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The background of the cover is an abstract, futuristic illustration. It features a dense field of red, glowing spheres of various sizes, resembling cells or data points. A large, prominent sphere on the right side is rendered in shades of blue and purple, with a grid-like pattern on its surface, suggesting a globe or a complex data structure. The overall effect is one of dynamic energy and technological advancement.

Strength and Opportunity 2017

The landscape of the medical technology and biopharmaceutical sectors in the UK



This is the ninth annual report that analyses the information contained in the Health Life Sciences Database, published in May 2018.

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Ministerial Foreword



I am pleased to introduce the ninth annual update of the Strength and Opportunity report which gives a detailed picture of the size and shape of the life sciences industry in the UK.



This report confirms that the UK remains a global hub for life sciences, building upon previous success. There are now 5,649 life sciences

businesses with a presence in the UK, generating turnover of over £70bn and employing nearly 241,000 people.

Life sciences in the UK continues to grow across all key performance indicators, with a 2.4% increase in employment and 9.3% increase in turnover between 2016 and 2017. This equates to 5,700 new jobs and an additional £5.9bn in revenue over the course of 12 months.

For the first time, employment in medical technology overtook biopharmaceuticals, with new and emerging segments within the life sciences sector coming to the fore. Digital health added an extra 1,100 jobs this year alone, bringing employment to over 10,000 and generating £1.2bn in turnover. Genomics, an emerging field in which the UK is world-renowned, contributed £1.7bn in turnover in 2017. The established biopharmaceutical presence also continues to thrive, delivering new scientific understanding and innovative products to the benefit of patients.

It is pleasing to see that UK life sciences activity is spread across all parts of the UK with nearly 70% of employment outside of London and the South East, with significant presence in the East and North West of England. SMEs continue to be a vital part of the industry accounting for 82% of businesses.

Despite these successes, Government remains focussed and committed to identifying new opportunities presented to maintain and strengthen this position. In December 2017, we published the first Life Sciences Sector Deal building on the ambitious Life Sciences Industrial Strategy paper. As part of the Sector Deal, we will increase investment in research development to 2.4% of GDP by 2027 and 3% over the longer term – delivering an estimated increase of £80bn over the next 10 years. We have also set out plans for the Health Research Authority to speed up approvals for clinical trials.

Government continues to support collaboration between industry, innovators and the NHS. This report comes five months after the Government's response to the Accelerated Access Review, with the new Accelerated Access Collaborative now in place. Following the success of the Test Beds Programme a second wave has been launched, and work continues apace to streamline the medicines pathway enabling innovative cost-effective products to reach UK patients as quickly as possible.

This report remains the most comprehensive depiction of businesses operating in the life sciences sector in the UK and we hope continues to provide valuable information for all seeking to understand life sciences in this country. I would like to thank all those who contributed to the creation of this report, particularly the external data partners which include trade associations and the Medilinks.



Lord Henley

Parliamentary Under Secretary of
State of the Department for Business,
Energy and Industrial Strategy



Lord O'Shaughnessy

Parliamentary Under Secretary of
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and Social Care

Introduction

- 0.1 This report identifies the Strengths in the UK Health Life Science industry and the Opportunities for future growth. The content of the report provides a 2017 snapshot of the UK Life Science industry covering the Biopharma and Med Tech sectors¹. The three main measures of economic contribution and industry structure are:
- employment - the number of people employed by life science businesses
 - turnover - the amount of money taken by businesses within scope of life science sector activities
 - number of businesses – the number of life science businesses and their sites registered in the UK
- 0.2 This report demonstrates the significant economic contribution of the life science sector in terms of company turnover and employment, distributed across the UK.
- 0.3 It contains analyses of the industry looking at the economic activity of businesses that market therapeutic products and medical devices as well as the specialist service & supply chains that are key parts of the ecosystem. A segmentation approach is applied that enables a detailed analysis of the product and service categories that make up the industry².
- 0.4 The analysis is based on the 2017 database of sites and businesses updated between October and December 2017³ using the methodology summarised in Annex 2. The number of sites in the 2017 database is 6,340 which corresponds to 5,649 businesses. The difference between the numbers of records and businesses is due to businesses with multiple trading addresses, sites or legal entities and activity in more than one segment.
- 0.5 There are an additional net 298⁴ records in the 2017 database compared to 2016. The change in the number of records is due to the following additions and removals:
- Added 446 records of businesses that were formed more than 12 months before the update but not identified in previous annual updates
 - Added 121 records for businesses that were formed in the 12 months since the last annual update

1 The data does not include industrial biotechnology, animal health, not-for-profit organisations, public funded institutions or universities.

2 See Annex 4 for a description of the segmentation categories.

3 The data used is the most up to date from the sources used for each business and therefore the data on employment and turnover is for the last full year accounts.

4 In the 2017 annual update process 8,525 records were received for review from the data partners and other sources, of this 3,099 were already in the database, the remaining records were reviewed from which 592 records were added to the database.

- Added 70 records that are new sites for businesses in the 2016 database
- Added 19 businesses previously reported as ceased trading now trading
- Removed 188 businesses that have ceased trading or sites were closed
- Removed 170 businesses that are either reviewed as now not-in-scope, result of merger & acquisition activity or duplicates

0.6 This is the ninth 'Strength and Opportunity' annual report in the series. The data, charts, figures and maps used in this document, plus separate infographics can be found at <https://www.gov.uk/government/publications/life-science-sector-data-2017>

0.7 This year, for the first time, we will be publishing a subsequent supplemental report containing analysis of long-term trends utilising a new methodology which replaces the trend analysis used in all previous reports.

The Life Science industry – Key messages

0.8 The life science sector employs almost 240,900 people or approximately 1.0% of all private sector employment⁵. There are 5,649 businesses generating approximately £70.3bn in annual turnover.

0.9 Biopharma and Med Tech each account for half of industry employment, with Biopharma generating over two-thirds of turnover (68%) whilst Med Tech comprises two-thirds of businesses (63%).

0.10 Between 2016 and 2017 the industry grew by 2.4% for employment and 9.3% for turnover⁶. The increase in turnover was due to a significant increase in the turnover of three businesses, two of which were in the small molecules segment. Excluding the increase due to these businesses, turnover for the industry increased 2.5%.

0.11 The industry is composed of four sectors:

- Biopharma Core sector – comprises 673⁷ businesses active in developing and marketing human therapeutics employing an estimated 64,120 people and generating £33.3bn in annual turnover.
- The Biopharma Service & Supply sector contains 1,393 businesses with activity in the sector employing an estimated 54,900 people and generating £14.9bn in turnover.

5 Based on ONS EMP13: Employment by Industry release 15th Nov 2017 estimating 25.19m private sector jobs.

6 Estimate is like-for-like growth based on change associated with trading, company creation and cessation. Information on the methodology for these estimates is presented in Annex 2.

7 The sum of the number of businesses in the sector data is greater than the industry total because some businesses are active across more than one sector – for example large medical device businesses that also produce biopharmaceuticals. See Figure 17 in Annex 2.

- Med Tech Core Sector – comprises 2,604 businesses with activity in developing and marketing medical devices, employing an estimated 97,300 people and generating £17.8bn in annual turnover, of which £1.2bn is from businesses with activity in digital health.
- The Med Tech Service & Supply sector contains 979 businesses with activity in the sector employing an estimated 24,600 people generating £4.4bn in annual turnover.

0.12 The Top 3 segments in the industry based on number of people employed are:

- Biopharma businesses primarily involved in therapeutics based on small molecules
- Biopharmaceutical contract manufacturers and research businesses
- Suppliers of Biopharma consumables and equipment.

0.13 The Digital Health sub-segment contains 491 businesses, the largest number of all Med Tech segments. It employs an estimated 10,000 people, the largest Med Tech segment by employment and generated turnover of £1.2bn. The largest sub-segment contains businesses and sites involved in hospital information systems such as electronic medical records.

0.14 Business demographics:

- The majority of industry employment (68%) is outside of London and the South East with significant concentrations in East (an estimated 39,000 people) and North West of England (an estimated 25,500 people). Compared to the Biopharma sector where 37% of sector employment is focused in London and the South East, the Med Tech sector is less focused with this area representing 28% of employment.
- SMEs comprise a substantial proportion of the life sciences industry, accounting for 82% of businesses, over 56,000 jobs and £7.2bn turnover. There are 784 large businesses, of which the 150 in Biopharma Core generate 98% of turnover in that sector ('Big Pharma').
- Where ownership data is available⁸, this shows that 59% of these businesses and sites are UK owned and they employ 45% of the workforce⁹.

8 Ownership data was available for 3,434 of the records in the source database or 54%.

9 3,434 businesses with records of ownership employ 219,400 out of 240,886 UK life science workforce.

Terminology

Industry is the term used to collectively describe all Sectors covered in the analysis

Sector is the term used to describe Core Biopharma, Core Med Tech, Biopharma Service & Supply or Med Tech Service & Supply

Segment is the term used to describe the individual product or service groups within a Sector (see Annex 4 for the detail description of segments)

“Core Biopharma” includes all businesses involved in developing and/or producing their own pharmaceutical products – from small, R&D-focused biotechs to multinational Big Pharma.

Biopharma Service & Supply comprises businesses that offer goods and services to Core Biopharma businesses including for example Contract Research and Manufacturing Organisations, suppliers of consumables and reagents for R&D facilities.

“Core Med Tech” includes all businesses whose primary business involves developing and producing Med Tech products (ranging from single-use consumables to complex hospital equipment, including digital health products).

Med Tech Service & Supply sector comprises businesses that offer services to Core Med Tech businesses including for example Contract Research and Manufacturing Organisations, suppliers of consumables and reagents for R&D facilities.

Digital health includes businesses involved in making products for both hospitals and consumers including products such as hospital information systems and mobile medical devices and apps. It is a segment wholly within the Med Tech Sector.

Genomics is an interdisciplinary field focusing on the study of the human genome and the application of resulting knowledge to human health. It is a cross-cutting categorisation across all four sectors.

Real Growth (or like-for-like) refers to analysis of the change in employment and turnover between 2016 and 2017.

Business is used to describe the entity that is the legal owner of a group of trading addresses or sites and legal entities. A business may consist of more than one site or registered company. The term business is used in this document when discussing the whole life science industry and the four sectors. There are 107 businesses that are active in more than one sector which means there is a small difference in the count of businesses at the industry level (5,542) compared to the sector level (5,649). See Annex 2 for more detail. There is no difference in the sums of employment or turnover at the different levels of analysis.

Sites is used when referring to the data at the segment or geographical level. All of the data in the spreadsheets that accompany this document are analysed at the site level. This is the level at which all data entries (6,340 records) are held and analysed in the database. A single site is segmented and has employment and turnover assigned to it. As a business can have multiple sites and can operate in more than one segment the total counts of sites at segment level is greater than the count of businesses referred to at sector level.

SME status is based on the European definition of Small and Medium-sized Enterprises and refers to 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.

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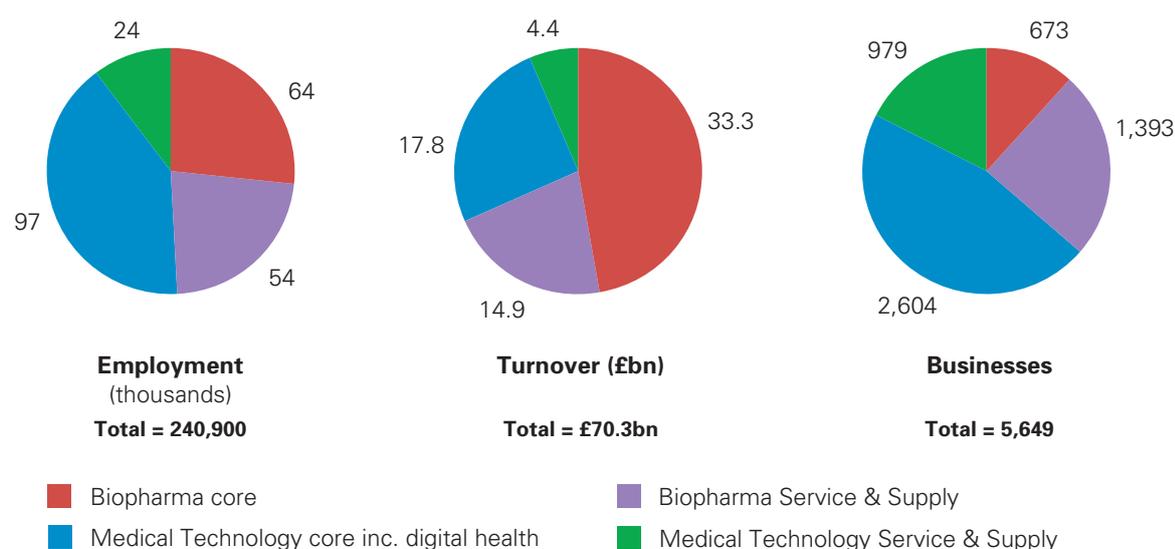
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The data, charts and figures included in this document is published at <https://www.gov.uk/government/publications/life-science-sector-data-2017>

Chapter 1

Industry Overview

Figure 1. Total employment, turnover and number of businesses in the life science industry by sector



- 1.1 The industry employs 240,900 people in the UK. Approximately 123,900 (51% of the industry total) are employed in the Med Tech sector of which 97,300 (40%) are employed in Core Med Tech businesses. Within the Med Tech sector 10,000 are employed in digital health, and a further 24,600 (10%) in service & supply businesses that support the sector. The Core Biopharma sector employs 64,100 (27% of the industry) in 673 businesses supported by a service & supply sector that employs a further 54,900 people (23% of the industry).
- 1.2 The Med Tech core sector has the largest number of businesses in the industry, with 46% of all businesses. Within this sector the digital health segment contains the largest number of businesses and is the largest segment by employment.
- 1.3 In terms of turnover from UK based activity, the Biopharma core sector has the largest proportion (47%) of the industry's £70.3bn annual turnover. The sector had turnover of £48.2bn of which £33.3bn is from the 673 Biopharma Core businesses that develop and market therapeutic products.

1.1 Core Sectors

- 1.4 The segment of Biopharma businesses whose main activity is classified as Small Molecule¹⁰ Therapeutics is the largest in terms of employment and turnover representing 21 % (49,500) and 39% (£27.3bn) respectively of the UK industry totals. The 673 businesses in this segment include all of the global Top 20 pharmaceutical businesses (based on turnover)¹¹ who have activity in the UK.
- 1.5 The contribution of global Top 30 Med Tech businesses¹² to Core Med Tech sector is 20% (19,500) of the total employment and 29% (£5.2bn) of the turnover. Med Tech businesses and sites with more than 250 employees represent an estimated 37% (36,200) of the all Core Med Tech employment compared to 72% (46,000) for Biopharma.

Figure 2. Top 5 segments (excluding the service & supply businesses) in the life science industry in terms of employment, turnover and number of sites

	Employment	Turnover	Number of Companies
1st	Small Molecules	Small Molecules	Small Molecules
2nd	Digital Health	Single Use Technology	Digital Health
3rd	Single Use Technology	Therapeutic Proteins	Assistive Technology
4th	Orthopaedic Devices	Antibodies	In vitro diagnostic technology
5th	Assistive Technology	In vitro diagnostic technology	Single Use Technology

- 1.6 Biopharma leads the top 5 segments by turnover with 3 of the top 5, whilst Med Tech dominates both employment and sites with 4 out of the top 5 for each.
- The five segments of small molecules, single use technology, digital health, orthopaedic devices and assistive technology contain 57% of the employment for Core Biopharma and Med Tech businesses (86,100 people).

10 Businesses that are classified in the small molecules segments may develop and market other classes of therapeutic products such as antibodies. Where the proportion of activity associated with other therapeutics for an individual company is available this will be distributed into the appropriate segment. If the data is not available all activity is classified in the segment where most UK economic activity of a company is estimated to be derived.

11 The Top 20 ranking as based on <http://www.pharmexec.com/pharm-execs-top-50-companies-2017>.

12 The Top 30 ranking as based on https://www.mpo-mag.com/issues/2016-07-01/view_features/top30-medicaldevice-manufacturers.

- The five segments of small molecules, single use technology, therapeutic proteins, antibodies and in-vitro diagnostics contribute 70% (£34.6bn) of the total turnover for Core Biopharma and Med Tech businesses.
- 1.7 An alternative view of the distribution of employment in the life science industry is shown in the tree diagram format in Figure 3 on the following page.
- 1.8 This confirms the importance of small molecule therapy businesses in terms of employment and of the two largest segments in the Biopharma service & supply sector: Contract Research and Manufacturing businesses, and suppliers of Reagents and Equipment¹³.
- 1.9 Emerging and growing product segments are key contributors to employment and turnover of the industry. In Biopharma, new therapies based on large molecule technologies such as those used to produce therapeutic proteins and antibodies now account for 49% of sales of the Top 100 biopharmaceutical products, up from 30% in 2008¹⁴. In UK the therapeutic proteins segment is the third largest overall in terms of turnover in Core Biopharma and Med Tech and along with antibodies have an estimated turnover of £3.6bn.

13 Suppliers of equipment and reagents are not exclusive suppliers to Core Biopharma and also supply the academic sector.

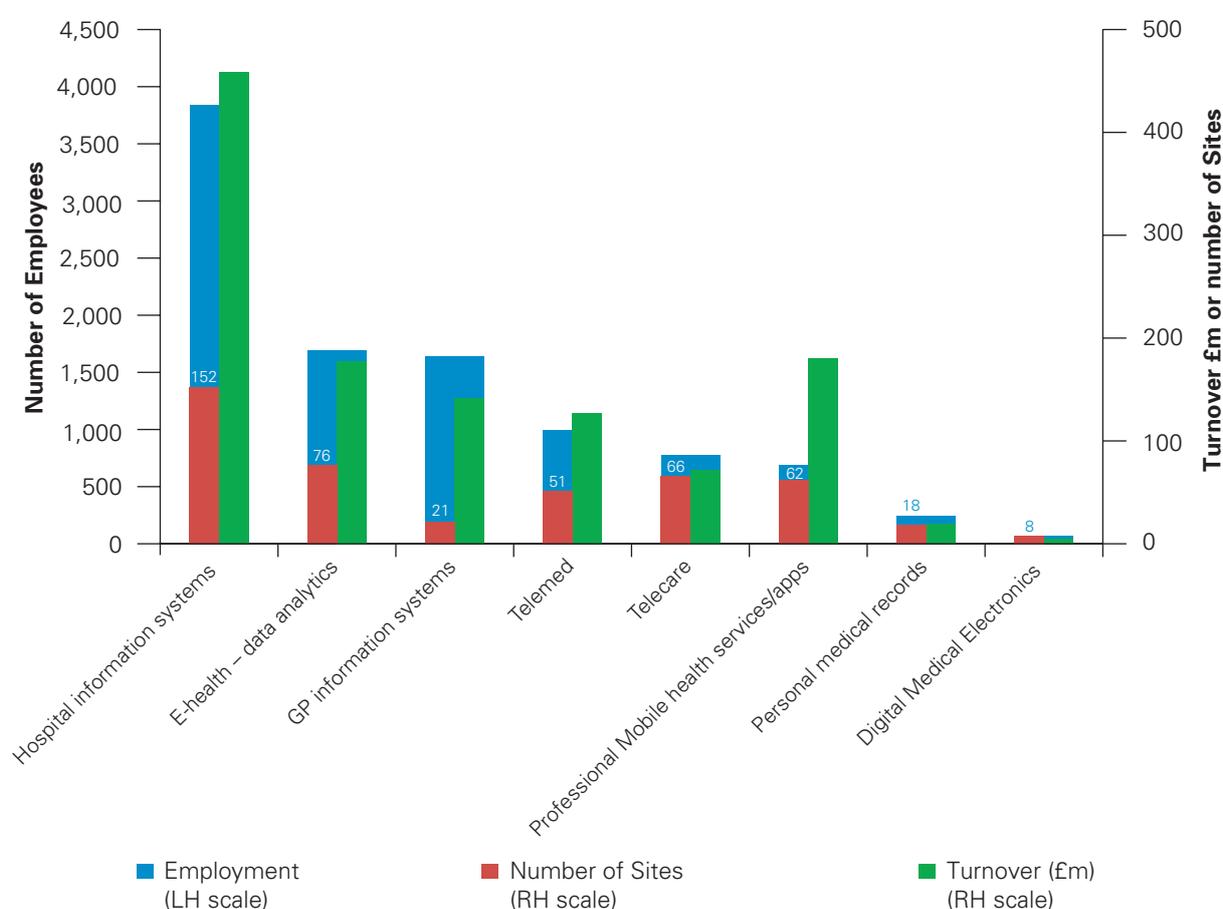
14 EvaluatePharma® World Preview 2017, Outlook to 2022, June 2017.

Figure 3. Tree Diagram representation of the employment per segment for the life science industry (Key: Red = Core Biopharma, Blue = Core Med Tech, Purple = Biopharm service & supply, Green = Med Tech service & supply). Data included includes segment code (BPE etc.) and number of employees



- 1.10 In the Med Tech sector the emerging sector of digital health is a significant contributor to employment with an estimated 10,000 people employed in 491 sites with activity in the segment¹⁵. The segment has the 6th largest turnover at £1.2bn of the Core Med Tech segment.
- 1.11 The digital health segment includes businesses producing software to support the management of primary and secondary healthcare systems including electronic patient records, health analytics software businesses that assist healthcare professionals in clinical care and mobile medical device businesses that rely on software for key elements of their functionality.

Figure 4. The distribution of employment, turnover and number of site cross the Digital Health sub-segments (only for sub-segments that employ more than 50 people)



- 1.12 The three largest segments in terms of both employment and turnover are hospital information systems, E-health or data analytics and GP or primary care information systems. Together these three sub-segments account for 72% digital health employment (7,200 people) and 66% of turnover (£780m).

¹⁵ Employment and turnover in the digital health segment is based on data for businesses that have the majority of the economic activity in the segment. This analysis does not include the activity in large multi-market businesses that may have a significant level of activity that is a low percentage of their overall activity. Therefore the overall economic activity in the segment is estimated to be larger than quoted.

- 1.13 The digital health segment is a relatively young industry with 27% (131) of the businesses incorporated in the last 5 years and 54% or 260 in the last 10 years, this compares with 17% (1,099) and 29% (1,851) respectively for all life science businesses¹⁶.

Service and Supply Sectors

- 1.14 Both the Core Biopharma and Med Tech businesses are supported by large specialist UK based service & supply sectors. The Biopharma service & supply sector employs 54,900 people in 1,393 businesses with turnover of £14.9bn. The largest segments in the sector are Contract Manufacturing and Research, Reagent & Equipment suppliers and Clinical Research Organisation that together employ 38,300 people and account for 83% (£12.4bn) of the sector turnover.
- 1.15 The Med Tech service & supply chain sector employs 24,600 people in 979 businesses with a turnover of £4.4bn. The largest segments in the sector are Reagent & Equipment Suppliers, Contract Manufacturing and Research and Specialist Consultants (excluding regulatory) that together employ 13,200 people and account for 55% (£2.4bn) of the sector turnover.

¹⁶ Data based on the 99% of life science businesses and 98% of digital health businesses for which the date of formation is known.

Chapter 2

Sector Overviews – Key Facts and Trends

2.1 Biopharma sector

- The Biopharma sector contains 2,066 businesses that generate a turnover of £48.2bn and employ 119,000 people across the UK. Biopharma accounts for half of industry employment (49%), over two-thirds of turnover (68%) and 37% of businesses.
- The core sector comprises businesses developing, manufacturing and selling therapeutic products supported by an extensive network of service & supply businesses. There are 673 businesses selling therapeutic products with turnover of £33.3bn and employing 64,100 people. The 1,393 service & supply businesses employ 54,900 people (46% of the sector) and generate £14.9bn in turnover from UK activity.
- Businesses developing and producing therapeutic products using small molecule technology comprise the largest segment employing 77% (49,500) of Core Biopharma employees and generating 82% (£27.3bn) of the turnover. Therapeutic proteins and Antibodies are the next largest segments.
- Within the service & supply network the 320 businesses and their sites that supply contract manufacturing or research services make-up the largest by employment with 17,800 people. Reagent and equipment suppliers generate the largest revenue at £7.4bn and are second largest by employment with 12,500 jobs. The third largest segment by employment is Clinical Research Organisations generating £2.2bn turnover. Together the top 3 segments account for 70% of Biopharma service & supply employment.
- The sector increased employment by 2,200 between 2016 and 2017 representing 1.9% growth driven by growth in service & supply businesses. Turnover increased 12.3% driven by strong growth in small molecules.
- The majority of the sector businesses are SMEs with an estimated 71% (477) of Core Biopharma and 83% (1,154) of service & supply businesses.

- There are 255 UK-owned Core Biopharma sites that employ 33,700 people and account for £15.3bn of the turnover. In the service & supply sector the 457 UK-owned sites employ 16,000 people.
- There is economic activity in the Biopharma sector across the UK with a concentration in the South East and East of England, London and the North West of England. These four areas account for 69% of the employment in the sector (82,300 people) and this proportion rises to 82% for the Core Biopharma sector.

2.2 Biopharma – Core businesses

2.2.1 **“Core Biopharma”** includes all businesses whose business falls under developing and/or producing their own pharmaceutical products – from small, R&D-focused biotechs to multinational Big Pharma.

2.2.2 **Overall** the Core Biopharma sector contains 673 businesses with 832 sites with activity employing 64,100 people and with a turnover of £33.3bn in 2017.

2.2.3 **The sector breakdown shows** that businesses whose main economic activity involves small molecule therapeutics form the largest segment, accounting for 66% (552) of businesses and sites, 77% of employees (49,500) and 82% (£27.3bn) of turnover. This segment contains some of the largest businesses in the industry; of the life science businesses that employ more than 500 people, 21% are in the Small Molecule segment (11 of 53). Antibodies, Therapeutic Proteins and Vaccines are the next largest segments, together making up 20% (12,700) and 16% (£5.2bn) of employment and turnover respectively.

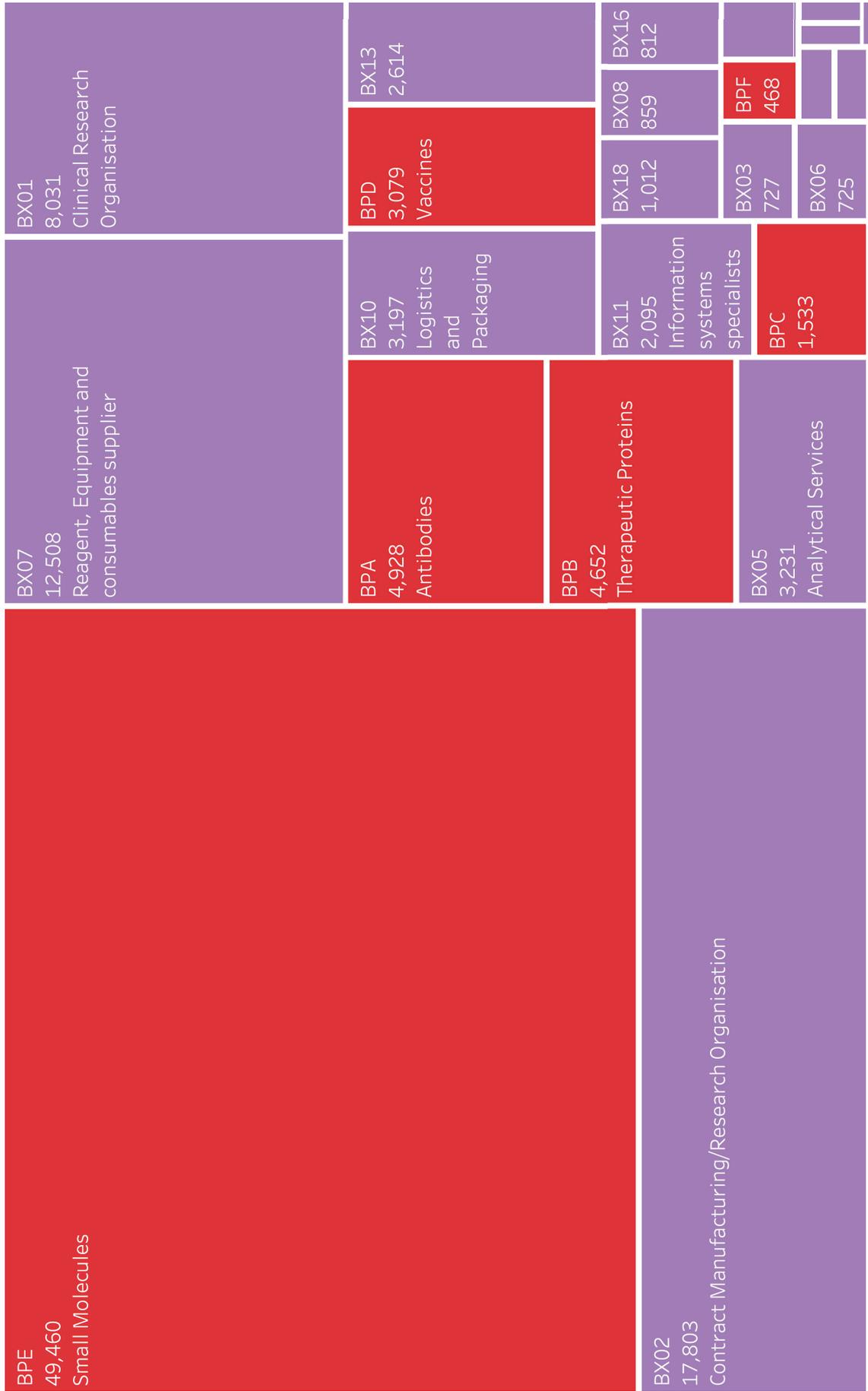
2.2.4 **Geographical analysis of employment** shows Core Biopharma businesses in all areas of the UK with the greatest concentration in the South East, East of England, London and the North West of England which together account for 82% (52,600) of Core Biopharma employment.

2.2.5 **Analysing the size of the businesses** shows that 22% of Core Biopharma businesses are large (150 businesses). These large businesses employ 59,300 people (93% of Core Biopharma employment) and account for £32.5bn of turnover (98% of Core Biopharma turnover). They represent 46% of total life sciences industry turnover and 25% of employment.

- 2.2.6 Growth based on** like-for-like growth between 2016 and 2017 for all Core Biopharma businesses¹⁷ estimates the sector grew turnover by £3.3bn or 11.5% while employment remained essentially constant. Turnover growth was driven by a large increase in the small molecule segment for two businesses; without these turnover slightly decreased (by 0.9%). Between 2016 and 2017 47 new businesses or sites were formed with another 29 closing.
- 2.3 Biopharma – service and supply chain**
- 2.3.1 The Biopharma Service & Supply sector** comprises businesses which offer goods and services to Core Biopharma businesses. This includes Contract Research and Manufacturing Organisations, suppliers of consumables and reagents for R&D facilities, providers of specialist analytical, IT, recruitment and logistics services as well as legal and regulatory expertise and also finance businesses specialising in biopharma investments (but not counting their portfolio assets).
- 2.3.2 Overall** The Biopharma service & supply chain consists of 1,393 businesses with 1,551 sites, 54,900 employees and generates a turnover of £14.9bn. The activity represents 46% of the total employment in the Biopharma sector and 31% of the turnover.
- 2.3.3 The sector breakdown** shows the largest employing segments are Contract Manufacturing and Research Organisations that together consist of 320 sites employing 17,800 people. The largest segment in terms of turnover is Reagent & Equipment suppliers which represents 50% (£7.4bn) of the total. Clinical Research Organisations completes the Top 3 Biopharma service & supply segments; in total the Top 3 account for 70% (38,300) of the employment.
- 2.3.4 Geographical analysis of employment** shows the South East and East of England have the most service & supply businesses and employees (39%), followed by Scotland (10%), and the North West of England (8%).
- 2.3.5 Analysing the size of the businesses shows** that the service & supply sector is predominated by SMEs (1,153 businesses – 83% of Biopharma service and supply). However they represent only 24% of employment (13,000 people) and 11% of turnover (£1.6bn) for the sector. Biopharma service and supply SMEs constitute 20% of businesses in the life sciences industry, and 25% of total life sciences SMEs.
- 2.3.6 Analysis of growth based on** like-for-like growth between 2016 and 2017 estimates that the biopharma service & supply sector employment grew by 2,400 and turnover grew by £1.8bn representing increases of 4.8% and 14% respectively. Between 2016 and 2017 30 new businesses or sites were formed with another 40 closing.

17 Using a method to estimate “real growth” in data – see Annex 2.

Figure 5. Tree Diagram representation of the employment per segment for the Biopharma sector (Key: Red = Core Biopharma, Purple = Biopharma service & supply). Data included includes segment code (BPE etc.) and number of employees



2.4 Med Tech Sector (including digital health)

- The Med Tech sector contains 3,583 businesses that generate a turnover of £22.2bn and employ 121,900 people across the UK. Med Tech accounts for half of industry employment (51%), one-third of turnover (32%) and 63% of businesses.
- The sector comprises businesses developing, manufacturing and selling medical devices supported by an extensive network of service & supply businesses. There are 2,604 businesses selling medical devices with turnover of £17.8bn and employing 97,300 people. The 979 service & supply businesses employ 24,600 people, or 20% of the sector, and generate £4.4bn in turnover from UK activity.
- Businesses in the digital health segment comprise the largest segment in terms of employment with 8% (10,000) of medical device employees. The single use technology segment is the largest by turnover generating 11% (£2.0bn) of all Core Med Tech revenue.
- The Top 5 medical device segments for employment are: digital health, single use technology, orthopaedic devices, assistive technology and in-vitro diagnostics. Together these segments employ 46% (44,500) of the Core Med Tech total. The Digital Health segment contains the largest number of businesses and sites followed by Assistive Technology (wheelchairs and other non-digital devices) and In-vitro Diagnostics.
- Within the service & supply network, the 289 sites that supply consumables and equipment make-up the largest segment employing 6,400 and generating 33% (£1.4bn) of the turnover. Businesses involved in contract research or manufacturing and specialist consulting (non-regulatory) make up the next largest segments by employment.
- The sector increased employment by an estimated 3,500 between 2016 and 2017 representing 2.9% growth driven by growth in Core Med Tech businesses. Turnover for the sector increased by 3.7% with growth across most segments.
- The majority of the sector businesses are SMEs with an estimated 83% (2,172) of Core Med Tech and 85% (832) of service & supply businesses.
- There are 965 UK owned core Med Tech sites that employ 37,500 and 346 UK-owned sites in the service and supply sector employing 11,300.
- The Southeast of England contains the largest number of sector employees (26,100) but employment is widely distributed with 79% located in the rest of the UK. Core Med Tech employment is concentrated in South East while service and supply employment is more widely distributed across the UK.

2.5 Med Tech – Core businesses

- 2.5.1 **“Core” Med Tech** includes all businesses whose primary business falls under developing and producing their own Med Tech products (ranging from single-use consumables to complex hospital equipment and including digital health products).
- 2.5.2 **Overall** the Core Med Tech sector contains 2,604 businesses employing 97,300 people with a turnover of £17.8bn.
- 2.5.3 **The sector break down shows** the largest segment by turnover is Single Use Technology (i.e. disposables) followed by In Vitro Diagnostics, Orthopaedics, Wound Care and Assistive Technology. These top five segments account for 43% (£7.6bn) of the Core Med Tech turnover. Digital Health technology is the largest segment by employment followed by Single Use technology, Orthopaedics, Assistive Technology and In-Vitro Diagnostics. These top five account for 46% (44,500) of sector employment.
- 2.5.4 **Geographical analysis of employment** shows there are sites spread across the UK with a concentration in the South East England and the Midlands representing 24% (22,900) and 16% (17,900) respectively of the total Core Med Tech employment followed by Yorkshire and the Humber at 12% (12,000).
- 2.5.5 **Analysis of the size of businesses** shows that of the 2,604 businesses in Core Med Tech, 83% (2,172) are SMEs. They represent 31% (30,000) of Core Med Tech employment and 21% (£3.7bn) of Core Med Tech turnover. Core Med Tech SMEs account for nearly half (47%) of the total number of life sciences SMEs.
- 2.5.6 **Analysis of growth based on** like-for-like growth between 2016 and 2017 estimates that the Core Med Tech sector grew employment by 4,100 and turnover by £0.7bn representing increases of 4.4% and 3.9% respectively. Between 2016 and 2017 34 new businesses or sites were formed with another 85 closing.

2.6 Med Tech – service and supply chain

- 2.6.1 **The Med Tech Service & Supply** sector comprises businesses which offer services to Core Med Tech businesses. This includes Contract Research and Manufacturing Organisations, suppliers of consumables and reagents, providers of specialist analytical, IT, recruitment and logistics services as well as legal and regulatory expertise and finance businesses specialising in med tech investments (but not counting their portfolio assets).
- 2.6.2 **Overall** the sector contains 979 businesses that employ 24,600 and generates a turnover of £4.4 bn.
- 2.6.3 **The sector break down shows** the largest segment of the sector is Reagent, Equipment and Consumables suppliers which contains the highest

number of sites (289) and employs 26% (6,400) of the sector's total and 33% (£1.4bn) of its turnover. The next largest segments by employment are Contract Manufacturing and Research followed by Specialist Consultants.

- 2.6.4 **Geographical analysis** shows, in contrast to Core Med Tech, the top 3 areas are the North West and East of England and the East Midlands. These three areas account for 47% (11,400) of the employment and 43% (**£1.9bn**) of the sector turnover.
- 2.6.5 **Analysis of the size of businesses** shows that 85% (832) of businesses are SMEs, employing 8,500 people (35% of Med Tech Service & Supply) and accounting for £1.2bn (28%) of turnover.
- 2.6.6 **Analysis of growth based on** like-for-like growth between 2016 and 2017 estimates that the Med Tech service and supply sector reduced employment by 600 a decrease of 2.3% while turnover by £0.1bn representing an increase of 3.1% led by growth in the reagent, equipment and consumables segment. Between 2016 and 2017 10 new businesses or sites were formed with another 34 closing.

Figure 6. Tree Diagram representation of the employment per segment for the Med Tech sector (Key: Blue = Core Med Tech, Green = Med Tech service & supply). Data included includes segment code (MTN etc.) and number of employees

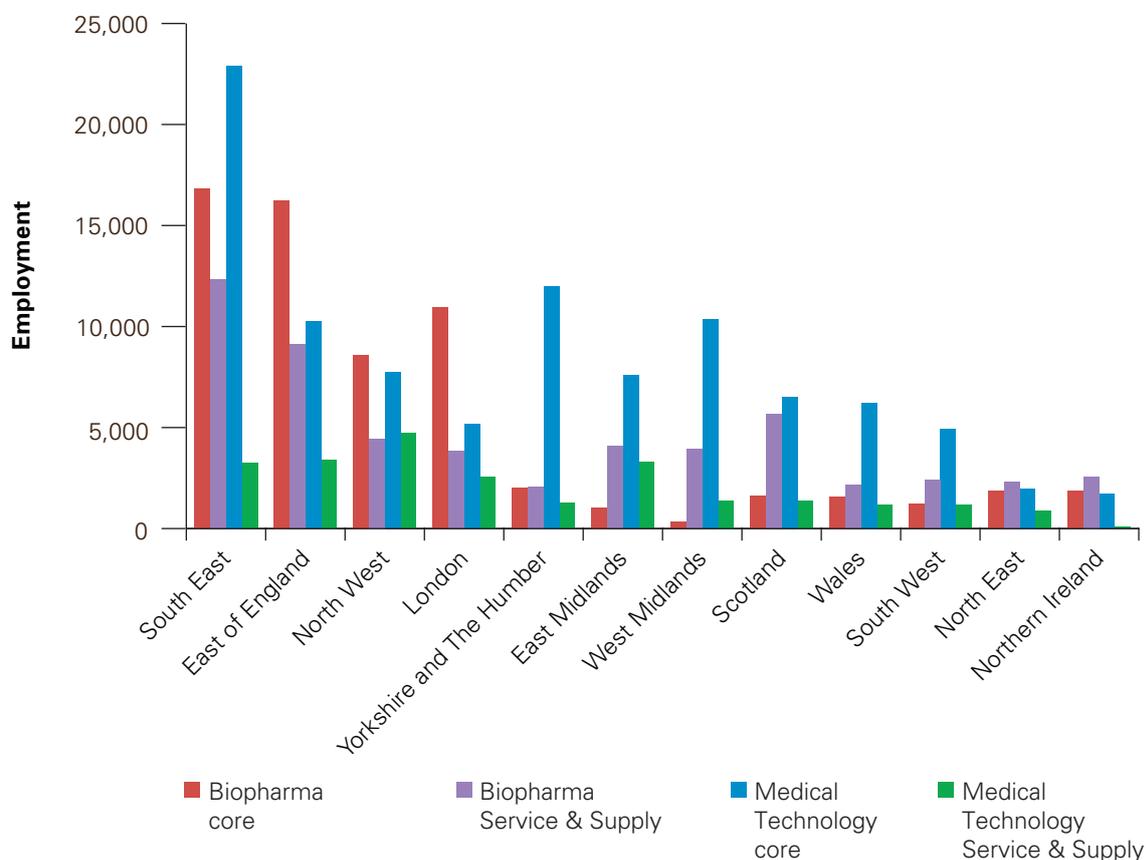
MTT 10,021 Digital health	MTB 7,985 In vitro diagnostic technology	MTO 4,979 Re-usable diagnostic or analytic equipment n.e.c.	MTA 4,775 Wound Care and Management	MTK 4,291 Drug Delivery	MTM 3,965 Surgical Instruments (reusable) n.e.c.
MTN 9,502 Single use technology n.e.c.	MTS 7,943 Hospital hardware including ambulatory	MX02 3,744	MX13 3,124	MIG 2,792	MIL 2,433 Infection Control
MTF 8,640 Orthopaedic Devices	MX07 6,360 Reagent, Equipment and consumables supplier	MTD 3,555 Medical Imaging/Ultrasound	MX05 2,286 Analytical Services	MX16 1,513	MX01 1,465
MTQ 8,391 Assistive Technology	MTI 5,843 Ophthalmic Devices/Equipment	MTE 3,499 Anaesthetic and respiratory technology	MTJ 2,219 Dental and maxillofacial	MTV 961	MTP 558
		MTR 3,317 Mobility Access	MX10 2,052 Logistics and Packaging	MX18 859	
				MX14	

Chapter 3

Geographical Analysis

- 3.0.1 Postcodes attached to records in the database allow geographical analysis of employment and turnover at site level. Where available, we have validated employment data for the large businesses by looking at information such as annual reports or websites to identify the number and types of employment.
- 3.6.1 The primary allocation of turnover to location is based on the legal entity information sourced from third party databases, validated for large businesses from annual accounts. This method of turnover reporting is used throughout the document.
- 3.6.2 An alternative geographical allocation of turnover is shown in Annex 2 by factoring the employment at a location by the average turnover/employment ratio for the individual segment for that site or company.

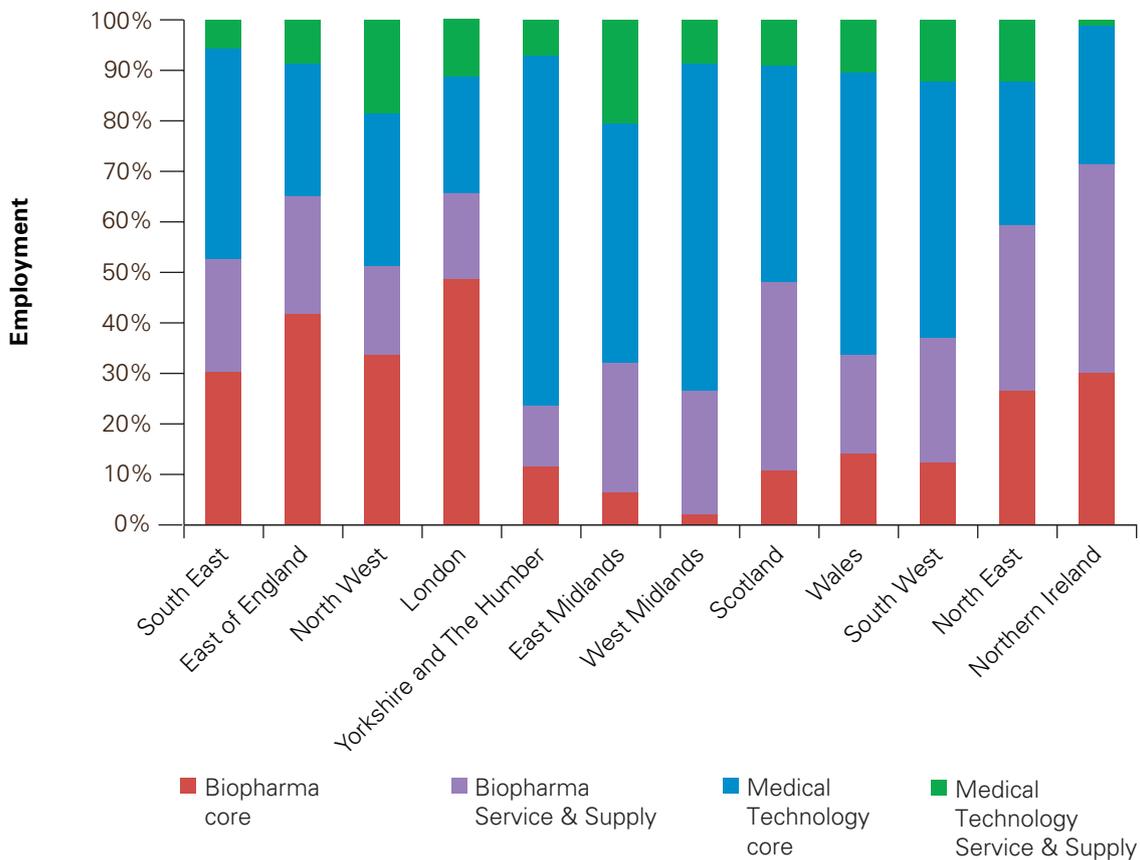
Figure 7. *The distribution of the industry employment by sector across the regions of England and in Northern Ireland, Scotland and Wales, ordered by total employment*



3.6.3 The South East of England contains the largest population of life science industry jobs and the largest number of Core Biopharma and Med Tech jobs. This region combined with the East of England contains 39% (94,300) of all the life science industry employees. The North West of England is the 3rd largest region in terms of employment with the largest regional employment in the Core Biopharma and Med Tech sectors.

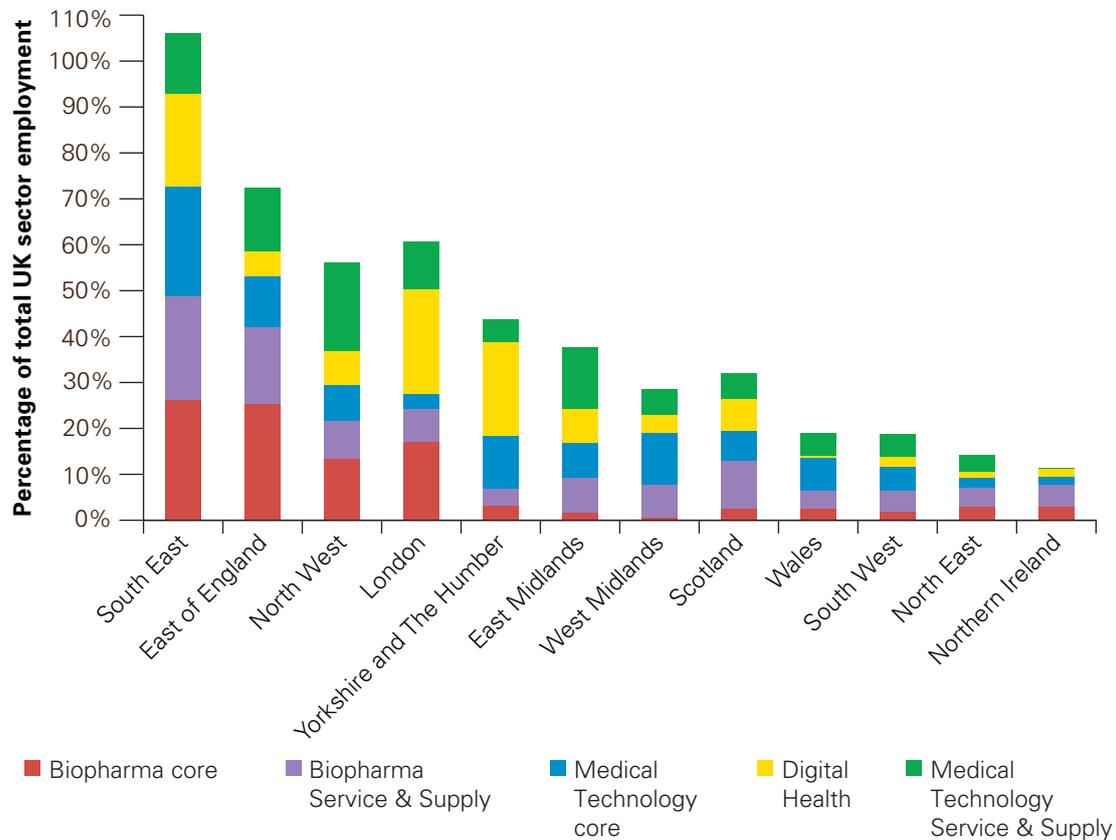
3.6.4 **Figure 8** demonstrates which sectors are prominent in a region by showing sector employment as a percentage as total regional life sciences employment. For example the Core Med Tech sector has the highest proportion of life science jobs in the West Midland and East Midlands regions, whereas in the London, the Core Biopharma sector has the largest proportion of life science employment.

Figure 8. Regional employment in the life science sector displayed as a percentage of the total life science employment in the region



3.6.5 **Figure 9** demonstrates which regions are most dominant for each sector by showing a region's employment for a sector as a percentage of total sector employment.

Figure 9. Regional employment in the life science sector and digital health segment displayed as a percentage of the total UK life science employment in the sector or segment

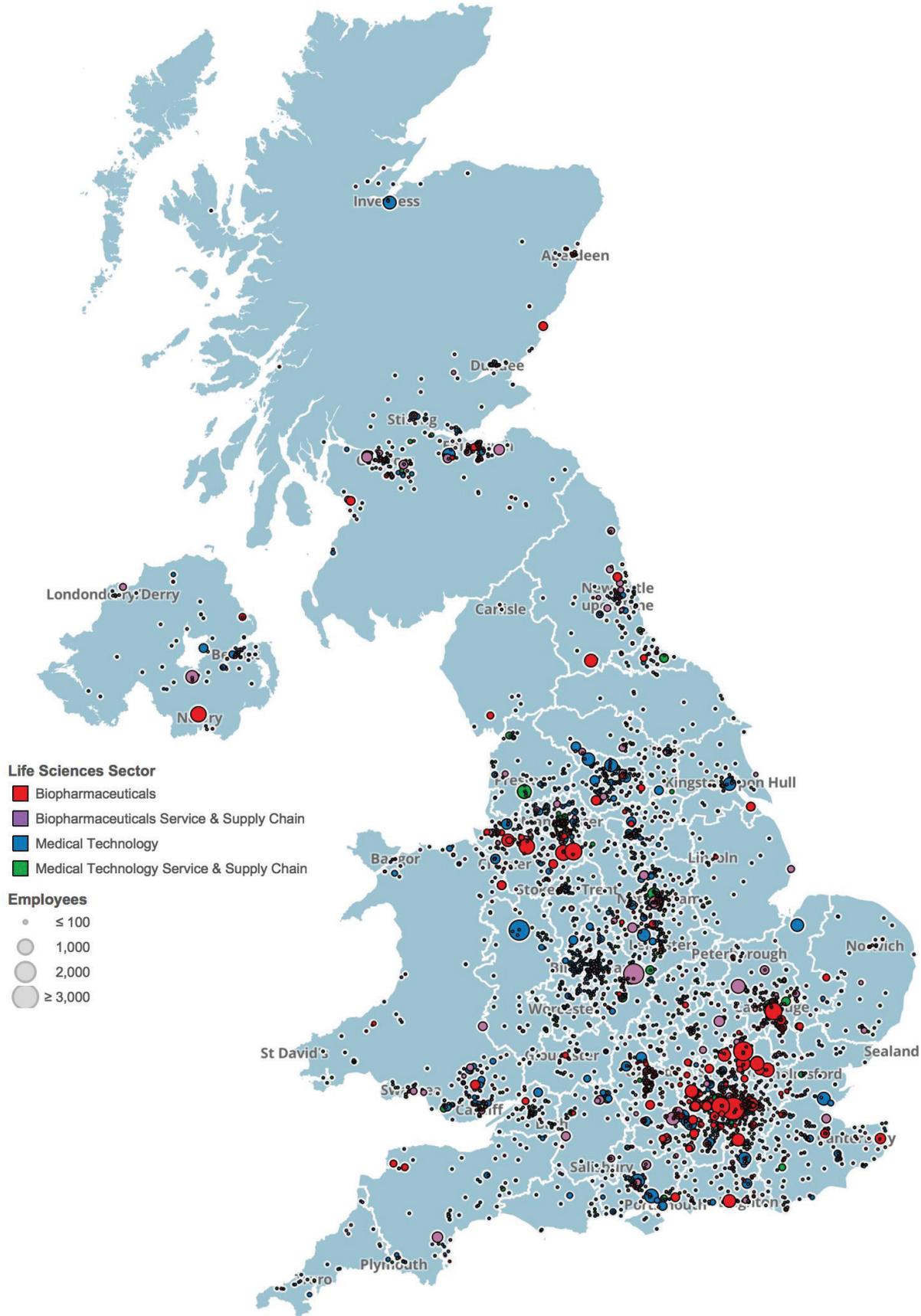


- Core Biopharma employment is concentrated in the South East, East, North West of England and London.
- Core Med Tech employment is concentrated in South East of England, West Midlands and Yorkshire and the Humber.
- Biopharma Service & Supply is concentrated in the South East and East of England and Scotland.
- Med Tech Service & Supply is concentrated in the North West, East of England and the East Midlands.
- Digital Health segment is concentrated in London, the South East of England and Yorkshire & the Humber.

3.6.6 **Figure 10** represents the employment information for the life science sector in a map format with concentrations of employment highlighted. The representation shows the clustering of the employment around major cities in England, Northern Ireland, Scotland and Wales in common with a number of industries.

3.6.7 The map also highlights the more dispersed geography of the Core Med Tech sector compared to the Core Biopharma sector, with the latter showing concentrations in the London-Stevenage-Cambridge corridor and in the North West. The service & supply sectors of the industry are also more widely distributed across the UK, although the Biopharma service & supply chain has significant concentrations in the South East and East of England and in Scotland.

Figure 10. Map of the life science sector employment in the UK

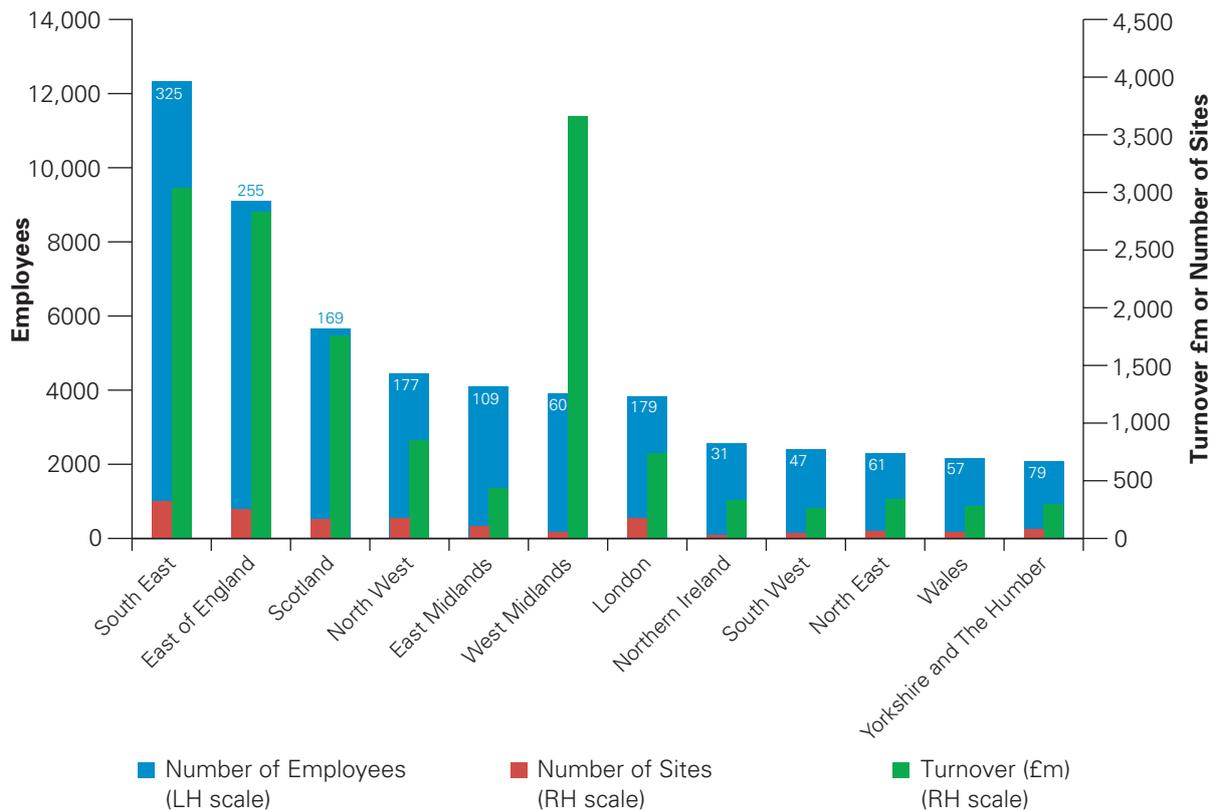


3.1 Biopharma Geographical analysis

3.1.1 The Core Biopharma sector has a concentration of economic activity in four regions of England. Of the 832 sites in the sector, 635 are located in the South East, East, North West of England and London. Together these four regions contain 82% of all employment and account for 92% of the turnover in the sector. For all regions, the distribution of the turnover follows that of employment.

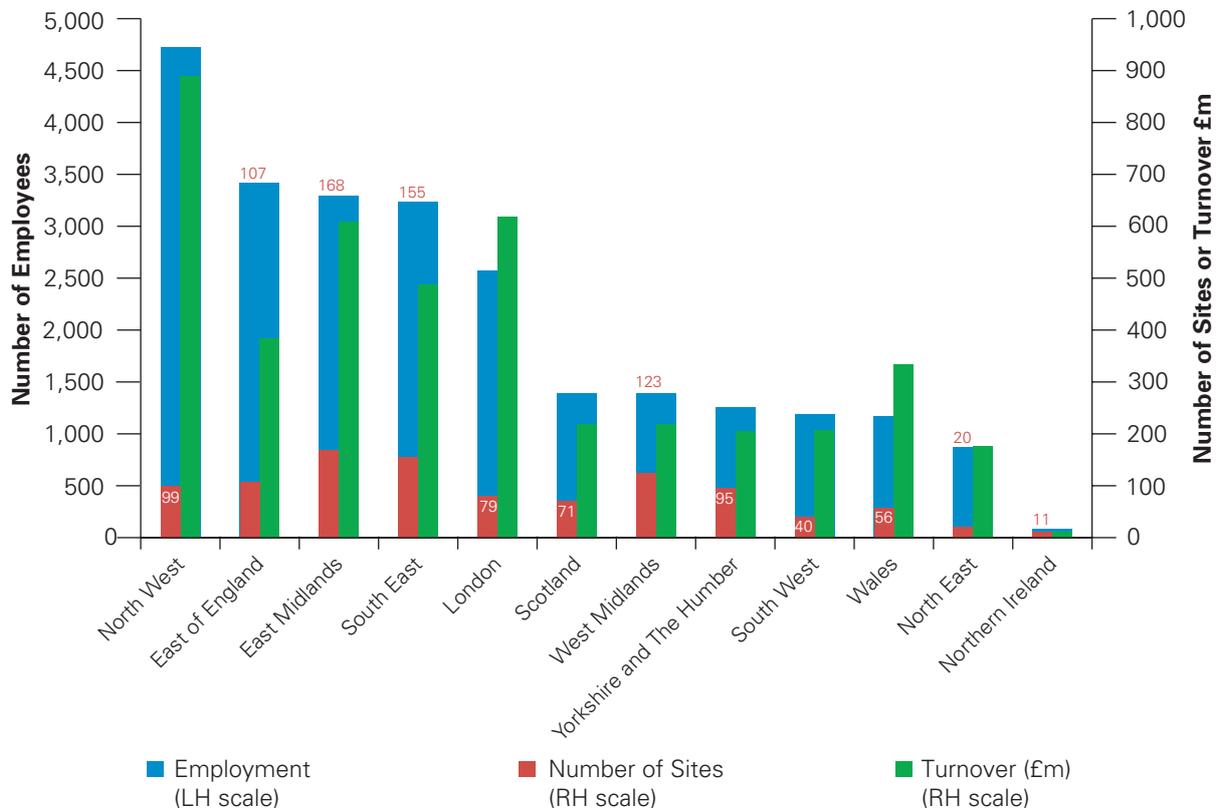
3.1.2 The Biopharma service & supply sector is more distributed across the UK with the top 4 largest regions by employment employing 57% of the total for the sector. For the majority of the regions, the Contract Manufacturing and Research segment is the largest contributor to employment, the exceptions are: the South East of England where Clinical Research Organisations make up the largest proportion; the South West where Analytical Services is the largest; and the Midlands where Reagent and Equipment suppliers make up the largest employment. The large turnover in the West Midlands is concentrated in the Reagents and Equipment segment.

Figure 11. Regional employment, turnover and number of sites for the Biopharma Service & Supply sector



- 3.1.3 The map of Biopharma sector employment shows more detail on the location of employment within the regions, highlighting the focus of Core Biopharma employment along the Oxford-London-Cambridge, Manchester-Liverpool and Edinburgh-Glasgow corridors. The Service & Supply chain sector is distributed more widely outside of these corridors; this would be expected for segments such as Reagents and Equipment where access to nationwide distribution routes is important.
- 3.1.4 An analysis of the composition of Biopharma sites by region shows that the South East and East of England contains 47% of UK sites with over 250 employees and 50% of all UK sites with 100-249 employees.
- 3.1.5 Analysis of the number of businesses that were formed in the last 10 years by region shows that between them the South East of England, East of England and London contain 54% of businesses that were formed between 2008 and 2017 inclusive. The North West and Scotland are the only regions that have more than 10% each of businesses formed over the same period.
- 3.2 Med Tech Geographical Analysis**
- 3.2.1 The Core Med Tech sector has a concentration of economic activity in three regions of England. Of the 2,932 sites in the sector 1,480 (51%) are located in the South East, Yorkshire and The Humber and the Midlands (East and West). Together these three regions contain 54% of all employment in the sector.
- 3.2.2 Analysis of the Med Tech Service & Supply sector distribution of employment shows a much more even geographical distribution with the North West and East of England followed by East Midlands, South East and London as having the highest concentration. For the majority of the regions the Reagent and Equipment suppliers make up the largest group of employers. All regions have high proportions of employment in contract manufacturing and research businesses with the East of England having the highest number of employees in this segment.

Figure 13. Regional employment, turnover and number of sites for the Med Tech Service & Supply sector

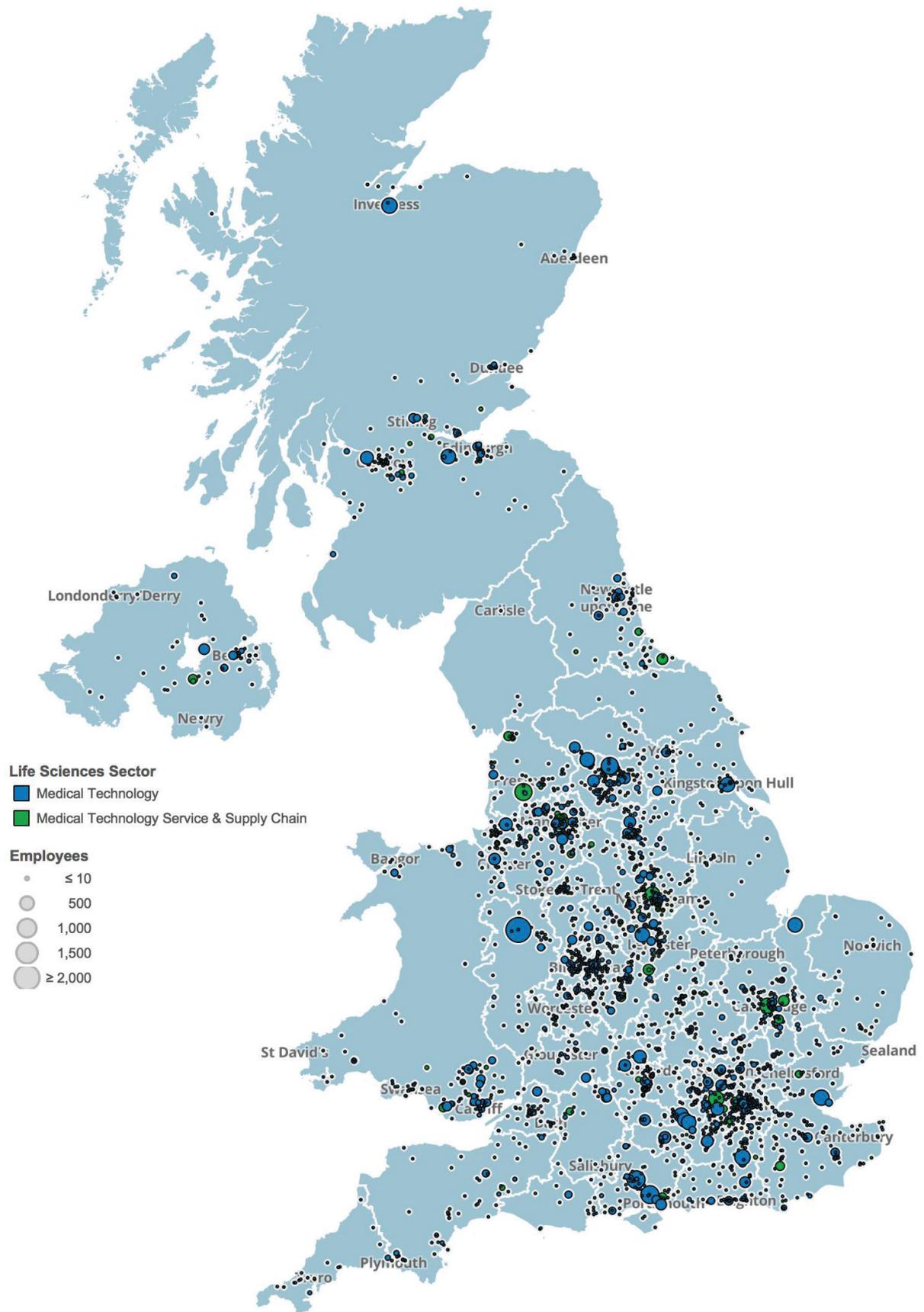


3.2.3 The map of Med Tech sector employment (Figure 14 on the following page) shows more detail on the location of employment within the regions, highlighting the economic clusters in the Liverpool-Manchester-Leeds corridor and south to Sheffield-Nottingham and west to Birmingham. Other significant clusters are present around London and in the Edinburgh-Glasgow corridor.

3.2.4 An analysis of the composition of Med Tech businesses by region shows that the four regions of South East and East England, the Midlands and Yorkshire and The Humber contain 55% of all UK sites with more than 250 employees.

3.2.5 Analysis of the number of businesses that were formed in the last 10 years by region shows that the South East of England followed by the Midlands have the highest numbers of businesses formed since 2008. Together these regions account for 41% of all businesses formed over this period.

Figure 14. Map of the Med Tech sector employment in the UK



Chapter 4

Digital Health and Genomics

In this section we look at the digital health and genomics economic activity based on the information in the database. The digital health sector in this analysis covers businesses that develop and market software and/or devices that rely on software for their key functionality (digital health data is included in the sections on med tech). These products are used in hospitals and GP surgeries, in the home to manage health or deliver services and in areas such as drug development (e.g. clinical trials or data analysis).

The genomics segment is a cross industry segment and has been analysed by adding an additional coding to a company independent of the primary sector and segment coding. For example a company can be coded in the Med Tech Service & Supply sector under the reagent and equipment segment and have an additional genomics coding under Sequencing Instruments.

4.1 Digital health

- 4.1.1 The digital health segment¹⁸ is the largest segment in the Med Tech sector based on employment and the 4th largest in the UK life sciences sector with strong growth potential. The global market for digital health was estimated to be worth £70bn in 2016 and is expected to almost double to £150bn by 2020 with mobile health applications and devices forecast to show the fastest growth.¹⁹
- 4.1.2 The digital health segment is composed of 491 sites, which is the 4th highest number of sites in the life science industry. The segment employs 10,000 people and has a total turnover of £1.2bn, one of only 13 segments in the life science industry with a turnover over £1bn and the 6th largest in the Core Med Tech sector.
- 4.1.3 The estimated turnover and employment includes only businesses where a significant proportion (over 20%) of their economic activity is in Digital Health. This approach does not include all the economic activity associated with, for example, large diversified businesses where digital health is not their main activity.
- 4.1.4 **Analysis of growth** based on the data for real growth between 2016 and 2017 digital health businesses had the largest increase in employment, adding an estimated net 1,100 jobs and a strong 11% increase in turnover.

18 See Annex 3 for a description of sub-segments used to further analyse this segment.

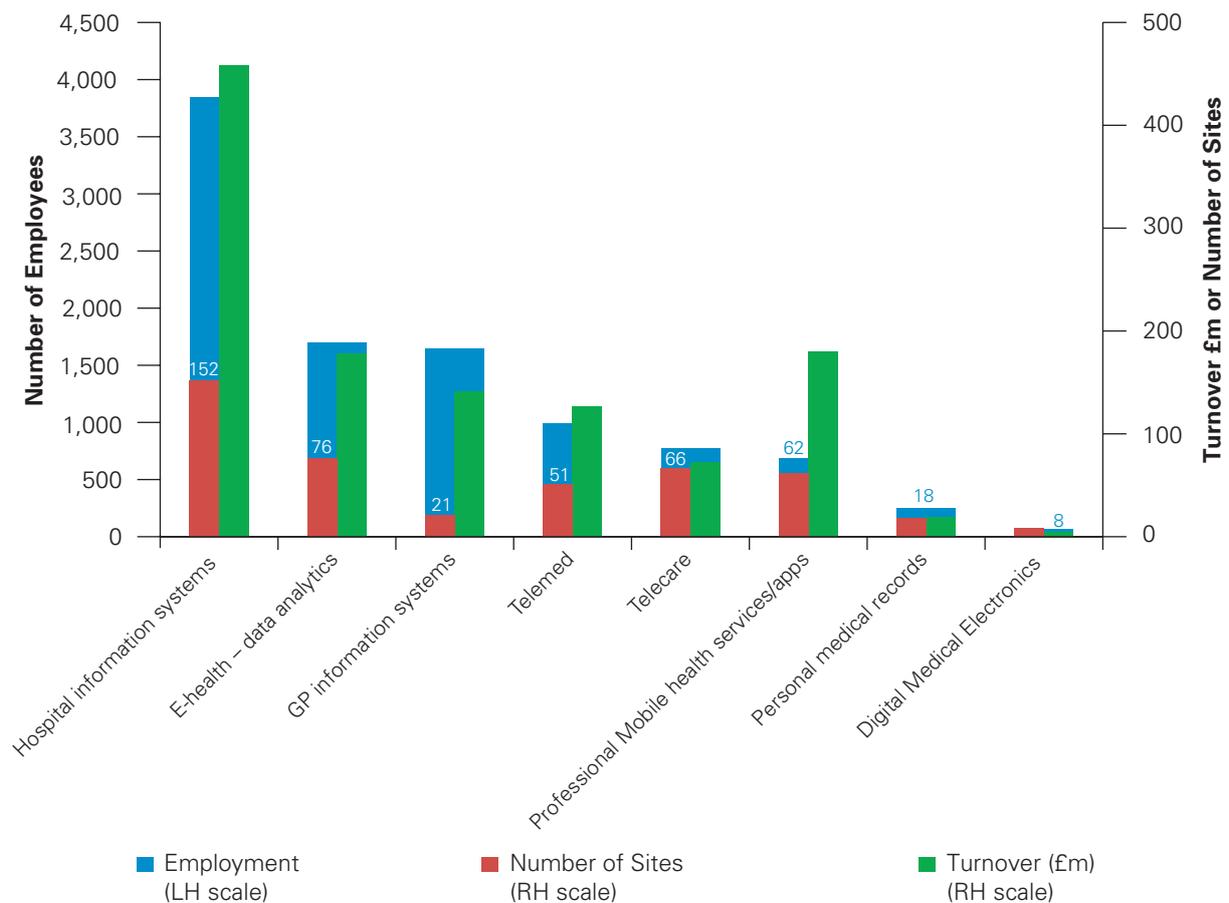
19 Data from American Marketing Association presentation.

4.1.5 Of the businesses where the formation date is known and an estimated 54% (260) of digital health businesses were formed in the last 10 years and 27% (131) over the last 5 years.

4.1.6 **Analysis of the breakdown of the sector** shows that within Digital Health, Hospital Information Systems accounts for the most sites, turnover and employees representing 38% of all employment (3,800 people). The E-health analytics and GP information system are the next largest segments employing an estimated 3,300 people combined. The E- health analytics sub-segment has the second highest turnover and number of sites in the segment.

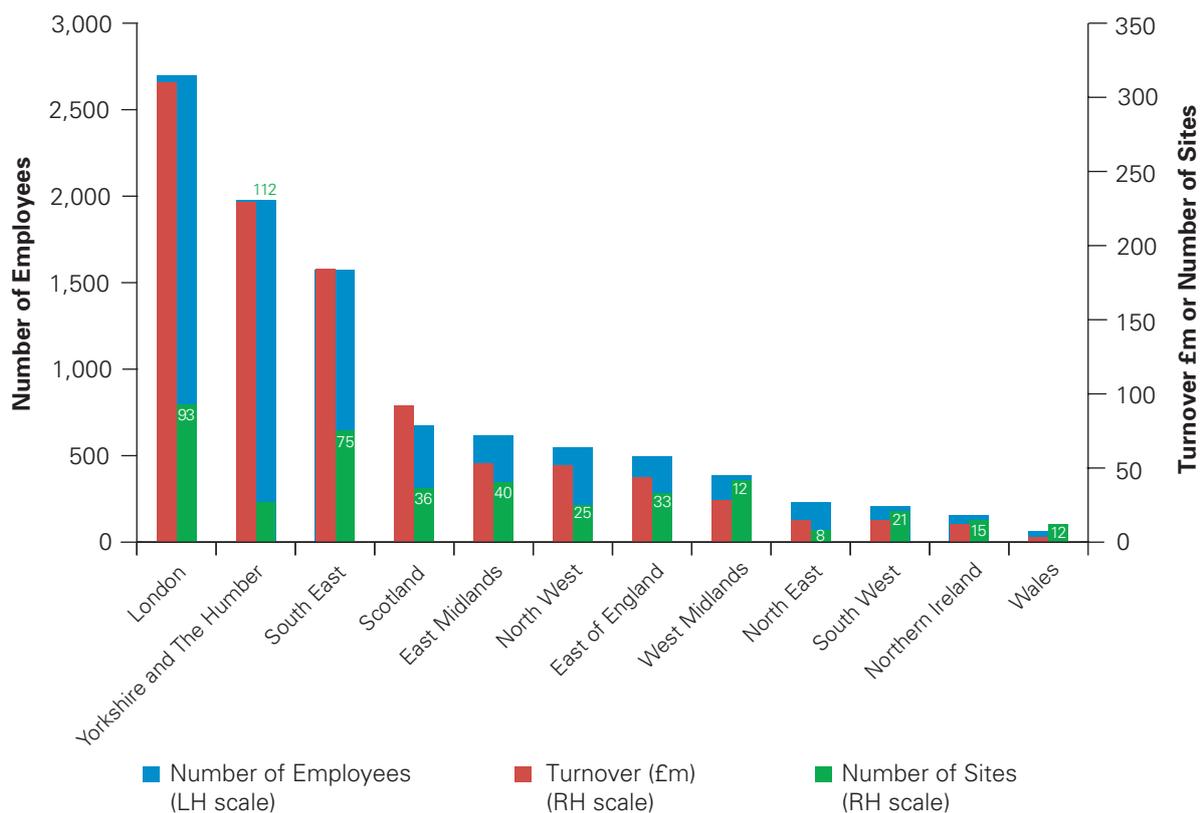
4.1.7 **Analysis of the size of businesses** shows that 83% (387) of digital health businesses are SMEs and employ 34% of digital health jobs (3,451 people), contributing £0.3bn in turnover (26%) of the digital health activities in the industry. The hospital information sub-segment has the largest number of SMEs (109) in digital health.

Figure 15. The distribution of employment, turnover and number of site cross the Digital Health sub-segments (only for sub-segments that employ more than 50 people)



4.1.8 **Geographical analysis** shows that London has the most Digital Health sites followed by Yorkshire and the Humber and then the South East of England. Employment shows the same ranking and these 3 regions are the only ones that employ more than 1,000 people. These 3 regions also generate the highest individual turnover and combined generate 69% (£0.8bn) of Digital Health turnover. **Figure 16** shows the geographical distribution of economic activity in the Digital Health segment.

Figure 16. The distribution of employment, turnover and number of companies for Digital Health across the UK



4.2 Genomics

4.2.1 Genomics is an interdisciplinary field of science and technology focused on the study of genomes. In this analysis the focus is on the study of the human genome and the application of the resulting knowledge to human health. Since the instigation of the Human Genome project in 2001, the field and its applications have grown. The market for equipment, reagents and services based on genomics is estimated at £8bn and is forecast to grow rapidly.²⁰

20 Genomics in the UK, Deloitte study for the Office of Life Sciences, Sept 2015.

- 4.2.2 **Overall genomics related activity** in the UK is located in 54 sites with 1,600 employees and a total turnover estimated at £1.7bn²¹.
- 4.2.3 **Analysis of the businesses involved in genomics** shows the largest group is those businesses involved in applying genomic information to activities such as designing clinical trials (44% of businesses). However, the largest segment in terms of employment and turnover contains businesses involved in providing sequencing equipment and consumables, accounting for 64% of employment and 96% of turnover within the genomics field.

21 The economic activity is based primarily on businesses that have the majority of their activity in the sector either selling equipment, reagents or services. The analysis does not include in-house use or application of genomics for example for drug discovery & development.

Annex 1

Full Data partners acknowledgement statement

- 1.1 The Office for Life Sciences gratefully acknowledge the contribution of the following regional and national organisations in the compilation of the Health Life Sciences Database.
- 1.2 The content of the database has been derived from a variety of proprietary data sources which have been provided under license. The Office for Life Sciences would like to acknowledge the assistance given by the owners of these data sources.
- 1.3 Business Information was accessed under license by Dun & Bradstreet Limited and the FAME database from Bureau van Dijk Electronic Publishing.
- 1.4 The database construction, data integration, data analysis and commentary preparation was completed by a consortium led by Cels Business Services (CBSL) Ltd. The consortium included Kepier Ltd and Lindum Ltd (data integration and analysis).

Data Partners

- Association of British Healthcare Industries (ABHI)
- Association of the British Pharmaceutical Industry (ABPI)
- AXREM
- BioIndustry Association (BIA)
- Bionow
- Biopartner
- Biosciences Knowledge Transfer Network (KTN)
- British Healthcare Trade Association (BHTA)
- British In Vitro Diagnostics Association (BIVDA)
- HealthTech and Medicines Knowledge Transfer Network (KTN)
- Innovate UK
- Invest Northern Ireland
- Medcity

- Medilink East Midlands
- Medilink West Midlands
- Medilink South West
- MediWales
- OBN
- One Nucleus
- Scottish Enterprise
- South East Health Technologies Alliance (SEHTA)
- TechUK
- Welsh Assembly Government

Annex 2

Summary of Methodology

- 2.1 The annual update of the database is carried out in 4 main phases: compiling information on new businesses and existing businesses; classification or segmentation of new businesses ; matching of business details with economic data from external databases; validation of the data set.
- 2.2 Information on new businesses is sourced from the data partners and also by searches of publically available and subscription databases. The data partners provide lists of businesses from their internal databases which contain both potentially new businesses (those businesses that have been formed in the period after the last annual update) and existing businesses (those businesses that are already in the database). For existing businesses this includes information the data partners have obtained on address changes, any information on employees at a location or suggested segmentation changes.
- 2.3 The information from data partners and other information sources is cleansed to remove duplicates and records already in the database and is then segmented. The segmentation assigns each new business and site to a sector and segment (in some cases allocation can be to more than one sector or segment, for example some large multi-national businesses produce both pharmaceutical and medical devices). If based on the information available a business cannot be assigned to a sector and segment it is deemed to be not-in-scope (NIS). Such NIS business information is retained for posterity but not included in the data set used to analysis the industry.
- 2.4 In order for a business to be classified as in-scope and their data to be included in the database they are assessed against the following criteria: have a legal entity in the UK; is a private limited company (this excludes universities, publically owned institutions, NHS activites, and charities); have 20% of their total UK turnover derived from one or more of the segments shown in Annex 3²².
- 2.5 Once the cleansed data set is prepared it is used to source data on turnover and employment from either Dun & Bradstreet (D&B) or FAME and from examination of published company reports or data. The turnover figures will

22 The focus of the economic activity included in the database is from companies that either develop or produce pharmaceuticals or medical devices sold to healthcare providers (e.g. the NHS) and companies that are part of the supply chain to these Core companies. There is also included activity from some of the larger wholesale companies that historically were involved in manufacture.

include turnover on the sale of products wholly or partially manufactured outside the UK.

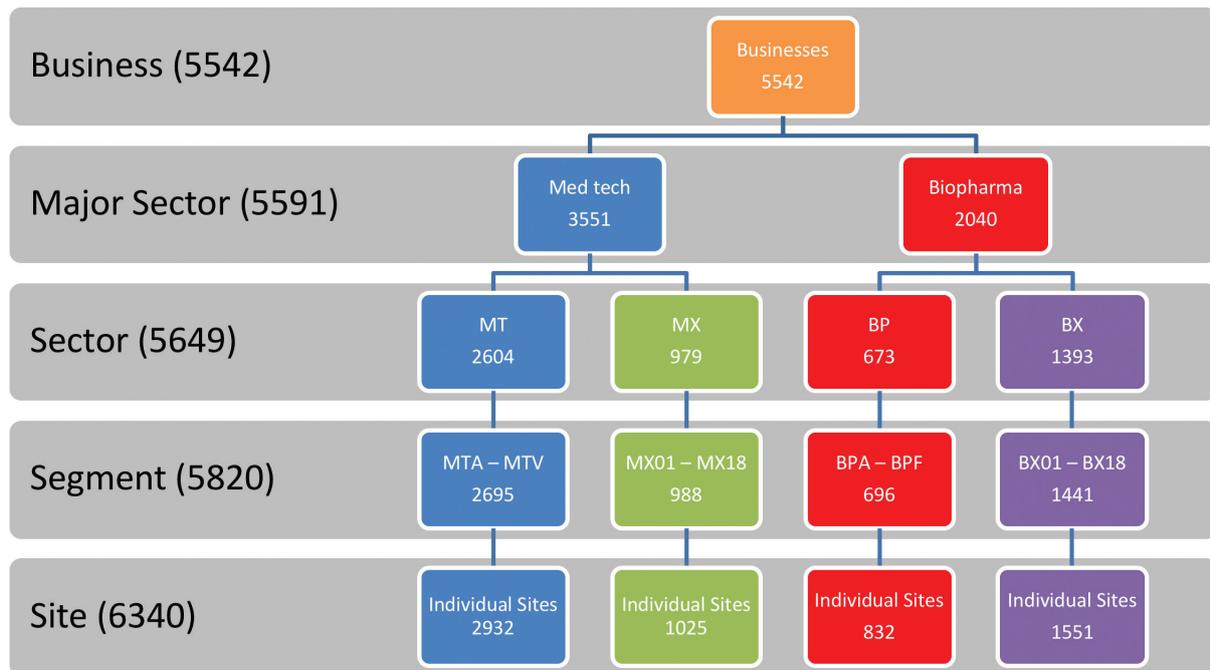
- 2.6 The year referred to in this report is the year of the update rather than the year of the turnover and employment figures; turnover and employment are for the latest 12 months available. For the majority of sites, these figures will have been derived from latest accounts submitted by businesses to Companies House; the figures may be submitted up to 9 months after the end of the accounting period (which itself may vary between businesses).
- 2.7 The data returns from D&B and FAME are carefully checked to ensure a correct match with the business location. Further detailed validation of the data is then carried out examining significant changes in the employment and turnover data. These changes are examined to detect any anomalies through verification against other sources. For example, large changes in employment at a business site are examined to see if information is available from press releases or other information in the public domain to verify the change. The data for individual sites under one business is examined to ensure that there is no double-counting of employment or turnover data.
- 2.8 Once the validation analysis is completed the data set is “locked” for the annual update cycle, ready for analysis for Strength and Opportunity publication.

Segmentation

- 2.9 The Health Life Sciences database contains information on businesses in the UK structured at the level of trading address corresponding to the 6,340 records in the database. Using this as the lowest level of information the data is aggregated to site and company level to give the estimate of total number of life science businesses in the UK (5,543). Each trading address or site is examined to allocate the activity carried out to one of the segments within in a sector. Because a small proportion of businesses in the database have more than one trading address or site and can operate in more than one sector (for example can have activity in medical technology and pharmaceuticals) the sum of number of businesses from analysis at the sector, segment and geographical level will be greater than the total number of businesses in the UK.
- 2.10 Each business and their individual sites are segmented depending on the main type of final medicinal product or device produced. Businesses that produce products that are directly used in healthcare are designated “Core” businesses to distinguish them from businesses that are active only in the service and supply chain.
- 2.11 Within the database codes are used to allocate businesses and sites to one or more segments. Where a company has products that fall in more than one category these are all coded, however in the analysis of the data only the code that represents the majority of a the business activity is used.

Figure 17 breaks down the count of records in the database from the total of number of businesses in life sciences down to the allocation of sites to business activity.

Figure 17. The count of records in the database at each level of classification from site level through segment, sector and industry.



- 2.12 Segmentation was reviewed for all businesses and sites in the 2014 update. During the 2015 update a number of the businesses that have large contributions to employment and turnover were reviewed for segmentation and their turnover in scope (TOS). The Pharmaceutical and Medical Biotechnology sectors were also combined into a new sector: Biopharma.
- 2.13 Additional segmentation codes are used to further classify company activities by both product type and business activity. For example in-vitro diagnostics is further segmented into in-vitro diagnostic products that involve clinical chemistry, immunochemistry etc. The business activity codes are used to code businesses and sites dependent on whether they undertake R&D, manufacturing, service & supply (of their products) and sales/distribution (of their products).
- 2.14 The codes for each sector containing Core businesses are shown in Annex 3. The service and supply chain sectors that serve the Biopharma and Med Tech sectors are coded with the prefix BP and MT respectively followed by the appropriate number to define the type of service or supply.

Alignment with SIC codes

- 2.15 Standard Industry Classification (SIC) codes are used to classify businesses by industry in administrative statistics. This was last updated in 2008²³. This classification system has categories for businesses whose primary activity is the manufacture of pharmaceuticals, manufacture of types of medical equipment, and those whose primary activity is biotechnology R&D.
- 2.16 However the SIC system does not allow identification of the full range of health life science businesses. A bespoke industry segmentation based on this wider range, specifically to be used in the database, was defined with the assistance of the Data Partners and is summarised in Annex 3. This is the classification system used in this report.
- 2.17 We have analysed the SIC codes of the businesses within the database and only 21% of businesses in the Health Life Sciences database fall into the standard SIC codes used to identify the life sciences sector. The remaining businesses fall into another 241 SIC codes, demonstrating the on-going need for this report and for the Health Life Science database to describe and analyse the full breadth of the health life science industry.
- 2.18 For comparison **Table 1** shows the total employment and turnover for businesses in the database with SIC codes typically used to define the life science sector.

Table 1. *Turnover, employment and number of sites based on the SIC codes that cover the main sectors in the life science industry.*

SIC code description	SIC Code	Number of Sites	Employment	Turnover £m
Manufacture of Basic Pharmaceuticals	21100	269	44,710	21,145
Manufacture of pharmaceutical preparations	21200	110	11,656	3,831
Manufacture of Irradiation, Electromedical and Electrotherapeutic Equipment	26600	30	1,328	372
Manufacture of Medical and Dental Equipment and Supplies	32500	448	25,649	4,675
Research and Experimental Development on Biotechnology	72110	619	10,165	3,709
Total Life Sciences based on SIC	NA	1,476	93,508	33,732
Total Life Sciences in database	NA	6,340	240,886	70,345

23 <https://www.gov.uk/government/publications/standard-industrial-classification-of-economic-activities-sic>.

- 2.19 The additional benefit of the segmentation approach used in the health life science database is the ability to make a more granular assessment of the sector, including growth rates and trends. For example, this is the only source of definitive information that shows employment and growth rates in digital health or allows us to understand the growth of advanced therapy medicinal products.

Comparisons over Time

- 2.20 This year in addition to the real growth analysis between 2016 and 2017 we will be publishing a supplemental report containing an analysis of economic growth using a new methodology. This methodology will source available data for all businesses in the data base to fill in historical data. For those companies where the economic data is not sourced from company filed accounts an algorithm will be used to populate the data set based on growth profile averages for individual segments. This data set will enable the analysis of trends over a 10 year period up to 2017.
- 2.21 Real growth or like-for-like growth between 2016 and 2017 is calculated by removing changes in employment or turnover associated with the addition of businesses that were formed more than 12 months before the update and not previously in the 2016 dataset. Data for businesses that are re-classified as not in scope (NIS), duplicates or those were previously classified as ceased trading but now trading are also excluded. **Table 2** shows data used for the calculation of real or like-for-like growth.

Table 2. Breakdown of the employment and turnover differences between the 2016 and 2017 datasets including the elements that make the calculation of real or like-for-like growth.

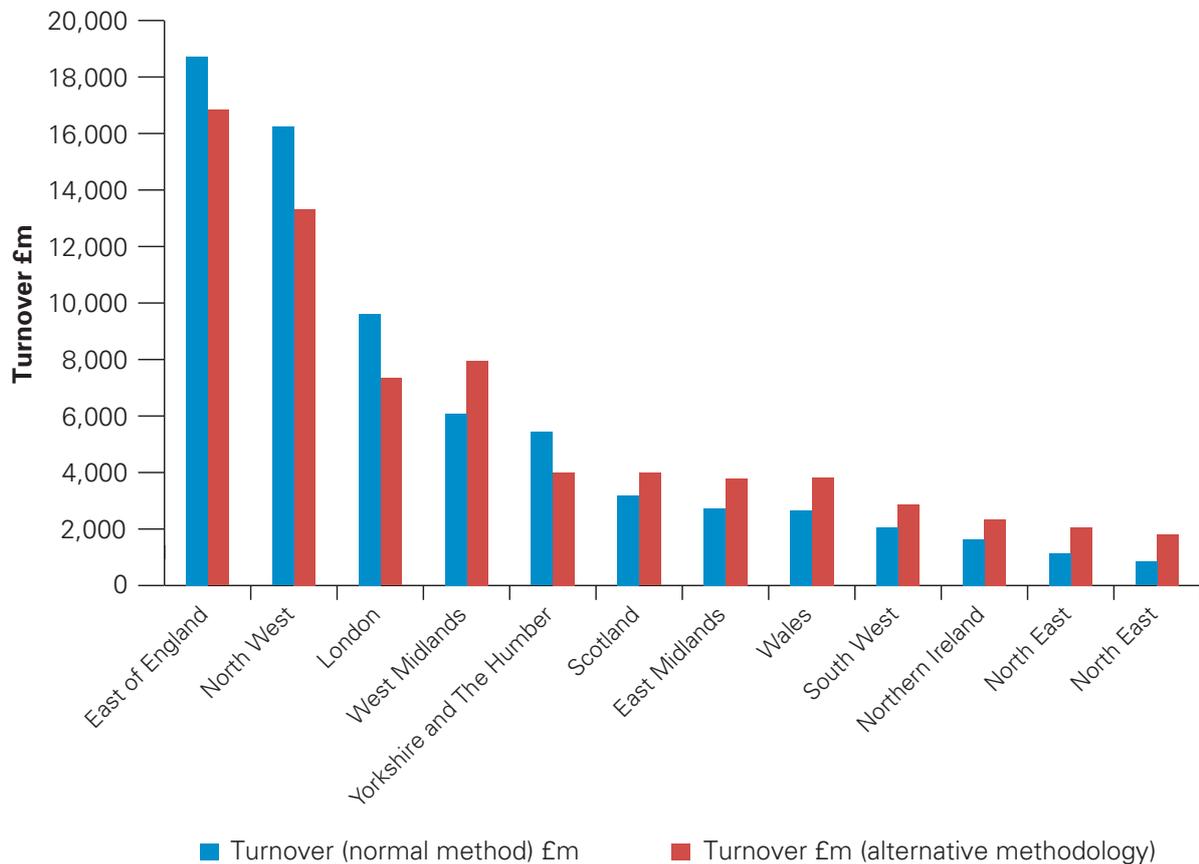
Class of change	Type of data	UK companies and sites	Employees	Turnover £'000
Total active 2016	As reported last year	6,042	233,401	63,500
Total active 2017	Reported this year	6,340	240,886	70,300
	Difference	298	7,485	6,900

Analysis of Real Growth Calculation				
Company births	Real change	121	315	24.7
Restructuring	Real change		4,305	1,420
Trading	Real change		3,484	4,700
Company deaths this reporting year	Real change	-177	-1,975	-170
Site closures this reporting year	Real change	-11	-432	-89
		Total Real Change	5,697	5,900
			2.4%	9.3%
New old – businesses (sites formed in 12 months prior to update data sourced)	Excluded from real change	446	6,453	1,840
New old - sites (new sites for businesses already in 2016 database)	Excluded from real change	70	517	530
Terminated (duplicates, mergers and acquisitions, not-in-scope)	Excluded from real change	-170	-6,050	-1,700
Reinstated (previously out-of-scope or deemed to have stopped trading)	Excluded from real change	19	868	280
	Reconciled totals	298	7,485	6,900

2.22 The geographical distribution of industry turnover is based on the site level information from third party data sources, primarily D&B and FAME. Whilst this is the most robust method available to assign geography to turnover it may not correlate directly with the economic activity at that location. For example, a company can, within its legal structure, place turnover in a sales legal entity based at its company HQ location.

2.23 An alternative method of allocating geography to turnover is to calculate the average sales turnover per employee for each segment, then multiply by the number of employees in that segment in a region. Regional segment turnovers are summed to reach regional totals. This modelled approach is less reliant on third party data sources and so is less affected by missing data.

Figure 18. Geographical distribution of Life Science industry turnover based on factoring of regional employment compared to the primary allocation methodology

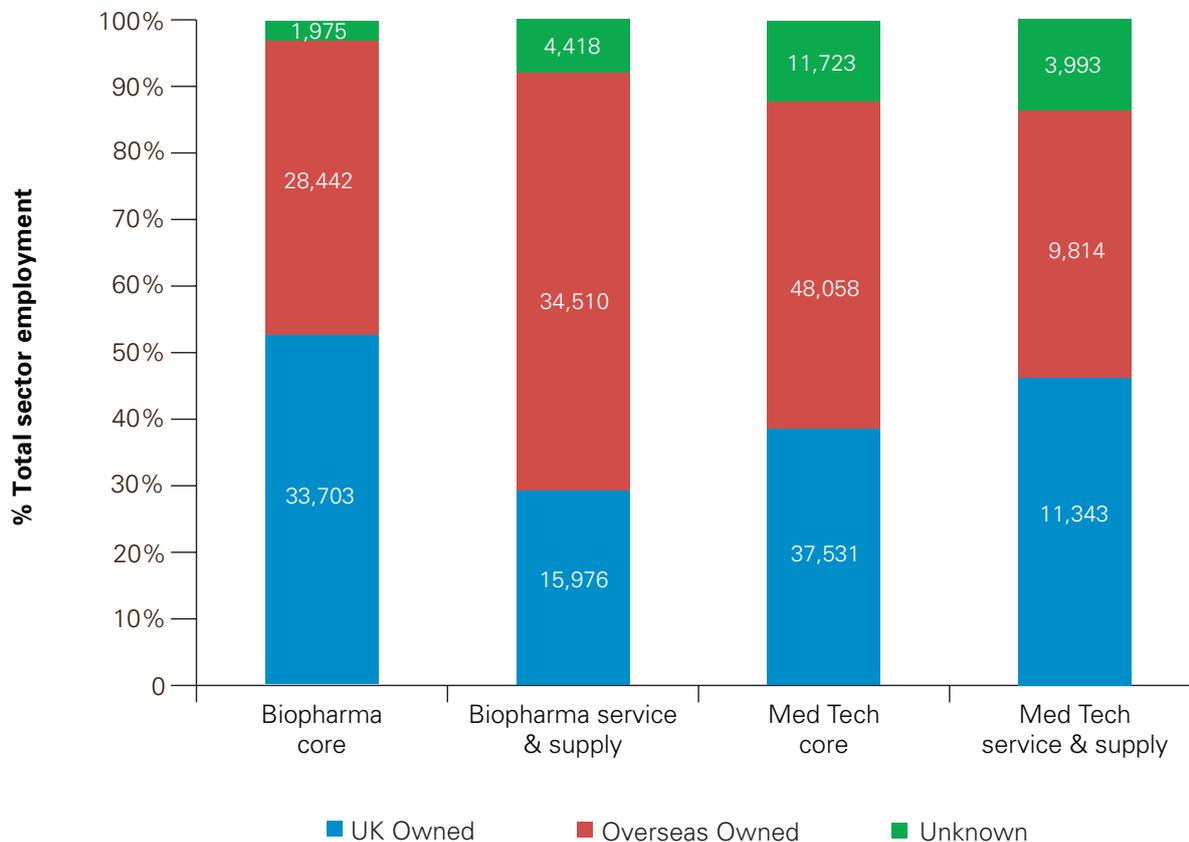


2.24 This shows on average a 28% difference per region however, with limited effect on the rank order of the regions. Using the alternative method, the South East and East of England would still be the two largest, the ranking of 3rd to 5th would alter with London moving to the 3rd position followed by North West of England and then the West Midlands.

Company Ownership

- 2.25 The data sources contain information on the ultimate global owner of the businesses in the database. This information is available for 3,434 of the records in the database or 54%. However, the businesses where the owner origin is not known have a low economic impact as can be seen from **Figure 18**.
- 2.26 Where ownership data is available businesses and sites that are UK owned employ 45% of the life science industry workforce, while businesses and sites where the owner is unknown account for 9% of the total. The 255 Core Biopharma businesses and sites that are UK owned employ 53% of the total for the sector, contrasting with the 965 UK owned Core Med Tech businesses and sites that account for 39% of the sector employment.

Figure 19. Distribution of sector employment between UK and Overseas businesses



Annex 3

Segmentation codes

Biopharma	
Code	Description
BPA	Antibodies
BPB	Therapeutic Proteins
BPC	Advanced Therapy Medicinal Products (ATMPs)
BPD	Vaccines
BPE	Small Molecules
BPF	Blood and Tissue Products
BX01-18	Supply Chain

Service & Supply Chain²⁴	
Code	Description
X1	Clinical Research Organisation
X2	Contract Manufacturing/Research Organisation
X3	Contract Formulation Manufacturing
X4	Assay developer
X5	Analytical Services
X6	Formulation/Drug delivery specialist
X7	Reagent, Equipment and consumables supplier
X8	Regulatory Expertise
X9	Patent and Legal specialist
X10	Logistics and Packaging
X11	Information systems specialists
X12	Tissue and Biomass
X13	Specialist consultants
X14	Contract design
X15	Training
X16	Recruitment
X17	Investment Businesses
X18	Healthcare services

24 Codes for Biopharm and Med Tech sectors covering the Service & supply segments are prefaced with BX and MX respectively e.g. Medtech Clinical research organisation is coded as MX1.

Medical Technology	
Code	Description
MTA	Wound care and Management
MTB	In vitro diagnostic technology
MTC	Radiotherapy equipment
MTD	Medical Imaging/Ultrasound/and Materials
MTE	Anaesthetic and respiratory technology
MTF	Orthopaedic Devices
MTG	Cardiovascular and vascular devices
MTH	Neurology
MTI	Ophthalmic Devices/Equipment
MTJ	Dental and maxillofacial technology
MTK	Drug Delivery
MTL	Infection Control
MTM	Surgical Instruments (reusable)
MTN	Single use technology nec
MTO	Re-usable diagnostic or analytic equipment
MTP	Implantable devices nec
MTQ	Assistive Technology
MTR	Mobility Access
MTS	Hospital hardware including ambulatory
MTT	Digital Health
MTV	Education and Training
MX01-18	Supply Chain

Digital Health			
Sub-segment code	Short Description	Long Description	Deloitte segment or example
MTT1	Hospital information systems	Secondary health system-held medical record systems are electronic versions of traditional paper records – often abbreviated to EHR. Includes provider-provider communication systems, e-prescribing	Digitised Health systems – provider held digital records
MTT2	GP Information Systems	Primary health system-held medical record systems are electronic versions of traditional paper records – often abbreviated to EHR. Includes provider-provider communication systems, e-prescribing	Digitised Health systems – provider held digital records
MTT3	Social Alarms / Communications devices	Telecare - support and assistance provided at a distance using ICT, such as fall alarms and medicine management delivered over hard-line or mobile platforms	Telehealthcare - Telecare
MTT4	Personal Medical Records	Systems for patients to hold their own medical information	Digitised Health systems – patient held digital records
MTT5	Teled (medical monitoring) and telediag	Telehealth - the remote exchange of clinical data between a patient and their clinician delivered over hard-line or mobile platforms. Includes video consultation and remote monitoring of health parameters such as blood pressure.	Telehealthcare - Telehealth
MTT6	E-health – data analytics	<ul style="list-style-type: none"> • Software and infrastructure to enable analysis of health and medical Big data. Applications included: • To support clinical decision-making: enabling clinicians to make evidence-based clinical decisions about patient care • Pathway design: using population level analysis to help redesign clinical pathways • Commissioning: developing standard frameworks and models for innovative commissioning/funding • Drug assessment: the long term use of real world evidence to support drug development and approval. • Performance management: prioritising resource allocation and measuring key performance metrics to better manage finances within the healthcare system. 	Health Analytics – data analytics
MTT7	Digital Medical Electronics	Devices that conduct monitoring of body activity internal or externally, are wireless and incorporate sophisticated software that involves enables a high degree of operation independent of human intervention	e.g. Proteus digital pill, imaging pills, predictive intensive care monitoring stations (algorithms predict impending crisis).
MTT8	Professional Mobile health devices	Mobile devices that are applied in a clinically setting (can include embedded software or interface with independent software)	mHealth – applications – medical apps e.g. wearable electrocardiogram worn by patient at home for periods of days to detect heart arrhythmias
MTT9	Professional Mobile health services/apps	Clinically-led apps that manage medium to high confidentiality data (health data and personal medical records); these are used by clinicians, patients or hospital system reporting to aid prevention, diagnosis, and/or monitoring of disease	mHealth – applications – medical apps
MTT10	Consumer Mobile health devices	Consumer-led fitness and wellbeing devices that monitor basic body functions such as activity levels, heart rate and blood pressure	mHealth – wearables , applications -wellness/fitness
MTT11	Consumer Mobile health services/ apps	Consumer-led fitness and wellbeing apps that handle low-confidentiality data (personal wellness and activity data) and are usually a consumer-driven purchase, includes services to store consumer data in the cloud and provide health advice based on the data	mHealth – wearables , applications -wellness/fitness

Genomics				
Main	Main Value chain	Description	Sub-tag code	Sub-tag chain activity
Tagging code	Activity			
GenA	Sampling	The process of collecting and packaging samples (e.g. saliva, blood). The kits used to collect DNA samples are fairly simple.	GenA1	Consumables
GenB	Sequencing	Decoding the order of the nucleotides in a genome. DNA sequencing on a large scale is done by high-tech machines	GenB1	Consumables
			GenB2	Instruments
			GenB3	Services
GenC	Analysis	The process to identify disease-causing variants, often run by bioinformatics software.	GenC1	Data cleansing
			GenC2	Variant Analysis
			GenC3	Database services
GenD	Interpretation	Taking analysed information and providing clinically useful interpretations and results	GenD1	Reporting
			GenD2	Link with EHRs
			GenD3	Tailoring results
GenE	Application	The process of directly using genomic information to improve targeting of clinical services	GenE1	Drug development
			GenE2	Clinical Services
				Diagnostics
GenX	Activities not elsewhere classified	A segment where companies that are not clearly assigned to GenA-E should be placed. When this group becomes large it will be examined to see if new segments are required	N/A	N/A

Annex 4

Data Quality Principles

4.1 Whilst this report is not Official Statistics, we aim to collect data and present this report in line with principles of the Code of Practice for Statistics²⁵ to engender trust in our data and encourage the use of this report as a reliable source of life sciences data.

4.2 This data quality statement covers the fourteen principles under the three pillars of the Code: trustworthiness, quality and value.

A4.1 Trustworthiness:

A4.1 **T1: Honesty and integrity** – Data is collected, processed and quality assured by an independent contractor. The initial technical specification is set by professional statisticians with the Office for Life Sciences (OLS) who also engage regularly with the contractor, review methodological aspects, and undertake further quality assurance checks before publication.

A4.2 **T2: Independent decision making and leadership** – OLS statisticians abide by the Code of Practice, keeping pre-publication access to the data strictly to those involved in the report's creation and ensuring the statistical integrity of content. The Department's Head of Profession for Statistics is engaged when necessary.

A4.3 **T3: Orderly release** – Pre-publication access to the report is restricted to those involved in the report's creation and publication. The report meets GSS standards of statistical impartiality, separating statistical commentary from any political, press or ministerial statements. Subsequent statements by the government using data from this report quote this source and non-governmental users are encouraged to do the same. Unscheduled corrections are released as soon as is practicable, alongside an explanatory note on both the cause and impact of the error, in line with the Code of Practice.

A4.4 **T4: Transparent processes and management** – Substantial financial and administrative resources are employed to enable this data collection and effective quality assurance, including a proportion for further development of the report each year in light of new user requirements or new methodology / collection possibilities. We are transparent about our methodology and approach to quality, as evidenced in Annex 2.

25 <https://www.statisticsauthority.gov.uk/code-of-practice/>.

- A4.5 T5: Professional capability** – Data is collected, processed and quality assured by a consortia contractor. Each individual has appropriate analytic capabilities, data protection awareness and industry-specific expertise, and has been involved in the production of the report for several years. The report ‘owners’ within OLS are professional GSS-badged statisticians.
- A4.6 T6: Data governance** – All professionals involved in the creation, publication and storage of this dataset are well-versed in data protection and operate in compliance with data protection legislation. We publish the maximum amount of data available without contravening third-party licence agreements, utilising GSS best practice for statistical disclosure control (e.g. banding commercially sensitive variables).
- A4.2 Quality:**
- A4.2.1 Q1: Suitable data sources** – Full methodology including a description of third party administrative data sources and their suitability can be found in Annex 2. The annex also contains a comparison between the health life sciences database and ONS SIC codes, the main alternative source. Different segmentation levels and how these are aggregated into final figures are explained in Annex 2, with the glossary defining key terms to ensure users are clear at what level figures are presented (e.g. businesses vs. sites).
- A4.2.2 Q2: Sound methods** – Full methodology can be found in Annex 2, alongside assumptions made. Terminology is consistent through the report and accompanying files, with clear descriptions in the glossary. Year-on-year trends are for real growth only based on like-for-like data against the previous year. The method used for the real growth calculations is explained in the Annex 2. To ensure long-term trends are calculated using the most robust methodology and greatest level of data available, we will be undertaking extra trend analysis which will be published in a supplemental report later in the year.
- A4.2.3 Q3: Assured quality** – Rigorous quality assurance has been undertaken by the contractor, OLS statisticians and an external business analyst within the wider Department. Quality assurance is a significant part of the technical specification and contract tendering process, and is reviewed each year. When an unscheduled revision was necessary following the post-publication identification of an error in a previous report, we immediately alerted users, engaged with the Department’s Head of Profession for Statistics, and published an explanation of the cause and impact of the error alongside the revised report, all in accordance with the Code of Practice.
- A4.3 Value:**
- A4.3.1 V1: Relevance to users** – We review content each year based on user needs, allowing a proportion of resource for that year’s topic of interest. In previous years this has led to the inclusion of digital health and genomics as chapters in their own right, with a new cross-cutting classification designed

to identify businesses operating in genomics. This year the topic of interest is a portrayal of long-term trends using an alternative methodology which will be published in a supplemental report later in the year. In response to user feedback, this year we have further extended the fields in the publically available underlying businesses dataset to include all fields for which we are not restricted by commercial licences. In particular, we now include a unique reference number for each site.

- A4.3.2 V2: Accessibility** – Data is free and equally available to all, published on gov.uk with no restrictions to access. Underlying data is published up to the extent our commercial licenses allow, with banded variables where we cannot provide exact figures. Commentary is objective and a range of graphical visualisations are used to aid comprehension.
- A4.3.3 V3: Clarity and insight** – Commentary on the current size and shape of the life sciences sector is objective, focussing on impartial statistical messages. Charts and maps are used to illustrate these. Key statistical messages are highlighted up front. A comparison between the health life sciences database and ONS SIC codes, the main alternative source, is presented in Annex 2. The database itself is created through collaboration with a range of industry experts, including region-specific and sector-specific representation through trade bodies and other network organisations.
- A4.3.4 V4: Innovation and improvement** – We review content, presentation and methodology each year based on user needs. Past development has primarily been around scope and how to identify new and emerging segments of the life sciences sector, e.g. digital health and genomics. Each new approach to scope is explored and tested with our data partners, and the statistical impact is fully considered before implementation. Other developments have included extending the scope of publically available data fields.
- A4.3.5 V5: Efficiency and proportionality** – Where possible, the database draws on existing information using third party sources, such as the D&B and FAME datasets and company accounts. All data partners are voluntary contributors. The need for this health life sciences database and report arises from the difficulty in identifying the life sciences sector from already-existing ONS sources since they use SIC codes, which do not encapsulate the full extent of the life sciences. In particular, as SIC codes were last refreshed in 2008 they do not allow easy identification of new and emerging segments within the medical technology sector, such as digital health. The public good of a robust evidence base on the size and shape of the UK life sciences sector is deemed of suitable value to warrant the creation of this additional database and report.

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