

Tay Cities Digital Skills Mapping



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1 Executive summary

About the Tay Cities Region Deal Digital Skills Project

Funded by the Scottish Government through the Tay Cities Region Deal, the Tay Cities Digital Skills project is part of a wider £20 million investment into the Tay Cities Region Deal Skills and Employability Development Programme. As part of the programme, in December 2022, the Scottish Government awarded the Digital Skills Project £1.5m of government funding, over a 3-year period to support the development and delivery of digital skills throughout Angus, Dundee, North East Fife and Perth & Kinross

Defining Tay Cities digital economy skills

1.1 The Digital Economy Skills Action Plan (DESAP) states there is no single agreed definition of 'digital economy skills'. Digital economy skills are not just about digital technology jobs but include the adoption and integration of digital technology in non-technology jobs and within our everyday lives. The plan suggests that digital economic skills “ ... encompasses the spectrum of digital skills utilised by every employee in every business in Scotland.”

1.2 The latest Skills Development Scotland (SDS) data shows the Tayside digital industry (excluding North East Fife) hosts around 4,200 jobs based on a narrow definition of industry sectors.

1.3 But the Tay Cities region (including North East Fife) hosts around 8,200 digital technology & data skills jobs. This is based on a broader definition of digital skills occupations across all industries.

1.4 Of the 8,200 jobs more than one quarter are in programming and software development roles (2,100 jobs) with 1,400 people working as IT analysts, architects and system designers and 300 roles in cyber security.

1.5 The largest employers of digital skills roles in the Tay Cities region are the public sector, colleges and universities. This includes local authorities, health services and emergency services.

1.6 The definitions of digital skills could be expanded further. For example, science and engineering roles would add a further 7,400 jobs with around 15,600 of the region's jobs (7%) in digital, data, science or engineering roles.

Benchmarking digital skills

1.7 Both Aberdeen (4.2%) and Edinburgh (5.5%) have a higher proportion of jobs in digital skills roles than the Tay Cities region (3.7%). Some of the difference between the regions can be attributed to Edinburgh's higher proportion of jobs found in more digitised industries such as financial services.

1.8 But Edinburgh also leads the Tay Cities region with more digitised roles in comparable sectors. This may reflect more large scale opportunities in the Edinburgh City Region where both private and public sector organisations may have an advantage in *digital transition skills* and embracing digital technologies.

1.9 This pattern is also evidenced within the Tay Cities region where digital jobs are found across the region but with a strong urban focus.

1.10 Dundee accounts for 41% of all digital skills jobs across the Tay Cities region. The urban focus is stronger for more highly skilled digital jobs with nearly half (48%) of the professional digital skills jobs (including programmers, managers, analysts and cyber security professionals) based in Dundee.

Digital skills jobs within the Tay Cities Region

Area	Digital skills jobs	Share of Tay Cities	Digital Professional jobs	Share of Tay Cities
Dundee	3,400	41%	1,100	48%
Angus	1,200	15%	300	13%
Perth & Kinross	2,900	35%	700	30%
North East Fife	700	9%	200	9%

Total	8,200	100%	2,300	100%
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Employment projections

1.11 There will be 1,440 job openings across the Tay Cities region in digital skills jobs between 2022 and 2025. This is equivalent to 480 job openings each year covering both expansion and replacement demand.

1.12 There will be 590 job openings in Dundee between 2022 and 2025, around 200 job openings each year. Job openings arise across a broad range of occupations with programmers accounting for nearly one in four (24%) job openings, nearly 50 each year.

1.13 There will be 500 job openings in Perth & Kinross between 2022 and 2025, nearly 170 job openings each year. Programmers, business analysts and cyber security account for 200 of the job openings (40%), nearly 70 each year.

1.14 There will be 220 job openings in Angus between 2022 and 2025, around 70 each year. North East Fife will see 120 job openings between 2022 and 2025, 40 job openings each year.

Potential interventions

Abertay Cyber Quarter

1.15 A compelling vision to create jobs and investment has already been set out in the [Abertay Cyber Quarter](#) business case. Abertay University has developed an ambitious programme of activities and assets including the [virtual hack lab](#).

1.16 The Tay Cities region faces a challenge to develop digital opportunities of scale. Several stakeholders cited resource constraints across both the public sector and larger companies to invest in cyber security.

1.17 The DESAP calls for digital leadership, the embrace of digital transformation and for businesses to be equipped for cyber security incidents. The Digital Skills project could use the Tay Cities City Region Deal governance structure to engage with the Scottish and UK Governments and regional partners.

1.18 The Tay Cities Region Deal is far more than a funding mechanism and should be viewed as a platform to bring together the partners needed to collectively invest and make best use of the deal's assets.

1.19 Additionally, the UK Government's levelling up [white paper](#), includes a commitment to relocate more senior civil service roles out of London. While an ambitious objective for the Digital Skills Project alone, there is a compelling case for relocating digital economy decision-makers to the Tay Cities region to create a world leading digital hub for the public sector.

1.20 With the recent relocation of the Scottish Social Security HQ to Dundee and the investment in the Abertay Cyber Quarter. Edinburgh and the South East Region has ambitions to become the Data Capital of Europe, the Tay Cities Region could be the centre for excellence for Cyber Security and the public sector (bringing together stakeholders to develop commercial solutions with collaboration between companies, universities and colleges).

Business networks and clean growth

1.21 The consultations revealed some fatigue on the part of businesses in engaging in networks or working groups. Several employers felt engagement was good early on in launching new strategies or projects, but momentum was often lost.

1.22 A network to build links should be considered by the Digital Skills project but it would be preferable to align this with (or build from) existing networks and working groups. The net zero and clean growth agendas were identified as significant opportunities for the digitisation of construction, engineering and manufacturing across the region with lighter touch but more meaningful engagement with businesses.

Micro-credentials

1.23 Micro-credentials are a key component of the DESAP, offering flexibility in upskilling for both learners and employers and have been embraced by the Tay Cities universities. Micro-credentials can be stacked, if learners complete enough micro-credentials they can gain a graduate certificate.

1.24 There is clear evidence that demand for micro-credentials has far exceeded supply in the Tay Cities region. Micro-credentials need to be developed and delivered quickly or risk the content no longer being relevant or up to date. It can be several years between designing a new course to producing the first cohort of graduates through traditional routes.

1.25 Additional funding for micro-credentials could open new flexible career pathways, provision focused on current regional opportunities and regularly updated to fine-tune provision.

1.26 Arguably with less resource implications the Digital Skills project should consider investigating how stacking credentials between institutions could be achieved. This is a long-standing issue, unlikely to wholly resolved as part of the Digital Skills Project.

1.27 The project could start to consider how the region's institutions could work more closely on micro-credentials. QAA Scotland have already explored the [potential of micro-credentials](#) and concluded there is a need for more collaborative working, clearer replicable standards and robust ways of working between institutions.

Distributed learning model

1.28 Several stakeholders raised concerns on focusing too heavily on online learning and how more distributed learning models could be considered. There are clearly trade-offs between efficiency and distributed learning models. Edinburgh's Data-Driven Innovation (DDI) supported activities were delivered in person with live online sessions, the sessions were recorded and could be viewed offline later.

1.29 A number of stakeholders raised the prospect of bringing together online learners to celebrate and promote engagement and success. This could help provide in-person peer group support to more remote and rural communities and potentially build on meta skills between courses.

Inclusion and diversity

1.30 The DESAP states females currently account for 30% of tech jobs, up from 24% in 2020 but women in digital technology roles still tend to be paid less than men.

1.31 Across the Tay Cities region female workers accounted for a higher share of jobs in management positions including IT project managers and IT managers. Female representation was also higher in web design professionals and graphic and multimedia designers. In these roles most degree level qualifications are not held in technical subjects.

1.32 There is limited data on movements between occupations, but management roles appear more likely to accept people from non-digital skills jobs. This may involve people bringing project management skills and experience from elsewhere within an organisation into an IT management role.

1.33 Edinburgh's Data-Driven Innovation (DDI) programme found a similar issue. The programme aimed to support women returning to work and women in work by upskilling and reskilling. But the initial college provision pitched provision at the wrong level with initial SCQF level 4 or 5 data courses, but they found most of the participants already had a degree level qualification.

1.34 The Tay Cities region [Skills Investment Plan](#) highlights the region's strong college infrastructure. This infrastructure will be key to deliver a similar programme in the Tay Cities region. The materials supporting the courses in Edinburgh have been developed on an open-source basis and would be available to the Tay Cities region.

1.35 Opening new pathways for women to bring management skills and experience to digital projects will help improve female representation in tech sector and help close the gender pay gap through opportunities to move into senior roles in the digital economy.

1.36 Overall, whilst many employers weren't familiar with the DESAP, they were familiar with the key themes. For example, a large employer stressed the need for engineers to become more digitally skilled given the digital technology involved in engineering, construction and energy projects.

1.37 As digital skills become an increasingly important part of a wider range of roles, it will be possible for people to carve new career pathways cutting across industries.

1.38 Better linking career pathways across sectors and employers within the Tay Cities region will help to grow the digital economy, create new jobs and make the region a more attractive place for people to work and live.

2 Introduction

Tay Cities digital skills

2.1 Funded by the Scottish Government through the Tay Cities Region Deal, the Tay Cities Digital Skills project is part of a wider £20 million investment into the Tay Cities Region Deal Skills and Employability Development Programme. Part of the regions inclusive growth agenda, this programme aims to support people living and working in the Tay Cities region to develop the skills required to gain high quality jobs in the regions key and growth sectors. Digital skills have been identified as not just a requirement for the digital technology industry but for all sectors across the Tay Cities region.

2.2 In December 2022, the Scottish Government awarded the Digital Skills Project £1.5m of government funding, over a 3-year period to support the development and delivery of digital skills throughout Angus, Dundee, North East Fife and Perth & Kinross. An additional £2.5 million is due to be invested between 2025 and 2029.

2.3 The project's objectives include plugging the digital skills gap, understanding/satisfying business needs and creating unrivalled talent in the region through an inclusive approach. The project will help to bring a real change in the region's digital skills system by delivering new, pilot approaches and enablers for digital skills - to deliver a step-change in performance and inclusion.

2.4 The project's business case included a mapping exercise of the supply of skills across the region, consultations, research on employer needs and options analysis. This included consultation with stakeholders, high level mapping of supply and secondary research into employer requirements. However, this work is now out of date and wasn't sufficiently detailed to inform priority activities for the Digital Skills project.

Refreshing the case for digital skills

2.5 This report seeks to refresh and develop the understanding of the digital technology and data skills needs across all sectors for the Tay Cities Region (Angus, Dundee City, North East Fife and Perth & Kinross Council areas). This includes mapping the current supply of digital and data skills in the region and identifying gaps in provision.

2.6 The key elements of this report cover:

- Secondary data analysis of the current state, scale, and composition of the digital economy and its sectors (including the size and scale of the digital economy, regional economic importance and forecast changes).
- Consultations with employers, skills providers and stakeholders to understand current and future skills needs.
- A review of digital skills provision, drawing on consultations and the [Digital Economy Skills Action Plan](#) recently published by Skills Development Scotland.
- Recommended interventions by the Digital Skills Project to bring about real change in the region's digital skills system focusing on new, pilot approaches and enablers.

2.7 This report has focused on providing more detailed information on sectors within the region's digital economy and occupational profiles. The report considers how the demand for digital skills may develop over the next three to five years. The report has been completed based on the best available evidence; however some evidence gaps remain.

3 Tay Cities' Digital Economy

Mapping the digital economy

3.1 The Office for National Statistics ([ONS](#)) has established an ongoing programme of research to better capture the value and activities with the digital economy. A [recent article](#) published as part of the ONS research programme showed that a narrow definition of the digital economy (based on digital products) accounted for less than five percent (4.6%) of the UK's economy.

3.2 However, if a looser definition is taken based on 'products affected by digitalisation', the digital economy was found to account for more than one quarter (26.3%) of the UK's Gross Value Added (26.3%) or GVA. The Digital Economy Skills Action Plan (DESAP) similarly found that Scotland's digital technology sector accounted for around 4% (£6bn) of the Scottish economy in 2022.

3.3 The latest SDS online [data matrix](#) showed around 4,200 digital (key industry jobs in the Tayside region in 2022 (excluding North East Fife). Tayside's digital industry provided around 2% of jobs across the region (based on Oxford Economics data).

3.4 However, the DESAP states there is no single agreed definition of 'digital economy skills'. The starting point for the plan was that:

"... digital economy skills are not just about digital technology jobs (e.g., programmers and web designers), but encompasses the spectrum of digital skills utilised by every employee in every business in Scotland."

3.5 The DESAP sets out four categories of digital economy skills providing a framework to develop the plan. The categories include *digital adoption skills* (skills needed to be proficient technology users), *digital transition skills* (businesses embracing digital technologies), *integrated digital skills* (evolving job roles combining digital skills with other disciplines) and *professional digital skills* (traditional 'techie' roles now used across an increasing range of sectors).

Mapping digital skill categories

3.6 Digital technology skills for the Tay Cities region were captured using a set of digital skills [satellite accounts](#). This both follows the approach adopted by the ONS¹ and captures the DESAP's call to view digital skills through the four different categories.

3.7 The accounts link labour market information to economic data for the Tay Cities region. The industry sectors for the Tay Cities economy follow the 98 sectors shown in the [Input-Output tables](#) published by the Scottish Government. The labour market data for the Tay Cities region was taken from the Annual Population Survey, Labour Force Survey and Business Register and Employment Survey (BRES) data².

3.8 The labour market data was accessed through the ONS and, due to the small sample size, was pooled over a number of years to provide a larger sample. Other sources of data were also included to improve the accuracy of the accounts, this included information provided by employers.

Digital sectors

3.9 Fifteen occupations were identified as driven by digital technology or data skills. The occupations ranged from programmers and cyber-security to graphic and multimedia designers, a complete list of the occupations is appended (Figure A.1) including a description of the tasks associated with each occupational role.

3.10 As stated earlier, the latest SDS figures show Tayside's digital industry (excluding North East Fife) hosted around 4,200 jobs in 2022. This measure is based on a [narrow definition](#) of 23 industry sectors, ranging from manufacturing consumer electronics to hosting web portals.

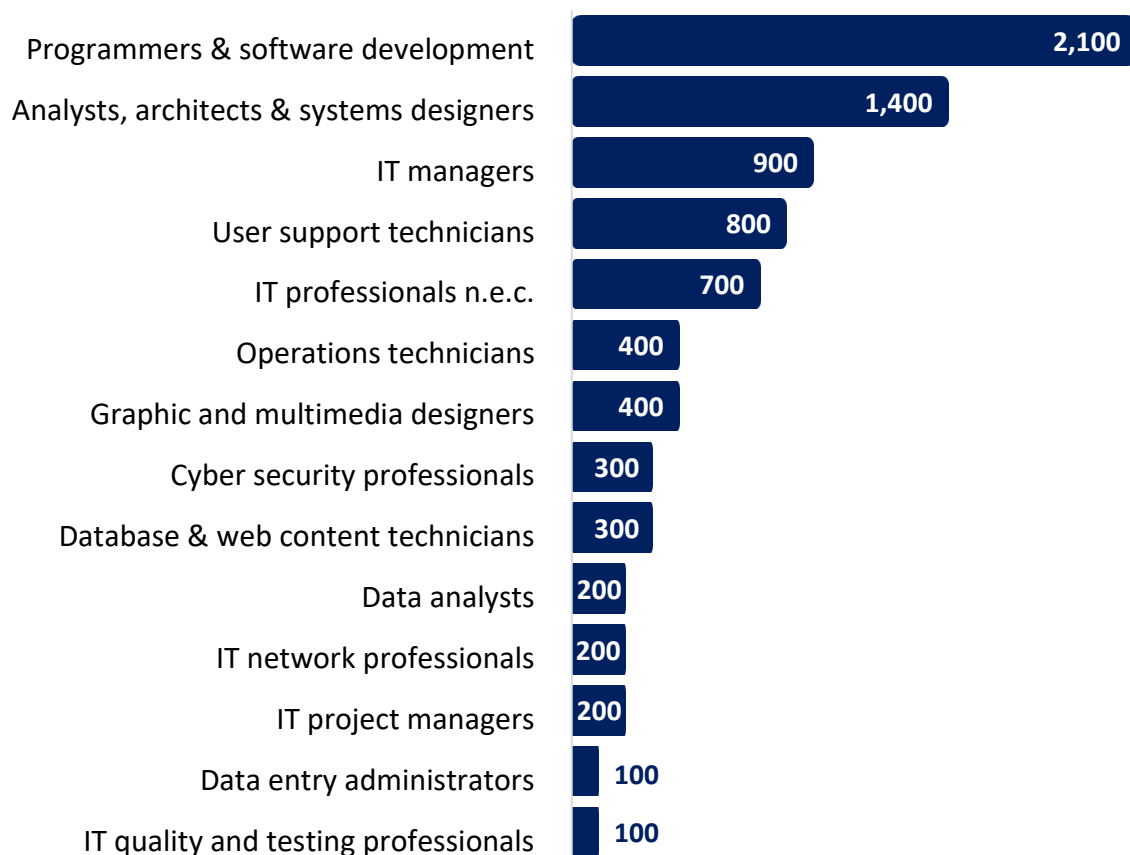
3.11 The digital skills accounts used a broader definition based on occupations (across all industry sectors). The Tay Cities region hosts around 8,200 digital technology & data skills jobs (in 2022), shown in Figure 3.1.

¹ The ONS's main framework for mapping the digital economy are the digital supply and use tables (DSUTs). This is part of the G20 digital roadmap and detailed in an [OECD handbook](#).

² Accessed through the UK Data Archive: Tay Cities Deal - Digital Skills Mapping Project.

3.12 Of the 8,200 jobs, more than one quarter are in programming and software development roles (2,100 jobs) with 1,400 people working as IT analysts, architects and system designers and 300 roles in cyber security.

Figure 3.1: Tay Cities region digital skills jobs (occupations)

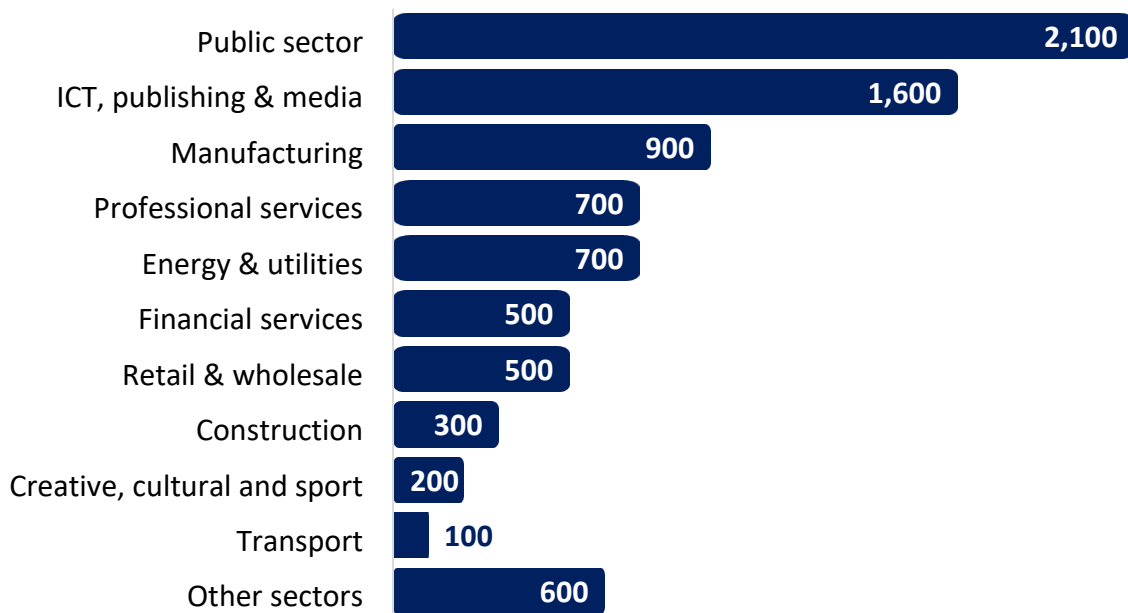


3.13 The 8,200 digital jobs in the Tay Cities region are shown across industries in Figure 3.2. A list of industries and definitions is appended (Figure A.2).

3.14 The largest employer of digital skills roles in the Tay Cities region is the public sector (2,100 jobs). This includes local authorities, health services, colleges, universities and emergency services. The *professional digital skills* described in the DESAP are found across a wide range of industrial sectors in the Tay Cities region.

3.15 The public sector jobs shown in Figure 3.2 cover a range of sectors including education. The education sector alone accounts for 600 digital skills jobs. If education were removed, the number of digital skills jobs in the region's public sector would fall from 2,100 jobs to 1,500 jobs (slightly less than in the ICT, publishing and media sector).

Figure 3.2: Tay Cities region digital skills jobs (industries)



3.16 Figure 3.3 shows the proportion of jobs within each industry accounted for by digital skills jobs. More than one in three (36.2%) jobs in ICT, publishing & media are in digital skills roles compared to just 2.9% across the public sector.

Figure 3.3: Tay Cities region digital skills jobs (industries)

Sector	Digital Skills Jobs	Share of all Sector Jobs
Public sector	2,100	2.9%
ICT, publishing & media	1,600	36.2%
Manufacturing	900	6.9%
Energy & utilities	700	12.9%
Professional services	700	5.4%
Retail & wholesale	500	1.6%
Financial services	500	16.5%
Construction	300	2.7%
Creative, cultural and sport	200	2.7%
Transport	100	3.1%
Other	600	1.3%
Total	8,200	3.7%

3.17 The accounts developed to inform this report offer a degree of flexibility around definitions. For example, science and engineering roles across the Tay Cities region would add a further 7,400 jobs with 15,600 of the region's jobs (7%) in digital, data, science or engineering roles (Figure 3.4).

3.18 The broader definition includes professional science occupations (SOC 2111 to 2119) including chemical scientists (2111) and biomedical scientists (2113). Professional engineering occupations (SOC 2121 to 2129) includes civil engineers (2121) and process engineers (2125).

3.19 Science & engineering technician occupations (SOC 3111 to 3120) include laboratory technicians (3111) and CAD, drawing and architectural technicians (3120).

Figure 3.4: Tay Cities region digital, data, science and engineering

Occupational roles	Jobs
Digital & data skills jobs	8,200
Scientists & engineers	5,100
Science & engineering technicians	2,300
Total	15,600

Benchmarking digital skills

3.20 The accounts framework was used to benchmark the Tay Cities region against a set of modelled employment outcomes for the Edinburgh City region and Aberdeen City region. Both Aberdeen (4.2%) and Edinburgh (5.5%) have a higher proportion of jobs in digital skills roles than the Tay Cities region (3.7%), shown in Figure 3.5.

Figure 3.5: Tay Cities Region Digital, Data, Science and Engineering

Area	Share of jobs in digital roles
Tay Cities Region	3.7%
Aberdeen City Region	4.2%
Edinburgh City Region	5.5%

3.21 Some of the difference between the regions can be attributed to Edinburgh's higher proportion of jobs found in relatively digitised industries such as financial services. But Edinburgh also leads the Tay Cities region with more digitised roles in comparable sectors (shown in Figure 3.6).

3.22 This may reflect more large scale opportunities in the Edinburgh City Region where both private and public sector organisations may have an advantage in *digital transition skills* and embracing digital technologies.

Figure 3.6: Benchmarking Digital skills

Industry	Edinburgh City Region		Tay Cities Region	
	Jobs	Sector share	Jobs	Sector share
Public sector	7,100	3.1%	2,100	2.9%
ICT, publishing & media	13,900	43.2%	1,600	36.2%

3.23 The underlying Tay Cities region data can be analysed in addition to providing a platform for modelling skills. For example, the relative concentration or distribution of digital skills occupations across industries. Among the Tay City region's digital skills, web design professionals are the most concentrated employed within a small number of industries.

3.24 IT managers are the most dispersed digital skill group in the Tay City region, appearing in over fifty different industries with a pattern of industrial dispersal similar to health and safety managers. Data entry administrators are less dispersed than IT managers with most roles arising in social work and public administration.

Digital skills qualifications

3.25 Figure 3.7 shows the highest levels of qualification held within the Scottish Credit and Qualifications Framework ([SCQF](#)) for each of the digital skills occupations across the Tay Cities region. Of the 8,200 digital skills jobs nearly three quarters (74%) hold degree level qualifications (SCQF 9-12).

3.26 Among professional digital skills occupations, nearly nine out of ten business analysts and programmers held degree level qualifications. This was lower for cyber security professionals and IT project managers.

3.27 Among IT technicians and user support roles, less than half of workers held degree level qualifications. The number of workers without any formal qualifications was low (less than 1%).

3.28 The skills requirements across the digital skills jobs are significantly higher than for most jobs in the region. The latest SDS skills forecasts show that 7% of all new job openings in the Tayside region (excluding North East Fife) between 2022 and 2025 will be associated with roles with no formal qualifications and 57% will require qualifications at SCQF level 7 or higher.

Figure 3.7: Tay Cities region digital skills by occupation and the level of highest qualification held

Code	Occupation	9-12	7-8	6-7	5	1-4	No quals	Total
2131	IT project managers	130	20	20	10	-	-	200
2132	IT managers	710	80	70	40	10	-	900
2133	IT business analysts, architects & systems designers	1,160	90	120	60	10	-	1,400
2134	Programmers & software development professionals	1,800	110	110	40	20	10	2,100
2135	Cyber security professionals	160	-	50	30	10	-	300
2136	IT quality & testing professionals	60	-	10	-	-	-	100
2137	IT network professionals	140	20	20	-	-	-	200
2139	Information technology professionals n.e.c.	520	70	60	20	10	10	700
2141	Web design professionals	70	-	10	-	-	-	100
2142	Graphic & multimedia designers	380	40	10	10	-	-	400
3131	IT operations technicians	160	60	100	50	20	-	400
3132	IT user support technicians	370	110	190	90	50	10	800
3133	Database administrators & web content technicians	200	10	40	30	20	10	300
3544	Data analysts	160	10	40	30	-	-	200
4152	Data entry administrators	70	10	30	20	10	10	100
	Total	6,100	600	900	400	200	<100	8,200

Note: SCQF 9-12 (degree or above), SCQF 7-8 (other HE level), SCQF 6-7, SCQF 5, SCQF 1-4, No qualifications

3.29 Figure A.3 (appended) provides a breakdown of the qualification subject areas for those holding higher education qualifications in digital skills roles. Of those holding higher education qualifications, just over one third (35%) were qualified in computing related subject.

3.30 Nearly two thirds (61%) of those holding higher education qualifications were qualified in a technical subject (including computing, maths, engineering, technology and physical sciences). There were significant variations across the different digital skills occupations (Figure A.3 appended)

3.31 Around two thirds of programmers & software development professionals (with higher education qualifications) held a qualification in a computing related subject with nearly nine out of ten holding a qualification in a technical subject. By contrast around three quarters of web design professionals and graphic & multimedia designers held non-technical qualifications (including arts and design subjects).

3.32 Among professional digital skills occupations, most IT project managers and IT managers held higher education qualifications in non-technical subjects. There is limited data on movements between occupations, but IT management roles appear more likely to attract people moving from non-digital skills jobs.

3.33 For example, this may involve people bringing project management skills and experience from elsewhere within an organisation into an IT management or IT project management role.

Modern Apprenticeships

3.34 SDS regularly publish a range of data on apprenticeships including Modern Apprenticeships (MAs). An [overview](#) of the Technical Apprenticeship in Digital technology is available; this apprenticeship support technician level digital technology roles adopted across different sectors with pathways for software development, cyber security and data analytics.

3.35 The number of MA starts in the Tay Cities region has risen significantly since 2020-21, when the number of participants fell sharply due to the Covid-19 pandemic. In 2022-23 there were 1,861 MA starts in digital skills subjects across Scotland, 7.3% of all MA starts.

3.36 The digital skills subjects (based on framework data) included Data Analytics, Digital Applications, Digital Marketing, Digital Technology, Information Security and IT & Telecommunications (Technical Apprenticeships were also included).

3.37 Based on the residence of the apprentice (rather than the employer) the Tay Cities region accounted for 161 MA starts in 2022-23 in digital skills subjects (around 4% of all MA starts in 2022-23). Across the Tay Cities local authority areas there were 13 MA starts in digital skills in Angus (2% of all MA starts), 32 in Dundee (5%), 19 in Perth & Kinross (3%) and 97 in Fife (6%).

Local areas

Mapping the digital economy across local areas

3.38 There are significant challenges in capturing the activities, employment and skills within the Tay Cities region digital economy. Data for the four local authority areas within the region is limited, summary data is shown in this section with further data appended.

3.39 The Dundee City Council area accounts for 41% of all digital skills jobs across the Tay Cities region. The region's more highly skilled digital jobs are more likely to be found in urban areas with nearly half (48%) of the professional digital skills jobs (including programmers, managers, analysts and cyber security professionals) based in Dundee.

Figure 4.1: Digital skills jobs within the Tay Cities region

Area	Digital skills jobs	Share of Tay Cities	Digital Professional jobs	Share of Tay Cities
Dundee	3,400	41%	1,100	48%
Angus	1,200	15%	300	13%
Perth & Kinross	2,900	35%	700	30%
North East Fife	700	9%	200	9%
Total	8,200	100%	2,300	100%

3.40 The latest SDS forecasts (November 2022) show digital industry jobs for each of the local authorities. These figures are based on a narrow industry definition with around 4,200 digital industry jobs in the Tayside region in 2022 (excluding North East Fife).

3.41 Using a broader definition focusing on digital skills, the number of jobs in the Tay Cities region is significantly higher. The more broadly defined digital skills jobs are more evenly distributed across the local authority areas. The number of digital skills jobs in Dundee (3,400) is nearly 10% higher than the number of jobs in the city's digital industries (3,100) cited by SDS.

3.42 In Perth & Kinross digital skills jobs (2,900) are more than three times the number of jobs in local digital industries (900). In Angus digital skills jobs (1,200) are six times the number of jobs in local digital industries (200).

3.43 Dundee's digital jobs are more readily identifiable with the city's technology sectors. In Perth & Kinross and Angus, more significant differences emerge with digital skills embedded in a range of sectors including financial services, energy, manufacturing and engineering.

3.44 The SDS figures show that Dundee accounted for nearly three quarters (74%) of all digital industry jobs in the Tayside region. The sector is projected to expand by 100 jobs over the next three years, but the SDS projections do not anticipate replacement demand, due to the digital industry's relatively small size.

3.45 The latest SDS forecasts show no replacement demand within the digital industries for the local authority areas contained wholly within the Tay Cities Region (Dundee, Perth & Kinross and Angus). This appears to be a conservative assumption; replacement demand is likely to arise with a large and growing number of digital skills jobs spread across a range of industries.

3.46 Several comparison sites provide benchmarking data for salaries based on online job adverts. Salaries for most digital skills occupations in the Tay Cities region appear to be lower than similar positions elsewhere in Scotland and other parts of the UK.

3.47 For example, the average salary ([June 2023](#)) for application engineers was £50,700 for jobs based in Dundee, £62,300 in Scotland and £67,300 in the UK. Salaries in Scotland were driven by a high volume of job adverts in Edinburgh (average salary £66,000) while salaries in the UK were driven by London (average salary £79,800).

3.48 The same benchmarking sites shows the average salary for IT support manager roles were £31,200 in Dundee, £36,900 in Scotland and £41,300 across the UK. Differences in salaries are likely to reflect the relative availability of skilled labour in the Tay Cities region, lower living costs and quality of life measures.

Small towns and rural communities

3.49 The difference between the Tay Cities communities is clearer when using the Scottish Government's six fold [urban-rural classification](#). The model was used to estimate employment in occupations requiring digital skills across just over 600 [data zones](#). These were classified as accessible rural, accessible small towns, large urban areas, other urban areas and remote rural areas (summarised in Figure 4.2).

Figure 4.2: Digital skills jobs in urban and rural areas

Area	All jobs	Digital jobs	Programmers & cyber security
Large urban areas	39.4%	41.6%	49.1%
Other urban & accessible areas	53.6%	52.5%	45.2%
Remote & rural areas	6.9%	6.0%	5.7%
<i>of which remote small towns</i>	<i>2.8%</i>	<i>1.9%</i>	<i>1.4%</i>
All areas	100%	100%	100%

3.50 Large urban areas account for a higher share of digital jobs than other types of employment. Nearly half (49.1%) of all programmers and cyber security professionals³ in the Tay Cities region. Outside of the region's large urban centres digital jobs account for a relatively lower share of employment.

3.51 Remote and rural communities account for 6.9% of the region's jobs but only 6.0% of digital jobs and 5.7% of programmers and cyber security professionals. This means the number of highly skilled digital jobs in remote and rural communities is nearly 20% lower than expected based on the overall number of jobs hosted in each type of area.

3.52 The clustering of digital jobs, particularly highly skilled digital jobs, in large urban centres was recognised in the [Logan Review](#) in 2020. The review describes technology 'market squares' where people with differing skills and experience can intermingle and share ideas outside of their companies.

³ Programmers & software development professionals (occupation code 2134) and cyber security professionals (occupation code 2135)

3.53 Small towns across the region are underrepresented in digital jobs, particularly highly skilled digital jobs. Figure 4.2 show remote small towns account for 2.8% of the region's jobs but only 1.9% of digital jobs and 1.4% of programmers and cyber security professionals.

3.54 The number of highly skilled digital jobs in remote small towns is nearly 50% lower than expected, based on the overall number of jobs hosted in remote small towns. In accessible small towns highly skilled digital jobs are also nearly 50% lower than expected based on the overall number of jobs.

3.55 If small towns (accessible and remote) across the Tay Cities region were to raise their representation in digital jobs in line with overall employment this would sustain an additional 200 to 300 jobs. The [Tay Cities Region Deal Document](#) states that many small towns are “struggling to identify their economic futures.”

3.56 There is poor digital connectivity in many rural areas with most parts of the Tay Cities Region lagging the rest of Scotland. The deal states that poor digital connectivity limits inclusion and restricts the region's economic performance.

Summary of local authority areas

Dundee

3.57 The latest SDS forecasts (November 2022), show a total of 80,700 jobs in the Dundee City Council area in 2022. This is forecast to increase to 81,400 jobs by 2025. Employment is projected to expand by around 700 jobs (around 230 jobs each year) or a 0.8% rise over three years. The projected rate of job growth is around two thirds of that projected for Scotland (1.2%) from 2022 to 2025.

3.58 SDS forecast that replacement demand⁴ in Dundee will generate around 10,000 job openings from 2022 to 2025. The total requirement, including expansion and replacement demand is projected to be around 10,600 job openings, or around 3,500 jobs each year.

⁴ Replacement demand is the number of job openings generated by people leaving the labour market including those who retire, move away, or change jobs.

3.59 The SDS forecasts showed 3,100 digital industry jobs in Dundee in 2022, nearly three quarters (74%) of all digital industry jobs in the Tayside region. The sector is projected to expand by 100 jobs over the next three years. SDS projections do not anticipate replacement demand for the narrowly defined digital industry.

3.60 As set out earlier, digital jobs (defined by occupations) accounted for 3,400 jobs in Dundee (48% of digital jobs in the Tay Cities region). Figure 4.3 shows the total requirement (including expansion demand and replacement demand) for digital skills jobs in Dundee by detailed occupation.

3.61 There will be 590 job openings in Dundee between 2022 and 2025, around 200 each year. Job openings arise across a broad range of occupations with programmers accounting for nearly one in four (24%) job openings, nearly 50 each year.

Figure 4.3: Dundee forecast total requirement (2022-25)

Code	Digital skills jobs	Total requirement
2134	Programmers & software development professionals	140
3132	IT user support technicians	100
2133	IT business analysts, architects & systems designers	80
2132	IT managers	60
3131	IT operations technicians	50
2139	Information technology professionals n.e.c.	40
3133	Database administrators & web content technicians	40
2142	Graphic & multimedia designers	30
2135	Cyber security professionals	20
2131	IT project managers	10
2137	IT network professionals	10
-	Other digital skills occupations ⁵	10
Total		590

Perth & Kinross

3.62 The latest SDS forecasts (November 2022), show a total of 72,800 jobs in the Perth & Kinross Council area in 2022. This is forecast to increase to 74,900 jobs by 2025. Employment is projected to expand by around 1,100 jobs (around 370 jobs each year) or a 1.5% rise over three years. The projected rate of job growth is higher than projected for Scotland (1.2%) from 2022 to 2025.

⁵ 2136 IT quality & testing professionals, 2141 Web design professionals, 3544 Data analysts and 4152 Data entry administrators

3.63 SDS forecast that replacement demand in Perth & Kinross will generate around 5,700 job openings from 2022 to 2025. The total requirement, including expansion and replacement demand is projected to be around 6,800 job openings, or around 2,300 jobs each year.

3.64 The SDS forecasts showed 900 digital industry jobs in Perth & Kinross in 2022, around one fifth (21%) of all digital industry jobs in the Tayside region. SDS forecasts show the industry is projected to remain stable over the next three years and does not anticipate expansion or replacement demand.

3.65 As set out earlier, digital jobs (defined by occupations) accounted for 2,900 jobs in Perth & Kinross (35% of digital jobs in the Tay Cities region). Figure 4.4 shows the total requirement (including expansion demand and replacement demand) for digital skills jobs in Perth & Kinross by detailed occupation.

Figure 4.4: Perth & Kinross forecast total requirement (2022-25)

Code	Digital skills jobs	Total requirement
2134	Programmers & software development professionals	110
3132	IT user support technicians	90
2133	IT business analysts, architects & systems designers	70
2132	IT managers	50
3131	IT operations technicians	50
3133	Database administrators & web content technicians	40
2139	Information technology professionals n.e.c.	30
2135	Cyber security professionals	20
2142	Graphic & multimedia designers	20
2131	IT project managers	10
2137	IT network professionals	10
-	Other digital skills occupations ⁶	<10
Total		500

3.66 There will be 500 job openings in Perth & Kinross between 2022 and 2025, nearly 170 job openings each year. Programmers, business analysts and cyber security account for 200 of the job openings (40%), nearly 70 each year.

Angus

3.67 The latest SDS forecasts (November 2022), show a total of 40,100 jobs in the Angus Council area in 2022. This is forecast to increase to 40,700 jobs by 2025. Employment is projected to expand by around 600 jobs (around 200 jobs each year) or a 1.5% rise over three years.

⁶ 2136 IT quality & testing professionals, 2141 Web design professionals, 3544 Data analysts and 4152 Data entry administrators

3.68 The projected rate of job growth is higher than projected for Scotland (1.2%) from 2022 to 2025. SDS forecast that replacement demand in Angus will generate around 5,600 job openings from 2022 to 2025. The total requirement, including expansion and replacement demand is projected to be around 6,200 job openings, or just over 2,000 jobs each year.

3.69 The SDS forecasts showed 200 digital industry jobs in Angus in 2022, nearly in six (17%) of all digital industry jobs in the Tayside region. The sector is projected to remain stable over the next three years and with no anticipated expansion or replacement demand.

3.70 As set out earlier, digital jobs (defined by occupations) accounted for 1,200 jobs in Angus (15% of digital jobs in the Tay Cities region). Figure 4.5 shows the total requirement (including expansion demand and replacement demand) for digital skills jobs in Angus by detailed occupation.

Figure 4.5: Angus forecast total requirement (2022-25)

Code	Digital skills jobs	Total requirement
2134	Programmers & software development professionals	40
3132	IT user support technicians	40
2133	IT business analysts, architects & systems designers	30
2132	IT managers	20
3131	IT operations technicians	20
3133	Database administrators & web content technicians	20
2135	Cyber security professionals	10
2139	Information technology professionals n.e.c.	10
2142	Graphic & multimedia designers	10
-	Other digital skills occupations ⁷	20
Total		220

⁷ 2131 IT project managers, 2136 IT quality & testing professionals, 2137 IT network professionals, 2141 Web design professionals, 3544 Data analysts and 4152 Data entry administrators

3.71 There will be 220 job openings in Angus between 2022 and 2025, around 70 job openings each year. Job openings outside of professional occupations account for just over one third (36%) of job openings including user support technicians, operations technicians and database administrators & web content technicians.

North East Fife

3.72 SDS forecasts aren't available for North East Fife, job creation across Fife is projected to match Scotland from 2022 to 2025. As set out earlier, digital jobs (defined by occupations) accounted for 700 jobs in North East Fife (9% of digital jobs in the Tay Cities region).

3.73 Figure 4.6 shows the total requirement (including expansion demand and replacement demand) for digital skills jobs in North East Fife by detailed occupation. There will be 120 job openings in North East Fife between 2022 and 2025, 40 job openings each year.

Figure 4.6: North East Fife forecast total requirement (2022-25)

Code	Digital skills jobs	Total requirement
2134	Programmers & software development professionals	30
2133	IT business analysts, architects & systems designers	20
3132	IT user support technicians	20
2132	IT managers	10
2139	Information technology professionals n.e.c.	10
2142	Graphic & multimedia designers	10
3131	IT operations technicians	10
3133	Database administrators & web content technicians	10
-	Other digital skills occupations ⁸	10
Total		120

⁸ 2131 IT project managers, 2135 Cyber security professionals, 2136 IT quality & testing professionals, 2137 IT network professionals, 2141 Web design professionals, 3544 Data analysts and 4152 Data entry administrators.

4 Addressing inequalities

Under-represented people and places

4.1 The Digital Economy Skills Action Plan ([DESAP](#)) recognises an urgent need “to rapidly accelerate a more diverse range of talent entering tech roles.” The plan seeks to address labour market inequalities and draw on the skills of under-represented groups to help mitigate skills shortages.

4.2 The DESAP highlights underrepresentation and the barriers faced by older workers, young people, people with disabilities, workers displaced by the adoption of digital technologies, ethnic minorities and women. The plan also states that a place-based approach is ‘essential’ to achieve inclusive growth and support all digital economy employers.

4.3 Under representation across the Tay Cities region remote and rural communities is shown earlier in this report. Small towns across the region are underrepresented in digital jobs, particularly highly skilled digital jobs. If small towns across the Tay Cities region were to raise their representation in digital jobs in line with overall employment this would sustain an additional 200 to 300 digital skills jobs.

4.4 Mapping digital skills jobs in the Tay Cities region to the Scottish Index of Multiple Deprivation (SIMD) shows the region’s most deprived communities are least likely to host digital skills jobs. The most deprived communities (SIMD quintile 1) account for just over one in ten of all jobs (11%) across the region but just 8% of the region’s digital skills jobs.

4.5 The share of digital skills jobs based in the region’ least deprived communities (12%) is also lower than their share of all jobs in the region (15%). The most over-represented communities in region are those in the fourth SIMD quartile.

Figure 5.1: Tay Cities jobs by SIMD Quintile

SIMD Quintile	All jobs	Digital skills jobs
1 (most deprived)	11%	8%
2	22%	23%
3	21%	22%
4	30%	35%
5 (least deprived)	15%	12%
Total	100%	100%

Gender representation

4.6 The Digital Skills Project project is designed to promote inclusive growth. The DDI Skills Gateway (available [online](#)) has similar aspirations to promote inclusion within digital technology industries.

4.7 However, there is limited data on the characteristics of the Tay City Region's digital workforce, including under-represented groups. The DESAP says that women continue to be under-represented in the labour market, despite initiatives to tackle inequalities.

4.8 The plan states that gender inequalities persist in digital technology occupations but are improving. Females currently account for 30% of tech jobs, up from 24% in 2020 but women in digital technology roles still tend to be paid less than men.

4.9 The Tay Cities region baseline data was extended to include a gender profile for each of fifteen digital skills occupations. This draws on a blend of data for the Tay Cities region and Scotland and should be treated as indicative of the pattern of female employment in the region's digital skills occupations.

4.10 Female workers accounted for a higher share of jobs in management positions including IT project managers and IT managers. Female representation was also higher in web design professionals and graphic and multimedia designers. In all four of these roles most degree level qualifications are not held in technical subjects (Figure A.3 appended).

4.11 Other significant variations include lower female representation in business analysts, programmers and cyber security roles. In data entry roles most workers are female and nearly half of database administrators and web content technicians are female.

4.12 Female representation in digital skills occupations across the Tay Cities region is around 30%. Dundee’s cluster of programming and cyber security activities suggests female representation in the city is likely to be lower. North East Fife has a more balanced range of digital activities, partly driven by the presence of the University of St Andrews and its broad range of digital activities.

Figure 5.2: Digital skills jobs by gender

Area	Female share of digital jobs
Dundee	29%
Perth & Kinross	30%
Angus	32%
North East Fife	35%
Total	30%

5 Employers and stakeholders views

Background

5.1 The latest Regional Skills Assessment for the [Tayside region](#) sets out how advances in technology continue to change the world of work. Many jobs are expected to evolve rather than disappear with the pandemic accelerating digital transformation.

5.2 Consultations were undertaken with twenty stakeholders including large, medium and small employers from the Tay Cities region, at least one employer from each of the four local authority areas. Views were gathered from employers across a range of industries including software, energy, construction, engineering, media and fintech.

Skills needs and outlook

5.3 Most employers felt they were well placed to tackle skills gaps and shortages. However, some employers had found that the meta skills of those applying for positions may have been negatively impacted by the pandemic. Skills like communication, creativity, critical thinking and collaboration may have been harder to develop during the public health restrictions faced by colleges and universities due to the impact of Covid-19.

5.4 Several stakeholders emphasised the need for employees to develop a broad skill set to work alongside customers to deliver transformational projects. These projects are often complicated, expensive and daunting with workers needing to reassure and build confidence with clients in addition to providing technical solutions.

5.5 Many workers in digital roles regularly work from home and most employers felt this had clear advantages. Most employers said they had been able to access a broader range of potential workers by accommodating hybrid working.

5.6 Some stakeholders emphasised the DESAP conclusions that the digital economy will cut across sectors with new hybrid tech sectors emerging. It was suggested that with more flexible working arrangements industries like construction will begin to poach talent from the computer games industry.

5.7 Some employers had reduced or relinquished their office space to reduce operating costs. However, concerns were expressed as to whether non-technical skills such as communication, collaboration and other meta skills could be developed as effectively with remote working now here to stay.

5.8 A larger employer stated that before the pandemic they had a proclivity for hiring locally, now they hire new recruits across the UK and Europe. Partly because of the pandemic, the local talent pool is viewed as less important now, but most larger employers stated an ambition to offer opportunities within the Tay Cities region where possible.

5.9 The ambition to promote opportunities locally partly stems from some companies being proud to be from Tayside and reinvesting in their local communities. Several stakeholders also offered a view similar to the technology 'market squares' set out in the Logan Review.

5.10 While many employers were not familiar with the DESAP, they articulated the plan's key points. For example, a large employer stressed the need for engineers to become more digitally skilled given the digital technology involved in engineering, construction and energy projects. As digital skills play an increasingly important role across a wider range of occupations it will be possible for people move through career pathways across industries.

5.11 However, one of the larger employers stated that young people with the right skills often don't stay in one area and are likely to look at opportunities in Edinburgh or London. The employer suggested we need to look at better linking career pathways across sectors and employers within the Tay Cities region and make the region a more attractive place for people to work and live.

5.12 There's growing demand for cyber security, many companies in the Tay Cities region have helped build digital solutions for clients and now they are working to reverse engineer these solutions and make sure their digital estate is secure and there's effective governance across it. This needs creative thinking and innovation, blending technical and commercial skills.

5.13 The Tay Cities region is a good functional geography for local stakeholders to work with one another to develop commercial solutions with collaboration between companies, universities and colleges. There isn't a single digital transformation process or project but rather a more fundamental change need in cultural and commercial outlook across the region.

5.14 Some stakeholders suggested most companies (including larger companies and the public sector) will struggle to bring the knowledge needed in-house to fully grasp the digital transformation agenda. This is where the Tay City region stakeholders could begin to work with one another more closely.

5.15 One employer suggested that unless companies or public sector agencies can clearly see the way that the stars are aligned, then it's difficult to drive digital projects forward internally. The Tay Cities region could act as a scalable laboratory showcasing its vision and demonstrating the value of commercial products to a global market.

Skills

5.16 Employers welcomed the focus on meta skills set out in the DESAP. Several employers emphasised that they preferred to recruit staff with good communication, teamworking and customer facing skills and develop technical skills through on the job training.

5.17 Commonly cited roles that employers need to fill included IT project managers, scrum masters, UI developers/UX designers and business analysts. Commonly cited technical skills included Java, Python and cloud computing.

5.18 Artificial Intelligence (AI) and cyber security were consistently raised as two important new areas of technical skills. Some larger employers were considering investing in AI products and training. Some smaller companies suggested AI may increase the need to outsource some digital processes.

5.19 Most employers suggested they were now likely to employ some staff based outside of Scotland working remotely. The ICT, publishing & media companies consulted suggested around 10% of the workforce is notionally based in the Tay Cities region but with employees living outside of Scotland. The digital skills data shows this sector accounts for around 1,600 jobs in the Tay Cities region, suggesting around 160 employees (10%) may live outside of Scotland. Most employers reported facing more competition from outside of Scotland and felt this was likely to increase as industries embrace digitisation.

Manufacturing, construction, engineering and net zero

5.20 The consultations revealed the region's construction, manufacturing and engineering sectors are already significant employers of people in digital roles. This is supported by the labour market data set out earlier in this report.

5.21 Employers suggested this was being driven by Building Information Modelling (BIM), digital twins and other new digital approaches. A few stakeholders suggested construction, manufacturing and engineering may begin to poach digital talent from the computer games industry (and other digital talent pools).

5.22 Most employers emphasised the need for digital skills to be applicable across a range of sectors. The clean growth and net zero agendas were cited by several stakeholders.

Micro-credentials

5.23 Most employers emphasised the need for shorter and more up-to-date courses and welcomed the DESAP's focus on micro-credentials. The courses offered by Abertay have continued to generate interest in the interplay between information security and governance.

The new rural accessibility challenge

5.24 Several stakeholders raised the issue of poor connectivity in remote and rural areas, particularly in Perth & Kinross and Angus. As suggested in the DESAP, remote working appears to be here to stay, and a lack of good quality broadband is likely to present a new rural accessibility challenge for employment and learning opportunities.

Upskilling and reskilling

5.25 Edinburgh's DDI programme aimed to support women returning to work and women in work by upskilling and reskilling. But the initial college provision pitched provision at SCQF level 4 or 5 data courses, but they found most of the participants already had a degree level qualification.

5.26 [Equate Scotland](#) supported a review of participants and refining of provision. Nearly 90 women applied to courses supported by the DDI programme, the target was 25 (delivered over a single semester, around 18 weeks).

5.27 The activities were delivered in person with live online sessions, the sessions were recorded and could be viewed offline later. A broad range of ages engaged with the courses, but the majority were aged between 25-30 and were already in work. The courses attracted a large number of learners from local government.

5.28 Staff across four colleges delivered the professional learning programme. Two years ago there was limited delivery on digital skills, and it took time to develop the courses and support staff to deliver the courses. The longer-term funding made available to the Edinburgh City Region Deal has played an important role in the step change in delivery.

5.29 The Tay Cities [Skills Investment Plan](#) highlights the region's strong college infrastructure with regional colleges for Dundee & Angus and Fife, Perth College (part of the University of the Highlands and Islands (UHI) and Scotland's Rural College (SRUC) Elmwood Campus in Cupar.

5.30 This infrastructure will be key to delivery a similar programme in the Tay Cities region. The materials supporting the courses in Edinburgh have been developed on an open-source basis and would be available to the Tay Cities region.

6 Potential Interventions

Aligning policy

6.1 Several potential interventions are shown below, the list is not exhaustive but reflects the views of the consultees and available evidence. Priority has been given to interventions that may supplement or extend activities already underway in the Tay Cities region with a view to piloting some activities as part of the Digital Skills project.

Cyber Quarter

6.2 A compelling vision to create jobs and investment has already been set out in the [Abertay Cyber Quarter](#) business case. Abertay University has developed an ambitious programme of activities and assets including the [virtual hack lab](#).

6.3 There is a wealth of opportunities to develop the Abertay Cyber Quarter's vision and spur further investment and job creation. As an example, NHS Scotland's cyber security agency has already become the Abertay Cyber Quarter's first tenants, [bringing 30 jobs](#) to the Tay Cities Region (relocating from Edinburgh).

6.4 The Tay Cities region faces a challenge to develop digital opportunities of scale. Several stakeholders cited resource constraints across both the public sector and larger companies to invest in cyber security.

6.5 The DESAP calls for digital leadership, the embrace of digital transformation and for businesses to be equipped for cyber security incidents. The Digital Skills project could use the Tay Cities City Region Deal governance structure to engage with the Scottish and UK Governments and regional partners.

6.6 Growth across the region's digital skills jobs will create around 300 new job openings by 2025. If the Tay Cities region's public sector and ICT sector were to match the digitisation of the Edinburgh city region's public sector & ICT sector, this would create an additional 500 digital jobs.

6.7 The Tay Cities Region Deal is far more than a funding mechanism and should be viewed as a platform to bring together the partners needed to collectively invest and make best use of the deal's assets.

6.8 Additionally, the UK Government's levelling up [white paper](#), includes a commitment to relocate more senior civil service roles outside of London. While an ambitious objective for the Digital Skills Project alone, there is a compelling case for relocating digital economy decision-makers to the Tay Cities region to create a world leading digital hub for the public sector.

6.9 Edinburgh and the South East Region has ambitions to become the Data Capital of Europe. With the recent relocation of the Scottish Social Security HQ to Dundee and the investment in the Abertay Cyber Quarter, the Tay Cities region could be the centre for excellence for Cyber Security and the public sector. This could bring together stakeholders to develop commercial solutions with collaboration between companies, universities and colleges.

Business networks and clean growth

6.10 The consultations revealed some fatigue on the part of businesses in engaging in networks or working groups. Several employers felt engagement was good early on in launching new strategies or projects, but momentum was often lost.

6.11 A network to build links should be considered by the Digital Skills project but it would be preferable to align this with (or build from) existing networks and working groups. The net zero and clean growth agendas were identified as significant opportunities for the digitisation of construction, engineering and manufacturing across the region with lighter touch but more meaningful engagement with businesses.

Micro-credentials

6.12 Micro-credentials are a key component of the DESAP, offering flexibility in upskilling for both learners and employers and have been embraced by the Tay Cities universities. Abertay University has been offering upskilling micro-credentials, mostly online, often for a few hours a week and has recently expanded into sustainability.

6.13 Micro-credentials can be stacked, if learners complete enough micro-credentials they can gain a graduate certificate from Abertay University. A small number of people have started doing this and they're beginning to create new flexible pathways.

6.14 Many universities have offered micro-credentials at around SCQF 11, Abertay University have pitched it a SCQF 9 or 10. There was a risk that micro-credentials from universities would simply displace other short courses already in place. Abertay University are taking undergraduate modules and breaking them down into micro-credentials (digital marketing etc).

6.15 They have filled their micro-credentials spaces every year, as Abertay University is one of Scotland's smallest universities they get less funding for micro-credentials than other universities. This year, micro-credentials were delivered to 800 learners, but funding ran out in January (2023). The university has developed sustainability and cyber security micro-credentials, but more funding is needed.

6.16 Micro-credentials present an opportunity and a challenge. They need to develop and deliver micro-credentials quickly or risk the content no longer being relevant or up to date. It can be several years between designing a new course to producing the first cohort of graduates through traditional routes.

6.17 Additional funding for micro-credentials could open new flexible career pathways, provision focused on current regional opportunities and regularly updated to fine-tune provision.

6.18 Arguably with less resource implications the Digital Skills project should consider investigating how stacking credentials between institutions could be achieved. This is a long-standing issue, unlikely to wholly resolved as part of the Digital Skills Project.

6.19 The project could start to consider how the region's institutions could work more closely on micro-credentials. QAA Scotland have already explored the [potential of micro-credentials](#) and concluded there is a need for more collaborative working, clearer replicable standards and robust ways of working between institutions. Other areas may also provide insights, for example provinces in Canada are also developing approaches to [regulating micro-credentials](#).

Distributed learning model

6.20 Several stakeholders raised concerns on focusing too heavily on online learning and how more distributed learning models could be considered. There are clearly trade-offs between efficiency and distributed learning models.

6.21 A number of stakeholders raised the prospect of bringing together online learners to celebrate and promote engagement and success. This could help provide in-person peer group support to more remote and rural communities and potentially build on meta skills between courses.

7 Appendix

Figure A.1: Tay Cities region digital skills by occupation

Code	Occupation	Description	Tay Cities Jobs
2131	IT project managers	Manage, coordinate and technically supervise specific IT projects of a discrete duration and/or budget.	200
2132	IT managers	Plan, organise, manage and coordinate the provision of IT services and functions in an organisation.	900
2133	IT business analysts, architects & systems designers	Provide advice on the effective utilisation of IT and design IT systems to meet the business objectives or to enhance the business effectiveness of the organisation.	1,400
2134	Programmers & software development professionals	Design, develop, test, implement and maintain software systems on a range of platforms to meet the specifications and business objectives of the information system; they also design and develop specialist software.	2,100
2135	Cyber security professionals	Design, implement, test and maintain cyber security systems and track, investigate and analyse data linked to cybercrime.	300
2136	IT quality & testing professionals	Test the quality of IT software, systems and computer games and identify and recommend solutions to problems and improvements that could be made.	100
2137	IT network professionals	Design, set up and maintain computer networks, support the network users and fix problems which arise.	200

Code	Occupation	Description	Tay Cities Jobs
2139	Information technology professionals n.e.c.	Job holders in this group perform a variety of tasks not elsewhere classified.	700
2141	Web design professionals	Design, develop and maintain websites and web and mobile applications to meet a client's specified requirements.	100
2142	Graphic & multimedia designers	Use illustrative, sound, visual and multimedia techniques to convey a message for information, entertainment, advertising, promotion or publicity purposes, and create special visual effects, 3D models and animations for computer games, film, interactive and other media.	400
3131	IT operations technicians	Responsible for the day-to-day running of IT systems and networks including the preparation of back-up systems, and for performing regular checks to ensure the smooth functioning of such systems.	400
3132	IT user support technicians	Responsible for providing technical support, advice and guidance for internal/external users of IT systems and applications, either directly or by telephone, e-mail or other network interaction.	800
3133	Database administrators & web content technicians	Administer, maintain and provide user support for databases and websites and assist in the design and development of databases; and monitors social media sites for posts and comments on behalf of companies.	300
3544	Data analysts	Gather and organise a variety of data and analyse it to understand what it means for their organisation or society.	200

Code	Occupation	Description	Tay Cities Jobs
4152	Data entry administrators	Enter a variety of information into databases using various software packages and assist colleagues in retrieving information.	100
	Total		8,200

Figure A.2: Tay Cities region digital skills by industry

Industry	Description (SIC code)	Tay Cities Jobs	Digital share of all sector jobs
Public sector	Public administration & defence (84), education (85), Health (86), Residential care and social work (87 & 88) and Employment services (78)	2,100	2.9%
IT, computers & telecoms, publishing, tv & video	Telecommunications (61), Computer services (62), Publishing services (58) and Film video & TV etc; broadcasting (59 & 60)	1,600	36.2%
Manufacturing	Manufacturing (10-32)	900	6.9%
Energy & utilities	Electricity (35.1), Gas etc (35.2-3), Water and sewerage (36 & 37), Waste, remediation & management (38 & 39)	700	12.9%
Professional services	Professional services (68-74) and Business support services (82)	700	5.4%
Retail & wholesale	Wholesale & Retail - vehicles (45-47)	500	1.6%
Financial services	Financial services (64-66)	500	16.5%
Construction	Construction (41-43)	300	2.7%
Creative, cultural and sport	Creative services (90), Cultural services (91), Gambling (92) and Sports & recreation (93)	200	2.7%
Transport	Land (49), Water (50), Air (51) and support services (52)	100	3.1%
Other	-	600	1.3%
Total		8,200	3.7%

Figure A.3: Tay Cities region Digital Skills by occupation and HE qualification subject held

Code	Occupation	Computing subjects	All technical subjects	Other subjects	Total
2131	IT project managers	20	50	100	150
2132	IT managers	180	350	440	790
2133	IT business analysts, architects & systems designers	300	710	540	1,250
2134	Programmers & software development professionals	1,300	1,680	240	1,920
2135	Cyber security professionals	70	110	50	160
2136	IT quality & testing professionals	10	30	30	60
2137	IT network professionals	60	160	-	160
2139	Information technology professionals n.e.c.	100	380	210	590
2141	Web design professionals	10	20	50	70
2142	Graphic & multimedia designers	40	90	320	410
3131	IT operations technicians	20	110	120	230
3132	IT user support technicians	100	220	270	480
3133	Database administrators & web content technicians	50	60	140	210
3544	Data analysts	50	70	90	160
4152	Data entry administrators	20	30	40	80
	Total	2,330	4,070	2,640	6,720

Note: All technical subjects include maths, computing, engineering, technology and physical sciences

Figure A.4: Skills Development Scotland forecasts (summarised from online data matrix)

Code	Occupations & industries	Tayside				Scotland			
		2022	2025	2032	Change 2022-25	2022	2025	2032	Change 2022-25
21	Science, research, engineering & technology professionals	8,900	9,100	9,300	2.2%	193,500	198,100	205,400	2.4%
31	Science, engineering & technology associate professionals	5,200	5,200	5,000	0.0%	64,600	64,400	62,900	-0.3%
35	Business & public service associate professionals	13,400	13,400	13,900	0.0%	193,000	197,900	206,400	2.5%
41	Administrative occupations	15,800	15,700	15,400	-0.6%	224,500	222,800	217,700	-0.8%
-	Digital industries	4,200	4,300	4,300	2.4%	87,200	90,000	90,000	3.2%

Source: Skills Development Scotland (based on Oxford Economics projections)

Figure A.5: Skills Development Scotland forecasts (summarised from online data matrix)

Code	Occupations & industries	Scotland			Tayside	
		Replacement demand	Expansion demand	Total requirement	Replacement % of current jobs	
21	Science, research, engineering & technology professionals	22,600	4,700	27,300	12%	10%
31	Science, engineering & technology associate professionals	18,700	-200	18,500	29%	29%
35	Business & public service associate professionals	4,300	4,900	9,200	2%	2%
41	Administrative occupations	22,400	-1,700	20,700	10%	8%
-	Digital industries	87,200	90,000	90,000	12%	Not available

Source: Skills Development Scotland (based on Oxford Economics projections)

Figure A.6: Tay Cities region skills demand forecast (2022-25) by occupation

Code	Occupation	Expansion demand	Replacement demand	Total requirement
2131	IT project managers	10	20	30
2132	IT managers	30	110	140
2133	IT business analysts, architects & systems designers	40	160	200
2134	Programmers & software development professionals	70	250	320
2135	Cyber security professionals	10	40	50
2136	IT quality & testing professionals	-	10	10
2137	IT network professionals	10	20	30
2139	Information technology professionals n.e.c.	20	80	100
2141	Web design professionals	-	10	10
2142	Graphic & multimedia designers	10	50	60
3131	IT operations technicians	10	120	130
3132	IT user support technicians	20	230	250
3133	Database administrators & web content technicians	10	90	100
3544	Data analysts	-	-	-
4152	Data entry administrators	-	10	10
	Total	240	1,200	1,440

Figure A.7: Tay Cities region skills demand forecast (2022-25) by highest qualification level held

Code	Occupation	9-12	7-8	6-7	5	1-4	No quals	Total
2131	IT project managers	20	-	-	-	-	-	20
2132	IT managers	110	10	10	10	-	-	140
2133	IT business analysts, architects & systems designers	160	10	20	10	-	-	200
2134	Programmers & software development professionals	280	20	20	10	-	-	330
2135	Cyber security professionals	30	-	10	10	-	-	50
2136	IT quality & testing professionals	10	-	-	-	-	-	10
2137	IT network professionals	20	-	-	-	-	-	20
2139	Information technology professionals n.e.c.	80	10	10	-	-	-	100
2141	Web design professionals	10	-	-	-	-	-	10
2142	Graphic & multimedia designers	50	-	-	-	-	-	50
3131	IT operations technicians	50	20	30	20	10	-	130
3132	IT user support technicians	110	30	60	30	20	-	250
3133	Database administrators & web content technicians	60	-	10	10	10	-	90
3544	Data analysts	-	-	-	-	-	-	-
4152	Data entry administrators	10	-	-	-	-	-	10
	Total	1,000	120	180	90	40	10	1,440

Note: SCQF 9-12 (degree or above), SCQF 7-8 (other HE level), SCQF 6-7, SCQF 5, SCQF 1-4, No qualifications

Figure A.8: Tay Cities region digital skills forecast (2022-25) by occupation and HE qualification subject held

Code	Occupation	Computing subjects	All technical subjects	Other subjects	Total
2131	IT project managers	0	10	10	20
2132	IT managers	30	50	70	120
2133	IT business analysts, architects & systems designers	40	100	70	170
2134	Programmers & software development professionals	200	260	40	300
2135	Cyber security professionals	10	20	10	30
2136	IT quality & testing professionals	0	10	0	10
2137	IT network professionals	10	20	0	20
2139	Information technology professionals n.e.c.	10	60	30	90
2141	Web design professionals	0	0	10	10
2142	Graphic & multimedia designers	0	10	40	50
3131	IT operations technicians	10	30	40	70
3132	IT user support technicians	30	60	80	140
3133	Database administrators & web content technicians	10	20	40	60
3544	Data analysts	0	0	0	0
4152	Data entry administrators	0	0	10	10
	Total	360	670	450	1,120

Note: All technical subjects include maths, computing, engineering, technology and physical sciences

Figure A.9: Tay Cities region digital skills forecast (2022-25) by occupation and local authority area

Code	Occupation	Dundee	Perth & Kinross	Angus	North East Fife	Total Requirement
2131	IT project managers	10	10	-	-	30
2132	IT managers	60	50	20	10	140
2133	IT business analysts, architects & systems designers	80	70	30	20	200
2134	Programmers & software development professionals	140	110	40	30	320
2135	Cyber security professionals	20	20	10	-	50
2136	IT quality & testing professionals	-	-	-	-	10
2137	IT network professionals	10	10	-	-	30
2139	Information technology professionals n.e.c.	40	30	10	10	100
2141	Web design professionals	-	-	-	-	10
2142	Graphic & multimedia designers	30	20	10	10	60
3131	IT operations technicians	50	50	20	10	130
3132	IT user support technicians	100	90	40	20	250
3133	Database administrators & web content technicians	40	40	20	10	100
3544	Data analysts	-	-	-	-	-
4152	Data entry administrators	-	-	-	-	10
	Total	590	500	220	130	1,440

Figure A.10: Skills forecasts 2022-25

SCQF level	6-12	5	1-4	No quals	Total
Tay Cities Region (digital jobs)	90%	6%	3%	1%	100%
Tayside Region (all jobs)	71%	19%	3%	7%	100%

Source: 4-consulting (Tay Cities) and SDS (Tayside) Regional Skills Assessment ([November 2022](#))