

ESES City Region Deal IRES Programme

Appendix One

Data Driven Innovation (DDI) Skills Gateway

Project Proposition - FINAL

Approved by Joint Committee on 1 March 2019

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**ACCELERATING
GROWTH**

EDINBURGH AND SOUTH EAST SCOTLAND
CITY REGION DEAL

Data Driven Innovation Skills Gateway Project Proposition

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1 Introduction

1.1 About this Document

This Business Case, following UK Treasury Green Book principles, sets out a detailed case for investment of around £8 million in a targeted Data Driven Innovation (DDI) Skills Gateway, as part of the Integrated Regional Employability and Skills (IRES) programme. It should be considered in conjunction with the IRES Programme Business Case, and alongside the DDI activities being undertaken as part of the Edinburgh and South East Scotland City Region Deal by the University of Edinburgh and Heriot Watt University. Reference is made throughout the document to the City Region – this encompasses the area covered by The City of Edinburgh Council, East Lothian Council, Fife Council, Midlothian Council, the Scottish Borders Council and West Lothian Council.

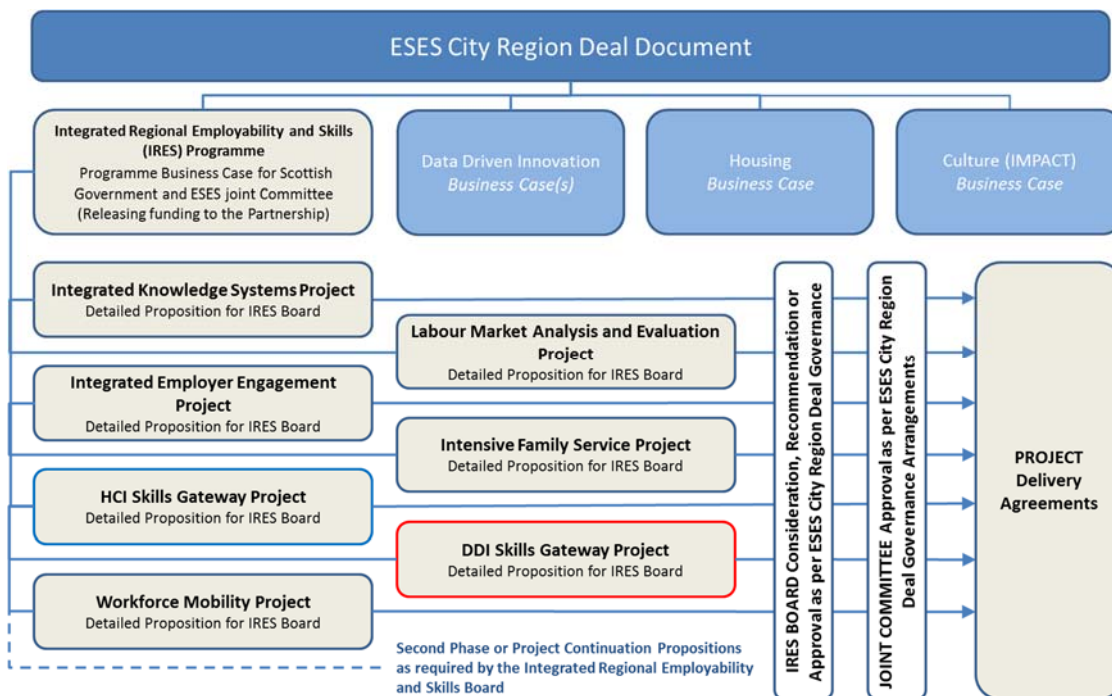


Figure 1: Suite of IRES programme documents

1.2 Project Vision

The DDI skills programme aims to develop a strategic approach to increasing the data skills of the population of the city region, regardless of gender, background or location. The skills activity brings together industry, universities, colleges, schools and other partners to help to develop an integrated pipeline of skills development and progression routes into data careers.

The programme aims to develop *data literacy*, or the ability to derive meaningful information from data. This skillset is not the same as digital literacy, although in practice working with data often requires digital skills such as using analysis software or programming, and improving data literacy is also likely to improve digital

literacy. Because data is so crucial for organisational success, data literacy, and associated meta-skills, are increasingly in demand for all employees.

The complexity of data analysis means that data literacy requires some knowledge of mathematics and statistics, but the skills required go beyond that. It includes the ability to:

- Know what data is appropriate to use for a particular purpose;
- Interpret data visualisations, such as graphs and charts;
- Think critically about information yielded by data analysis;
- Understand data analytics tools and methods and when and where to use them;
- Recognize when data is being misrepresented or used misleadingly; and
- Communicate information about data to people lacking data literacy, an ability sometimes referred to as data storytelling¹.

Where possible references in this document relate to data skills activity, but where this information is not available information on digital skills has been used as a best fit.

1.3 Context: Data Driven Innovation (DDI)

There has been an explosion in the amount of data being generated since the start of the digital age. Today, we create as much data every two days as we did from the beginning of time until 2000.² Advances in storage and machine learning algorithms means that many different types of data can be captured, stored and analysed. The ability to collect all of this data, and use it to advantage across a wide range of areas, sits behind the concept of data driven innovation.

Furthermore, as Artificial Intelligence (AI) systems become better at sorting data, finding patterns, and making predictions, algorithms are undertaking an ever-increasing range of tasks, from processing medical scans, to computing efficient delivery routes, and to tackling more sophisticated problems such as providing legal advice. Increased attention is being paid to the impact of AI-powered automation on jobs and employment, with the 'Intelligence Revolution' predicted to have a significant effect on a range of tasks, meaning that more jobs can potentially be performed by robots and computers. A number of high-profile studies have predicted high levels of job displacement as a consequence of automation across developed economies.

The Centre for Cities Outlook 2018 predicts that 17.5% of the City of Edinburgh's workforce are currently in occupations that are likely to shrink due to automation³ – comparable figures are not available at a regional level. However, the increasing use of data science, machine learning and artificial intelligence poses both a

¹ <https://whatis.techtarget.com/definition/data-literacy>

² www.bernardmarr.com What Is Big Data?

³ <http://www.centreforcities.org/wp-content/uploads/2018/01/18-01-12-Final-Full-Cities-Outlook-2018.pdf>

threat but also an opportunity to the Scottish workforce⁴. Predictions of new technology and automation related redundancy range from 47% to 9% of the workforce⁵.

Whilst there is a lot of uncertainty about the shape of the future jobs market, we can be more certain that jobs that rely on more routine, simple tasks can more easily be automated, whereas creative and complex tasks will be more resistant to replacement. This risks exacerbating inequality and impacting on future inclusive growth in a number of ways:

Socio-economic: *“Many low- or middle-skilled occupations (e.g., manufacturing production) are expected to become less important in the workforce. The predicted decline in administrative, secretarial and some sales occupations is also consistent with these trends ... Employment growth is expected to derive disproportionately from smaller, generally high-skilled job families that will be unable to absorb job losses coming from other parts of the labour market⁶”* World Economic Forum

Gender: *“There is a strong gender dimension to expected employment changes whereby, notably, gender gaps appear to be more pronounced within both high growth and declining job families. For example, women make up low numbers in the fast-growing STEM job families, pointing, on current trends, to a deteriorating gender gap over time⁷”* World Economic Forum

Generational: *Much of the current workforce in employment now will still be in employment in 2030. With the rapid adoption of data-driven technologies and automation the current workforce needs to access re-training so they are not left behind.*

In addition, employer investment in skills and training of their workforce has declined significantly⁸ across the UK in recent years and is a huge contributing factor to flagging productivity. Whilst this is beginning to be recognised as an issue, and associated programmes are beginning to increase investment in ‘new talent’, there are comparatively fewer skills enhancement programmes targeted at those already in work.

As set out in the Edinburgh and South East Scotland City Region: science and innovation audit⁹, across the UK there is a publicly identified Digital Skills Crisis¹⁰ with an additional 740,000 digital-savvy workers being required over the period 2013-2017. “The big data dilemma” report from the House of Commons Science and Technology Committee¹¹ suggests that “the digital skills gap is approaching crisis levels and this not only has economic implications but also puts the quality and security of this data at risk. This risks UK business being

⁴ <https://www.ippr.org/publications/scotland-skills-2030>

⁵ <http://www.nesta.org.uk/publications/future-skills-employment-2030>

⁶ http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

⁷ http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

⁸ https://www.ippr.org/files/publications/pdf/skills-2030_Feb2017.pdf p.22

⁹ https://www.ed.ac.uk/files/atoms/files/edinburgh_science_and_innovation_audit_mainreportoct16.pdf

¹⁰ House of Commons Science and Technology Committee Second Report of Session “Digital Skills Crisis” 2016-2017

¹¹ “The big data dilemma”, House of Commons Science & Technology Committee 2015-16

unable to grow the big data sector at the rate it should. In the meantime, this skills gap is forecast to grow exponentially as big data reaches further into the economy”.

Demand for digital talent is expected to grow strongly in the medium to long term. The Scottish Futures Trust forecasts that, as Scotland emerges as a world-leading digital hotspot, 175,000 new digital jobs would be created by 2030.¹² We estimate that approximately 30%, or 50,000 of these additional jobs would be created in the City Region as a whole, with 37,000 of these being in Edinburgh (3,600 additional jobs per year). This represents a level of growth that is 2-3 times higher than for the economy as a whole. Given the increasing importance of information to the digital sector discussed previously, these jobs will become increasingly DDI-oriented. As the size of the sector increases, staff attrition¹³ in the sector will also grow as a result of factors such as retirement, pursuit of alternative career paths and re-location. New talent will be needed to fill these roles, and this has a considerable effect on the volume of new talent that will be required to sustain the digital sector in the City Region. Combining the demand for new talent resulting from both sector growth (3,600 additional jobs per year) and attrition (1,550 in 2016, 4,050 by 2030), demand for new talent in the City Region will grow from 5,100 per annum in 2016 to 7,600 by 2030 – an increase of 46% over the period.

There is a risk that the growth of the City Region digital economy will be limited by skills shortages. In spite of rising salaries, 61% of digital organisations in the City Region continue to cite a limited supply of talent as the single biggest challenge they face, with 21% citing problems with retention of workers.¹⁴ As the global competition for digital talent intensifies and our own local demands increase, the lack of availability of **data professional** skills within the City Region will inevitably impact upon business competitiveness.

In addition the importance of data skills is being recognised in a large number, and diverse range, of job roles. For example, care workers are likely to be required to provide more patient-centred care using telemedicine to connect with doctors and coordinate care activities, and drivers, threatened by the increasing prevalence of autonomous vehicles, may be required to develop new skills so that they can carry out tasks using data management to co-ordinate and supervise a convoy of autonomous vehicles.¹⁵ The **data worker** is in demand. Such workers can apply basic knowledge of statistics, programming and / or analysis software to generate and interpret datasets from their organisation to answer questions, target markets and develop business models. The DDI Skills Gateway aims to equip local people, working across all sectors, with these skills, training them for changing roles and preparing them for the jobs of the future.

As well as the economic benefits of investing in skills for data worker roles, there is a societal need to educate **data citizens** about how data impacts their everyday lives on topics such as how personal data is processed by

¹² Deloitte for Scottish Futures Trust “The economic and social impact of enhanced digitalisation in Scotland” July 2015

¹³ The analysis assumes that individuals pursue a 20-year career in the sector on average, resulting in 5% attrition from the sector.

¹⁴ Tech City UK <https://technation.techcityuk.com/cluster/edinburgh/>

¹⁵ https://www.accenture.com/t20171012T025413Z__w_/in-en/_acnmedia/PDF-62/Accenture-New-Skills-Now-Report.pdf

companies, individuals’ rights with respect to data and the wider societal implications of data and automation within a democracy.

1.4 Overview of the DDI Skills Gateway Project



Figure 2: Overview of DDI Skills Gateway

As significant City Region Deal investment in the DDI programme drives change in the regional economy, the DDI Skills Gateway is targeted at providing educational and skills opportunities to enable local people to be key contributors to the data sector, and to respond to the challenges presented by the rise in “Big Data”. The aim is to provide high quality data education, skills development and supported routes into data-related jobs for people across the City Region, including those from disadvantaged groups. Furthermore, citizens across the city region will have the opportunity to learn about **data citizenship**; how personal data is collected, stored and used, as well as their legal rights and privacy implications. The target learner groups include school pupils, a wide range of Further and Higher Education students, in-work learners and groups of people with untapped talent. This is illustrated in overview in Figure 1 and further elaborated in the diagrams in Section 2.4.

The DDI Skills Gateway proposal has been developed by a board of experts working across the current technical skills pipeline, (details of the Programme Development Board are shown in Annex 1), and through engagement with a range of relevant national and local organisations, including third sector representatives. What is envisaged is a wide-reaching programme, aimed at testing a range of approaches to developing data skills, stretching from school education to in-work learning. Furthermore, there is a real ambition to look at how best

to redress gender imbalance across data roles through a range of interventions, and ensure that intersectional equality is respected and supported across the sector.

Evaluation points are built into the programme to allow for a redirecting of resources as appropriate. The city deal funds and governance arrangements being proposed will help to ensure a joined up approach across the various stakeholders involved in this programme of activity and a regional spread of activity.

The ambitions of the eight-year programme are that:

1. Economic opportunities are addressed: there will be a closer match between supply and demand for data skills;
2. Aspirations are met: individuals will get more opportunity to participate in interesting and well-paid careers in the growing data sector;
3. Learners leave education with higher levels of data skills, ready to excel in later stages of their learning journey; and
4. There will be increased participation of women and other minority groups in data roles, with positive and inclusive working environments in the technology sector.

The programme aims to provide an accessible gateway and clear pathways to support entry to key training and jobs in the city region; develop and deliver new courses, training, partnerships and skills aligned to industry needs; attract new entrants to the sector and support equality across all levels; support and grow local talent, as well as encouraging talent to stay in the region.

The Programme has been developed around a number of core themes, namely;

- *Inclusive learning opportunities, coaching, mentoring and support for disadvantaged and under-represented group.* The programme will ensure that there is equality of opportunity, particularly for women returners, people facing redundancy, the unemployed and people with special employment needs, including those with disabilities;
- *Investment in teacher education* (for example through the development of *Knowledge Sharing Schools*) to help develop data skills in all of the region's school pupils;
- *Curriculum Development.* The programme will help to develop a data science curriculum and high quality inclusive learning material across all stages of the learner journey;
- *Continued Professional Learning and innovative Learning Networks.* The programme will touch teachers, FE and HE lecturers, executives, those in changing job roles, those whose current roles would benefit from additional skills in data analysis, (including frontline support workers), and data scientists who wish to deepen their expertise;
- *Data Career Pathways.* The programme will offer clearly defined routes along the skills pipeline. The focus will be on widening access pathways and raising awareness of the sector opportunities to a wider cohort. This activity will be linked to the Integrated Employer Engagement programme which will provide opportunities to engage directly with key client groups. Ongoing engagement with SDS will also ensure that timely and inclusive information about data opportunities can be provided to careers advisers; and

- *Engagement with data employers.* The programme will offer placements, assist in further developing inclusive working environments, provide intelligence on skills demands and training routes, and support the route from education to employment.

1.5 Targeting resources

This programme provides an opportunity to support inclusive growth ambitions by exploring ways to target key client groups for the DDI Skills Gateway. These will include:

- *School pupils* across the city region, *college learners*, from a variety of backgrounds, and *university students*, drawn from the local population;
- *Unemployed* people;
- People with *disabilities*;
- Those whose roles are *at risk of redundancy* through automation; and
- *Women* returners

The programme has the potential to help diversify the cohort of those working within the technology sector, and to prepare local people for the transformation in the workforce which is likely to result from automation.

The interventions proposed will be integrated with the opportunities provided by the City Region Deal investment in DDI, drawing on the academic expertise within the city region and aligning with sectoral developments and opportunities where appropriate. These will work towards ensuring that we help to reduce skills shortages and gaps, and deliver incremental system-wide improvements to boost the flow of individuals from disadvantaged groups into the good career opportunities generated through the city region deal investment.

Proposed investment has been prioritised across a number of inter-related strands of activity, details of which are provided later in the business case. These include:

- Diversity and Inclusion;
- Data Training for Work;
- Data Education for Schools, FE and HE students (augmenting activity proposed as part of the wider DDI programme at The University of Edinburgh and Heriot Watt University); and
- Employer Engagement to create inclusive work opportunities for all data students in the City Region

Whilst the activities above constitute the initial core DDI Skills Gateway Programme, there is also a recognition of the importance of ongoing engagement with employers, regional DYW groups and employability providers, amongst others, to continue the exploration of opportunities to pilot innovative approaches to skills development and explore further ways to widen access into data related roles and opportunities. The initial

priorities will be reviewed as the programme rolls out and the impacts of early interventions are evaluated. Furthermore, opportunities to leverage in additional funds to augment this initial programme of activity, and assist with delivering the vision of the DDI Skills Gateway, will be explored with a wide range of stakeholders.

Alignment with existing local and national related activity will be ensured by way of robust governance and ongoing engagement activity.

1.6 Summary of outputs

A summary of projected outcomes is shown in Annex 2.

2 Strategic Case

The DDI project strategic case is set out in two parts:

Part A: The Strategic Context – indicating the alignment of the DDI project proposals with government policy and existing assets and strengths; and,

Part B: The Case for Change – which summarises the objectives to be addressed by the programme and identified investment needs and operational risks, constraints and dependencies.

2.1 PART A: The Strategic Context

2.1.1 National Context and Strategy Alignment

*Scotland's Economic Strategy*¹⁶ sets out the Scottish Government's purpose "to create a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth" and has two key goals- increasing competitiveness and tackling inequality. In its Economic Action Plan 2018-20¹⁷ the Government outlines its plans to help develop a highly skilled workforce through education, training and reskilling,

*The ICT and Digital Technologies Sector Skills Investment Plan*¹⁸ published in March 2014, and informed by an industry-led steering group which included representatives from Amazon, JP Morgan. ScotlandIS and e-Skills UK (at the time the sector skills body for the tech sector), provided a framework to develop skills provision to meet industry needs. The plan has been structured around two strategic objectives, namely "Attracting more talent today" and "Closing the gap". There is recognition in the plan of the need to help address immediate skills shortages, but also to begin to broaden the talent pool for the technology sector. This includes making the education system more responsive to the needs of employers, raising the profile of careers within the sector, promoting new entry routes into technology jobs and highlighting the benefits of these routes to schools and employers. Reference is also made of the need to increase the number of women in technology roles.

¹⁶ Scotland's Economic Strategy, Scottish Government, 2015, <https://beta.gov.scot/publications/scotlands-economic-strategy/>

¹⁷ Economic Action Plan 2018-20 <https://economicactionplan.mygov.scot/>

¹⁸ Skills Investment Plan for Scotland's ICT an Digital Technologies sector
https://www.skillsdevelopmentscotland.co.uk/media/35682/ict_digital_technologies_sector_skills_investment_plan.pdf



Figure 3: The ICT and Digital Technologies Sector Skills Investment Plan

*Realising Scotland’s full potential in a Digital World: A Digital Strategy for Scotland*¹⁹, published by The Scottish Government in March 2017, includes a vision which focuses education and training systems on expanding the pool of digital skills and capabilities and tackling the current gender gap in digital skills and careers. It also points to the use of City and Region deals to maximise the role that digital innovations and infrastructure can play in delivering both economic and inclusive growth. Furthermore, the Skills Investment Plan for Edinburgh and South East Scotland²⁰ identifies the priority to develop an employer-led programme to upskill the region’s residents in data and digital skills.

The Scottish Government’s Programme for Scotland 2018-19, *Delivering for Today, Investing for Tomorrow*²¹ references the importance of data-driven innovation and calls for action to address the data skills gap. The initial findings of the Scottish Government’s Enterprise and Skills Strategic Board also point to the need to ensure a demand led skills system that is flexible and responsive to industry and learner needs – underpinned by robust evidence of employer demand, predictive analysis of future skills needs and access to lifelong careers advice.²² Furthermore, it references the need to encourage a greater uptake of digital skills and technologies.

¹⁹ Realising Scotland’s full potential in a Digital World: A Digital Strategy for Scotland www.gov.scot/publications/realising-scotland-s-full-potential-digital-world-digital-strategy-scotland/

²⁰ Skills Investment Plan for Edinburgh and South East Scotland <https://www.skillsdevelopmentscotland.co.uk/media/43648/edinburgh-sip-2017-digital-version.pdf>

²¹ Delivering for Today, Investing for Tomorrow, The Government’s Programme for Scotland 2018-19 <https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2018/09/delivering-today-investing-tomorrow-governments-programme-scotland-2018-19/documents/00539972-pdf/00539972-pdf/govscot%3Adocument>

²² Working Collaboratively for a Better Scotland <https://www.gov.scot/publications/working-collaboratively-better-scotland/>

Allied to this the Creating a Fairer Scotland (Employability)²³ policy and Equalities Act 2010 seeks to promote greater fairness and equality in employment, while also driving continuous service improvement through strong productive partnerships.

*No One Left Behind, Next Steps for the Integration and Alignment of Employability Support in Scotland*²⁴ urges the need to incrementally develop an integrated regional employability and skills system that is more:

- flexible, tailored, and takes a 'whole person' approach;
- straightforward for people to navigate;
- better integrated and aligned or interwoven with other supporting services;
- provides pathways into sustainable and fair work;
- is driven by evidence to supports people into the right job at the right time;
- designed, delivered, and improved in partnership;
- responsive to those with high needs (e.g. young care leavers, workless, and those in low paid or insecure jobs) who are at major risk of missing out on the benefits of economic growth; and
- minimises skills shortages and gaps or gender imbalances in our key growth sectors, while promoting greater workforce diversity

The DDI project tightly aligns with all of these policy aims. The ambition of the programme is to equip local people with the skills needed for them to benefit from the data revolution and to help mitigate any adverse effects of this. By focusing attention on strengthening and streamlining the progression pathways into roles requiring data skills for young people, disadvantaged individuals, and those whose current roles are at risk of automation it also establishes collaboration across regional partners to deliver better impact from existing (public, private and third sector) investments that will support accelerated progress towards a more inclusive economy.

2.1.2 Alignment across the IRES Programme

The current strength of demand for technology-based roles previously mentioned, and detailed later in the Economic Case, has resulted in significant and increasing skills gaps and workforce shortages.

The DDI Skills Gateway, along with other IRES projects, will help open up new sources of labour market supply and achieve more inclusive growth outcomes. It will also ensure that talent is grown locally, and is more likely to be retained in the city region. Whilst the DDI Skills Gateway can be considered a sector based skills and support pipeline, its impact has the potential to be far-reaching as increasing numbers of job roles will require data skills.

²³ Creating a Fairer Scotland: A New Future for Employability Support in Scotland, Scottish Government, <https://beta.gov.scot/publications/creating-fairer-scotland-new-future-employability-support-scotland/>

²⁴ No One Left Behind - Next Steps for the Integration and Alignment of Employability Support in Scotland, Scottish Government, <https://www.gov.scot/Publications/2018/03/5358/downloads>

Positioned within the IRES programme of activity, there are links particularly across the DDI and HCI Skills Gateways into the Integrated Employer Engagement, (for example, raising awareness of gender and disability challenges, and identifying opportunities within data roles across sectors), and Disadvantaged Families, (potentially providing a pipeline of new learners), IRES project activities. Furthermore there is an opportunity to use the evolving DDI capabilities within the city region to develop more responsive Labour Market information to help profile and predict labour market demand. The overall plan is for a much improved and focussed Skills Gateway Pipeline specific to industry needs with heightened focus on increasing throughput of numbers into employment in the sector. The Skills Gateway Delivery Group and IRES Board will ensure robust monitoring and reporting of progress towards targets as outlined in the Management Case.

2.2 Part B: The Case for Change

2.2.1 Existing Arrangements, Challenges & Business Needs

The Digital and IT sector is forecast to be the fastest growing sector in Scotland by 2024. Digital tech jobs in Edinburgh increased at over three times the national average between 2014 and 2017, according to a recent report by Tech UK²⁵. However, companies within the sector reported ongoing challenges around access to talent, and demand for digital and data talent is expected to grow strongly in the medium to long term.

Current data education and skills provision is limited and fragmented. The skills system is complex, with no clear pathways for learners wanting to acquire data skills and identify route ways into data jobs. Typical paths into data-related roles rely on the traditional Higher Education route, which is not delivering either the number or diversity of workers required to fill the growing regional and national demand for workers with the relevant skill sets to undertake both data worker and data professional roles.

2.2.1.1 Schools

The most relevant school-based subjects are Computing Science and Mathematics. Take-up and attainment levels at a national level for both are shown below (this information is not readily available at a regional level):

²⁵ Tech Nation 2018

SUBJECT	2018				2017			
	A - C		Entries		A - C		Entries	
	No.	%	No.	%	No.	%	No.	%
National Courses - National 5 (Qualification of 24 SCQF credit points)								
Computing Science	4,814	75%	6,442		6,108	82%	7,442	
Computing Science	3,787	73%	5,178	80	4,857	81%	5,990	80
Computing Science	1,027	81%	1,264	20	1,251	86%	1,452	20
Mathematics	26,894	65%	41,590		26,927	64%	42,191	
Mathematics	12,699	64%	19,759	48	12,856	64%	20,176	48
Mathematics	14,195	65%	21,831	52	14,071	64%	22,015	52
National Courses - Higher (Qualification of 24 SCQF credit points)								
Computing Science	2,816	69%	4,099		2,887	64%	4,476	
Computing Science	2,301	67%	3,430	84	2,436	64%	3,818	85
Computing Science	515	77%	669	16	451	69%	658	15
Mathematics	13,973	75%	18,753		13,953	74%	18,861	
Mathematics	7,039	73%	9,701	52	7,215	73%	9,929	53
Mathematics	6,934	77%	9,052	48	6,738	75%	8,932	47
National Courses - Advanced Higher (Qualification of 32 SCQF credit points)								
Computing Science	454	71%	636		454	71%	641	
Computing Science	379	69%	548	86	395	70%	565	88
Computing Science	75	85%	88	14	59	78%	76	12
Mathematics	2,751	75%	3,683		2,672	75%	3,586	
Mathematics	1,637	72%	2,265	61	1,628	72%	2,252	63
Mathematics	1,114	79%	1,418	39	1,044	78%	1,334	37

	Boys		Girls
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Figure 4: SQA Computing Qualifications.

It is worth reflecting that:

- The numbers taking Computing Science across qualification levels have decreased between 2017 and 2018;
- Boys are opting to take Computing Science in significant more numbers than girls; and
- Girls who did take Computing Science out performed boys²⁶

Limited numbers of Computer Science teachers, and inflexibility in some option choices, might also act as a barrier. However, Computing Science is just one of the learning pathways into tech courses and careers; Maths is also a relevant qualification.

Since a positive meeting with the DDI Skills Gateway team in autumn 2017, SQA have pulled together a qualification development group working on National Progress Awards (NPA) in Data Science at Levels 4, 5 and

²⁶ SQA Attainment Statistics <https://www.sqa.org.uk/sqa/64717.html>

6 and the team are actively involved with this. These non-exam based qualifications should be available to schools and colleges from summer 2019.

The University of Edinburgh is also working with SDS, and other national stakeholders, to help address a national shortage in Computer Science teachers. An options appraisal is currently under development to offer more flexible routes into the teaching profession, and draw together existing valuable, but unevenly distributed, Corporate Social Responsibility (CSR) initiatives by employers targeted at schools into a more coherent framework which gives equal coverage across the regions' schools.

2.2.1.2 Colleges

There are clear concentrations of Computing Science courses in particular parts of the country. For example, Glasgow has 20% of the enrolments whereas Edinburgh only has 10%. Furthermore, the computing science cohort at college is predominantly male (85%) and increasingly under 24 years (62%). At a national level, in 2014/15, 86% of computing science college leavers entered further full time study, compared with 69% across all college disciplines.²⁷

Level	Passes	Trend
SCQF 1-5	1,692	-12%
SCQF 6	533	4.5%
SCQF 7 - 12	3,708	1.5%

Table 1. College computing science courses.

According to information provided to partners by the Scottish Funding Council, there are around one thousand students studying Computer Science related courses across the Edinburgh and South East city region, of which only 10% are female. Over half of the students are studying at Edinburgh College and a further third at Fife College. Only around a dozen students are studying computer science related courses in the Borders College.

Around 125 students articulate from Edinburgh College computing courses to undergraduate degrees in Computing Science and related programmes, with over 85% going on to Edinburgh Napier University.

2.2.1.3 Universities

The City Region contains approximately 1740 students graduating in subjects related to Computer Science and Data related courses (3710 total student numbers)²⁸. This represents a significant shortfall in the current

²⁷ Digital Scotland Scotland's Digital Technologies: Summary Report 2016 – based on "Scotland's Digital Technologies Sector Analysis" conducted by Ekosgen

²⁸ Figures supplied by Scottish Funding Council (SFC)

projected demand of 5,100 per year as set out in the Science and Innovation Audit²⁹. The computing science cohort at university is also predominantly male (81%) and increasingly under 24 years (71%).^{See 27}

The DDI Talent ambitions of the University of Edinburgh and Heriot Watt University have been described in the DDI Programme Business Plan³⁰, and approved by the city region deal Joint Committee. These include proposals for the Universities to engage with around 716,000 people across the UK and globally over the fifteen year programme lifecycle, (of whom around 62,000 will receive formal certification and an additional 30,400 CPDs).

Edinburgh Napier and Queen Margaret Universities are well placed to augment this ambition, and also help develop local learners, with 45% and 41%, respectively, of all of their UK domiciled students coming from the Edinburgh and South East Scotland city region area.

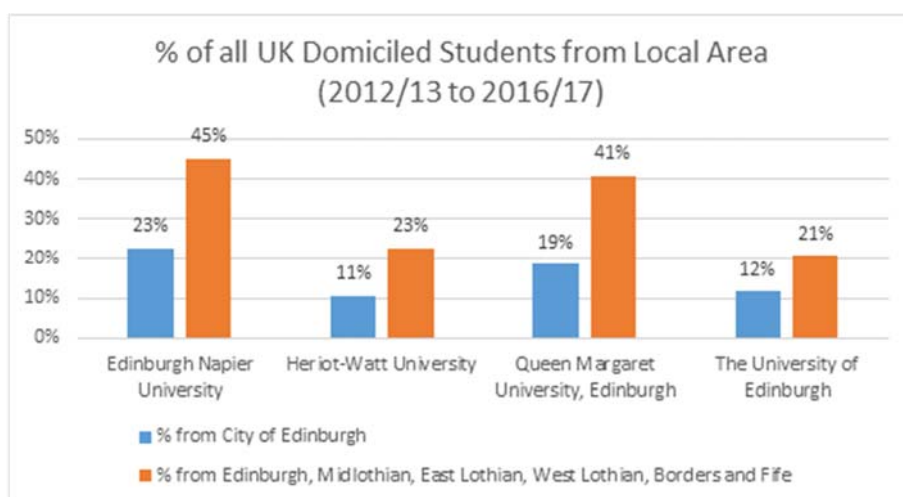


Figure 5: Proportion of UK-domiciled undergraduate students from Local Area (2012/13 to 2016/17)

Like the other university partner organisations, Edinburgh Napier University has a demonstrable track record in enrolling students from deprived postcodes (Figure 6). Courses highlighted for further data skills development have been identified to maximise the opportunity to reach MD20/ MD40 students and those most likely to be drawn from, and remain in, the City Region population.

²⁹ https://www.ed.ac.uk/files/atoms/files/edinburgh_science_and_innovation_audit_mainreportoct16.pdf

³⁰ Programme for Delivery of a Data Driven Innovation Cluster in the Edinburgh City Region

	2018/19		2017/18	2016/17
	Number	%	%	%
Deprivation by SFC Quintile				
1 - 20% Most Deprived (MD20)	341	12.6%	10.2%	10.5%
2	443	16.3%		
3	550	20.3%		
4	635	23.4%		
5 - 20% Least Deprived	742	27.4%		
SDUE with matching postcode	2711	100.0%		

Figure 6.: Proportion of Scottish-domiciled undergraduate entrants from the 20% and 40% most deprived postcodes studying at ENU

2.2.1.4 Apprenticeships

There are over 120 apprenticeship types available in Scotland, with apprentices getting flexible training and a qualification designed for particular industries. Apprenticeships can be used to attract new talent, or upskill existing staff. Skills Development Scotland (SDS) will contribute towards the training costs, with the amount being dependent on the age of the apprentice, the type and level of training. However, contributions are generally for employees who are aged 16 – 24, although there is an enhanced contribution available for disabled and care-experienced young people between the ages of 20-29. Despite the age restrictions, apprenticeships are a key part of the employability pipeline, providing flexible routes into upskilling and drawing in wider cohorts of learners.

In 2017/18 a rural support policy was applied for trainees who live in more remote Local Authority areas, including the Scottish Borders. This supports the payment of additional supplements, above the standard contribution rate.

2.2.1.4.1 Foundation Apprenticeships (FAs)

There are currently no Foundation Apprenticeships in Data specifically. The FA most closely aligned to opportunities within the technology sector is the FA in Software Development. The National Progression Award (NPA) in Data Science, currently under development, provides an opportunity to develop a data specific framework at this level which could be embedded in the Foundation Apprenticeship model, and there is the potential for this to be made available from 2021.

2.2.1.4.2 Modern Apprenticeships (MAs)

The Modern Apprenticeship framework aligned to this skill set is the Data Analytics Technical Apprenticeship (SCQF Level 8). However, although, the apprenticeship was available from 2016/17, there were no starts on the framework until 2018/19. As at the end of quarter 2, 2018/19, there were only 11 starts spread across the country, and none of the starts have completed the framework.