

Sectoral Skills Assessment

Digital Technologies

October 2023



Sectoral Skills Assessments

First launched in 2017, the purpose of the Sectoral Skills Assessments (SSAs) is to provide a robust evidence base to support partners in strategic skills investment planning. Skills Development Scotland (SDS) has worked with key partners and stakeholders in the production of SSAs to ensure an inclusive approach to their development, dissemination and utilisation.

SSAs include published data sets. Inevitably, when using published data there is a time lag, but the data contained is the most up-to-date available at the time of writing.

SSAs also include forecast data that has been commissioned through Oxford Economics. The Technical Note¹ provides full detail on the caveats that must be applied when using forecast data, but broadly, it should be noted that:

- Forecasts are based on what we know now and include past and present trends projected into the future.
- The more disaggregated they become, especially at smaller geographical units, the less reliable they are likely to be.
- Their value is in identifying likely directions of travel rather than predicting exact figures.
- The forecasts do not account for national or sectoral activities, initiatives or investments that are planned.

Industries and occupations used in the SSAs are defined by standard industrial classifications (SIC) and standard occupational classifications (SOC). The Office for National Statistics have SIC² and SOC³ hierarchy tools that can be used to understand the classifications in more detail.

This SSA infographic is for the Digital Technologies sector. The sector encompasses: Reproduction and Repair of Computer Media, Manufacturing of Digital Components, Publishing of Computer Games, Telecommunication Activities, Computer Programming Activities, Data Processing, and Web Portals. Please see Appendix 1 for the SIC definition used in this report.

Key Sectors are central to our Skills Investment Planning approach. Each Key Sector has a tailored Skills Investment Plan (SIP) which outlines trends in skills and qualification supply and employers' perspectives on the skills issues affecting the sector. Regional SIPs have also been developed and are available alongside SIPs on the SDS website.⁴

The SSAs are part of a suite of Labour Market Insight publications by SDS. Other products in the suite include:



Economy, People and Skills provides succinct and up-to-date evidence on Scotland's economy, business and people. It is updated monthly.



Regional Skills Assessments provide a coherent evidence base to inform future investment in skills, built up from existing datasets and forecasts for Regional Outcome Agreement areas, Rural Scotland and all City and Growth Deals regions. It is updated annually.



The **Data Matrix** is an interactive tool offering data from a variety of sources in a visually engaging format. It is updated frequently.

Alongside the suite of Labour Market Insight publications, SDS also produces a wide range of reports such as statistics on the Apprenticeship Family and the Annual Participation measure for 16-19 year olds. Further information can be found on the [Publications and Statistics](#) section of the SDS corporate website.

For any further information or queries on the SSAs or any of our other products, please contact: RSA@sds.co.uk

We value user feedback on the Sectoral Skills Assessments.



If you would like to provide feedback on the SSAs please do so [here](#).

The Context for Scotland's Labour Market and Sectoral Insight

Within the last 10 years, the economy has faced disruption due to events such as the pandemic, Brexit, the war in Ukraine, and the cost of living crisis. In addition to these events, megatrends around demography, technology, and the environment have continued to shape Scotland's economy and labour market.

This section provides an overview of five key drivers of the Scottish labour market, highlighting that an agile and responsive skills system is vital to respond to the challenges and opportunities that exist in the economy, to support and attract inward investment, to increase productivity and to tackle inequality and deprivation.



The Economy

Scotland and the UK have been hard hit by rising inflation, tight monetary policy, and subdued economic performance. The impact of the war on Ukraine, increased energy prices, and a tight labour market have resulted in inflation reaching a 40-year high in 2022. At the time of writing, inflation has started to fall, but at a slower pace than previously anticipated. By the end of 2023, the Bank of England expect inflation to be 4.9%, falling to within the 2% target by Q2 of 2025.¹

Interest rates have increased to combat rising inflation, and rates are likely to remain higher for longer than expected as inflation proves challenging to address. This has weighed on economic growth and the outlook for Scotland and the UK remains uncertain, with downside risks.

Forecasts predict Scotland² and the UK³ will see weak economic growth between 2023 and 2026.³ International growth is also expected to be weak by historical standards, with global growth of 3% forecast for both 2023 and 2024.⁴ However, the success of Scotland's economy is not solely based on GDP. There has been growing commentary on the need to evaluate the economy on measures other than GDP growth, such as how the economy serves society and sustains the environment. The Scottish Government's National Strategy for Economic Transformation (NSET) noted a commitment to a 'Wellbeing Economy' – '*a society that is thriving across economic, social and environmental dimensions*'.⁵

Skills Shortages and Skills Gaps



The [Employer Skills Survey 2022 \(ESS\)](#) provides insight on skills supply, skills gaps and training across Scotland and the UK. The published findings are timely; however, they do not capture the very recent cooling of the labour market that has taken place during 2023. The ESS shows:

- **Supply challenges have worsened** across Scotland and the UK, and vacancies have become harder to fill.
- **There has been a sizeable rise in skills shortages**, 10% of establishments in Scotland reported a Skills Shortage Vacancy (up from 6% in 2017).
- **Skills gaps have decreased slightly in Scotland**, 15% of establishments reported a skills gap (-1 pp) while 4.8% of employees in Scotland were not fully proficient, which was the lowest level recorded.
- **Training activity has decreased across Scotland**, access to training offered by employers was at the lowest recorded level since the survey began in 2011.



Technology and Automation

Technology and automation have been major disruptors and drivers of the Scottish labour market and economy over the past few decades. Ongoing advances and technological change are expected to continue to have a great impact on the global economy, particularly with the prominence of Artificial Intelligence.⁶ This will shape consumer behaviour, modify commercial models, and drive innovations in ways of living, working and learning.

While Artificial Intelligence is expected to result in changes to the world of work, many jobs are expected to evolve rather than disappear.⁷ However, around a third of jobs may see a large share of their tasks being automated and changed. The technological revolution has highlighted the importance of uniquely human meta-skills around self-management, social intelligence and innovation.⁸

As well as risks to certain jobs, technology may also create new jobs and enhance existing roles to support smarter and more agile ways of working. However, employers are already reporting digital skills gaps in the workforce.⁹ The [Digital Economy Skills Action Plan](#) aims to address the digital economy skills challenge through upskilling and reskilling, to help realise the potential of Scotland's digital economy.¹⁰

SDS is exploring the potential labour market impact of Automation and Artificial Intelligence through new research. The findings from the research will be published at the beginning of 2024 and will include breakdowns of the risk of automation by gender, income and occupation.



Climate Change

The Climate Emergency has been recognised by governments across the world, with the Scottish Government being one of the first to do so in 2019. Recognising the gravity of the situation, the Scottish Government has set a target to achieve a net zero carbon economy by 2045.¹

Growing recognition of the importance of protecting the environment will have a significant impact on the labour market. Changes in legislation and consumer behaviour will mean growing demand in some areas and a fall in others. Demand for green jobs (and green skills) is expected to increase rapidly as a result of policy and legislative drivers, and consumer choice.²

Scotland's skills requirements for the Climate Emergency are set out in the [Climate Emergency Skills Action Plan](#). It outlined the need for action to ensure that current and future skills investment in support of net zero is strongly evidence based.³

The CESAP Pathfinder is a direct response to this, led by Skills Development Scotland (SDS) in collaboration with the Scottish Funding Council (SFC) and forms part of the [Shared Outcomes Framework](#). The CESAP Pathfinder advances the evidence base used to identify current and future skills demand, establishes a baseline of green skills provision and identifies nine opportunities for action needed across the skills system. A suite of reports to share insights, intelligence and lessons learned is due to be published in Autumn 2023.



Demographic Change

Scotland's population is ageing. By 2045, the number of people of pensionable age in Scotland is expected to increase, while the working-age population is projected to decline, and migration is expected to be the only source of population gain in Scotland.⁴ Demographic change could contribute to a tighter labour market in the future, and increase pressure on the demand for public services and the funds available from tax and National Insurance to provide them.

Whilst it was initially thought that Brexit would lead to falling levels of migration, the Office for National Statistics estimated that net migration to the UK hit a record high in 2022.⁵ Migration has been driven by non-EU citizens, while more EU citizens left than arrived in the UK. Migration from outside of the EU has been driven by a number of factors, including humanitarian schemes such as those available to Ukrainians; higher levels of migration for study; and people coming to the UK for work. Changes to migration policy and the UK's points-based migration system could further impact migration flows.

With populations ageing, the global economy is likely to see more people working for longer due to increases in the state pension age.⁶ Advances in medicine and technological innovations are expected to enhance the health of the older population, which in turn will likely change working habits and preferences. As a result, some targeted upskilling and reskilling may be required to enhance older workers' experience and knowledge to enable the transition into new and growing careers.⁷



Scotland's Census 2022⁸

Scotland's population was estimated to be 5,436,600 in March 2022, which marks the highest population ever recorded by Scotland's Census. The Scottish population has **grown by 2.7% since the previous census**, however, this growth rate was slower than the period between 2001 and 2011, when the population grew by 4.6%.

Although Scotland's population increased over the past ten years, this growth was largely driven by migration, as the number of deaths exceeded the number of births. **Without migration, Scotland's population would have declined by around 49,800.**

The proportion of females (51.4%) and males (48.6%) in Scotland has remained relatively unchanged compared to the previous census in 2011 (51.5% and 48.5% respectively). However, **there are now more older people in Scotland than ever before**. The number of people aged 65 and over increased by 22.5% between 2011 and 2021, while the population aged 0-14 and 15-64 decreased by 2.5% and 1.1% respectively.



Inclusive Growth and Equality

Across Scotland, significant economic inequalities exist, especially for disadvantaged groups. For example, more women than men earned less than the Real Living Wage in 2022¹, the disability employment gap remained high (29.6 percentage points) in 2023², meaning people with a disability are less likely to be employed, and in the same year, the employment rate gap for the ethnic minority population compared with the white population was 9.2 percentage points.³

The Scottish Government's commitment to fairness and greater equality is reiterated in the National Strategy for Economic Transformation (NSET). One of the strategy's key ambitions is creating a fairer society – '*Ensuring that work pays for everyone through better wages and fair work, reducing poverty and improving life chances*'.⁴

A 'Fairer and More Equal Society' is also one of the five programmes of action outlined in the NSET. This programme of action looks to '*reorient our economy towards wellbeing and fair work*' with key aims including higher rates of employment and wage growth, and reducing poverty.⁵

The Scottish Government's targets are set against the challenging backdrop of the cost of living crisis and the pandemic, affecting groups already impacted by inequality the most: low-income households, young people, disabled people, and people from ethnic minority backgrounds.⁶ Research from the Joseph Rowntree Foundation found that eight in ten single parents, large families and low-income households in Scotland had to go without one or more essentials (such as food or heating) in spring 2023.⁷



Sectoral Insight⁸

Scotland's technology sector continues to play a crucial role in Scotland's economic prosperity, illustrated by the prominence of digital, and of developing a digitally skilled workforce in the [National Strategy for Economic Transformation \(NSET\)](#).

Technology professionals are employed across all sectors in Scotland and not just in the technology sector; demand for technology professionals across the whole economy has increased by 20% to 15,600 job openings each year.⁹

Scotland's reputation as an innovator continues as we lead the way in emerging technologies with opportunities identified for blockchain, quantum and photonics. Reports highlight that by 2030 [Blockchain](#) could be worth £4 billion to the economy, and [Quantum](#) could also bring billions to Scotland.

Despite producing some high-calibre tech start-ups, Scotland still lags other OECD countries rates of entrepreneurial activity. The Scottish Government's [Tech Scaler programme](#) and their [Entrepreneurial Campus report](#) provide a policy and investment framework for action which will help accelerate the rate and success of new tech sector business ventures. [The Pathways: A new approach for women in entrepreneurship](#) work will also seek to improve the under-participation of women engaging in entrepreneurial activity.

challenges with low numbers of females and individuals from ethnic minority groups, and this imbalance has been echoed in technology professional occupations, but there have been improvements with the numbers of females in tech jobs now 30%, up from 24% in 2020.¹⁰

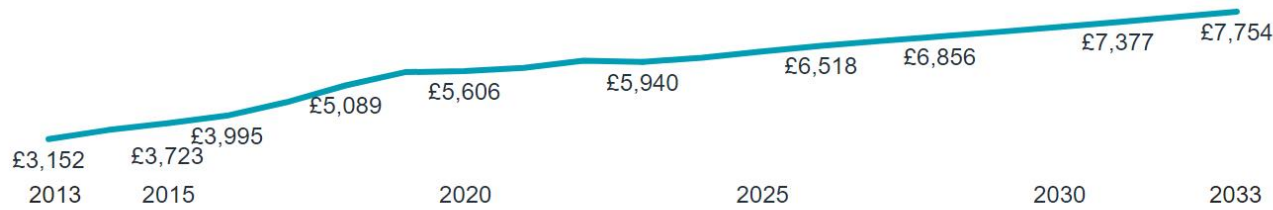
Despite this significant progress, evidence shows that women in digital technology professional roles still tend to be paid lower with a salary gap of nearly £20,000 between men and women.¹¹

Alongside technical skills, sales and marketing skill sets continue to be in high demand. Employers are also increasingly recognising the value of timeless digital meta-skills such as digital agility and intelligence and digital creativity.

It is important to note that the forecasts used in this Sectoral Skills Assessment are policy and investment neutral. This means the figures present a baseline outlook that takes into account historical trends and external economic conditions, but the figures do not reflect investment or policy that is unconfirmed or at planning/development stage. Therefore, the forecasts should be used in conjunction with other sources, and readers are encouraged to overlay the forecasts with their own local and sectoral knowledge.

The Economy¹

Gross Value Added (GVA, £m) (2013-2033)²



In 2023, GVA in the Digital Technologies sector was forecast to be £5,940m, generating 4.0% of Scotland's total economic output. Between 2013 and 2023, GVA in the sector grew by 6.6% on average each year, compared to growth of 1.0% across Scotland over the same period.

In 2022, the Digital Technologies sector experienced economic growth of 4.5%, marginally above the Scottish economy as a whole (4.3%). However, GVA is estimated to contract by 0.7% in 2023, due to challenging economic conditions.

GVA in the Digital Technologies sector is forecast to grow on average 2.7% each year between 2023 and 2033, above Scotland's average of 1.3%. In 2033, Digital Technologies sector is forecast to account for 4.6% of Scotland's total economic output.



Digital Technologies forecast GVA in 2026: **£6,518m**

↑ up 9.7% from 2023

Scotland forecast GVA in 2026: **£155,521m**

↑ up 5.1% from 2023

Digital Technologies forecast GVA in 2033: **£7,754m**

↑ up 19.0% from 2026

Scotland forecast GVA in 2033: **£168,475m**

↑ up 8.3% from 2026

Productivity (GVA per job)³

In this report, we have used Oxford Economics measure of productivity, which is calculated by dividing total sectoral GVA by total sectoral employment (measured by jobs). Please note, there are different ways of calculating productivity, and the pandemic has created new challenges in how productivity is accurately measured. Caution is needed when interpreting productivity data presented in this report, and it must be considered in the context of other data and insight.

In 2023, productivity in the **Digital Technologies** sector was forecast to be **£64,900**. In comparison, the Scottish average was £52,600.



Digital Technologies forecast productivity in 2026: **£68,700**

↑ up 5.9% from 2023

Scotland forecast productivity in 2026: **£54,100**

↑ up 2.9% from 2023



Digital Technologies forecast productivity in 2033: **£81,000**

↑ up 17.9% from 2026

Scotland forecast productivity in 2033: **£58,200**

↑ up 7.6% from 2026

1. Forecasts by Oxford Economics (unless otherwise stated). See Page 11 for full list of source references

2. GVA is the measure of the value of goods and services produced within the economy and is an indicator of the sector's health. GVA in constant 2019 prices.

3. Productivity is the measure of goods and services produced per unit of labour input. The Oxford Economics forecasts of productivity shown here have been calculated by dividing total sector GVA by total sector employment (measured by jobs).

Current Demand¹



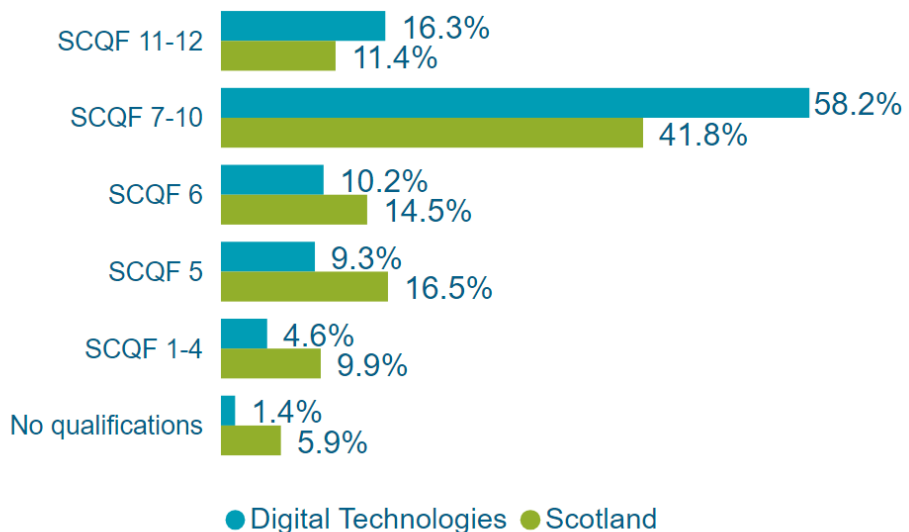
Workforce size 2023: **83,500** people

The workforce **increased** by **20.2%** or **14,000** people between 2013 and 2023. During pandemic (2019-2021), the workforce **increased** by **1.6%** or **1,300** people.

This compares to a Scotland wide increase of **4.0%** or **99,400** people between 2013 and 2023. Between 2019 and 2021, the workforce declined by **-2.2%** or **-56,900** people across Scotland.

Workforce Qualifications, 2023

Workers in the **Digital Technologies** sector have higher qualifications than the Scottish average. In 2023, an estimated 75% of workers in the sector were qualified to SCQF Level 7 and above.²



The proportion of workforce in the Local Authorities employed in Digital Technologies, 2023³

In 2023, **Digital Technologies** sector accounted for 3.2% of Scottish employment.

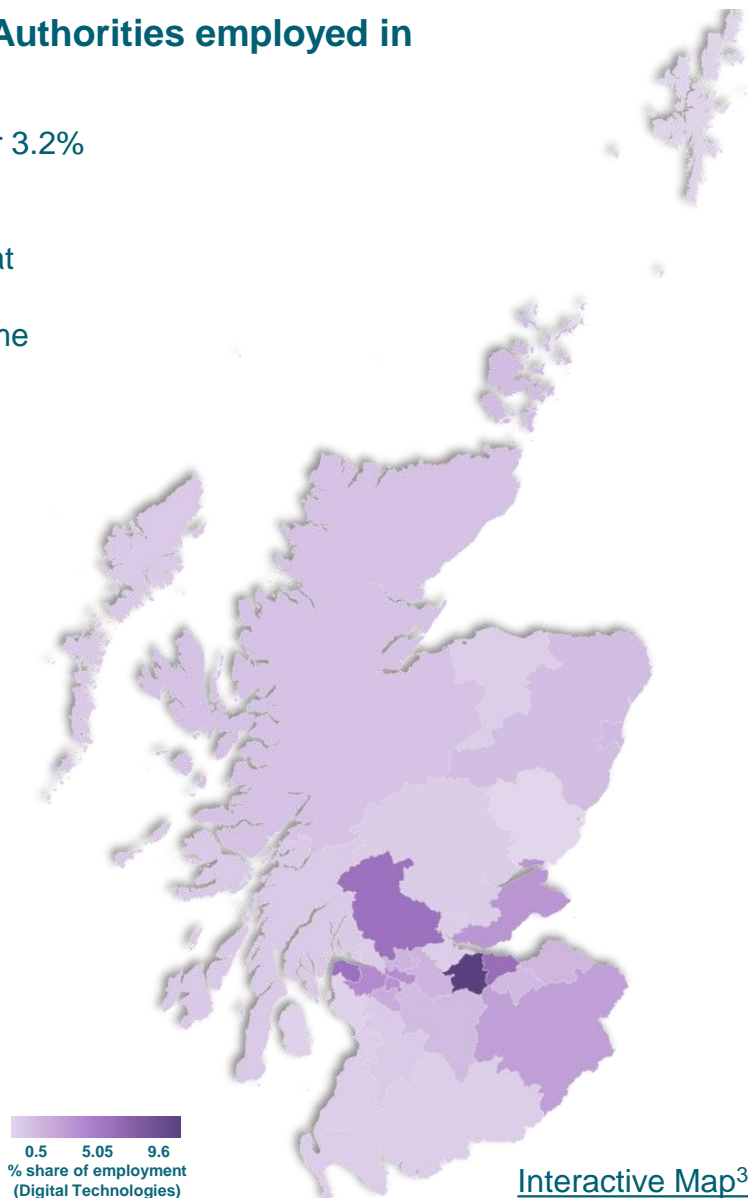
Scottish local authorities have sectoral strengths that make them unique. This means that the **Digital Technologies** sector may be more important to some local economies, as a higher proportion of the local workforce is employed in the sector.

The sector was most prominent in the West Lothian (9.6%), City of Edinburgh (6.0%), Inverclyde (5.8%), and Stirling (5.8%) local authorities.

Employment by Region (people), 2023

The greatest number of people employed in **Digital Technologies** were in:

Edinburgh, East and Midlothian	23,500
Glasgow College Region*	19,900
West Lothian	7,100
West Region	5,600



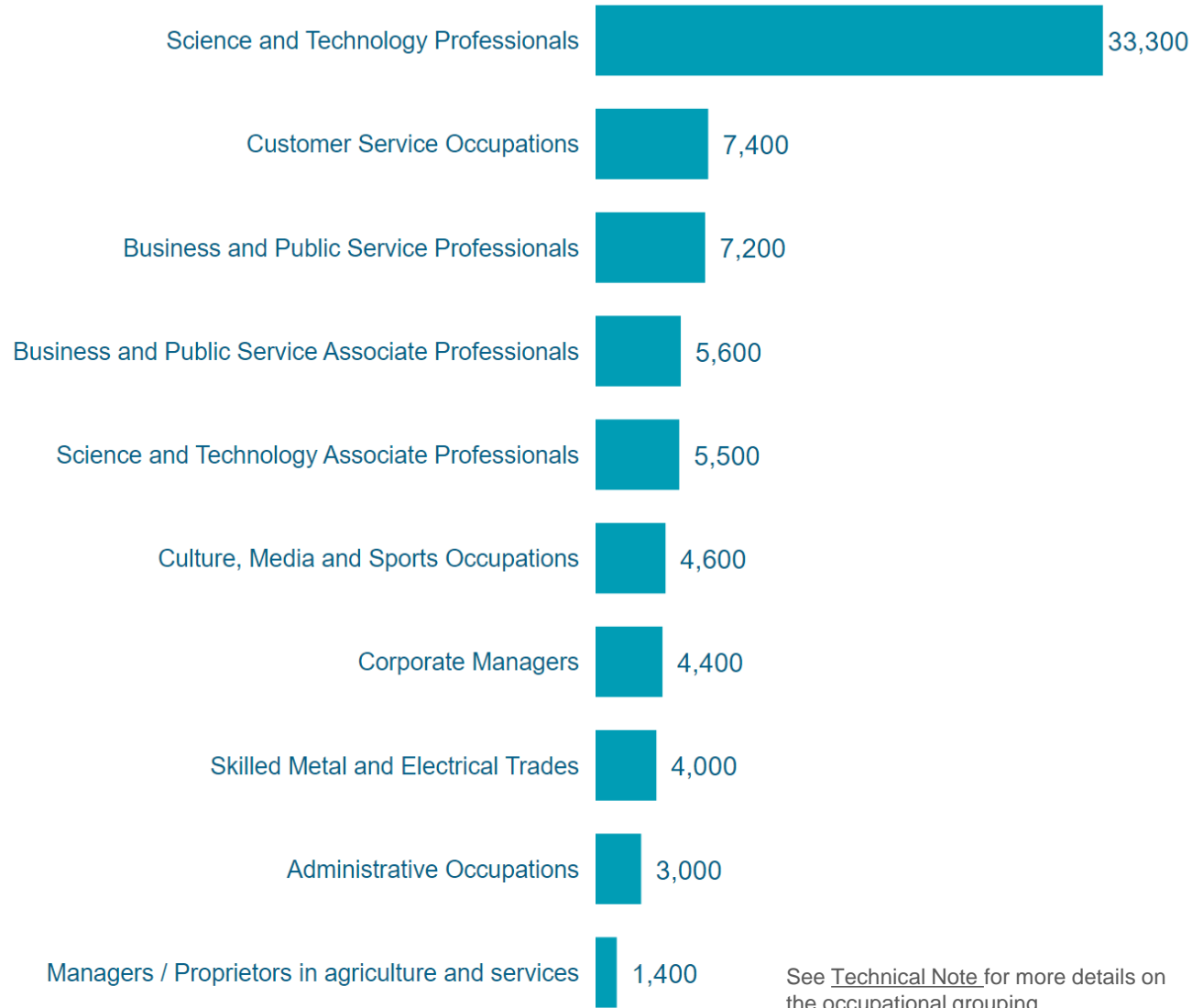
1. Forecasts by Oxford Economics (unless otherwise stated).
2. See [SCQF Framework](#) for further information on SCQF qualification levels

3. The proportion of the workforce in the Local Authority employed in sector is calculated by dividing the sectoral employment in the area by total employment in the area.

*Glasgow College Region covers East Dunbartonshire, East Renfrewshire and Glasgow City local authorities.

Current Demand¹

Top 10 Employing Occupations (people), 2023



1. All Forecasts by Oxford Economics (unless otherwise stated)

2. Due to data availability, a 'best fit SIC code approach' has been used, so the sectoral definitions and totals in this section may vary from those we have used elsewhere.

3. 2022 data is provisional.

4. The real living wage rates have been independently calculated by the Resolution Foundation according to the cost of living based on household goods and services and are overseen by the Living Wage Commission.

Real Living Wage and Gender Pay Gap^{2,3}

Individuals earning Real Living Wage or more:⁴

In April 2022, the real living wage rate for employees who did not work in London was £9.90.



Manufacturing

2021: **87.2%** 2022: **91.1%**

Information and Communications

No data available

Other Service Activities

2021: **73.2%** 2022: **76.6%**

All sectors

2021: **85.5%** 2022: **91.0%**

Gender Pay Gap for median full-time hourly earnings:^{5,6}



Manufacturing

2021: **12.0%** 2022: **17.2%**

Information and Communications

2021: **9.6%** 2022: **13.9%**

Other Service Activities

2021: **22.2%** 2022: **21.1%**

Scotland

2021: **3.0%** 2022: **3.7%**

Due to data availability, a 'best fit SIC code approach' has been used, so the sectors definitions may not fully match key sector definitions.

Modern Apprenticeships⁷



MAs starts for IT & Other Services*:

Q4 2021/22: **2,798**

Q4 2022/23: **3,258**

Q1 2023/24: **658**



MAs in training for IT & Other Services*:

Q4 2021/22: **3,171**

Q4 2022/23: **4,077**

Q1 2023/24: **4,019**

* Based on [SDS Occupational Groupings](#).

For data on FAs and GAs please see the Publications section of our [website](#). For data on colleges and universities please see [Scottish Funding Council](#) and [Higher Education Statistics Agency](#).

5. A 4% gender pay gap denotes that women earn 4% less, on average than men. Conversely, a -4% gender pay gap denotes that women earn 4% more, on average, than men.



Spotlight on... Programmers and Software Developers

Between January 2023 and June 2023, there were **8,100 job postings**

Top Locations:

-  **Glasgow City**
3,200 job postings
-  **Edinburgh City**
2,700 job postings
-  **Aberdeen City**
500 job postings

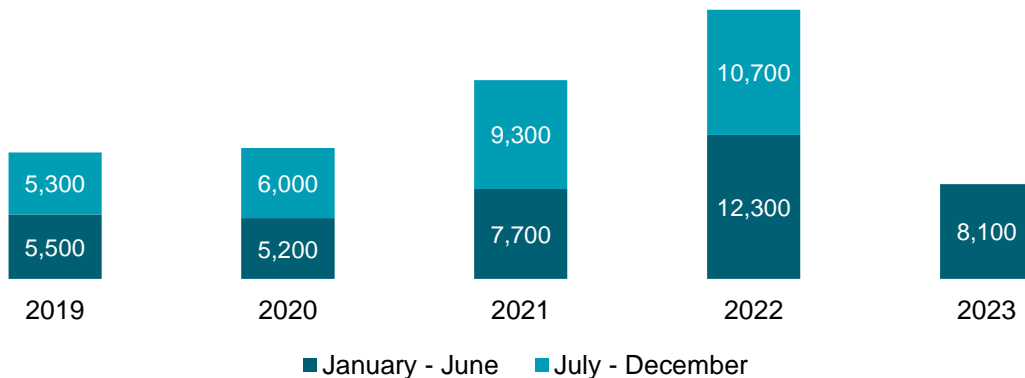
Specialised skills and knowledge:

- **Software Engineering and Development**
- **Agile Methodology**
- **Programming Languages**
- **Web Design and Development**



Median real-time advertised salary: **£54,900***

Job Postings 2019 – 2023, Programmers and Software Developers



Spotlight on... Data Analysts

Between January 2023 and June 2023, there were **600 job postings**

Top Locations:

-  **Edinburgh City**
250 job postings
-  **Glasgow City**
240 job postings
-  **Aberdeen City**
20 job postings

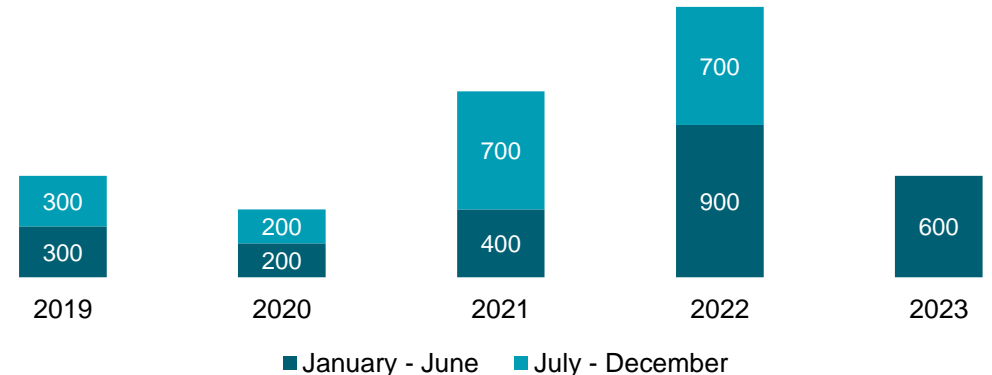
Specialised skills and knowledge:

- **Problem Solving and Analysis**
- **Data Modelling and Management**
- **Data Visualisation**
- **Business Intelligence Software**



Median real-time advertised salary: **£39,600***

Job Postings 2019 – 2023, Data Analysts



1. Lightcast 2023. Online job postings data provides a useful barometer for the health of the jobs market. It is important to note that the data does not capture all activity, so it should be considered as an estimate of activity only.

2. Job postings are rounded to the nearest 10 or 100.

3. Data for Programmers and Software Developers is based on SOC 2136 for the whole of Scotland. Data for Data Analysts is based on job titles for the whole of Scotland.

* Median salary based on the following proportion of job postings that contain salary information: Programmers and Software Developers – 29%, Data Analysts – 37%

Future Demand: Mid-term (2023-2026)¹

In the mid-term (2023-2026), **the number of people in employment is forecast to grow by 2.8% (2,400 people)** in the **Digital Technologies** sector. This is a larger percentage growth than is forecast overall across Scotland where employment is predicted to rise by 2.2% (57,000 people).

In 2026, the top employing regions in the sector are forecast to be **Edinburgh, East and Midlothian** and **Glasgow College Region**, the same as in 2023. Similar to 2023, **the largest proportion of the workforce** is forecast to be educated to **SCQF 7-10**, and the top employing occupation is forecast to be **Science and Technology Professional Occupations**.

The forecasts for the mid-term (2023-2026) suggest there could be demand for **3,400 people in the sector**, as a result of the need to replace workers leaving the labour market and opportunities created through expansion demand. Whilst positive, caution is needed as a wide range of factors may impact the future labour market.

Workforce (people), 2026



Workforce size 2026: **85,900** people



The workforce is expected to **grow** by **2.8%** or **2,400** people between 2023 and 2026



Compared to a Scotland wide increase of **2.2%** or **57,000** people

Total Requirement*



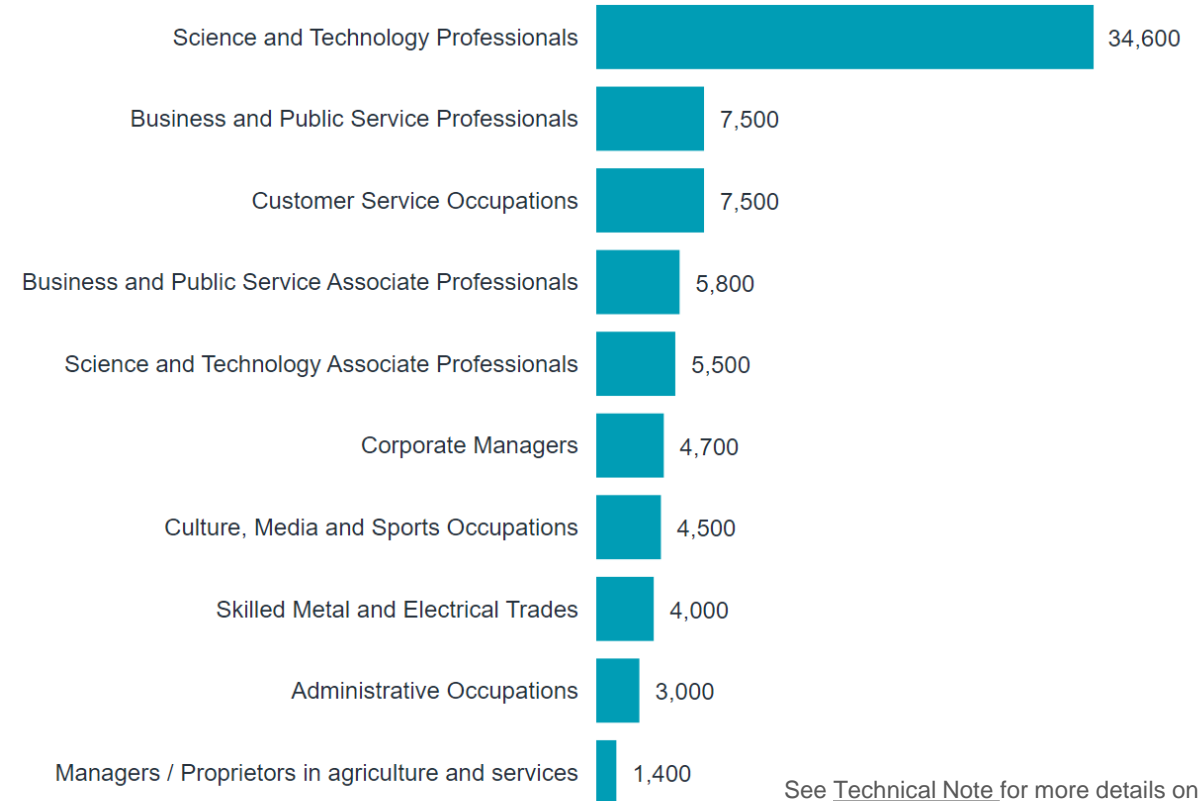
Expansion demand:
2,400 people

Replacement demand:
1,000 people

Total requirement:
3,400 people

Digital Technologies is forecast to account for **1.0%** of Scotland's total requirement for people in the mid-term (2023-2026)

Top 10 Employing Occupations (people), 2026²



See [Technical Note](#) for more details on the occupational grouping

1. Forecasts by Oxford Economics (unless otherwise stated).

* Total requirement for people is made up of expansion and replacement demand.

The expansion demand is the number of people required as a result of economic growth or contraction;

The replacement demand is the number of people required to replace workers leaving the labour market (i.e. those who retire, move away or change jobs). Please note, figures are rounded to the nearest 100 and as a result totals may not equal the sum of the constituent parts

Future Demand: Long-term (2026-2033)¹

Employment growth in the **Digital Technologies** sector is forecast to continue, with an increase of **1.5% (1,300 people)** in the long-term (2026-2033). This is a larger percentage growth than is forecast overall across Scotland where employment is predicted to rise by 0.9% (22,700 people).

In 2033, **Edinburgh, East and Midlothian** and **Glasgow College Region** are forecast to remain the top employing regions in the sector. The largest proportion of the workforce employed in the sector is forecast to be educated to **SCQF 7-10**, and **Science and Technology Professionals** is forecast to remain the most in-demand occupation within the sector.

Forecasts for the long-term (2026-2033) estimate that **5,100 people** could be required in the sector. This will be driven by **the need to replace workers leaving the labour market and the creation of opportunities through expansion demand**.

Workforce (people), 2033



Workforce size 2033: **87,200** people



The workforce is expected to **grow** by **1.5%** or **1,300** people between 2026 and 2033



Compared to a Scotland wide increase of **0.9%** or **22,700** people

Total Requirement*



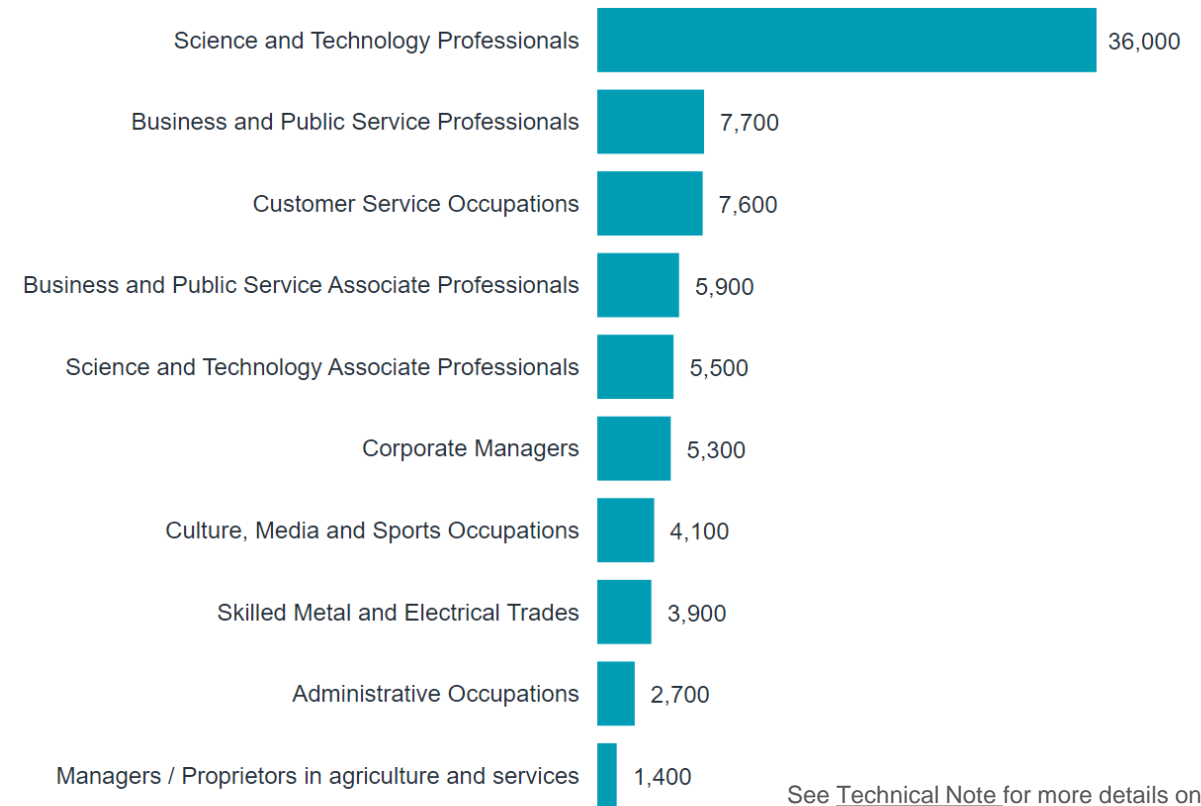
Expansion demand:
1,300 people

Replacement demand:
3,800 people

Total requirement:
5,100 people

Digital Technologies is forecast to account for **0.7%** of Scotland's total requirement for people in the long-term (2026-2033)

Top 10 Employing Occupations (people), 2033²



See [Technical Note](#) for more details on the occupational grouping

1. Forecasts by Oxford Economics (unless otherwise stated).

* Total requirement for people is made up of expansion and replacement demand.

The expansion demand is the number of people required as a result of economic growth or contraction;

The replacement demand is the number of people required to replace workers leaving the labour market (i.e. those who retire, move away or change jobs). Please note, figures are rounded to the nearest 100 and as a result totals may not equal the sum of the constituent parts

Appendix 1: Digital Technologies Sector Definitions (SIC 2007)

SIC	Name
18.20/3	Reproduction of computer media
26.11	Manufacture of electronic components
26.12	Manufacture of loaded electronic boards
26.20	Manufacture of computers and peripheral equipment
26.30	Manufacture of communication equipment
26.40	Manufacture of consumer electronics
26.8	Manufacture of magnetic and optical media
27.31	Manufacture of fibre optic cables
58.21	Publishing of computer games
58.29	Other software publishing
61.1	Wired telecommunications activities
61.2	Wireless telecommunications activities
61.3	Satellite telecommunications activities
61.9	Other telecommunications activities
62.01	Computer programming activities
62.02	Computer consultancy activities
62.03	Computer facilities management activities
62.09	Other information technology and computer service activities
63.11	Data processing, hosting and related activities
63.12	Web portals
63.99	Other information service activities n.e.c.
95.11	Repair of computers and peripheral equipment
95.12	Repair of communication equipment

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