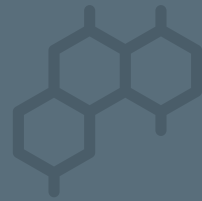


In partnership with



Life Sciences 2030 Skills Strategy

Science Industry Partnership

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Ministerial Foreword

The Life Sciences 2030 Skills Strategy is another key milestone in delivering on the recommendations of the Life Sciences Industrial Strategy and the subsequent Life Sciences Sector Deals.

It has been developed under the leadership of employers across the sector, in partnership with the Association of the British Pharmaceutical Industry (ABPI) and the BioIndustry Association (BIA) with support from the Office for Life Sciences (OLS).

The 2030 Strategy is yet another milestone reached through Government working hand-in-hand with the Life Sciences sector to ensure the UK remains a global destination for industry investment, for continued medicines discovery and progress in new and exciting therapeutic approaches.

And this is a growth sector. This report tells us that the Life Sciences sector has the potential to create approximately 133,000 jobs over the next 10 years, and that digital and computational skills, statistical literacy, leadership and inter-disciplinary working are essential to its continued success.

The report also recognises that new and emerging technologies are bringing with them the need for a range of new skills. For example, the developing field of digital health continues to grow, and now represents the largest segment of the Med Tech industry, and inward investment to the UK artificial intelligence (AI) sector has increased by 17% over the past year, more than the whole of Europe combined.¹

It also highlights that we need to continue to increase uptake of apprenticeships, particularly across SMEs. Government and industry are working together to build strong vocational Life Sciences skills by funding more high quality science apprenticeships through the UK Apprenticeship Levy. The UK is also ensuring that key skills gaps are addressed, for example, by putting £1.5m into the Advanced Therapies Apprenticeship Community (ATAC).

The People foundation of the UK Industrial Strategy is pivotal to ensuring this high value sector continues to prosper. The Life Sciences sector relies on a highly-skilled workforce to keep pace internationally and to ensure the UK maintains its competitive edge.

This report sets out a clear ambition to deliver future growth by unlocking value through skills across a sector which is at the very forefront of medical endeavour and healthcare innovation. It also highlights the importance of Life Sciences in addressing the Grand Challenges identified in the UK Industrial Strategy, in particular Artificial Intelligence and Data and Ageing Society.

I look forward to seeing the publication of the Skills Action Plan which will ensure that the findings and recommendations in this report result in real world change. With that in mind, I look forward to working with the sector, and its partners in skills, to continue to implement the People dimension of the Sector Deal, not only to underpin economic growth, but also to continue to ensure the UK remains a world leading global hub for Life Sciences.



Nadhim Zahawi MP

Minister for Business and Industry

¹ Life Sciences Industrial Strategy Update January 2020: <https://www.gov.uk/government/publications/life-sciences-industrial-strategy-update>

Foreword

Getting fit for the future – unlocking value through skills

The concept of the Fourth Industrial Revolution is well and truly with us – but within those three words lies a whole world of change. A world that offers the potential for our Life Sciences sector to grow and prosper from a position of strength.

This Life Sciences 2030 Skills Strategy tells us that it's not just about Artificial Intelligence and Robotics, both transforming our world and workplaces, it's also about a changing society and the expectations of the Next Generation.

The Strategy has been developed under the Leadership of the Science Industry Partnership (SIP) *Futures Group* as a key deliverable in the Life Sciences Sector Deal 2, and will play a central role in delivering the skills ambition of the Industrial Strategy.

It tells us that the Life Sciences sector has the potential to create approximately 133,000 jobs over the next 10 years, and that digital and computational skills, statistical literacy, leadership and inter-disciplinary working are essential to our continued success.

And of course the sector has much to build on: from Watson and Crick determining the double-helix structure of DNA, through to today's major breakthroughs in cell and gene therapies offering us huge potential for the long-term management and even cure of disease.

Indeed, these new therapies are driving a disruptive revolution right across Life Sciences – from treating injuries and burns through to the treatment of hugely challenging diseases including Alzheimer's, cancer and muscular dystrophy.

Our sector is being digitally disrupted along with almost every other sector of the economy, and we need to get fit for the future. This is a future which, to some extent, is still unknown, but we have the potential to meet its challenges **now**. Significant demographic shifts are bringing about parallel disruption in both the nature and the structure of the workforce.

We can see that members of Generation Z (individuals born post 1995), for example, are coming into our sector workforce with very different values to even the Millennial generation that preceded them. The older members of our workforce are not always retiring as we might expect – some may continue to (and be encouraged to) work for us, albeit in a different way, into their sixties and even beyond.

Younger people now expect a social purpose, and for them, diversity and equality in the workforce is no longer a tick box exercise,² it must be part of our very DNA. As this report shows, we need to promote our sector at a very high level, as one that can make a real difference.

All of this means that our 2030 workplace will be very different indeed. As a sector we need to prepare for such change and meet these new demands by developing a home-grown pipeline as an industry priority, in order to unlock value through skills and meet the significant recruitment demand we face.

We already have a strong skills infrastructure across Higher Education and Further Education, which embraces technical and vocational skills development. But the existing arrangements will not entirely meet the skills challenges we face. We would welcome a sector-based skills investment into our Industrial Strategy, as well as investment into the high level apprenticeships so crucial to our sector – alongside flexibilities in use of the Apprenticeship Levy.

We also need to take a more diverse approach to our apprenticeships and graduate intake, to ensure young people have a say in the way we operate. We need a new approach to lifelong learning and an ever stronger and closer partnership with our schools, universities and training providers.

We can be very proud of our past and our current innovations. However, we also need to look to the future.

The evidence presented here shows that we need to organise our teams to be much more agile. Rather than working in traditional functions, we need to be further integrating traditional Life Sciences skills with digital skills. We need to design our resourcing approaches to respond to this. We recognise that the need for more multi-skilled employees with the right attributes has its solution in education of people before they enter the workforce as well as their development within it.

According to the educational Charity Founders4Schools,³ if a young person has just four interactions with business while at school they are much more likely to find future employment suited to them. Therefore tapping into talent should be happening earlier in the recruitment cycle.

Our current workforce will need to develop new skills and expertise for both us as employers – and them as individuals – to remain competitive. Resilience, creativity and entrepreneurialism are also becoming paramount.

Our organisational leaders will need skills strategies to be able to manage in this changing environment, with a big focus on productivity and outcomes.

Through this Strategy we want to collaboratively and strategically address the skills and workforce dynamics affecting our workplaces. The period leading into 2030 is a really challenging time of change. I'm really positive about our future workforce - we'll be even more diverse, inclusive, agile and just as focussed on improving the world around us as we've ever been.

But to do that we will need over 130,000 skilled people who really want to work with us. We want to respond now to tackle not just the tip of the skills iceberg we can see, but the substantial challenges that lay beneath the surface.

Sector leadership will now be central to the production, implementation and monitoring of a Life Sciences Skills Action Plan to oversee and coordinate the delivery of this Strategy's recommendations, through a partnership approach.

This will be the next step on this journey, and we look forward to working with partners from across the skills arena to take our recommendations forward, to address the skills challenges faced by a sector that has long been recognised as a jewel in our economic crown.

Finally, a huge thanks must go to all our partners in the Science Industry Partnership's Futures Group who have put considerable time, effort and creativity into shaping and driving the Life Sciences 2030 Skills Strategy.



Alex Felthouse

Managing Director of Eisai Manufacturing Ltd and Chair of the SIP Futures Group

³ Charity Founders4Schools (2018) Annual Review and Accounts

Partners' Preface



Richard Torbett
Chief Executive, ABPI

The way we look for new treatments and cures is evolving, and medicines are more personalised now than ever before. Treatments are becoming more sophisticated as we gain a better understanding of science and disease. So never has it been more important that we have a sustainable skills pipeline, which will be integral to the UK's continued success.

We have priority skills gaps in advanced medicines discovery that need filling now. Skills gaps in immunology, genomics and clinical pharmacology. We also know that we need to be recruiting the best from around the world, particularly in terms of digital and data skills. All of this means capturing the imagination of people now, from all backgrounds, to ensure a diverse and highly-skilled workforce of the future.

High-level future skills are needed to continue the UK's world-leading position in innovating revolutionary medicines and treatments of deadly diseases, such as HIV and various cancers, not

only in the UK but across the world. Our industry's future success thrives on collaboration between industry, academia, research institutions and hospitals, so it is important that we support career agility to allow new talent to enter our industry from different sectors and disciplines to ensure skills diversity and facilitate future collaboration.

The ABPI are proud to support the development of this Life Sciences 2030 Skills Strategy and its strategic recommendations to ensure the UK successfully delivers the Industrial Strategy and remains at the heart of medicine breakthroughs.



Steve Bates
Chief Executive Officer, BIA

The UK Bioindustry delivers ground-breaking treatments to patients, creating novel therapies and diagnostics that will help treat and manage conditions to enable people to lead normal lives. From investing in and carrying out research and development, to getting drugs into patients, UK bioscience plays a central role in developing the treatments needed for future generations here and around the globe. It is a rewarding and diverse industry with quality job opportunities across all levels driving the development of cutting-edge technologies and future disease treatments.

Specialist skills in our workforce are needed to design, develop, manufacture and deliver these innovative therapies which underpin the success of the industry. As the industry grows, and novel therapies progress through to clinical delivery, more new job opportunities and unique skills will be required. It is a growing sector with a significant increase in skills demands reported and sector challenges with skills gaps ranging across all roles from research and development scientists, data science and informatics, bioprocessing specialists, regulatory professionals and clinical experts.

Advocacy is a core BIA strength. In developing the Life Sciences Sector Deal, BIA have been a key partner in delivering the Life Sciences 2030 Skills Strategy representing views of organisations across UK Bioindustry. By working together across organisations of all shapes, sizes and technologies, skills challenges can be overcome by influencing current policy, connecting across the sector, lowering the barriers to skills development and collaborating on funding opportunities. People are at the heart of our organisations and this skills strategy builds on the strength of current science industries positioning the UK for global success.

Executive Summary

This Life Sciences 2030 Skills Strategy represents a major research exercise into the skills required over the next decade to ensure a globally competitive sector and one that builds on a position of strength.

It sets out how, in the context of global markets for knowledge and skills, UK Life Sciences will attract, retain, train and develop the research, manufacturing and technical skills required by our dynamic and diverse sector.

The Life Sciences sector involves biomedical science, engineering, computer science, data analytics, chemistry, physics and mathematics working in close partnership with clinical research and high-value manufacturing expertise.

This report stems from a recommendation of the Life Sciences Industrial Strategy (LSIS), and its subsequent sector deals, for the development of an industry-led skills strategy, based on a skills gap analysis of the sector.

This Strategy shows the need for the sector to recruit, reskill and develop employees in both specialist and non-specialist roles as the demand for innovation and integrated skills intensifies. It also sets the scene for a demographic shift that has far reaching consequences – an ageing population with growing healthcare requirements in need of solutions; skilled older workers leaving the sector and younger people replacing them with very different expectations.

The Science Industry Partnership (SIP), through the SIP Futures Group, has collaborated with key industry stakeholders to deliver on this recommendation through comprehensive research into our sector's skills requirements. It provides us with clear priority areas that we can target through a collaborative Action Plan.

Our statistical workforce modelling indicates our sector has the potential to create approximately 133,000 jobs, through replacement and growth, over the next 10 years. This modelling is based on a high economic growth scenario, which is the required growth rate to ensure the successful delivery of the ambitions set out in the LSIS. In addition, the Cell and Gene Therapy Catapult's 2019⁴ skills demand report shows rapid growth in the cell and gene therapy industry, which is expected to continue, particularly in bioprocessing.

Building on the ABPI's 2019 skills gap research,⁵ which highlights the specific skills shortages in immunology and genomics, this Strategy highlights that a number of sector-wide skills issues are to be addressed to fulfil the sector's full potential. At the top of the list are digital and computational skills, and statistical literacy. Leadership, effective communication and inter-disciplinary working are also essential to our continued success as collaborative activity grows on a global and domestic scale. Translation and commercialisation skills, along with holistic sales and marketing skills, are also vital to bring new products and services to market and drive further growth.

Through extensive consultations with key industry stakeholders, we have established a robust set of recommendations to ensure the sector is equipped with a high-level workforce to deliver ambitious future growth plans. Following this, a collaborative Action Plan will be implemented that can be continuously reviewed and adapted so recommendations are delivered effectively and efficiently.

Bold ambitions are achieved through actions not words.

⁴ Cell and Gene Therapy Catapult's 2019 skills demand report (2019) https://ct.catapult.org.uk/sites/default/files/publication/Catapult_01_UK%20Skills%20Demand%20Report%202019_published_v2.pdf

⁵ ABPI (2019) Bridging the skills gap in the Biopharmaceutical Industry: Maintaining the UK's leading position in Life Sciences <https://www.abpi.org.uk/media-centre/news/2019/january/addressing-skills-shortages-critical-to-the-future-of-uk-science/>

Recommendations Overview



Life Sciences 2030 Skills Strategy Delivery

Produce, implement and monitor a Life Sciences Skills Action Plan to oversee and coordinate the delivery of this Strategy's recommendations, through a partnership approach. This will ensure delivery of the UK's Life Sciences Industrial Strategy through the sectors' commitment to skills.



Integrated Skills

Develop and fund a sector-based skills policy that joins up the skills and business agendas and meets the ambitions of the Life Sciences Industrial Strategy. This will ensure multi-disciplinary, industry-relevant learning and skills are embedded at all education types and levels from schools and apprenticeship standards through to re-skilling.



Apprenticeships

Continue to promote, encourage and incentivise the take-up of apprenticeships in all parts of the sector to establish parity of esteem with academic routes. Levy recovery is very low in Life Sciences⁶ and much greater flexibility is needed to support the development of a skilled workforce. Provide additional non-levy investment into apprenticeships to ensure SMEs receive the support they require.



Global Operating Environment

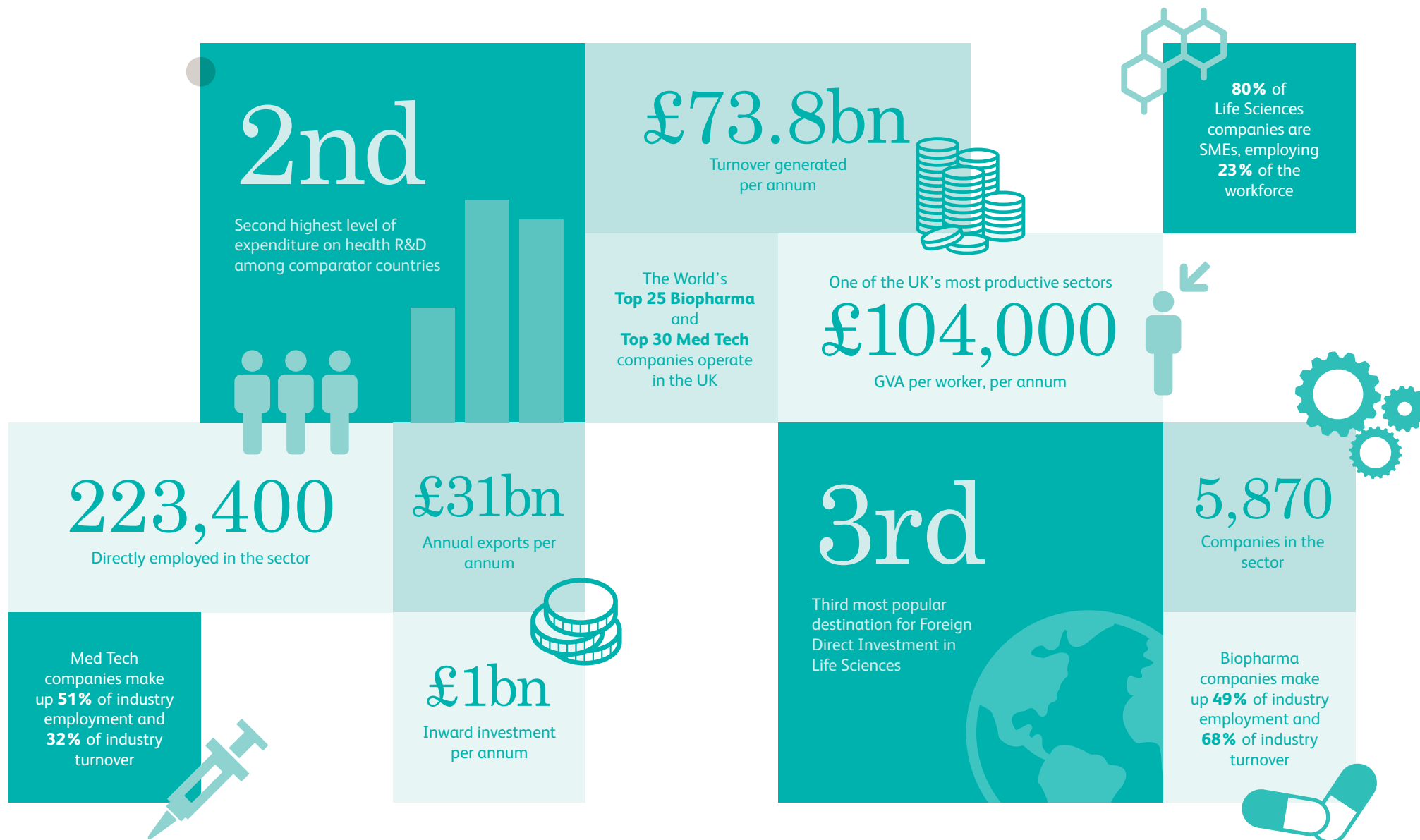
Maintain the UK's world-leading position in the Life Sciences sector, by supporting the facilitation of the transfer and exchange of a global workforce, and ensuring the UK is an attractive place to invest and work.



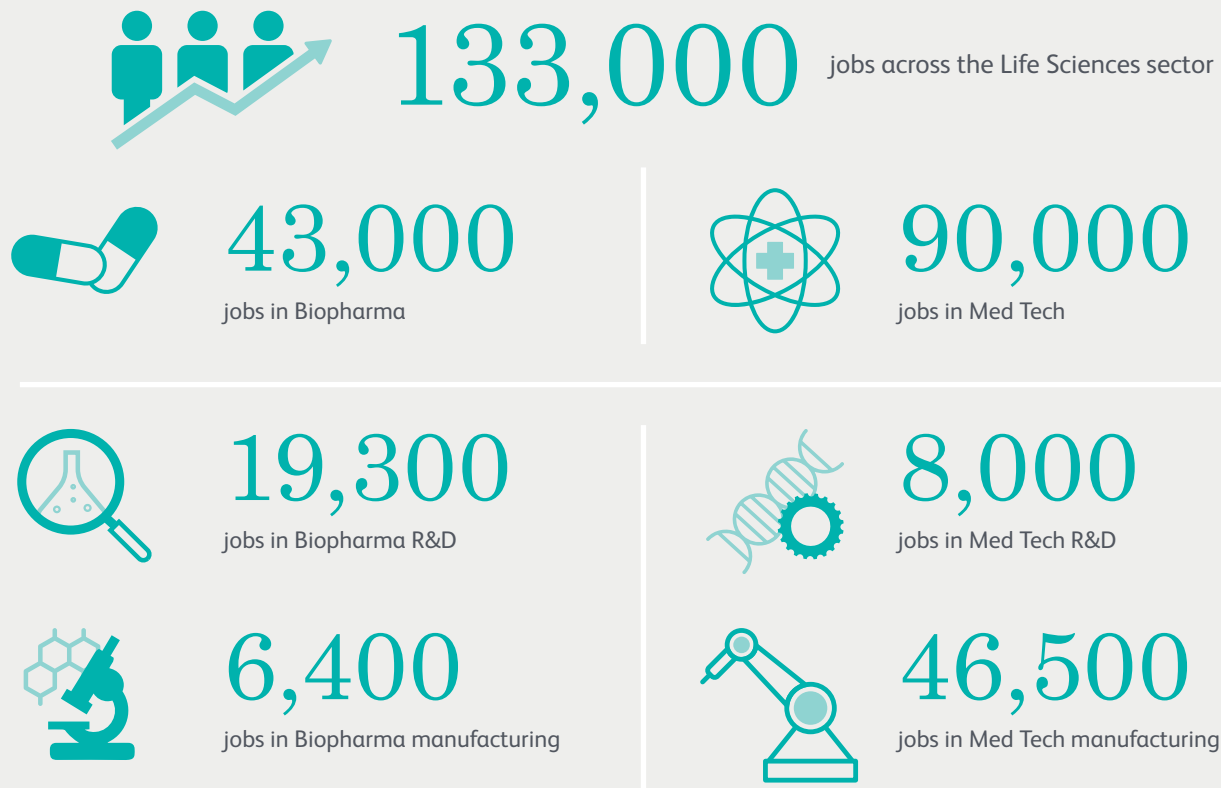
Attraction and Perception

To meet the demand requirement for up to 133,000 jobs across the sector, develop and roll out an attraction strategy to promote working in the Life Sciences sector to inspire, inform and build a diverse, entrepreneurial and resilient future workforce.

The UK Life Sciences Sector



Our workforce projections show by 2030, to meet forecasted growth demands and replace retirees, the sector is likely to need...





52,400

Service & Supply jobs across the Life Sciences



55,000

workers to replace retirees across the Life Sciences



60%

of the workforce at qualification level 6 (degree level) or above

1

Introduction

1.1 UK Life Sciences sector

- Is one of the UK's most productive sectors with an average Gross Value Added (GVA) per worker of £104,000 a year, which is more than twice the UK average;
- Has 5,870 companies; 20% of which are large companies and 80% are SMEs;⁷
- The world's top 25 Biopharma companies and 30 Med Tech companies have operations in the UK;
- Directly employs over 220,000 people, with over 160,000 within core operations and a further 60,000 within service & supply;⁸
- Has the potential to create around 133,000 jobs, through replacement and growth, over the next 10 years;
- Generates turnover of approximately £73.8bn a year;
- Has achieved an 8% increase in employment and a 3% increase in annual turnover over the past 10 years;
- Exports goods worth approximately £31bn annually, which is more than 5% of all UK exports by value, of which 84% are pharmaceutical and 16% are medical technology products;
- Attracts around £1bn of inward investment a year;
- Is the third most popular destination of foreign direct investment in Life Sciences, after the USA and China;
- Is driving global innovation in the Life Sciences with the second highest level of expenditure on health R&D among comparator countries, behind the USA;
- Is delivering the UK Life Sciences Industrial Strategy through two Sector Deals, which have agreed over £1bn of industry investment, more than £500m of government investment, and a tripling of investment in collaborative R&D in the NHS to £900m;
- Is a key sector in responding to the Grand Challenges identified in the UK Industrial Strategy, in particular Artificial Intelligence and Data, and Ageing Society.^{9 10 11 12 13}



⁷ Office for Life Sciences (2018) Bioscience and Health Technology Sector Statistics bases SME status on the EU definition of "businesses with fewer than 250 employees and which either have annual turnover up to and including €50m and/or have an annual balance sheet total up to and including €43m, and are not part of a Non-SME ownership group".

⁸ Definitions of service & supply functions taken from: Office for Life Sciences (2018) Bioscience and Health Technology Sector Statistics. This report states that around 248,000 people are employed within the Life Sciences. However, around 28,000 service & supply roles were deemed outside the scope of this report. Full details of omitted segments can be found in **Appendix E** (online version only).

⁹ Department for Business, Energy and Industrial Strategy and Office for Life Sciences [BEIS and OLS] (2018) UK Life Sciences: Bioscience and Health technology Sector Statistics 2018 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/798593/life-sciences-infographic-2018.pdf

UK Life Sciences will attract, retain, train and develop the research, manufacturing and technical skills required by our dynamic and diverse sector.

1.2 The partners

This UK Life Sciences 2030 Skills Strategy has been developed by the **Science Industry Partnership** (SIP) through the SIP Futures Group, which includes representatives from the **Association of the British Pharmaceutical Industry** (ABPI) and the **Bioindustry Association** (BIA), working with Cogent Skills and supported by the **Office for Life Sciences** (OLS).¹⁴

1.3 Aims and objectives

The **UK Life Sciences Industrial Strategy** (LSIS) sets out the long-term vision for UK Life Sciences. The LSIS notes that its success is ‘closely tied to the ability to train and recruit the best possible workforce, equipped with a breadth of critical skills’.

This Life Sciences 2030 Skills Strategy sets out how, in the context of global markets for knowledge and skills, UK Life Sciences will attract, retain, train and develop the research, manufacturing and technical skills required by our dynamic and diverse sector. A sector that involves biomedical science, engineering, computer science, data analytics, chemistry, physics and mathematics working in close partnership with clinical research and high-value manufacturing expertise.¹⁵ The Strategy also responds to what the LSIS calls the ‘urgent requirement to train and attract more entrepreneurs and individuals with commercial experience’ to grow the Life Sciences sector.

The measure of success will be the extent to which this Strategy and the subsequent Action Plan deliver on the skills priorities highlighted in the UK Life Sciences Industrial Strategy and the **Sector Deal 1** and **Sector Deal 2**, particularly:

- Attracting and retaining globally mobile talent – including a system that facilitates recruitment and retention of highly skilled workers from the EU and beyond, and does not impede intra-company transfers;
- Increasing the take-up of science, technology, engineering and maths (STEM) subjects;
- Understanding, anticipating, and responding to skills gaps across occupations;
- Supporting mobility between sectors, for example transfers between academic, clinical and commercial sectors to share knowledge and develop skills;

- Supporting training for migration of academic scientists into industry;
- Developing apprenticeships and facilitating take-up of apprenticeships, particularly by SMEs; plus, improving digital skills in the workforce;
- Accelerating convergence at the interface between Life Sciences, computer science, mathematics, statistics, engineering and chemistry in the fields of diagnostics, personalised medicine and data science.

¹⁰ UK Department for Exiting the European Union, Life Sciences sector report, December 2017

¹¹ The Association of the British Pharmaceutical Industry (ABPI) and BioIndustry Association (BIA) (2016), Maintaining and growing the UK’s world leading Life Sciences Sector in the context of leaving the EU: UK EU Life Sciences transition programme report, for the UK EU Life Sciences steering committee, 6th September 2016. (p. 3)

¹² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/811347/life-sciences-competitiveness-data-2019.pdf

¹³ Office for Life Sciences [OLS] (2017) Life Sciences: industrial strategy. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/650447/LifeSciencesIndustrialStrategy_acc2.pdf

¹⁴ Acknowledgements of contributing stakeholders can be found in **Appendix A**.

¹⁵ See **Appendix C** (online version only) for a definition of the industries which make up the sector.

2

Key Drivers

2.1 Introduction

The UK Life Sciences sector is diverse, dynamic, and global. It generates high-value and rewarding jobs, is a significant source of innovation, produces wealth and tax revenues for the country, and improves quality of life by delivering improved health outcomes. While the sector is globally successful, there is no room for complacency. To stay ahead and drive excellence, the sector is required to deliver change at the global level.

2.2 Drivers of change in the UK Life Sciences sector

Table 2-1 draws on recent reports by PWC, IPPR, Deloitte, Pearson, Forbes and McKinsey to provide a summary of some key drivers of change in the dynamic and growing Life Sciences sector. The drivers are grouped under the following five headings:

- **Macro-drivers:** especially the global trade and investment environment, which is vital to the success of the Life Sciences sector, and climate change. This will require systematic industry-wide changes in the way the sector works, and to the products and services the sector offers;
- **Societal change:** in particular an ageing society and workforce, and changing lifestyles, attitudes to work, and life goals that require employers to think and act differently;
- **Changing attitudes to learning:** such as the increasing self-reliance of learners and serious questions regarding the value of a university education relative to costs;
- **Technology drivers:** particularly AI, automation and new therapies;
- **Market dynamics:** such as new business models that require new skill mixes.

2.3 Stakeholder views on drivers of change

Stakeholders who helped to develop this Strategy highlighted the following issues:

- The importance and impact of digitalisation on the sector's skill requirements mean that there is a need to:
 - Upskill the current workforce;
 - Ensure the future talent pipeline has up-to-date digital, computational and engineering skills;
- The significance of team-based and multi-disciplinary working, which require 'intangible skills', such as, creativity, originality, and problem-solving to complement technical skills;
- The need to develop a more entrepreneurial culture in the UK Life Sciences sector to ensure effective translation of research into commercial products and services and retention of ideas and talent;
- The need for the sector to adopt new practices in its approach to role specification, as well as recruitment, in order to address skills shortages, for example, recognition that roles previously seen as graduate level may be effectively performed by non-graduates;
- The UK's intended departure from the European Union has brought issues around attracting and retaining a talented global workforce to the fore. Stakeholders emphasised the importance of responding to the sector's global operating environment, which requires the UK's visa, research, and training frameworks to support and enable international collaboration and the transfer of skills and knowledge across national boundaries.

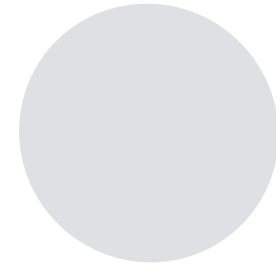





















Table 2-1 Drivers of change in the Life Sciences sector and skills implications

| Driver | | Implication |
|--------------------------------|--|---|
| Macro-drivers |  <ul style="list-style-type: none"> An uncertain international political and trading environment – especially in relation to UK-EU relations and international trade arrangements – affects market growth, supply chain operations, and collaborative R&D. | <ul style="list-style-type: none"> Risks to international trade and investment flows affect the operation of global supply chains and international R&D collaboration. This could increase demand for R&D and manufacturing in the UK, or, if the UK cannot respond effectively, it could lead to work moving overseas. Thus, the UK needs to invest in its skills base to maintain its competitive advantage. |
| |  <ul style="list-style-type: none"> Manmade climate change requires new processes and approaches to how the sector uses resources. | <ul style="list-style-type: none"> The sector needs to develop skills and processes that reduce the sector’s carbon footprint and develop products and services to help climate change adaptation. |
| Societal change |  <ul style="list-style-type: none"> Ageing population – both globally and in the UK. | <ul style="list-style-type: none"> The sector needs to ensure it has the skills required to meet the needs of growing health care markets, particularly in the treatment of cancer, heart disease, dementia, Parkinson’s disease, rheumatism, osteoporosis, and metabolic disorders. |
| |  <ul style="list-style-type: none"> Ageing workforce – in advanced economies. | <ul style="list-style-type: none"> The sector needs to take steps to retain knowledge and skills, and ensure economic wellbeing in an ageing workforce by extending working lives through upskilling and flexible working arrangements. |
| |  <p>Changing attitudes to work and life goals:</p> <ul style="list-style-type: none"> Members of Generation X (born 1961-1980) seek work-life balance, manage ‘portfolio careers’, and are loyal to a profession but not necessarily to an employer. Members of Generation Y (born 1981-1995) seek freedom and flexibility, are digital entrepreneurs who work with not for organisations. Members of Generation Z (born 1995-2010) seek security and stability, are ‘technoholics’, and are IT-dependent. Members of Generation Alpha (born post 2010) are digital natives and seek agile careers, where work is based on a series of projects with their own rewards. Staying in education for longer, they seek to become true specialists and are highly motivated by social purpose. | <p>Employers need to:</p> <ul style="list-style-type: none"> Respond to the different work and life goals of different generations if they are to attract and retain workers; Ensure transfer of knowledge and behaviours between generations to facilitate effective team working; Embed the knowledge and experience of those likely to retire in subsequent generations, in order to retain and build on existing knowledge and know-how. |
| Changing attitudes to learning |  <ul style="list-style-type: none"> Individuals are increasingly taking responsibility for their own learning and development – linked to an expectation of multiple careers over a working life. | <p>The sector needs to provide:</p> <ul style="list-style-type: none"> Clear, useful, and practical information about the Life Sciences sector to help individuals make informed educational and career choices; Multiple entry-points into the sector to support and enable career agility. |
| |  <ul style="list-style-type: none"> Expectation of digital and virtual learning experiences as part of education and training. | <ul style="list-style-type: none"> The sector needs to provide engaging and accessible learning materials and experiences to attract, retain and upskill workers. |
| |  <ul style="list-style-type: none"> While higher education is valued, increasing numbers of people also recognise the value of vocational routes into employment. | <ul style="list-style-type: none"> The sector needs to provide clear information and guidance on academic and vocational routes into the sector and the earning potential associated with the qualifications and roles in the sector to enable students to make informed choices. |
| |  <ul style="list-style-type: none"> Greater appreciation among learners of ‘intangible skills’ given the advance of AI and automation. | <ul style="list-style-type: none"> Build on learners’ desire to develop skills that AI cannot easily replicate by offering ‘AI-proof’ training as part of ongoing professional development. |

| Driver | | Implication | |
|--------------------|---|--|--|
| Technology drivers |  | <ul style="list-style-type: none"> Data and AI, blockchain technology, automation and robotics. | <ul style="list-style-type: none"> The sector needs to gear-up the workforce's data analytic skills as these pervasive skills are required in R&D, manufacturing, service & supply, and customer/patient interaction. However, AI and automation may reduce demand for technical skills – ONS estimates c.46 % of Pharmaceutical Technician jobs 'at risk'. |
| |  | <ul style="list-style-type: none"> Additive manufacturing and new materials. | <ul style="list-style-type: none"> Additive manufacturing and new materials enable customised, on-site manufacturing – this will change processes and the associated skill requirements for manufacturing, quality assurance, and logistics. |
| |  | <ul style="list-style-type: none"> Advanced, cell and gene therapies and genetic profiling/diagnosis. | <ul style="list-style-type: none"> The sector needs to anticipate demand for skills to deliver clinical trials, commercial development, and scale-up. |
| |  | <ul style="list-style-type: none"> Growth of wearable technology and telehealth. | <ul style="list-style-type: none"> Linked to the growing importance of data, wearables will generate personal data, enable personalised and co-management of health, which will require data analytics and effective communication skills. |
| |  | <ul style="list-style-type: none"> Engineering excellence is a driver as well as an enabler of technological innovation. | <ul style="list-style-type: none"> The UK Life Sciences sector needs to attract, retain and develop engineers to maintain engineering excellence. |
| Market dynamics |  | <ul style="list-style-type: none"> Spending on health care, Pharmaceuticals and Med Tech will increase as a percentage of global and UK income. | <ul style="list-style-type: none"> The Pharmaceutical sector is forecast to grow with prescription drug sales forecast to rise from US\$900bn in 2019 to US\$1.2tn in 2024. Worldwide Med Tech sales are forecast to grow from US\$475bn to US\$595bn by 2024. This means there will be an increase in demand for skilled workers in the sector. |
| |  | <ul style="list-style-type: none"> Growth in precision and preventive medicine. | <ul style="list-style-type: none"> The global personalised medicine market is expected to increase c.11 % 2017–2024, with advances in healthcare analytics, AI, and blockchain technology. This will require Continuing Professional Development (CPD) both to exploit opportunities and increase adoption rates. |
| |  | <ul style="list-style-type: none"> Disruptive technology. | <ul style="list-style-type: none"> Innovation in technology will require strong leadership and entrepreneurship in the UK skills base, if the UK is to make the most of future opportunities arising from disruptive technology. |
| |  | <ul style="list-style-type: none"> Cost of R&D increasing and return on new drugs declining. | <ul style="list-style-type: none"> Cost-conscious payers increasingly require proof of real-world value before buying new medicines/devices, leading to lower returns on investment at a time when R&D costs are rising. Thus, there is a need to ensure staff have the skills required to deliver R&D and real-world trials quickly and efficiently. |
| |  | <ul style="list-style-type: none"> New business models for innovation, disease management, manufacturing/production, and lifestyle management require a different skills mix. | <ul style="list-style-type: none"> Breakthrough-innovators require entrepreneurship skills. Disease-managers require data, analytic and communication skills. Efficient-producers require automation and supply-chain analytics skills. Lifestyle-managers require analytics and intangible skills. |

2.4 Stakeholder views on how to respond to the drivers of change

In developing this Strategy, stakeholders confirmed their commitment to:

- Promote the Life Sciences sector to all potential recruits, at all career stages, by:
 - Developing clear pathways from further education to the Life Sciences sector;
 - Facilitating collaborative, cross-sector working to create a diverse and agile workforce stemming from the public and private sector, and academia; particularly to enable career agility from sectors experiencing structural change to enter the Life Sciences sector;
 - Promoting apprenticeships to widen the talent pool from which the sector draws.
- Work with the Institute for Apprenticeships and Technical Education (IfATE) and universities to ensure that standards keep up with changes in technology and industry needs.

- Use the Apprenticeship Levy as a vital resource to:
 - Develop the talent of the future;
 - Upskill the current workforce;
 - Strengthen supply chains to maintain international competitiveness, especially by supporting small and medium sized enterprises to develop their staff’s skills.
- Work with UK Catapults in Cell and Gene Therapy, Medicine Discovery, and Digital to develop the UK’s skills and knowledge base and global competitiveness.
- Work with universities, research bodies, and charities to deliver the skills required to develop, translate and commercialise a globally competitive pipeline of innovative products and services in a timely way.

2.5 Policy and legislative environment for the UK Life Sciences sector

The UK Industrial Strategy and the UK Life Sciences Industrial Strategy (LSIS) provide the overarching policy framework within which this Life Sciences 2030 Skills Strategy has been developed. Table 2-2 summarises the main elements of the UK Industrial Strategy – the five Foundations of Growth and the four Grand Challenges. And Table 2-3 summarises the key elements of the UK Life Sciences Strategy relevant to people and skills.

| Table 2-2: UK Industrial Strategy | | |
|-----------------------------------|--|--|
| Five Foundations of Growth | Ideas: the world’s most innovative economy | Supported by Local Industrial Strategies |
| | People: good jobs and greater earning power for all | |
| | Infrastructure: a major upgrade to the UK’s infrastructure | |
| | Business Environment: the best place to start and grow a business | |
| | Places: prosperous communities across the UK | |
| Four Grand Challenges | Artificial Intelligence and data | Supported by the Industrial Strategy Challenge Fund |
| | Ageing society | |
| | Clean growth | |
| | Future of mobility | |

Source: UK Industrial Strategy

Table 2-3: UK Life Sciences Industrial Strategy: People and Skills Priorities

- Attraction and retention of globally mobile talent
- Increasing the take-up of science, technology, engineering and maths (STEM) subjects
- Understanding, anticipating and responding to skills gaps across occupations
- Supporting mobility between sectors
- Supporting training for migration of academic scientists into industry
- Developing apprenticeships and facilitating take-up of apprenticeships, particularly by SMEs, and improving digital skills in the workforce
- Accelerating convergence at the interface between Life Sciences, computer science, mathematics, statistics, engineering and chemistry in the fields of diagnostics, personalised medicine and data science

Source: **UK Life Sciences Industrial Strategy, Sector Deal 1 (2017)** and **Sector Deal 2 (2018)**

National skills policy sets the legal and administrative framework within which the Life Sciences 2030 Skills Strategy is to be delivered. Table 2-4 provides a summary of the key elements of the skills landscape in the UK, in particular, the Technical Education Act, the Higher Education and Research Act, Apprenticeship Levy, and Careers Strategy.

Table 2-4: UK Life Sciences Industrial Strategy: People and Skills Priorities

| Building block | Aims and objectives |
|--|---|
| Technical Education Act | <ul style="list-style-type: none"> • To simplify the technical education sector by creating clear pathways from further education to employment. • To extend the remit of the Institute of Apprenticeships (renamed the Institute for Apprenticeships and Technical Education) to cover college-based technical education in addition to apprenticeships. • To provide protection for students if their college goes into administration. • To make sure that technical education colleges under Local Authority control share information and performance data with the government. |
| Higher Education & Research Act | <ul style="list-style-type: none"> • To establish a regulatory framework for higher education to increase competition and student choice, ensure students receive value for money, and strengthen the research sector. • To establish the Office for Students (OfS) with responsibilities for regulating the Higher Education sector – including power to award and remove degree-awarding powers – it supersedes the Higher Education Funding Council for England and the Office for Fair Access. • To establish UK Research and Innovation (UKRI) with responsibilities for regulating and funding research; bringing together the country's seven research councils and strengthening interdisciplinary research; acting as an advocate for the whole research sector; and enabling the pooling of resources. |
| Apprenticeship Levy | <ul style="list-style-type: none"> • To establish a 0.5% charge on the paybills of employers with paybills over £3m a year. (See Apprenticeship Levy in a nutshell). • To boost productivity by investing in human capital. • To improve the quality and quantity of apprenticeships. • To ensure control of apprenticeship funding sits with employers through the Digital Apprenticeship Service. |
| Careers Strategy | <ul style="list-style-type: none"> • To ensure everyone irrespective of background is able to build a rewarding career. • To give everyone access to an excellent programme of advice and guidance. • To provide everyone with support tailored to their circumstances. • Provide everyone with the information that they need to understand the job and career opportunities available to them. |

Source: **Steer-ED**

The Apprenticeship Levy in a nutshell

- Employers with a pay bill over £3 million each year must now pay the Apprenticeship Levy.
- Levy payers can support apprenticeships in other organisations by transferring a percentage of their apprenticeship funds to other employers. In April 2019 the rate available to transfer was established at 25% of the annual value of funds entering the apprenticeship service account. These funds can be transferred to any employer, including smaller employers in levy payers' supply chains, and Apprenticeship Training Agencies (ATAs), which recruit, employ, and arrange training for apprentices on behalf of employers to support new opportunities and widen participation in apprenticeships.
- A group of companies may pay the levy together, set up a single shared apprenticeship account, and pool funds to facilitate or improve training.
- Non-levy paying employers share the cost of training and assessing their apprentices with government - 'co-investment'. This sees employers paying 5% towards the cost of apprenticeship training. The government pays the rest (95%) up to the funding band maximum.
- Employers must register with the Apprenticeship service to:
 - Receive levy funds for them to spend on apprenticeships;
 - Manage their apprentices;
 - Pay the training provider;
 - Stop or pause payments to the training provider.
- Funding is available for apprentices that work at least 50% of the time in England.
- Apprenticeship standards cover a specific occupation and set out the core skills, knowledge and behaviours an apprentice needs; they are developed by employer groups known as 'trailblazers'.
- Funding bands vary by sector and level of qualification – but do not vary to take account of the minimum cohort required to ensure a programme is viable.

2.6 Conclusion

The UK Life Sciences sector is a confident and ambitious sector with a positive future. However, it is essential that the sector continues to evolve and adapt to technological, economic and societal change in order to maintain its global competitive advantage through a diverse and highly skilled workforce.

It is crucial that the sector responds effectively to the next generation of 'digital natives' entering the workforce, who will seek career agility as well as equality and social purpose. Alongside this, the integration of advanced digitalisation skills will ensure the continued global success of the UK Life Sciences sector.

While traditional academic routes will remain an important part of developing future skills, the continued progression of industry-specific apprenticeship standards and T Levels could play a key role in delivering the high-level, specialist skills needed to successfully deliver the Life Sciences Industrial Strategy.

The sector will build on the platform provided by UK skills policy to create high-value, well-paid, rewarding jobs, and to diversify the workforce to meet the growing global demand for Life Sciences' products and services.

3

UK Life Sciences Sector



3.1 Introduction

UK Life Sciences is a significant and growing sector. The sector:

- Has 5,870 companies, of which 20 % are large companies and 80 % are SMEs;
- Directly employs over 220,000 staff;
- Generates approximately £73.8 billion in turnover a year;
- Achieves an average Gross Value Added (GVA) per worker of £104,000, compared to average UK average of £49,000 GVA per worker;
- Has averaged an 8 % increase in employment and a 3 % increase in annual turnover over the past 10 years;
- Contributes significantly to UK trade:
 - Life Sciences products account for over 5 % of all UK exports by value – of which 84 % are pharmaceutical goods and 16 % are medical technology products;
 - In 2016, the UK exported approximately £31bn of Life Sciences goods.

¹⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/32451/11-1428-investing-in-uk-health-and-life-sciences.pdf

¹⁷ Times Higher Education (2020) World University Rankings 2020. https://www.timeshighereducation.com/world-university-rankings/2020/world-ranking#/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats

¹⁸ Times Higher Education (2019) World University Rankings 2019 by subject: clinical, pre-clinical and health. https://www.timeshighereducation.com/world-university-rankings/2019/subject-ranking/clinical-pre-clinical-health#/page/0/length/25/locations/GB/sort_by/rank/sort_order/asc/cols/stats

The Life Sciences sector is one of the UK's most productive sectors, attracting talent and investment from around the world.

3.2 A globally competitive ecosystem

The UK is an internationally renowned centre of excellence for Life Sciences with strong innovation and manufacturing assets and a supportive policy environment.¹⁶ The UK's Life Sciences ecosystem combines:

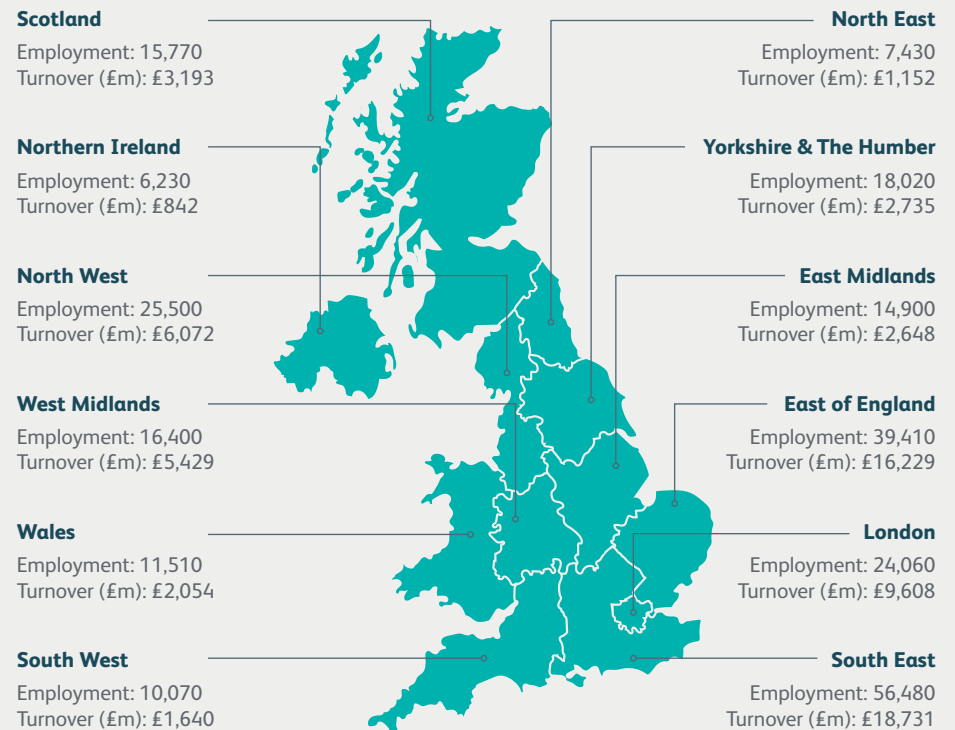
- Pioneering fundamental and applied research assets and capability:
 - Three of the top ten universities in the world;¹⁷
 - Six of the top 20 global universities for clinical, pre-clinical and health research;¹⁸
 - An integrated health system, with high-quality patient data, which is able to conduct clinical trials at scale;¹⁹
- A large talent base, e.g. in 2016, approximately 14% of graduates in the UK were in Natural Sciences or Mathematics and Statistics programmes; almost double the proportions of other G7 countries, such as, the USA, France and Italy;²⁰
- A large domestic healthcare market;
- The presence of significant global operators:
 - The top 25 global Biopharma companies and the top 30 Med Tech companies operate in the UK.²¹

Figure 3-1 illustrates the distribution of the UK's Life Sciences industry. The 'Golden Triangle', which spans Oxford, Cambridge and London, is a major driver of economic growth in the Life Sciences sector. It is home to four of the world's top twenty universities (three in the top ten), four of the top ten medical sciences faculties in the world and some of the world's largest research institutes – the Wellcome Sanger Centre, the Francis Crick Institute and Harwell.

The Core Biopharma sub-sector is comprised of 31% large companies and 69% SMEs. Large companies employ 92% of the total Core Biopharma workforce. SMEs within Biopharma service & supply account for 81% of companies in this sub-sector and 22% of its employment.

The Core Med Tech sub-sector is comprised of 81% SMEs and 19% large companies, with 30% of its employment from SMEs. Med Tech service & supply SMEs account for 82% of companies within this sub-sector, employing 30% of its workforce.²¹

Figure 3-1
The distribution of the UK's Life Sciences industry



Source: Office for Life Sciences [OLS] (2017) Life Sciences: Industrial Strategy Sector Deal 2.

¹⁹ See for example, <http://www.thenhsa.co.uk/app/uploads/2019/01/NPIHR-SIA-Report.pdf>

²⁰ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/811347/life-sciences-competitiveness-data-2019.pdf

²¹ Office for Life Sciences [OLS] (2017) Life sciences: industrial strategy. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/650447/LifeSciencesIndustrialStrategy_acc2.pdf

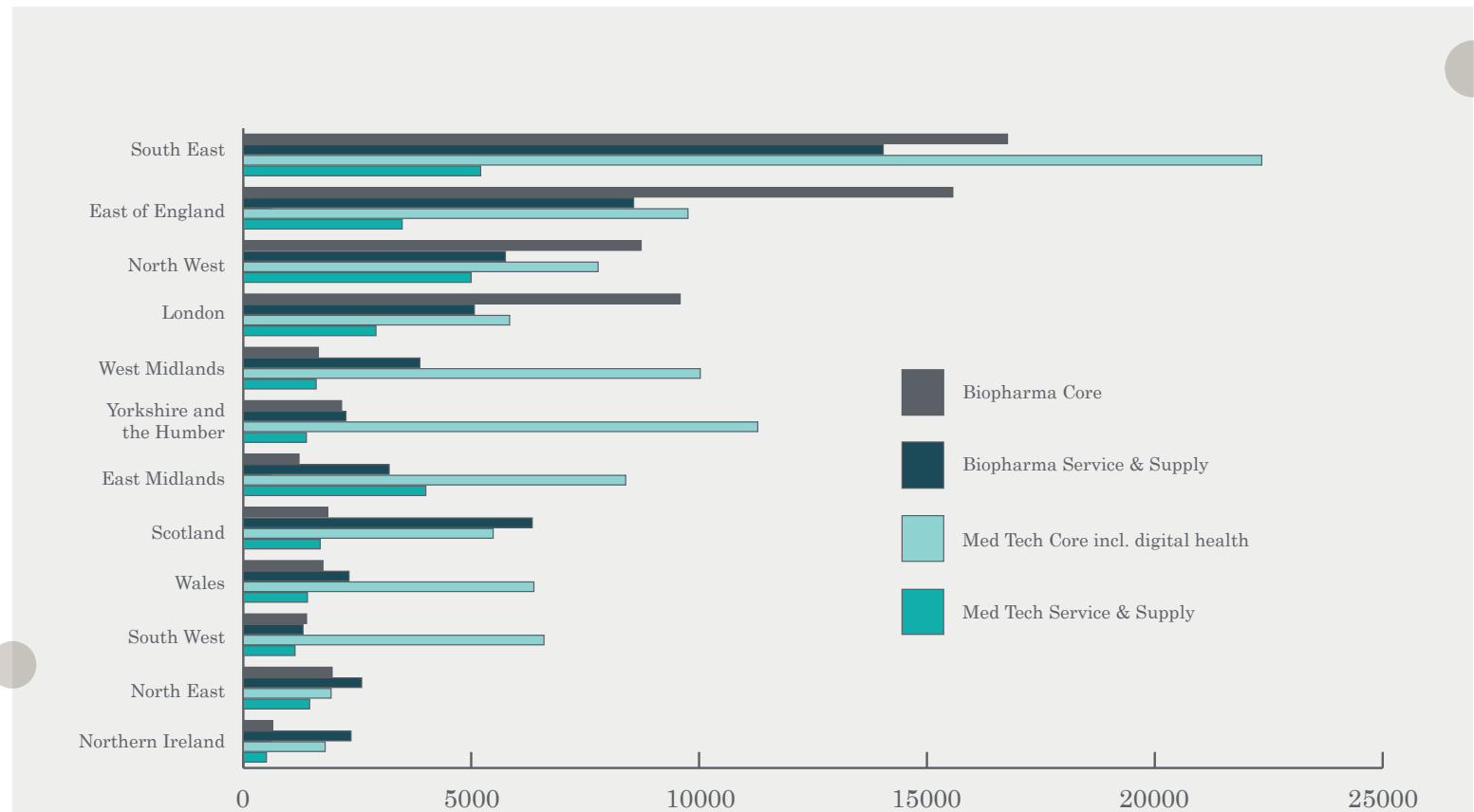
3.3 Employment

Figure 3-2 shows the UK's distribution of the industry employment by sub-sector across the regions of England and in Northern Ireland, Scotland, and Wales.

More generally, Life Sciences commercial activity in the UK occurs in distinct clusters:

- In Biopharma there are major clusters in the 'Golden Triangle' (Oxford, Cambridge and London), North West England and Scotland;
- In Med Tech, there is a greater spread with centres in the Midlands and Yorkshire.

Figure 3-2
The distribution of the industry employment by sector across the regions of England and in Northern Ireland, Scotland, and Wales



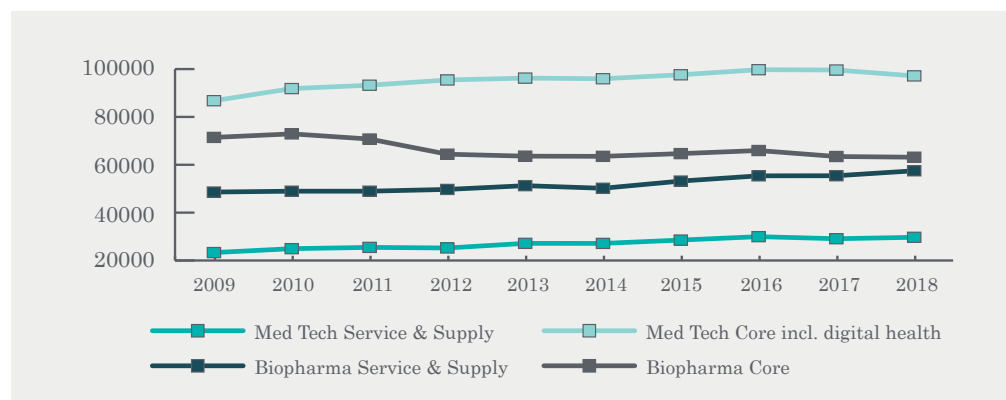
Source: OLS (2019) Bioscience and Health Technology Sector Statistics

3.4 Occupational structure and change over time

Figure 3-3 provides a breakdown of employment change in the sector over the past ten years. It shows:

- Core Med Tech employment increased by 12 %;
- Med Tech Service & Supply employment increased by 27 %;
- Biopharma Service & Supply employment increased by 18 %;
- Core Biopharma was the only sub-sector to have experienced a contraction in employment (a decrease of 12 %).

Figure 3-3
Change in employment within UK Life Sciences, 2009 - 2018

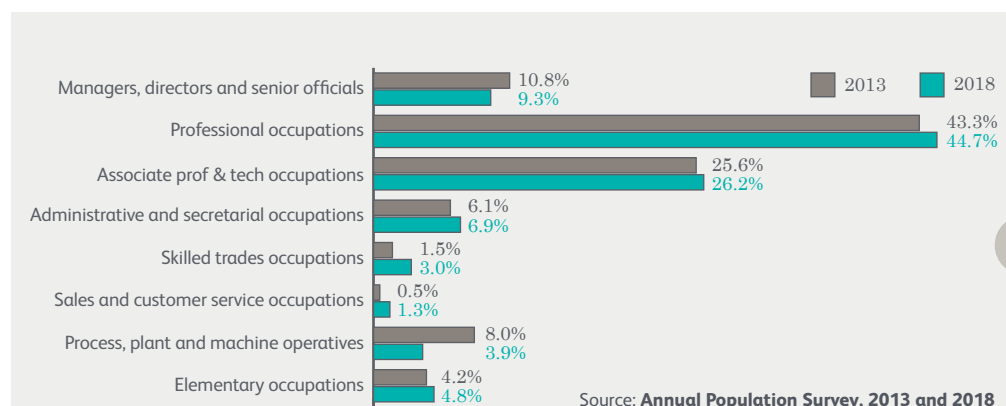


Source: OLS (2019) Bioscience and Health Technology Sector Statistics

3.5 An evolving occupational structure

Figure 3-4 provides a breakdown of change by occupation between 2013 and 2018.²² It shows a broadly stable occupational structure, but with significant change in two areas: Employment for ‘process, plant and machine operatives’ declined by 50 %; and Employment in ‘skilled trades occupations’ increased by 100 %. Stakeholder consultations indicated that these trends are likely to continue to 2030.

Figure 3-4
Employment in UK Life Sciences by occupational group, 2013 & 2018



Source: Annual Population Survey, 2013 and 2018

3.6 Conclusion

The UK Life Sciences is a major contributor to the UK economy and an internationally competitive sector.

The sector’s commercial activity operates in distinct regional hubs, with a strong commercial and graduate presence in the South East of the UK. This may present both opportunities and challenges when attracting, developing and retaining a world-class workforce across the UK.

SMEs make up 80 % of companies within the Life Sciences sector, so their contribution to the sector’s success is important. Therefore, a focus on the skills of the SME workforce is just as important as large companies.

²² A detailed breakdown of occupations by types of activity e.g. Manufacturing and R&D can be found in **Appendix E** (online version only).

4

UK Life Sciences Skills

4.1 Introduction

The continued success of the UK Life Sciences sector depends on the skills and talent of the workforce.

This section provides an overview of the current demand for, and supply of, skills and training in the UK Life Sciences sector. This provides the context for our workforce projections, which are discussed in the next section.

4.2 Overview

Entry routes to working in the UK Life Sciences sector

There are a number of routes to join the UK Life Sciences sector, with entry into employment possible at each stage of the educational journey, including:

- **Academic education:** moving from GCSEs, to A levels, to Foundation and/or bachelor's degrees, to postgraduate degrees and PhDs;
- **Vocational education:** with Intermediate, Advanced, Higher and Degree-level apprenticeships, and the upcoming introduction of T Levels from 2020;²³
- **Career agility:** requiring sector-relevant skills training to facilitate moves into the sector from other sectors, e.g. academia, the health service, advanced manufacturing, software development and gaming;
- **International transfer:** with sector-relevant academic/vocational skills and experience.

These routes have different lead-in times for when skills become available to the sector, providing options for how to address both short- and medium-term skills requirements.

The current distribution of roles and sources of workers in UK Life Sciences

To understand the sector's skills needs, it is important to understand its occupational distribution and the sources from which workers are drawn.

Table 4-1 sets out the percentage of the UK Life Sciences workforce by occupation. This shows the majority of the sector's employment is in 'Professional Occupations' and 'Associate Professional and Technical Occupations'.

Table 4-1: Share of UK Life Sciences sector by occupation

| Standard Occupational Classification | % of UK Life Sciences Workforce |
|--|---------------------------------|
| Managers, Directors and Senior Officials | 9 % |
| Professional Occupations | 45 % |
| Associate Professional and Technical Occupations | 26 % |
| Administrative and Secretarial Occupations | 7 % |
| Skilled Trades Occupations | 3 % |
| Sales and Customer Service Occupations | 1 % |
| Process, Plant and Machine Operatives | 4 % |
| Elementary Occupations | 5 % |

²³ <https://www.gov.uk/government/publications/introduction-of-t-levels/introduction-of-t-levels>

Table 4-2 shows the overall UK Life Sciences workforce is comprised of 73% from the UK, 12% from the EU, under 1% from other parts of Europe, around 7% from Asia with the remaining 7% from the Rest of the World. Thus, just over 25% of the UK Life Sciences workforce comes from overseas, and around 50% of these overseas workers are drawn from the EU. This illustrates the sector's need and desire to maintain the flow of international talent.²⁴

Table 4-2: UK Life Sciences workforce by origin

| Source | UK | EU (exc. UK) | Other Europe | Asia | RoW |
|--------------|------|--------------|--------------|------|-----|
| Share as a % | 73.0 | 12.1 | 0.7 | 7.2 | 6.9 |

Table 4-3 shows the proportion of workers by origin for each occupational category. It shows an above average reliance on overseas workers in 'Professional Occupations' (31% relative to an overall average of 27%), which is important because these occupations constitute 45% of sector's workforce. Table 4-3 also shows an above average reliance on overseas workers in 'Elementary Occupations' (40%); however, these account for a lower proportion of the overall workforce.

Table 4-3: Proportion of workers in UK Life Sciences from each world region by occupation level

| Occupation Level | UK % | EU (exc. UK) % | Other Europe % | Asia % | RoW % |
|--|------|----------------|----------------|--------|-------|
| Managers, Directors and Senior Officials | 72.8 | 14.7 | 0 | 3.0 | 9.5 |
| Professional Occupations | 68.8 | 14.0 | 0.7 | 10.9 | 5.5 |
| Associate Professional and Technical Occupations | 79.8 | 9.3 | 0.6 | 3.3 | 6.9 |
| Administrative and Secretarial Occupations | 84.9 | 8.9 | 0 | 1.8 | 4.3 |
| Skilled Trades Occupations | 92.6 | 4.7 | 2.7 | 0.0 | 0.0 |
| Sales and Customer Service Occupations | 80.5 | 10.3 | 4.5 | 0.0 | 4.6 |
| Process, Plant and Machine Operatives | 83.2 | 8.5 | 0 | 7.5 | 0.7 |
| Elementary Occupations | 60.3 | 25.4 | 0 | 9.2 | 5.1 |

Source: SIP analysis of ONS, Labour Force Survey, 2018

²⁴ Access to talent has been highlighted as recruiters' biggest concern in relation to the UK's exit from the EU REC (2017) REC Blog. <https://www.rec.uk.com/news-and-policy/corporate-blog/skills-shortages-in-the-life-sciences-sector>

4.3 Demand for and supply of skills

To achieve the ambitions for the sector there is a need to effectively match the supply of skills to demand in specific roles. However, there is also a need to understand the sector's overarching skills needs, such as team-working, leadership, and the all-pervasive need for digital and analytic skills.

Stakeholder views on overarching skills requirements

Drawing on their experience of recruitment, retention and career development, stakeholders²⁵ raised a number of overarching skills issues within Life Sciences. To continue to deliver growth in employment and innovation, the sector should address the following:

- **Digital, computational, and statistical literacy:** in line with other sectors, the UK Life Sciences sector is required to upskill its workforce to make the most of digitalisation. There is a reported gap between US and UK capability in this area. Therefore, to remain competitive, the UK Life Sciences sector should ensure there is a strong flow of data science skills, including technical experts and staff who combine laboratory and computational skills (see Table 4-4) by:
 - Upskilling existing staff, some of whose roles may not previously have required data or computational skills;
 - Enhancing staff's ability to manage and analyse large datasets;
 - Promoting familiarisation with Big Data technologies to maximise the benefits of Artificial Intelligence, e.g. by using bespoke training modules as part of Continuing Professional Development (CPD) and degree/apprenticeship programmes;
- Attracting, retaining and developing more data scientists, particularly with data modelling and programming skills, (e.g. to build programs and infrastructure for medicines manufacturing), by developing the talent pipeline (e.g. industrial placements for students prior to joining the sector, and refresher modules for existing staff);
- Attracting and retaining more health economists to maximise the benefits of larger and richer datasets in the sector;
- Building the capability of chemical and process control engineers to produce 'digital twins' to generate efficiencies in development processes.
- **Leadership skills:** especially in the promotion of the digitalisation of the sector by defining and promoting excellence in leadership in different roles, and by addressing skills shortages in particular areas, e.g. protein science.
- **Communication skills:** given the pace of technological development, there is a need to improve the sector's ability to communicate new advances in medicines and medical technology, e.g. more effective use of social media via engaging content.
- **Translation and commercialisation skills:** for the sector to make the most of the UK's ground-breaking research there is a need to:
 - Improve the pipeline of academic innovation flowing to business development in industry;
 - Align the skills pipeline to the innovation pipeline;
 - Increase the efficiency with which research findings are transferred to industry;
 - Breakdown the 'artificial walls' between careers in academic research and industry.
- **Skills updates to reflect technological and regulatory change, in particular:**
 - Acknowledge the broad spectrum of digital capability in the workforce and enable staff to adapt and retrain quickly;
 - Keep up with and take advantage of advances in manufacturing techniques, in particular additive manufacturing, by updating skills for (chemical and process control) engineers and staff's ability to access and utilise equipment online;
 - Broader and deeper knowledge of robotics, e.g. for scientists;
 - Increasing the number of people trained in industry regulatory requirements, e.g. Qualified Persons;
 - Develop curricula to reflect sector-specific skills for data scientists.



- **Skills for cross-team and cross-disciplinary working:** address skill gaps and shortages by increasing and enhancing cross-team and cross-disciplinary working – through development of ‘intangible skills’.
- **Succession planning for an ageing workforce:** Life Sciences, along with other sectors in the UK, has an ageing workforce. Therefore, it is important for the sector to plan for and enable the transfer of knowledge and skills to the next generation, particularly for companies that have bespoke technology. The sector also needs to review and adapt its employment practices in order to retain older workers, e.g. through more flexible working arrangements.
- **Promotion and facilitation of agile careers:** the scale of change across industry will generate opportunities to attract workers from outside the Life Sciences sector, but the competition for talent from other sectors, especially for digital skills, will be high. Therefore, the sector is required to promote itself as an attractive career option, provide clear routes to entry and appropriate training offers to facilitate career agility.
- **Continuing Professional Development (CPD):** The UK Life Sciences sector lacks the infrastructure to deliver life-long learning to reskill and upskill the workforce. This adversely affects the long-term attractiveness and resilience of the talent base, for example, in developing the digital capabilities that the sector requires. The sector should seek to introduce and support CPD and lifelong training to ensure a skilled and committed workforce that is fit for the industry of the future, as well as industry of today.
- **Holistic sales and marketing skills:** to maintain the sector’s international competitiveness, there is a requirement to enhance sales and marketing efforts, particularly by reinforcing the skills required to take new products to market. To do this, project management and ‘intangible skills’ should complement the technical knowledge that is essential to the delivery of effective marketing.

Table 4-4: **Key findings: Royal Society’s Dynamics of data science skills: How can all sectors benefit from data science talent?**

The Royal Society’s vision for the future of data science

The UK is a leading data science research nation with a sustainable flow of expertise. Diverse data science skills are integrated into curricula in order to develop future users, developers and citizens. Data science provides an exciting and fulfilling career choice. Data skills and appropriate infrastructure are available across sectors. Data science is applied to achieve broad societal benefit.

Major action areas:

- Develop foundational skills: ensuring the education system provides all young people with data science knowledge and skills, which will require curriculum change within ten years;
- Advance professional skills and nurture talent: offering nimble and responsive training opportunities and develop training based on collaborations between the academic, public and private sectors;
- Enable the movement and sharing of data science talent: addressing barriers to mobility between industry, academia and the public sector;
- Widen access to data in a well-governed way: opening up data securely and providing access to computing power.

Source: <https://royalsociety.org/topics-policy/projects/dynamics-of-data-science/>

²⁵ Stakeholder input was gathered by Cogent Skills from members of the UK Bioindustry Association, Medicines Manufacturing Industry Partnership, and Association of the British Pharmaceutical Industry as well as wider stakeholders from within industry and higher education. A full list of contributors is shown in **Appendix A**.

‘Pinch points’ by occupation

Recent studies and reports of the demand for skills in the sector have highlighted a number of specific skills shortages (insufficient quantity of workers) and skills gaps (lack of specific skills within the existing workforce). The ABPI’s *Bridging the skills gap report*²⁶ identified skills gaps and shortages in the following areas of the pharmaceutical industry:

- **Biological Sciences:** Immunology and Genomics;
- **Clinical Areas:** Clinical Pharmacology;
- **Informatics, Computational, Mathematical and Statistics Areas:** Pharmacokinetic/ Pharmacodynamics Modelling, Computational Chemistry, Chemoinformatics and Chemometrics, Biomedical Imaging;
- **Chemical Sciences:** Medicinal and Synthetic Organic Chemistry;
- **Regulatory Areas:** Regulatory Affairs, Qualified Person (Pharmacovigilance) and Qualified Person (Quality Assurance) – roles considered to be particularly affected by the UK’s departure from the EU.

Consultations undertaken by the MMIP identified key skills gaps/shortages.²⁷ Key shortage occupations, skills and characteristics identified by consultees were:

- Engineers (involved in chemical and/or process control) who understand both digital and pharmaceuticals and can drive process and efficiencies;
- Engineers who can simulate processes and build digital twins;
- Digital/data scientists who can create relevant programs and infrastructure to medicines manufacturing;
- Chemists/pharmacists who understand AI and can adapt to and apply new technologies.

The cell and gene therapy skills demand report 2019 shows the sector is extremely innovative. Speed of progress from early development through to pivotal clinical trials and commercialisation is a key global driver of business location. A lack of talent will highly likely act as a brake to growth, with significant negative consequences on both commercial growth and inward investment for the UK. Various themes have been identified in the 2019 skills demand report including:

- 98 % of companies in this sector are increasing their headcount within the next 5 years;
- 83 % raised concerns that recruitment and/or retention of skilled individuals will be an issue for growth;
- Requirements for prior industry experience provide a great opportunity for cross sectoral training;
- 63 % believe digital skills will be critical for their future workforce;
- Apprenticeships have been successful in supporting employers to bridge some of the skills gaps and should continue to be funded.

Respondents believed that a lack of skilled and experienced people will be one of the main issues that could slow down or cause significant delay to their forecasted expansions. Therefore, there is a significant need for focussed effort from all stakeholders to assist with developing relevant sector skills.

Company-level work undertaken by the SIP provides case study evidence of these issues and examples of how firms are seeking to rise to the challenge (see Table 4-5 and Table 4-6).

²⁶ ABPI (2019) *Bridging the skills gap in the Biopharmaceutical Industry: Maintaining the UK’s leading position in Life Sciences* <https://www.abpi.org.uk/media-centre/news/2019/january/addressing-skills-shortages-critical-to-the-future-of-uk-science/>

²⁷ Consultations took place with 34 individuals: 26 were involved with small molecule manufacturing, 12 with large molecules/biologicals, and three with Advanced Therapies Medicinal Products. MMIP’s unpublished findings were shared with Cogent Skills.

Table 4-5: Case Study: UCB's approach to skills

About UCB

UCB is a global Biopharmaceutical company, headquartered in Belgium. It focuses on the discovery and development of innovative medicines and solutions to tackle severe diseases of the immune system and central nervous system.

What are the key roles for the future?

UCB views the following roles as vital for the future: Clinical pharmacologists, Translational biologists, Bioinformaticians, Computational chemists, Statisticians, Data scientists with Artificial Intelligence expertise, Health informaticians, Health economists, and Qualified Persons.

What will be the key competencies?

UCB views the following key competencies as essential to future success: Early pipeline development, Advanced Modelling, Medicinal Chemistry, Cryo-EM, Clinical Strategy, Pharmacokinetics and pharmacodynamics, and Data Analytics.

How does the company develop its talent pipeline?

UCB develops its talent pipeline by investing in staff through internal development programmes and the sponsorship, or co- sponsorship, of over 50 PhD studentships involving 16 UK universities with a £2 million commitment. In addition, UCB supports around six student internships a year and 15 apprentices over a three-year period.

Source: https://www.scienceindustrypartnership.com/media/1792/sip-ucb-case-study_final.pdf

Table 4-6: Case Study: Covance's approach to apprenticeships

About Covance

Covance Inc. is the drug development business of LabCorp®. It offers discovery services, laboratory testing services, central laboratory services, and Phase III clinical trial management services.

How do apprenticeships help to develop leaders and managers of the future?

Apprenticeships form a key part of a number of the company's in-house development programmes, including *Women in Leadership* and the *Managing Essentials* programme. The apprenticeships enable the creation of pathways from Team Leader to MBA. The apprenticeship programme enables a blend of internal and external academic learning, ensuring development of competencies and skills that will be required in the workplace of the future.

Which apprenticeship standards have been applied?

Covance have applied the following apprenticeship standards: Laboratory Technician, Laboratory Scientist, Data Analyst, Data Scientist, Customer Service, Health Care Practitioner, Business Administration, Team Leader, Chartered Manager, MBA Senior Leader, and Associate Project Manager.

Source: <https://www.scienceindustrypartnership.com/media/1788/covance-sip-future.pdf>

With specific regard to the attraction of overseas talent, in May 2019 the Migration Advisory Committee (MAC) placed biological scientists and biochemists on the Shortage Occupation List (SOL). The MAC also recognised IT skills shortages in the following key roles:

- IT business analysts, architects and systems designers;
- Programmers and software development professionals;
- Web design and development professionals;
- Cyber security specialists.

However, Information Technology and Telecommunications Directors, and IT Specialist Managers were not placed on the SOL.²⁸

²⁸ <https://www.gov.uk/government/publications/full-review-of-the-shortage-occupation-list-may-2019>

4.4 Demand for and supply of skills training

If the UK Life Sciences sector is to deliver its growth ambitions, the education and skills element of the UK Life Sciences ecosystem requires the capacity and capability to (i) provide an ongoing flow of talent and (ii) support the upskilling and reskilling of the workforce:

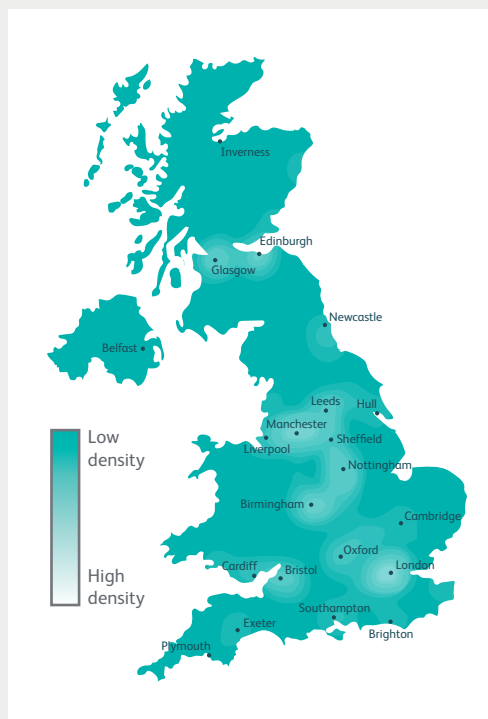
- At the right scale;
- In the right locations;
- At the right time.

Scale and location of education and training participation

Higher Education

Figure 4-1 maps Higher Education participation in Life Sciences in 2016/17. It shows there are around 141,000 students studying Life Sciences at 118 universities in the UK. Thirteen of these institutions had fewer than 100 students and 11 had in excess of 3,000. Thus, the pool of Life Sciences students is large but, it should be noted, many of these students choose clinical and research careers rather than a career in industry.

Figure 4-1
Higher Education participation in Life Sciences subjects



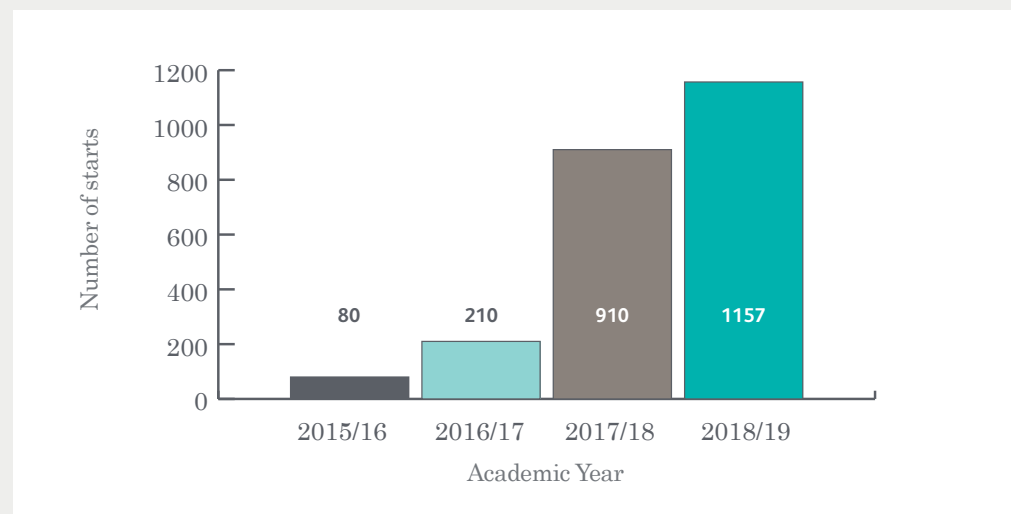
Source: HESA (2016/17) Students in Higher Education

Apprenticeships

Take-up of apprenticeships

SIP analysis of Labour Force Survey (LFS) data estimated over 4,000 new starts on all apprenticeship programmes across the Life Sciences and Industrial Sciences²⁹ sectors in 2018. Figure 4-2 shows that starts on science-specific apprenticeship standards are continuing to rise, with 1,157 starts at the time of publication (up to end of 2018/19 academic year).

Figure 4-2
Apprenticeship starts on science-specific standards from 2015/16 to 2018/19³⁰



Source: Education and Skills Funding Agency (ESFA): Starts and achievements by apprenticeship standard

²⁹ 'Industrial Sciences' includes Chemicals, Coatings, Polymers and Downstream Petroleum.

³⁰ Starts on the apprenticeship standards developed by the SIP-facilitated Life Sciences and Industrial Sciences Trailblazer Group up to October 2019. The list of these standards can be found here <https://www.scienceindustrypartnership.com/sip-groups/trailblazers/>

In 2018, the SIP conducted an Apprenticeship Survey of employers to assess the impact of apprenticeship reforms in science-based industries. The survey covered Life Sciences as well as Industrial Sciences, with just under 75 % of respondents paying the Apprenticeships Levy.

The survey found across both sectors that 71 % of respondents were currently training apprentices, 24 % had never trained an apprentice, and 5 % had previously trained apprentices. It highlighted that 90 % of respondents preferred to recruit on an as-required basis rather than via an annual intake, suggesting growth expectations in the sector are likely to affect the uptake of apprenticeships. Respondents raised the following reasons for choosing not to employ apprentices in their organisation:

- Lack of staff/resources to offer training (46 %);
- Preference to recruit experienced staff (38 %);
- Lack of an applicable apprenticeship standard relevant to their business needs (29 %);
- Lack of information and support in relation to apprenticeships (25 %);
- No recruitment requirement (25 %).

Across both sectors, respondents also cited difficulties associated with releasing apprentices for 20 % of their working time to undertake off-the-job training for upskilling and reskilling reasons.

The majority of Life Sciences respondents who employ apprentices stated that they had used apprenticeships for new recruits (72 %), with 54 % of their apprentices at levels 4-7 and 11 % at levels 6 and 7 (degree and master's, respectively). In addition, 31 % indicated that they used science-subject apprentices compared with 17 % in Industrial Sciences.

The 2018 SIP Apprenticeship Survey found that less than 6 % of the Life Sciences' £13.3m Apprenticeship Levy contribution was recovered by levy payers in the sector. However, levy-paying SMEs were more likely to recover all of their levy contribution compared with large employers. An example of how a specialist SME has effectively utilised the apprenticeship system can be found in Table 4-7.

Table 4-7: Case Study: Replimune's approach to apprenticeships

About Replimune

Replimune is small company that is developing a new generation of cancer treatments called oncolytic immunotherapies, which enhance the ability of viruses to replicate in and kill cancer cells; thereby generating a powerful patient-specific, systemic anti-tumour immune response.

What's the added-value of apprenticeships?

Apprenticeships offer Replimune a structured programme that was designed with input from other industry stakeholders and which exposes staff to other companies and learning opportunities in the Advanced Therapies Apprenticeship Community.

How do apprenticeships help to develop leaders and managers of the future?

Apprenticeships enable an SME like Replimune to recruit new scientific talent as well as to develop existing staff to move into new more senior roles.

Which apprenticeship standards have been applied?

Replimune uses the Technician Scientist apprenticeship standard at Level 5 to develop new talent and the Senior Leader apprenticeship to support key talent move into leadership roles.

Source: <https://www.scienceindustrypartnership.com/media/1920/replimune-case-study.pdf>

This Strategy's consultations with employers highlighted their desire to maximise skills investment in the sector. Although the sector has developed and adopted apprenticeships, more time is required to see the maximum positive impact that the Apprenticeship Levy could have for skills in the sector.

Consultees were keen to ensure that the sector has the time and flexibility needed to build its capacity and capability to best utilise the levy, for example by:

- Promoting the sector's apprenticeship offers to young people who are making study and career choices and to those who require reskilling if they are to move into the sector;
- Developing and operating supply-chain apprenticeship programmes that will help to drive efficiencies in the sector;
- Forming communities and networks to deliver apprenticeship programmes at scale for growing sub-sectors (Table 4-8 provides an example of industry collaboration with a Catapult);
- Maximising the use of levy transfers from larger employers to SMEs in the sector to reduce the percentage of non-levy funded apprenticeships in the sector;
- Providing incentives to training providers to support the development and delivery of high-value, small-cohort apprenticeship programmes;
- Investing in a collaborative infrastructure, such as data sharing and coordination of training providers and employers at regional level, to help build viable apprenticeship cohorts for training providers to serve;
- Developing a strong, industry-wide CPD framework that fosters collaborative working within the sector and is supported by the growth of apprenticeships.

Table 4-8: **Case Study: Advanced Therapies Apprenticeship Community**

What is the Advanced Therapies Apprenticeship Community?

The Advanced Therapies Apprenticeship Community (ATAC) was established by the Cell and Gene Therapy (CGT) Catapult to develop the first apprenticeship programme designed specifically to train and upskill individuals to develop, manufacture, and deliver advanced therapies at scale.

Why was ATAC established?

Employment forecasts in the Advanced Therapies sector indicate up to 3,000 new positions will be required in the sector over a five-year period. It is anticipated that 2,000 of these will be in cell and gene bioprocessing and manufacturing roles. Therefore, there is a need to increase the number of qualified workers available to the sector.

What are ATAC's main objectives?

ATAC aims to train at least 100 new apprentices at technical and operational manufacturing levels, as well as to upskill existing technically oriented employees via apprenticeships over five years.

How does the apprenticeship operate?

On-the-job, advanced therapy-specific training is provided by ATAC apprentice employers supplemented by additional training from external providers.

How does ATAC help to prepare the workers of the future?

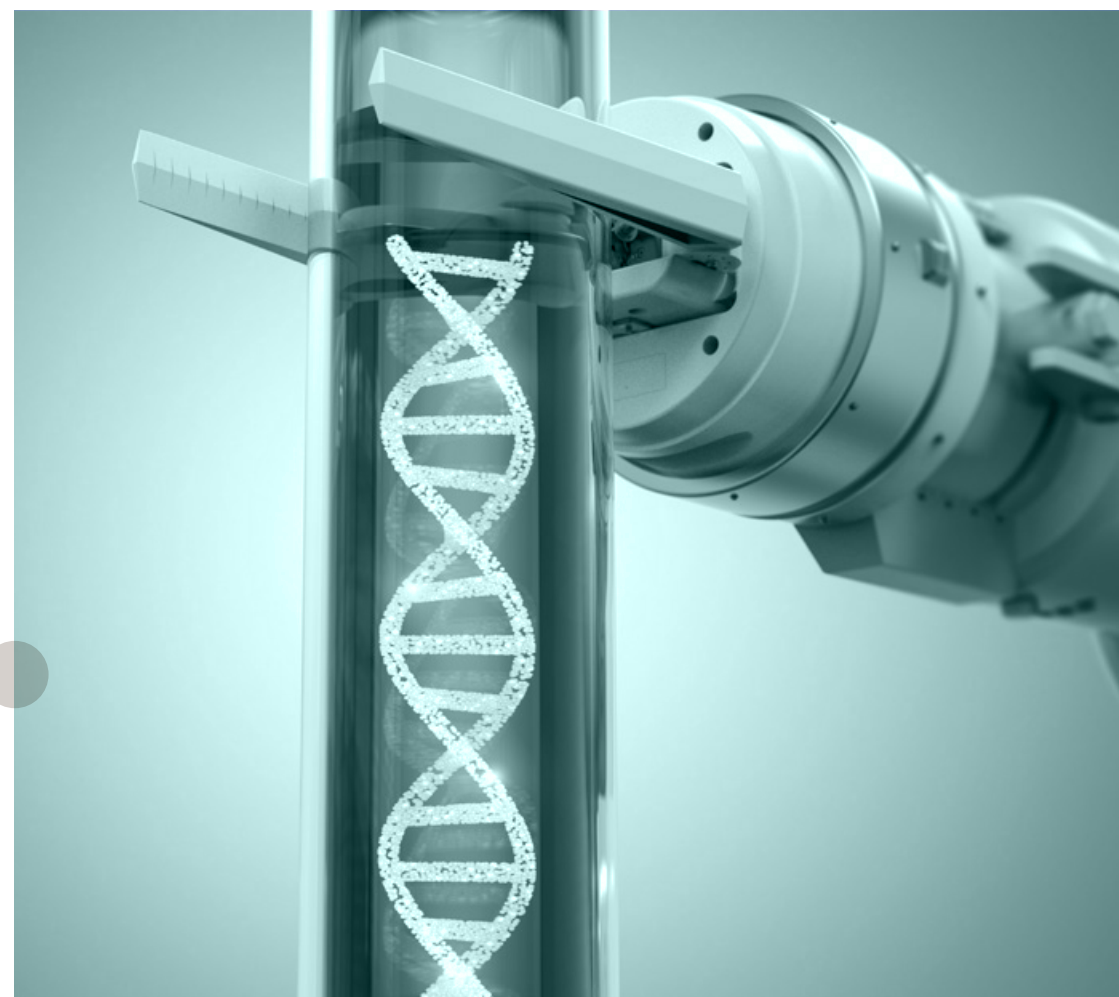
The programme gives apprentices an opportunity to establish an early-career community of researchers to enable collaboration and career support for the long term.

Source: <https://www.scienceindustrypartnership.com/media/1946/atac-addressing-the-skills-gap-in-advanced-therapies-industries-final.pdf>

4.5 Conclusion

The continued success of the UK Life Sciences sector depends on the skills and talent of the workforce. The sector is required to attract, develop and retain the best global talent.

Whilst the sector will continue to have a strong graduate base, apprenticeships can deliver a range of industry-specific skills for now and the future.



5

Workforce Projections

The Life Sciences industry sector is required to develop a strong talent pipeline to deliver the UK Life Sciences Industrial Strategy, informed by the following workforce projections

5.1 Introduction

To underpin planning for skills development in the UK Life Sciences sector, we developed three growth scenarios to inform our workforce projections:

- **Continuation scenario** – the annual average trend-rate of growth achieved between 2010 and 2018.³¹
- **High-growth scenario** – the highest average growth rate achieved over three consecutive years between 2010 and 2018. For Biopharma the period 2015-2017 achieved the highest average growth and for Med Tech the period 2010-2012 achieved the highest average growth.
- **Low-growth scenario** – the lowest average growth rate across three consecutive years between 2010 and 2018. For Biopharma the period 2011-2013 saw the lowest average growth and for Med Tech the period 2016-2018 saw the lowest average growth.³²

Table 5-1 outlines the average annual growth rates and the cumulative growth rates of each scenario between 2019 and 2030.³³

Table 5-1: **Growth rate scenarios**

| Scenario | Biopharma | | Med Tech | |
|---------------------|----------------------------|---------|----------------------------|--------|
| Continuation | Annual growth: | -0.14 % | Annual growth: | 1.54 % |
| | Cumulative growth to 2030: | -2 % | Cumulative growth to 2030: | 20 % |
| High-growth | Annual growth: | 1.24 % | Annual growth: | 3.6 % |
| | Cumulative growth to 2030: | 16 % | Cumulative growth to 2030: | 53 % |
| Low-growth | Annual growth: | -2.26 % | Annual growth: | 0.25 % |
| | Cumulative growth to 2030: | -24 % | Cumulative growth to 2030: | 3 % |

Source: **Steer-ED and SIP Futures Group, 2019**

³¹ The period for which data are available (data obtained from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/798586/Bioscience_and_Health_technology_sector_2018_the_data_behind_the_charts.xlsx).

³² The scenarios were calibrated by a subgroup of the SIP Futures Group.

³³ The projections associated with the other scenarios are in **Appendices F, G and H** (online version only).

The coefficients for each growth scenario were entered into a bespoke workforce model to produce projections for all skill levels³⁴ and specialist and non-specialist roles in R&D, manufacturing, and service & supply activities in both Biopharma and Med Tech sub-sectors to 2030 (**Appendix D** provides more details of the workforce model – online version only).

Table 5-2 provides a brief definition of specialist and non-specialist roles and **Appendix E** provides a more detailed explanation (online version only).

Given the ambitions set out in the UK Life Sciences Industrial Strategy (LSIS), the focus of this Strategy is on the skills required to deliver a high-growth scenario. The rest of this section outlines what the ambition means in terms of the numbers of people required by role type and level of qualification. It begins with an overview of the sector and then looks in turn at the needs of the Biopharma and Med Tech sub-sectors. It should be noted that these projections assume the current occupational structure is maintained to 2030³⁵ and that the average retirement age is 61 years for both Biopharma and Med Tech sub-sectors.³⁶

Table 5-2: Definition of specialist and non-specialist roles

Through an analysis of the relevant 4-digit Standard Industrial Classification (SIC) codes by 1-digit Standard Occupational Classification (SOC) code (see **Appendix C** – online version only), roles within the Life Sciences workforce were allocated as either 'specialist' or 'non-specialist'. For the purposes of this Strategy, specialist roles are defined as those which have technical skills and knowledge which are unique to the Life Sciences sector, whereas non-specialist roles are shared with other industry sectors (including sales & marketing, human resources, finance, logistics and administration).

To calculate the split of specialist or non-specialist roles, the Life Sciences workforce within each of the relevant SIC codes was broken down by SOC code and allocated to a Life Sciences Occupational Group of either 'R&D', 'Manufacturing' or 'Supporting Role'. From this, it was possible to assess the proportion of specialist and non-specialist roles within each of the SOC codes. These are shown in the following table.

| SOC codes | Specialist | Non-Specialist |
|---|-------------|----------------|
| 1. Managers, directors and senior officials | 55 % | 45 % |
| 2. Professional occupations, e.g. Bioinformatics Scientist Level 7 | 92 % | 8 % |
| 3. Associate professional and technical occupations, e.g. Laboratory Scientist Level 6 and Science Industry Process/Plant Engineer Level 6 | 68 % | 32 % |
| 4. Administrative and secretarial occupations | 0 % | 100 % |
| 5. Skilled trades occupations | 0 % | 100 % |
| 7. Sales and customer service occupations | 0 % | 100 % |
| 8. Process, plant and machine operatives, e.g. Science Industry Maintenance Technician Level 3 | 93 % | 7 % |
| 9. Elementary occupations, e.g. Science Manufacturing Process Operative Level 2 | 84 % | 16 % |
| Total | 72 % | 28 % |

Source: SIP analysis of ONS, Labour Force Survey, 2018

³⁴ Definitions of skill levels may be found here <https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels>

³⁵ The model does not allow manipulation of the occupational structure; current occupational trends suggest growth below level 2 is unlikely to be at the rate the model projects.

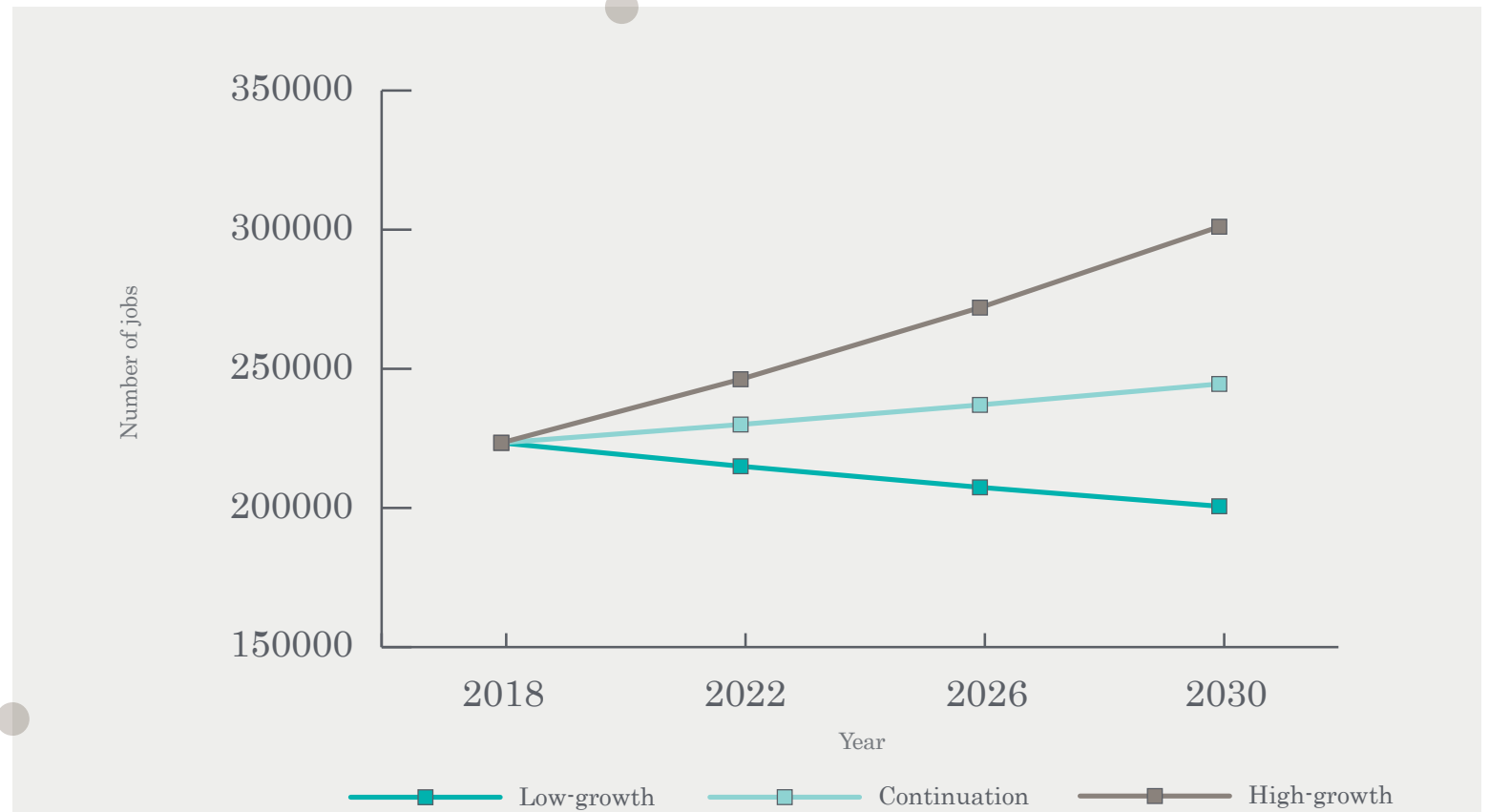
³⁶ The assumption regarding the average retirement age is based on consultation with industry representatives. Projections for average retirement at 63 and 65 years are available in **Appendix F, G and H** (online version only).

5.2 Roles and skills to deliver the UK Life Sciences Industrial Strategy

Total Employment Growth

In a high-growth scenario, the total employment of the Life Sciences sector is expected to grow from 223,400 to just over 300,000 by 2030 (Figure 5-1).

Figure 5-1
Total employment in Life Sciences to 2030



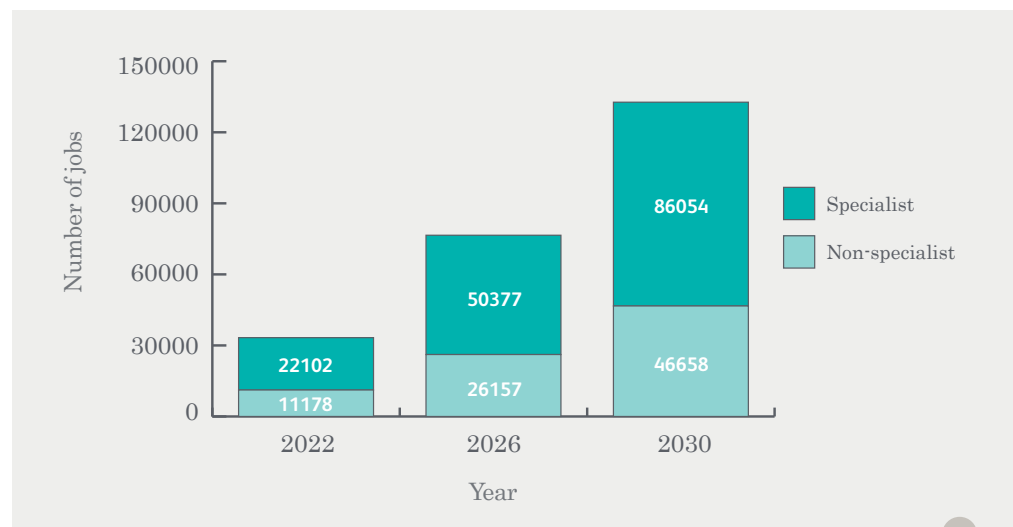
Source: Science Industry Partnership, 2019

To meet the ambitions of the Life Sciences Industrial Strategy, the sector will need to generate up to 133,000 jobs over the next 10 years. The challenge the sector faces is how to attract, train and retain talent to meet this demand.

Roles on offer

In headline terms, we project that the UK Life Sciences sector could generate around 133,000 job opportunities over the next 10 years – 43,000 in Biopharma and 90,000 in Med Tech (Figure 5-2). Of these jobs, 55,000 (41 %) will be required to replace workers who are expected to retire – around 25,500 of these will be required in Biopharma and 29,500 in Med Tech. To fulfil growth ambitions, we will require up to an additional 77,500 jobs (59 %) – 17,000 in Biopharma and 60,500 in Med Tech.

Figure 5-2
Projected employment inflow (replacement plus growth) by role type across Life Sciences



Source: Science Industry Partnership, 2019

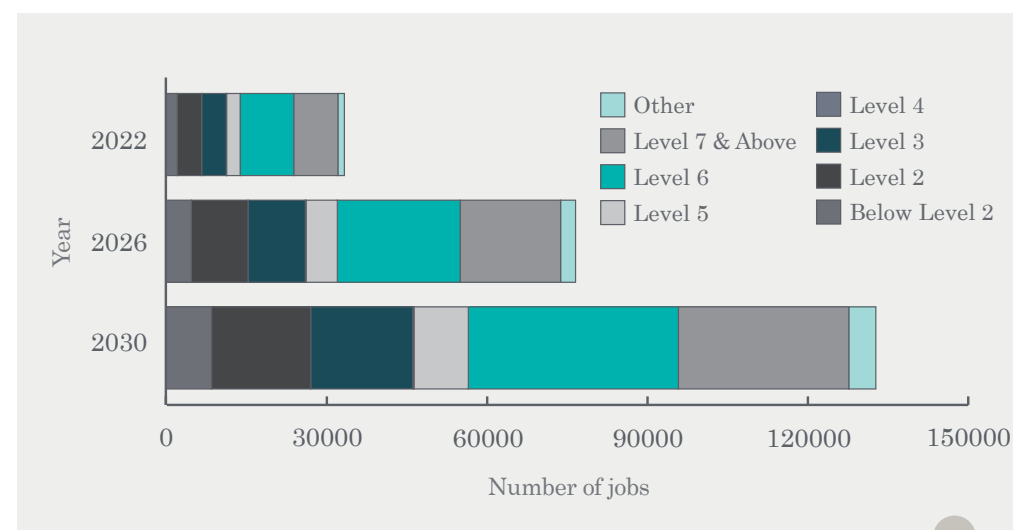
³⁷ https://consult.education.gov.uk/higher-technical-level-4-5-review-team/higher-technical-education/supporting_documents/Improving_higher_technical_education%20pdf.pdf

Qualifications required at sector level

Figure 5-3 provides an overview of the qualification levels required by the Life Sciences sector to 2022, 2026 and 2030. The skills distribution may change over the next 10 years, for example proposed current reforms to level 4 and 5 training³⁷ may cause an increase of workers operating at these qualification levels by 2030. In addition, it is anticipated that fewer entrants to the sector will have qualifications below level 2; therefore, a suppression of workers below this level may be observed by 2030.

Our projections indicate that the sector will require an additional 30,000 people qualified at levels 2 to 8 by 2022. This rises to 69,000 by 2026 and 119,000 by 2030. Of the 119,000 people with level 2-8 qualifications required by 2030, around 39,000 (33 %) will be required at level 6 (degree level) and 32,000 (27 %) at level 7 or above (postgraduate level) – highlighting the importance of the traditional academic route as well as degree-level apprenticeships.

Figure 5-3
Projected employment increase by skill level to deliver the UK Life Sciences Industrial Strategy



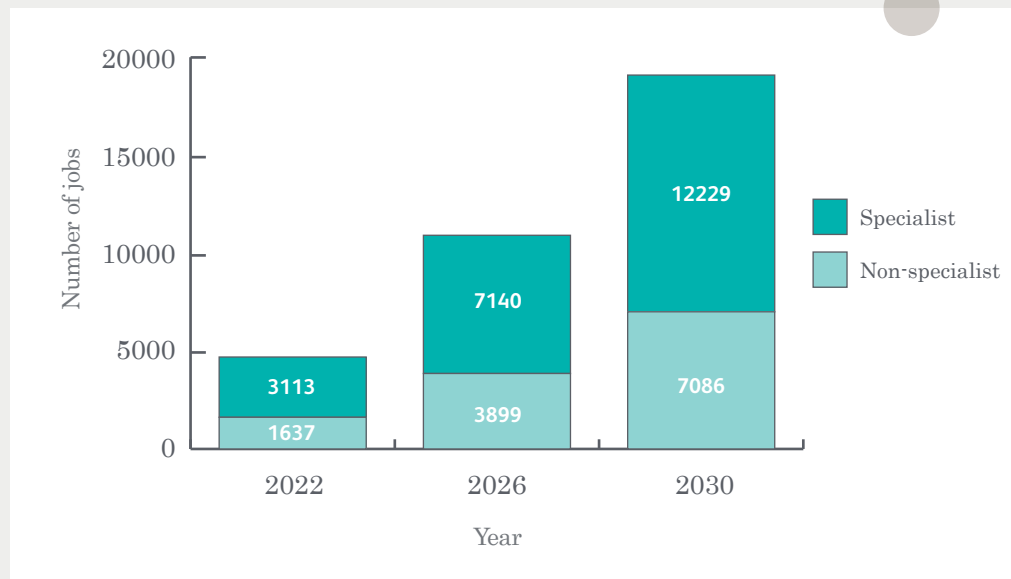
Source: Science Industry Partnership, 2019

5.3 Total Biopharma inflow requirements

Biopharma R&D

By 2030, we estimate that total employment in Biopharma R&D will rise from 49,300 people to around 57,000. To achieve this overall increase, we will need to attract over 19,300 people; 11,500 to replace retirees and 7,800 to deliver growth.

Figure 5-4
Projected employment inflow (replacement plus growth) by role type for Biopharma R&D

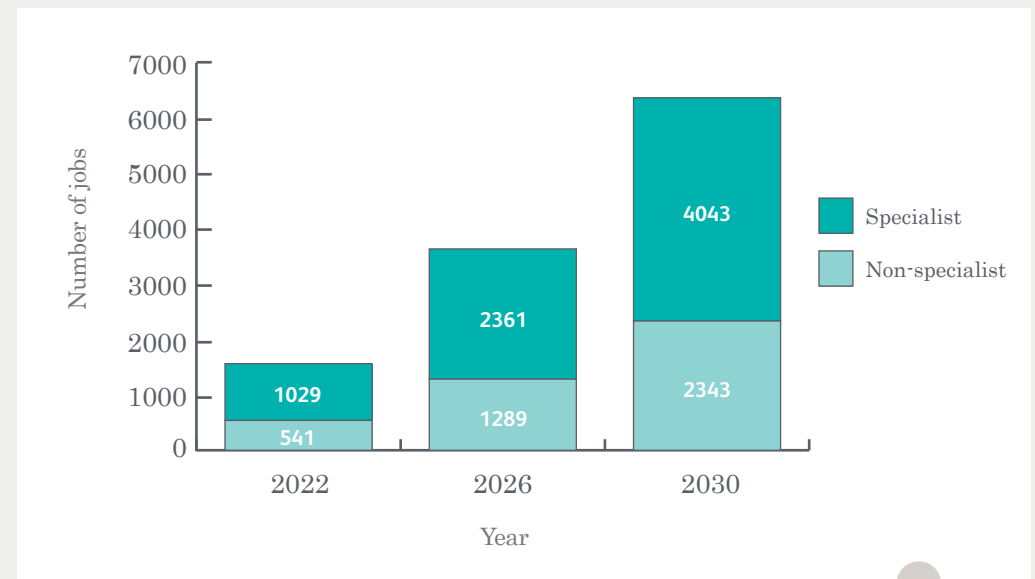


Source: Science Industry Partnership, 2019

Biopharma manufacturing

We estimate that by 2030, there will be a total of approximately 19,000 people working in Biopharma manufacturing, up from 16,300 in 2018. To achieve this increase we will need to attract almost 6,400 people; 3,800 of whom will be required to replace retirees.

Figure 5-5
Projected employment inflow (replacement plus growth) by role type for Biopharma manufacturing

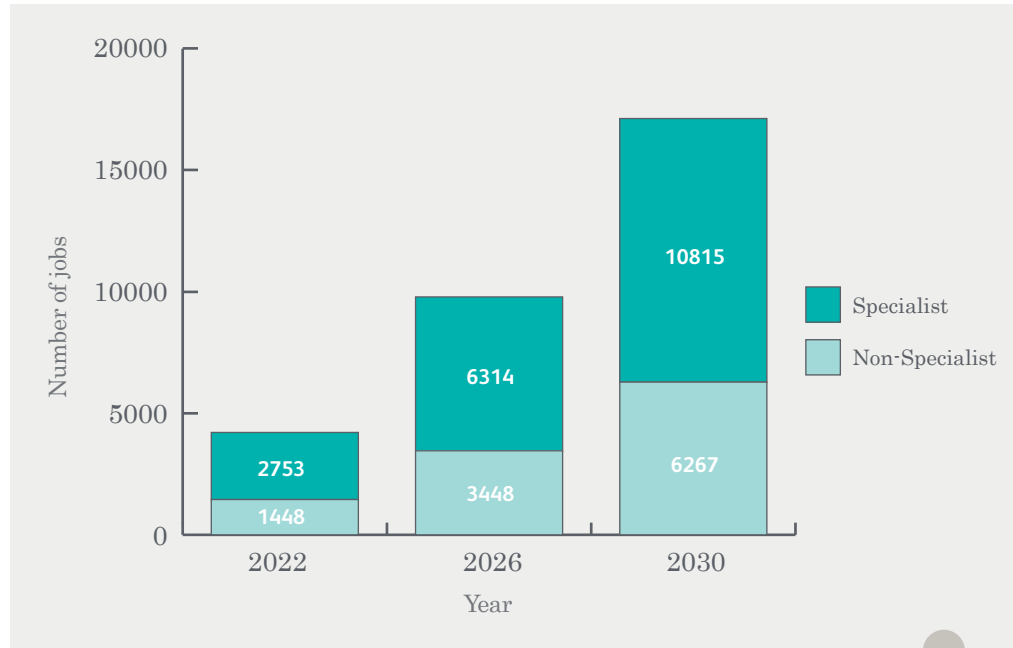


Source: Science Industry Partnership, 2019

Biopharma service & supply

Our projections show a rise in total Biopharma service & supply employment from 43,600 in 2018 to 50,500 in 2030. But to achieve this increase, we need to recruit 17,000 workers over the next 10 years; 10,000 of these will replace retirees and 7,000 will deliver the growth ambitions.

Figure 5-6
Projected employment inflow (replacement plus growth) by role type for Biopharma service & supply

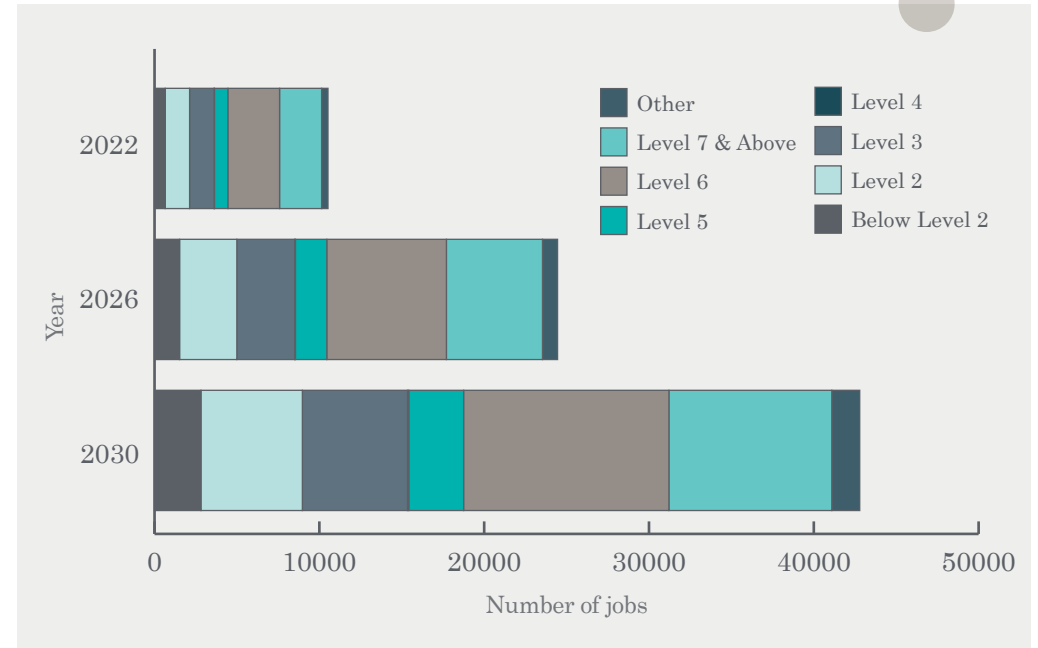


Source: Science Industry Partnership, 2019

Biopharma qualification level projections

Figure 5-7 provides an overall summary of the qualification level projections of the Biopharma sub-sector to 2030.

Figure 5-7
Projected employment inflow (replacement plus growth) by qualification level for Biopharma



Source: Science Industry Partnership, 2019

To meet forecast growth and replacement demand within Biopharma:

Biopharma R&D will require up to an additional:

4,300

people qualified at levels 2 to 8 by 2022

10,000

by 2026

17,300

by 2030

Of the 17,300 people required by 2030, around 5,600 (32 %) will be required at level 6 (degree level) and 4,500 (26 %) will be required at level 7 or above (postgraduate level).

Biopharma service & supply will require up to an additional:

3,800

people qualified at levels 2 to 8 by 2022

8,800

by 2026

15,300

by 2030

Of the 15,300 people needed by 2030, around 5,000 will be required at level 6 (degree level) and 4,000 at level 7 or above (postgraduate level).

Biopharma manufacturing will require up to an additional:

1,400

people qualified at levels 2 to 8 by 2022

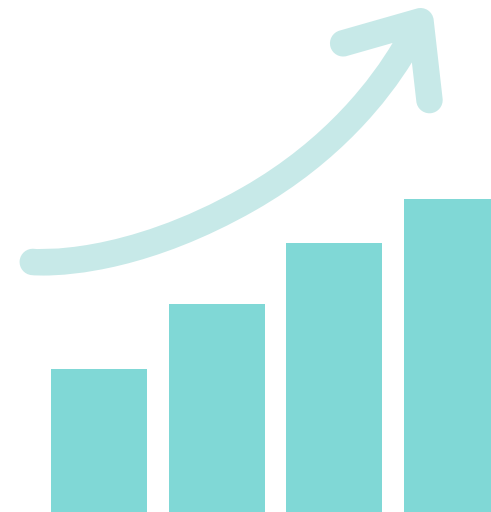
3,300

by 2026

5,700

by 2030

Of the 5,700 people required by 2030, around 1,900 will be required at level 6 (degree level) and 1,500 at level 7 or above (postgraduate level).

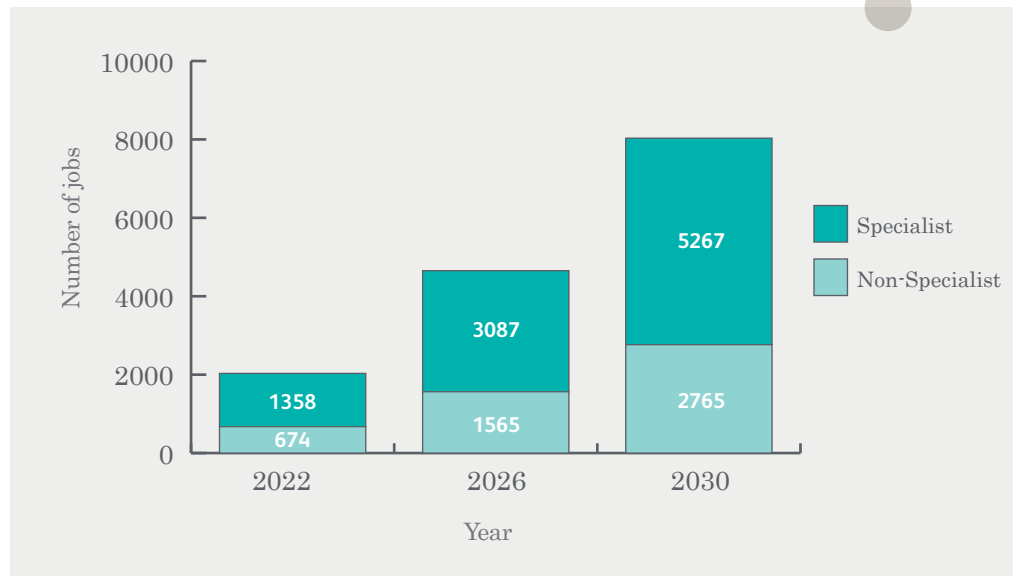


5.4 Total Med Tech inflow requirements

Med Tech R&D

We project that total Med Tech R&D employment will increase from 10,200 in 2018 to 15,600 in 2030. To achieve this, we anticipate recruiting 8,000 people; 2,650 people will be required to replace those leaving the sector through retirement and 5,350 to support growth.

Figure 5-8
Projected employment inflow (replacement plus growth) by role type for Med Tech R&D

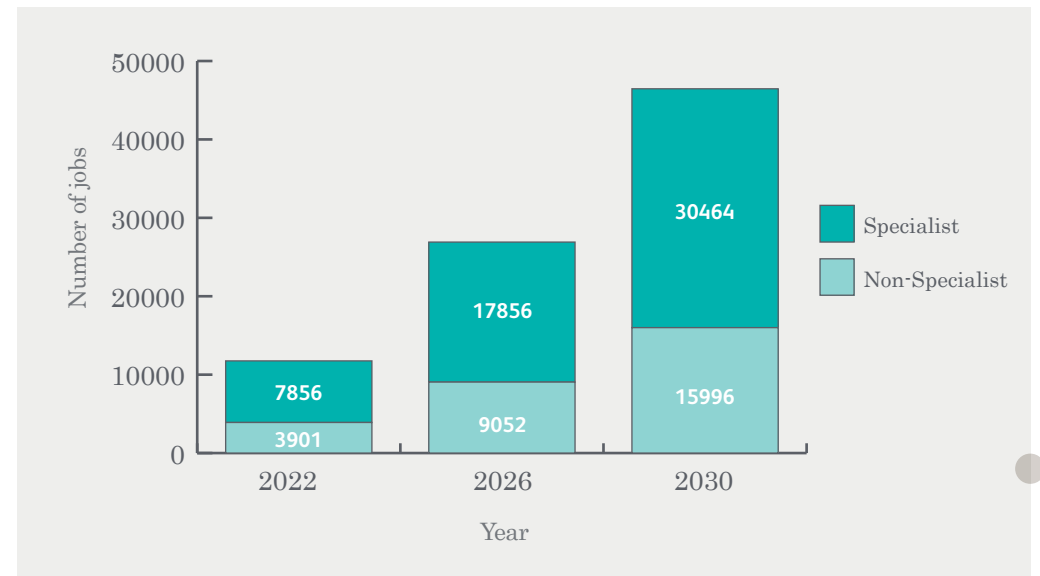


Source: Science Industry Partnership, 2019

Med Tech manufacturing

Our modelling indicates that total employment in Med Tech manufacturing may rise from 59,000 in 2018 to 90,000 in 2030. To achieve this increase, we will need to recruit over 46,500 people over the next 10 years, of whom over 15,300 will be required to replace those expected to retire from the workforce and over 31,200 will be required to deliver the growth ambition.

Figure 5-9
Projected employment inflow (replacement and growth) by role type for Med Tech manufacturing

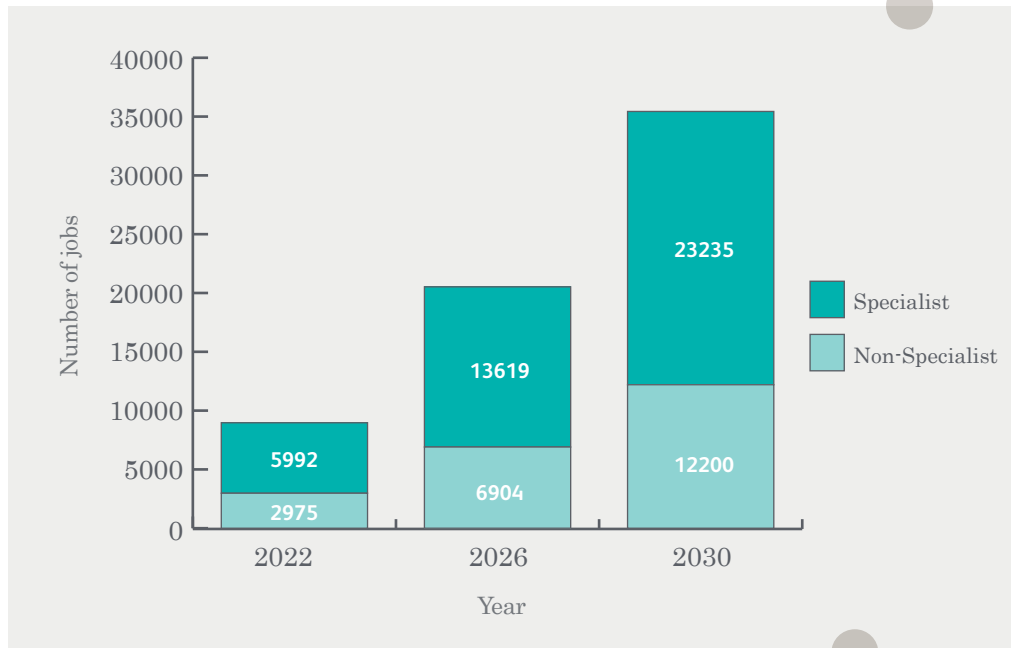


Source: Science Industry Partnership, 2019

Med Tech service & supply

We anticipate that employment in Med Tech service & supply activities could increase from 45,000 in 2018 to almost 69,000 in 2030, provided we can recruit over 35,400 people; 11,700 to maintain current employment levels and 23,800 to deliver growth.

Figure 5-10
Projected employment inflow (replacement and growth) by role type for Med Tech service & supply

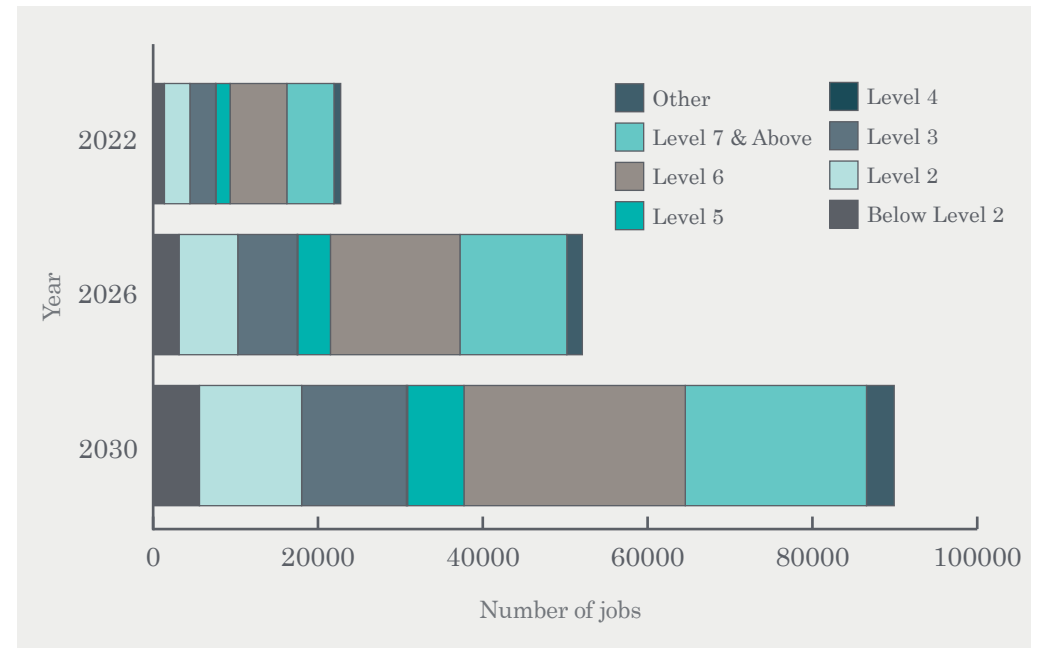


Source: Science Industry Partnership, 2019

Med Tech qualification requirements

Figure 5-11 provides an overall summary of the qualification level projection of the Med Tech sub-sector to 2030.

Figure 5-11
Projected employment inflow (replacement plus growth) by qualification level for Med Tech



Source: Science Industry Partnership, 2019

To meet forecast growth and replacement demand within Med Tech:

Med Tech R&D will require an additional:

1,800

people qualified at levels 2 to 8 by 2022

4,200

by 2026

7,200

by 2030



Of the 7,200 people sought by 2030, around 2,400 will required at level 6 (degree level) and 2,000 at level 7 or above (postgraduate level).

Med Tech service & supply will require an additional:

8,100

people qualified at levels 2 to 8 by 2022

18,500

by 2026

31,900

by 2030



Of the 31,900 people needed by 2030, around 10,600 will required at level 6 (degree level) and 8,700 at level 7 or above (postgraduate level).

Med Tech manufacturing will require an additional:

10,600

people qualified at levels 2 to 8 by 2022

24,300

by 2026

42,000

by 2030



Of the 42,000 people needed by 2030, around 14,000 will required at level 6 (degree level) and 11,400 at level 7 or above (postgraduate level).

5.5 Conclusion

The Life Sciences sector offers significant employment opportunities for future UK and international skills talent, without which the sustainability and growth of the industry is at risk. Our modelling indicates that:

- The Biopharma sub-sector has the potential to generate almost 43,000 jobs over the next 10 years. Sixty percent of these jobs – 25,500 – are required to replace those retiring from the labour market. If the average retirement age increased from 61 to 63, then 3,300 fewer recruits would be required, and if the average retirement age rose to 65, nearly 9,000 fewer recruits would be required by 2030.
- The Med Tech sub-sector has the potential to generate 90,000 jobs by 2030, of which 29,600 are required to replace retirees. If the average retirement age rose from 61 to 63, this would require 5,000 fewer recruits, and if it reached 65, then 10,000 fewer recruits would be required.

6

Strategic Ambitions for the UK Life Sciences 2030 Skills Strategy

Bold ambitions for a pioneering sector



Our delivery ambitions are to...

- Deliver up to 133,000 skilled workers by 2030, through replacement and growth;
- Become a global exemplar of tripartite cooperation between industry, government, and education and training providers.



Our integrated skills ambitions are to...

- Be the sector that sets the standard for driving integrated skills and digital skills;
- Be the best sector for lifelong learning;
- Build the best links between employers and skills providers to deliver lifelong learning.



Our apprenticeships ambitions are to...

- Expand apprenticeships by working with employers, careers advisers, parents and schools;
- Use apprenticeships to promote diversity in the workforce and promote social mobility;
- Ensure apprenticeships reflect modern technological needs; in order to
- Achieve parity of esteem for vocational and academic routes within the sector.



Our global operating environment ambitions are to...

- Make the UK the best place in world to build a career in the Life Sciences;
- Enhance the UK's role as a global hub for talent, knowledge, expertise and investment in the Life Sciences.



Our attraction and perception ambitions are to...

- Raise awareness of the positive social impact that the sector achieves;
- Promote the fulfilling and rewarding careers on offer in the Life Sciences;
- Attract people from diverse groups to the sector to refresh the talent base;
- Support careers advisers, parents and teachers to help students to make informed choices about careers in the Life Sciences sector;
- Recruit workers from other sectors by promoting multi-disciplinary working and new entry routes and transitions at the industry-academia-NHS interface.

By 2030, the UK will be the best place in the world to build a career in Life Sciences.

7 Recommendations

Bold ambitions are achieved through actions not words

The following tables set out key recommendations based on our ambitions for:

- Delivery of the Life Sciences 2030 Skills Strategy recommendations;
- Integrated skills;
- Apprenticeships;
- Global operating environment;
- Attraction and perception.

We propose an industry-led group to develop and oversee a dynamic Life Sciences 2030 Skills Strategy Action Plan that sets out the:

- Specific actions to deliver each recommendation;
- Lead body/person responsible for delivering the specified action;
- Resources required to deliver the action, along with the proposed source/s of those resources;
- Key Performance Indicators to track progress over time;
- Timelines for delivery of each action.

Table 7-1 Delivery of the Life Sciences 2030 Skills Strategy Recommendations

The skills landscape and priorities will change over time. It is recognised that: (i) a single industry group or organisation cannot penetrate all levels of the education system; (ii) skills for Life Sciences are not unique at lower levels of education; and (iii) the workforce is increasingly mobile between sectors. Therefore, delivery of a strategic programme of actions will require significant effort and coordination.

| Strategic Objective | Recommendations | Key Stakeholders |
|--|--|---|
| <p><i>Fit with UK Life Sciences Industrial Strategy Strategic Priorities</i></p> | <ul style="list-style-type: none"> • A delivery group to lead the production, implementation and monitoring of a Life Sciences Skills Action Plan and to oversee and coordinate the delivery of this Strategy’s recommendations, working in partnership with other skills advisory and leadership groups in the Life Sciences sector.³⁸ This will ensure delivery of the UK’s Life Sciences Industrial Strategy through a partnership approach to the sectors’ commitment to skills. <p><i>Understanding, anticipating and responding to current and potential skills gaps across occupations.</i></p> | <ul style="list-style-type: none"> • Industry • Government • Trade bodies • Professional bodies |

³⁸ In September 2019, ABPI submitted a joint proposal with OLS to create a ‘Life Sciences Skills Strategic Advisory Group’, comprising industry, NHS, academia, learned societies and government departments (including DfE, DHSC, BEIS, DCMS), to horizon scan in real time (5-15 years) workforce needs across the Life Sciences ecosystem. The group will also recommend steps to mitigate against any skills gaps. This could include advocating action at the school-age level, up through academic and vocational routes to post-Doctoral level, as well as in relation to upskilling the existing workforce.

The challenge now is to turn the recommendations into actions.

Table 7-2 Integrated Skills Recommendations

Rapid technological advancements within the sector are driving a need for increased integrated skills, at all levels of the current and future workforce, in order for continued world-class innovation and its effective translation into commercially ready products.

| Strategic Objective <i>Fit with UK Life Sciences Industrial Strategy Strategic Priorities</i> | Recommendations | Key Stakeholders |
|--|--|---|
| <ul style="list-style-type: none"> Ensure industry skills – particularly digital and data skills – match advances in technological developments to maximise the sector’s productivity and international competitiveness by ensuring that the next generation has the necessary digital skills and that top and middle leaders leverage these skills. <p><i>Supporting mobility between sectors; Accelerating convergence; Understanding and responding to current and potential skills gaps across occupations.</i></p> | <ul style="list-style-type: none"> Promote a culture of lifelong learning and Continuing Professional Development (CPD) – to ensure a digitally skilled workforce – by drawing on lessons from other sectors. Develop and quality assure training provision with professional bodies. | <ul style="list-style-type: none"> Industry Training providers Professional bodies |
| <ul style="list-style-type: none"> Support schools to enable science teaching to keep pace with technological developments, especially in relation to data and AI applications in science and medicine. <p><i>Understanding, anticipating and responding to current and potential skills gaps across occupations.</i></p> | <ul style="list-style-type: none"> Work with government to build on the Computing in Schools programme and work with teachers’ CPD programmes to ensure the science curriculum and teaching keeps pace with technological change. | <ul style="list-style-type: none"> Industry Government |
| <ul style="list-style-type: none"> Leverage the strengths of the UK research environment, including Centres of Doctoral Training, through a focus on multi-disciplinary learning, of both tangible and intangible skills, to support an efficient translation of innovation into commercial readiness and by promoting multi-disciplinary working and transitions at the industry-academia-NHS interface. <p><i>Supporting mobility between sectors and cross-disciplinary working; Understanding, anticipating and responding to current and potential skills gaps across occupations.</i></p> | <ul style="list-style-type: none"> Develop and support cross-faculty academic programmes to embed cross-team working e.g. for Biology and Computer Science, and Engineering and Art/Product Design. | <ul style="list-style-type: none"> Industry Academia Trade bodies |
| <ul style="list-style-type: none"> Translation skills are required, if the UK is to maximise and retain the benefits of its investments in R&D. <p><i>Attraction and retention of globally mobile talent.</i></p> | <ul style="list-style-type: none"> Identify potential skills requirements linked to research priorities and the R&D pipeline and align investment in training with these. Develop a culture that values translation research as highly as basic research. Share best practice in translation within the HE sector. | <ul style="list-style-type: none"> Government Professional bodies Trade bodies Charities Higher Education Institutions |
| <ul style="list-style-type: none"> Boost entrepreneurial skills in UK Life Sciences, to prevent barriers to the commercialisation of research. <p><i>Supporting mobility between sectors, e.g. academic and industry; Attraction and retention of globally mobile talent; Support entrepreneur training.</i></p> | <ul style="list-style-type: none"> Provide training and support to promote entrepreneurial activity, e.g. via placements as part of PhDs, enterprise fellowships and mentoring programmes. | <ul style="list-style-type: none"> Industry Government Higher Education Institutions Research bodies Trade bodies Professional bodies |
| <ul style="list-style-type: none"> To stimulate more inward investment in a competitive global environment for new types of medicines and/or technologies, such as Advanced Therapies, by improving the skills required in these areas. <p><i>Understanding, anticipating and responding to current and potential skills gaps across occupations.</i></p> | <ul style="list-style-type: none"> Support for UK Advanced Therapy Medicinal Products (ATMP) companies to deliver on their growth strategies through provision of supportive education programmes, a range of industry relevant training and specific technical, digital and practical packages. This is to ensure students, existing staff and those entering from other sectors have the opportunity to learn and practice complex processes and procedures, which are specifically tailored to meet the needs of the sector. | <ul style="list-style-type: none"> Industry Government Professional bodies Trade bodies |

Table 7-3 Apprenticeship Recommendations

The sector's uptake of apprenticeships is key to upskilling the current workforce and developing an industry-ready future workforce to meet the sector's ambitious growth demands.

| Strategic Objective <i>Fit with UK Life Sciences Industrial Strategy Strategic Priorities</i> | Recommendations | Key Stakeholders |
|--|--|---|
| <ul style="list-style-type: none"> Recognise apprenticeships as a game-changing opportunity to maximise the sector's use of the Apprenticeship Levy, to meet upskilling needs and expected future growth demands, and to complement 'traditional' or academic routes into and progress in the sector. <p><i>Developing apprenticeships and facilitating take-up of apprenticeships; Understanding, anticipating and responding to current and potential skills gaps across occupations.</i></p> | <ul style="list-style-type: none"> Work with other sectors to examine and develop a consistent approach to flexibility in levy use. Enable flexible use of 'unspent levy' to meet the upskilling needs of the existing workforce – especially improving digital skills via accredited short programmes. Ring-fence unspent levy money for the sector to allow the sector time to utilise the resources available. | <ul style="list-style-type: none"> Industry Government Other sectors requiring levy flexibility |
| <ul style="list-style-type: none"> Ensure SMEs and supply-chain partners can easily access comprehensive information on apprenticeships and the associated administrative processes. <p><i>Developing apprenticeships and facilitating take-up of apprenticeships.</i></p> | <ul style="list-style-type: none"> Review how the apprenticeship system might be used to upskill the existing workforce – particularly in supply chains and SMEs. | <ul style="list-style-type: none"> Industry Government |
| <ul style="list-style-type: none"> Promote apprenticeships to overcome barriers to their adoption, extend geographic coverage of apprenticeships, and achieve parity of esteem between academic and vocational routes into the sector to ensure a continuous flow of future talent. <p><i>Understanding, anticipating and responding to current and potential skills gaps across occupations; Developing apprenticeships and facilitating take-up of apprenticeships.</i></p> | <ul style="list-style-type: none"> Collaboration between key stakeholders to promote and enable the take-up of apprenticeships in the Life Sciences sector. Build on the achievements of the: <ul style="list-style-type: none"> Apprenticeship Support and Knowledge (ASK) project that provides teachers with knowledge and support they need to promote apprenticeships to students; SIP Ambassadors; Regional Science Industry Apprenticeship Consortium (SIAC) to facilitate SME collaboration to increase take-up of apprenticeships. Ensure providers are incentivised to deliver programmes for high-value added roles where participant numbers may be too low to ensure financial viability within established funding bands. | <ul style="list-style-type: none"> Industry Government Professional bodies Trade bodies |
| <ul style="list-style-type: none"> Apprenticeship standards, and high-quality provisions, to keep pace with ongoing developments in industry and emerging technologies. <p><i>Developing apprenticeships and facilitating take-up of apprenticeships.</i></p> | <ul style="list-style-type: none"> Industry, government and training provider collaboration to develop and maintain apprenticeship standards that reflect technological developments across the Life Sciences sector. Government to support trailblazer groups in taking this forward. | <ul style="list-style-type: none"> Industry Government Professional bodies Trade bodies |

Table 7-4 Global Operating Environment Recommendations

Maintain the UK's world-leading position in the Life Sciences sector, by supporting the facilitation of the transfer and exchange of a global workforce, and ensuring the UK is an attractive place to invest and work.

Strategic Objective

Fit with UK Life Sciences Industrial Strategy Strategic Priorities

Recommendations

Key Stakeholders

- Attract and retain global talent at different skill and salary levels, so the Life Sciences sector continues to grow and be a world leader.
Attraction and retention of globally mobile talent.

- An immigration system that is based on skill levels and sector skill requirements.

- Government
- Industry
- Trade bodies

- Enable the exchange and transfer of staff between countries for continued success and growth.
Attraction and retention of globally mobile talent.

- An immigration system that facilitates intra-company transfers, expert migration, and international research collaboration, including academic requirements and conference engagements.

- Government
- Industry
- Trade bodies

- Attract entrepreneurs from around the world in order to maintain the UK Life Sciences sector's leading global position.
Attraction and retention of globally mobile talent.

- An immigration system that supports global entrepreneurs to establish their businesses in the UK – with sector input into assessing innovation and start-up potential of applicants.

- Government
- Industry
- Trade bodies
- Professional bodies

Table 7-5 Attraction and Perception Recommendations

To meet future growth demands, attracting and retaining a skilled workforce is needed to ensure the Life Sciences sector continues to be a key contributor to the UK’s economy.

| Strategic Objective <i>Fit with UK Life Sciences Industrial Strategy Strategic Priorities</i> | Recommendations | Key Stakeholders |
|--|---|--|
| <ul style="list-style-type: none"> To address the immediate skills shortage highlighted in this report, the sector needs to enrich its talent base by attracting skills from other sectors, e.g. engineering and digital. <i>Supporting mobility between sectors.</i> | <ul style="list-style-type: none"> Develop career pathways to enable career agility from other sectors, in order to bring cross-sector learning to the Life Sciences. Target this activity on filling skills gaps. | <ul style="list-style-type: none"> Industry Trade bodies Professional bodies |
| <ul style="list-style-type: none"> Attract and retain a diverse workforce in order to meet talent requirements, through retaining knowledgeable and experienced workers; attracting diverse future talent; and supporting social mobility. <i>Supporting mobility between sectors.; Understanding, anticipating and responding to current and potential skills gaps across occupations.</i> | <ul style="list-style-type: none"> Undertake research to understand the Equality, Diversity & Inclusion (ED&I) issues of the sector, and benchmark against other industries to identify best practice when addressing workplace diversity, to inform the action plan. Develop and implement an ED&I Strategy that promotes best practices. | <ul style="list-style-type: none"> Industry Trade bodies Professional bodies |
| <ul style="list-style-type: none"> Inform and inspire young people, and their career influencers, about working in the Life Sciences sector. <i>Understanding, anticipating and responding to current and potential skills gaps across occupations.</i> | <ul style="list-style-type: none"> Build on STEM careers outreach initiatives to inform and enthuse young people, and their career influencers, to enter the sector. This will be achieved through the production of age-relevant, engaging material, in a range of media, which outlines potential careers and routes into the Life Sciences, and highlights the sector’s positive social impact as an attractor. | <ul style="list-style-type: none"> Industry Professional bodies STEM careers outreach organisations |

8

Appendices

A. Acknowledgements

Partners

The production of this Strategy was made possible through a collaborative approach from key stakeholders across the Life Sciences sector. The Science Industry Partnership would like to thank the Office for Life Sciences (OLS), Association of the British Pharmaceutical Industry (ABPI), BioIndustry Association (BIA), Medicines Manufacturing Industry Partnership (MMIP) and Cogent Skills for funding this work and providing expert direction in developing this Strategy. In particular, the SIP Board would like to thank Andrew Croydon (Skills & Education Policy and Examinations Director, ABPI), Nick Gardiner (Chief Operating Officer, BIA), Kate Barclay (Skills Strategy Consultant, BIA), Austen Okonweze (Head of Innovation Projects, OLS), Julia Fong (Policy Advisor, OLS), Tina Sawyer (Head of Membership Services, Cogent Skills), Craig Alexander (Membership Development Manager, Cogent Skills), Judith Holcroft (Head of Marketing & PR, Cogent Skills) and Chloe Watts (Research & Policy Officer, Cogent Skills).

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SIP Futures Group Members

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- Replimune
- Synthace
- TDR Training Ltd
- UCB
- Vertex
- Victrex
- Wellcome
- Youthforce

B. Summary of workforce growth projections

Table B-1 Sector Inflow

The forecast range of required demand to replace retirees and sustain calculated growth through to 2030.

| Sector Area | 2022 | 2026 | 2030 |
|---------------------------------------|----------------|-----------------|-----------------|
| Biopharma R&D | -3,135 – 4,750 | -5,037 – 11,039 | -5,620 – 19,316 |
| Biopharma Manufacturing | -1,036 – 1,571 | -1,665 – 3,650 | -1,858 – 6,386 |
| Biopharma Service & Supply | -2,772 – 4,201 | -4,454 – 9,763 | -4,971 – 17,082 |
| Med Tech R&D | 353 – 2,033 | 928 – 4,652 | 1,771 – 8,032 |
| Med Tech Manufacturing | 2,042 – 11,757 | 5,369 – 26,908 | 10,244 – 46,460 |
| Med Tech Service & Supply | 1,558 – 8,967 | 4,095 – 20,523 | 7,813 – 35,436 |

Table B-2 Sector Expansion Demand

The forecast range of required demand to sustain calculated growth only through to 2030.

| Sector Area | 2022 | 2026 | 2030 |
|---------------------------------------|----------------|----------------|-----------------|
| Biopharma R&D | -4,308 – 2,481 | -8,239 – 5,087 | -11,827 – 7,824 |
| Biopharma Manufacturing | -1,424 – 820 | -2,724 – 1682 | -3,910 – 2587 |
| Biopharma Service & Supply | -3,810 – 2,194 | -7,287 – 4,499 | -10,460 – 6,919 |
| Med Tech R&D | 100 – 1,549 | 202 – 3,334 | 304 – 5,389 |
| Med Tech Manufacturing | 580 – 8,961 | 1,166 – 19,282 | 1,758 – 31,171 |
| Med Tech Service & Supply | 443 – 6,834 | 890 – 14,707 | 1,341 – 23,775 |

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