Nottingham Trent University

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Digital and Life Sciences Skills in D2N2

Labour market intelligence report for Nottingham College

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Executive Summary

This report assesses the national, regional and local labour market in the digital and life sciences sectors in support of a proposal to deliver a Skills Accelerator Programme as part of the Strategic Development Fund (SDF). To do so, the report includes an extensive review of the relevant research and policy literature and a detailed analysis of regional and local data. We examine demand from the perspective of the employer and not the potential student. That is, the report is concerned with the demand for labour and not the demand for courses.

Key findings

- Negative impact on economic growth and productivity is well documented at national level, with some understanding of possible impacts at regional and local levels. Despite this, long standing calls to ensure support is provided and curricula can keep up to date with emerging digital skills trends have gone unanswered.
- Terms such as ‘digital’ and ‘bio-tech' remain broad concepts, with no universally agreed definition for either. Further clarity within and beyond the sectors would help reduce ambiguity and improve comprehension of issues at multiple levels.
- Some examples of initiatives to tackle the digital skills shortage have included Further Education Colleges and Universities working both independently and collaboratively to provide cyber skills courses, ranging from introductory level to degree apprenticeships, whilst local schools shape their curricula to bring focus on skills development in ICT and the sciences. Successful programmes have led to several schools and colleges becoming recognised by the National Cyber Security Centre (NCSC), for offering top quality cyber security education.
- Skills shortages within life sciences and bio-tech have highlighted a shift in demand for highly specialized individuals/experts in a narrow field, to those with broader skillsets. This includes ongoing recognition of a long-term decline in the training of laboratory technicians, with one impact being the under-employment of university graduates.
- Intervention strategies purporting to address skills shortages continue to be hampered by poor measurement of outcomes; decision makers must seek ‘better evaluation methods to determine what has been successful’, and ‘ensure past failures are not replicated’.
- The analysis of local data finds strong evidence of demand for digital skills and particularly coding, web and software development, and data and analytics. Demand for technical creative skills, motion graphic editing skills as well as digital marketing skills is also evident in all datasets used in the report.
- The regional business ecosystem and employment trends suggest that there is sufficient demand for life science skills whereas the analysis of job postings provides robust evidence of strong demand for CAD/CAM skills and digital rendering.
- Evidencing demand for skills through analysis of job postings is problematic when applying this to small sectors such as the life sciences. Lack of evidence of postings should not be interpreted as evidence of a lack of demand in this case.
- It is expected that demand for Cyber Security will extend far beyond the two sectors in question and outside the geographical boundaries.

Introduction

This report assesses the national, regional and local labour market in the digital and life sciences sectors in support of a proposal to deliver a Skills Accelerator Programme as part of the Strategic Development Fund (SDF). To do so, the report includes an extensive review of the relevant research and policy literature and a detailed analysis of regional and local data. Data from the Office for National Statistics, the FAME database and EMSI are interrogated to understand the nature and scale of the regional demand for skills in the digital and life sciences sectors. We examine demand from the perspective of the employer and not the potential student. That is, the report is concerned with the demand for labour and not the demand for courses.

The digital and the life sciences sectors are explored in a national and regional context through analysis of the relevant literature. These sections highlight the macro trends and the challenges of meeting business demand. The data analysis provides granular information at a local level. The geographical scale of the data is limited to Derbyshire and Nottinghamshire, which together form the D2N2 LEP area. The report highlights the limitations imposed by sectoral definitions and the need to consider demand from beyond the region. We find strong evidence of demand for technical skills in both the digital and life sciences sectors.

National context

Digital Sector

In their forecast for digital employment[1], the Local Government Association (LGA) states that whilst there is no universally accepted definition of the digital sector, this can be broadly understood as 'related activities or characteristics' via the production (of goods and services) intended to 'fulfil or enable the function of information processing and communication by electronic means' as defined by Organisation for Economic Co-operation and Development[2]. This could include 'transmission and display' (for example infrastructure/services allowing for the enjoyment and exploitation of digital technology for personal or business purposes). Drawing on the UK Governments 'Digital Skills for the UK Economy'[3] the report highlights 'three expansive categories' of digital skills that require further focus, as those deemed by the DCMS (Department for Culture, Media and Sport) as 'no longer optional' in the context of employer needs. These are:

- Digital skills for technology professionals: the skills needed to work across the diverse 'digital' sector.
- Digital skills for the general workforce: the skills needed in a workplace and generally linked to the use of applications developed by IT specialists.
- Basic digital literacy skills: the skills needed by every citizen to become 'digitally literate'. Skills are built up in layers, without good support for skills in the other areas it will be difficult to grow technical skills successfully in the future. Consideration of a fully integrated programme of support is needed.

[1] LGA, 2021
[2] OECD, 2002; 2017; 2020
[3] Department for Culture; Media and Sport et al., 2016

Pulling together research from across the World Economic Forum[4], The Edge Foundation[5], Robert Walters[6] and more, the LGA also identifies 'the jobs of tomorrow' which will require advanced digital skills, including:

- Data analysts and scientists
- AI and machine learning specialists
- Big data specialists
- Internet of things specialists
- Digital transformation specialists
- Process automation specialists
- Information security analysts
- Fintech engineers
- Database and network professionals
- Business development professionals
- Cybersecurity
- Digital skills for the general workforce

Figure 1. Skills Levels and Needs in Nottingham in 2030, thousands

	Low Skilled	Intermediate Skills	High Skills
Supply of Skills	40	88	82
Employer Skills Demand	24	97	132
Skills Gap	17	-10	-49

Note: The figures above are rounded to the nearest thousand.

This is backed by recent findings from the Open University's Annual Business Barometer[7], which suggests that UK employers face a huge challenge when it comes to hiring 'specialist, entry level talent'. This comes from a survey of 1,500 senior organisation leaders, with 45% of respondents claiming that they have struggled when recruiting for non-senior roles. The report also suggests that 56% of businesses view apprenticeships and work-based learning as 'critical to long-term success', with 96% of employers (currently working with apprentices) said to be planning to maintain or increase the number of apprentices in their organisation. However, it is stressed that the benefits of digital skills are not 'limited to traditional tech sectors' with digital skills considered a 'near-universal entry level requirement' for two-thirds of occupations which account for 82% of online job vacancies[8]. Digital skills are also required across multiple levels. In jobs branded 'low-skill', 77% of openings required digital skills – increasing to 85% of 'middle-skill' job vacancies and 83% for 'high-skill' jobs. The report also highlights how digital skills could benefit areas such as career progression and

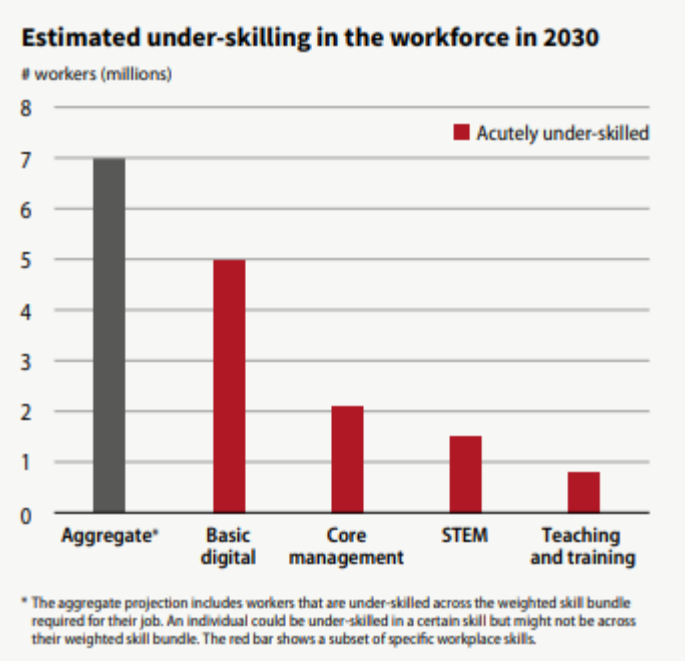
[4] Ratcheva et al., 2020
[5] The Edge Foundation, 2021
[6] Robert Walters, 2021
[7] The Open University, 2021
[8] LGA, 2020

economic reward – with job seekers who hold digital skills said to be commanding higher salaries, and roles requiring digital skills paying 29% more than roles that do not.

Recent research published by the Learning and Work Institute[9], has attempted to model potential skills gaps in England by 2030, quantifying the potential loss of economic output. Analysis suggests a potential shortfall in England of 2.5 million highly skilled people by 2030, coupled with a surplus of 3.1 million workers considered intermediate and low skill, equating to risk to economic output of around £120 billion. In the context of Nottingham city area, the study found a projected shortage of skills at both the intermediate (levels 2-3 – based on the National Qualification Framework) and high levels (level 4+), with an expected surplus of skills deemed 'low-level' (no qualifications to below level 2):

This is further evidenced by research from the Government Office for Science[10], the Industrial strategy Council[11], and The Edge Foundation[12] highlighting that whilst the UK's demand for intermediate to high level skills (particularly technology and interpersonal) is likely to increase considerably over the next few years, the supply of those skills is likely to be constrained, equating to a 'skills mismatch' in terms of shortages and surpluses. This is again thought to result in a 'drag' on economic growth via employment and earnings limitations at individual level, and by impacting on performance and productivity within local and national industry.

Figure 2. Estimated under-skilling in the workforce in 2030



Source: Industrial Strategy Council, 2019

Indeed, UK firms have previously cited lack of access to the right skills as "the number one threat to the competitiveness of the UK labour market"[13], with current participation for in work

[9] Melville & Bivand, 2019
[10] Green, 2016
[11] Industrial Strategy Council, 2019
[12] Edge Foundation, 2020
[13] Edge foundation, 2020, p20

training among the UK's adult workforce considered 'flat at best', there are an estimated 7 million additional workers facing the potential of being considered 'underskilled' for their job requirements (20% of the labour market by current standards), within the next decade. Reskilling, therefore, is likely to be one of the major challenges between now and 2030, with the most widespread under-skilling is likely to be in digital skills[14].

Life Sciences and the Bio-tech industry

The life sciences are also a difficult to define sector, typically covering both bio-pharmaceuticals and medical technology, including the development of new treatments and therapies[15]. Whilst there are some similarities between the terms (with both witnessing a huge surge in terms of popularity and growth, exacerbated by the ongoing pandemic) there are also key differences, mainly that bio-pharma products often stem from bio-tech research and production. The following are also useful in terms of definitions and distinctions:

- Biotechnology can be defined as technology that has its sources in biology. Bio-tech makes use of biomolecular and cellular processes in order to develop products that can aid human health and the environment. When it comes to the medical specifically, it can be defined as a branch of medicine that makes use of living cells as well as cell materials in order to research and then create pharmaceutical drugs.
- Biopharma refers to biopharmaceutical industry, and companies that produce bio-pharma medicines. These are manufactured with the use of living organisms, such as yeast and bacteria, so they refer to medicines that are produced by biological methods[16].

In 2018, the UK's Office for Life Sciences reported that the life sciences industry had grown to employ 248,400 people throughout 58,701 businesses, generating an annual turnover of £73.8bn. The 'Core Biopharma' (with the highest turnover of largest by turnover contributing to 45% of the industry) and 'Core Med Tech' (the largest by employment accounting for 39% of the industry) sectors include businesses involved in the discovery, development and marketing of therapeutics, and medical devices respectively. They are also supported by two Service & Supply sectors that supply materials, equipment and specialist services[17]. The industry has seen 'record growth' since then, particularly from global investment[18] with current understanding also suggesting there has been a shift in demand for skills:

"from highly specialized individuals who are experts in a narrow field, to those who have a broader skillset including inter-disciplinary science, commercialisation skills and business acumen… [and that]… there has been a long term decline in the training of laboratory technicians, one consequence of which may be under-employment of graduates…[with] life sciences firms… often small and… lack the resources to invest in training"[19]. The Association of the British Pharmaceutical Industry (ABPI) has also recently warned of potentially devastating impact of the 'existing skills shortages throughout key disciplines', along with 'proposed post-Brexit curbs on immigration' which it is felt may see the UK lose its

[14] Green; 2016; Edge Foundation, 2020
[15] Rossiter et al., 2018
[16] Brinson & Brinson, 2020, para4
[17] Vanlint, 2019
[18] BIA, 2021
[19] Rossiter et al. 2018, pp4-5

world-leading research and development status, and that continued failure to address the issue of skills shortages throughout the industry will result in the UK losing its status "as a world-leading R&D hub…[and]… we may see even more research - and with it highly skilled jobs - move abroad. This would be bad news for NHS patients and the UK economy"[20].

Amidst what has been deemed a 'crisis point' in the UK's shortage of trained lab technicians[21] the immediate impact on UK covid lab testing capability & future resilience has also been stressed to policy makers:

"At the moment, there are simply not enough trained and skilled lab technicians and quality assurance (QA) technicians across the UK. This is a particularly acute problem within the Covid testing laboratory sector, which is struggling to keep up with the increasing demands on the testing system. Laboratories are understaffed and some are at crisis point; they simply cannot get enough lab technicians and QAs through the doors and into key roles."[22]

However, it is a sector primarily composed of SMEs and start-up companies, with the UK said to be 'leading Europe in discovery research and life-science start-up funding'. It is perhaps therefore unsurprising to note that many companies lack the resources to train technicians[23].

Local & regional context

Life Sciences and the Bio-tech industry

In their 2018 report on Biotechnology, life sciences and skills within the D2N2 area (a Local Enterprise Partnership [LEP] for Derby, Derbyshire, Nottingham and Nottinghamshire), researchers from Nottingham Business School undertook a telephone survey of life science companies in D2N2 throughout May and June 2018. The survey collected quantitative and qualitative data, feeding into the assessment of skills requirements and barriers to business growth[24]. The findings suggest that whilst the local market will continue to be influenced by external factors (such as industry developments at global level), there are a number of suggestions which may help develop local strengths throughout the local (regional/sub regional) sector. This includes:

- There exists an inadequate supply of laboratory technicians, which presents issues for a number of local stakeholders which should be explored further. Not least because one consequence of this phenomenon may be a rise in under-employment of university level graduates; the supply of which, along with doctoral level scientists appears adequate, and already able to meet the foreseeable need of the sector.
- Continued support for the development of specialist business incubation and grow-on facilities suitable for use by life-sciences and biotech companies is important. Alongside the sectors other strengths, it has been demonstrably significant in the emergence of a notable life-sciences cluster in and around Nottingham.

[20] Porkess, in Jones, 2019, para8
[21] McIntyre, 2021
[22] Lord, in Rowe, 2021, para3
[23] Rossiter et al., 2018; Med-Tech, 2019; Vanlint, 2019; Bhandari et al., 2021
[24] Rossiter et al., 2018

- It is also suggested that many small firms are unlikely to have the scale of demand or capacity to make meaningful investments to train technicians themselves. Local stakeholders may therefore perhaps consider drawing from other regional models in the development of a collaborative approach to training of laboratory technicians to meet this demand. This could draw on other emerging/existing models such as those which utilise partnerships involving colleges, universities and councils.
- Further areas of skill needs which are relevant to the future development of the sector were also identified. For example upskilling – scientists working in a sector characterised by a preponderance of small firms, have been said to require significant business expertise, and commercialisation knowledge alongside their scientific qualifications, along with an appreciation for 'the importance of a positive orientation towards interdisciplinary scientific working'. Although interdisciplinary working may be best addressed in Higher Education, it would be useful to explore how the business and commercialisation skills for scientists may be met via collaborative local provision[25].

This is perhaps further evidenced by research exploring the emergence of the growing bioscience cluster in Nottingham. Here it is suggested, that whilst the emergence of biosciences in the Nottingham area has begun building a 'hopeful' foundation, it should be remembered that many challenges remain, and furthermore that it is only a fraction of highly successful counterparts (such as the biotechnology cluster in Cambridge)[26]. Indeed, there remains a 'persistent productivity gap' and 'skills lag' throughout the region, which sees the promise for growth limited by ongoing significant subregional variation in employment, productivity, workforce skills and the provision of education and training[27].

Digital Sector

The digital technology sector is also a significant contributor to the UK's economy, measured in the form of gross value added (GVA). In the east midlands, the LGA's review[28] has suggested that, despite having a higher increased rate average in England over the past decade, at £4.2 billion, the East Midlands tech GVA sits as the second lowest, making up just 45 of regional GVA, and sitting well below the average. The main contributor of tech GVA in the East Midlands is Nottingham, with £0.9 billion, around 9% of the regional total though the area associated with the highest growth rate with respect to tech GVA over the past ten years was Broxtowe (248%) which along with Nottingham, Ashfield and Newark and Sherwood is also viewed as the highest sector contribution to GVA[29].

Despite this dip in forecast, the East Midlands remains home to 93,000 tech professionals (7% of the total for England). This is set to more than double (with an increase of 111%) by 2050. Of the 40 council districts that make up the East Midlands, sixteen are forecast to increase tech employment numbers by a rate exceeding the region average – notably Corby, North-West Leicestershire and Blaby (all over 140%). Twenty-six districts will see tech employment growth below the regional rate – though even in Melton where the rate of

[25] Rossiter et al., 2018
[26] Smith et al., 2018
[27] D2N2, 2021
[28] LGA, 2021
[29] ibid

growth will be lowest, it is anticipated that tech employment will rise by 83% over the 2020-50 period.[30]

Table 1. High growth areas (above national average) for tech employment in the East Midlands by council, 2020-50

Area	Estimated growth
Corby	148%
North West Leicestershire	148%
Blaby	145%
South Derbyshire	138%
Daventry	134%
Hinckley and Bosworth	132%
Charnwood	128%
Kettering	125%
Harborough	124%
Boston	123%
Rushcliffe	123%
Ashfield	120%
South Northamptonshire	118%
South Holland	117%
East Northamptonshire	115%
Bolsover District	113%
East Midlands	111%

Source: Sagacity Research Ltd

Though not associated with the largest growth rates, in volume terms, the largest changes are predicted to occur in Leicester (up 8,000), Northampton and Nottingham (7,000 in each case) whilst tech specialism sees the number of tech managers and professionals in the region set to increase in by 29,000, 57,000 and 17,000 respectively over the 2020-50 period (121%, 119% and 82% respectively)[31].

Recent attempts to understand the impact of skill gaps and skill shortages at regional level on firm productivity suggest a high level of skills shortages in the local labour market could be indicative of operational issues, whereby production is constrained as firms are unable to optimise staffing levels and therefore impeding productivity[32]. However, regionally, particularly severe skill shortage vacancies have been observed in the east of England (notably Leicestershire, and Bedfordshire) with current data pointing to a 'negative spill over effect' in terms of skill shortage vacancies and suggesting that skill deficiencies cannot be compensated by pooling resources from related industries and regions when these are characterised by skill gaps or shortages in their workforce.

[30] ibid
[31] ibid
[32] Morris et al., 2020

Figure 3. Skill shortage vacancies and skills gaps per region.

Skill Shortage Vacancies and Skill Gaps per region (NUTS2): Data on skill shortage vacancies and gaps derived from the ESS dataset.

Source: Morris, Vanino, and Corradini, 2020[33]

Along with the grave forecast regarding economic impact, what this also perhaps serves to indicate is that long standing calls to address the need to improve the quality of skills at local and national levels through education and work experience have not been met[34]. In particular, the low levels of ICT training received by students at various levels (from school to undergraduate study), along with higher education courses in ICT in particular needing to find ways of addressing the widespread and longstanding complaint in the UK that students are not 'industry-ready', or that they do not demonstrate a long list of 'work-ready skills' including 'grit and resilience'[35]; ensuring that curricula can keep up to date with emerging digital skills trends, perhaps through more exchanges of staff, shared use of equipment, joint project development etc.[36].

Lessons from current interventions, initiatives, and programmes to address skills shortages

The LGA suggests a number of positive case studies which may illustrate some key learning for other regions and areas across the UK. For example, in the case of Cheltenham's 'cyber central initiative'[37], further education colleges and universities worked both independently and collaboratively to provide cyber skills courses ranging from introductory level to degree

[33] Morris, Vanino, and Corradini, 2020, p10
[34] Connor et al., 2001; Kruss, 2006; Stephens & Hamblin, 2006
[35] Prickett et al., 2020
[36] Weert & Tatnall, 2006; Buckingham, 2007; Fu, 2013
[37] GFirst LEP, 2019

apprenticeships. This is something which has also been suggested may work to address the shortage of lab technicians on other skilled support staff within the life sciences[38]. As part of this model, local schools began shaping their curriculum with a focus on skills development in ICT and the sciences. In the wider Cheltenham area, there were also a number of schools and colleges which have since become recognised by the National Cyber Security Centre (NCSC) for offering top quality cyber security education[39]. Further recommendations include a focus on collaboration to advance/build skills. For example, taking on the role of convening and bringing together collaborations, councils can be pivotal in driving digital and tech skills in their area and should recognise that 'digital technology skills are prevalent across the economy', and that the supply of skills can often emerge 'from a very broad base'.

The Industrial Strategy Council (2019) also points to a number of examples of employer digital-training schemes which may help to provide digital-skills enablement. This includes Cisco has set up more than 300 academies across schools, colleges, university technical colleges, universities, prisons, apprenticeship training providers, non-for-profit and other organisations to prepare people with skills for the digital economy; Barclays eagle-surfers help people operate iPads, a skill becoming increasingly in demand; and Google's digital garage programme which provides digital-skills training for businesses and individuals across 80 towns in the UK and has pledged to provide five hours of digital training to every person and small business in the UK.

Another suggestion centres on ensuring adequate research to build local skills reports which can inform skills advisory panels and other l local partnerships that can work to identify and address local skills priorities. Any such partnerships should work to strengthen the link between employers and skills providers – including colleges, independent training providers and universities, identifying gaps in local skills provision and work with stakeholders to ensure that it is appropriately delivered. Again, councils have a key role to play in setting the agenda and ensuring that the provision of digital skills is aligned to employer needs, both now and in the future.[40]

Other academic institutions such as GlosCol are also delivering dedicated cyber courses, degrees and apprenticeships. They have recently opened the 'Insitute of Technology'[41] which has received government funding along with other support and sponsorship. Local schools, keen to make the most of the opportunities Cyber Central presents, are shaping their curriculum with a focus on skills development in IT and the sciences.

In Scotland, a recent investigation considered whether 'apprenticeship computing degrees' could be a possible solution to fill digital skills requirements within the labour market by attracting additional entrants who would go on to become IT professionals[42]. With many examples of existing policy around the globe which already outlines plans to address digital skills shortages via the introduction of additional education or training programmes[43] - in the UK, this has been expressed as a 'key goal' for new higher-level apprenticeships, often

[38] Rossiter et al., 2018
[39] LGA, 2021
[40] ibid
[41] Institute of Technology, 2021
[42] Taylor-Smith et al., 2019
[43] Richardson & Bissell, 2019

pushed as ‘plugging the skills gap’ by working in partnership with business via ‘innovative’ curriculum design, thereby widening access for those who may not necessarily pursue a ‘traditional degree’.

Focusing on new graduate apprenticeships across three Scottish universities, participants completed a short survey asking about their route into their degree (including aspirations, motivations, and previous experience). The results highlighted that most participants had embarked upon an IT career before they started the apprenticeship, and were therefore upskilling, whilst achieving an internationally recognised qualification. A third were new to IT, including school leavers and those seeking to switch careers. Participants expressed a primary motivation as gaining skills, and that many had chosen the apprenticeship based on the integration of work experience. This was also followed by financial reasons (graduate apprentices earn salaries and can avoid student debt).

Based on the results of the study, the authors suggest that these kinds of apprenticeships demonstrate not only an attractive new route to gaining higher level computing skills and qualifications to those who may not be attracted to ‘traditional’ degree programmes, but also demonstrate serious potential in addressing digital skills shortages. Although it is acknowledged that more research in this area is needed, not least longitudinal/follow yup studies such as those which can follow further the lifeline of these new apprenticeships through from degree completion, to explore the nature of work-based learning as the course is delivered and seek confirmation that the digital skills gap is being addressed in terms of quality.

In Nottingham, the National Biofilms Innovation Centre (NBIC) is a Collaborative Training Partnerships (CTP), co led by the university of Nottingham. The scheme run by the Biotechnology and Biological Sciences Research Council (BBSRC) has recently received funding as part of a £22.5m investment from the UK Government to address skill gaps in the UK bioscience industry. It aims to do so via doctoral training led by businesses, through collaborative partnerships that work across the BBSRC’s strategic priority areas such as Net Zero+, Tackling Infections, Transformative Technologies etc.. The NBIC is a led by four universities, Edinburgh, Liverpool, Nottingham and Southampton, with funding awarded to the Centre in partnership with portfolio medical technology business - Smith+Nephew and the NBIC Industry Advisory Board[44].

It is equally important to note calls for caution in regard to interventions, initiatives, and other related activities which have come to characterise a wider aspiration for developing ‘broader and transferable societal digital, data and computational skills’[45]. The Institute of Coding (IoC), for example is a recent £40m+ initiative from the UK Government, which aims to ‘transform the digital skills profile of the country’[46], as a ‘collaborative national consortium of industry, educators and outreach providers’ seeking to provide training initiatives delivering core digital skills, data science, software development, AI, cybersecurity etc. via

[44] Anscombe, 2021
[45] Davenport et al, 2019
[46] IoC, 2022

bootcamps[47]. This new initiative joins a 'long history' of UK and international HE-industry partnerships and collaborations focusing on R&D activities[48].

Indeed, in terms of 'digital' skills, this is said to present another 'significant widening of scope', covering sectors ranging from finance, through to state services and the public sector, along with 'traditional IT, software, hardware and telecoms', whilst intersecting with established work on innovation and entrepreneurship across strong European and international networks. It is therefore suggested that the aims and activities of the initiatives such as the IoC, as part of a 'multitude of initiatives purporting to quickly address the digital skills gap', must seek better evaluation methods to determine what has been successful, and to ensure past failures are not replicated:

"When establishing a model for viewing computer science education initiatives, it is apparent that there is substantial diversity between education systems – from formal school curricula through to tertiary education, as well as wider education policy and funding – and this can create obstacles when trying to understand progress made in one country and potentially replicate it in another…There remain significant challenges, particularly around connectedness and coherency of policy, as well as bridging the gap between the expectations and evolving requirements of (higher) education and industry. However, two overarching themes are apparent:

- Firstly, such effort has to be viewed as a coordinated multi-pronged approach, requiring an overarching holistic strategy, co-designing/co-constructing/co-producing with universities, colleges, employers including but not limited to key digital industry partners, local and national government, as well as young people, parents and the wider public; it must also cohere with other related education and skills interventions, especially in national curricula and compulsory education pathways.
- Secondly, there is a need to overcome the challenges of recurrent funding and support to ensure long-term sustainability of the interventions, as well as parity of opportunity for all young learners. In essence, it must be viewed as a long-term, strategic activity, as part of core funding, aligning to related national policy priorities (especially economic policy, such as the UK Industrial Strategy). Whilst we do not necessarily recommend replicating some of the policy or governance structures under which the UK operates (especially national quality assessment exercises such as the TEF), we have seen how they can provide a useful policy lever for initiatives such as the Institute"[49].

[47] University of Bath, 2021
[48] Department for Business, Innovation & Skills, 2011; Eggington et al., 2013; Smith, 2015; National Centre for Universities & Business, 2021
[49] Davenport et al, 2020, p1406

Regional and Local Data Analysis

There are three sources of data that can provide insights on employers' demand for life sciences and digital skills in the region, these are:

- Active businesses in the region that operate in the life science or digital sectors.
- Employees in the region that work in the life science and digital sectors.
- Job adverts that require skills relevant to the digital economy and life science sector.

Geography

For the purposes of this report, we define the region as the broader Nottinghamshire and Derbyshire area, which includes the cities of Nottingham and Derby. This spatial level is the same as D2N2 LEP area and provides a consistent and comparable geography covered by official and national statistics. However, demand for skilled labour will extend beyond this geography and could come from anywhere in the UK. While the local business ecosystem may benefit from local skills, competition for labour is necessary for wages to be comparable across the UK's regions. While this report focuses on the local skills demand, the extent of national demand may also be of value in appraising any proposal for skills provision.

Sector definitions

The Department for Culture Media and Sport (DCMS) has provided a definition of the digital sector which utilises 4-digit SIC codes. While the DCMS definition of the digital sector is limited in its ability to identify the full range of digital businesses, it has been used widely across similar studies and allows for a consistent interpretation of the data. Similarly, the Office for Life Sciences (OLS) has validated previous definitions of the life science sector (see for example Bioscience and health technology sector statistics, 2018). A further definition of the life science sector by Rossiter et al (2018) matches that of the OLS and provides a distinction between subsectors that can aid the analysis. The full classification list used in defining these sectors is provided in the Appendix.

Businesses

There are 360 life science businesses and 7,437 digital businesses in Derbyshire and Nottinghamshire. Of these businesses, 250 can be classified as both life science and digital. This occurs because the life science and digital sectors cut across the SIC definitions. Further, many businesses use multiple SIC codes to describe their businesses and the dataset used herein utilises both the primary and secondary definitions of these companies. For example, a company that specialises in the manufacturing of fabricated metals may do so for medical components and may also utilise advanced digital technologies. The summary figures are provided in Table 2 but the rest of this analysis will treat the two broad industrial groups (life sciences and digital) separately and ignore any duplicate counts that occur as a result of primary and secondary classifications.

The digital sector is considerably larger than the life sciences and this reflects the national picture also. In terms of the geographical spread of these businesses, there is a notable concentration in urban areas for both industrial groups. Businesses specialising in life sciences are concentrated in Nottingham whereas a large number of digital businesses are located in Derby and Nottingham. Table 3 provides a breakdown of businesses and employment by local authority.

Table 2. Summary of digital and life sciences sector businesses in D2N2

Measure	Number of businesses in D2N2
Life sciences	360
Digital	7,437
Unique counts	7,187
Duplicates	250

Source: Author calculations using FAME data

With over 7,000 employers in the digital sector it is fair to conclude that there will be significant demand for digital skills across the region. However, many of these organisations may be micro businesses and employ no people. As such, this data provides limited insights into the demand for digital skills. Conversely, 360 life science businesses would indicate low demand but the only a handful of companies may account for a very large portion of jobs. Nevertheless, the business counts and the spatial distribution alludes to the fact that there is a cluster of digital businesses in the region, which is indeed confirmed by literature (Karagounis and Rossiter, 2022; Rossiter et al., 2018).

Table 3. Business counts and estimated employment by local authority and sector

	Businesses		Employees	
Local authority	Life science	Digital	Life science	Digital
Amber Valley	10	281	33	696
Bolsover	5	100	57	378
Chesterfield	20	283	178	1,245
Derby	38	1,289	6,364	5,798
Derbyshire Dales	12	232	27	406
Erewash	11	265	108	967
High Peak	4	13	3	97
North East Derbyshire	3	165	19	537
South Derbyshire	4	237	760	928
Ashfield	6	186	255	1,175
Bassetlaw	11	257	139	1,510
Broxtowe	25	368	45	1,702
Gedling	12	261	83	400
Mansfield	11	234	21	2773
Nottingham	120	1,312	1,334	12,670
Newark and Sherwood	8	349	67	1734
Rushcliffe	39	731	760	3,532
Total	**339**	**6,563**	**10,253**	**36,548**

Source: Author calculations using FAME data

Precise data on the size of these organisations is not available because the number of employees is not reported consistently in Companies House, where the raw data are drawn from. However, employment data are available for most large companies. Although these

large companies make up only a small fraction of total businesses, they account for the majority of employment. Therefore, it is possible to make some inferences about the number of jobs in the two sectors based on FAME data. In turn, this provides some understanding of the nature of these employers and the demand for skills. Users of this data are advised to treat this data with caution primarily due to the fact that large organisations are often composed of multiple departments spanning a variety of skills and specialisations. A case in point is Derby where almost 1,300 people are employed in the life science sector, despite having 3 times fewer life sciences companies than Nottingham. There are two reasons for this:

a. There are two very large life science companies in Derby that employ 5,300 people between them

b. The two major life sciences employers are only tenuously related to life sciences – one is the University of Derby and the other is Rolls Royce Submarines

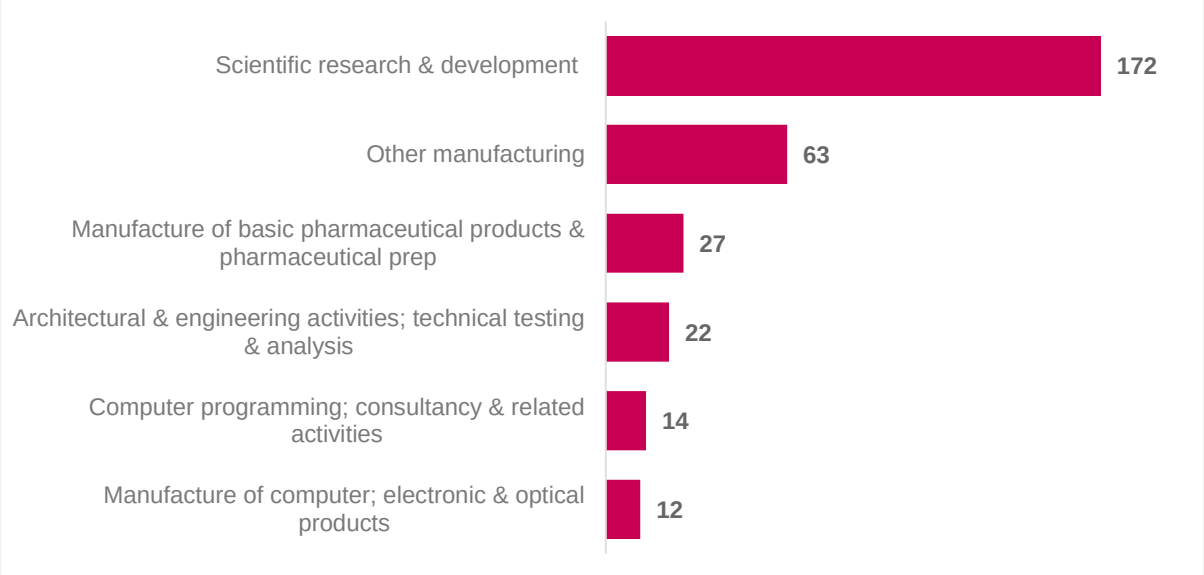
While the above points highlight the need to interpret employment figures within any sector with a degree of caution it is also likely that these figures outlined in Table 3 underestimate the true extent of jobs posts, particularly given the narrow definitions of the sectors.

The sector definitions provided in this section are broad but can be disaggregated further to develop further insight into the demand for skills. Figures 4 and 5 show the number of businesses by 2-digit (sub)sector classifications for the life sciences and digital sectors. Only the subsectors with the largest amount of businesses are included in Figures 4 and 5 for clarity and simplicity.

While the majority of the region's businesses in the health science sector specialise in scientific R&D and manufacturing, a sizeable proportion of them operate in other sectors such as computer programming and architectural & engineering. The prominence of such subsectors in the life sciences sector are likely associated with digital and technical skills such as CAD, 3D printing and digital rendering as well as some of the more expected technical skills such as laboratory analysts.

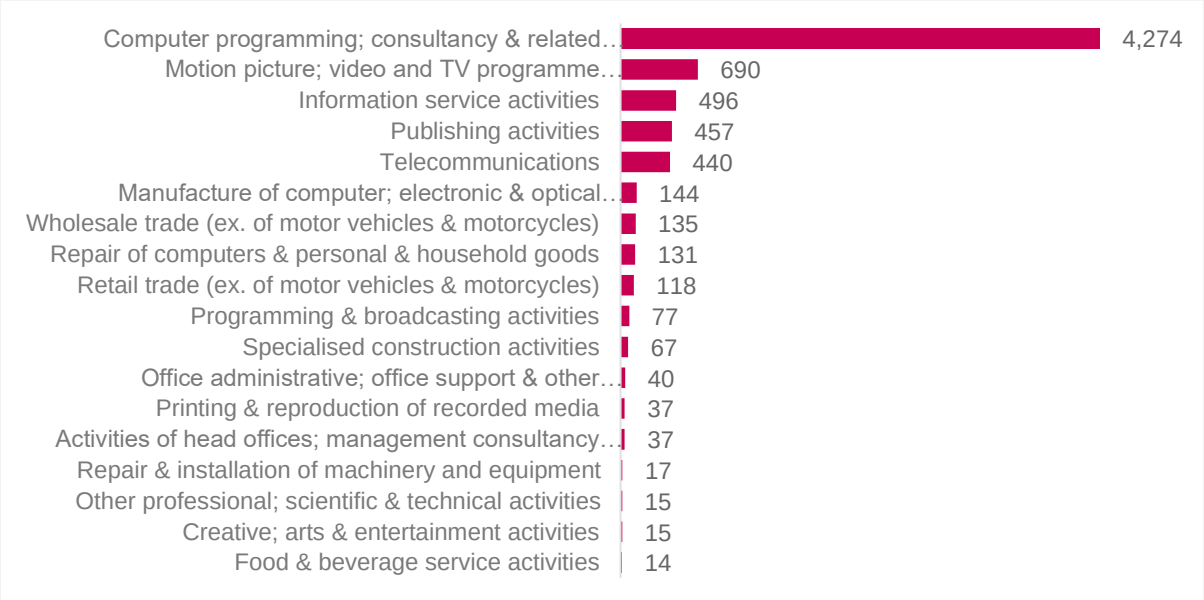
The region's digital sector is dominated by businesses that specialise in computer programming & consultancy services – areas of activity which are strongly associated with coding skills, data and analytical skills, cyber security skills and digital marketing skills. Still, the sector is diverse and comprises a large proportion of businesses in the technical creative sector such as motion picture & video production and publishing activities which are associated with skills like motion graphic editing. Software, web and application development skills as well as digital marketing are likely to be ubiquitous in the digital sector whereas coding skills are so fundamental that they are likely to be in high demand across other sectors as well.

Figure 4. 2-digit subsector classifications in Life Sciences sector



Source: Author calculations using FAME data

Figure 5. 2- digit subsector classifications in Digital sector



Source: Author calculations using FAME data

Taking a more granular view of the sectoral breakdown of life sciences and digital businesses in the region provides further insight into the skills needs. Business activity in life sciences centres on research and manufacturing of medical and dental supplies and pharmaceuticals, as illustrated in Table 4. This further support the need for more labour with skills in analytical chemistry and dental laboratory as well as technical skills needed in the manufacturing process. Business activity in the digital sector is centred on services, software development and technical creative, as seen in Table 5. All of which are likely to require skills in data analytics, coding, software development, digital marketing and motion graphic editing.

Table 4. Life sciences sector classifications and business counts in D2N2

5-digit sector classification	Business counts
Other research and experimental development on natural sciences and engineering	101
Research and experimental development on biotechnology	71
Manufacture of medical and dental instruments and supplies	60
Manufacture of basic pharmaceutical products	19
Engineering related scientific and technical consulting activities	11
Manufacture of pharmaceutical preparations	8
Information technology consultancy activities	6
Business and domestic software development	6

Source: Author calculations using FAME data

*Table 5. **Digital sector classifications and business counts in D2N2***

5-digit sector classification	Business counts
Information technology consultancy activities	2,254
Other information technology service activities	1,031
Business and domestic software development	839
Other information service activities n.e.c.	275
Other telecommunications activities	257
Video production activities	220
Sound recording and music publishing activities	176
Other publishing activities	152
Motion picture production activities	140
Repair of computers and peripheral equipment	117
Book publishing	110
Data processing; hosting and related activities	109
Web portals	102
Wireless telecommunications activities	94
Ready-made interactive leisure and entertainment software development	93
Other software publishing	88
Motion picture; video and television programme production activities	86

Source: Author calculations using FAME data

Employment

More accurate employment figures are available through the ONS Business Register and Employment Survey (BRES) dataset. While this dataset is less timely than FAME data – it is updated annually and retrospectively with the latest release covering 2020 – it does provide a much more accurate estimate of employment by sector. The BRES data provide estimates on employment numbers at a high level of industrial and spatial disaggregation. However, it should be noted that estimates are derived through survey data and so are less accurate at a local authority level. Furthermore, the BRES provides workplace based not residence based data.

Table 6. Employment and proportional employment by area, 2020

	Life sciences sector		Digital sector	
Area	Number of employees	% of area's employment	Number of employees	% of area's employment
Derby	260	0.2%	7,745	5.6%
Derbyshire	350	0.1%	19,210	6.9%
Nottingham	575	0.3%	15,880	8.2%
Nottinghamshire	940	0.3%	20,035	6.9%
D2N2	2,125	0.2%	62,870	6.9%
England	77,500	0.3%	1,914,750	7.4%

Source: Author calculations using BRES 2021 data

Based on the BRES data there were 2,125 people employed in the life sciences sector in D2N2 and 62,870 employed in the digital sector in 2020. While the life sciences sector is an order of magnitude smaller than the digital sector this is reflective of the national picture. Table 6 demonstrates that employment in the life sciences and digital sectors in D2N2 are broadly in line with national proportions. That is, there is likely to be as much demand for life sciences and digital skills in D2N2 as there is in on average across the whole of the England. Nottingham in particular has a considerably higher proportion of employment in the digital sector than the regional and England average, with 8.2% of total employment associated with the sector.

Figure 6. Employment in life sciences sector

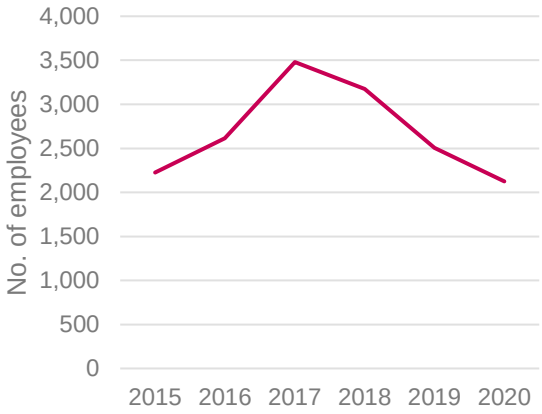
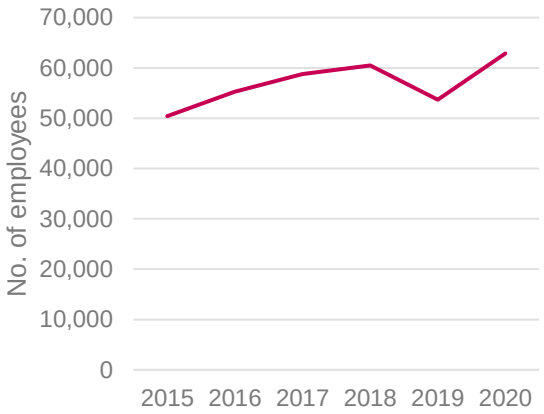


Figure 7. Employment in digital sector



Source: Author calculations using BRES 2021 data

As illustrated in Figures 6 and 7, the digital sector in D2N2 has shown strong growth over time, which would suggest that demand for jobs in the sector is not slowing down. Employment in the life sciences sector has shown a lot more volatility year on year but over the entire 6-year period has remained relatively stable. Employment figures therefore support the view that there is growing demand for digital employment and sizeable demand for life sciences employment in proportion with the England average. Due to lags in the data, it is not possible to account for the changes in skills demand brought about by Covid-19. Nationally there has been an increase in medical trials and the manufacture of medical

equipment and protective gear. It is expected that this will have had some stimulus effect on the demand for skills in the life sciences sector. However, with lagging indicators it is too early to assess the scale and nature of this impact.

Job postings

Perhaps the best evidence for skills demand is provided by job postings data. We use data retrieved and compiled by EMSI and focus on the same Derbyshire and Nottinghamshire geography to determine the demand for skills and jobs that relate to the skills provision proposed in the SDF application. A key consideration in this section is the definition of relevant skills and jobs. Unlike sectors, there is no commonly agreed definition of digital or life sciences jobs. More importantly, many of the skills needed in the life sciences and digital sectors are used in many other sectors. Digital skills are needed in every sector and our analysis finds that they are particularly prevalent in life sciences professions. Likewise, skills associated with life sciences such as CAD/CAM or 3D printing are widely used in manufacturing, design and engineering professions.

Data gathering and analysis of occupations or skills pose problems. Job titles are highly variable and definitions of standard occupational classifications (SOC) are broad, making both a blunt way of measuring business demand for skills. For example, the SOC group Marketing Associate Professionals is likely to include jobs where digital marketing or search engine optimisation skills are necessary and are equally likely to include jobs that require only the most elementary of digital skills. On the other hand, skills data offer much more granularity but are cross cutting and may apply to many jobs that are less irrelevant to the analysis. For example, CAD skills are equally as relevant to roles in the life sciences sector as they are to architects or manufacturers and at different levels of specialisation. Certain jobs with ambiguous sectoral specialisations, like project managers, are associated with a variety of skills. These jobs are also more numerous, which can lead to misinterpretations of the data.

Table 7. Job group unique posting in D2N2 – March 2012 to March 2022

Occupation group	Unique postings
IT Technical and Support	85,539
Developers & Software Engineers	83,571
Business Services, Finance and Management	82,476
Engineering & Manufacturing	64,246
Marketing	47,577
Life science technical	36,806
Data Science & Analytics	27,920
Technical Creative	4,677
Other	4,370

Source: Author calculations using EMSI data

Both these issues are problematic for data gathering and analysis. To mitigate this we follow multiple iterations of data collection to refine our selection of jobs and skills. While this will not remove all extraneous data it ensures that inessential data are minimised. This approach

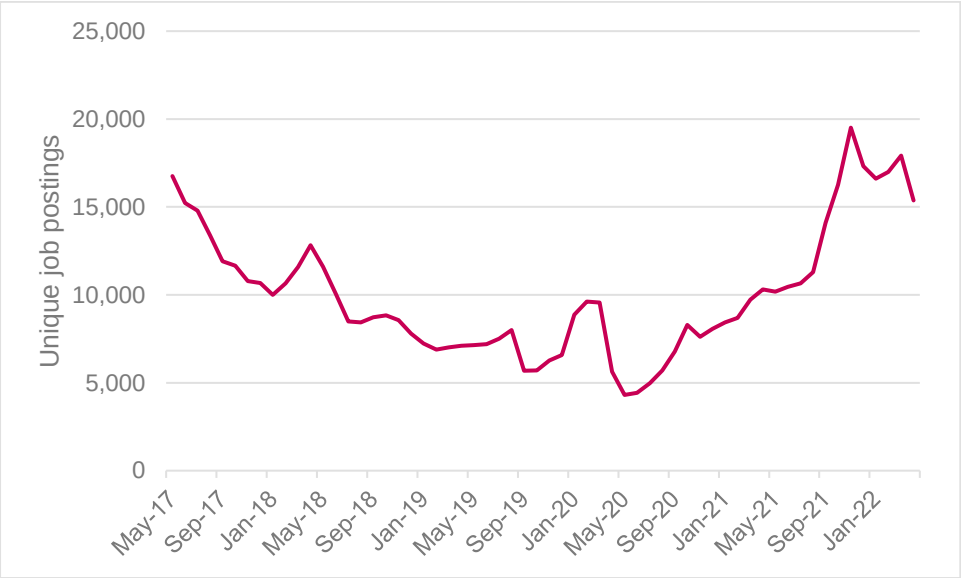
also helps refine the definitions of digital and life sciences jobs and skills, which are otherwise fuzzy and contestable, while also highlighting soe of the nuances in these definitions. The full list of SOC groups, job titles and skills are provided in the appendix. Table 7 provides a segmented view of SOC group in an effort to summarise the results and provide some tractability to the analysis. The grouping of the job titles into broader segments is primarily based on the nature of the occupations but is also aimed at highlighting the demand for jobs that are relevant to the skills in the SDF proposal. The alignment of each occupation with the job group is also provided in the appendix.

The occupation data suggest high demand for all occupations that are associated with the listed skills. Our analysis finds that digital skills are most prevalent in occupations that can be broadly grouped as Developers & Software Engineers; Business Services, Finance and Management; IT Technical and Support. The presence of business services highlights once again the cross cutting nature and wide application of digital skills. Cyber security is particularly likely to be in high demand outside of the digital sector given the widespread use of digital technologies in all employment settings. Occupations associated with life sciences are also in high demand across D2N2 with 26,806 unique postings in the ten years to March 2022. A large portion of Engineering and Manufacturing jobs require skills that are associated with life sciences such as 3D printing, CAD and CAM – further evidencing demand for these skills.

Between May 2017 and April 2022 there were a total of 602,678 unique job postings that are associated with digital and life sciences skills in D2N2. The change over time is given in Figure 8 which shows that job postings declined after 2017 but began to increase at a fast pace in 2021 as lockdown measures associated with Covid-19 began to ease. There is considerable variation in the number of unique postings over time but it should be noted that fluctuations in labour demand is subject to macroeconomic conditions and does not necessarily reflect local or regional idiosyncrasies. Nevertheless, job postings that meet the criteria for digital and life sciences occupations have increased over the last year and hint at large and growing demand. For example, in 2021 there were approximately 147,000 unique job postings. The D2N2 economically active population in 2021 is estimated by the ONS to be 1,086,700. The job postings therefore represent about 13.5% of the economically active population and suggest very high demand. However, it is not clear from the data source how long these postings were live, if they were re-posted or even if they were potentially counted twice if they appeared twice in two months. As such these figures should also be treated with caution and only be used as indicative of rising or falling demand.

Job postings are concentrated in the two cities of Nottingham and Derby as indicated in Table 8. Nottingham has the highest demand for digital and life science occupations with an estimated 210,099 unique job postings in the 10 years to March 2022. Derby, which has the second highest demand has less than half that of Nottingham with 104,908 job postings. As would be expected, there are considerably fewer job postings in the Derbyshire and Nottinghamshire districts. However, there are some notable clusters of relatively high demand in Chesterfield, Mansfield, Amber Valley and Bassetlaw which suggests a reasonably wide distribution of demand for digital and life sciences occupations across the region.

Figure 8. Life sciences and digital job postings in D2N2



Source: Author calculations using EMSI data

Table 8. Unique job postings by local authority – March 2012 to March 2022

Local authority	Unique postings
Amber Valley	12,975
Bolsover	1,051
Chesterfield	28,108
Derby	104,908
Derbyshire Dales	8,428
Erewash	4,007
High Peak	6,109
North East Derbyshire	1,179
South Derbyshire	7,241
Ashfield	5,836
Bassetlaw	10,536
Broxtowe	2,175
Gedling	749
Mansfield	14,188
Nottingham	210,099
Newark & Sherwood	9,872
Rushcliffe	2,433
D2N2 total	**429,894**

Source: Author calculations using EMSI data

The job postings represent demand from private as well as public sector organisations with the majority being from recruitment agencies. Some of the highest demand for digital and life sciences occupations in the last 10 years comes from the NHS, the University of Nottingham, Experian, Boots and Rolls Royce, as illustrated in Figure 9. The NHS in

particular is likely to be a major source of demand for skills associated with both sectors. The presence of Derbyshire's and Nottinghamshire's largest employers in these statistics demonstrates the importance these organisations have in driving and sustaining demand for digital skills and life science skills. Together, these 5 employers are responsible for an average of 2,400 job postings per year in D2N2, which suggests high demand for digital and life sciences skills.

Figure 9. Top 20 job posting organisations in D2N2 – March 2012 to March 2022

Organisation	Unique postings
NHS	10,368
Hays	8,355
University Of Nottingham	5,470
Nigel Frank	4,450
Rise Technical Recruitment Ltd	4,113
Macildowie	3,831
Michael Page	3,750
Computer People	3,576
Experian	3,393
Reed	2,682
Walgreens Boots Alliance	2,411
Rolls-Royce Holdings	2,388
Sf Group	2,277
Ck Group	2,238
Senitor Associates	2,230
Elevation Recruitment	2,179
Experis	2,119

Source: Author calculations using EMSI data

Skills in this analysis are determined by first looking at jobs that fall strictly in the life sciences and digital sectors. The skills associated with these jobs are then used as search terms to derive further occupations and jobs which are cross-referenced with the existing skills. This process is run through multiple iterations to refine the skills data and retain only the most relevant. The final dataset used is included in the appendix but the top 20 results are included in Table 10 below. There is evidence of high demand for programming languages and coding skills. The 5 most sought after skills in the broader digital and life sciences sectors are all programming skills, emphasising the importance of these skills. There is also very high demand for CAD with over 10,000 job postings in the last 10 years requiring this skill. Further relevant skills are also featured in high numbers (available in the appendix) such as Digital Marketing and Search Engine Optimisation. However, this dataset provides weaker evidence of high demand for other life sciences skills, which is expected given the relatively small size of the sector – this is true even at a national scale.

While the data used in this analysis is drawn only from the D2N2 area, it should be noted that demand for skills, particularly those which are in biotech niches, is national and applicants for skilled jobs are inclined to relocate. The provision of skills to meet local demand only is likely to exacerbate national skills gaps and regional discrepancies. On the

other hand, the increasing trend towards remote working is further reducing the importance of proximity in skilled work. Broadening the geographic boundaries of this analysis will undoubtedly reveal considerably higher demand for what is an increasingly mobile and flexible labour force.

Table 10. Top 20 skills in D2N2 digital and life sciences sectors – March 2012 to March 2022

Skill	Postings with Skill
SQL (Programming Language)	36,494
JavaScript (Programming Language)	34,801
C# (Programming Language)	31,099
Cascading Style Sheets (CSS)	22,637
HyperText Markup Language (HTML)	20,784
Software Development	16,147
Java (Programming Language)	14,562
Key Performance Indicators (KPIs)	13,938
Software Engineering	13,487
Automation	12,899
PHP (Scripting Language)	12,124
Data Analysis	11,676
JQuery	11,360
New Product Development	11,220
Technical Support	11,092
ASP.NET	11,049
Customer Relationship Management	10,708
Project Management	10,168
Computer-Aided Design	10,060
Linux	9,662

Source: Author calculations using EMSI data

Summary

This analysis finds evidence of digital and life sciences skills needs in D2N2. Evidence from the literature indicates an underskilled workforce in digital and life science jobs at a national level. Coupled with expected growth in these sectors, this suggests that the demand for these skills is unlikely to be met in the near future, resulting in skills gaps. Literature covering the East Midlands and D2N2 regions paints a similar picture and suggests an even greater challenge in meeting the demand for skills, particularly given the expected growth rate and existing underperformance of these sectors in the area.

Analysis of FAME data provides insights into the size of the digital and life sciences sector as well as the specialisation of businesses in the region, both of which suggest high demand for the types of digital and health science skills put forward in the SDF proposal – particularly in the two cities of Derby and Nottingham. Employment trends in the two sectors suggest stable demand for jobs in the life sciences and growing demand for jobs in the digital sector. In turn, this suggests growing demand for skills in coding/programming, data analytics, and technical creative skills. Sustained skills needs for laboratory analysis, digital rendering, 3D printing and CAD skills are also supported by the evidence.

Occupations and skills analysis of job postings provides stronger evidence of demand for the above skills. The data also highlight the fact that these skills are not confined to the digital and life sciences sectors. Digital skills are cross cutting and are required in most sectors whereas many of the skills that fall under life sciences are applicable to the broader engineering and manufacturing sectors.

With a labour force that is generally quite mobile, further demand for these skills is likely to come from businesses far outside the D2N2 area. Coupled with the demand from other sectors beyond the digital and life sciences suggests that demand is likely to be considerably higher than the analysis in this report indicates.

Appendix

Table A. Digital and life sciences sector classifications

SIC07 code	SIC07 description	Digital Sector	Life Sciences	Source
2110	Manufacture of basic pharmaceutical products		YES	Rossiter et al.
2120	Manufacture of pharmaceutical preparations		YES	Rossiter et al.
2611	Manufacture of electronic components	YES		DCMS
2612	Manufacture of loaded electronic boards	YES		DCMS
2620	Manufacture of computers and peripheral equipment	YES		DCMS
2630	Manufacture of communication equipment	YES		DCMS
2640	Manufacture of consumer electronics	YES		DCMS
2660	Manufacture of irradiation; electromedical and electrotherapeutic equipment		YES	Rossiter et al.
2680	Manufacture of magnetic and optical media	YES		DCMS
3250	Manufacture of medical and dental instruments and supplies		YES	Rossiter et al.
4651	Wholesale of computers, computer peripheral equipment and software	YES		DCMS
4652	Wholesale of electronic and telecommunications equipment and parts	YES		DCMS
5811	Book publishing	YES		DCMS
5812	Publishing of directories and mailing lists	YES		DCMS
5813	Publishing of newspapers	YES		DCMS
5814	Publishing of journals and periodicals	YES		DCMS
5819	Other publishing activities	YES		DCMS
5821	Publishing of computer games	YES		DCMS
5829	Other software publishing	YES		DCMS
5911	Motion picture, video and television programme production activities	YES		DCMS
5912	Motion picture, video and television programme post-production activities	YES		DCMS
5913	Motion picture, video and television programme distribution activities	YES		DCMS
5914	Motion picture projection activities	YES		DCMS
5920	Sound recording and music publishing activities	YES		DCMS
6010	Radio broadcasting	YES		DCMS
6020	Television programming and broadcasting activities	YES		DCMS
6110	Wired telecommunications activities	YES		DCMS
6120	Wireless telecommunications activities	YES		DCMS
6130	Satellite telecommunications activities	YES		DCMS
6190	Other telecommunications activities	YES		DCMS
6201	Computer programming activities	YES		DCMS
6202	Computer consultancy activities	YES		DCMS
6203	Computer facilities management activities	YES		DCMS
6209	Other information technology and computer service activities	YES		DCMS
6311	Data processing, hosting and related activities	YES		DCMS
6312	Web portals	YES		DCMS

6391	News agency activities	YES		DCMS
6399	Other information service activities n.e.c.	YES		DCMS
7211	Research and experimental development on biotechnology		YES	Rossiter et al.
9511	Repair of computers and peripheral equipment	YES		DCMS
9512	Repair of communication equipment	YES		DCMS

Table B. D2N2 advertised occupations in digital and life sciences sectors

Occupation (SOC)	Unique Postings (Mar 2012 - Mar 2022)	Grouping
Programmers and Software Development Professionals	60,205	Developers & Software Engineers
Marketing and Sales Directors	29,929	Marketing
IT Business Analysts, Architects and Systems Designers	26,968	IT Technical and Support
Engineering Technicians	24,485	Engineering & Manufacturing
Web Design and Development Professionals	23,366	Developers & Software Engineers
Book-keepers, Payroll Managers and Wages Clerks	22,803	Business Services, Finance and Management
Chartered and Certified Accountants	21,137	Business Services, Finance and Management
IT User Support Technicians	19,732	IT Technical and Support
Management Consultants and Business Analysts	18,036	Data Science & Analytics
Science, Engineering and Production Technicians n.e.c.	17,713	Life science technical
Marketing Associate Professionals	17,333	Marketing
Engineering Professionals n.e.c.	16,285	Engineering & Manufacturing
IT Operations Technicians	15,056	IT Technical and Support
Civil Engineers	14,329	Engineering & Manufacturing
Business and Financial Project Management Professionals	13,677	Business Services, Finance and Management
Information Technology and Telecommunications Professionals n.e.c.	12,386	IT Technical and Support
Financial Managers and Directors	11,040	Business Services, Finance and Management
Finance and Investment Analysts and Advisers	10,181	Business Services, Finance and Management
Electrical Engineers	9,884	Data Science & Analytics
IT Project and Programme Managers	7,772	IT Technical and Support
Quality Control and Planning Engineers	6,728	Engineering & Manufacturing
Biological Scientists and Biochemists	5,883	Life science technical
Medical and Dental Technicians	4,135	Life science technical
Chemical Scientists	3,565	Life science technical
Graphic Designers	3,348	Technical Creative
Information Technology and Telecommunications Directors	2,918	Other
Laboratory Technicians	2,811	Life science technical
Business, Research and Administrative Professionals n.e.c.	2,743	Business Services, Finance and Management
Electronics Engineers	2,419	Engineering & Manufacturing
Telecommunications Engineers	2,057	IT Technical and Support
Pharmaceutical Technicians	1,802	Life science technical

Photographers, Audio-visual and Broadcasting Equipment Operators	1,135	Technical Creative
IT Specialist Managers	928	IT Technical and Support
Physical Scientists	897	Life science technical
Actuaries, Economists and Statisticians	895	Business Services, Finance and Management
Natural and Social Science Professionals n.e.c.	744	Other
Research and Development Managers	708	Other
IT Engineers	640	IT Technical and Support
Advertising Accounts Managers and Creative Directors	315	Marketing
TV, Video and Audio Engineers	194	Technical Creative

Table C. D2N2 advertised job titles in digital and life sciences sector

Job Title	Unique Postings (Mar 2012 - Mar 2022)
Production Operatives	6,220
Project Managers	5,376
Business Development Managers	5,100
Maintenance Engineers	4,437
Management Accountants	4,089
Account Assistants	3,940
Purchase Ledger Clerks	3,709
PHP Developers	3,367
.NET Developers	2,929
Software Developers	2,886
C# .NET Developers	2,783
Project Engineers	2,492
Web Developers	2,419
ASP.NET Developers	2,361
Business Analysts	2,324
Finance Managers	2,225
Software Engineers	2,218
Financial Controllers	2,178
Assistant Accountants	2,071
Multi-Skilled Maintenance Engineers	2,053
Quality Engineers	2,018
Financial Accountants	1,986
Java Developers	1,962
Electrical Engineers	1,952
Business Development Executives	1,911
Marketing Executives	1,907
Structural Engineers	1,762
Manufacturing Engineers	1,747
Sales Managers	1,692
Payroll Administrators	1,684
Accountants	1,679
Marketing Managers	1,652
Electrical Design Engineers	1,648
Infrastructure Engineers	1,553
Mechanical Design Engineers	1,489
Front End Developers	1,397
Service Desk Analysts	1,366
Marketing Assistants	1,305
Finance Business Partners	1,286
Assistant Management Accountants	1,274

Account Administrators	1,257
Systems Engineers	1,204
C# Developers	1,199
Data Analysts	1,184
Paraplanners	1,179
Bookkeepers	1,131
Embedded Software Engineers	1,129
Design Engineers	1,081
Site Engineers	1,061
DevOps Engineers	1,038
Finance Analysts	1,015
IT Support Engineers	1,005
Digital Marketing Executives	965
JavaScript Developers	926
.NET Software Developers	921
ASP.NET MVC Developers	835
SQL Database Administrators	780
.NET MVC Developers	732
CAD Technicians	730
Developers	659
C# ASP.NET Developers	638
Business Intelligence Developers	624
Full Stack Developers	623
Digital Marketing Managers	623
Marketing Apprentices	607
Technical Support Engineers	571
Front End JavaScript Developers	550
Test Analysts	539
Product Managers	532
IT Support Technicians	525
Solutions Architects	523
Web Designers	502
Application Support Analysts	487
Java Software Developers	484

Table D. D2N2 specialised skills in digital and life sciences job adverts

Skill	Postings with Skill
SQL (Programming Language)	36,494
JavaScript (Programming Language)	34,801
C# (Programming Language)	31,099
Cascading Style Sheets (CSS)	22,637
HyperText Markup Language (HTML)	20,784
Software Development	16,147
Java (Programming Language)	14,562
Key Performance Indicators (KPIs)	13,938
Software Engineering	13,487
Automation	12,899
PHP (Scripting Language)	12,124
Data Analysis	11,676
JQuery	11,360
New Product Development	11,220
Technical Support	11,092
ASP.NET	11,049

Customer Relationship Management	10,708
Project Management	10,168
Computer-Aided Design	10,060
Linux	9,662
.NET Framework	9,574
Machinery	9,556
Model View Controller	9,551
Microsoft SQL Servers	9,509
Information Technology Infrastructure Library	9,132
Scrum (Software Development)	9,073
Front End (Software Engineering)	8,990
Management Accounting	8,827
Microsoft Azure	8,691
Active Directory	8,656
Electrical Engineering	8,619
Digital Marketing	8,583
Customer Support	8,457
Windows Servers	8,449
Operating Systems	8,330
Sales Management	8,268
Selling Techniques	8,217
HTML5	8,204
Warehousing	8,114
Application Programming Interface (API)	8,032
C (Programming Language)	7,923
C++ (Programming Language)	7,897
Maintenance Engineering	7,897
Procurement	7,896
MySQL	7,852
Angular (Web Framework)	7,850
Financial Services	7,799
Search Engine Optimization	7,675
SAP Applications	7,667
Process Improvement	7,562
Amazon Web Services	7,560
Computer Science	7,557
Scripting	7,423
AutoCAD	7,176
Business Intelligence	7,122
Test-Driven Development (TDD)	6,995
Python (Programming Language)	6,813

Table E. Top hiring companies for digital and life sciences jobs in D2N2

Company	Unique Postings (Mar 2012 - Mar 2022)
NHS	10,368
Hays	8,355
University Of Nottingham	5,470
Nigel Frank	4,450
Rise Technical Recruitment Ltd	4,113
Macildowie	3,831

Michael Page	3,750
Computer People	3,576
Experian	3,393
Reed	2,682
Walgreens Boots Alliance	2,411
Rolls-Royce Holdings	2,388
Sf Group	2,277
Ck Group	2,238
Senitor Associates	2,230
Elevation Recruitment	2,179
Experis	2,119
Harvey Nash	2,013
Modis	1,890
Cherry Professional Limited	1,855
Penguin Recruitment	1,833
Ascent People Ltd	1,651
Bombardier Transportation	1,568
Syntax Consultancy Ltd	1,554
Cordius Limited	1,410
Recruitment Genius Limited	1,359
Blusource	1,304
Capital One	1,275
EMBS	1,219
Derbyshire County Council	1,208
Capita Group	1,173
Chase Holland	1,172
Computer Futures	1,108
Nottingham Trent University	1,094
Gi Group	1,067
Rullion Group	1,032
Oscar & Associates	1,025
Adecco	1,013
Ambitions Personnel	979
Evolution	976
Robert Half	976
Spring Technology	942
Randstad	930
AECOM	910
Shorterm Group	901
Parexel	853
University Of Derby	814
Talk Staff Group	800
Thorn Baker	718
Search Consultancy	714

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