Digital Health & Care Innovation Centre

Mapping Policies relating to the digital transformation of health and care sector and the associated workforce skills and capabilities in Scotland and the UK

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Introduction

The Digital Health and Care Innovation Centre (DHI) has been a long-term advocate for increasing the provision of digital health and care skills training and education in Scotland.

The centre has produced several research documents and projects identifying skills and capability gaps in the sector, recommending changes to address them, as well running a digital health MSc scholarship programme to promote postgraduate skills development in Scotland's digital health and care sector.

Over the last year (2020-21), both the Scottish and the UK Governments have placed greater emphasis on expanding and improving the provision of digital skills and capabilities across all economic sectors. This is predicated on the growing skills gap as well as skills shortage that is inhibiting expansion of the entire digital technology sector, and in turn, of the digital health and care sector.

 The impact of COVID-19 on the national and global economies has seen an increase in the rhetoric surrounding the growth of current digital skills provision and the development of novel methods for training and education for these.

The DHI, with a vast network of partners, are in the process of developing a National Campaign to address future workforce development questions in digital health and care. The work will include a campaign to raise awareness of the sector, create new educational pathways and opportunities and a pipeline of talent feeding into it.

This work will focus on two broad categories of staff, as illustrated in the diagram below: first, we will work on creating a pipeline of talent leading to roles in the specialist digital health and care sector, and second, addressing the digital preparedness of the future frontline health and care staff working in the sector going through a digital transformation.

The destination that the digital health and care specialist staff will work can be in the public, private or the third sector. Each of these sectors require digital health and care professionals, but the types of roles vary. Where the public sector needs more informaticians and data analysts, the private sector is in need of software developers and engineers.
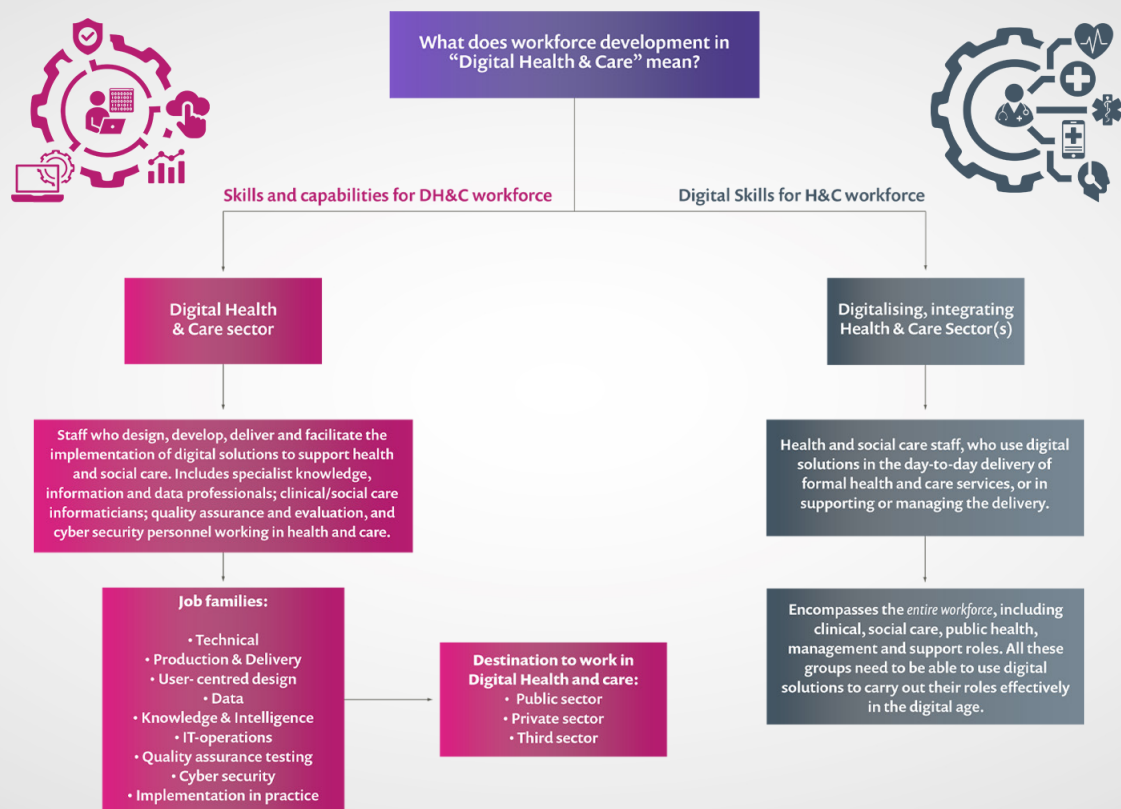
Diagram 1. Depiction of the distinction between workforce in the digital health and care sector and those working in the health and care sector that is going through a digital transformation.

Accordingly, ScotlandIS suggest that 75% of tech employers struggle to recruit qualified digital staff [1]. This coincides with a 31% reduction in computing education generally and a high drop-out rate of computer science undergraduates [1, 2]. ScotlandIS also reports that Scotland has approximately 13,000 new digital job opportunities annually, but there are only 5,000 home-grown graduates and apprenticeships being produced by HE and FE now [1, 3].

HEE Digital Readiness Programme projects a 69% increase in demand for digital and data specialists as part of NHS in England [4]. It is fair to say there is likely to be a proportionately similar demand at NHS Scotland. At the same time, as the demand grows for staff with specialist digital skills, the digital transformation is also affecting the nature of work for the frontline health and care staff, a development accelerated by the rapid adoption of digital tools during the Covid-19 pandemic.

This document presents a review of relevant Scottish and UK strategies, policies, frameworks, and action plans to form a strategic case of support for this programme of work. It will first make the case for the need of a digital workforce in terms of employment figures, and then lay out the different strategies, whose work the National Campaign plan supports.

The summaries have been grouped under the three headings of:
• Projections for workforce demand,
• Scotland's digital strategies, and
• Core governmental documents.

These sections are accompanied with their own individual relationship trees that attempt to order the policy documents in terms of level of influence over each other. For example, the Digital Strategy for Scotland supersedes all technology related policy documents, but not policies relating to Health and Social Care that have their own digital strands (the ranking of documents is represented through colour coding). The policies within these trees will subsequently be summarised with a focus on their aims, objectives and/or intended impact with regards to workforce development and the necessary skills and capabilities in Scotland and the UK for the future workforce both in the digital as well as the digitalising health and care sectors. These documents demonstrate the political backing – UK-wide, nationally, and regionally – for the work of the Digital Health and Care Talent Pipeline project.

Projections for Workforce Demand

SDS Sectoral Skills Assessment: Digital (2021)

SDS Sectoral Skills Assessment: Social Care (2021)

SDS Sectoral Skills Assessment: Health Care (2021)

Independent review of Adult Social Care (2020)

Need for digital and data professionals by the NHS England: Data-Driven Healthcare in 2030 (2021)
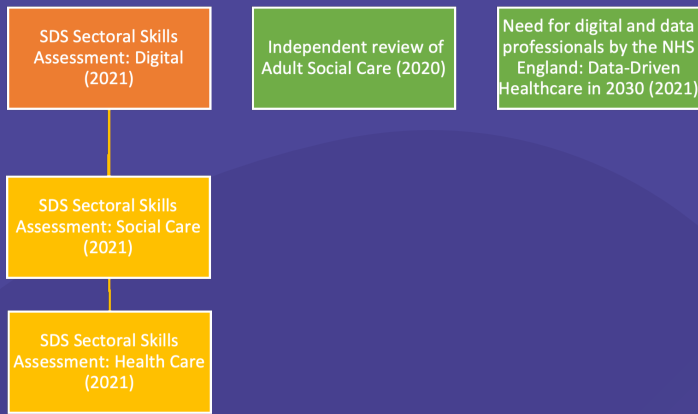
This section reviews different documents highlighting the need for digital, healthcare, social care and digital health and care workforce. Skills Development Scotland (SDS) carries out annual Sectoral Skills Assessments. The three most relevant to the strategy review are the Digital, Health Care and Social Care assessments. These predict an increased staff need for all three areas.

Scottish Government has carried out An Independent Review of Adult Social Care (2021), which proposes a thorough transformation of the social care workforce working conditions, education and organisation, as well as setting up a National Care Service (NCS) [5].

While the review does not touch upon the art of the possible that digital offers for transforming the social care services, with current direction of travel, it will be impossible to do that without the digital element. That, in conjunction with setting up a NCS, will create a need for specialist digital workforce at scale also for the social care.

Health Education England (HEE) Digital Readiness Programme (2021) has released a report looking at the need for digital technology and health informatics workforce for NHS England, predicting a 69% growth of specialist digital and data workforce by 2030 [4]. Similar trends can be expected in Scotland.

SDS Sectoral Skills Assessment (2021): Digital

- SDS (2021) SDS Sectoral Skills Assessment: Digital. Accessed from: https://www.skillsdevelopmentscotland.co.uk/media/47420/digital-ssa.pdfs

In 2020, the digital workforce in Scotland comprised 82,000 people (an increase of 2.1% on the previous year). However, across the whole Scottish economy, there are believed to be more than 100,000 people employed as digital technology professionals, representing 4% of the total workforce [6].

This number is expected to increase further over the next few years, with forecasts for the mid-term (2020-2023) suggesting that there could be some jobs growth and opportunities created as a result of the need to replace workers leaving the labour market due to retirement and other reasons. 40% of digital professionals are employed in tech businesses with the other 60% being employed across other parts of the economy [6].

Longer-term vision (to 2030) forecasts strong jobs growth in the digital sector, with an estimated 13,000 new people needed to work in the digital tech sector in Scotland each year [6].

Tech businesses have played an important role in the Covid-19 pandemic and have experienced increased demand for cloud services, digital connectivity, remote working and digital health data and solutions. There has been a shift from the traditional role of tech as a business support service to an integral part of business functions, making it an increasingly essential part of day-to-day operations, and tech is supporting recovery in a range of sectors, helping businesses adapt and diversify to the new economic environment [6].

Whilst there is an employer demand for more re-skilling opportunities to support career changers into tech roles – and a demand across all sectors and roles for employees to have more sophisticated digital technology skills, there is an increasing interest for individuals with blended skillsets, and a continued importance on cyber resilience skills for all [6]

SDS Sectoral Skills Assessment (2021): Healthcare and Social Care

- SDS (2021) SDS Sectoral Skills Assessment: Health Care. Accessed from: https://www.skillsdevelopmentscotland.co.uk/media/47427/health-care-ssa.pdf
- SDS (2021) SDS Sectoral Skills Assessment: Social Care. Accessed from: https://www.skillsdevelopmentscotland.co.uk/media/47436/social-care-ssa.pdf

In 2020, the healthcare workforce in Scotland comprised 246,900 people (an increase of 1.6% on the previous year), with social care workforce reaching 188,800 employees (a similar increase) [7, 8]. Together, the two sectors employ 435,700 people. The health and social care sectors have continued to recruit during the pandemic period, and employment levels are expected to increase in the short to medium term. From September to December 2020, it was estimated that the health and social care sector was the largest sector in terms of vacancy level (121,000), accounting for more than 22% of all vacancies across the UK [7, 8].

This number is expected to increase further over the next few years, with forecasts for the mid-term (2020-2023) suggesting that there could be some jobs growth and opportunities created as a result of the need to replace workers leaving the labour market due to retirement and other reasons [7, 8].

Longer-term vision (to 2030) forecasts strong jobs growth forecast in healthcare sector, and it has been estimated that the healthcare workforce will grow by 12,600 new people between 2023 and 2030, with social care workforce expanding by 9,300 new employees in the same period [7, 8]. Pre-COVID, the Scottish Government forecast a 1.3% growth in the NHS workforce and 1.7% growth required in the social care workforce to meet demand for services. This is now expected to be higher over the next 18-24 months as a result of the pandemic. Overall, the health and social care sector has maintained a positive outlook with sub-sectors such as digital health expected to expand rapidly [7].

The pandemic has served to accelerate existing trends, compressing years of change into a few months (e.g., the adoption of video consultations). The unexpected benefits that have materialised suggest that much of this change will persist beyond the pandemic, and harnessing the power of digital tech to change or augment roles, processes and services remains a priority in the medium to long term [7]. A similar trend is expected to apply to social care [8].

Independent Review of Adult Social Care (2020)

- Scottish Government (2020) Independent Review of Adult Social Care. Accessed from: https://www.gov.scot/groups/independent-review-of-adult-social-care/

The Independent Review of Adult Social Care is a comprehensive proposal for reforming social care in Scotland, carried out by the Scottish Government (2020). The review proposes three key changes: shift in paradigm from responding to crises to prevention; strengthening foundations and redesigning the system, which would take the form of creating a "National Care Service". [5]

The report addresses a number of serious considerations relating to workforce: 83% are female, the staff are underpaid, undervalued, and there is a 30% turnover of staff annually. Short-termism in awarding contracts for providers results in wasted resources, poor job-security, and difficulty in retaining staff etc. The sector fails to attract new staff, offers poor career progression and not enough quality training or CPD etc.

At the same time, delivering social care requires high levels of skills and knowledge, but as it is not often recognised as such, which leads to difficulties in delivering quality care. The review proposes adopting a national approach to workforce development, training, recruitment, and pay. However, while naming social care workforce as the top priority for investment throughout the report, there is no mention of service transformation through adoption of digital technologies or consideration how that might impact the required skills and capabilities of the workforce, or what that might mean for the associated training and education provision.

However, if a National Care Service is to be set up, digitalisation of the services will be central to the success of the reform, and that will have implications for workforce development and digital skills training, as well as the demand for the specialist digital staff to develop, support and utilise the digital solutions.

Data-Driven Healthcare in 2030 (2021)

- HEE Digital Readiness Programme. (2021). Data Driven Healthcare in 2030: Transformation Requirements of the NHS Digital Technology and Health Informatics Workforce [Interim report]. https://www.hee.nhs.uk/our-work/building-our-future-digital-workforce/data-driven-healthcare-2030

In March 2021, NHS England released a report describing their scenario for data-driven healthcare, which requires digital transformation and technology-supported organisational change [4]. Underpinning these ambitions is the need for a workforce with the right job roles and specialist skills in health informatics and data, digital, information technology and knowledge-management services.

The report by Health Education England (HEE) Digital Readiness Programme suggests that increase in staffing levels and changes in the composition of the digital workforce during 2020-30 is crucial to achieve this [4]. The report projects an increase of approximately 69%, or an additional 32,000 full-time digital specialist positions to be created in the NHS England by 2030. The table below depicts the projected change in job numbers for the digital specialist staff required to work in NHS in the next 10 years.

The most notable is the demand for Clinical informatics specialists, which is predicted to grow by a whopping 672%, with a 179% increase in demand for Knowledge Management specialists in the same category. The second biggest demand will be for specialists in IT strategy and development at 325%.

Role family	Area of work	Workforce size in 2020 – WTEs	Projected demand in 2030 – WTEs	10-year decrease (-) or increase (+) required – WTEs	10-year decrease (-) or increase (+) required – %
Data architecture	Clinical coding	3,560	3,101	-459	-13%
	Health records	12,610	12,315	-295	-2%
	Information management	8,113	15,961	+7,848	+97%
Technical infrastructure	Information and communications technology	16,407	21,963	+5,556	+34%
Application	Clinical informatics	1,778	13,731	+11,953	+672%
	Knowledge management	788	2,199	+1,411	+179%
Organisational transformation	IT programmes and project management	1,741	4,859	+3,118	+179%
	IT strategy and development	801	3,407	+2,606	+325%
	IT education and training	212	387	+175	+83%
	Total workforce	**46,009**	**77,923**	**31,914**	**+69%**

Table 1: 10-year increase or decrease in workforce size required by area of work, based on demand projections in a Data Driven Future. Source: HEE Digital Readiness Programme (2021), Summary Document, p. 10.

According to the report, these domains are in early stages of becoming crucial functions in NHS trusts, laying the foundations for the NHS to become a data-driven organisation. The reports lists professionals, such as clinician-informaticians, health data analysts, data scientists and clinician bioinformaticians as essential in doing advanced analytics and in improving AI and machine-learning capabilities in use of data. Many of the future in-demand professions require advanced qualifications and knowledge of the health and care domain that the data is being applied to.

The report furthermore suggests that leading up to 2030, there will be a new unit of managers and senior leaders setting up the strategic direction to the NHS, including:

- chief clinical information officers;
- chief nursing information officers;
- chief analytical officers;
- chief data officers;
- chief knowledge officers.

The report lays out the requirement for investment by the NHS in workforce development. The estimated cost to the NHS England with these projected figures is £5.2bn by 2030.

As is the case with digital health sector workforce availability in Scotland, the NHS England is set to face significant recruitment and staff retention issues for staff with digital and data skills. The report suggests giving consideration both to monetary and non-monetary reward factors to driving recruitment and retention.

HEE Recommendations:

1. Workforce planning

   - Develop and sustain an agreed digital technology and health informatics occupational framework in the health and care sector.

   - Focus on the supply factors affecting the NHS digital technology and health informatics workforce and develop an action plan to address the need for an increase in staffing levels.

   - To review the financial reward structures for the NHS digital technology and health informatics workforce with particular attention given to the competitiveness of the labour market in affecting recruitment and retention of staff in the NHS.
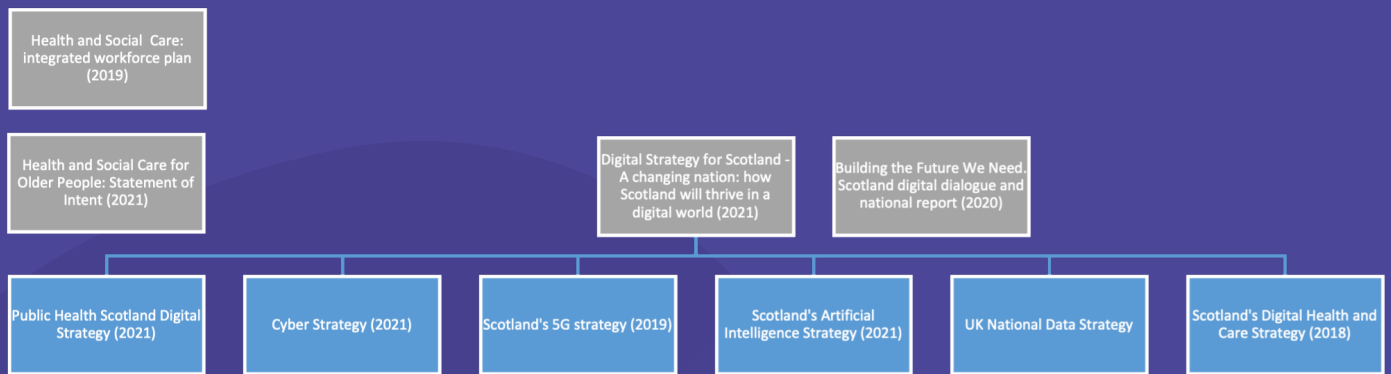
2. Workforce development and professionalisation

- Develop standardised job roles for multi-professional clinicians, including clinician-informaticians, to address the workforce demand anticipated across the depth and breadth of clinical informatics.

- Commission a postgraduate-level programme to develop chief analytical officers and chief data officers, commensurate with the NHS Digital Academy programme of developing the next generation of digital leaders

- Develop a cadre of chief knowledge officers via a commissioned learning programme to meet the demand for senior leadership roles in the knowledge management function of NHS trusts.

- Develop and commission a programme to develop professionals and managers in the field of IT education and training.

3. Workforce supply

- Health Education England to further work with Health Data Research UK (HDRUK) and expand on a programme of under-and postgraduate education in universities to deliver a supply of health data analysts and data scientists into the health and care sector.

- Support the development and retention of ICT professionals in the NHS by setting up a collaborative knowledge and skills transfer programme with public, academic, research, and private sector bodies and employers.

- Continue to expand, evaluate and roll out the HEE Digital Readiness programme-commissioned NHS Graduate Digital, Data and Technology Scheme.

- Develop key roles and a supply of professionals in the area of managing programmes and projects relating to the implementation of digital technology and the introduction of new, technology-supported clinical and organisational processes in NHS trusts.

Scotland's Digital Strategies

Health and Social Care: integrated workforce plan (2019)	
Health and Social Care for Older People: Statement of Intent (2021)	Digital Strategy for Scotland - A changing nation: how Scotland will thrive in a digital world (2021)

Digital Strategy for Scotland - A changing nation: how Scotland will thrive in a digital world (2021)

Building the Future We Need. Scotland digital dialogue and national report (2020)

Public Health Scotland Digital Strategy (2021) · Cyber Strategy (2021) · Scotland's 5G strategy (2019) · Scotland's Artificial Intelligence Strategy (2021) · UK National Data Strategy · Scotland's Digital Health and Care Strategy (2018)

Building the Future We Need. Scotland digital dialogue and national report (2020)

- techUK. (2020). Building the Future We Need. Scotland digital dialogue and national report 2020. https://www.techuk.org/shaping-policy/nations-and-regions/building-the-future-we-need.html

The Scotland Digital Dialogue is a regional report written by techUK [2]. The organisation brought together local leaders from across the public and private sectors on 6 July 2020 to discuss the impact of COVID-19 on Scotland and how digital technology can support a levelled-up recovery. The three recommendations for Scotland are:

- Strengthening local digital capital

- Seizing local growth opportunities

- Innovating to tackle urgent problems

The local digital capital describes the inputs required locally to maximise the benefits of digital. Eight inter-related components, UK-wide, were identified by the participants.

To strengthen digital capital locally, the discussion participants focussed on:

- Digital skills – these need improving; the role of apprenticeships is deemed as important in helping people gain advanced digital skills without a university degree. SMEs and SME leaders need upskilling to advance further digital adoption.

- Connectivity is a key issue especially for rural and disadvantaged communities.

- Importance of data, data skills, privacy, safety and the need to address security weaknesses for many SMEs.

- Better collaboration and coordination between private and public sectors.

Digital sector, and digital health and care, were identified among the key local growth opportunities, along with fintech, green finance, gaming and space technology.

Image 1: The eight elements contributing to local digital capital

Digital Strategy for Scotland (2021)

- Digital Scotland (2021). A Changing Nation: How Scotland will thrive in a digital world. Scottish Government. https://www.gov.scot/publications/a-changing-nation-how-scotland-will-thrive-in-a-digital-world/

Digital technology is transforming every sector, shaping the way in which Scotland seeks to meet the national priorities such as economic recovery, climate change, decarbonisation, well-being and social renewal. The way in which Scotland responds to the impact of technology is the greatest public policy challenge of the modern age.

The Digital Strategy, released in March 2021, sets out the measures that will guarantee Scotland can fulfil its potential in an ever-evolving digital world, with a focus on ensuring Scotland is recognised worldwide as a truly digital nation.

The strategy distinguishes a strong digitally skilled workforce as a key driver to inclusive economic growth, and as fundamental to supporting the digital technologies sector – a high-growth sector - that is key to Scotland's economic recovery. CBI research (p.45) suggests that the adoption of new technologies, including the skills to use them, could grow the Scottish economy by £25 billion by 2030, but realising that requires raising the digital competencies of everyone in Scotland. Already before the pandemic, the demand for skilled employees for digital roles exceeded the offering, restricting the growth of both the digital sector and the wider economy [9].

This assessment applies also to the situation for the specialist digital health and care workforce, as well as those entering jobs in the frontline health and care sector going through the digital transformation. The National Campaign being planned seeks to address the digital skills and capabilities questions both among the future health and care staff as well as staff working in the specialist digital health and care sector.

The Scottish Government is promising to increase the number of people trained in Scotland in advanced digital skills to 10,000 people per year and work with partners to encourage more people, including women, the disabled, neurodivergent people and those from minority ethnic backgrounds, to take advantage of the available digital skills training opportunities, and find ways to enter the digital sector through upskilling and reskilling.

The Digital Strategy for Scotland aligns with the National Performance Framework and lays out the actions to be taken that will realise the goal of a fully digital nation [10]. This includes actions that relate to the development of digital skills training and education across the nation, including[9]:

- The launch of a new Digital Growth Fund to address the current undersupply of digital skills.

- Design key public services in areas such health and social care, justice and social security around the needs of their users.

- Use City and Region deals to maximise the role that digital innovations and infrastructure can play in delivering both economic and inclusive growth.

- Create the conditions in which our digital technologies industries can thrive, working with industry to meet a shared objective to employ 150,000 in digital technology roles over the next 5 years.

- Launch a new digital schools programme, expand the number of school coding clubs and provide teachers with the skills and resources required to use digital to enrich their teaching.

- Work with our schools, employers and skills providers to tackle the persistent gender gap in digital skills and careers.

- Launch a new round of funding for community digital inclusion projects and expand Scotland's Digital Participation Charter to get more organisations involved in a national movement to promote digital skills.

In alignment with the National Performance Framework, the strategy promises to:

1. ensure digital knowledge and skills has a place in education;
2. build a skilled digital workforce;
3. support upskilling and reskilling opportunities;
4. increase diversity in the digital skills pool;
5. establish the Scottish Digital Academy as the skills provider of choice;
6. establish a resource of digital and data experts that the public sector can call upon;
7. create a Data Science Competency Centre.

To support Scottish Digital Technology Sector, the strategy aims to:

1. back and progress the Logan Review's recommendations;
2. attract national and international investment in our tech sector;
3. create a programme of data-driven innovation;
4. establish Scotland as an attractive location for green data centres;
5. capitalise on Scotland's competitive advantage in the growing international market for GovTech;
6. increase diversity in the digital workforce;
7. launch Scotland's AI strategy;

implement the Strategic Framework for a Cyber Resilient Scotland.

These aims, in tandem with promised actions to increase the digital skills talent pool and develop a skilled digital workforce, will help achieve the goals of the strategy. The actions include:

- Increasing the number of people trained in Scotland in advanced digital skills to 10,000 every year.
- Offer continued support for entry into digital roles through initiatives such as the Digital Start Fund that offers digital skills training to those who are unemployed or on a low income.
- Supporting the upskilling and reskilling of the workforce by leveraging National Transition Fund wherever possible.

There are many more actions laid out in the strategy beyond those that are education, training and skills specific, all of which drive towards creating a digital nation with a fully digitally competent workforce and general population.

Scotland's Digital Health and Care Strategy (2018)

- Scottish Government. (2018, April 25). Scotland's Digital Health and Care Strategy—Enabling, Connecting and Empowering. http://www.gov.scot/Publications/2018/04/3526

The Scottish Digital Health and Care Strategy is currently undergoing a refresh following the previous 2018 publication [11]. The Strategy is now being updated to reflect the developments in innovation and partnership working that Covid-19 necessitated. It will also align with the recently published Digital Strategy (2021, see above) and the AI strategy (2021); Logan review published in 2020, the Independent Review of Adult Social Care (2021), as well as the recently published Public Health Scotland Digital Strategy (May, 2021) [5, 9, 12, 13].

The principles of the original strategy (empowering citizens to better manage their health and wellbeing, and the underpinning architectural and information governance building blocks for the effective flow of information, to enable this) will continue into the refreshed strategy. However, it will also set out the new structure for digital health and care to be dictated by the Scottish Government in the near future.

The refreshed strategy will embed the premise that to empower and enable citizens to better manage their health and care, live independently and gain access to services through digital means, delivery of integrated care is vital. The strategy will also have a greater emphasis on data, ethics, human rights, digital maturity, workforce capacity and procurement.

All of these changes will have an inevitable skills-component embedded within them, the actions in relation to digital education, training and skills for the sector will likely be mirrored in the various strategies it seeks to align with.

Public Health Scotland Digital Strategy (2021)

- Public Health Scotland. (May, 2021). Public Health Scotland Digital Strategy. Public Health Scotland. https://publichealthscotland.scot/our-organisation/digital-strategy-summary/ accessed 4th June 2021

Public Health Scotland (2021) have published their first digital strategy, whose vision is to ensure communities across Scotland can flourish through maximising the power of digital and data [14]. The organisation seeks to be data and intelligence led, focussed on outcomes, be trustworthy, and operate on local, regional and national levels, being a collaborative leader.

The strategy introduces four key priorities, which are to be achieved through three key enablers. Looking at this from the workforce development point of view, each key priority and enabler is under-pinned by the availability of digitally skilled workforce. The aims of the National Campaign align well and partially overlap with the ones listed out below.

Key digital priorities [14]:

1. Engage and empower the public.

2. Actionable insight across the public health system.

3. Leading digital collaboration.

4. Accelerate digital innovation in the public health system.

Key digital enablers:

1. Closing the data gap across the public health network.

   - Includes the aim to develop "greater and more advanced specialist capability and capacity", especially in advanced data analytics and data science, Artificial Intelligence, automation and machine learning, in order to enable the PHS to engage in data driven innovation across the public health system and to maximise the impact of public health outcomes.

2. Developing joined-up, scalable, adaptable and easy to use IT-solutions.

   - The creation of a comprehensive, modern and well-functioning digital public health infrastructure assumes the availability of sufficient numbers of software developers, engineers and architects, UX designers etc. and other digital specialists.

3. Building a skilled and connected workforce operating with a digital-first culture.

   - Delivering the kind of digital transformation as described in the document requires creating a "clear and unified digital culture". The strategy proposes three cross-organisational opportunities related to workforce development:

     i. getting the "right people" in place to create the desired type of digitally supported organisation;

     ii. having "right skills" available in the organisation, either through recruitment or upskilling and reskilling of existing employees in digital working; and

     iii. developing the right workplace culture that will embrace and support digital ways of working.

   - To materialise the aims for the "workforce enabler" include developing a digital culture, assessing the relevant skills needs around the different parts of the organisation, and developing a "Learning Academy" for digital and data, which includes access to training materials, certifications and support; developing career pathways for digital and data profession, and to create a digital and data community that will shape training development needs, share ideas and learning with partners.

Health and social care: integrated workforce plan (2019)

- NHS Scotland (2019) Health and social care: integrated workforce plan. Accessed from: https://www.gov.scot/publications/national-health-social-care-integrated-workforce-plan/

The 'health and social care: integrated workforce plan' (2019), issued by NHS Scotland, focusses on effective workforce planning to achieve safe, high quality and affordable health and social care services for Scotland [15]. Using lessons learned in previous national workforce plans, the integrated workforce plan acknowledges the need for robust data and intelligence on the highly skilled workforce.

The plan recognises digital skills as a necessity moving forwards. While predominantly focussing on the standard skills of the health and social care workforce, the plan sets out how the sector will enable its workforce to develop the necessary digital skills to take full advantage of the growing role of technology in the delivery of health and care.

The plan aligns itself with the Digital Health and Care Strategy, see below for further detail, and prioritises four key areas of skill development [15]:

- **Digital Leadership:** Develop the skills required by all staff at all levels to promote digital as an enabler in transforming the sector.

- **Workforce Skills:** Develop digital skills in the general workforce to support the effective delivery of services that meet the expectations/demand of the patient/service users.

- **Workforce Skills (specialist):** Develop skills within specialist digital roles (plan likens this to ICT staff) to deliver digital solutions and services in health and care services.

- **Future Workforce:** Develop skills that are required and shaped by the current transformation of services, again in line with user expectation/demand.

Further to this, the plan highlights the work of NHS Education Scotland (NES) and Scottish Social Services Council (SSSC) (working with COSLA and various Health and Social Care Partnerships) in supporting the implementation of digital skills provision in the health and social care environment, helping to provide leadership in this area. This work includes [15]:

- Partnering with the Scottish Government's Digital Academy, to improve access to high quality digital skills training.

- Developing digital leadership skills through collaboration with the NHS Digital Academy and similar bodies.

- Working with higher and further education to ensure that digital skills are an integral part of the education and the training of our future workforce.

- Building capacity and capability across specialist digital, IT and data professions.

- Promoting existing and new solutions to enable more agile and flexible working.

- Identifying solutions that bring the most modern of technologies into the sectors business and administrative requirements, freeing up staff capacity to focus on frontline services.

- Providing productivity and collaboration services and tools to support improved and secure ways for working across organisational boundaries.

Health and Social Care for Older People: Statement of Intent (2021)

- Scottish Government (2021) Health and social care for older people: statement of intent. Accessed from: https://www.gov.scot/publications/health-social-care-older-people-statement-intent/

The Scottish government's statement on intent, published in March 2021, does not provide direct policy or actions regarding digital skills training and provision [16]. However, it does lay out the foundations for the future of health and social care for older people that will require a more digitally literate and skilled workforce that can meet the future expectations of the sector. If the aforementioned actions in the integrated workforce plan are carried out, the sector will meet its own intended outcomes for service delivery [16].

Cyber Strategy (2021)

- Scottish Government (2021) Cyber Resilient Scotland: Strategic framework. Accessed from: https://www.gov.scot/publications/strategic-framework-cyber-resilient-scotland/

Cyber Resilient Scotland: Strategic framework' (2021) builds upon the Scottish Government's first cyber resilience strategy (published in 2015) expanding on its achievements and tackling new and ongoing challenges.

The overarching vision of the strategy is that "Scotland thrives by being a digitally secure and resilient nation" [17].

Digital technologies are critical to the functioning of society and the economy, and this new Framework recognises that cyber resilience is not simply an 'IT issue', but rather the very backbone to the country's operational resilience and business continuity – and to its capacity to grow and flourish as it adapts to increasing demands of operating online [17].

The Framework focuses on four outcomes [17]:

1. people recognise cyber threats and are well-prepared to manage them;

2. businesses and organisations recognise the cyber risks and are well-prepared to manage them;

3. digital public services are secure and cyber resilient; and

4. national cyber incident response arrangements are effective.

Cyber resilience is more than making technologies and systems secure. It is about how prepared people are to meet cyber risk, and how well-equipped they are to withstand, and defend against, manage, recover quickly, and learn from cyber incidents. Features of cyber resilience include [17]:

- Knowledge and awareness of risk and threat.

- Access to guidance, tools and resources.

- Understanding policy and processes.

- Learning and skills.

- Effective incident management, response, and recovery processes.

One of the key aims of the Learning and Skills action plan is to "[S]upport the development of accessible cyber security skills training pathways and effective careers guidance to help ensure that skills supply meets demand".

As new technologies and their applications develop and are adopted (for example, the Internet of Things and AI), new threats will emerge, thus driving demand for more advanced and specialist cyber security skills also in health and care.

The national campaign aims to facilitate the creation of more flexible educational pathways and opportunities that will establish a pipeline of cyber security talent attracted to work in the digital workforce in the health and care sector [17].

Scotland's 5G strategy (2019)

- Scottish Government (2019) 5G: Strategy for Scotland. Accessed from: https://www.gov.scot/publications/forging-digital-future-5g-strategy-scotland/

The 5G: Strategy for Scotland (2019) sets out the Scottish Government plans for the rollout of 5G technology. The Scottish Government's aspiration is to establish the whole country as a leading 5G digital nation, by establishing 5G as a dominant connectivity force.

The strategy highlights the importance of mobile connectivity not just for individuals, but in how it can benefit a range of sectors where Scotland already has a leading edge – such as transport, education, public service delivery, energy, agriculture, and aquaculture – and healthcare.

Hospitals, medical research facilities and community health clinics employ approximately 170,000 people, and will benefit from 5G around the country. These potential use cases could transform the way services are delivered by driving national productivity, delivering efficiencies, and improving the consistency and reliability of the user experience [18].

5G technology could provide easier access to healthcare for people, wherever they live in the country. It has the potential to drive efficiency and patient engagement, as well as inclusive access to treatment in Scotland's rural and remote areas [18].

The features of 5G technology are valuable in many areas of healthcare including telehealth, remote surgery, transferring large medical files, tracking patient movements inside facilities, using wearable devices for real-time monitoring, and delivering continual treatment information and support to patients.

Current initiatives in Scotland include Fit Homes, using in-home sensors to monitor patient health, and use of IoT to monitor hospital beds and automate maintenance [18].

An accelerated rate of digital transformation may only be achievable by improving awareness and understanding of 5G, meaning an increase in skills provision is a necessity to take advantage of this and many more emerging technologies.

Scotland's Artificial Intelligence Strategy (2021)

- • Digital Scotland (2021) Scotland's Artificial Intelligence Strategy. Accessed from: https://www.scotlandaistrategy.com/

The AI Strategy (2021) outlines how the country can unlock the social and economic benefits of AI, exploring how the technology can be used to create positive impact, and the Scottish Government plans to establish Scotland as a global leader in ethical and inclusive AI [12].

The strategy will ensure that AI-driven technologies are "used for positive effect across the economy and society" and "highlight the opportunity to become a world leader in ethical AI" [12].

The AI strategy is expected to complement Scotland's digital strategy (an updated version of which was also published in March 2021) [12].

One of the key objectives of Scotland's AI Strategy is to reinforce the nation's existing AI ecosystem: developing a skilled and diverse workforce, supporting organisations to be innovative and providing the right investment.

The strategy identifies that "Partnership working can make this happen by creating the necessary skills, data infrastructure and access to funding, and influencing national and international policy and regulation to enable AI technologies to thrive in Scotland." [12].

A key focus of the strategy is cultivating a more mature AI ecosystem in Scotland, along with "reinforcing" the existing players and stakeholders. To achieve this, the strategy recommends a strong emphasis on developing a more skilled and diverse workforce [12]. Emerging technologies (like AI) and data are further driving demand for more specialist technology skills.

UK National Data Strategy (2020)

- GOV.UK (2020) National Data Strategy. Accessed from: https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy

The National Data Strategy (2020) sets out the best way to utilise data for the UK, building on the industrial strategy, AI review and the R&D Roadmap. The strategy outlines a framework for how the UK will approach and invest in data to strengthen the economy and develop future opportunities [19].

The strategy establishes the governments approach, the improvements aimed to be delivered and the priority missions required to achieve them. It includes a UK-wide consultation on the general framing, and actions being considered.

The strategy emphasises the opportunity of data creating jobs and opening new markets for a highly skilled workforce, while also benefiting the individual by providing insight and bringing change to their health, financial and overall/daily behaviours [19].

The opportunities presented in the strategy include [19]:

- Growth
- Jobs
- Public Services
- Research
- Society

The actions or missions are [19]:

- Unlocking the value of data across the economy.
- Maintaining a pro-growth and trusted data regime.
- Transforming government's use of data.
- Ensuring the security and resilience of data infrastructure.
- Championing the international flow of data.

These actions are aligned with the pillars of effective data use [19]:

- Data Foundations: improving the quality of data its formatting.
- Skills: to better use of data, we require a wealth of skills, which mean delivering said skills through our education system while ensuring continued professional development for data skills through an individual's life.
- Availability: encourage better coordination, access to and sharing of data for the right quality between organisations across all sectors.
- Responsibility: ensure that data is used responsibly.

Skills: Data skills for a data-driven economy and data-rich lives

Businesses are more likely to be competitive in today's digital-driven economy if they can use data effectively. Likewise, data-literate individuals are more likely to benefit from and contribute to the increasingly data-rich environments they live and work in, while data-driven companies can deliver significant productivity benefits to their own business and the wider economy [19].

The need for data skills is growing across the economy, having tripled since 2013. Additionally, data analysis skills will be the fastest growing digital skills cluster by 2025.

Consultation with data experts identified several challenges [19]:

- A lack of coordinated vision and leadership across multiple industry interests.
- Greater clarity needed in describing data skills required by industry.
- Need for formal and vocational education systems to better prepare school leavers.
- Industries need to develop an understanding of their own data skills needs.
- There is a limited pool of data-skilled individuals nationally.

To address these challenges the government aims to [19]:

- Publish a working definition of data skills for the wider economy to distinguish the differences between data, digital and data skills.

- Work with the appropriate bodies to understand how data science is integrated into relevant technical qualifications, ensure that good quality data science courses are offered and that data related skills are given due consideration in their work to support emerging skills.

- Test the most effective ways to teach foundational data skills to undergraduates in two ways – through offering modules including wider subjects such as AI, cyber and digital skills, and by integrating data skills in other subject areas. Universities will take part in the pilot on a voluntary basis.

- Examine ways of expanding the supply of advanced data skills across research engineers and professionals to help maximise R&D investments and to increase mobility across business and academia and to foster the links between industry and universities at the regional level; this work will build on the interim observations of the UKRI AI Review, which highlights the critical shortage of data capabilities in research professionals across all disciplines.

- Post 16T levels are being developed to deliver on the skills needs of employers, these include qualifications for digital skills.

- Further measures will be announced as part of the Digital Strategy and through the National Skills Fund.

- Recruit leaders with data and digital skills across government to build a strong cadre of technical, policy, legal and analytical data experts in the centre of government.

- Test the most effective ways to teach foundational data skills to undergraduates in two ways – through offering modules including wider subjects such as AI, cyber and digital skills, and by integrating data skills in other subject areas. Universities will take part in the pilot on a voluntary basis.

Core Governmental Documents

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The Government's
Programme for
Scotland (2020-2021)
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├── Logan Review - Scottish technology ecosystem: review (2020)
├── Scotland's Economic Action Plan (2019)
│   └── Scotland's Future Skills Action Plan (2021)
└── Scotland IS Industry Technology Survey (2021)
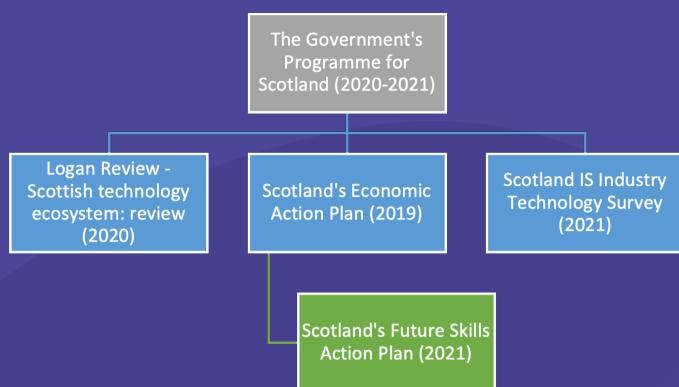
The Government's Programme for Scotland 2020-2021

- Scottish Government (2020) Protecting Scotland, Renewing Scotland: The Government's Programme for Scotland 2020-2021. Accessed from: https://www.gov.scot/publications/protecting-scotland-renewing-scotland-governments-programme-scotland-2020-2021/

The Programme for Government sets out the actions we will take in the 2020-2021 period in Scotland. This includes the legislative programme for the current parliamentary year. The programme references the economic impact of COVID-19 and reaffirms the government's commitment to achieving net zero carbon emission by 2045. The government's programme connects these challenges and the opportunities they present by committing to [21]:

- A national mission to create new jobs, good jobs and green jobs – with a particular focus on young people, supporting retraining and investing in the Scottish Green New Deal to tackle climate change.

- Promoting lifelong health and wellbeing – by tackling COVID19, remobilising and reforming the NHS and social care and tackling health inequalities.

- Promoting equality and helping our young people fulfil their potential.

The commitments relating to education, training and workforce development for "new, good and green jobs" for digital or health and care include [21]:

- A £60 million Youth Guarantee, so every young person aged between 16 and 24 will be guaranteed an opportunity at university or college, an apprenticeship programme, employment including work experience, or participating in a formal volunteering programme. This will be backed by additional funding for apprenticeships and the new Job Start Grant.

- An initial £25 million National Training Transition Fund to provide retraining opportunities for people who have lost their jobs or are at risk of doing so.

- Create a £100 million Green Jobs fund, investing alongside a range of sectors – such as manufacturing, tech, and land-based organisations – to support new and increased opportunities for green job creation across Scotland.

- A new Inward investment strategy, to give people new skills, and attract investment and jobs into Scotland, with the potential to generate 100,000 high value jobs over the next decade.

- Invest £1.5 million in the next phase of the Unlocking Ambition programme, which provides grant and specialist wraparound support for early stage, growth potential businesses, with a new focus on low carbon and economic recovery.

- Steadily increase Scotland's annual infrastructure investment until it is £1.5 billion higher by the end of the next Parliament than in 2019-20.

- Work with trade unions and employers to pioneer new ways of embedding fair work practices in all workplaces. We will also tackle the discrimination and unfair practices towards minority ethnic people.

- Doubling the Flexible Workforce Development Fund to £20m – enabling employers to access up to £15,000 each to address skills gaps in their workforce.

- Establishing a national network of world-class start up incubators, "Tech Scalers", with the aim of creating and supporting between 300 and 500 high quality start-ups over the next 5 years.

- Commit an additional £23m this year to help more digitally excluded people get online – providing both devices and internet connections. This will bring the total number of people supported to 50,000 by the end of the year.

Entries relating to forestry, oil and gas, banking, construction etc. are omitted from the list.

Regarding promoting health and wellbeing the programme commits to [21]:

- Scale up access to digital care – for both physical (Near Me video consultations) and mental health (Cognitive Behavioural Therapies) care

For promoting equality and helping our young people fulfil their potential, the programme commits to [21]:

- Ensure our young people catch up on any lost education due to Covid19 with £135 million additional investment. This will include funding to recruit 1400 additional teachers and 200 support staff and help close the poverty related attainment gap

- Support children to learn online through the provision of 25,000 chromebooks

- Allocate £3 million to support young people to engage in youth work activities

While not all the actions present direct points of alignment between the programme and our business case, it showcases a wealth of investment in restimulating the economy. The main points relevant to the National Campaign relate to addressing the digital skills gaps across all aspects of health and social care; emphasis on scaling up of digital care;Investing in supporting tech start-ups and entrepreneurialism; supporting reskilling and upskilling of people left unemployed by Covid-19; offering fair wages and supporting employers in upskilling their staff; investing in the education of younger generations and the digitally excluded;

Investing in supporting tech start-ups and entrepreneurialism; supporting reskilling and upskilling of people left unemployed by Covid-19; offering fair wages and supporting employers in upskilling their staff; investing in the education of younger generations and the digitally excluded; supporting the development of the digital health and care sector, and outlines policies in early learning that align with our plan to engage with younger audiences.

Scotland's Economic Action Plan (2019)

- Scottish Government (2019) Economic Action Plan 2019-20. Accessed from: https://economicactionplan.mygov.scot/

The Economic Action Plan 2019-20 is based around the 3Rs (Resilience, Recovery and Restructuring), and it lays out the national actions to be taken in regard to national investment, enterprise, international trade and investment, innovation, skills, regional actions, people and sustainability [20].

The plan lays out a series of actions that were to be taken over the course of the last parliament to address specific policy areas for the Scottish Government. This action plan directly addresses investment into national skills development, which include a number of actions that directly align with the plan for the National Campaign. These contain funding for developing the young workforce, skills for life, refresh of the Scottish curriculum and establishment of a national retraining partnership [20].

The key actions that relate to digital skills in Scotland include:

- **Skills**

  - Providing £16.1 million to deliver intensive employability support for low-income parents to access and progress in employment, supporting them to address barriers and upskill.

  - Delivering a refreshed narrative for Scotland's curriculum with a strong emphasis on skills for life, learning and work.

  - Investing £750 million during this Parliament to tackle the attainment gap and ensure every child has an equal chance to succeed.

  - Continuing to deliver the Developing the Young Workforce (DYW) Programme, Learner Journey Review and STEM (Science, Technology, Engineering and Maths) Education and Training Strategy.

  - Investing £214 million in Skills Development Scotland.

  - Creating 30,000 Apprenticeships by 2020, developing Apprenticeship pathways through Foundation, Modern, and Graduate Apprenticeships.

  - Establishing a National Retraining Partnership

- **People**

  - Delivering on actions from Scotland's Fair Work Action Plan, our Future Skills Action Plan and Skills Action Plan for Rural Scotland.

Scotland's Future Skills Action Plan (2021)

- Scottish government (2021) Scotland's Future Skills: Action Plan – Phase Two. Accessed from: https://www.gov.scot/publications/scotlands-future-skills-action-plan/pages/12/

The Future Skills Action Plan provides a framework to demonstrate the development and re-focus of Scotland's skills system [22].

The plan focuses on four themes:

- increasing system agility and employer responsiveness;

- enhancing access to upskilling and retraining opportunities;

- ensuring sustainability across the skill system; and

- accelerating the implementation of the learner journey review.

Key actions include:

- Increasing our investment in workforce development to £20M per annum from 20/21, building on the current £10M Flexible Workforce Development Fund.

- Addressing skills gaps and shortages as a central part of the Scottish Government's response to the UK's departure from the European Union.

- The National Manufacturing Institute Scotland (NMIS) Manufacturing Skills Academy - development of a catalogue of advanced manufacturing modules, which cater to and recognise a range of industry needs across the sector.

- Skills Development Scotland, the Scottish Qualifications Authority and the Scottish Funding Council will develop and promote a clear definition of meta-skills - the timeless, higher-order skills that create adaptive learners, and fully implement the joint 5-stage skills alignment planning model.

- Continuing to support the industry-led Developing the Young Workforce Employer Groups.

- Identifying opportunities to enhance access to upskilling and reskilling opportunities through the Scottish National Retraining Partnership in conjunction with the CBI and STUC.

- As part of the £1.3 billion funding made available to City and Growth Deals, building on work to develop and deliver skills investment plans in each region.

The plan seeks to increase system agility and employer responsiveness and increase the number of opportunities for upskilling and retraining. The plan states that the government expects more FE and HE courses to be delivered to those in work, with course content co-designed with employers, as well as seeking to ensure a sustainable skills system in Scotland. These aims align with those of the national campaign seeks to realise as well.

Scottish Technology Ecosystem Review (2020)

- Logan, M. (2020). Scottish Technology Ecosystem review. Scottish Government. https://www.parliament.scot/S5_ EconomyJobsFairWork/General%20 Documents/20200827-Logan_Review.pdf

The Logan review, or the Scottish Technology Ecosystem review (2020), examines how Scotland's tech sector can contribute to the country's economic recovery after Covid-19 pandemic. The recommendations of the review primarily concern stimulating and accelerating the maturity of Scotland's Technology Ecosystem, which supports and nurtures technology businesses in Scotland across the spectrum of readiness from start-ups to fully scaled maturity. The output of the ecosystem is designed to increase the number of technology start-ups that reach sustained profitability, with a significant number doing so at scale, thus benefitting the Scottish economic recovery and job creation. [13].

The review outlines three fundamental, mutually dependent supporting areas upon which the performance of the technology ecosystem depends, and which, taken together, accelerate the ecosystem towards its tipping point :

- Education and talent – across all stages of education, including at FE, which is left out of the report, and at the level of supporting start- ups to scale up;

- Infrastructure – including social infrastructure through creating co-location environments for start-ups to support a vibrant tech ecosystem;

- Funding – grants, public funding and stimulation of private funding.

While the recommendations of the review (34 in total) should all be actioned, the most relevant category of recommendations to the campaign is the call for the creation of a Foundational Talent Pipeline. Recommendations in this area concern interventions and improvements across the education spectrum as it relates to the teaching of Computing Science and related disciplines.

The strategy proposes a transformation of Computing Science education at school level, with the principle that the subject must be treated, from 1st year at Secondary School level with the same focus as Mathematics or Physics. It also recommends considerable expansion of extra-curricular support for Computing.

At university level, the strategy proposes specific interventions intended to better equip technical students with international-class start-up skills and to improve the success rate and volume of university spin-outs. It presents several recommendations to swell the size of the overall talent pool in parallel access paths into technology [13].

The review focusses on supporting the technology ecosystem in Scotland, which the specialist digital health and care workforce is a part of. Most of the Scottish digital health and care companies are SMEs, and the sector has scope to grow.

Most of the talent feeding into this sector in Scotland comes from tech and computing background (software engineers, software developers, cyber security architects and administrators, etc.), which is why the recommendations of Logan review resonate well

1"Tipping-point" – the point at which the ecosystem hosts a critical mass of viable start-ups and scale-ups. At this point, positive network effects start strengthening the ecosystem without further intervention being required. The current Scottish ecosystem is identified as being at pre-tipping-point.

Scotland IS Industry Technology Survey (2021)

- ScotlandIS (2021) ScotlandIS Technology Industry Survey 2021. Accessed from: https://www.scotlandis.com/wp-content/uploads/2021/05/ScotlandIS-Survey_FINAL.pdf

The ScotlandIS Technology Industry Survey is a key piece of research informing policymakers in the sector. Findings from the survey allow ScotlandIS to lobby government with evidence-led policy, and the information is also used by individual companies and investors in the digital technologies sector and beyond to inform business and investment decisions [3].

The survey results help ScotlandIS to represent the digital technologies industry better and provide support to members and the wider sector to grow their businesses and thus contribute to Scotland's economic growth [3].

The skill sets identified as most in-demand by industry were sales and marketing, with 82% (down by 4% from 2020) of respondents indicating either a high requirement or some requirement in this area. Data skills were ranked as next most in-demand by two-thirds of respondents, whilst 63% of respondents required software and web development skills [3]. When asked to share the greatest opportunities for their business over the next 18 months, the top three answers related to data analytics, Artificial Intelligence and the Internet of Things. The key growth area of opportunity, which rose from last year, was cyber security, growing from 21% to 23% [3].

ScotlandIS acknowledge that there is a critical shortage of skilled software and IT people in Scotland, which puts securing talent for the future high on their agenda. [3].

Conclusion

The review of the Scottish, and where relevant, the UK, strategy landscape shows strong support for developing Scotland's current education and training provision to boost the development and adoption of digital technologies across all sectors to support restarting the economy and helping it grow. This includes the need for increasing the number of skilled professionals entering the field of digital health and social care, something that the national campaign seeks to advance. The current strategic environment and its specific recommendations form a fertile ground for realising the aims of the campaign. The campaign has the potential to create an immediate and positive impact within both the specialist digital health and care sector, and the health and care sector going through a digital transformation. Raising the profile of the digital health and care sector, creating new and clearer educational opportunities leading into the sector, creating and retaining a pipeline of talent for the sector; and supporting the digital preparedness of the future frontline health and care workforce will help to boost Scotland's economy and industry in a post-Covid world. The proposed campaign will also assist in creating a fairer more equitable health and care service that ensure all citizens can live happy and healthy lives.

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