

# Digital Economy Skills Action Plan 2023-2028

## Key Issues And Priority Actions




Skills  
Development  
Scotland

fsb<sup>08</sup>

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A man and a woman, both wearing striped aprons, are standing in a kitchen. They are looking at a tablet computer held by the woman. The man is pointing at the screen. The background shows kitchen shelves and a window.

**As the very fabric of the economy changes around us, the need to invest in one's own skills and the skills of others is more pressing than ever. It is essential that we consider how we can best support individuals to develop the skills they will need for the future, and businesses to fully utilise them.**

**Increasing integration of digital technology into the everyday life of a small business owner and sole trader is important in tackling skills gaps in the workforce. We know embracing digital technology can help businesses in every sector across Scotland be more productive.**

**That is why FSB Scotland welcomes the Digital Economy Skills Action Plan which will boost small businesses' stake in the digital economy and support local skills.**

Rachel Cook, Deputy Head of Policy Scotland, Federation of Small Businesses (FSB)



**Developed with partners working across Scotland's digital economy, this Digital Economy Skills Action Plan (DESAP) draws on research, insight, and expertise to highlight the digital economy skills opportunities which will support Scotland's economic vision of becoming a wellbeing economy: thriving across economic, social, and environmental dimensions, and one that delivers economic prosperity for all Scotland's people and place.**  
(National Strategy for Economic Transformation)



# An Economic Call to Action



Scotland is experiencing a major economic crisis due to the increase in the cost of living crisis and the impact of the war in Ukraine adding to the economic challenges created by Brexit and Covid-19. Scottish business confidence is low and almost half of small businesses expect to see revenues decrease, with one in six expecting to downsize their operations, sell or close over the next year.<sup>1</sup> Scotland also has long-standing challenges associated with low pay and in-work poverty, slow economic growth combined with weak productivity, and despite £2 billion of annual investment in post-school skills and education, Scotland experiences persistent skills shortages in key sectors.<sup>2</sup>

The National Strategy for Economic Transformation (NSET) is the Scottish Government's response to these challenges, and to the economic opportunities presented for Scotland. Arranged under five programmes for action, NSET presents a ten-year ambition to transform Scotland's economic performance by 2032, and address structural economic inequalities. NSET highlights the importance of digital technology by citing digital as a

sectoral opportunity, and DESAP amplifies this by recognising the essential role of digital economy skills. These skills are found in all NSETs critical industry sectors from high value manufacturing, hydrogen, and blue economies to life sciences, food & drink, and the creative industry economy.

Prioritising and supporting the development of digital economy skills broadly contributes to the ambitions of NSET and will help foster a prosperous, higher skilled and higher wage economy. Digitally skilled employees benefit from higher salaries, and this is essential for Scotland's inward investment pipeline in support of the Scottish Government's Inward Investment strategy. Growing digital economy skills will also support Scotland in realising a potential £25 billion economic gain from an accelerated adoption of digital technologies.<sup>3</sup>

To achieve this, industry has called for DESAP to provide the framework for urgent and radical action to address our digital economy skills challenge and to help realise the enormous potential of Scotland's digital economy as a strategic enabler of growth.

The industry ask is that the framework should be based on principles of industry leadership and co-investment, government sponsorship and investment. It should be led by the Digital Economy Skills Group which mobilises partners, both supporting them and holding them to account on their efforts to rebalance their activity and investment in areas of critical digital economy skills shortages.

It is clear from the evidence that Scotland is continuing to face digital economy skills pressures and without urgent action risks being left behind other nations. We must collectively work together to rebalance post-school investment, intensify and better align vocational and technical education, upskill the existing workforce, support all business to be digitally enabled, and create opportunities for everyone to access digital economy jobs.

As Chair of the SDS Digital Economy Skills Group I urge every industry, education and public partner to fully commit to supporting the implementation of this Digital Economy Skills Action Plan.

**Ross Tuffee**

Chair of the Digital Economy Skills Group

<sup>1</sup> Federation of Small Business

<sup>2</sup> Audit Scotland, Investing in Skills Audit 21/22

<sup>3</sup> CBI Scotland

## Executive Summary

1. The Digital Economy Skills Action Plan (DESAP) is a 'Call to Action' which has been shaped by industry partners. It is set against an extremely challenging economic climate. It is now critically important that Scotland's people and businesses are equipped with essential digital economy skills to ensure an inclusive, sustainable, and competitive economy offering opportunities for everyone.
2. Digital economy skills shortages and gaps are acutely felt by employers across the Scottish labour market, with jobs like software developers in high demand, and basic digital skills lacking in many workplaces. The impact of international remote hiring, the cost of living crisis and the digital talent shortage are all contributing to salary inflation and staff recruitment and retention issues.
3. There is an unprecedented window of opportunity to harness the economic value of the digital economy, and DESAP was developed to support the decisive economic ambition, which is presented in the National Strategy for Economic Transformation (NSET).
4. The Scottish Government has already developed a range of policies to support the digital economy, and there are also multiple examples of effective interventions and collaborations to help solve digital economy skills challenges. DESAP will build on these by driving an urgent step-change to increase the supply of digital economy skills.
5. DESAP provides the framework which will leverage the considerable leadership capabilities and co-investment of Scottish employers to focus on workforce development and critical digital economy skills, in support of Scotland's economic opportunity.
6. Digital economy skills play a central role in reaching the net zero target by 2045, with technology acting as a catalyst to enable carbon neutral solutions. A vibrant digital economy also supports the ambition to address climate change challenges in a way that is fair and equitable as it can support inclusive growth by improving access to employment and training for under-represented groups.
7. The digital economy cuts across all sectors and has resulted in the emergence of new hybrid sectors such as FinTech, AgriTech, and TravelTech. In all sectors, new digitally enabled roles will continue to emerge as technology develops, and jobs that were previously considered non-digital will all require some level of digital economy skills.
8. Fostering a vibrant digital economy features prominently across the City and Regional Growth Deals which identify digital as critical to economic success. Learning from their innovative approaches and best practice will provide significant value. This will enable identifying further opportunities to partner and ensure regional workforces have essential digital economy skills.
9. The digital economy is vast and complex, with digital skills underpinning most of our daily work and life activities. DESAP takes a skills-based approach to dividing the digital economy into four skills segments:
  - **Digital Adoption Skills** (basic digital skills that individuals need to use and operate technology systems in the workplace confidently and securely)
  - **Digital Transition Skills** (digital skills that support business transitions such as into e-commerce and online trade, or the ability for the business to understand the value of data)



- **Integrated Digital Skills** (the integration of professional digital skills into non-technology job roles)
  - **Professional Digital Skills** (digital skills for roles which were traditionally found only in the tech sector such as cyber security engineering, software development and cloud security).
10. In addition to technical digital economy skills, soft skills such as meta skills also play an important role in driving behavioural change across individuals and businesses. Meta skills will support individuals to become digital leaders who can understand and communicate the benefits of a digital transition to others and support re-skilling.
11. The skills system plays a key role in responding to changing employer demand and supporting individuals in all communities to access emerging opportunities. The increased adoption of digital technologies, such as artificial intelligence and automation will cause some disruption in the wider labour market. The DESAP aims to ensure that individuals at risk of displacement are supported, and that digital economy opportunities are accessible for all.

Supporting diversity in the digital economy is an important part of addressing critical skills shortages but is also essential for digital creativity and innovation.

12. An analysis of the DESAP evidence base has presented five thematic areas of opportunity where the enhancement of digital economy skills will make an essential contribution to the ambitions of the Scottish Government's National Strategy for Economic Transformation:
- Supporting a Vibrant Technology Economy will Contribute to Economic Growth
  - Supporting Growth in Emerging Sectors will Contribute to Scotland's Prosperity
  - Increasing Scotland's Digital Maturity Will Lead to Increased Productivity Growth
  - Supporting a Diverse Digital Economy will Contribute to Inclusive Growth
  - Cross-sector Collaboration to Address the Climate Emergency

DESAP monitoring and evaluation will sit under the NSET Skilled Workforce Programme Board, with linkages to the other NSET Programme Boards.

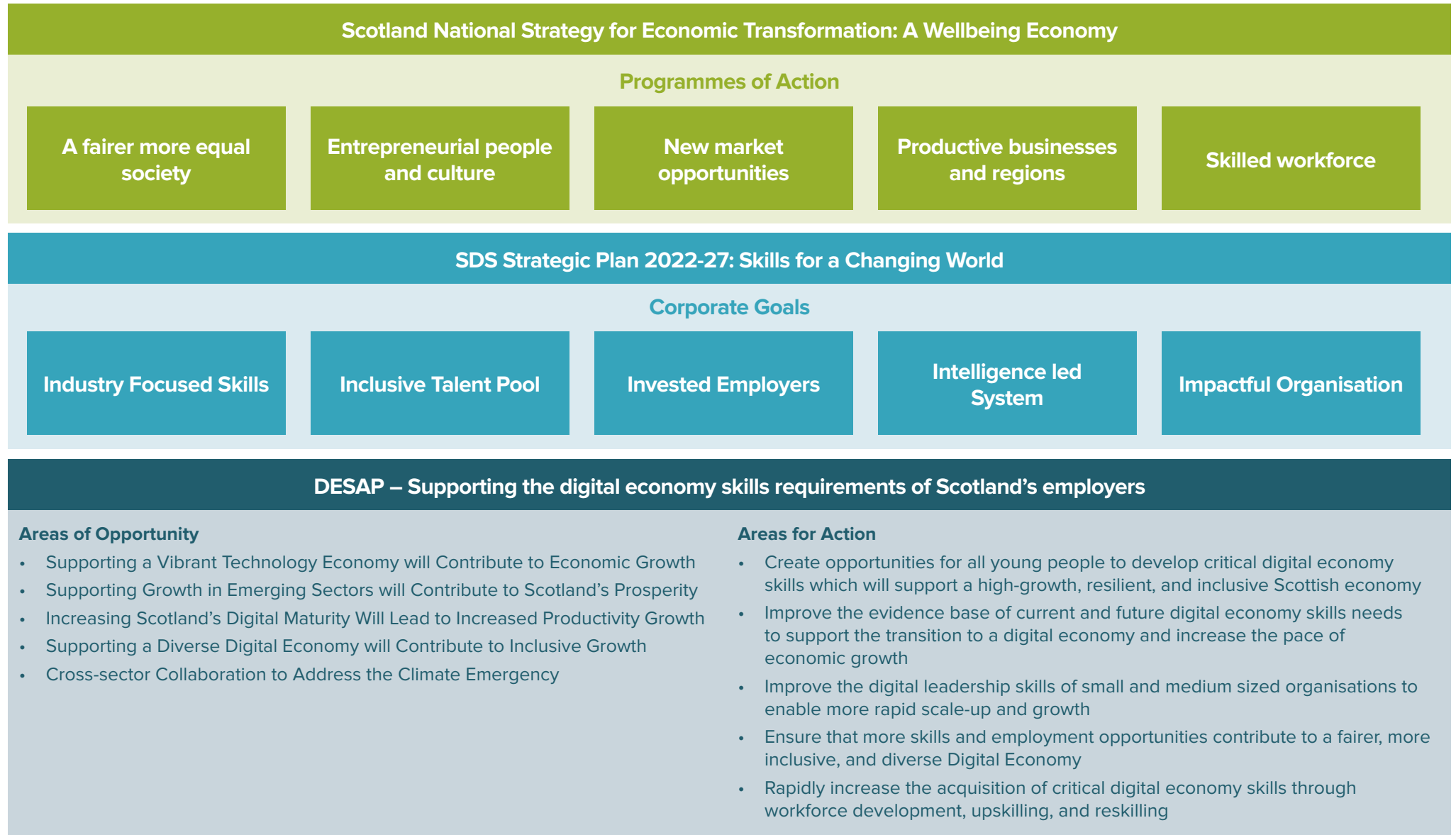
13. Building on the analysis of the evidence base and the skills implications for each of these opportunities, the following priority areas for action have been agreed:
- **Priority Action Area 1:** Create opportunities for all young people to develop critical digital economy skills which will support a high-growth, resilient, and inclusive Scottish economy
  - **Priority Action Area 2:** Improve the evidence base of current and future digital economy skills needs to support the transition to a digital economy and increase the pace of economic growth
  - **Priority Action Area 3:** Improve the digital leadership skills of small and medium sized organisations to enable more rapid scale-up and growth
  - **Priority Action Area 4:** Ensure that more skills and employment opportunities contribute to a fairer, more inclusive, and diverse digital economy
  - **Priority Action Area 5:** Rapidly increase the acquisition of critical digital economy skills through workforce development, upskilling, and reskilling

14. DESAP focuses on immediate actions to support the development of the digital economy skills required to address existing digital skills shortages, as well as long term actions that will enable Scotland to keep up with the pace of digital change. Undertaking an annual review will ensure that the DESAP remains relevant and responsive to the existing and emerging skills needs in the digital economy.
15. DESAP sets out a clear direction for the urgent changes needed in the digital economy skills system, and identifies that industry, third sector, government, education and agencies must collaborate to achieve this transformation. DESAP will deliver actions over the next five years with ongoing annual reviews, concluding in 2028.
16. DESAP was developed through engagement with industry, stakeholders, and Industry Leadership Groups. This process was facilitated by an Expert Group comprising Skills Development Scotland, the Scottish Funding Council, South of Scotland Enterprise, Scottish Enterprise, The Data Lab/AI Alliance, Inclusion Scotland, The Federation of Small Businesses, South of Scotland Enterprise Agency, Digital Boost and Scottish Government Digital Economy Unit.





## DESAP Strategic Alignment



# 1: Developing a Digital Economy Skills Action Plan for Scotland

## Background

In Spring 2022 the Cabinet Secretary for Finance and the Economy set out a ten-year economic vision for Scotland in the National Strategy for Economic Transformation (NSET).<sup>4</sup>

The strategy recognises that Scotland is embarking on a period of unprecedented change driven by Brexit and Covid-19. This also presents opportunity, and future economic success will be based on Government and its agencies collaborating to deliver against the five policy pillars.

These policy priorities were echoed in the Scottish Government's Resource Spending Review (RSR), which outlined this very challenging and volatile fiscal environment. This means that education and public agencies must continue to deliver and innovate even with flat cash settlements.<sup>5</sup>

Consequently, to maximise resources and efforts, DESAP aligns with the NSET and RSR policy areas, as well as SDS corporate goals which put employers, net zero and inclusion at the centre of its priorities.

At the same time the Scottish Government have announced an Independent Review of the Skills Delivery Landscape which is expected to make recommendations about how Skills Development Scotland and the skills ecosystem can support NSET by ensuring that industry is supported with their future skills requirements, and that individuals are effectively equipped to access rewarding careers.<sup>6</sup>

Notwithstanding the potential of new ways of working that may emerge through this Review, there remains an urgency for partners to address the significant digital economy skills challenges. Doing so will contribute to Scotland being a productive, high value, high wage economy. Record levels of investment in skills has not translated into strong economic growth and output. DESAP calls for a step-change in pace, innovative thinking, and open and genuine partnerships to build on existing activity and drive stronger economic growth.

Implementing this change in times of economic uncertainty will undoubtedly involve difficult decisions, and DESAP will seek out opportunities to benefit from existing policy and strategic responses such as building on activity being taken forward by the SDS Careers by Design.<sup>7</sup> It is clear however that industry is looking to government, education, and public agencies to prioritise the critical digital economy skills interventions which are essential for Scotland's economic prosperity.

<sup>4</sup> National Strategy for Economic Transformation

<sup>5</sup> Scottish Government Resource Spending Review 2022

<sup>6</sup> Skills Delivery Independent Review

<sup>7</sup> Delivering Careers By Design

## National Strategy for Economic Transformation Policy Programmes:

1. Establish Scotland as a world-class entrepreneurial nation
2. Strengthen Scotland's position in new markets and industries and generate new, well-paid jobs from a just transition to net zero
3. Make Scotland's businesses, industries, regions, communities, and public services more productive and innovative
4. Ensure people have the skills they need to meet the demands of an ever-changing economy and society, and that employers invest in the skilled employees they need to grow their businesses
5. Reorient our economy towards wellbeing and fair work, to deliver higher rates of employment and wage growth, to significantly reduce structural poverty

## Skills Development Scotland, Strategic Plan 2022-27: Corporate Goals

1. **Industry-focused Skills:** People develop skills and competencies that drive productive businesses and regions, and help create a fairer, more equal society
2. **Inclusive Talent Pool:** Talent is diverse and resilient, with people who can all adapt and thrive in the changing world of work
3. **Invested Employers:** Employers invest in Scotland's workforce through job opportunities, skills development, and fair work
4. **Intelligence-led System:** An agile, responsive, resilient, and inclusive skills ecosystem consistently delivers the skills the Scottish economy needs
5. **Impactful Organisation:** Team SDS maximises return on investment, collaborating to deliver better outcomes and experiences for our customers, colleagues, and the economy

The **SDS Careers by Design** is an ambitious redesign of the career system in Scotland, with ten recommendations designed to ensure career services equip people with the skills to thrive in a rapidly changing world of work.





## A Digital Scotland

Scotland is proactive in developing policy and action plans which support our vibrant digital economy. From the publication of *Scotland's Digital Future: A Strategy for Scotland*, to the launch of *Scotland's AI Strategy, 5G: Strategy for Scotland* and more recently the *Scottish Tech Ecosystem Review*, there is a clear commitment to making Scotland a digital nation. The prominence of digital, and of developing a digitally skilled workforce in the National Strategy for Economic Transformation (NSET) also shows how important a successful digital economy is to Scotland's economic prosperity.

These efforts from the Scottish Government and its agency partners have succeeded, with Scotland becoming the first country in Europe to offer data analytics school qualifications. Businesses have been helped to improve their digital capabilities through Digital Boost, and the Digital Development Loan was launched to enable organisations to adopt and innovate with technology. However, there is clearly

more to be done with many small businesses reporting digital economy skills gaps and shortages.<sup>8</sup>

An ambition of *Digital Scotland: A Changing Nation* is that every business and every individual in Scotland can embrace the economic opportunities presented by the digital economy.<sup>9</sup> Achieving this target requires an inclusive skills and education system which is responsive to the ever-changing needs of the digital economy. This will enable individuals to access the high-quality digital economy job opportunities, contribute to community wealth building, and support businesses across all sectors to innovate and benefit from a digital transition. This Digital Economy Skills Action Plan sets out the actions to deliver on the skills needs of this ambition.


## A Digital Recovery

We are in a time of unparalleled digital disruption. The ongoing fast pace of

technological change means the skills and knowledge required to keep up is only expected to increase. Digital is no longer just about the tech sector. There is a near universal demand for basic digital skills across all jobs, and the demand for more sophisticated digital skills is permeating across almost every sector.<sup>10</sup>

The Covid-19 pandemic accelerated the digitalisation of many business processes and ways of working, and it is important that we continue this momentum and the benefits it can bring. This digital opportunity is recognised by Scottish Government who identify in their strategy for economic recovery that it is essential to help businesses adopt digital technologies and improve their digital capabilities.

Added to the need for post-pandemic recovery, Scotland is also navigating an environmental recovery which aims to address the climate emergency and the transition to a net zero economy. Evidence suggests that digital technologies have the potential to



Only 3 in 10 businesses are fully equipped with cyber security skills



Only 1 in 3 businesses engage in ecommerce



Only 1 in 5 businesses feel fully equipped with digital technology skills

<sup>8</sup> Digital Economy Business Survey 2021

<sup>9</sup> A Changing Nation: How Scotland will Thrive in a Digital World

<sup>10</sup> Disconnected: Exploring the Digital Skills Gap

help other sectors such as construction and logistics save as much as 20% of global CO2 emissions by 2030.<sup>11</sup> Scotland already has a growing climate tech sector and positions itself as a leader in harnessing new and emerging digital technologies such as artificial intelligence (AI) and data analytics to mitigate the impacts of climate change across all sectors.<sup>12</sup>

## A Just and Inclusive Digital Economy

A vibrant digital economy which creates opportunities for all is an important contributor to achieving inclusive growth. The average salary for digital technology professionals is higher than the average Scottish salary and it is continuing to grow. Similarly, roles that require digital skills pay 29% more than roles that do not.<sup>13</sup> In 2016 it was estimated that least 82% of all jobs in the UK will require digital skills and this is only set to increase.<sup>14</sup>

It is therefore essential that the new and current workforce is equipped with the required digital competences and confidence to embrace this change and benefit from these high value opportunities.<sup>15</sup>

It is critical that small and micro businesses, and social enterprises across all sectors and all locations, have the skills they need

to benefit from technology. They need to have the leadership skills to plan and manage a digital transition, and they need to have the tools to reskill employees and recruit effectively. There are already signs that Scottish small businesses may be lagging in digital maturity compared to larger enterprises. There is significant potential to support micro businesses to become more digitally mature, specifically ensuring support reaches businesses in sectors like agriculture and construction, and in rural areas such as the South of Scotland.<sup>16</sup>


It is essential that digital economy skills actions contribute to fostering a just and inclusive digital economy as there is a risk of exacerbating existing inequalities that exist in the wider economy. Individuals with lower levels of education and in lower skilled roles are at a greater risk of losing

their jobs to automation, or of their job being changed substantially by technology.<sup>17</sup> Individuals on lower incomes may be less likely to have the funding, information, or flexibility to take advantage of digital economy reskilling opportunities. Similarly, there are existing inequalities in areas like technology professionals' roles which despite improvement, continue to be male dominated.

A one size fits all approach to developing skills interventions and actions will clearly not suffice, due to the diversity and complexity of the digital economy. A concerted and collaborative effort is required by partners operating in the skills sphere. This combined with the use of robust labour market evidence and expert insights ensure that the implementation of digital economy skills actions take account of equality, diversity, inclusion and rurality.



**Requirement for digital skills appears in at least 82% of online job adverts**



**Jobs that require employees to use digital competences pay 29% higher than roles that do not**

11 Digital action = Climate action: 8 ideas to accelerate the twin transition

12 Innovation Critical: Scotland's Net Zero Mission and Climate Tech Opportunity

13 No Longer Optional: Employer Demand for Digital Skills

14 No Longer Optional: Employer Demand for Digital Skills

15 Jobs will be very different in 10 years. Here's how to prepare

16 Digital Economy Business Survey 2021

17 Automatic...For the People?

## Digital Economy Skills Challenges and Interdependencies

**Demand for digital technology talent** in Scotland remains strong; one in ten of all Scottish vacancies are in the technology sector, and tech sector employment is forecast to grow by 3.2% between 2022-25 compared to a Scotland-wide increase of 1.2%.<sup>18</sup> Forecasts indicate there will be around 15,600 job openings for tech professionals each year across the whole economy which is a 20% increase on previous estimates.<sup>19</sup> Added to this is the more difficult to quantify 'hidden' demand for integrated digital skills with many job roles looking for individuals with more sophisticated technology skills.

**Demand for tech professionals increases by 20% to 15,600 job openings each year**

Software development continues to be one of the most in-demand skills, with data analytics and cyber security skills sets continuing to feature prominently, alongside business skills of tech sales and marketing.<sup>20</sup> This rising demand is proving difficult to fulfil with sectors like fintech citing the lack of digital technology skills threatening growth ambitions, and staff

recruitment and retention identified as one of the top three challenges for digital technology employers.<sup>21</sup>

Since 2014 the **maturity of Scotland's digital economy** has been measured against a baseline, and progress was subsequently tracked in 2017 and 2021.<sup>22</sup> This research shows that despite the pandemic being an accelerator of digitalisation, Scottish businesses predominantly are in the lower half of digital economy maturity and a lack of skills is a contributor. There is a vital need to help move businesses along this maturity spectrum as this will be key to Scotland's economic success.

Businesses across the maturity spectrum reported digital skills issues, which included a quarter of businesses identifying their workforce lacked the basic digital skills to use email, internet, and office packages effectively. Only around a third of business reported being fully equipped with cyber security skills which is a serious risk as businesses faced an average of 24 cyber security incidents last year.<sup>23</sup>

The distinguishing feature between the less digitally mature and more digitally mature business, is the latter are more likely to be taking action to address their skills challenges. Evidence suggests that businesses may not

appreciate the significant value that digital competences can bring to their business, such as increased productivity, improved customer interactions, and business resilience. Increasing digital leadership skills will be an important way to address this lack of awareness.

Improving the supply of digital economy skills presents significant challenges but cannot be viewed in isolation as there are several **interdependencies** which will have an impact on how successfully challenges can be overcome. These are largely outside the scope of DESAP and are being addressed by a range of other government policies, such as 'No One Left Behind'.<sup>24</sup>

- Universal **digital connectivity** is essential to ensure an inclusive and Scotland wide digital economy. Through the Digital Scotland Superfast Broadband programme over 95% of premises in Scotland can now benefit from faster speeds. However, gaps in connectivity persist and there remains a divide particularly between urban and rural Scotland.<sup>25</sup>
- Internet access in Scottish homes has increased but there remains a **digital divide** with online home internet access lower amongst those on low incomes.<sup>26</sup> This digital divide was amplified by

18 Tech Nation; Digital Technologies Sector Skills Assessment

19 SDS Oxford Economics Forecasts

20 ScotlandIS Technology Industry Survey

21 Insider; ScotlandIS Technology Industry Survey

22 Digital Economy Business Survey 2021

23 The State of the Cyber Security in the UK

24 No One Left Behind; delivery plan.

25 A changing nation: How Scotland will thrive in a digital world.

26 The digital divide - inequality in a digital world



the pandemic which heightened the importance of good quality and stable internet access in all aspects of daily life including in the delivery of education and skills. Those in education with no access or limited access to digital technology will be at a significant disadvantage, potentially missing out on the same learning opportunities and skills provision as their peers.

- The impact of **Covid-19** will have long term implications for businesses particularly in sectors such as hospitality and food & drink. Whilst many businesses will still be dealing with the remaining effects of the pandemic, this economic downturn provides an opportunity for a digital recovery. During the pandemic one in four businesses stated that digital technology was essential to their survival, but the potential for technology to help Scotland's economic recovery goes far beyond the short-term digitalisation of work and workplaces.<sup>27</sup> Entire sectors are being transformed, such

as Traveltech for Scotland which illustrates the massive opportunity to harness digital economy skills across the non-tech sector to help Scotland's businesses sustainably recover, rebuild, and thrive using technology to innovate.<sup>28</sup>

- The full economic impact of **Brexit** is still being realised and whilst the technology sector has so far remained comparatively less affected there are indications that many sectors are being adversely impacted by labour supply shortages. Pre-pandemic research identified that at least one in five jobs were at risk of automation or displacement, and the impact of labour shortages could accelerate a move to embrace automation of tasks due to rapid technology advancements. Alternatively, if businesses must focus on short-term survival and sourcing staff to remain open, they may be unable to divert time and resource to exploring or implementing potentially longer term beneficial digital solutions.

### Digital Leadership Skills Include:

- Communication
  - Digital literacy
  - Innovation
  - Digital awareness and adaptability
- Despite being initiated and widely adopted by businesses in response to the pandemic, **remote working** seems likely to remain and will continue to break down geographical barriers, creating opportunities for people to work flexibly from anywhere. This means that individuals can access a wider pool of potentially high value job vacancies remotely. However remote working could undermine community wealth building strategies by discouraging technology employers from locating in parts of Scotland if their supply of talent is remote. It also means that Scotland is competing on a global stage for talent which could lead to unfilled vacancies and inflated salaries, with larger international businesses out-competing smaller Scottish businesses.

The term **digital economy** describes a connected economy, which includes every business that uses technology to communicate, create, consume, innovate, and trade.



27 Digital Economy Business Survey 2021

28 Traveltech for Scotland

## Cobots in Advanced Manufacturing

Scottish manufacturing businesses have the potential to be transformed by technology innovations like collaborative robots (cobots) which can help optimise manufacturing and production processes.

Unlike robots, cobots have been specifically designed to work alongside humans, supporting employees with mundane or hazardous tasks in the workplace.

The [Smart Hub Lanarkshire](#) is a great example of how college, university and local authority partners collaborated to introduce non-tech employers to the business benefits of technology and automation.

Through a series of workshops aimed at food & drink and life science companies' local businesses have had the opportunity to get hands-on with cobots as well as and learning about their multiple applications in the workplace.



## 2: The Contribution of Skills for the Digital Economy

### The Rationale for a Digital Economy Skills Action Plan

Scotland's digital technology sector continues to play an important role in Scotland's economy, contributing around £5,997m in 2022. This not only accounts for 4% of Scotland's total economic output but its GVA has increased by a staggering 107.5% between 2012 and 2022 compared with an increase of 12.8% for Scotland overall. The digital technology sector also has higher productivity than the Scottish average; it has demonstrated resilience during Covid-19 by already returning to pre-pandemic levels of 4.7% GVA growth; and its total workforce increased by 3.6% to 87,200 between 2019-21, in contrast to a Scottish wide decline of 2.2%.<sup>29</sup> However, if shortages aren't addressed urgently this will limit future economic growth.

Over the last decade there has been a transition from a standalone tech sector to a digital economy which has the potential to encompass every business and every individual in Scotland. Employees are increasingly being asked to carry out their roles at the interface of technology, and business owners and senior management need to be digital leaders. This requires employers of all types, sizes, and locations to be able to understand and harness the

benefits of digital technology and manage their digital transition. By supporting this increased digital adoption there is a £25 billion economic benefit to Scotland to be realised, but this is contingent on advancing digital competencies.<sup>30</sup>



Digital economy skills also play a vital role in addressing inequality, but there is a risk of inequalities getting worse and individuals left behind if they are not supported to re-train. It is critical that opportunities are accessible and widely distributed to under-represented groups that may have previously been excluded. This includes working with industry to mitigate the effects of job displacement by supporting individuals to remain in work whilst they acquire high value digital economy skills.<sup>31</sup>

There is an economic urgency to address digital skills gaps and shortages which will not only address inclusion and provide positive socio-economic outcome for individuals but will also be key to driving economic success and increases in national productivity.<sup>32</sup>

To achieve this requires intervention at all stages of the pipeline to prevent Scotland being left behind other nations, and to ensure existing inequalities are not exacerbated. Businesses urgently require new mechanisms to help them develop these critical skills in the existing workforce, as well as the improved alignment of post-school education to provide them with new talent through their recruitment processes. Employers are demanding a digital economy skills system and a labour market that is agile and supports people to reskill at multiple stages in their career. A system that proactively responds to intelligence about the ever-changing needs in the digital economy workplace.

The 2021 Programme for Government made several commitments to supporting Scotland's digital economy with significant investment in programmes to increase the digital capacity and capability of businesses.<sup>33</sup> Digital is also now central to multiple non-technology Government strategies with Scotland's economic recovery and its journey to net zero both recognising that digital economy capabilities are no longer optional for any organisation.<sup>34</sup> It is therefore essential that skills development is integral to the implementation of these policies and action plans, and that the necessary investment to achieve this step change is not neglected.

<sup>29</sup> Digital Technologies Sector Skills Assessment

<sup>30</sup> CBI Scotland

<sup>31</sup> Digitalisation and productivity: a story of complementarities

<sup>32</sup> techUK calls for SME Digital Skills Tax Credit to boost productivity

<sup>33</sup> A Fairer, Greener Scotland: Programme for Government 2021-22

<sup>34</sup> No Longer Optional: Employer Demand for Digital Skills



In pursuit of this Scottish Government has identified the importance of ensuring DESAP complements and supports the key priorities in NSET and the Scottish Technology Ecosystem Review (STER).<sup>35</sup>

## Transition to a Digital Economy

The structure of the labour market and the demand for skills has already been affected by digitalisation, with digital skills being required in over 80% of UK job adverts.

New 'digital economy' jobs across every sector will increasingly require individuals to use scientific and analytical skills to problem solve, whereas the demand for routine skills such as machine maintenance are in decline.<sup>36</sup> Some employees will inevitably be displaced entirely by automation, but research points towards specific elements within jobs being replaced and freeing employees up for higher value tasks. Technology is also cited as contributing additional high value jobs to the economy with indicators pointing towards increased demand for digital technology occupations and skills.

Whilst some sectors such as financial services, life sciences, and advanced manufacturing rely on digital economy skills more than other sectors, ultimately every person will need to

demonstrate digital competencies to operate in the labour market. Occupations traditionally considered non-digital such as home carers, refuse collectors and nurses now frequently include a digital element which ranges from records management to technology enabled service delivery.

There are clearly barriers to be addressed as the number of businesses are not keeping up with this change. The number of Scottish businesses that felt they were fully equipped with digital skills decreased from 26% to 21% between 2017 and 2021.<sup>37</sup>

For economic prosperity and an inclusive digital skills transition, skills, education providers and the labour market will need to demonstrate greater agility and resilience than ever before. This requires a digital economy skills system that rapidly adapts to delivering new in-demand digital economy skills, a system which creates opportunities for individuals most at risk of exclusion, and one that works with employers to co-invest in Scotland's workforce by nurturing their existing talent through reskilling.

**26% of Scottish businesses need to develop basic digital skills like email, internet navigation, Microsoft Office, and Excel**

**46% of Scottish businesses were not taking action to develop their employees' digital technology skills**

## Foundational Digital Skills for Employees in a Digital World

### Digital fluency and citizenship

- Digital literacy
- Digital learning
- Digital collaboration
- Digital ethics

### Software use and development

- Programming literacy
- Data analysis and statistics
- Computational and algorithmic thinking

### Understanding

- Data literacy
- Smart systems
- Cybersecurity literacy
- Tech translation and enablement

Source: McKinsey

<sup>35</sup> Scottish Tech Ecosystem Review

<sup>36</sup> Talent for survival: Essential skills for humans working in the machine age

<sup>37</sup> Digital Economy Business Survey 2021

## Understanding Digital Economy Skills

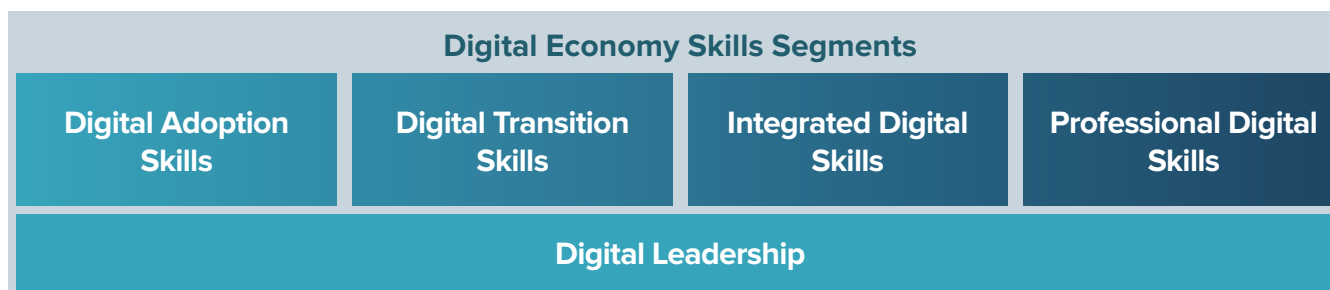
There is no single agreed definition of ‘digital economy skills’ so the term can seem abstract and subject to interpretation. This is compounded by the fact that terms such as digital technology, digital, ICT and tech are often used interchangeably.

The starting point for DESAP is the acknowledgement 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. This skills-based approach mirrors approaches taken across Scotland’s regions.<sup>38</sup>

DESAP describes digital economy skills in the four segments shown in the diagram on this page. Each segment represents a spectrum that takes account of the fact that individuals or businesses may be at different levels of digital skills maturity. It does not represent a progressive hierarchy, as each digital economy skill segment stands alone.

These four categories of digital economy skills provide the contextual framework to support the development of the action plan.

- **Digital Adoption Skills** relate to the skills individuals need to be proficient users of technology within every job role. Whilst



these have traditionally been relatively basic digital skills, as businesses become more digitally mature these skills become more sophisticated and essential for every employee. Examples include proficiency in accessing and using everyday business software, the ability to understand and use multiple online systems, and the ability to operate securely online.

- **Digital Transition Skills** relate to the businesses embracing digital technologies such as using technology to adapt a business model. This could also include the skills required for the business to use ecommerce and trade online, to develop new technology enabled products and services, and to derive value from data.
- **Integrated Digital Skills** recognises the evolution of job roles that require individuals to have skillsets combining digital technology with other disciplines such as business, science, engineering,

or health. These roles may involve employees in research roles undertaking basic programming as opposed to using Excel, or construction roles using building information modelling software. Importantly, the job titles for roles which require integrated digital skills are likely to remain the same, but the skillsets required within these roles are evolving to include significant aspects of technology.

- **Professional Digital Skills** are those ‘techie’ roles that have been traditionally found in the tech sector but are now used across all sectors. The professional digital skillset is a specialist one, held by digital creators who develop the tools and systems for others to use. This includes skills such as software development, cyber security engineering, technology management and cloud security.
- Digital technology is constantly evolving which means there is a need

for everyone to be a **Digital Leader** by keeping themselves up to date with relevant technology developments, being adaptable and embracing new technologies, and supporting colleagues on their digital journeys. Digital leadership skills are particularly relevant to the small and micro business owner who may have to overcome their fear of change, rapidly increase their technology knowledge, and inspire their workforces to try new ways of working. The ability to support small and micro businesses to develop their digital leadership capacity and capability lies at the heart of a successful digital economy.

## The Importance of Meta Skills

Digital skills cannot be applied in isolation as their effectiveness will be diminished if not combined with meta skills like communication, creativity, critical thinking and collaboration.

Meta skills are essential for the digital economy as they are timeless, higher order skills that create resilient workforces, foster innovative thinking, and encourage the development of collaborative solutions to solve business, society, and environmental challenges.

In a constantly evolving digital economy, meta skills will be essential to support individuals' career agility and resilience, helping them embrace the inevitable changes to their jobs and businesses driven by continual digital transition. Meta skills are also distinguishable from rapidly changing technical skills that will need to be constantly updated in a digital economy.

Employers also identify the importance of durable competencies like **computational thinking** which is increasingly beneficial for roles in the digital economy.

Computational thinking has its origins in computer science, but it has applicability to many STEM and digital economy careers. It provides skills to break down complex problems into simpler steps and think logically to support innovative solutions. Computational thinking skills are considered particularly relevant when dealing with real world problems such as climate change.

As AI and technology continue to disrupt jobs it will also be essential for people to develop skills that are resistant to automation such as **digital creativity**. This is the ability to use digital tools to develop innovative solutions through creative problem solving, as well as using digital skills to make best use of a range of multimedia platforms.

### Benefits of Meta Skills in the Digital Economy:

- encourages high performing workplaces that supports recovery and growth
- develops capability to respond, and become catalysts for technological change
- creates a resilient workforce who can adapt to technological developments
- fosters conditions which encourage creativity, innovative and design thinking
- supports a shift in mindsets towards a technology enabled workplace

As technology continues to transform the workplace **digital agility and intelligence** will also be an essential skill which employers value.<sup>39</sup> Digital agility is not about a person's level of technical competence, but about a positive and resilient attitude towards embracing technology.

Digitally agile employees will have the confidence to switch between using different technologies, be able to adapt to them



quickly, and be able and willing to undertake self-directed learning to make best use of them. The adoption of online working due to Covid-19 is a good example of how employees are now expected to embrace new technologies.

Technology will increasingly support employees in the workplace by taking on routine or hazardous tasks and freeing up their time for more meaningful, human, and higher-level activities. There are already multiple examples of cobots automating processes and operating alongside humans in areas like advanced manufacturing and in food and drink production.

To gain maximum impact from these technology developments it will become more important for employees to gain skills which support effective **human and computer interactions**.

### Most Requested Skills by Digital Technology Employers

- Teamwork/collaboration
- Customer service
- Sales
- Budgeting
- Project management
- LINUX
- Customer contact
- Software development
- SQL
- Telecommunications
- Cisco
- System administration
- Stakeholder management

### The World of Work is Changing

## 3: The Digital Economy Skills and Education Landscape

### Education, Skills Provision and Support

Digital economy skills are not only developed in schools, universities, colleges and private providers, but increasingly within extra-curricular environments, third sector settings and online. Although Scotland clearly demonstrates examples of innovation and excellence (such as in the suite of technology National Progression Awards, and by integrating digital economy skills into non-technology disciplines), the evidence is clear that the current pattern of skills investment needs to be rebalanced to increase supply. Scotland has persistent challenges including the under-supply of technology graduates, the decline in computing science attainments at school, the inconsistent access to digital economy skills opportunities at school, and the gender imbalance in the digital economy skills pipeline.

The Shared Outcomes Framework has been developed by the Scottish Government, SFC and SDS. It will provide a mechanism to effect the necessary change to make education provision more agile, flexible and responsive. This could include digital economy education programmes and is aligned to the NSET ambition. The focus must be on must be on meaningfully increasing the supply of

relevant university graduates, while intensifying and better aligning the vocational pipeline to improve outcomes for individuals and businesses. New apprenticeships will help to meet the growing employer demand and to further leverage the significant co-investment of Scottish businesses in the skills system.

At a school level it is essential that we address the long-term decline in computing science uptake, and this must include ramping up collaborative efforts to inspire future generations about digital economy careers in Scotland, and critical to this is addressing the inconsistent access to digital economy skills experiences at school.

Workforce development efforts must also be prioritised to ensure that the current workforce can be upskilled and reskilled to align better with the needs of the workplace, and in advance of occupational change. This should include working through business support organisations to help employers forward plan and identify their future needs, and creating the mechanisms to deliver short sharp, industry specific provision.

Scotland's labour market remains tight, so there is an enormous opportunity to deploy rapid retraining to support more of Scotland's economically inactive, under-represented groups, and young people into digital economy

jobs. This should include exploring the viability of shorter reskilling pathways, greater utilisation of apprenticeships and encouraging employers to continue to look beyond their typical recruitment practices.

### Computing Science National Qualifications in Schools

At a school level, challenges persist in part due to an under-supply of computing science teachers. Around 36 schools lack a dedicated teacher, and this is even more pronounced in rural schools.<sup>41</sup> Despite a computing science curriculum refreshed to focus more on developing in-demand skills like software development and web development, the number of students studying computer science at National Qualifications to Advanced Higher has declined by just over 9,000 in the last decade to around 14,000 in 2021/22.<sup>42</sup> There also remains a significant gender divide with females accounting for only 20% of computing science pupils.

The decline in pupil uptake has been associated with these changes to the Computing Science curriculum, but also due to the discontinuation of the Information Systems course at school which was popular due to its focus on applications and systems and also

<sup>40</sup> Shared Outcomes Framework

<sup>41</sup> Computing Science in Local Authority Secondary Schools

<sup>42</sup> SQA

had a higher uptake amongst females. There is however an opportunity to address this gender divide because when young girls do participate in technology experiences the feedback tends to be positive. Girls cite a lack of knowledge about technology qualifications and jobs as their reason for not engaging.<sup>43</sup>

Schools' data also illustrates wider equality issues as between 2017 and 2019 the attainment gap between the most and least affluent computing science students was increasing, although there was improvement during the pandemic when student grades were based on teacher assessment.<sup>44</sup>

These challenges associated with pupils studying computing science is extremely concerning as there has been a reduction in the number of pupils studying the subject at school at a time when digital economy jobs are in growth. However computing science is not the only feeder into digital economy careers as the technology NPAs and FAs provide flexible and diverse pathways which will attract more young people onto further technology study at college, university, and apprenticeships.

## **Other Digital Economy Pathways at School**

Computing science is now only one of multiple pathways for developing digital economy skills at school as the curriculum includes digital literacy that teaches young people about problem solving with technology, as well as cyber resilience and internet safety. Like literacy and numeracy, schools are expected to place digital literacy at the heart of all learning and not just within a specific technologies' curriculum.

Scotland's evolving suite of National Progression Awards (NPAs) is designed to respond to the skills needs of industry, and there has been an increase in learners taking NPA qualifications including in data science, computer games development, digital media and cyber security. Senior phase school pupils can also undertake a technology Foundation Apprenticeship (FA), which is a work-based learning opportunity delivered by colleges in partnership with an employer.

Technology NPAs and FAs are important contributors to the pipeline, as by offering alternative and vocational opportunities they expand technology to pupils beyond the traditional computing science cohort. They also bring in employer engagement through the provision of work experience, which is invaluable in inspiring young people, particularly girls about digital technology careers. However, computing science and

<sup>43</sup> Tackling the technology gender gap together

<sup>44</sup> Computing Science in Local Authority Secondary School



technology FA's and NPAs are not universally available to every pupil in Scotland which presents an opportunity to work with local authorities and education partners to address barriers to availability of provision.

## Colleges

Through the network of Scottish colleges, employers operating in the digital economy have access to range of provision from

digital literacy skills through to specialist training for digital technology professional roles and vendor qualifications. In 2019/20, almost 9% (26,600) of all college enrolments were in digital technology subjects. Despite an increasing appetite from employers to recruit digital technology college graduates, relatively few graduates progress directly into employment, with over three quarters moving onto further study.<sup>45</sup> Reasons for graduates

not moving directly into employment include employers citing a lack of practical technology work experience, and college students opting for further study as they perceive technology employers to expect a degree qualification.

Digital technology college students tend to have an older age profile from other student disciplines with almost half aged 25 or over. In academic year 2019/20 the digital technology student cohort was predominantly white at 85% but compared to all other college enrolments digital technology college courses were more successful in attracting Black (including Black Scottish and Black British), Pakistani and Chinese students.<sup>46</sup> Despite college digital technology enrolments being male dominated at 56%, this gender split is significantly better than in other parts of the digital pipeline.

## Schools and industry are working together to develop tomorrow's digital talent



- **Barefoot Computing** works with primary teachers to help them teach computing science and this includes workshops delivered by Barefoot volunteers.
- **Critical Friends** matches schools with industry to help teachers shape a curriculum that matches the needs of employers.
- **Discover Tech Skills** streams 'tech experts' into schools to raise awareness of careers in areas like cyber, data science and green technology.
- Industry and public sector partners have collaborated to create a **Tech Industry in Schools** toolkit to make it easier for digital economy employers to engage with schools.
- **DYW** makes it easier for employers to connect with education through their network of 20 regional DYW Groups and School Coordinators, as well as working with SDS on **Marketplace** which enables employers to offer activities directly to schools and colleges.

## University

Scotland has a strong reputation of producing high quality digital technology graduates with universities demonstrating excellence in computer gaming, data science, cyber security, and quantum computing. Universities have responded to employer demand with qualifiers in computing and mathematical science subjects growing by around 11% each year since 2015/16, now reaching around 6,000 graduates in 2020/21.<sup>47</sup>

45 HESA (2021)

46 SFC (2021)

47 HESA

**Scottish colleges are demonstrating their ability to listen to employers and respond to the demand for everyone to have more sophisticated digital economy skills.**

The Edinburgh & South East Scotland City Region Deal colleges have worked together to embed critical data science skills into non-technology disciplines. Students in sport, horse care, rural skills, hair & beauty, business, and construction were all given the opportunity to gain data science skills to take them into their respective industries.



Colleges are working through a future technology partnership to develop innovative solutions to address future tech skills requirements. This partnership is a strategic collaboration of colleges working with Colleges Scotland, SDS and SFC to improve the supply of digital technology skills for employers.



As part of the Cyber Resilient Scotland Strategic Framework SDS worked with Dundee and Angus College to build a new cyber security module for non-tech students which is now in a further nine colleges. The module demonstrates the importance of gaining technology skills through multi-disciplinary learning by highlighting the critical role that cyber security plays in all parts of the digital economy.



In response to the growing demand for digital economy skills across their employer industries, Dumfries & Galloway College and Borders College have joined forces with national and local partners to establish a South of Scotland Digital Skills Hub. The hub, which will focus on providing upskilling and retraining for people in the South of Scotland through increased digital capacity, learning, and training will also work with employers and third sector organisations to better understand their future digital economy skills needs.



Analysis forecasts an increase in most digital occupations to 2031, equating to around 15,600 job openings for tech professionals each year. Although most of these graduates successfully progress into full-time employment or into further study, industry feedback has revealed that employers are exploring other options to fill their vacancies.

At 5% the unemployment rate for digital technology graduates is similar with other disciplines. As well as entering roles in the technology industry, digital technology graduates find roles in financial services and manufacturing, reflecting the growing digitisation of these sectors.

Importantly computing science and related subjects are not the only feeder for technology employers who identify the value of hiring graduates with the transferable technical and meta skills gained from a range of non-technology university disciplines. Examples include statistical analysis and problem-solving skills acquired in psychology courses, geographical information system skills developed in geography courses, and even the analysis of human behaviour in sociology courses proving valuable for roles in cyber, data and software. The growing demand for integrated digital skills is expected to continue this trend.

In addition to this provision, universities are also working with employers through the SFC's Upskilling Fund to provide short duration upskilling courses. A number of these courses have a focus on digital skills development.

## Apprenticeships

Digital economy apprenticeships are now recognised as a mainstream contributor to

the supply of digital professionals, and there has been a steady increase in the numbers of employers participating. There has been significant employer co-investment in apprenticeships and across digital economy pathways (including cyber security, data science software development and digital marketing). Modern Apprenticeships (MAs) account for almost 1,800 apprentices each year.<sup>48</sup> Apprenticeship developments are also

### Universities Working Together to Develop Data Talent



The Data Lab has been supporting the growing demand for data skills through The Data Lab Academy (prev. The Data Lab Masters) since 2015. This pioneering collaboration across 12 universities has provided funded MSc scholarships for over 1000 students across a variety of data and AI courses. The academy programme has been developed in collaboration with industry, public sector, and government to respond to the increasing demand for data skills, but also builds the essential digital economy meta skills of problem solving, critical thinking and communication.

Over 400 of the MSc students have also completed internships gaining valuable industry experience across a variety of Scottish Industries including in the creative economy by working with companies like TV Squared to analyse the enormous amount of data collated as part of television and digital advertising.

Working with industry to develop new and accessible pathways like this into data and technology careers is important to encourage a diverse digital economy workforce, and The Data Lab is continuing to foster new university partnerships and developing new courses to meet the needs of employers.

Apprentices who undertake a Modern Apprenticeship in Engineering & Digital Manufacturing will develop in-demand skills in emerging technologies, such as artificial intelligence, digital twinning, and data science.



taking account of the demand for integrated digital skills, such as the new engineering & digital manufacturing apprenticeship.

Graduate Apprenticeships (GAs) have proven particularly popular with digital technology employers who value the combination of work experience whilst working towards a recognised degree-level qualification. Demand for work-based learning continues to grow with ScotlandIS identifying increased numbers of their employers viewing apprenticeships as an important part of recruitment strategies.<sup>49</sup>

47% of ScotlandIS employers were likely to recruit a digital economy Graduate Apprentice in 2022: an increase from 33% in the previous year

<sup>48</sup> SDS Modern Apprenticeships Statistics

<sup>49</sup> ScotlandIS Technology Industry Survey



**Demand from ScotlandIS employers for digital economy Modern Apprenticeships is up from 22% in 2021 to 38% in 2022**

Post-pandemic and subject to funding there is a clear opportunity to further increase the numbers of apprentices by targeting activity at the types of employers (by size, sector or location) who have had less participation in digital economy apprenticeships.

Similarly increasing employer awareness of the higher-level technology Technical Apprenticeships at SCQF Level 8 will be relevant for many roles that require advanced qualifications.

The increasing demand for technology apprenticeships demonstrates employers are widening their talent pool, and there are indications that apprenticeships could also

further contribute to a more diverse digital economy workforce by enabling career changers to reskill for critical digital roles whilst retaining employment.<sup>50</sup>

There is a need to intensify vocational skills delivery and expand apprenticeship pathways. Continuing to deliver responsive, flexible, and agile apprenticeship developments that provide learning pathways into digital technology professional jobs will be essential, but developments should also address the need for all individuals to be prepared for the digital economy. Further integrating relevant digital economy skills to all apprenticeships will create an increasingly productive and resilient workforce.

**Female participation in the data science Graduate Apprenticeship has increased year on year to 35.8% in 2020/21**

**Data science and cyber security graduate apprentices have an older age profile at predominantly 25 years plus**



**Over 85% of the data science and cyber security Graduate Apprenticeships were utilised for workforce development to build critical digital economy skills in existing employees**

## Non-formal Learning

In addition to the further and higher education provision there is a diverse range of providers delivering short digital skills-focused courses, seminars, and bootcamps that are predominantly aimed at reskilling individuals for professional digital economy roles. The collective numbers going through these programmes each year is unknown, but they are recognised by employers as an important addition to their digital economy skills pipeline. Some examples include –

- **CodeClan** which provides immersive courses to individuals who can be fast tracked in software or data professional careers.
- **Digital Skills Pipeline** provides funded courses for individuals on low incomes to begin their digital journey and build the skills required to progress into careers in growth areas such as cyber security, software development and data analytics.
- **FDM** run a variety of programmes aimed at reskilling graduates, veterans, and women returners for professional technology roles.
- **Data Kirk** is an Edinburgh social enterprise offering free and paid courses to help people start on their journey into a data career.
- **Code Your Future** is a non-profit coding school training refugees and disadvantaged people to become web developers and help them to find work in the tech industry.

There is also an abundance of online, and often free to access training courses such as from **FutureLearn**, **Udemy** and **Coursera** for individuals to self-serve and stack learning onto existing skills and qualifications. Micro-credentials like these are increasingly recognised by employers as valuable, but individuals beginning on their digital economy journey may require additional wrap-around support and guidance to ensure they select a course which is right for them, and which takes them on an achievable and viable career path.

## Business Support

Significant investment has been made by industry and Scottish Government to enable public agencies to deliver business support services which assist small and micro-organisations and on their digital transition journey. This is not an exhaustive list, but some examples have included:

- **SCVO** provides free support to voluntary sector organisations and charities including support and advice on a range of digital topics and a Digital Check Up.
- **Digital Boost** delivered by Business Gateway provides businesses with free webinars, 1:1 consultancy and a Digital Health Check.
- **HIE Digital Enablement Grant Scheme** funds businesses to advance their digital capability
- The **ONE Agritech Programme** which was developed to support digital innovation in the agriculture sector.
- **Digital Development Loan** funding of up to £100k for organisations to improve digital capacity, digital capability, or digital skills.
- **Scottish Digital Academy** which supports the development of digital skills and leadership across the public and third sectors.

## 4: Understanding People and Place in the Digital Economy

### A Focus on People

With the widespread adoption of digital technologies across the whole economy, there is an urgent need to rapidly accelerate a more diverse range of talent entering tech roles from across the UK and abroad to fill the 15,600 vacancies per annum. This will address and narrow existing labour market inequalities. Achieving greater diversity in the digital economy workforce will address the ‘lost opportunity risk’ by harnessing the skills and talent of a diverse range of individuals who are currently under-represented in the workforce. This will improve the inclusiveness of technological developments and contribute to mitigating skills shortages.

Addressing imbalances in the digital economy labour market by recognising the barriers to skills, training, and employment, faced by under-represented groups is a priority for DESAP.

This chapter details characteristics individually but it is recognised that these often overlap and combine to make barriers to fair access to employment, skills, and training even greater.

### Age

Despite most jobs in the economy now requiring at least basic digital skills, many individuals, particularly amongst the older workforce lack digital competences. In 2020, insight identified that only 46% of people aged 65 plus in the UK had essential digital skills for life, compared with 96% of people in the 15-24 age group category.<sup>51</sup>

Whilst this may suggest that older workers require additional support from employers, it would be incorrect to assume that young people are digital natives possessing all the necessary digital skills for the world of work. Many young people may be digitally confident but lacking in digital skills for the workplace and could also require support to enhance their employability.

### Disability

People with disabilities have a disproportionately lower level of representation in the labour market and often face significant issues within the workplace such as poor promotion prospects, lack of support, and poor working conditions. They are also more likely to be in part time, transient and/or low paid employment.

The digital economy presents the opportunity to address employment barriers faced by those with disabilities.<sup>52</sup> Many digital technology jobs have the potential to offer flexible working with over half of responding technology employers indicating they would permanently offer remote working. This can be supportive for individuals with disabilities as well as for other under-represented groups.<sup>53</sup>

In terms of digital professional skills, studies have identified a range of positive traits linked to neurodiverse conditions that can benefit technology employers, and yet there is a low employment rate amongst autistic people for example, with only 32% of autistic adults in paid work. The cost of lost employment for autistic adults in the UK is estimated at an annual £9 billion.<sup>54</sup>

With the right support, Scotland’s transition to a digital economy could help many individuals gain and sustain high value employment. Scottish Government’s *A Fairer Scotland for Disabled People: Employment Action Plan* outlines how the employment gap will be reduced by at least half by 2038, with the digital economy presenting a significant opportunity to facilitate this.<sup>55</sup>

51 Developing essential digital skills

52 Technology can level the playing field for people with disabilities in the workforce

53 Is Hybrid Working Here to Stay

54 Neurodiversity in Digital Technology Summary Report

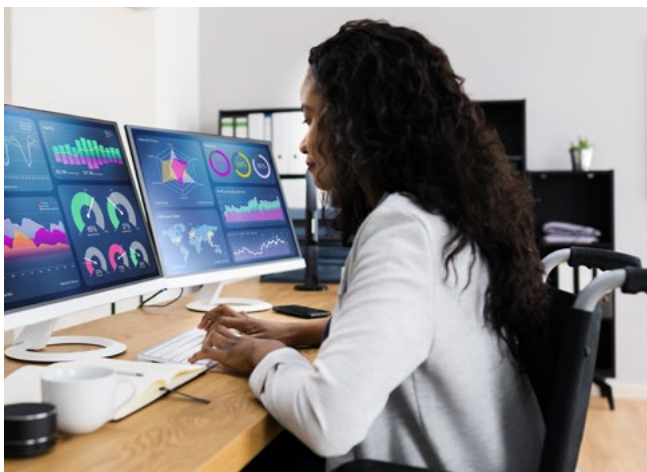
55 A Fairer Scotland for Disabled People: Employment Action Plan

## Displaced Workers

The adoption of digital technologies will see the growth of some jobs central to the digital economy, such as software developers and data scientists, and the decline of others such as administrative roles that may be replaced by automation. Recent analysis shows that by the mid 2030's, 30% of jobs in the UK will be at risk of automation, with jobs that are lower skilled and lower paid most at risk.<sup>56</sup>

There is a need to manage the impact of the increased digital technologies adoption to ensure that the benefits of advancements like automation are shared across the economy, and to guarantee that those in at-risk-jobs have opportunities to be reskilled.

This will require rapid and large-scale targeted upskilling and reskilling support to individuals in declining occupations, combined with clear and compelling information to encourage individuals to move into digital economy careers. Digital training funds should be utilised for displaced workers, and individuals returning to the labour market should be supported to upskill into new and emerging opportunities.



## Race

Individuals from ethnic minorities continue to experience greater labour market inequalities with higher levels of unemployment and underemployment.<sup>57</sup> Similarly, the Scottish Government's Expert Reference Group on Covid-19 and Ethnicity identified that individuals from ethnic minority backgrounds were disproportionately impacted by the pandemic, due to their over-representation in lower paid jobs across the wider Scottish economy.

Scotland's Race Equality Framework and Action Plan also highlights the labour market and income inequalities faced by ethnic minority individuals, and seeks to ensure that there is 'equal, fair and proportionate access to employment and representation at all levels,

grades and occupation types in Scotland's workforce' for this population.<sup>58</sup>

Despite existing barriers, some progress is being made with representation of individuals from ethnic minority backgrounds in the technology industry increasing in recent years. However, the retention rates amongst the tech workforce are low, suggesting more work is needed to ensure that workplaces are inclusive, address equal pay, and prioritise equal opportunities to all.<sup>59</sup>

Addressing representation of individuals from ethnic minority backgrounds across the wider economy will not only ensure that the digital economy is inclusive but will also address skills shortages and gaps, broaden labour supply into these key roles in the face of anticipated increasing demand.

The inaugural 2022 **Black (Data) Talent Summit** was established by DataKirk to help boost workplace diversity. The event which attracted industry, government and education partners focused on how the development of innovative pathways to employment and solutions to improve diversity, equality and inclusion in the workplace can help Scotland with the under supply of the critical data and digital economy skills in the labour market.

<sup>56</sup> Will robots really steal our jobs?

<sup>57</sup> Employment, Fairness at Work and Enterprise Independent Report

<sup>58</sup> Race Equality Framework and Action Plan

<sup>59</sup> Diversity in Tech



## Gender

Women continue to be under-represented in the labour market despite multiple initiatives to address inequalities. Whilst there have been improvements within the labour market, in 2021 women in full-time employment earned on average 6.6% less than their male counterparts.<sup>60</sup> Women also tend to be over-represented in low paid, part-time jobs.

This imbalance has been echoed in digital technology occupations, but this appears to be changing on a positive trajectory with the numbers of females in tech jobs now 30%, up from 24% in 2020. Despite this significant progress, evidence shows that women in digital technology roles still tend to be paid lower with a salary gap of nearly £20,000 between men and women.<sup>61</sup>

**Women in technology occupations continues to increase with females now holding 30% of technology jobs in Scotland.**

Multiple initiatives such as Dresscode, Scottish Women in Technology (SWIT) and Women Who Code all aim to inspire women to choose technology careers. However, without continued and concerted efforts to support more women and young girls into digital education, there will not be enough women entering digital roles to help the Scottish labour market to fulfil its digital skills requirements.



<sup>60</sup> Latest data on Scotland's gender pay gap highlights women's continued inequality in the labour market

<sup>61</sup> What are we worth?

## A Focus on Place

A place-based approach is essential to the effective implementation of DESAP if we are to achieve inclusive growth and support all digital economy employers.

Increasing digital economy skills can contribute to mitigating challenges which can be associated with rurality, like distance to customers, size of terrain, and under supply of labour. Rural industries like agriculture have already demonstrated the value of embracing digitally enabled innovations such as remote crop monitoring and connecting the milk supply chain through the SRUC Digital Dairy, but there is potential to do much more.

Equally, regional characteristics such as availability of training providers, connectivity, and access to computing science at school can be barriers, and it is necessary to take account of these to ensure digital economy skills opportunities are accessible and distributed across urban and rural Scotland.

Scotland has established an impressive network of regionally located digital economy assets from the Innovation Centres, ONE Tech Hub Aberdeen, HALO Kilmarnock, and the Tayside Cyber Quarter. Whilst many of these have a national focus, they operate on a regional basis, such as the Scotland 5G Centres' S5GConnect hub in Dumfries that supports local small businesses to understand and embrace 5G enabled technology developments.

There is much to be gained by working collaboratively with local partners to seek opportunities to scale their regional successes, as well as to test new approaches in different geographical contexts. The recent launch of the Techscalers network further demonstrates the Scottish Government's commitment to aligning national strategies with local deployment.

As each of the City Region Deals and Growth Deals identify the development of vibrant regional digital economies integral to their success, enhanced collaborations between national partners across Scotland's regions will be essential to maximise impact and minimise duplication.

## Digital Transformation in Rural Agriculture

To improve biodiversity and support the growth of local woodland, app-controlled cows is an exciting and [innovative trial in southwest Scotland](#).

As a first for Forestry and Land Scotland, the cows are fitted with GPS collars that emit an audible warning acting as a deterrent to animals wandering outside their allocated grazing area. The pilot uses technological advancements to achieve a positive environmental impact by reducing the damage caused by cattle and encourage woodland growth, but it also has other business benefits by the potential to reduce fencing maintenance costs for the landowner as the cattle can safely move within a prescribed boundary.

This is just one example of how traditional and rural industries and the environment can gain significant benefit by embracing the digital economy.



## 5: Opportunities and Skills Implications

DESAP identifies five thematic areas of opportunity where the enhancement of digital economy skills is essential to Scotland's national priorities of economic recovery, inclusive growth, and the journey to net zero. These areas will help to realise the potential scale of economic opportunity to Scotland of '£25 billion' over the next decade and directly support NSET ambitions across all five programmes of action. This alignment is outlined in the action plan in Chapter 6. There is a significant risk of this economic growth not being realised if employers cannot access enough appropriately skilled individuals.

Whilst these are presented as five distinct opportunity areas, there is significant overlap and connection between them. Each of the five priority areas has skills implications for the four digital economy skills segments described in chapter two.

### **Opportunity: Supporting a vibrant technology economy will contribute to economic growth**

Scotland is home to a thriving and diverse ecosystem of technology companies who are essential to economic prosperity; the tech sector was expected to contribute around £5,997 million to the economy in 2022 and

this is forecast to increase to £7,692 million by 2032.<sup>62</sup>

The number of tech companies has grown by 15% to around 10,000 since 2015, with computer consultancy and computer programming activities continuing to dominate tech sector growth. Other parts of the industry experiencing growth include fintech, as well as Scotland's cluster of gaming companies which has increased employment by 26% between April 2020 and December 2021.<sup>63</sup> Accelerated by the pandemic, e-commerce is also expected to continue to grow with internet sales accounting for 30% of UK retail, an increase from 20% since 2020.<sup>64</sup>

Glasgow and Edinburgh remain tech magnets accounting for over a third of the tech business base. Whilst the media image of the tech sector can be characterised by the Big Four tech companies of Apple, Amazon, Facebook and Google, many Scottish tech companies are micro businesses, with some local authorities only hosting micro tech sector companies in their region.

Employment in the tech sector continues to grow with 76% of employers expecting to increase their employee numbers.<sup>65</sup> Similarly, employment forecasts also indicate an increase in most digital technology occupations to 2031, equating to around 15,600 job openings

each year, which is a 20% increase on previous estimates.<sup>66</sup> Over half of these digital technology professionals are expected to be employed outside of the traditional tech sector as large banks, local authorities, government, and other public sector agencies who are high consumers of technology skills talent. Demonstrating the importance of transferable and meta skills, the skills which are in demand are wider than technology with employers citing sales and marketing followed by data analytics, artificial intelligence, and cyber security as essential to their growth.<sup>67</sup>

Whilst the prevailing message from technology employers is one of optimism and opportunity, staff recruitment and retention continue to be identified as one of the top three challenges by tech sector employers.<sup>68</sup> This has been exacerbated by the pandemic which heightened demand for digital technology skills across all sectors, and which has also facilitated international remote working meaning Scottish tech talent are being globally recruited.

If urgent action is not taken to address areas of long-standing and critical digital skills shortages, then tech-enabled economic growth could be at risk. Strong competition for skilled workers will continue to drive high levels of staff turnover, increased recruitment, and salary costs, and may out-compete the small and start

62 Tech Nation; Digital Technologies Sector Skills Assessment

63 Scottish Video Games Industry Soars by 26 per cent, says industry trade body TIGA

64 UK Ecommerce Market

65 ScotlandIS Technology Industry Survey

66 SDS Oxford Economics Forecasts

67 ScotlandIS Technology Industry Survey

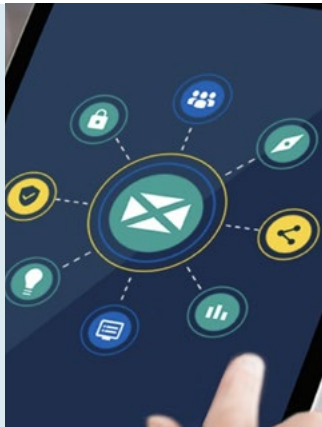
68 ScotlandIS Technology Industry Survey

up tech companies which are essential to the ecosystem. The positive impacts of productivity, innovation and exports associated with Foreign Direct Investment could also be impacted as technology has dominated inward investment but sustaining this relies on a strong pipeline of digital technology professionals.<sup>69</sup> Scotland's place as a global leader in the key industries identified in NSET could also be in jeopardy as these sectors rely on digital technology skills to drive innovation.

## Skills Implications

- Digital occupations are amongst the fastest growing in Scotland, and demand for digital technology skills is expected to continue into the next decade. The education and skills system are being

The establishment of **Scotland's Digital Academy** demonstrates the growing need for integrated and professional digital skills across public sector and voluntary organisations.



asked to respond to this by urgently and significantly increasing the quantity of new technology professionals trained, as well as by placing an increased focus on integrating digital economy skills across non-technology curriculums.

- Increasing the numbers of digital technology professionals from college and university is contingent on a buoyant supply of young people from school with the relevant skills and interest. Actions which are being implemented from the Scottish Technology Ecosystem Review (STER) must continue to be prioritised to ensure that every young person has equal access to digital economy skills experiences at school.
- There is a significant opportunity to leverage the considerable leadership capabilities and co-investment of Scottish business by working with industry to inform and intensify the provision of apprenticeships, college, and other vocational skills development to complement the supply of graduates into critical digital technology roles.
- It is recognised that the supply of new entrants from mainstream education pathways will not fill all the skills requirements of industry, and therefore reskilling for critical digital skills shortages should be seen by education, government, and its agencies as a strategic response to meeting the ongoing and rapidly changing skills requirements of employers.
- Reskilling programmes have typically focused on the demand for technology professionals in the technology sector, and specifically in data analytics, software development and cyber security skills, but the focus of reskilling programmes needs to be expanded to better support the needs of all employers and to respond to the demand for integrated digital skills.
- Central to this will be understanding the nature and scale of these jobs to ensure they offer viable opportunities for someone to be reskilled into. Understanding the number of entry level vacancies and targeting these for reskilling will lead to improved outcomes for individuals and support industry to fill skills shortages more quickly.
- Identifying the transferability of skills across displaced jobs and industries for in demand technology roles also offers a prime opportunity for reskilling the current workforce. Working across sectoral bodies and Industry Leadership Skills Groups to bring in their industry intelligence about



short, medium, and long-term opportunities will be an important feature of this work.

- A portfolio of flexible lifelong learning reskilling interventions that includes online and face-to-face and modular approaches, and which also considers the needs of the employed, unemployed, economically inactive and individuals who face additional barriers, will help make reskilling opportunities more available to everyone. This will also contribute to achieving an inclusive digital economy which reduces existing inequalities.
- To achieve maximum reach and impact the benefits of reskilling training programmes should be communicated clearly through comprehensive support and advice. This will include stimulating demand by promoting digital economy career opportunities to career changers, unemployed and the existing workforce, as well providing support and signposting to help individuals continue their next steps into work or further study. Creating opportunities for individuals on reskilling programmes to gain work experience and to engage with industry will also be an important factor for success.

### **Opportunity: Supporting growth in emerging sectors will contribute to Scotland's prosperity**

From law and education to health and medicine, and travel to agriculture, there are increasing numbers of sectors adding the word 'tech' to demonstrate they are not just embracing technology but being revolutionised by it. Fintech is one of the best-known examples of this, and Scotland has attained standing as a fintech leader with a cluster of over 200 fintech start-up and scale-up companies.

Scotland is also establishing an impressive reputation for SpaceTech with a fifth of the UK space sector jobs based in Scotland. Many of these space companies contribute to solutions which use technology to take on big social, environmental, and other tech for good problems. Space technologies can play a unique role in addressing issues such as tracking deforestation, and monitoring emissions as part of the journey to net zero.

Driven by entrepreneurs who innovate with technology to transform business models to create these new blended tech sectors, further growth is expected from the existing RetailTech, GovTech and FoodTech sectors, and in other areas which are still to

be established.<sup>70</sup> Fostering the conditions to support these emerging sectors is transformational for Scotland as they typically offer high quality career opportunities and expand the tech sector beyond the cities and central belt by building on regional assets. For skills this means encouraging an entrepreneurial mindset by creating opportunities to build enterprise activities into the curriculum, as well as ensuring there is a steady supply of individuals with the integrated digital skills emerging sectors require.

Despite this positive picture of rapid expansion in many of Scotland's emerging sectors, further growth is threatened if the under-supply of the right digital economy skills is not urgently reversed. Without action this means that traditional sectors like tourism and food & drink who are critically important to Scotland's economy could be prevented from continuing to innovate and drive the tech enabled transformational change which was essential to their Covid-19 survival, and is now addressing issues of hard to fill vacancies.<sup>71</sup> Scotland could also lose its edge in being seen to lead the way in new emerging sectors like Traveltech, and as being seen as one of the leading fintech clusters in the world.

<sup>70</sup> Fintech? HealthTech? RetailTech? A guide to make sense of Everything Tech

<sup>71</sup> R2 Dinner for "? Tech for Staff Shortages in Hospitality

## Skills Implications

- Support for the Techscalers network and appointment of Scotland's Chief Entrepreneur shows the important role that start-ups play in the digital economy, as they will help to fuel growth in emerging sectors like fintech and agritech. The Scottish Technology Ecosystem Review (STER) identifies several actions to increase the entrepreneurial focus in computing science at university, but there is an opportunity to further widen the entrepreneurial pool by **increasing opportunities for young people at school, college and in apprenticeships to combine the development of technology skills with entrepreneurial skills and careers experiences.**

- The growth of emerging sectors illustrates the prevalence of digital skills across all occupations and sectors. There is a need to ensure that the talent pipeline is future-proofed by increasing opportunities for people to undertake **multi-disciplinary courses where technology is combined with other diverse disciplines.**
- In emerging technology sectors, basic digital skills gaps are often coupled with a general lack of confidence amongst employees to embrace new digital technology and use it to develop their sectoral knowledge and skills. This lack of confidence is often misplaced, as **individuals underestimate the relevance and depth of their existing transferable digital skills that have currency in the**

**labour market.** Supporting individuals to understand their existing digital skills set in the context of work could address anxieties around new emerging technologies and aid the growth of new sectors and jobs.

- As these emerging sectors combine technology with other disciplines, they can play an important role in broadening the technology pipeline beyond the traditional computing science cohorts. There is a prime opportunity to work with emerging sectors such as ClimateTech and MedTech to **promote technology careers as enablers of societal change which may also help to attract and retain a more diverse workforce.**
- There is prime opportunity to ensure workforce development and critical skills shortages are addressed by **working more closely with start-ups and scale-ups and other business leaders in emerging sectors to intensify and better align vocational and technical with current and future industry need.**

Traveltech for Scotland are supporting Scotland's traditional tourism and hospitality companies to innovate and evolve their business models to help them Scotland's economy sustainably recover and thrive in a digital world. The cluster which now includes over 200 TravelTech companies has created an ecosystem where businesses can access support, as well as being encouraged to collaborate and help each other by sharing innovation and intelligence. And there is much for Scotland's TravelTech industry to be proud of with companies like Electrek Explorer demonstrating innovative ideas and partnerships which make business sense as well as having a positive impact on the environment.

Traveltech  
for Scotland

## Opportunity: Increasing the digital maturity of Scottish businesses will lead to increased productivity growth

Digital transformation is widely acknowledged as a key driver of financial and commercial growth and as a mechanism to achieve a competitive market advantage. Businesses who embrace technology and who are more digitally mature have expanded their geographical reach, demonstrated increased productivity, created operational efficiencies, and contributed to low carbon working.<sup>72</sup> Digitalised businesses also demonstrated greater resilience during the pandemic.

Scottish businesses are predominantly at the lower end of digital economy maturity, with the challenges most acute for micro businesses and those in rural areas. Whilst small and micro businesses and social enterprises are not a homogenous group, there is some commonality in their need to improve ecommerce and online trading skills, cyber resilience skills, as well as basic commercial digital using skills. Employers and employees could also benefit from support to build their digital skills confidence, and to help them recognise and understand the value of their pre-existing digital skills they have developed within the workplace.

In comparison to larger companies, small and micro businesses and social enterprises face unique challenges when it comes to embracing technology as they are often time poor, have limited resources which they need to deploy cautiously, and may lack specialist technical knowledge. A significant barrier to embracing technology systemically tends to be the lack of digital leadership skills to plan and manage a whole business digital transition.<sup>73</sup> Digital leadership skills are essential as they will help businesses to understand and evaluate the different types of technology that can improve business processes, can help them recognise when to ask for advice, and to identify the digital skills needs of their employees.

Whilst there is clearly much to gain if Scotland can become a nation of digitally enabled small and micro businesses, the price of not achieving this step change is too great as all the evidence points to accelerated digital adoption driving vibrant, resilient, and sustainable economies. As a small and micro business economy it is essential that decisive actions are taken to help businesses develop and access the essential digital economy skills. Failure to act risks Scottish small businesses being left behind in what has become a 'do or die' digital environment.<sup>74</sup>

This should include prioritising interventions which would support the 65% of businesses who are not trading online, and the 70% of businesses who said they are not fully equipped for cyber security incidents to develop the skills to survive and thrive in the digital economy.<sup>75</sup> There are significant benefits to be gained by supporting industries like tourism, food & drink, and the creative economy which are important to Scotland's growth, but which are also reeling from the combined effects of Brexit, the pandemic and the ongoing economic uncertainty.

### Skills Implications:

- Small and Medium sized Enterprises (SMEs) includes businesses from 250 employees, to less than 10, who will have very different needs in terms of skills requirements and barriers to access. It is essential that the delivery of DESAP interventions **support all sizes of organisations to digitally evolve and this should include considering the needs of sole traders and third sector organisations.**
- To achieve maximum return businesses should be helped to understand the value of **employees acquiring digital skills as an**

<sup>72</sup> SMEs are dragging their feet over digital transformation

<sup>73</sup> SME Digitalisation – Charting a course towards resilience and recovery

<sup>74</sup> Scotland's Business Base: Facts and Figures

<sup>75</sup> Digital Economy Business Survey 2021

**essential part of any digital investment.**

Ensuring that 'skills' are a prominent and equal feature of all publicly funded digital economy interventions (such as grant funding) will support this.

- Supporting the digital growth aspirations of small businesses will require **expanding and regularly reviewing the portfolio of training courses and resources.** This will identify gaps and emerging needs for constantly changing areas such as ecommerce trading and cyber security. It will also be important to consider steps to improve the accessibility, affordability, and availability of this provision.
- Effective digital leadership is an essential part of any digital transition as business owners will require the skills to develop their people, their business model, and their technologies. **Developing an accessible digital leadership course that can be integrated into existing leadership programmes, and which can also stand alone** will increase the numbers of businesses who can take a planned and systemic approach to their digital transition.
- Many businesses do not yet understand the value which digital competences bring to their business and therefore will not proactively seek out support. Working through **Scotland's Business Support Partnership to integrate digital economy skills to all employer discussions** will increase the number of businesses who can be signposted to next steps digital economy skills support.
- Organisations who are on their digital technology journey can benefit from the **transfer of knowledge gained by bringing in new digital skills through student placements, graduate programmes, and internships.** The Highlands & Islands Enterprise Technology Placement Programme illustrates the value that digital technology graduates can bring to small and micro businesses and efforts should be made to create Scotland wide access to similar programmes.

Increased digitalisation means that online trading and shopping continues to grow, and demand for ecommerce roles continues to rise. But ecommerce isn't just about the Amazons of the world as the boom in ecommerce provides a wide range of online selling platforms and a wealth of opportunity for Scottish digital economy small businesses and start-ups.

[Second Nature Online](#) is a great example of how a Dumfries and Galloway business which was started out as a hobby has grown into one which sells across global e-marketplaces, and whose owner Karen Riddick is now working with Local Authorities and Enterprise Agencies in Scotland to give advice to other businesses. Karen talks about how simple it can be to get into online trading, but stresses the importance of planning ahead and taking time to get advice.



## Opportunity: Supporting a diverse Digital Economy will help to meet the skills requirements of employers and contribute to inclusive growth

Advancing digital economy skills has the potential to improve productivity across Scottish businesses, as well as supporting inclusive growth, and helping to tackle existing labour market inequalities.

Despite some progress, women, individuals from ethnic minority backgrounds and individuals who have disabilities continue to be under-represented in digital technology occupations, which also represents a

significant loss of talent at a time when the technology industry is experiencing challenges with the recruitment and retention of digital skills

Although employers appreciate the value of a diverse digital economy workforce, and many make proactive efforts to achieve this, they often struggle with low levels of applications from under-represented groups. This challenge is particularly acute for smaller organisations due to a lack of dedicated HR support and expertise.

Whilst some of the diversity and inclusion challenges will be associated with the recruitment process, there is clearly also a

need to ensure a buoyant supply of individuals with the required digital economy skills and qualifications. Addressing the long-term decline in computing science at school level by inspiring and exciting all our young people about digital skills and careers, will also be an important part of achieving a diverse digital workforce.

### Skills implications:

- Labour market shortages have been the driver for industry looking beyond traditional graduate hires and has encouraged participation in apprenticeships and reskilling programmes. However, because of these positive experiences, employers now recognise the **significant business value of supporting a more diverse technology workforce through non-traditional career pathways**. Enhanced promotion of technology apprenticeships which are paid work-based learning roles, as reskilling opportunities for new and existing staff provides an opportunity for individuals who may otherwise be excluded from accessing digital technology careers.
- Research shows that diverse workplaces have improved staff retention and overall outperform less diverse organisations,

### Supporting Small Businesses through Technology

**Highlands & Islands Enterprises Technology Placement Programme** is a great example of supporting a non-technology business to embrace the digital economy. HIE's placement programme worked with Pat Munro Ltd, a family run Highland-based Construction, Home Building & Quarries contractor to place a University of the Highlands and Islands Computing Science graduate to digitally help improve their business processes. Business benefits included introducing digital dashboards, reducing data entry requirements, and enhancing the information flow to management to keep the company focused on Key Performance Indicators.

Pat Munro's managing director, Brian Munro explained the significant value from the graduate as it allowed them to explore new tech solutions bespoke to the company needs, before committing to them. Following the completion of the placement the graduate secured a permanent position with Pat Munro (AIness) Ltd.



so it is essential that employers are able to attract a more diverse workforce. An unbiased recruitment process which uses inclusive language and imagery, and inclusive interview practices will be an essential component. **Supporting organisations to benefit from the existing range of resources and best practice will help small businesses implement inclusive recruitment practices and working environments** and could improve the representation of under-represented groups across digital economy roles.

- Many young people continue to hold negative preconceptions about computing science and technology jobs, but in a labour market where there are increasing numbers of high-quality technology-related jobs, more needs to be done to generate interest across a diverse talent pool to reduce skills shortages. Stereotypes begin early but can often be changed with positive experiences which highlight the importance of **introducing inspirational technology careers and industry experiences to all pupils in primary school** and sustaining this through their school career.<sup>76</sup>
- Achieving a diverse and inclusive digital economy requires a holistic approach which considers the multiple barriers to

entry for under-represented groups. It will also require a multifaceted skills response which must be based on appropriate evidence, expert insights and by engaging with our learners. **To achieve this, the implementation of DESAP actions must be built on collating the appropriate evidence and baseline data, benefiting from good practice and by engaging with sector experts as well as learners.**

### **Opportunity: Cross-sector collaboration across the Digital Economy will accelerate progress to meet Climate Emergency targets**

The climate emergency is one of the most significant issues facing Scotland and consequently it has increased in political, societal, culture and economic importance, and features prominently alongside digital in the NSET as well as in multiple Scottish Government policies.

In 2020 SDS worked with Scottish Government to produce a Climate Emergency Skills Action Plan (CESAP) which evidenced the importance of enhancing access to the skills required for the high-quality green jobs essential for a low carbon economy.<sup>77</sup> It is widely recognised that digital innovation is critical to addressing

the climate emergency and unsurprisingly digitalisation is a central theme in CESAP which identifies growing demand for digital technology skills. Specifically, automation, artificial intelligence, and machine learning skills were all highlighted as increasingly important to green jobs and industries.

There is also a strategic opportunity to harness the benefits from Scotland's nascent climate tech industry which offers significant economic benefits to Scotland as a leader and exporter of climate change tech-solutions, as well as contributing to Scotland's own net zero target.

The disruptive forces of the digital economy and climate emergency sector have much in common. No business or individual will be immune to their effects, and with the right intervention climate and digital both offer significant opportunities due to their potential to create high value jobs and to stimulate regional growth. Success for both is also contingent upon a pipeline of digital economy talent, so this presents a clear and urgent economic, environmental and wellbeing imperative for government and partners to take dynamic action to secure Scotland's prosperity by supporting the critical digital economy skills required.

<sup>76</sup> Learner's views of computer science in Scottish Schools

<sup>77</sup> Climate Emergency Skills Action Plan

## Skills Implications:

- There is a window of opportunity for Scotland to develop the essential skills for a net zero and digital economy so **collaborative efforts to rapidly retrain the existing workforce who are at risk of displacement should be identified.** This should include partnering with industry to harness their insight, gain from their innovative thinking, and benefit from opportunities for co-investment.
- Increasing the supply of integrated digital skills as a core skillset for Scotland's workforce will contribute to economic growth, and to the development of innovative solutions to major challenges facing industry and government, including the climate emergency. Similarly, CESAP identifies that green skills should be embedded as a core skillset across curriculums. Levers to achieve these aims will be similar and will require senior leadership and fresh ways of thinking to mobilise partners around this ambitious goal. **By bringing the combined influence of digital and climate, efforts could be accelerated to make the systemic change required for the development of green and digital critical skills for the future workforce.**

- Digitalisation and climate emergency are causing a seismic shift in the labour market by changing existing jobs and creating new high-value digital and net zero careers. By embedding principles of **fairness and inclusion in the skills response this employment shift can support inclusive growth by improving employment opportunities for under-represented groups.** Alongside the enhanced promotion of funded work-based learning pathways, digital and climate should collaborate on approaches which tailor the short sharp provision which industry needs

in a way which supports and encourages under-represented group to participate.

- In the implementation of CESAP and DESAP there are clearly multiple opportunities for digital economy and climate emergency collaborations to maximise impact and resources. There is a further **strategic benefit to be gained from the considerable insight and influence of climate and digital leaders, and government coalescing around a shared economic vision, and to use this to drive immediate and radical change in the skills and education system.**

### Data Driven Decisions Supporting the Climate Emergency

Scottish Development International identify companies working in Scotland in emerging technologies and one of these is Reath which was founded in Edinburgh in 2019 and is one of the UK's fastest growing female software companies.

The logo for Reath, featuring the word "reath" in a dark blue, lowercase, serif font.

Reath demonstrate how technology can support the circular economy and contribute to reducing carbon emissions by helping businesses adopt safe, scalable, and compliant reuse systems for packaging. Using software that creates a digital archive by tracking packaging through every step of its journey, businesses can decide how packaging can be reused because they know where it has been and what it has been previously used for.

This demonstrates how digital leaders across multiple sectors can embrace technology to make data driven decisions which help the environment but also which support their business by responding to the changing customer buying behaviour of avoiding single use packaging.

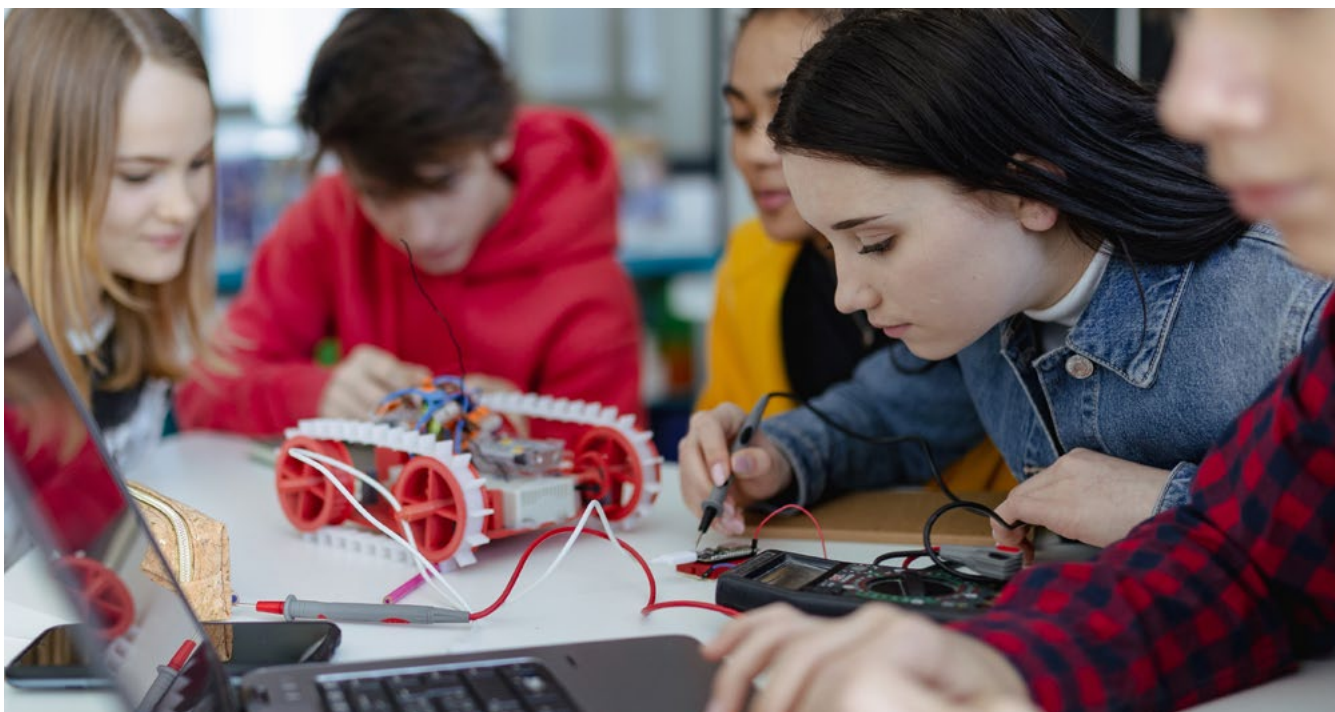
## 6: 'Call to Action' Priority Areas for Skills Action to Support the Digital Economy

### Identifying Areas of Opportunity

An analysis of cross-sectoral, Scottish, and international research into digital economy skills has formed the evidence base for DESAP. This has been supplemented by additional insight and solutions generated from employers and stakeholders during a series of online DESAP workshops. To collate this evidence base and to help co-promote DESAP workshops, Skills Development Scotland established a DESAP Expert Group whose membership included Highlands & Islands Enterprise, South of Scotland Enterprise, Scottish Enterprise, Federation of Small Business, Scottish Government, AI Alliance, Inclusion Scotland, Scottish Funding Council, and Business Gateway/ Digital Boost.

This plan was guided by the principles of ensuring that actions are decisively industry and economic opportunity led. This leverages the leadership capabilities and co-investment of Scottish industry and focuses squarely on the workforce development and critical skills needs of the digital economy sector.

DESAP will not seek to do everything but has prioritised the actions that stakeholders have confirmed as critical, and which will likely have the greatest impact. By using the action plan framework, DESAP will add value to other strategic priorities by ensuring that



digital economy skills continue to feature prominently. This will include supporting the activity of the National Strategy for Economic Transformation, Climate Emergency Skills Action Plan, Artificial Intelligence Strategy for Scotland, Review of Coherent Provision and Sustainability and the Career Review.

The plan will however remain flexible over the five-year period, as activities may need to change or pause considering restricted public spending.

The DESAP analysis was distilled into the five priority areas, and into a series of actions which are presented in this chapter. This action plan has been endorsed by the DESAP External Expert Group, and by the Digital Economy Skills Group as the Industry Leadership Skills Group.



## **Priority Action 1 – Create opportunities for all young people to develop critical digital economy skills which will support a high-growth, resilient, and inclusive Scottish economy**

Scotland must urgently develop the digital economy workforce of the future by increasing opportunities for all young people to gain critical integrated and professional digital skills. If the numbers of young people studying digital tech/Computing Science at school do not rapidly increase, then Scotland will not have enough ‘home-grown’ workers to fill the 15,600 digital tech workers that are needed each year.

Central to addressing this will be inspiring young people and encouraging them to continue their digital journey by delivering high quality careers experiences which leverage the significant capability and co-investment of Scottish businesses across all parts of the digital economy. If this does not happen skills shortages will get significantly worse leading to slower economic growth.

### **Impact**

This priority action area sets out the collective action required to rapidly increase the numbers of young people progressing into roles that require integrated digital skills and professional digital skills and will:

- align with work of NSET Programme Boards (Skilled Workforce; Entrepreneurial People and Culture; A Fairer and More Equal Society)
- align with actions set out in the Scottish Tech Ecosystem Review, and SDS Careers by Design Report which details the recommendations for Scotland’s future Career Strategy
- rapidly expand opportunities for young people to participate in technology experiences at school
- leverage industry in the co-design and co-delivery of inspirational technology curriculum related activities
- further integrate technology careers and industry experiences into the digital technology curriculum at school
- continue to raise awareness of the diverse range of digital economy career opportunities to young people and their influencers.

**Priority Action 1 – Create opportunities for all young people to develop critical digital economy skills which will support a high-growth, resilient, and inclusive Scottish economy**

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Extend the reach of digital technology experiences for young people who may otherwise not participate in technology subjects at school	<p>Digital Xtra Fund works with industry to fund and deliver extra-curricular technology clubs</p> <p>Projects such as Apps for Good, Code Club, Micro:bit are all active in Scotland with variable geographical offers and participation</p> <p>Providing the strategic support for extra-curricular school-stage programming clubs is a STER recommendation being taken forward by SDS in 2022/23</p>	Explore how a sustainable technology club could be delivered by non-specialist practitioners (such as within after school and holiday clubs)	SG, STER, DXF, SDS, SIS, DYW	From April 2023
Increase the opportunity for all young people in Scotland to have access to the computing science and digital technology curriculum at secondary school	<p>Higher Computing Science is currently delivered in around 83% of schools in Scotland. Some schools also offer digital National Progression Awards and Foundation Apprenticeships</p> <p>e-Sgoil was established to address teacher shortages and has already developed some online teaching materials for the computing science curriculum</p>	<p>Explore options to increase access to computing science experiences at school</p> <p>Increase access to technology experiences at school by supporting further expansion of digital economy Foundation Apprenticeships and SCQF Level 4-5 qualifications</p>	<p>SG, ES</p> <p>LA, SDS, STER</p> <p>SDS, Industry, DYW, SIS, Colleges</p>	Immediate/Ongoing
Contribute to solutions which increase the numbers of computing science teachers	<p>SDS delivers Scottish Government's STEM bursary which provides £20k bursary for students undertaking the Postgraduate Diploma in STEM Education.</p> <p>STER identifies several actions to increase the numbers of computing science teachers including the establishment of Scottish Advancing Computing Science (STACS)</p> <p>Teach in Scotland is a campaign to provide information for people considering a teaching career in Scotland including how to apply, training options, career prospects and professional development.</p>	<p>Maximise opportunities to promote computing science teaching careers and support to current technology students and career changers, including:</p> <ul style="list-style-type: none"> <li>promoting computing science teaching careers through careers information websites</li> </ul> <p>Collaborate with universities to explore potential opportunities to help computing science students gain experience of computing science teaching careers. This could include options such as exploring a Work based Learning Degree for prospective computing science teachers.</p>	<p>SDS, SG</p> <p>Universities, GTCS, STACS</p> <p>SDS</p> <p>SFC</p> <p>SDS, SFC</p>	From April 2023

**Priority Action 1 – Create opportunities for all young people to develop critical digital economy skills which will support a high-growth, resilient, and inclusive Scottish economy**

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Inspire young people about careers in the Scottish digital economy by engaging employers in every primary and secondary school in Scotland	<p>SDS has facilitated the establishment of a strategic Tech Industry into Schools partnership to support joint working between programmes such as –</p> <ul style="list-style-type: none"> <li>• SDS Live Lessons and Meet the Experts</li> <li>• ScotlandIS Critical Friends</li> <li>• BT Barefoot Computing</li> <li>• DYW Schools coordinators</li> <li>• Marketplace</li> <li>• Founders4Schools</li> <li>• Digital Technology Education Charter</li> </ul>	<p>Explore how to integrate technology careers and industry experiences into the computing science and digital technology curriculum at school:</p> <ul style="list-style-type: none"> <li>• explore how to scale and expand Tech Experts into every secondary school to create more opportunities for teachers and industry to co-deliver curriculum mapped activities</li> <li>• explore options for taking more technology careers and industry experiences into primary and early years pupils</li> <li>• Collate existing short- and long-term participation and evaluation data to help monitor effectiveness of all technology industry activity</li> </ul>	<p>DYW ILGs Skills Groups, Employers Schools Third sector SDS LA's SIS</p>	<p>From April 2023</p> <p>From April 2024</p> <p>Immediate/ongoing</p>
Contribute to skills development to support a vibrant technology start-up community in Scotland	<p>Existing enterprise activity is already delivered in schools, but often this may not be tailored to digital economy opportunities.</p> <p>The STER identifies several actions to increase the tech-entrepreneurial focus at university.</p>	<p>Create entrepreneurial mindset by developing opportunities to integrate enterprise skills and activities with digital technology qualifications at school, college, and apprenticeships by:</p> <ul style="list-style-type: none"> <li>• explore opportunities to align enterprise modules with technology Foundation Apprenticeships, through close working with the FA Enhancement Group</li> <li>• enhancing careers information through digital channels (e.g., My World of Work) to include inspirational case studies and role models from Scottish technology start-ups</li> </ul>	<p>SDS, SFC, Young Enterprise, industry SDS, Young Enterprise, industry</p>	<p>Immediate/ongoing</p> <p>From April 2023</p>
Provide young people with careers information on the varied job opportunities within the digital economy	Digital World was established by SDS to promote technology careers to young people and career changers	Continue to update career information on digital channels to reflect the growing demand for roles which require integrated digital skills and professional digital skills across all industries	SDS, industry	From April 2023

## **Priority Action 2 – Improve the evidence base of current and future digital economy skills needs to support the transition to a digital economy and increase the pace of economic growth**

As businesses across all sectors become more digitally mature, basic digital skills expectations have evolved, and more sophisticated digital skills are now essential for every employee. At the same time, emerging sectors are creating a requirement for new integrated digital skill sets, and the demand for professional digital skills continues to increase.

**If skills investment is not prioritised in ways that help employers recruit talent, there will continue to be a porous skills pipeline and 15,600 tech vacancies per year will not be filled.**

### **Impact**

This priority area identifies the key actions which will ensure that current and future skills investment to support the digital economy is based on a strong evidence base, and will:

- align with work of NSET Programme Boards (Skilled Workforce; Productive Businesses and Regions; A Fairer and More Equal Society)
- support the work of the SDS and SFC Shared Outcomes Framework to create alignment of economic opportunities with current and future skills provision, and the Education and Skills Impact Framework (ESIF)
- strengthen the evidence base on the demand for current and future digital economy skills
- improve the understanding of the current digital economy skills provision and its impact
- enable collaborative working to clearly articulate the skills needs across the education, skills, and careers system.



**Priority Action 2 – Improve the evidence base of current and future digital economy skills needs to support the transition to a digital economy and increase the pace of economic growth**

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Strengthen and communicate the evidence base on the current and future demand for digital economy skills and jobs	<p>SDS Sectoral Skills Assessment is produced for the <b>Digital Technologies Sector</b> and provides insight into current and future demand for jobs and skills</p> <p>Ongoing analytical activity following on from the Education and Skills Impact Framework (ESIF) work</p>	<p>Establish a programme of ongoing labour market research and analysis to keep public agencies, education and skills partners up to date with the supply and demand of digital economy skills by:</p> <ul style="list-style-type: none"> <li>producing a Labour Market and Skills Assessment for current and future digital economy skills and jobs. This will include agreeing to a definition of the precise digital economy skills and jobs in scope</li> <li>researching the skills demands from current and future technology to support inward investment opportunities</li> <li>establishing a clear picture of the investment in digital economy skills and its return to the economy</li> </ul>	SDS, SFC, SG, ScotlandIS, SDI	<p>Research From April 2023</p> <p>Delivery From April 2024</p>
Communicate and articulate the industry evidence on the increased demand for professional digital skills to educational institutions and other skills providers	<p>SDS and SFC have established a Shared Outcome Framework which will support alignment of economic demand with current and future provision</p> <p>SQA establishes Qualification Development Teams, and SDS established Technical Expert Groups as required to engage industry in qualification development</p>	<p>Agree how best to engage with the Shared Outcomes Framework to provide evidence-based advice to inform the supply of professional digital skills provision at college, university and apprenticeships (e.g. through a Strategic Digital Technology Skills Alliance)</p> <p>Establish a strategic process for engaging industry in the development of professional digital skills qualifications that meet top in demand skills requirements at school, college, university, and apprenticeships</p> <p>Continue to support opportunities for courses to integrate experiential learning, workplace experiences and work placements</p>	<p>SDS</p> <p>SFC</p> <p>SOAG</p> <p>FTP</p> <p>SQA</p> <p>ILGs, Skills Groups, Employers,</p> <p>FSB, Colleges, Universities</p> <p>Eplacement Scotland</p> <p>ScotlandIS</p>	From April 2023

**Priority Action 2 – Improve the evidence base of current and future digital economy skills needs to support the transition to a digital economy and increase the pace of economic growth**

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Identify key digital economy skills competencies and aligning and developing micro-credentialed/short courses to address skills needs of employers	<p>The European Computer Driving Licence (ECDL) is a recognised and accessible qualification providing individuals with proficiency in ICT</p> <p>The Essential Digital Skills framework defines the basic digital skills adults need to safely benefit from, participate in and contribute to the digital world</p> <p>SQA Core ICT Skills Framework is embedded across a range of learning programmes at school, college, and apprenticeships</p>	<p>Explore the requirement for a sector agnostic Digital Economy Skills Framework which includes the basic and more sophisticated technical and meta digital economy skills required for all employees to perform effectively in the changed world of work</p> <p>Use the Framework to influence the content and delivery of training and skills provision focusing on:</p> <ul style="list-style-type: none"> <li>• micro-credentials based on the Digital Economy Skills Framework which allows individuals to demonstrate their competency</li> </ul> <p>Work with college and university to integrate tech into their non-tech courses</p> <p>Develop a glossary of digital economy skills terminology (based on the Digital Economy Skills Framework) which can be used by partners to improve awareness and understanding of digital economy skills, careers, and courses</p>	<p>SDS</p> <p>Universities</p> <p>Colleges, JISC,</p> <p>SFC,</p> <p>SOAG,</p> <p>ILG, Skills Groups, Employers,</p> <p>Third sector</p> <p>FSB</p> <p>Awarding bodies</p> <p>SDS</p> <p>Universities</p> <p>Colleges, JISC</p> <p>SFC,</p> <p>SOAG</p> <p>ILG, Skills Groups, Employers,</p> <p>Third sector Awarding bodies</p>	<p>Research from April 2023</p> <p>Delivery from April 2024</p> <p>From April 2023</p> <p>From April 2024</p>

### **Priority Action 3 – Improve the digital leadership skills of small and medium sized organisations to enable more rapid scale-up and growth**

If Scotland is to achieve its digital ambition, then employers across all sectors, locations, and of all sizes require the skills to understand what technology can contribute, how to plan and invest in the right technology solutions and to understand how to develop the digital skills required in their workforce. Smaller organisations could be left behind in this digital transition as they often lack the knowledge, time or resources to make this change happen.

**If SMEs do not acquire the digital leadership skills needed to capitalise on digital technology, then there is likely to be an increase in business failures and constrained economic growth.**

#### **Impact**

This priority area identifies the actions which will contribute to improving the digital maturity of small and medium sized organisations by providing them with the skills to manage their digital transition and will:

- align with work of NSET Programme Boards (Skilled Workforce; Entrepreneurial People and Culture; New Market Opportunities; Productive Businesses and Regions)
- collect robust up-to-date intelligence about the digital skills needs of small and medium sized organisations, and feed this into the skills and business support organisations
- make it easier for small and medium sized organisations to engage with digital economy skills opportunities by integrating digital skills into wider business support offers
- help organisations to identify the digital skills needs of their workforce, and signpost them to further training assistance
- increase the digital capability of small and medium sized organisations by creating opportunities for knowledge transfer from student placements.

### Priority Action 3 – Improve the digital leadership skills of small and medium sized organisations to enable more rapid scale up and growth

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Support small businesses to identify and address the digital economy skills gaps in their workforce	<p>SDS Employer Engagement Executives work with small businesses to diagnose their skills needs</p> <p>Digital Boost has an online Digital Health Check to help small businesses improve their digital performance</p> <p>Cyber Essentials is a self-assessment tool to help businesses guard against cyber attacks</p> <p>SDS Skills Discovery Tool helps employers understand the capability and skills across their business.</p>	Explore the development of a Digital Skills Essentials self-assessment toolkit to support small businesses assess the digital skills of their workforce	<p>SDS</p> <p>Digital Boost</p> <p>ILGs, Skills Groups, employers, Third sector</p> <p>FSB</p>	<p>Research from April 2024</p> <p>Delivery from October 2024</p>
<p>Align the development of digital economy skills interventions with the needs of small businesses</p> <p>Create more opportunities for the existing current public investment to be utilised for digital economy skills</p>	<p>Digital Economy Business Survey completed every 2 years</p> <p>HiE Business Panel Survey, and other employer surveys distributed by SDS, FSB, SCVO, SoSE, SE etc.</p>	<p>Improve the intelligence held about digital economy skills needs of small businesses by utilising existing survey mechanisms:</p> <ul style="list-style-type: none"> <li>reviewing and contributing to the skills questions in the Digital Economy Scotland Business Survey</li> <li>creating further opportunities for digital economy skills questions to be included within non-digital employer research</li> </ul> <p>Influence partners to increase the prominence of digital skills as an eligible criterion in publicly funded small business interventions</p>	<p>SDS, ILGs, Skills Group, HiE, SoSE, SE, FSB, Digital Boost, Regional partnerships, Third sector</p> <p>SDS, Digital Boost, S5GC Connect Hubs</p> <p>SG, SE, HIE, SOSE</p>	<p>From April 2023</p> <p>From April 2024</p>



### Priority Action 3 – Improve the digital leadership skills of small and medium sized organisations to enable more rapid scale up and growth

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Support the development of leadership and management skills required for small businesses to embrace the digital economy	<p>Digital Boost provides a series of digital masterclasses for small businesses</p> <p>Digital Leaders is a UK programme providing professional support for leaders to embrace digital transformation. across all sectors</p> <p>Scottish Digital Academy delivers digital leadership programmes for public sector</p> <p>HiE, SoSE and SE deliver a Rural Leadership Programme which equips owners with the skills and confidence to adopt an ambitious growth mindset</p>	<p>Work across partners to review publicly funded leadership programmes to identify options for integrating digital leadership into leadership programmes</p> <p>Identify gaps in digital leadership provision across current programmes and identify core skills which can support SMEs in their first digital transition steps</p> <p>Subject to resources develop and deliver a pilot digital leadership online course suitable for small businesses to support them to take the first steps on their digital transition</p>	<p>SDS, HiE, SoSE</p> <p>SE, Digital Boost</p> <p>SFC</p> <p>ILGs, Skills Groups, employers</p> <p>Third sector, FSB, CDN</p>	<p>From April 2023</p> <p>From April 2024</p> <p>From April 2025</p>
Increase the number of small businesses who can harness the benefits of digital transition	<p>e-placement Scotland matches college and university students with technology employers for paid placements</p> <p>Glasgow University Software Service delivers student led software services to small businesses</p> <p>HiE Technology Placement Programme offers small businesses a student placement to help digitise their business</p>	<p>Identify options for a pilot placement programme for technology students to be placed in small businesses to support them to deliver digital transition projects</p> <p>Subject to resources deliver a pilot placement programme with the potential for wider roll-out across Scotland</p>	<p>SDS, SFC</p> <p>Universities, Colleges</p> <p>SICSA, ILGs, Skills Groups, employers, FSB</p> <p>eplacement scotland</p>	<p>Research From April 2024</p> <p>Delivery from October 2024</p>
Increase the opportunities for small businesses to benefit from digital economy skills advice and support	<p>The Business Support Partnership brings together Scotland's enterprise and skills agencies to provide an easy-to-navigate offers for small businesses</p>	<p>Share digital economy insights with Scotland's Business Support Partnership to enable partners to upskill business facing advisers</p>	<p>SoSE</p> <p>SE</p> <p>HiE</p> <p>ILGs, Skills Groups, Employers, FSB</p>	<p>Immediate/ongoing</p>

## **Priority Action 4 – Ensure that more skills and employment opportunities contribute to a fairer, more inclusive, and diverse digital economy**

The digital economy brings significant disruption as jobs and skillsets change, but with the right action it also presents the opportunity to support inclusive growth, and to tackle existing inequalities in the labour market. To achieve this it is essential that equality, diversity, and inclusion considerations are embedded within the development and implementation of every DESAP action.

**If there is not an increasingly diverse pool of people taking up digital economy roles, then skills shortages will get worse, and businesses won't be able to fill their vacancies.**

### **Impact**

This priority area sets out the actions which will ensure that fairness and inclusion are at the heart of the digital economy skills agenda and will:

- align with work of NSET Programme Boards (Skilled Workforce; Productive Businesses and Regions; A Fairer and More Equal Society)
- assemble expert knowledge and insights (including learners), to ensure that every DESAP action is developed with equality, diversity, and inclusion considerations from inception
- collate the right evidence on equality, diversity, and inclusion to demonstrate impact
- inform the development of inclusive learning pathways in new high value jobs.
- support and enable businesses across all regions to benefit from the digital economy.

## Priority Action 4 – Ensure that more skills and employment opportunities contribute to a fairer, more inclusive, and diverse digital economy

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Embed equality, diversity, and inclusion considerations into the implementation of DESAP	The Digital Economy Skills Group has been working with partners to instil the principles of inclusion, diversity, and equality across all activity	Establish a DESAP Equality Diversity & Inclusion (ED&I) Advisory Group to inform the development and delivery of all DESAP projects	SDS	From April 2023
	Public bodies are required to develop Equality Impact Assessments such as for SDS's work-based learning programmes	Under the guidance of the ED&I Advisory Group identify and address gaps in the baseline digital economy research and indicators which has been collated	ED&I Advisory Group, SDS,	From April 2024
	SDS has established workstreams to guide and support activity to address the under-representation of females and of neurodivergent individuals in technology	Gather key project evaluation and monitoring data disaggregated by ED&I criteria, including geographical where possible	ED&I Advisory Group, SDS,	From April 2024
Support small businesses to benefit from the advantages of a diverse digital workforce	Equate Scotland provides support to increase the number of women in STEM.	Use insights and intelligence to establish a baseline and capture best practice to help small businesses implement inclusive recruitment practices. This will increase the employment, retention, and progression processes for under-represented groups in digital roles	SE, SoSE, FSB HiE, TechScalers, SDS Employers, ILGs, Skills Groups Third sector	Baseline from April 2023
	FSB provide HR and employment law advice for small businesses			Development Activity from April 2024
	Auticon provides a Neurodiversity Inclusion Service which supports business to understand the benefits of having a neurodiverse workforce			
Build on the opportunities provided by the digital economy to address the under representation in digital economy skills and education		Identify opportunities for existing digital technology training and skills programmes to dedicate provision for under-represented groups	SDS, SFC, Universities, Colleges, ED&I Advisory Group	From April 2023

## Priority Action 4 – Ensure that more skills and employment opportunities contribute to a fairer, more inclusive, and diverse digital economy

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Create Scotland wide multi-agency collaborations to maximise opportunities for regional impact and relevance		<p>Build on existing opportunities to work with regional digital economy groups across Scotland’s City Deals and Growth Deals</p> <p>Ensure that the implementation of DESAP continues to support rural and Island communities’ by:</p> <ul style="list-style-type: none"> <li>• working with the Highlands and Islands Skills Leadership forum</li> <li>• supporting the digital economy needs of the refreshed Skills Action Plan for Rural Scotland</li> <li>• working with South of Scotland Enterprise</li> <li>• working with the South of Scotland Digital Skills Hub, including supporting their implementation of their SOAG digital skills pathfinder</li> </ul>	<p>Scottish Cities Alliance, City Region Deals, Growth Deal. SDS Highlands and Islands Skills Leadership Forum, SOSE, HIE, SDS, SoS Digital Skills Hub</p>	<p>From April 2023</p> <p>Immediate/ongoing</p>



## **Priority Action 5 – Rapidly increase the acquisition of critical digital economy skills through workforce development, upskilling, and reskilling**

Transitioning to a digital economy will require significant action from the Scottish Government, public agencies, education and employers to encourage the widescale upskilling and reskilling that is urgently required. This presents an enormous opportunity for the digital economy skills and education system to collaborate and to further demonstrate innovation, agility and responsiveness to support the needs of industry.

**If businesses don't upskill and reskill in line with technology developments, then they will fall behind and won't be competitive.**

### **Impact**

This priority area sets out the collective actions which will develop an evidence based strategic reskilling response to meet the rapidly changing digital economy skills requirements of employers and will:

- align with work of NSET Programme Boards (Skilled Workforce; Entrepreneurial People and Culture; Productive Businesses and Regions)
- use labour market evidence to align reskilling and upskilling programmes with realistic career opportunities
- influence the development of innovative learning pathways to support individuals to secure digital economy roles
- support individuals to make informed choices about digital economy careers and learning opportunities
- promote work-based learning as a reskilling opportunity.

## Priority Action 5 – Rapidly increase the acquisition of critical digital economy skills through workforce development, upskilling, and reskilling

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Aligning the work-based learning opportunities available to support new areas such as transition to net zero	<p>Current apprenticeship pathways include</p> <ul style="list-style-type: none"> <li>• Cyber security</li> <li>• Software development</li> <li>• Data science/analytics</li> <li>• Digital marketing</li> <li>• Digital manufacturing</li> </ul>	Explore the development of innovative pathways to support jobs that are being digitally transformed (e.g., changes to apprenticeships)	SDS, industry	From April 2023
Maximise the uptake of work-based learning pathways to support the demand for professional digital skills		Increase the reach and uptake of digital economy apprenticeships including as reskilling opportunities for existing workers and other career changers	SDS, Industry ILGs	From April 2023
Align education, apprenticeships, and online training opportunities to support the demand for professional digital skills	<p>Digital Start Fund and Digital Skills Pipeline have been delivered by SDS to support low-income individuals into technology job roles</p> <p>Individual Training Accounts, Flexible Workforce Development Fund and the National Transition Training Fund have provided funding for digital skills developments</p> <p>Scottish Government have committed to a lifetime upskilling and retraining offer for individuals and businesses</p> <p>Scottish Government's Digital Academy supports public and third sector employees to reskill and upskill</p>	<p>Use labour market intelligence to inform the development of reskilling solutions for Professional Digital skills and provide insight to inform the Lifetime Upskilling and Retraining offer</p> <p>Explore the development of a digital economy diagnostic tool to allow individuals to test their current technology ability and aptitude</p>	SDS, industry, colleges. Universities, Industry ILGs	<p>From April 2023</p> <p>From April 2024</p>

**Priority Action 5 – Rapidly increase the acquisition of critical digital economy skills through workforce development, upskilling, and reskilling**

Skills Action Areas	Current Activity	Future Focus	Key Partners	Start Date
Collaborate with other industries to support workers facing the prospect of displacement into digital economy roles	Partnership Action for Continuous Employment (PACE) is dedicated support for individuals made redundant or are facing redundancy	Ensure the PACE redundancy service takes account of relevant developments and opportunities such as by providing digital economy careers information and reskilling offers to help minimise displacement of workers	SDS, PACE, Industry ILGs	Immediate/ongoing
Broaden the digital economy skills pipeline by enabling career changers to make informed career choices	My World of Work is the SDS online careers information and advice service Digital World is the SDS and industry online partnership to promote digital economy careers. SDS has careers advisers who work in every state secondary school in Scotland and who work from a network of drop-in careers centres across Scotland	Develop a marketing and communications strategy to educate career changers and other new entrants about the importance and value of the digital economy and its jobs to Scotland	SDS, DWP, SDS Careers, Industry	From April 2024

## 7: Delivering the Digital Economy Skills Action Plan

### A Digital Economy Skills Framework

DESAP sets out the priority digital economy skills actions identified by industry to help businesses capitalise on the economic opportunities flowing from the digital economy. Delivery of these actions will directly contribute towards Scotland achieving an inclusive economic recovery.

DESAP focuses on the collective skills actions that require to be undertaken within the next five years to 2028. Delivering on these actions will require ongoing **commitment and collaboration from Scottish Government and its agencies, stakeholders, and industry** to foster the significant, urgent change and agility required from the digital economy skills and education system.

To achieve this the Digital Economy Skills Group (DESG) will work with industry and SDS to mobilise partners around a shared vision of advancing critical digital economy skills and workforce development.

DESG will link closely with Scottish Government to align the skills framework, implementation, and monitoring of DESAP with NSET's five programmes of delivery. This will include a direct reporting line to the NSET Skilled Workforce Programme Board, which will review progress and impact. There will also be links to the four other NSET Programme Boards.

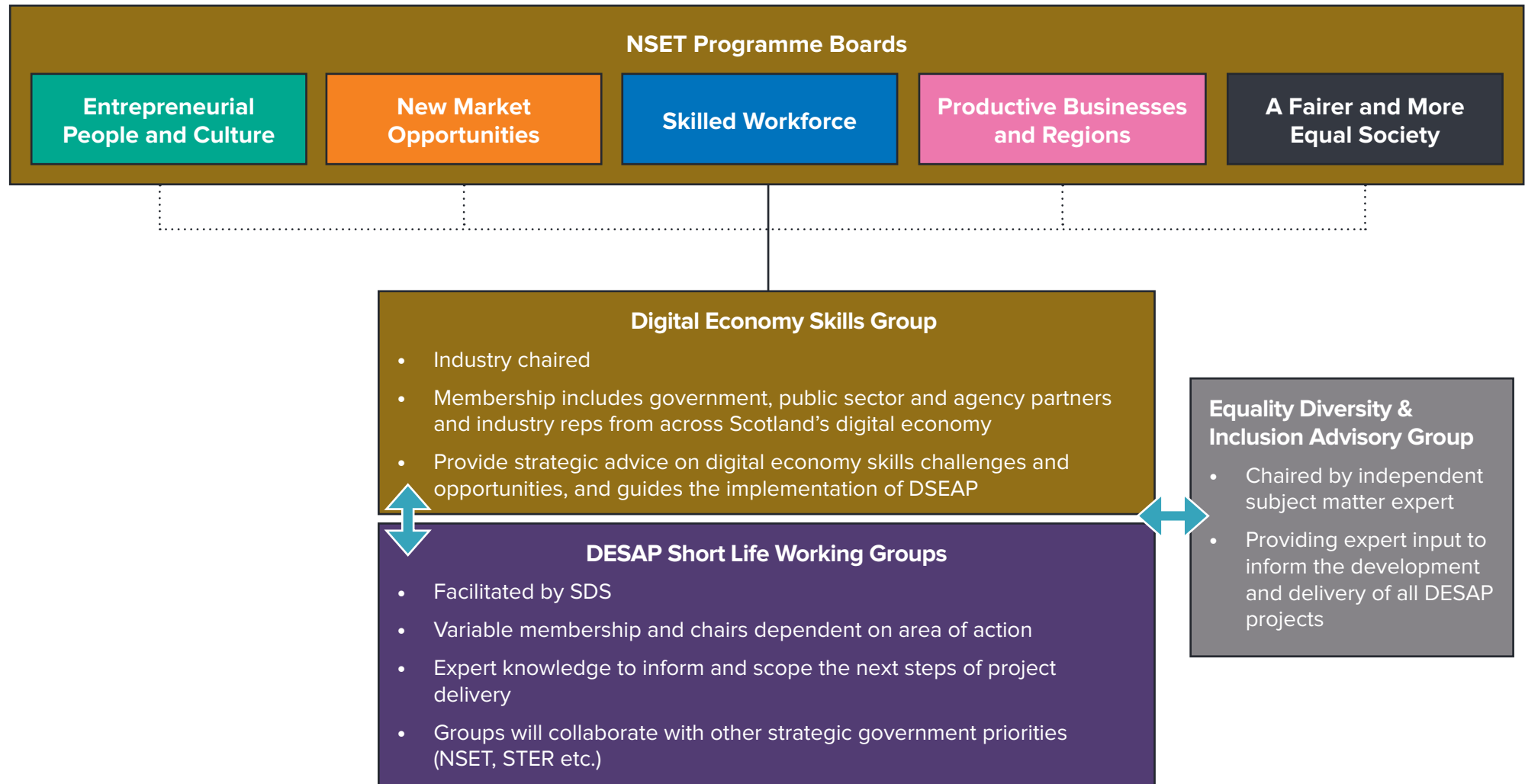
### Operational DESAP Implementation

SDS will work with the Digital Economy Skills group to agree detailed annual implementation plans for DESAP. This will be accompanied by a monitoring and evaluation framework for the first year of DESAP delivery. The NSET Skilled Workforce Programme Board will review this operational plan and monitor progress.

The implementation of DESAP will be supported by establishing Short Life Working Groups bringing in the expert knowledge and skills to execute the individual actions.



## DESAP Governance



## DESAP Guiding Principles

**Build on existing activity** – government, public agencies, education, and industry have already developed some excellent partnerships to address digital economy skills issues, and there are multiple interventions already delivering positive results. Where possible DESAP actions will first build on these successes to avoid duplication and to maximise impact and resources.

**Collaborative** – the implementation of DESAP must be a collaborative process which engages a wide range of stakeholders who can support the skills ambition of a Digital Scotland. DESAP should take this ethos further and create a development and delivery culture which is based on inclusion, co-production, and collaboration. This will mean bringing in organisations and individuals who have expert knowledge and experience in how barriers for under-represented groups can be addressed to allow for meaningful participation in the digital economy.

**Adaptive and agile** – whilst the DESAP action plan has been designed to be future proof by primarily focusing on structural actions which are sector and discipline agnostic, it is recognised that the digital economy and its skills needs moves quickly and therefore the action plan may need to be reviewed and refined within its five-year life cycle. To achieve this, SDS and the Digital Economy Skills Group will undertake an annual review of progress and assess whether actions remain fit for purpose.

## Glossary

<b>AI</b>	Artificial Intelligence	<b>GA</b>	Graduate Apprenticeship	<b>SE</b>	Scottish Enterprise
<b>BAME</b>	Black, Asian, and Minority Ethnic	<b>GTCS</b>	General Teaching Council of Scotland	<b>SoSE</b>	South of Scotland Enterprise
<b>CIAG</b>	Careers Information, Advice, and Guidance	<b>GVA</b>	Gross Value Added	<b>SICSA</b>	Scottish Information and Computing Science Alliance
<b>CDN</b>	College Development Network	<b>HE</b>	Higher Education	<b>SCA</b>	Scottish Cities Alliance
<b>CESAP</b>	Climate Emergency Skills Action Plan	<b>HIE</b>	Highlands and Islands Enterprise	<b>SFC</b>	Scottish Funding Council
<b>DESAP</b>	Digital Economy Skills Action Plan	<b>ILG</b>	Industry Leadership Groups	<b>SIS</b>	ScotlandIS
<b>DYW</b>	Developing the Young Workforce	<b>JISC</b>	Joint Information Systems Committee	<b>SME</b>	Small and Medium Sized Enterprises
<b>DXF</b>	Digital Xtra Fund	<b>LA</b>	Local Authorities	<b>SQA</b>	Scottish Qualifications Authority
<b>E, D &amp; I</b>	Equality, Diversity, and Inclusion	<b>LMI</b>	Labour Market Intelligence	<b>SG</b>	Scottish Government
<b>ES</b>	Education Scotland	<b>MA</b>	Modern Apprenticeship	<b>STACS</b>	Scottish Teachers Advancing Computer Science
<b>ESIF</b>	Education and Skills Impact Framework	<b>NSET</b>	National Strategy for Economic Transformation	<b>SDI</b>	Scottish Development International
<b>FA</b>	Foundation Apprenticeship	<b>MyWoW</b>	My World of Work	<b>SOAG</b>	Single Outcomes Assurance Group
<b>FE</b>	Further Education	<b>PACE</b>	Partnership Action for Continuing Employment	<b>STER</b>	Scottish Technology Ecosystem Review
<b>FWDF</b>	Flexible Workforce Development Fund	<b>RSS</b>	Resource Spending Review	<b>WBL</b>	Work Based Learning
		<b>SDS</b>	Skills Development Scotland		



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