sizes and cultures. The different perspectives they bring are valuable but can cause challenges. Some employers may be expert in their sectoral areas of interest but know very little about related qualifications and government policy. They may not be used to working collaboratively with other employers. It's necessary to understand the development needs of each employer in the community. Consider devising an initial assessment process which establishes each employer's level of knowledge, using the information to complete a gap analysis and devise an action plan for building collaboration.

2.3.6. Upskilling/building capacity

After evaluating employers' baseline knowledge and capacity, consider development activities, including:

- bespoke sessions on how your business works and approaches to developing qualifications, set in the context of government policy and sectoral trends
- signposting to generic resources on upskilling, such as onboarding packs
- ways to ensure employers' voices are heard and building their confidence to contribute.

Investment in knowledge and skills can encourage a reciprocal investment of employers' time and expertise, creating a community that can advise on the initial development of qualifications, and their ongoing review and maintenance.

2.3.7. Jointly setting terms of reference and ground rules

Agreeing roles and responsibilities, likely time commitments, and frequency and conduct is essential. It helps contributors to understand expectations of input and likely outputs. In an engagement community, employer time and capacity will vary considerably, so it's important to establish the commitment required as soon as possible. Where practical, terms of reference should be agreed and regularly reviewed. Whilst many employers appreciate financial remuneration for their time, there are other forms of compensation awarding bodies could consider, such as a mutually beneficial strategic partnership. Whether financial remuneration and/ or expenses are part of the partnership, the terms should be agreed as early as possible, as identified in Governance.

2.3.8. Governance

Agree the level of employer involvement early. For example, some community members may sit on a product development committee while others may only have time or knowledge to advise. It's important to be even-handed, where employers are involved at different levels. If some are involved more directly, be careful not to be biased in your direction/content if you need to represent a variety of employer interests. Be mindful of disadvantages to employers which can't play as active a role in development as others. A good understanding of an employer's situation will help you mitigate these issues by putting in place measures to help ensure they are not disadvantaged. Awarding bodies should consider doing the following:

- Decide whether the engagement community is to have a steering function, at a level removed from the development committee, or direct involvement in qualification development
- Create a governance structure for the qualification development programme, including terms of reference for the engagement community and development activities, with clear roles and responsibilities, agreed jointly
- Include governance of the engagement community as part of the general governance structure of the development, rather than duplicating effort by creating completely new bureaucratic arrangements
- Be light touch and flexible but also aware that structure is necessary, and work needs to be underpinned by principles and documentation. This will help with facilitation of the engagement community **and** provide evidence for the Employer Demand Test.

2.3.9. Ways of working and communication

Employers are required to balance engagement activities with core business responsibilities. An engagement community will usually benefit from an agile approach,

rather than reliance on long, face-to-face meetings. It may be more productive to use alternative meeting formats, for example hosting short gatherings based on specific themes might help employers take part. Consider also hosting the community via media such as webinars or other online fora, to aid inclusivity. While direct person to person engagement to gain qualitative insights is highly valuable, it can be labour-intensive for participants. Given this, awarding bodies may wish to explore evidence and analysis of qualifications and the qualifications landscape before sharing their findings with employers to maximise face-to-face contact time.

Additionally, it is important to find ways of fostering debate and challenge, even when employers aren't face-to-face. Crowd sourcing or eliciting responses digitally can be effective for gaining quick insights. Identifying industry champions in learning and development, to gain perspectives from employers already heavily engaged in the technical education sector can be invaluable. These employers could mentor/buddy with those less experienced.

2.3.10. Collectively setting the aims and objectives of engagement

[Sharing goals](#) and setting objectives collaboratively can create a unified purpose and aid relationship building. Determining how the objectives will benefit the product development process and wider technical education system is an important part of measuring success. Aligning qualification development objectives to system objectives will help to focus on developing a product which is fit for purpose and meets regulatory requirements. For example, the engagement community should be aware of central government strategies, both general and in specific sectors, and consider how they impact on technical training and qualifications. This will be vital in developing qualifications that help meet strategic goals.

2.3.11. Strategic planning to meet objectives

Using project planning principles will help you meet objectives and plan milestones and timescales. Using the engagement community to identify factors that could impact on qualification development can help to recognise opportunities and identify/mitigate potential threats. For example, an employer might have knowledge of a piece of research or local initiative that might impact on a sector's skills needs. This information might be relevant to and influence awarding bodies' development planning and should be formally taken account of, either through development objectives/tasks or risk management processes.

An engagement community can be an invaluable resource in identifying emerging skills needs or skills gaps, locally or nationally.

2.3.12.Evidence requirements for employer demand test

The information on IfATE's website gives comprehensive guidance on the evidence requirements necessary to meet the [employer demand test](#).

2.3.13.Evaluation

It's important to know what was successful and what might be done differently. This can be achieved by evaluating engagement activities against original objectives. Awarding bodies and partner employers within the engagement community should assess whether the engagement strategy has helped produce qualifications that:

- meet the skills needs of the employers in the engagement community
- provide clear progression pathways for members of the workforce/students
- have assessment strategies that met employer/student needs

Evaluation activities might include:

- analysis of completion/attrition and progression data
- commissioning and thematic analysis of employer, training provider and student feedback, for example student engagement; ease of employee access to training; levels of student competence on completion; progression within occupational area; employer satisfaction; levels of employer demand for qualification; effectiveness of assessment strategies. This could be conducted by questionnaire or via focus groups.
- analysing alignment with sectoral trends/developments, government strategy and emerging skills needs

2.3.14.Qualifications review and revision

Ongoing review and maintenance of qualifications by the engagement community will help ensure they are employer-led and fit for purpose, whether employers are involved in the product development process or participate in a steering or advisory function.

Consider ways in which to maintain employer buy-in after the qualification launch by:

- keeping a strategic focus on product maintenance by agreeing a review schedule
- reducing the time commitment whilst being clear when employer input will be needed
- ensuring there is a representative range of organisations participating in ongoing review and maintenance
- being aware of and actively addressing any employer disengagement, at an organisational and individual level

A standing engagement community with a clearly defined role and strategic focus will contribute to a sustainable approach to qualifications provision.

2.3.15. Case study

This is a scenario that an awarding body might experience when engaging with employers during qualification development. Awarding bodies may use this for:

- scoping of the qualifications potential within a route area
- planning specific development priorities
- promoting informed, purposeful interactions with the employers within their engagement communities

T-Quals Ltd, a medium-sized awarding body, has set up an [engagement community \(section 2.3.3\)](#) with several employers and an [employer representative organisation \(2.3.4\)](#). The primary objective of this community is to ensure the awarding body's qualifications in [electric vehicle maintenance \(3.1.4\)](#) are fit for purpose and will meet [approval requirements on demonstrating employer need](#). This area has been highlighted as having the [potential for large growth in the medium term \(3.1.4\)](#), with IfATE having identified a range of [emerging sector skills \(3.1.4\)](#), through analysis of [national research \(3.1.4 and 4.1.1\)](#) and engagement with industry. Because this is an interesting and potentially commercially attractive area to expand into, T-Quals Ltd has embarked on an intelligence gathering exercise to [research the area \[4.1 and 4.2\]](#) and analyse its potential.

One of the employers in the community, a [large national organization \(2.3.4\)](#), has specified a need to develop two [additional specialist qualifications](#) in electric vehicle maintenance to cover skills and functions it expects its future workforce to need. None of the other employers in the community has so far highlighted this specific need, although some have discussed similar concepts in more general terms.

T-Quals Ltd is limited in the extent to which it can commission its own research and the degree to which it can engage widely, due to its relatively small size.

It wants to equip itself with the [information and data \(3.1.4, 4.1 and 4.2\)](#) which will enhance the quality of both the collective discussions it conducts within the community and its one-to-one interactions with those employers that identify a particular need. It wants to ensure it has the knowledge and evidence to work effectively and collaboratively with employers and develop fit for purpose qualifications that have the required breadth and applicability to deliver wide employer need. However, it also needs to meet the specific requirements of those employers it has the closest relationships with.

3. Identifying emerging skills and current skills gaps

3.1. EMERGING SKILLS

IFATE is committed to a technical education system which is forward looking, supporting businesses to meet their future skills needs and reducing the risk of skills gaps and shortages.

As part of ongoing engagement with employers, professional and trade bodies and foresighting organisations, IfATE gathers intelligence and insights on emerging skills and technologies which may impact on the nature of an occupation, route or profession.

IfATE suggests it's important to share these insights with you to allow for further engagement with your employer networks and to support planning for future qualification development. This will help ensure that, in future, there will be sufficient provision in terms of qualifications and training which will build and accredit skills in these emerging areas.

3.1.1. The definition of Emerging Skills

IFATE defines emerging skills as skills and technologies that have been identified as those which will impact on the nature of occupations in the short/medium term (up to 5 years). They may already be in use by early adopters and specialist organisations.

The drivers for these emerging skill sets or technologies could include:

- adoption of new technologies, for example, digitisation of the workplace
- political or social drivers, for example, the move towards net zero, legislation around insulating properties or the move to electric vehicles

It is important we differentiate between emerging skills and skills gaps (where supply does not meet demand). [Section 3.2](#) provides further information on IFATE's intelligence on [Skills Gaps](#).

3.1.2. How to use this guidance

Predicting future skills needs is not an exact science and, for that reason, not all emerging skills areas appear within [IfATE's pre-defined list](#). For further information on pre-defined areas, see the [IfATE website](#). We therefore suggest this guidance is used by awarding bodies as prompts for discussion with their own employer networks for further exploration and to establish and monitor demand for these skills. We hope this will support awarding bodies establish whether these skills and technologies should be considered for inclusion within their wider qualification portfolio.

3.1.3. Exemplars of emerging skills areas

Whilst the previous section highlights the inherent uncertainties characterising emerging skills, this should not mean that the system stands still. Awarding bodies will be aware that there are opportunities that sit alongside the challenges.

3.1.4. Emerging skills exemplar 1: Engineering and Manufacturing

This section shares some of the evidence/intelligence that IfATE has collected on emerging skills in the Engineering and Manufacturing route. It offers suggestions to support awarding bodies to prepare for future workforce needs and consider how these emerging skills might inform technical qualification development.

Through its work with the Engineering and Manufacturing Route Panel and additional in-house research, IfATE has identified **automotive electrification** as an area with a significant requirement for new skills. This is broken down into five sub-areas:

- Battery manufacturing and maintenance
- Power Electronics, Machines and Drives (PEMD)
- Electric vehicle infrastructure (charging points)
- Electric vehicle manufacture
- Electric vehicle maintenance

The next part of the guidance provides a general overview of automotive electrification, followed by analysis of three of those sub-areas, **electric vehicle maintenance**, **electric vehicle infrastructure** and **battery manufacturing and maintenance**. These provide useful examples of how to approach an emerging skills need which highlight the necessity for subtly different approaches. They focus on the following themes to show potential relevance to awarding body activities:

- Evidence examples for the identified emerging skill sub-area
- Considering what this means for technical education system objectives
- How awarding bodies can contribute to system objectives to meet need

As described in [Section 2](#), an engagement community can be used as a dedicated resource for exploring emerging skills areas by building specific objectives around research and development. This will help ensure that qualifications developed in response to an emerging need also meet existing employer requirements for robust, fit for purpose products that can confer competence.

3.1.5. Overview

There's a clear policy context for electric vehicle expansion. The Government has committed the UK to moving to electric and hybrid vehicles as part of its net zero policy,

stating that sales of new petrol and diesel cars will end by 2030, and new hybrid cars by 2035. [The Ten Point Plan for a Green Industrial Revolution \(2020\)](#) commits to ‘accelerating the shift to zero emission vehicles’. The Government has committed £1 billion to support electrification of vehicles, including supporting the development battery factories in the UK. The Government also committed to investing £1.3 billion to support the roll out of charging infrastructure across the country, including installing rapid charge points on motorways and major roads and on-street charge points near homes and workplaces to make charging easy.

Research by the [Faraday Institute in 2022](#) estimated that an additional 145,000 jobs in the EV and Battery manufacturing would be generated by 2040, with the industry providing around 270,000 jobs. The study categorised these roles as follows:

- 170,000 jobs in EV production (cars, LCVs and other vehicles)
- 35,000 jobs in EV gigafactories
- 65,000 jobs in the EV battery supply chain

Government has also set up the Catapult network, through Innovate UK, to support research and innovation. [Catapults](#) offer a strategic steer to Government.

Two of the catapults, the [Energy Systems Catapult](#) and the [High Value Manufacturing Catapult](#) have been looking at electric vehicles and supporting infrastructure.

‘Catapults are physical centres with cutting-edge R&D infrastructures including hubs, laboratories, testbeds, factories and offices, as well as technical experts that prove and adopt breakthrough products, processes, services and technologies. Catapults work with thousands of innovative businesses across a wide range of sectors, such as manufacturing, space, health, digital, energy, transport, telecoms, the urban environment and many others.’

(Catapults website)

In 2021, the [High Value Manufacturing Catapult](#), in a collaboration between The Faraday Institution and WMG, University of Warwick, produced a [strategy paper](#) which set out ‘the opportunity for a national electrification skills framework and forum, to “re-skill, up-skill and new-skill” the UK engineering and manufacturing workforce’. The [Energy Systems Catapult](#) has set up the [Electric Vehicle Energy Taskforce](#) to ensure charging infrastructure is developed to meet rising demand.

In March 2022, the Government published its [UK Electric Vehicle Infrastructure Strategy](#), building on earlier commitments by setting out the vision and action plan for electric vehicle charging infrastructure in the UK. The report highlights the growth of the

electric car industry, noting that ‘In December 2021, over a quarter of all new cars sold in the UK were battery electric vehicles. The equivalent figure for 2019 was less than 2%’.

The evidence-base is significant and the policy context now well defined, with Central Government strategy being developed in this area. This provides an opportunity for awarding bodies to work with employers that recognise the need for these emerging skills, to help define and quantify the requirements, and potentially help shape government strategy.

3.1.6. Electric vehicle maintenance

There’s significant evidence to suggest a shortage of electric vehicle maintenance skills by the middle of this decade, which will continue to grow as we move towards 2030 and transition to electric vehicle use. [Analysis by The Institute of the Motor Industry](#) in November 2021, based on the Society of Motor Manufacturers and Traders upper scenario on electric vehicle adoption, suggested that:

- 90,000 automotive technicians will be needed to meet the service requirements of electric vehicles predicted to be on UK roads by 2030
- there will be a shortfall of 35,700 technicians by 2030, with 2026 marking the point at which the skills gap will materialise
- in 2020, there were 15,400 qualified TechSafe™ technicians in the UK, which represented 6.5% of the UK automotive sector

The UK Electric Vehicle Infrastructure Strategy (2022) highlights the work West Midlands Combined Authority (WMCA) is doing to support growth in electric vehicle use. WMCA is co-ordinating work across the automotive electrification areas and has set up a steering group of stakeholders “to ensure that a coordinated approach to EV strategy and infrastructure provision is taken across the region to support the accelerated uptake of EVs”. WMCA has launched a training centre to provide training to EV mechanics, to support electric vehicle maintenance:

The first of its kind in the UK, the Electric Vehicle and Green Technologies Training Centre has been backed with £250,000 in funding and aims to train 720 local people over the next 18 months. This will enable people to start a new career or upskill, providing crucial skills for the transition to EVs.

The centre estimates that currently only one in 20 mechanics in garages and dealerships is qualified to repair electric vehicles. ([New centre to train local people to work on electric vehicles opens in Wolverhampton \(WMCA website\)](#))

This considerable evidence base strongly suggests that the technical education system needs to act coherently to meet a future need that is rapidly turning into a skills gap.

Whilst this area is still in a state of flux, examples of innovative practice, such as that of WMCA described above, can provide pointers as to where development could be focused. Currently, the Wolverhampton centre has [programmes without qualifications](#) suggesting an opportunity for awarding bodies to accredit training (as long as qualifications can avoid being overly vendor or context specific). This model could represent an opportunity to work with MCAs more widely to explore qualification developments which provide accreditation in areas where there are skills gaps.

With evidence suggesting that the need for electric vehicle maintenance skills are on the rise, electric vehicle maintenance (under the banner of Motor vehicle maintenance) is on IfATE's [pre-defined list](#), with many of the functions of new electric vehicle maintenance specialist roles having been defined. This means awarding bodies will not be required to submit a proposal prior to developing qualifications.

IfATE is keen to encourage qualification development in this area and is here to support awarding bodies that would like to explore this. Effective employer engagement will also help realise and refine business opportunities.

3.1.7. Battery manufacturing and maintenance

Batteries are key to the effective roll out of electric vehicles. Having infrastructure in place to manufacture, dispose of and repair batteries will support the UK to meet its Net Zero target.

To support the UK battery Industry, Government announced in October 2022 that they would provide £211 million in new funding for battery research and innovation. ([Record funding uplift for UK battery research and development - GOV.UK](#))

The Faraday Institution, a research organisation aiming to advance battery science and technology, [predicts that the industry will cover over 270,000 jobs by 2040](#).

Work undertaken by WMG (University of Warwick survey of OEMs in the sector, literature reviews and studies) in 2020 defined the scale of the challenge:

- Over 60% of current automotive manufacturing roles related to batteries, power electronics and electric machines will be subject to significant change. For electric machines, this is expected to be as high as 84%.

- Powertrain material planning and logistics specialists will need training in batteries, drives and related controller technologies and systems. The study estimated ~ 60% of supply/procurement roles will need upskilling.
- The majority, 90%, of Quality engineers and technicians will need reskilling with knowledge of electrification technologies – batteries, drives and power electronics – to ensure safe products and working practices.

In contrast to electric vehicle maintenance, the functions of roles related to battery manufacturing are newer to the UK. Currently, there is only one battery factory in operation, with further factories expected to open in the future. In addition, battery technology is quickly developing, meaning skills are changing.

High Value Manufacturing Catapult mapped some of the future competences needed in the battery manufacturing and maintenance sector against IfATE's current standards. It identified a range of emerging skills required for occupations at levels 2 and 3 within this sector. Battery has subsequently been identified by IfATE as an occupation and an accompanying occupational standard is in development, due to be launched in autumn 2023.

Therefore, awarding bodies can be confident that there will be an occupational standard to underpin the development of qualifications. Again, strong engagement with employers will help awarding bodies develop and refine qualification content and address questions related to the nature of and extent of demand for occupational roles.

3.1.8. Electric vehicle infrastructure (charge points)

The Government has committed to investing £1.3 billion to support the roll out of charging infrastructure across the country, including installing rapid charge points on motorways and major roads and on-street charge points near homes and workplaces to make charging easy. (10 point plan, as above)

In 2022 Government recognised that *“The recent rapid increase in both the supply of, and the demand for, EVs means that charging infrastructure now stands as the single biggest challenge to that decarbonisation.”*

They set out the ambition to have at least 300,000 public charging points in UK by 2030. The reports also sets out that Government will spend £950 million to support the rollout of high powered chargers across the road network, committing to installing over 6,000 high power chargers along roads in 2035. They are also spending £50 million to support local authorities to *“fund local delivery support across the country, and provide training, tools and knowledge sharing. We will focus on upskilling areas which are currently behind in planning and delivering chargepoints.”*

With evidence suggesting that the need for electric vehicle infrastructure skills are on the rise, electric charge point installation is on IfATE's [pre-defined list](#), with many of the functions of new electric vehicle maintenance specialist roles having been defined. This means awarding bodies will not be required to submit a proposal prior to developing qualifications.

3.1.9. Emerging skills exemplar 2: Construction and the Built Environment

[The construction route review set out key principles for the route](#), four of which relate to new and emerging skills in the construction sector:

- **Digital construction** - digital technologies are now an integral part of our built environment. They enable a more efficient industry and bring about benefits including increased productivity and profitability, faster construction, safer projects, better outcomes for clients and of course help to attract the talent of tomorrow. Some of the digital technologies changing the construction industry are mobile technology, building information modelling (BIM), virtual reality, artificial intelligence and 3D printing.
- **Sustainability** - In a survey carried out by CITB, three quarters of respondents said that decarbonisation was either important or very important to themselves or their company. however, 78% of those they spoke to believed there would be a shortage of decarbonisation skills in their occupation in the future.
- **Retrofit** - The majority of existing building will still be in use 2050, therefore to meet NetZero targets we need to ensure that existing buildings are improved to reduce energy demand, so called retrofitting.
- **Modern methods of construction (MMC)** - can be described as using “a combination of offsite manufacturing, onsite techniques and innovative technologies to produce homes more quickly than traditional housebuilding methods.” This includes modular homes. To meet the expected increase in demand for MMC, Government have stated that they are providing £1.5 billion funding through the Levelling Up Home Building Fund to support SMEs and innovators using MMC to deliver 42,000 new homes across England. They are also providing up to £3 billion through the Home Building Fund in loans to SMEs, custom builders and developers using MMC. The fund is expected to support 70,000 homes.

We are encouraging awarding bodies to consider these principles and how they might be reflected in the qualifications they develop to meet future need, including those that will be submitted for approval in cycle 1.

However, through its work with the Construction Route Panel and additional in-house research, IfATE has identified **retrofit** as an area with a significant requirement for new skills. This is broken down into sub-areas:

- Energy assessors
- Retrofit coordinators
- Project managers (with a specific understanding of retrofit)
- Insulation installers (upskilled to modern standards)
- Heatpump installer
- Photovoltaic installers (solar panels)

The next part of the guidance provides a general overview of retrofit, followed by analysis of the sub-area: **heat pump installation**. We will also share an overview of another emerging skills area related to sustainability: **electric vehicle charging point installation**. These provide useful examples of how to approach an emerging skills need which highlight the necessity for subtly different approaches. They focus on the following themes to show potential relevance to awarding body activities:

- Evidence examples for the identified emerging skill sub-area
- Considering what this means for technical education system objectives
- How awarding bodies can contribute to system objectives to meet need

As described in Section 2, an engagement community can be used as a dedicated resource for exploring emerging skills areas by building specific objectives around research and development. This will help ensure that qualifications developed in response to an emerging need also meet existing employer requirements for robust, fit for purpose products that can confer competence.

3.1.10. Overview Retrofit

There's a clear policy context for retrofit. The UK and Welsh governments are committed to reaching net zero carbon emissions by 2050. With around 40% of total emissions coming from construction and the built environment, reducing emission from the sector will be key to meeting NetZero targets by 2050. Retrofitting homes so they become much more energy efficient will be a key tool to contribute to achieving net zero.

A 2021 report by CIBT ([Net Zero and Construction Perspectives and Pathways](#)) estimated the demand for new skills and roles will include:

- Energy assessors as the use of Energy Performance Certificates grows
- Retrofit coordinators to ensure quality as systems are installed concurrently (forecast of 50,000 to be required by 2050)
- Project managers with specialist knowledge of retrofit (forecast of 86,500 to be required by 2028)
- Insulation installers with knowledge of PAS2035 standards

- Heat pump installers (forecast of 50,000 to be required by 2030)

In October 2021, the [Department of Business, Energy and Industrial Strategy published its Heat and Buildings Strategy](#), setting out the vision and action plan for transition to high-efficiency low-carbon buildings in the UK. The report estimated that more than 240,000 low carbon jobs would be required by 2035. Overall, the construction industry is likely to require [2.67 million workers by 2027, an increase of 225,000](#), according to the 2023 Construction Skills Network report. This report also includes [regional breakdowns of projected demand](#). However, in March 2023 a report by recruitment consultancy Search Consultancy [estimated that 83 per cent of businesses within the construction industry were experiencing lack of skilled workers](#) (including within retrofit), with more than a fifth of managers surveyed saying they felt lack of training was a concern.

The evidence-base is significant and the policy context now well-defined for retrofit with central government strategy being developed in this area.

As Government policy interventions are still to be fully formulated across all the areas under the umbrella of retrofit the situation can be viewed as an opportunity for awarding bodies to work with employers that recognise the need for these emerging skills and to help define and quantify their requirements.

3.1.11. Heat pump installation

The government's Heat and Building Strategy stated that hydronic heat pump systems will be the key technology for many properties in the future. With this in mind, it pledged to reduce the barriers to installation, making heat pumps better designed, smaller, and easier to install and use. It also referenced the £60 million Net Zero Innovation Portfolio 'Heat Pump Ready' Programme to support the development of innovation across the heat pump sector, including initiatives to improve the consumer experience in installing and using a heat pump.

The report estimated a target to increase 35,000 hydronic heat pumps a year to a minimum of 600,000 per year by 2028, supported by the introduction of incentives for industry to take the lead in transforming the consumer market in low-carbon heating.

This could point to an opportunity for awarding bodies to offer qualifications in heat pump installation, engineering or design, or to consider whether there is opportunity to offer retrofit project management qualifications which include heat pump engineering. [Retrofit project management qualifications are also likely to need an increased emphasis on digitisation](#). (Unlocking Construction's Digital Future, CIBT, 2018). Therefore, it is also an opportunity for awarding organisations to ensure that new

knowledge and skills required to meet net zero targets in the construction industry are embedded in traditional trade qualification.

IfATE is keen to encourage awarding bodies to consider this area within their development planning. Effective employer engagement will also help realise and refine business opportunities.

3.1.12. Other emerging skills - Electric vehicle charging installation

Other construction sector roles expected to see increased demand include those supporting installation of electric vehicle charging points, as the automotive industry moves to electric vehicles.

In March 2023 The Department for Transport announced its aim to have 300,000 public charge points in the UK by 2030, equivalent to almost 5 times the number of fuel pumps currently available. The target will be supported by £1.6 billion of funding, under the [Electric Vehicle Infrastructure Strategy](#).

However, a [report by the Institute of the Motor Industry \(IMI\)](#) estimated that 90,000 automotive technicians will be required to support the vehicles and the infrastructure. - the government's Road to Zero deadline. The IM forecasts shortfall of 35,700 technicians by 2030, with a skills gap to emerge in 2026.

A report by [City & Guilds](#) said 70 per cent of UK electricians planned to enrol in a specialist electric vehicle charger installation qualification in the near future in response to the target.

With evidence suggesting that the need for electric vehicle infrastructure is rising, electric charge point installation is one of IfATE's pre-defined list, with many of the functions of new electric vehicle maintenance specialist roles having been defined. This means awarding bodies will not be required to submit a proposal prior to developing a qualification.

Therefore, awarding bodies may decide to offer a qualification in electric vehicle charger installation qualification. Strong engagement with employers would help to determine the extent and nature of demand for roles.

More information on how IfATE is supporting the government's net zero target can be found in IfATE's [Climate Change and Environmental Skill Strategy](#) and the [Green Jobs Taskforce Report](#), which investigates the best ways to upskill the workforce to meet the target.

3.1.13. Emerging skills exemplar 3: Health and Science

This section shares some of the evidence/intelligence IfATE has collected that relates to emerging skills in the Health and Science route. It offers suggestions to support awarding bodies to prepare for future workforce needs and consider how these emerging skills might inform technical qualification development.

Through its work with the Health and Science Route Panel and additional in-house research, IfATE has identified a general trend towards automation in health services delivery and management, specifically:

- Robotic Process Automation (RPA) in health and care service contexts
- Computer vision, sensors and machine learning
- Quantum computing

This section provides

- an overview of this emerging skills area
- evidence for and examples of applications of the identified sub-areas
- consideration of what this might mean for future skills and qualifications

3.1.14. Overview

Technological developments will impact significantly on the way health services are delivered and managed in future.

From mobile medical apps and software that support the clinical decisions doctors make every day to artificial intelligence and machine learning, digital technology has been driving a revolution in health care. Digital health tools have the vast potential to improve our ability to accurately diagnose and treat disease and to enhance the delivery of health care for the individual.

Source: [What is Digital Health? | FDA](#) (2020)

However, it is difficult to predict precisely what these advances will mean to health service workforces, because of the rapid rate of technological change and the relatively early stage in use of some of the emerging technologies.

NHS England's Transformation Directorate (formerly NHSX) is leading the NHS' digital transformation. It published a delivery plan in December 2021 (as NHSX) which set out an ambitious goal to increase digitisation and automation of the NHS. This has been built on with two further policy papers from NHS England and DHSC jointly, [A plan for digital health and social care](#) (2022) and [Data saves lives: reshaping health and social care with data](#) (2022).

The former paper outlines a workforce development plan whose 'aim is to build a culture of digital literacy, expertise and professional information governance across the

system'. Steps in the plan include the following intentions:

- co-create a national digital workforce strategy with the health and care system, setting out a framework for bridging the skills gap and making the NHS an attractive place to work (March 2023)
- enable recruitment, retention and growth of the Digital, Data and Technology (DDaT) workforce to meet challenging projected health and care demand by 2030, through graduates, apprentices and experienced hires, creating posts for an additional 10,500 full-time staff (March 2025)
- establish new and continuation of existing digital learning offerings through the NHS Digital Academy
- the Chief Nursing Information Officer (CNIO), in partnership with Health Education England, will undertake a review of skills and support required to prepare the nursing and midwifery workforce to deliver the digital future (the Phillips Ives Review, concluding May 2023)
- grow and nurture a pipeline of diverse future specialists and leaders through graduate and apprenticeship schemes, starting (June 2022)
- continue to support regional Informatics Skills Development Networks to meet regionally specific digital, data and technology training needs
- embed digital skills development into academic curricula to support future and incoming workforce (from 2022)

At present, there is limited analysis of the workforce implications of specific technological developments such as AI and RPA, relative to the understanding and applications of the technology itself. It's clear though that members of future health service workforces will need to be able to do things related to the adoption of technologies that enable automation. Examples of potential workforce needs include:

- **Interpreting data and triaging:** clinical specialists will need to be able to interpret new types of data, e.g., gene sequencing and AI-based diagnostic processes, to enable the right care and treatment to be given at the right time, and to plan service provision.
- **Generalist interpretation of data and results:** generalist clinicians will potentially require some knowledge of how to interpret data and outputs from automated systems, although this will vary between different functions/roles.
- **Specialist operatives:** staff will be needed to operate new systems and technology, and determine necessary points of human input.
- **Introduction and maintenance of technology:** technology support staff will be needed to set up and maintain systems across the range of applications.

3.1.15. Robotic process automation in the NHS

Robotic Process Automation (RPA) is used in different industries to automate manual

processes. Some NHS providers are using RPA to increase productivity, free up staff to do other, less repetitive tasks and save money. East Suffolk and North Essex NHS Foundation Trust used robots to register COVID-19 antibody testing, which led to over 82,000 hours of time being saved. In addition, automating GP referrals has saved the organisation over £220k by reducing referral processing time from 25 minutes to five minutes. NHS Dorset Clinical Commissioning Group also used automated COVID-19 antibody testing for Social Care staff across Dorset.

Whilst there are clear applications of RPA to health service administrative processes and the potential for significant expansion, it is not yet clear what workforce needs and additional skills will relate to its use.

3.1.16. Computer vision, sensors and machine learning

Digital health includes 'mobile health, health information technology (IT), wearable devices, telehealth and telemedicine, and personalised medicine' (FDA, 2020). Wearable devices and sensors can: improve knowledge of health and wellbeing, helping people monitor their own health; provide data to clinicians to improve knowledge of disease and other health conditions; and support prevention and non-invasive treatments:

[People] can use digital health technologies to better manage and track their health and wellness-related activities. The use of technologies, such as smart phones, social networks, and internet applications, is not only changing the way we communicate, but also providing innovative ways for us to monitor our health and well-being and giving us greater access to information.

Source: [What is Digital Health? | FDA](#) (2020)

A key sensor technology is computer vision. Computer vision starts with the optical sensors that capture and store an image, or set of images. It then transforms those images into digital information that can be further acted upon. It is comprised of several technologies working together. Computer vision is used in:

- screening and diagnostics, e.g., AI used to perform second breast cancer screening instead of a second doctor
- drug testing, e.g., using computer vision for early drug development
- high frequency cameras that can capture subtle movements not perceivable by human eyes to help athletes analyse their gaits

Artificial intelligence (AI) technologies applied to imaging, for example through computer vision, are among the most advanced uses of AI in healthcare. AI could transform the prevention, early detection and treatment of diseases, such as cancer screening, helping the NHS to provide faster and better treatment and care. ([NHS AI](#)

3.1.17. Quantum computing

Machine learning is supported by data from sensors and used to inform treatment and research. The key benefit of quantum computing is the speed it can complete complex analysis, carry out tasks and find solutions, using machine learning in faster and more complex ways. This has the potential to revolutionise research and discovery across all industries. In healthcare, this has great potential to speed up drug development and innovation.

“A quantum computer can allow looking into every known type of molecule at unprecedented speeds, test drug compositions on any cell known to humans — and all in the shortest time imaginable.”

Source: [‘Quantum Computing And Healthcare’](#) (2021)

In 2020, [IBM published a report](#) which speculated on the impact that quantum computing could have on healthcare. It predicted that quantum computing could improve healthcare by providing:

1. **Diagnostic assistance: Diagnose patients early, accurately, and efficiently** - Quantum computing could speed up and improve the analysis of medical images, making AI-supported diagnostics easier and more accurate. It could also improve cell sequencing and biomarker discovery, finding *“interdependencies, correlations, and patterns that are challenging to find with traditional computational methods.”*
2. **Precision medicine: Keep people healthy based on personalized interventions/treatments** - According to the paper, medical care only contributes for 10-20 percent of the outcome with the remaining 80-90 percent being determined by *“health-related behaviours, socioeconomic factors, and environmental aspects”*. Quantum computers could improve the analysis of health factors leading to more pro-active screenings to support diagnosis and improved and more targeted treatments.

The potential applications of these new technologies are wide-ranging, but the skills and workforce implications are currently less well understood. IfATE encourages awarding bodies to consider the challenges and opportunities of new technologies, particularly their potential impact on emerging skills requirements and how they might be reflected in qualifications that meet the needs of the health and science sector.

3.1.18. Emerging skills exemplar 4: Education and Early Years

Immediate challenges

The Education and Early Years sector has been subject to a series of immediate challenges since the pandemic. [Among them is a gap in knowledge and skills, either because content had not been taught when schools and settings were partially closed or because pupils did not learn well remotely.](#)

These included knowledge gaps in phonics, mathematics and writing stamina. The skills and knowledge gaps have contributed to an increase in individuals or groups of pupils who needed additional support, such as one-to-one interventions.

An additional issue faced by education professionals is the [increasing volume and complexity of SEND provision for schools.](#)

To aid this, the Department for Education (DfE) published its [SEND and AP improvement plan](#) (Special Education Needs and Disability and Alternative Provision) in early March 2023, which confirmed investment in training for thousands of workers. It also included details of thousands of additional specialist school places facilitated by the provision of 33 new special free school across the country.

Overall investment in SEND and AP will increase by more than 50% from 2019 to 2020, to over £10 billion by 2023 to 2024.

Other measures announced as part of the plan included:

- A new leadership level Special Educational Needs Co-ordinator National Professional Qualification (SENCo NPQ) to ensure teachers have the training they need to provide the right support to children
- A new approach to AP with a focus on preparing children to return to mainstream education or to prepare for adulthood. This will include intervention within mainstream education, as well as standalone provision,
- An additional £6m investment to fund the extension of AP Specialist Taskforces, which work directly with young people in AP to offer intensive support from experts, including mental health professionals, family workers, and speech and language therapists, backed by an additional £6 million investment
- £18 million of funding to help young people make the transition into adulthood, by doubling of the number of supported internship places by 2025
- £30 million to go towards developing approaches for [short breaks for children, young people and their families](#), providing respite for families of children with complex needs

Long term opportunities

During 2020 many schools adopted remote learning practises to support students temporarily during a period of restrictions and uncertainty. Whilst schools are no longer under covid restrictions, remote learning is still likely to be a future area of growth. Oak

National Academy, an organisation which provides an online classroom and resource hub for pupils aged from 4 to 16, set up in response to the pandemic in 2020, is continuing to support remote working, [advertising for curriculum experts in March 2023](#).

The move to using remote education supported by technology has accelerated the development of a range of practices utilising technology and emerging skills. These skills, identified in a report on Scotland's [National Improvement Hub](#) website, include:

- Streaming of live lessons and accessing recorded lessons
- Collaborative learning
- Supporting learning through social media
- Learning in immersive virtual environments
- Hybrid learning
- Support to parents / parents in a learning support role
- Asynchronous learning and teaching
- Game based learning
- Mobile learning
- Open Education Resources

Additionally, a 2018 report, [Measuring the Impact of Emerging Technologies in Education](#), brought together a collection of research, including reports confirming that augmented reality based mobile learning and computer games could have positive educational effects in school and university contexts.

Another report, [Digital Learning Innovation Trends](#), also identified use of mobile devices, gamification and game-based learning as emerging trends in education, as well as adaptive learning (adaptive learning technologies use an assessment of a student's learning based on activities to inform a personalised pathway based on an individual 's strengths and weaknesses).

We are encouraging awarding bodies to consider the challenges and opportunities, especially those centred on emerging skills, and how they might be reflected in the qualifications they develop to meet future needs in the education sector, including those that will be submitted for approval in cycle 1.

3.1.19. Emerging skills exemplar 5: Digital

This section shares some of the evidence/intelligence IfATE has collected that relates to emerging skills in the Digital route. It offers suggestions to support awarding bodies to prepare for future workforce needs and consider how these emerging skills might inform technical qualification development.

- Computer vision
- Sensors, edge computing and connected devices
- AI and quantum computing
- Robotic Process Automation (RPA)

This section provides

- an overview of this emerging skills area
- evidence for and examples of applications of the identified sub-areas
- consideration of what this might mean for future skills and qualifications

3.1.20. Overview

The Digital route is unique in that it covers technological developments that impact on all other technical routes when applied across different occupational contexts. This means that Digital will impact on emerging skills needs across very diverse industries and organisations, at different technical levels and types of role. The impact of Digital on the workforce can be broken down into the following areas:

- New technologies to understand, set up and learn to use, e.g., artificial intelligence (AI) across multiple functions and contexts; process automation, such as Robotic Process Automation (RPA); AI applications such as chatGPT and Bard; and Blockchain technologies. Digital developments are rapid and it's difficult accurately to predict the precise nature of future technologies and which will predominate.
- The digital skills of workforces at a foundational level will need to be developed and improved to keep up with new technologies, with educational products needed to support people in a flexible, responsive and tailored way.
- Generalised competencies to enable people to develop their practice over time in their work setting. Skills relevant to digital, such as: problem solving; basic numeracy; creativity; etc. will need to be built into digital qualifications.
- Innovative assessment practices: development of digitally supported assessment will be of particular interest to awarding bodies as they design qualifications with more significant use of digital technologies such as simulators and virtual reality that can enable assessment of competence in a risk-free environment [see Gatsby work for ref].

Technological developments will impact on the skills system significantly, but it is difficult to predict precisely what these advances will mean to workforces. This is partly because of the rapid rate of technological change and the relatively early stage in use of some of the emerging technologies.

3.1.21. Computer vision

Computer vision starts with the optical sensors that capture and store an image, or set of images, and then transforms those images into digital information that can be further acted upon. It comprises several technologies working together. Computer vision engineering is an interdisciplinary field requiring cross-functional and systems expertise in a number of these technologies.

Computer vision, coupled with internet protocol (IP) connectivity, advanced data analytics and artificial intelligence (AI), are catalysts for innovation. The technology will

be used to solve complex problems. Some examples of use are:

- agricultural drones that monitor the health of crops
- transportation infrastructure management
- unmanned aerial vehicle drone inspections to detect deterioration of infrastructure
- next generation SMART home security cameras (with face recognition, speech recognition, etc.)
- health screening and diagnostics, e.g., AI used to perform second breast cancer screening instead of a second doctor
- drug testing, e.g., using computer vision for early drug development

Computer vision's current and potential applications are significant, but the skills requirements and workforce implications are currently less well understood.

Sensors

The use of sensors has increased significantly over preceding years and the technology has moved forward greatly. Sensors are used in all industries and sectors and play a key role in monitoring and tracking processes and changes. They are crucial in supporting Industry 4.0 and allowing for smart cities, smart factories and smart homes.

One of the key findings from the Chartered Institute of Transport and Logistics research into what 2035 might look like was that there will be an increased use of sensors and digital tools to collect and analyse data to optimise services.

Examples of how optical sensors are used today:

- Infrared sensors and lasers combine to sense depth and distance, which is critical to enable self-driving cars and 3D mapping applications
- Use of nonintrusive sensors that track vital signs of medical patients without physical contact
- High frequency cameras that can capture subtle movements not perceivable by human eyes to help athletes analyse their gaits
- Ultra low power and low cost vision sensors that run anywhere for a long period of time

Sensors support and enable Industry 4.0, which has been described as revolutionising business (see [What is Industry 4.0 and how does it work? | IBM](#) and [How smart sensors are driving Industry 4.0 forward | EY – Switzerland](#)).

Smart sensors exchange data and even use their own algorithms. In doing so, they don't just make production substantially more efficient, they're changing many companies' business models from the ground up.

Source: [How smart sensors are driving Industry 4.0 forward | EY – Switzerland](#)

Wearable devices and sensors are already playing a vital role in digital health:

[People] can use digital health technologies to better manage and track their health and wellness-related activities. The use of technologies, such as smart phones, social networks, and internet applications, is not only changing the way we communicate, but also providing innovative ways for us to monitor our health and well-being and giving us greater access to information.

Source: [What is Digital Health? | FDA](#) (2020)

Edge computing and connected devices

With the progress of sensor technology and smart devices the amount of data being transferred and analysed has increased and capacity is becoming an issue.

For example, there are platform systems that offer multiple sensors and devices to give a full view of a buildings status (e.g. temperature, humidity, smoke and dust sensors combined with security cameras, alarms points) giving people a streamlined tool to manage buildings. Edge computing is an important enabler of digitalisation by ensuring data is stored closer to the source, enabling quicker response time and requiring less bandwidth.

TechUK lists edge computing as a key factor for enabling innovation and supporting UK's digital transformation journey.

3.1.22. AI and quantum computing

Quantum computing offers the chance for businesses to find better or quicker ways to solve problems, many of which are not possible using standard computers. Industries including pharmaceuticals, aerospace and transport that substantially contribute to the UK economy are set to benefit most. This is because this technology could help them to accelerate the discovery of new drug treatments, improve the efficiency of global supply chains including across food, automotive and aerospace sectors, and cut road traffic in towns and cities, shortening people's commuting times while reducing pollution levels – and benefiting people's lives and businesses.

Source: [Government backs UK's first quantum computer: GOV.UK](#)

The Government, in conjunction with IBM, has invested £210 million in quantum computing technology, enabling an [artificial intelligence and quantum computing centre](#) to be launched in the North-West of England.

IBM has published analysis focusing on [five new technologies for the next five years](#),

reflecting on how they will impact on the world. It looks at how AI and quantum computing can accelerate the process of discovery, supporting sustainability:

Using AI and cloud based technology to speed up discovery of new materials and ways to capturing and transforming CO₂ to mitigate climate change

IBM researchers are creating a cloud-based knowledge base of existing methods and materials to capture CO₂. The process uses technology for annotation and natural language processing to mine information and applies AI to digest information and present findings. Based on this, scientists are able to define desired properties of molecules to be considered for CO₂ capture and separation processes. Teams can then employ AI algorithms to predict the optimal molecules to be used.

Modelling Mother Nature to feed a growing population while reducing carbon emissions

Researchers at IBM are looking for a better and less energy intensive way to create fertilisers to support food production for a growing population. Certain bacteria on the roots of plants fix nitrogen naturally, and for over 50 years researchers have been trying to engineer a catalyst to improve this biological process, in a bid to address the limited supply of naturally fixed nitrogen. By using modern methods of modelling IBM is hoping to speed the discovery up, and in the future the hope is that quantum computers can be used to simulate different nitrogen fixation catalytic processes to find a sustainable solution.

Rethinking batteries before we have to rethink our world

Li-ion batteries require the use of cobalt and nickel, which pose environmental and health concerns in their mining and production, are in dwindling supply and can be harmful to the environment if the batteries are not disposed of properly. IBM is hoping that AI and quantum computing can help researchers find new solutions to the energy storage problem.

Sustainable materials, sustainable products, sustainable planet

Using AI and quantum computing will speed up the traditional trial and error method, accelerating the discovery of new materials and compounds. In the future we will have AI models that automatically suggest new classes of compounds that meet specific efficiency and environmental targets. The most promising of these can then be tested experimentally with robotic systems, which can synthesize these molecular candidates with little human intervention.

Learning from our past for a healthier future

A combination of AI, analytics and data can potentially help with the rapid analysis of real-world medical evidence to suggest new candidates for drug repurposing and speed clinical trials.

IfATE encourages awarding bodies to consider the challenges and opportunities of new technologies, particularly their potential impact on emerging skills and how they might be reflected in qualifications that meet the needs of the health and science sector.

3.2. SKILLS GAPS

The definition of a skills gap used by IfATE and other system bodies is skills for which there is a current shortage. These are usually areas identified as a priority by government or sector representative bodies and there is likely already to be a concerted effort to address them. Unlike emerging skills, skills gaps are generally well understood and evidenced. The challenge is how the system gets from where it is to where it is known it needs to be.

Awarding bodies are well versed in identifying gaps in the qualifications market. It's part of their core business to use data and intelligence alongside their employer contacts to find commercially viable market areas. Section 4.1 and 4.2 provide a brief introduction to a range of information on skills gaps that IfATE and other sector bodies have identified in their research and engagement activities, signposting to sources of research and data that will be useful as a basis for market analysis, establishing a solid starting point for awarding bodies to research a promising area for themselves as part of their business development.

Data and information sources which provide a UK-wide overview of skills gaps across all industry sectors can be found in Section 4.1. Route specific sources on skills gaps are in Section 4.2.

If your awarding body has a strong local or regional presence, consider accessing more local sources of data and research on skills gaps identified in that geographical footprint.

3.2.1. Local Skills Improvement Plans (LSIP)

[LSIP](#) are potentially an excellent future source of information on skills needs and gaps in local areas. The mainstream phase of the planning process, where a plan is required for each [local area](#), has just begun. Designated [Employer Representative Bodies](#) (ERB) are working closely with employers, providers and key stakeholders to develop evidence-based, credible, and actionable LSIPs that 'provide an agreed set of priorities that employers, providers and stakeholders in a local area can get behind to drive change' ([gov.uk](#)). The pilot phase, in which six local areas were asked to develop plans has now been completed. The outputs and analysis of the pilot phase will be published soon.

The technical qualifications landscape

The reforms are designed to rationalise the qualifications landscape for employers and students. IfATE intends to analyse data on qualification reforms and, where relevant, provide awarding bodies with guidance intended to aid their development decisions.

IfATE is particularly interested in areas where there might be a risk of a gap in coverage. To start to determine the level of risk, IfATE has carried out some initial analysis of occupational standards areas, noting where there currently appears to be a low level of funded qualifications within an occupational area. IfATE will regularly review and update the information.

IfATE's analysis is based on the likelihood of awarding bodies developing or redeveloping qualifications in areas where they already offer products. Therefore, any inferences made using currently available information are tentative. IfATE will conduct further analysis once the level 3 approvals process is well under way and has generated more current data on awarding bodies' development intentions, allowing us better to predict the post-reform landscape for each sector. Whilst there will be reasons for variations in current numbers of funded qualifications aligned to different occupational standards, IfATE will continue to monitor the landscape to identify any gaps in funded qualification availability that may emerge. This includes assessing the availability of funded qualifications for adult learners in areas which overlap with T levels.

IfATE analysis suggests that most occupational standards have several funded offers aligned to them, if current products, in either redeveloped or new guises, are submitted for and gain approval.

IfATE recommends that awarding bodies consult employers to gauge their views on the sufficiency and clarity of current qualifications coverage before committing to development of their qualification offer. To help ensure a coherent post-reform landscape, awarding bodies, with employers, should, where there are significant numbers of products aligned to a particular standard, consider the specific role their qualification(s) plays. As highlighted in the [barriers section \(2.2\)](#), employers have told IfATE that, in some occupational areas, the number of qualifications in the system can be confusing.

There are some occupational areas for which there is currently a small number of funded qualifications. In some cases, there is a singular funded qualification offer related to an occupational standard. IfATE will continue to monitor areas of low coverage and the reasons for this, enabling accurate analysis of potential gaps. Where IfATE observes a possible gap emerging, it may engage with the awarding sector to discuss how the system can ensure continued funded qualification coverage. IfATE therefore encourages awarding bodies to engage with the qualification approvals process as early as possible. The resulting data and intelligence will help IfATE determine when it might be necessary to work with awarding bodies to ensure qualifications remain available for students outside of apprenticeships in each occupational area. Future iterations of this guidance will provide a more robust data

and evidence analysis of potential areas lacking in qualification developments that awarding bodies might want to explore.

Based on current information, IfATE has inferred that the following occupational standards have a relatively small number of funded qualifications related to them:

3.2.2. Engineering and Manufacturing

- Boatbuilder
- Composite technician
- Electrical, electronic product service and installation engineer
- Fitted furniture design technician
- Food and drink maintenance engineer
- Motorcycle technician (repair and maintenance)

3.2.3. Construction and the Built Environment

- Engineering construction erector rigger
- Engineering construction pipefitter
- Facilities management supervisor
- Fire, Emergency and Security Systems Technician
- Industrial thermal insulation technician
- Landscape technician
- Refrigeration air conditioning and heat pump engineering technician

3.2.4. Health and Science

- Dental nursing

3.2.5. Education and Early Years

- Learning mentor

3.2.6. Digital

- Data technician

4. Information and data sources to inform employer engagement

The following sections list the data and information sources referred to in this guidance and some useful additional resources. Awarding bodies can use them to help build an evidence base for qualification development and facilitate effective employer engagement. For each, there is a brief description of the source. The list is not exhaustive, but does provide a stimulus to inform research and enquiry.

4.1. LABOUR MARKET INFORMATION

Office for National Statistics (ONS)

The [Office for National Statistics](#) collects and analyses statistics about the UK's economy, society and population. This includes business and economic data, including regular labour market reports, productivity reports on specific sectors, and data relating to growth. This may help you to predict where there are gaps in technical qualification provision and future requirements.

The Unit for Future Skills

[The Unit for Future Skills](#) supplies analysis and data on the quality of jobs and skills in the UK. It includes a variety of dashboards, including a

- [career pathways dashboard](#) to show the routes young people take through education and into employment in different industry sectors across regions of England.
- [further education outcomes dashboard](#) showing qualification level, employment and earnings outcomes data for apprenticeships and adult further education.
- [16 to 18 qualifications dashboard](#) showing detailed qualification level, employment and learning outcomes for 16 to 18 year olds finishing study at further education institutions.
- [local skills dashboard \(prototype\)](#) showing statistics on local employment and skills in England, to support local skills planning and delivery.

These data can help awarding bodies identify skills gaps and provide a useful stimulus for employer engagement.

The Edge Foundation

[The Edge Foundation](#) is an educational organisation which brings together organisations and academics to produce a series of Skills Shortage Bulletins

exploring skills shortages across sectors. The bulletins can be found here: <https://www.edge.co.uk/research/skills-shortages/>

Gatsby

[Gatsby](#) is a charity which specialises in education. As part of this they convene research and publish reports on innovation and emerging skills approaches in technical education. For example, their Set Skills in the Workplace focus looks at skills which will be required by technicians in the future: <https://www.gatsby.org.uk/education/focus-areas/stem-skills-in-the-workforce>

Skilled Worker visa: shortage occupations

This is a government resource which enables checks on which jobs are on the shortage occupations list in each area of the UK, for the Skilled Worker visa and the Health and Care visa: <https://www.gov.uk/government/publications/skilled-worker-visa-shortage-occupations/skilled-worker-visa-shortage-occupations>

4.2. SECTOR-SPECIFIC DATA AND INFORMATION SOURCES

4.2.1. Engineering and Manufacturing

Engineering Council

As the regulatory body for the UK engineering profession, the [Engineering Council](#) sets and maintains internationally recognised standards of professional competence and commitment.

Enginuity

[Enginuity](#) creates 'practical solutions for individuals, educators, and manufacturing and engineering employers, using unmatched industry expertise and data'.

Engineering and Physical Sciences Research Council (EPSRC)

[EPSRC](#) creates knowledge in engineering and physical sciences for UK capability to benefit society and the economy.

The Engineering Construction Industry Training Board (ECITB)

The [Engineering Construction Industry Training Board](#) (ECITB) is the employer-led skills, standards and qualifications body for the development of the engineering construction workforce of Great Britain. An arms-length body of the UK Government, the ECITB reports to the Department for Education.

High Value Manufacturing Catapult

The stated role of the [High Value Manufacturing Catapult](#) is to ‘help accelerate new concepts in manufacturing to commercial reality, driving original research to the market’.

UK Electric Vehicle Infrastructure Strategy

This is the Government’s vision and action plan for electric vehicle charging infrastructure within the United Kingdom.

[UK electric vehicle infrastructure strategy](#)

The Ten Point Plan for a Green Industrial Revolution

This Government plan from 2020 sets out the approach it intends to take to build back better, support green jobs, and accelerate our path to net zero.

[The Ten Point Plan for a Green Industrial Revolution](#)

‘UK electric vehicle and battery production potential to 2040’

This [report](#) from [The Faraday Institution](#) poses the question ‘how can the UK Government and participants in the UK automotive industry build on the success to date and ensure that the UK has sufficient battery assembly plants to sustain a level of EV production in the UK that is broadly similar to pre-pandemic levels of vehicle production?’.

4.2.2. Construction and the Built Environment

CITB

CITB works with industries in construction and the built environment to encourage training and regularly publishes reports on the sector and issues affecting training and labour.

<https://www.citb.co.uk/about-citb/construction-industry-research-reports/>

The Catapult Increasing diversity in the heating sector to address the skills shortage and meet Net Zero

The Catapult Increasing diversity in the heating sector to address the skills shortage and meet Net Zero report looks at challenges in the heating sector, including diversity in the workforce:

<https://es.catapult.org.uk/report/skills-diversity-in-heating/>

The Local Green Jobs – Accelerating Sustainable Economic Recovery

The Local Green Jobs – Accelerating Sustainable Economic Recovery report gives information on jobs in low-carbon and renewable energy economy and is intended to help inform local planning:

<https://www.local.gov.uk/local-green-jobs-accelerating-sustainable-economic-recovery>

The Construction Leadership Council

The Construction Leadership Council works with government and industry on challenges such as meeting the challenges of Net Zero. It regularly publishes reports on priorities for the sector:

<https://www.constructionleadershipcouncil.co.uk/news/clcs-construction-skills-plan-for-2022-more-growth-new-challenges/>

CITB

CITB works with industry to help promote training and safety, including publishing industry reports.

<https://www.citb.co.uk/about-citb/construction-industry-research-reports/construction-skills-network-csn/>

Engineering and Construction Industry Training Board (ECITB)

The ECITB works with employers and training providers to give the engineering construction industry workforce the skills it needs to meet the challenges of the future

<https://www.ecitb.org.uk>

4.2.3. Health and Science

Health Education England (HEE)

[HEE](#) supports the delivery of healthcare and health improvement to the patients and public of England by ensuring that the workforce of today and tomorrow has the right numbers, skills, values and behaviours, at the right time and in the right place. Its work covers more than 100 programmes from planning and commissioning, to recruiting and developing healthcare staff in a range of healthcare and community settings.

NHS England

[NHS England](#) leads the National Health Service (NHS) in England. Its many functions include: policy; commissioning; primary care services; NHS operations; and digital transformation. It will soon include Health Education England's functions when the two organisations merge.

The Chartered Institute for the Management of Sport and Physical Activity (CIMSPA)

[CIMSPA](#) is the professional development body for the UK's sport and physical activity sector.

A plan for digital health and social care

[The plan for digital health and social care](#) is the NHS policy paper that outlines a

This is the first in a series of blogs from [Strategy of Things](#) on the convergence of computer vision with the Internet of Things, providing a high level overview of the drivers of this convergence.

[The convergence of computer vision with IoT is poised to disrupt](#)

‘Quantum computing and Healthcare’

This article from [Forbes](#) analyses how quantum computing could be applied to healthcare.

[Quantum Computing And Healthcare](#)

‘Expert Insights: Exploring quantum computing use cases for healthcare Accelerate diagnoses, personalize medicine, and optimize pricing’

This is a report by from IBM which explores quantum computing use cases in healthcare.

[Expert Insights: Exploring quantum computing use cases for healthcare Accelerate diagnoses, personalize medicine, and optimize pricing](#)

4.2.4. Education and Early Years

Department for Education (DfE)

The DfE reports, plans and research, such as the SEND and alternative improvement plan and the Short Breaks for Disabled Children, can be found on the central DfE site.

<https://www.gov.uk/government/publications/send-and-alternative-provision-improvement-plan>

<https://www.gov.uk/government/publications/short-breaks-for-disabled-children>

Oak Academy

The OAK Academy hosts online resources and planning to help deliver remote education.

<https://www.thenational.academy/>

Emerging Technologies, Emerging Practices in Education

The Emerging Technologies, Emerging Practices in Education report looks at how technology can be used in education.

<https://education.gov.scot/improvement/research/emerging-technologies-emerging-practices-in-education/>

Online Learning Consortium

The Digital Learning Innovation Trends report by the Online Learning Consortium looks at how digital innovation is delivered globally
<https://files.eric.ed.gov/fulltext/ED603277.pdf>

Artificial Intelligence and Emerging Technologies in Schools

The Artificial Intelligence and Emerging Technologies in Schools report was commissioned by the Australian Department of Education to provide information on artificial intelligence for educators
<https://apo.org.au/node/254301>

The Support for Remote Learning site, from Education Scotland, hosts a range of resources to help support remote education:
<https://education.gov.scot/improvement/supporting-remote-learning/supporting-remote-learning/>

4.2.5. Digital

Artificial intelligence and quantum computing centre

This [GOV.UK article](#) discusses a new artificial intelligence and quantum computing centre has been launched in North West England, thanks to a £210 million investment from the government and IBM with the intention 'to help cement the UK's status as a science superpower'.

The convergence of computer vision with IoT is poised to disrupt

This [web article](#) is about the convergence of computer vision with the Internet of Things, providing a high-level overview of the drivers of this convergence.

What is Industry 4.0?

This [web article](#), published by IBM, explains Industry 4.0, where manufacturers are integrating new technologies, including Internet of Things (IoT), cloud computing and analytics, and AI and machine learning into their production facilities and throughout their operations.

How smart sensors are driving industry 4.0 forward

This [web article](#) from EY describes how smart sensors exchange data and use their own algorithms to make production substantially more efficient, fundamentally changing many companies' business models.



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