



Scottish Technology Industry Survey 2018

Analysis of questions on innovation systems and the gender gap

ScotlandIS

Oracle Campus | Blackness Road | Springfield | Linlithgow | EH49 7LR

Tel: 01506 472200

www.scotlandis.com

Contents

1. Introduction.....	1
a. Objectives of the research	1
b. Methodology	1
2. Overview of the survey sample	4
3. Innovation systems	7
a. Innovation activities	7
b. Innovation support.....	11
c. Survey results in perspective	15
4. Addressing the gender issue	18
a. Survey results in perspective	21
Annex	27

1. Introduction

a. Objectives of the research

Since 2006, ScotlandIS has been conducting the annual Scottish Technology Industry Survey. It provides a measure of the digital technologies industry's health and performance during the last year and its expected development during the current year. These annual survey reports are a valued resource for business leaders, investors and public sector stakeholders.

For the 2018 edition of the survey, Scottish Enterprise commissioned ScotlandIS to extend the survey to include additional analysis on the following topics:

- **Innovation System.** Including understanding what types of innovation are undertaken in Scotland, what level of awareness there is of various parts of the innovation ecosystem (e.g. Innovation Centres) and what parts companies have actually used or would consider using in future.
- **Addressing the Gender Issue.** What are companies currently doing to address the gender gap and is it having any effect?

Three questions have been added to the survey to covers these topics (see Annex). The headline results from these questions were published as part of the Scottish Technology Industry Survey 2018 report, which is available through the ScotlandIS website¹.

This paper provides further analysis of the survey results in relation to innovation systems and gender issues. It includes commentary highlighting key insights and puts the results into a broader cross-industry and international perspective.

b. Methodology

The Scottish Technology Industry Survey 2018 was conducted between 4 January and 9 February 2018 through an online survey platform. The survey received 205 responses, of which 171 have been selected for analysis after discounting duplicates and unusable responses. The respondents include both ScotlandIS members and non-members.

For additional desk research and the analysis of official statistics, the following standard industrial classification (SIC) and standard occupational classification (SOC) codes have been used to define digital technologies businesses and jobs:

¹ <https://www.scotlandis.com/resources/scottish-technology-industry-survey/>

Digital technologies sector definition by main area of business

SIC Code	Description
18203	Reproduction of computer media
2611	Manufacture of electronic components
2612	Manufacture of loaded electronic boards
262	Manufacture of computers and peripheral equipment
263	Manufacture of communication equipment
264	Manufacture of consumer electronics
268	Manufacture of magnetic and optical media
2731	Manufacture of fibre optic cables
5821	Manufacture of fibre optic cables
5829	Publishing of computer games
611	Wired telecommunications activities
612	Wireless telecommunications activities
613	Satellite telecommunications activities
619	Other telecommunications activities
6201	Computer programming activities
6202	Computer consultancy activities
6203	Computer facilities management activities
6209	Other information technology and computer service activities
6311	Data processing, hosting and related activities
6312	Web portals
6399	Other information service activities not elsewhere classified
9511	Repair of computers and peripheral equipment
9512	Repair of communication equipment

Digital technologies sector definition by occupation

SOC Code	Description
1136	Information Technology and Telecommunications Directors
2133	IT Specialist Managers
2134	IT Project and Programme Managers
2135	IT Business Analysts, Architects and Systems Designers
2136	Programmers and Software Development Professionals
2137	Web Design and Development Professionals
2139	Information Technology and Telecommunications Professionals not elsewhere classified
3131	IT Operations Technicians
3132	IT User Support Technicians
5242	Telecommunications Engineers
5245	IT Engineers

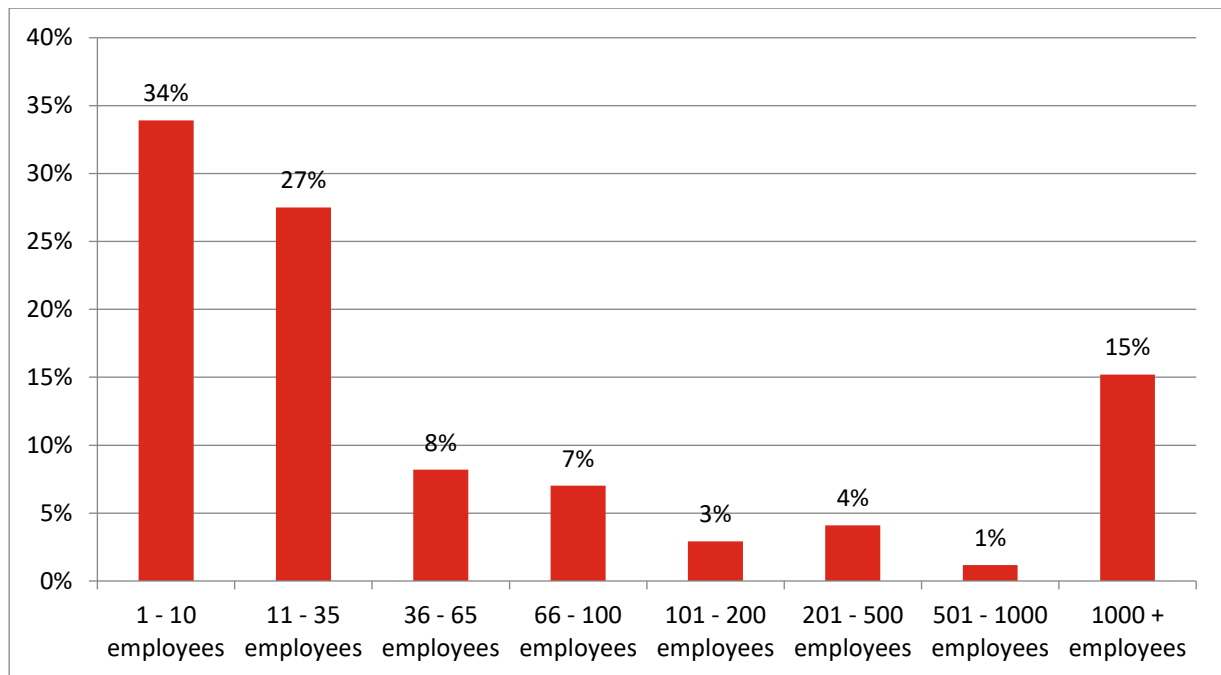
2. Overview of the survey sample

171 useable survey responses have been collected. The following charts provide an overview of the profile of participating companies.

Business size

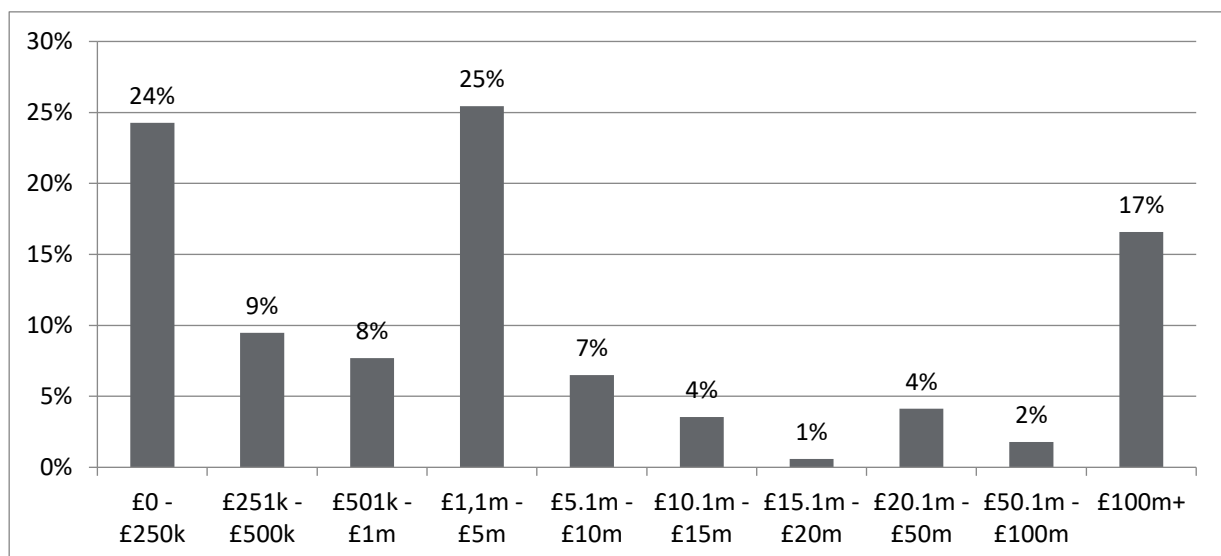
Based on the number of employees, the majority of responding business are small, with 69% having 1-35 staff. 15% of companies in the sample have more than 1000 employees.

Figure 1 - Business size by employee numbers



41% of respondents report a turnover of up to £1m, 37% between £1.1m and £20m and 23% have a turnover greater than £20.1m.

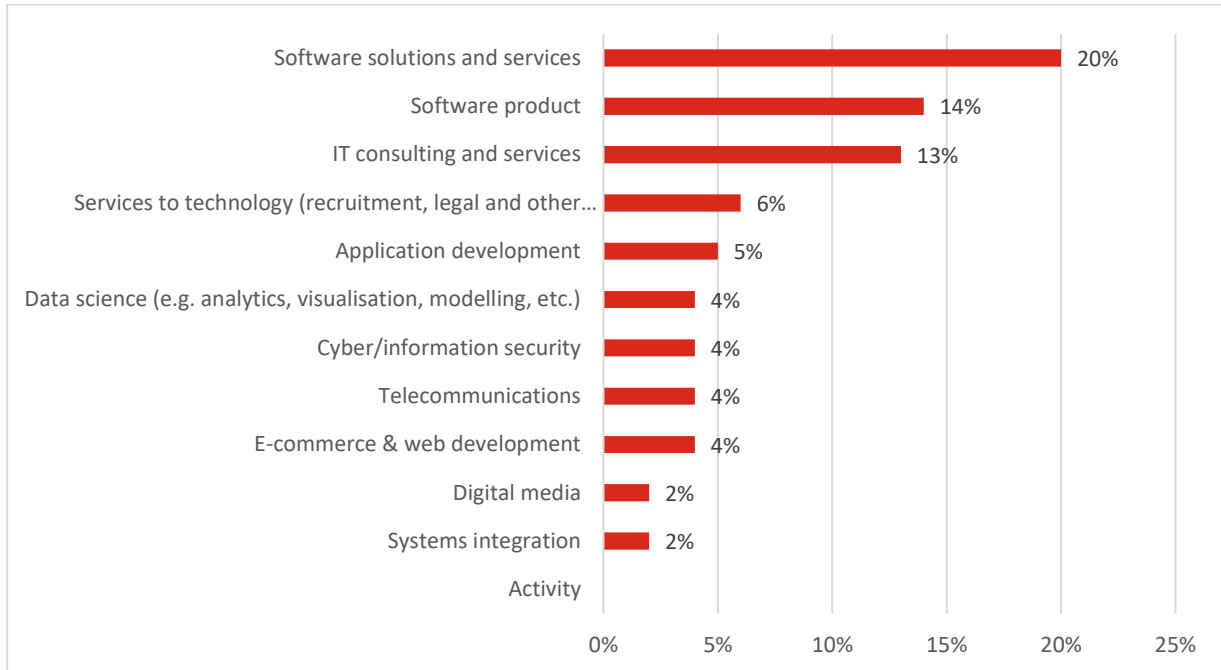
Figure 2 - Business size by turnover



Main activity of business

Software solutions and services (20%), Software Products (14%) and IT Consulting and Services (13%) are the most common activities respondents are engaged in.

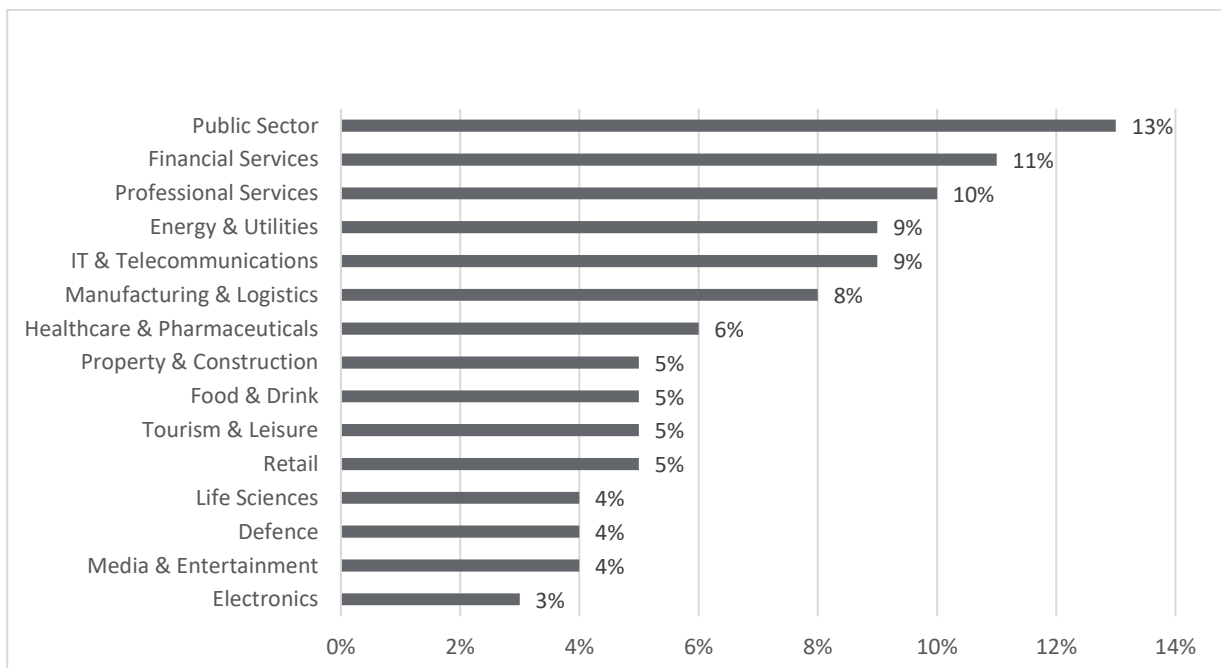
Figure 3 - Main activity of business



Sectors being supplied

The companies included in the survey sample supply a wide range of sectors - the top three being the public sector (13%), financial services (11%) and professional services (10%).

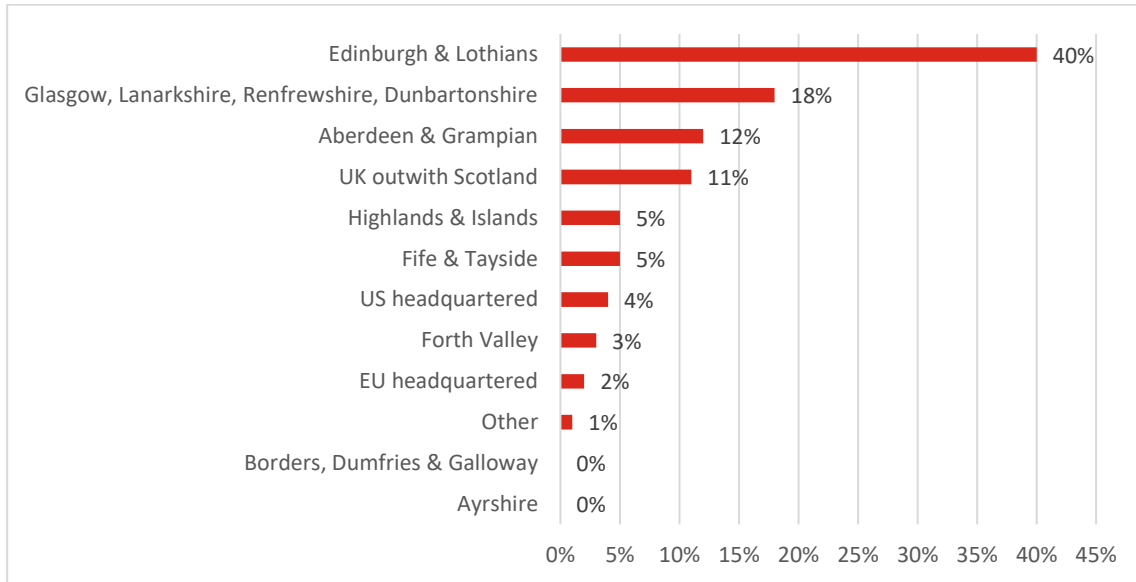
Figure 4 - Sector being supplied



Location of businesses headquarters

The biggest cluster of respondents is located in Edinburgh & Lothians (40%), followed by the Greater Glasgow area (18%), and the Aberdeen and Grampian area (12%). 18% of responding companies' head offices are situated outside Scotland.

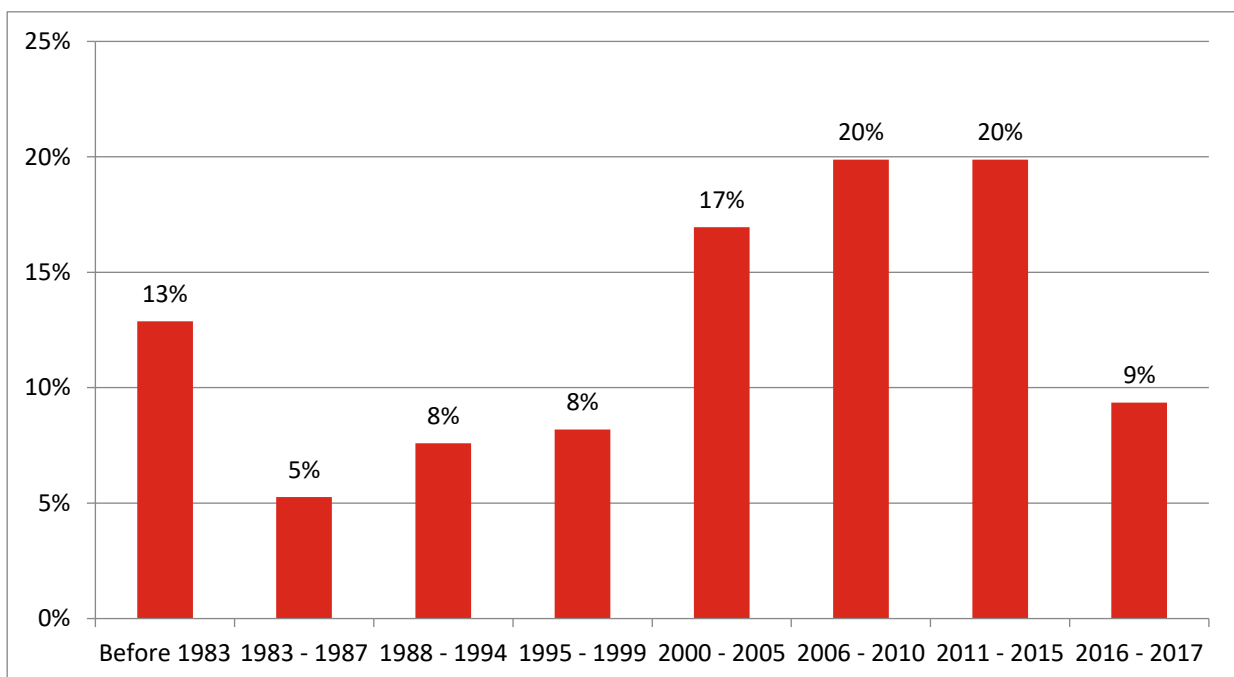
Figure 5 - Location of business headquarters



Age of businesses

The majority of businesses in the sample (66%) were formed since 2000 with 9% being relatively new start-ups that were established in the last two years.

Figure 6 - Year of business formation



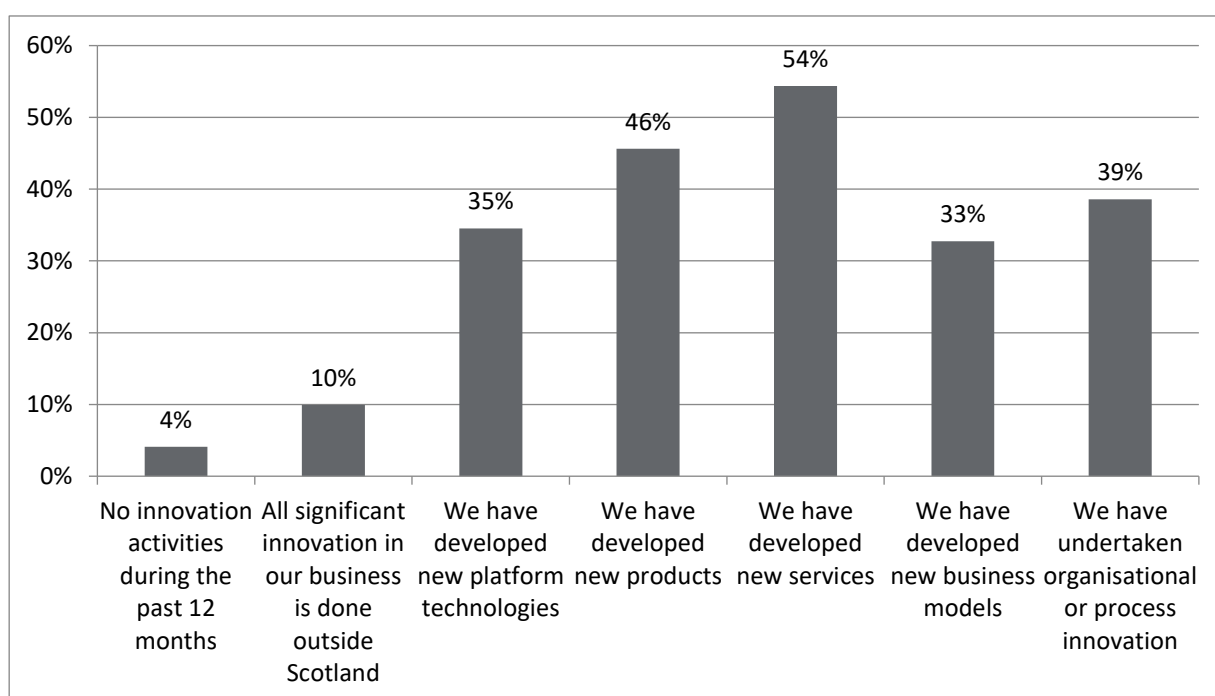
3. Innovation systems

Survey participants were asked about their innovation activities and their awareness and use of innovation support mechanisms and partners.

a. Innovation activities

Nearly all respondents, 96%, were engaged in innovation activities in the past 12 months. New services were developed by the largest share of businesses (54%), followed by new products (46%) and organisational and process innovation (39%). 10% of respondents, mainly the larger companies, indicated that they do all innovation outside Scotland.

Figure 7 - Innovation activities (all respondents)



Correlation with company size by employee numbers

Large businesses² were significantly more likely than small and medium companies to undertake all significant innovation outside of Scotland (39% of all large businesses, 8% of medium businesses³, 3% of small businesses⁴).

Out of those companies that have undertaken innovation activities in Scotland in the last 12 months, medium-sized companies were more likely than small and large companies to develop new products and services. Larger businesses were more likely to be engaged in

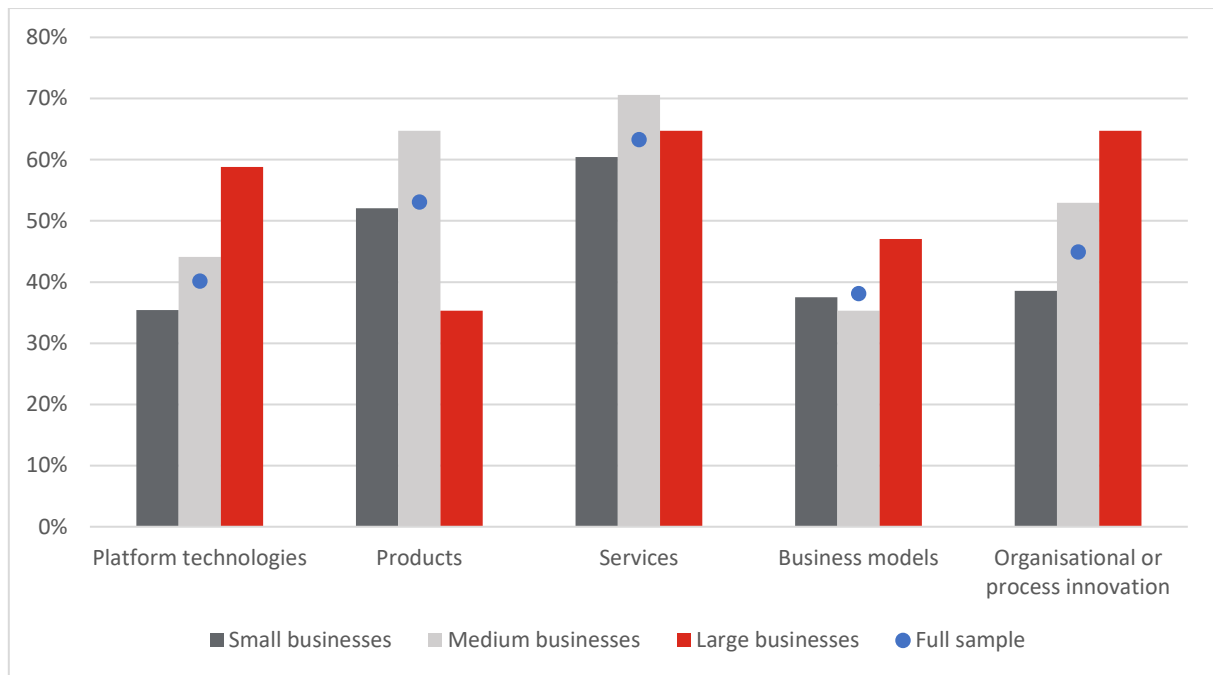
² >500 employees

³ 36-500 employees

⁴ 1-35 employees

the development of platform technologies, new business models and organisational and process innovation than the full survey sample.

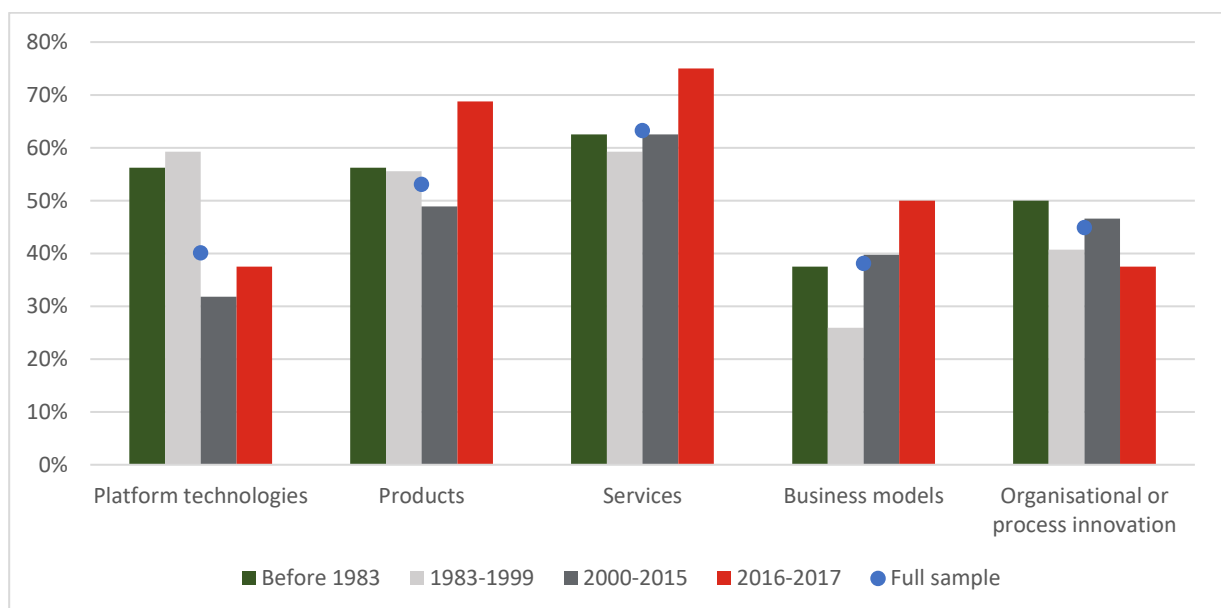
Figure 8 - Innovation activities in Scotland in the past 12 months – companies by employee numbers



Correlation with company age

Companies that were established within the last two years are more likely than the survey average to have developed new products, services and business models in the last 12 months. Businesses founded before 1999 have developed new platform technologies more often than the two other groups of respondents. Companies founded between 2000 and 2015 perform largely like the survey average in all categories apart from “Platform technologies”.

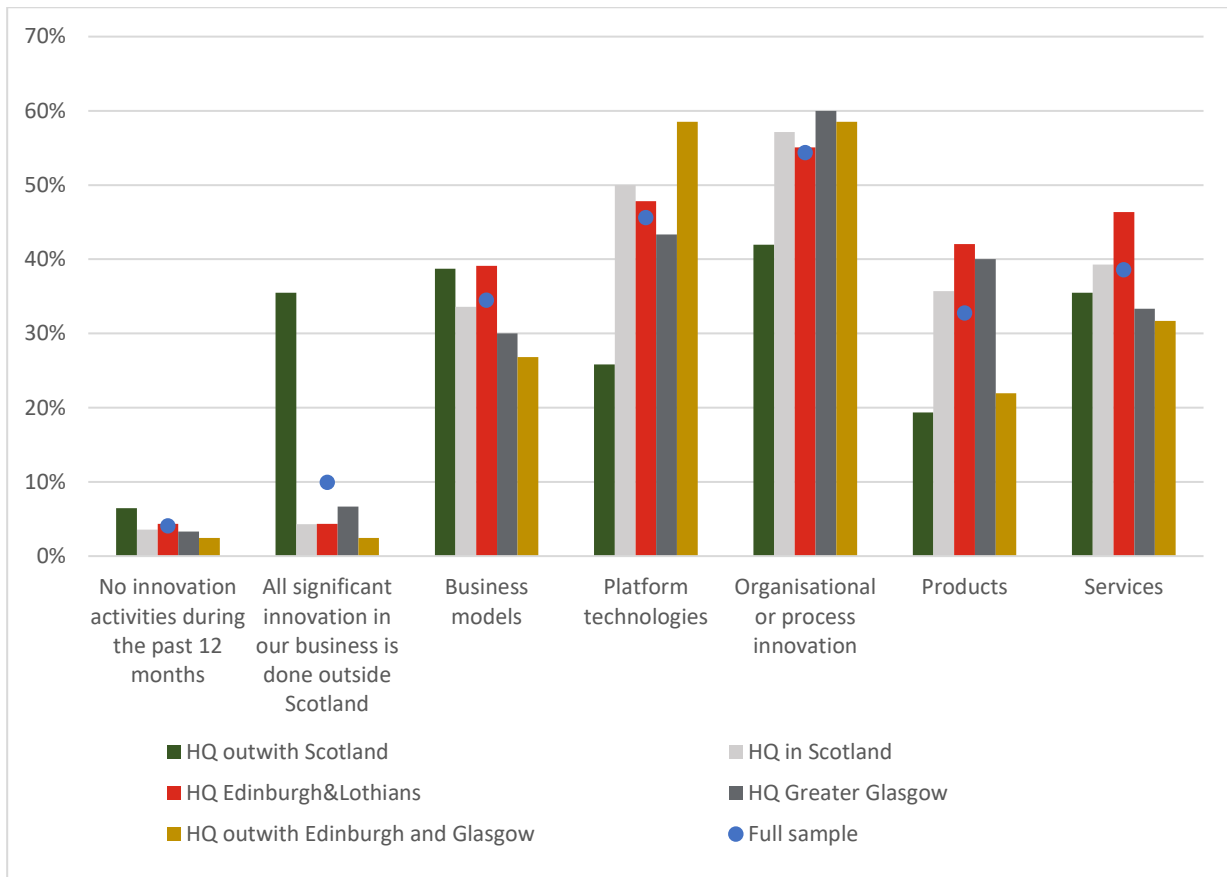
Figure 9 - Innovation activities in Scotland in the past 12 months – companies by year of establishment



Correlation with headquarter location

Companies whose head office is located outside of Scotland are significantly more likely to undertake all significant innovation activities outside of Scotland than the survey average. Businesses with headquarters in Greater Glasgow were more likely to develop new services and new business models but less likely to be involved in organisational and process innovation or new products. Respondents with HQs in Edinburgh and the Lothians developed new products and services more often than the survey average. Companies with Scottish headquarters outside of Edinburgh and Greater Glasgow were more likely to be involved in platform technology innovation.

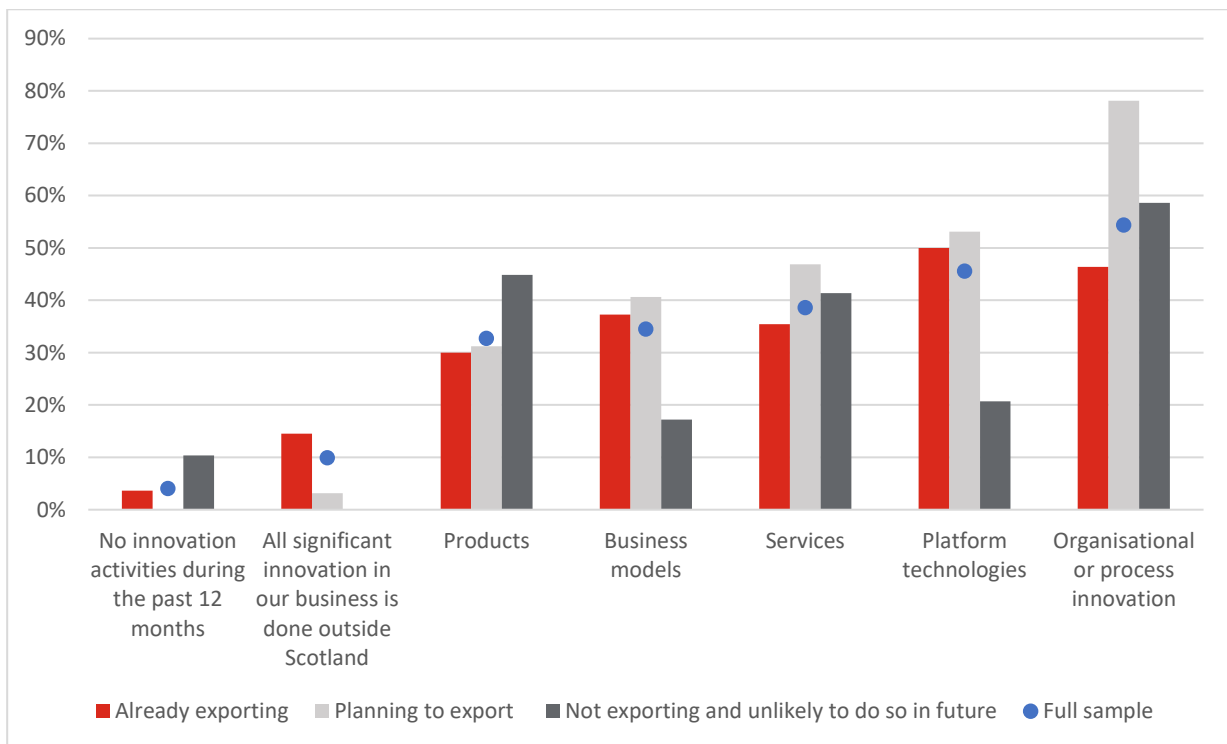
Figure 10 - Innovation activities – companies by location of headquarter



Correlation with export status

Companies that are not exporting and have no plans to do so in the future are slightly more likely to not have undertaken innovation activities over the past 12 months than those who are already exporting or planning to. If they were innovating, they were more likely than the survey average to develop new products and less likely to work on new business models or platform technologies. Businesses that are not yet exporting but planning to do so are more likely than the survey average to be involved in all innovation activities, apart from products, and particularly often working on organisational and process innovation.

Figure 11 - Innovation activities - companies by export status

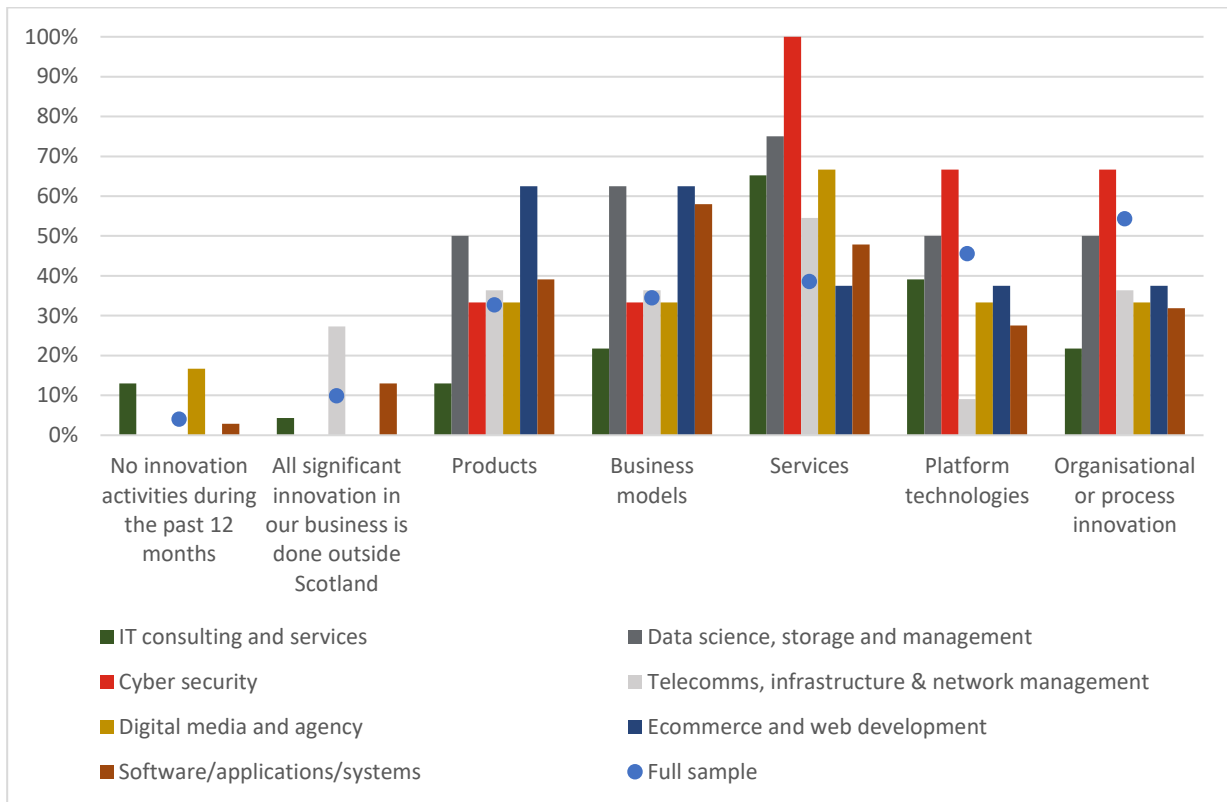


Correlation by main area of business

Respondents in the cyber security sector were particularly often developing new services, platform technologies and organisational processes. Responding data science, storage and management companies were more likely than the survey average to work on innovative products, business models and services in the last 12 months. Respondents in the categories “IT consulting & services” and “digital media & agency” were more likely than the average to innovate in services, probably due to the nature of their business which is focused on service delivery. Businesses in the “software/applications/systems”⁵ category were more likely than the survey average to develop new business models.

⁵ Includes the following business areas: software solutions and services, software product, application development, systems integration

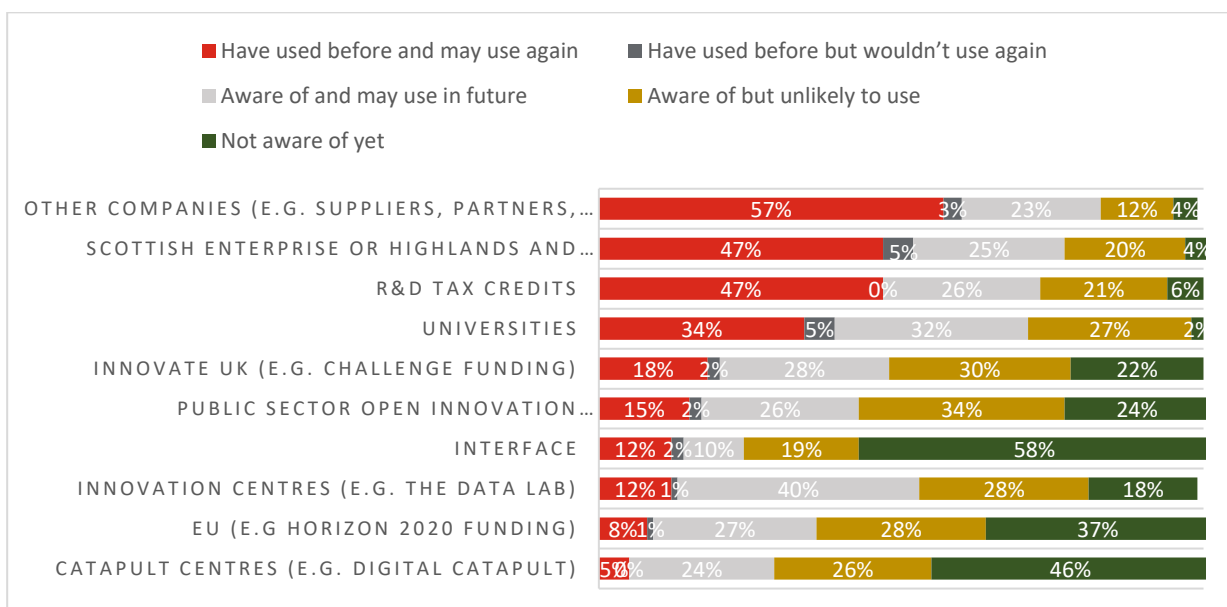
Figure 12 - Innovation activities - companies by main area of business



b. Innovation support

The most commonly used innovation support is other companies, like suppliers, partners or customers (used by 60% of respondents), Scotland's enterprise agencies (52%) and R&D tax credits (47%). Together with universities, these organisations and mechanisms are also the best known whereas businesses are less aware of Interface, the Catapult Centres, the Innovation Centres and EU support and funding.

Figure 13 - Innovation support (all respondents)

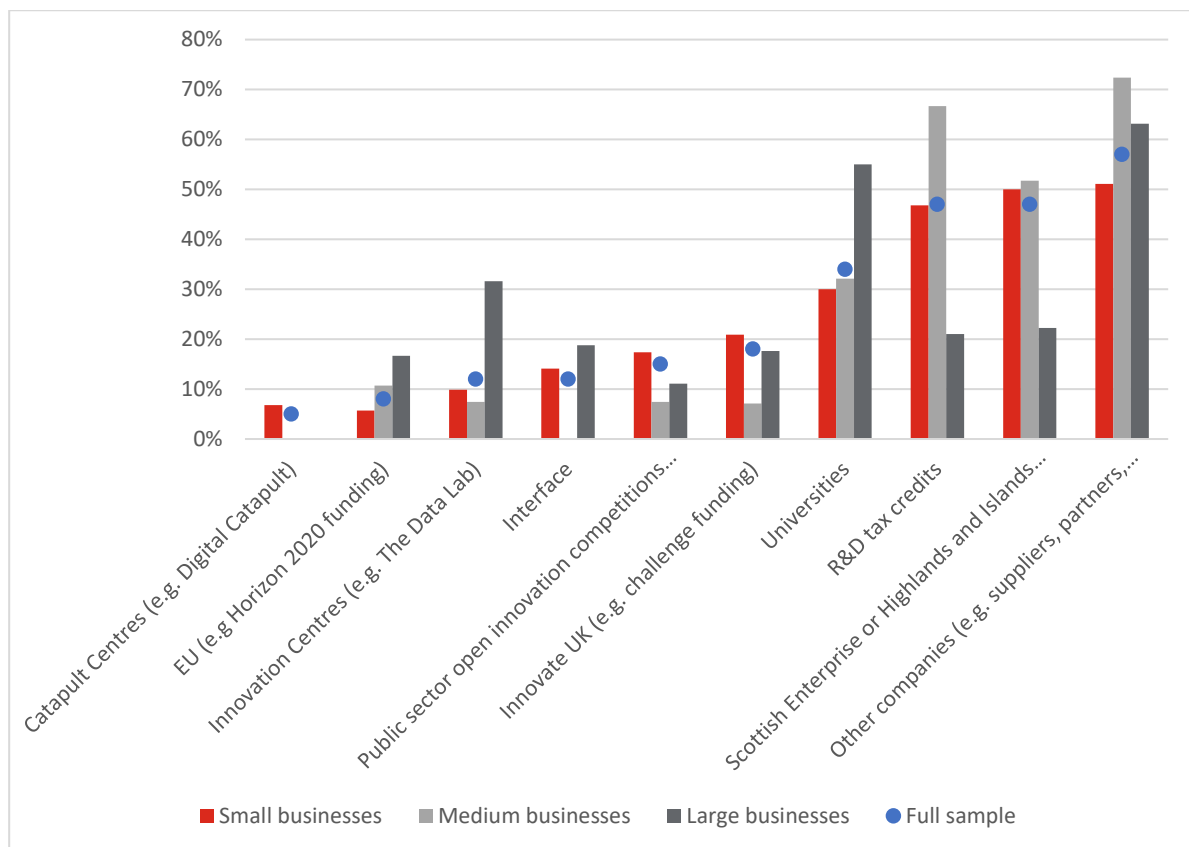


In comments on their experiences with these mechanisms and partners, respondents mention lengthy and costly application processes, limited support for smaller companies and limited understanding of businesses needs and ways of working. The support landscape was also described by several respondents as difficult to navigate with sometimes overlapping responsibilities.

Correlation with company size by employee numbers

Large business respondents are significantly more likely than small and medium businesses to have used the Innovation Centres and universities as innovation support and would also use them again. At the same time, they are less likely to have used R&D tax credits and support from Scotland’s enterprise agencies. Medium companies were particularly likely to have used (and would use again) R&D tax credits and other companies as innovation partners. Public sector open innovation competitions, Innovate UK and Interface support were less likely to be used by medium companies. Small businesses, on the other hand, were more likely to work with these partners.

Figure 14 - Innovation systems – answer option “Have used before and may use again” – companies by size

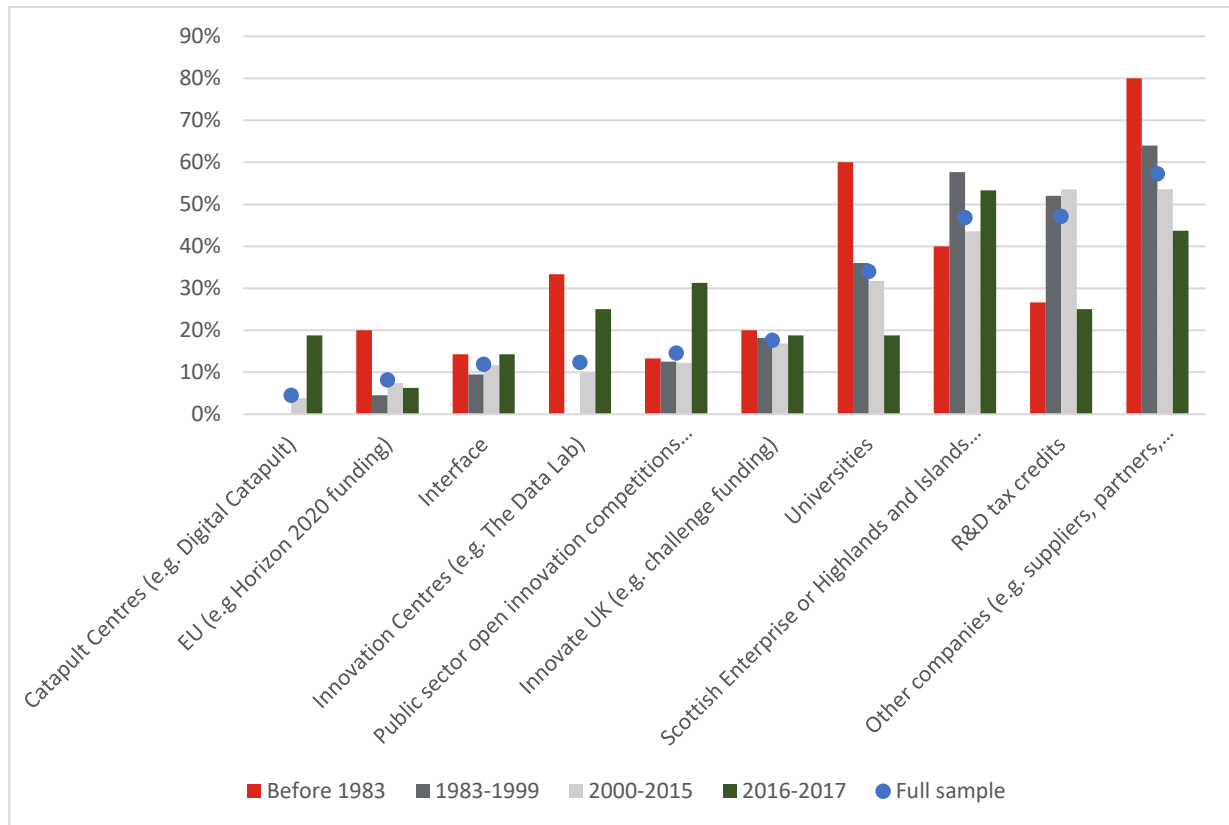


Correlation with company age

Responding companies established before 1983 were more likely than younger businesses to have used EU funding, Innovation Centres, universities and other companies before and would also consider working with them again. They were less likely to have used innovation support through R&D tax credits and Scottish Enterprise or Highland and Islands Enterprise. Businesses founded between 1983 and 1999 and

between 2000 and 2015 are showing similar patterns in their use of innovation systems. Start-ups (founded within the last two years) were more likely than older businesses to have used the Catapult Centres, the Innovation Centres and public sector open innovation competitions.

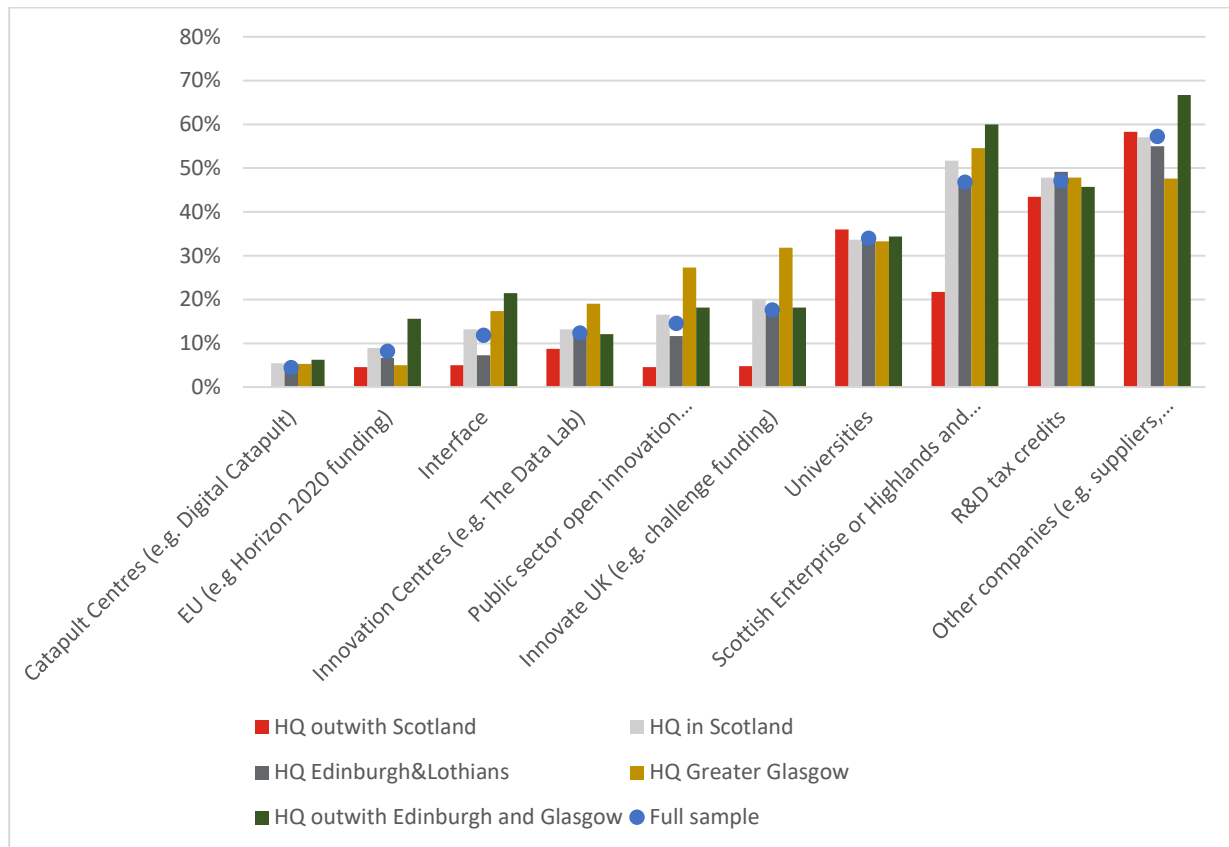
Figure 15 - Innovation systems – answer option “Have used before and may use again” – companies by year of establishment



Correlation with headquarter location

Responding companies with head offices outside Edinburgh & Lothians and Greater Glasgow are more likely than other businesses to have used (and would consider using again) innovation support from the EU, Interface, the enterprise agencies and other companies. Those headquartered in the Greater Glasgow area are more likely to have worked with the Innovation Centres, public sector open innovation competitions and Innovate UK. Businesses with head offices outside of Scotland were less likely to have used Interface, public sector open innovation competitions, Innovate UK or Scotland’s enterprise agencies.

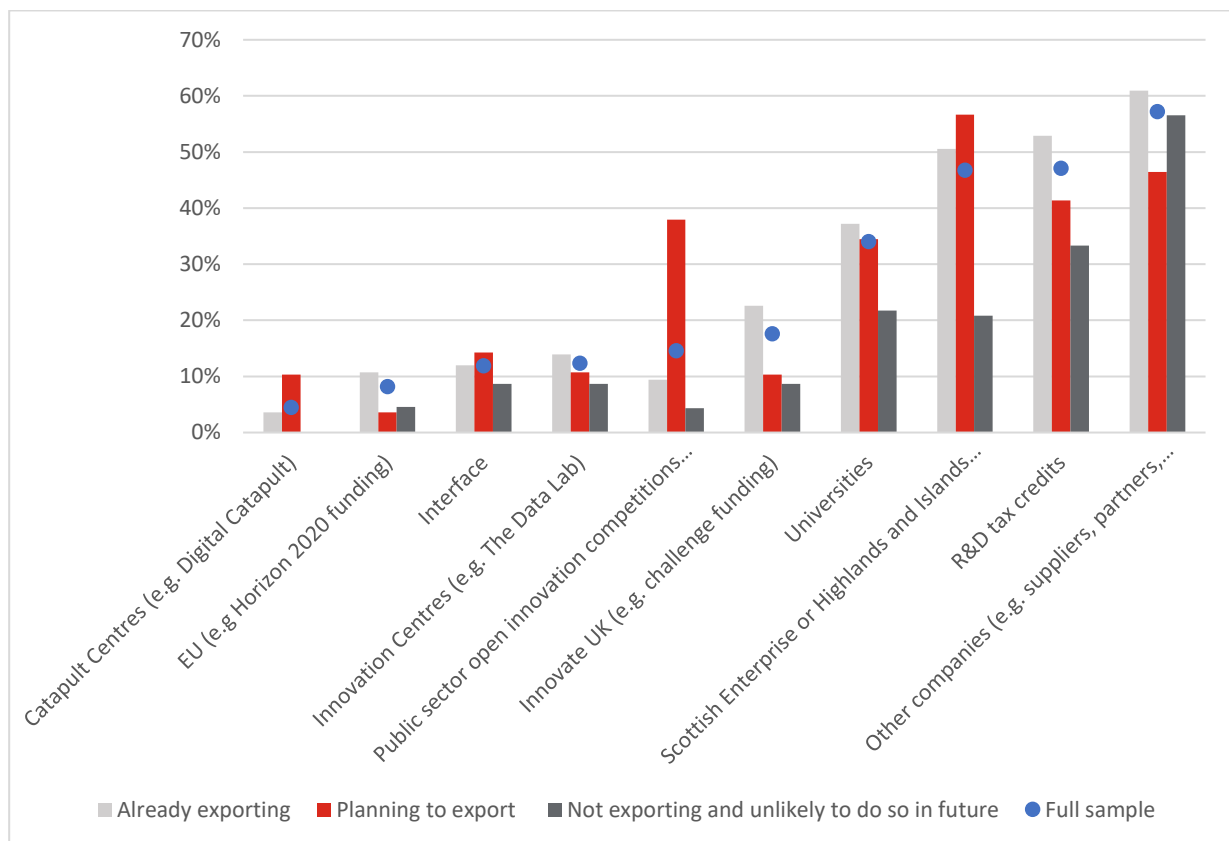
Figure 16 - Innovation systems – answer option “Have used before and may use again” – companies by HQ location



Correlation with export status

Respondents that are already exporting are more likely than those that are not selling internationally to have worked with Innovate UK, R&D tax credits and EU funding to support innovation activities (and would use them again). Businesses that are not yet exporting but are planning to do so are particularly likely to have participated in public sector open innovation competitions or to have worked with the Catapult Centres. Companies that are not exporting and have no plans to do so are less likely to use innovation support from universities, Scotland’s enterprise agencies and Innovate UK.

Figure 17 - Innovation systems – answer option “Have used before and may use again” – companies by export status



c. Survey results in perspective

The digital technologies industry is one of the most innovative sectors in Scotland. Expenditure on R&D performed within businesses (BERD) at current prices was £155,817,000⁶ in 2016, which represents 14.5% of the total BERD in Scotland. Only companies in the “professional, scientific and technical activities” sector and the manufacturing sector spend more on R&D. Computer programming and information services activities and software development account for about one quarter each of the information and communication sector’s BERD.

⁶ This refers to the BERD of the Information and Communication sector (SIC section J), as more detailed data that would allow the use of the definition for the digital technologies sector set out in the methodology chapter was not available.

Table 1 - Expenditure on R&D performed within businesses (BERD) in Scotland at current prices in 2016⁷

Sector	Share of total BERD in Scotland in 2016
Professional, scientific and technical activities (M)	35.8%
Manufacturing (C)	31.1%
Information and communication (J)	14.5%
Non-Manufacturing Production (ABDE)	8.4%
Financial & Insurance Activities and Real Estate Activities (KL)	4.9%
Administrative and support service activities (N)	2.2%
Wholesale and retail trade; Repair of motor vehicles and motorcycles (G)	1.3%
Transportation & Storage and Accommodation & Food Service Activities (HI)	0.6%
Construction (F)	0.6%
Arts, Entertainment & Recreation and Other Service Activities (RS)	0.4%
Public Administration, Education and Health (OPQ)	0.1%

R&D expenditure in the digital technologies industry also grew particularly quickly over the last few years. Between 2009 and 2016, BERD in the Information and Communication sector grew by 75%, compared to 49% in the “professional, scientific and technical activities” sector and 25% in the manufacturing sector.

Table 2 - Expenditure on R&D performed within businesses (BERD) in Scotland at current prices between 2009 and 2016, in thousand £⁸

Sector	2009	2010	2011	2012	2013	2014	2015	2016	Change between 2009 and 2016
Information and communication (J)	38,243	33,691	51,650	72,634	80,248	82,997	107,758	155,817	+75%
Professional, scientific and technical activities (M)	193,824	197,850	270,380	294,321	350,054	453,672	433,179	383,680	+49%
Manufacturing (C)	251,259	234,176	256,533	274,488	263,164	262,678	265,387	333,636	+25%

⁷ <http://www.gov.scot/Topics/Statistics/Browse/Business/RD/BERDTables>

⁸ <http://www.gov.scot/Topics/Statistics/Browse/Business/RD/BERDTables>

A comparison of the digital technologies sector's BERD intensity within the European Union shows that the UK ranks slightly above the middle of a league table led by Hungary, France and Denmark. The sector's BERD intensity in China, Norway and the US is nearly twice as high as in the UK.⁹ Unfortunately, no data was available that compared Scotland separately with other countries or regions in the EU and beyond.

Looking at the public funding of ICT R&D within the EU, the United Kingdom ranks in second place with €731m in current prices, behind Germany which spends about twice as much. The US spends more than ten times as much with €8,669m.¹⁰

This data shows that the digital technologies industry is a very innovative sector compared with other parts of the Scottish economy. However, the comparison with digital technologies sectors in other countries shows that Scotland would need to invest considerably more in innovation to rank amongst the top tier countries in the EU and beyond. The survey results can help to identify how the current innovation support landscape needs to be adapted to encourage increased investment in innovation activities. The results could also help targeting the right types of companies with the most appropriate type of innovation support available.

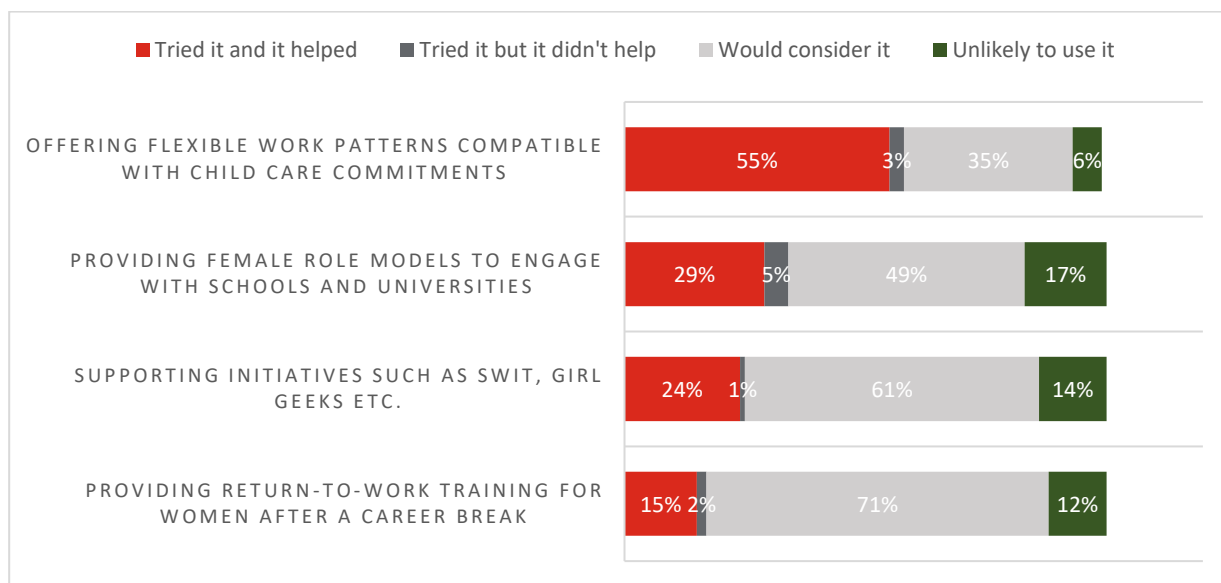
⁹ See interactive visualisation of 2017 PREDICT data set for ICT sector/subsector BERD intensity (BERD/VA) in 2014 -ICT services industry, available [here](#). ICT services industry has been chosen for this comparison as it is the closest approximation to the Information and Communication sector according to SIC codes.

¹⁰ See interactive visualisation of 2017 PREDICT data set for public funding of R&D in ICT in 2015, available [here](#).

4. Addressing the gender issue

The most commonly taken step to attract more women is to offer flexible working patterns that are compatible with child care commitments. 55% have tried this measure and found that it helps and only 6% of respondents are unlikely to try it. Around a quarter of responding companies provide female role models for engagement with schools and universities and/or support initiatives like Scotland Women in Technology (SWiT) or Girl Geeks. The least used measure is the provision of return-to-work training for women after a career break (15%) even though 71% of respondents would consider this step.

Figure 18 - Steps taken to attract more female workers (all respondents)

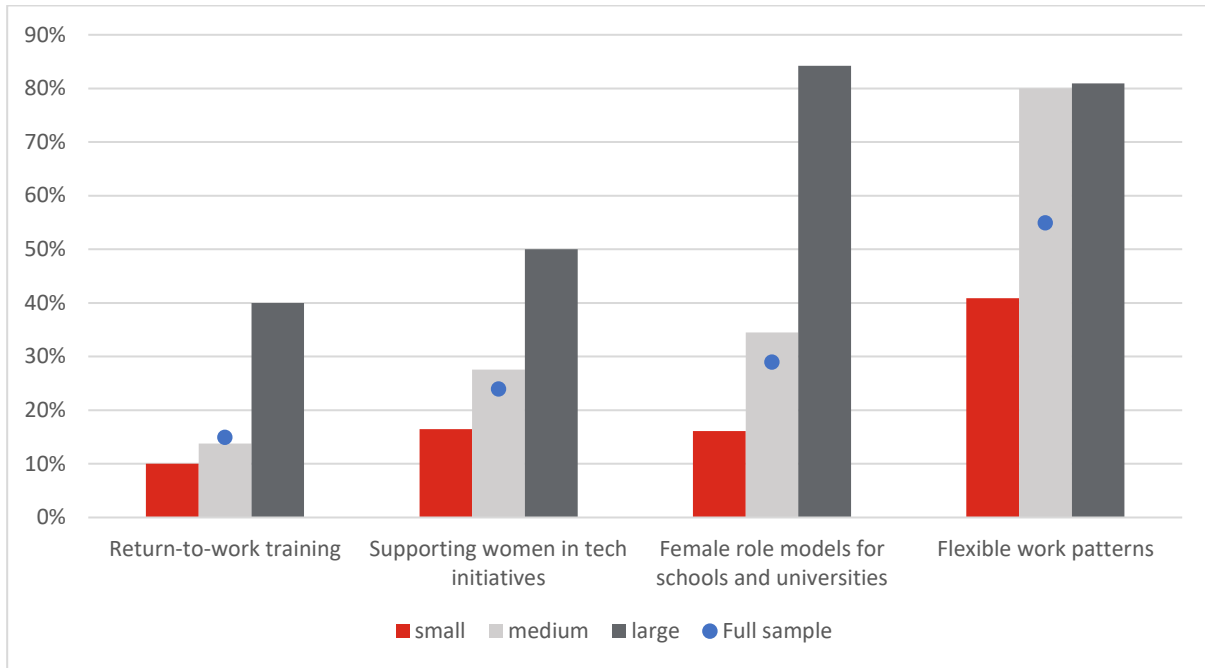


In comments, some respondents highlighted a variety of other steps they are taking to attract more female staff. Several companies report that there are not enough women with the relevant skills on the market, so action is needed to address the gender gap much earlier in the skills pipeline. A few respondents questioned measures to address the gender gap in general and other felt that they already have a good representation of females in their workforce.

Correlation with company size by employee numbers

Companies with up to 35 employees were less likely than medium and large businesses to have taken the steps (and found that they helped) to attract more women included in the answer options. Large businesses were more likely to provide female roles models for schools and universities and return-to-work training or to support initiatives that support women in tech.

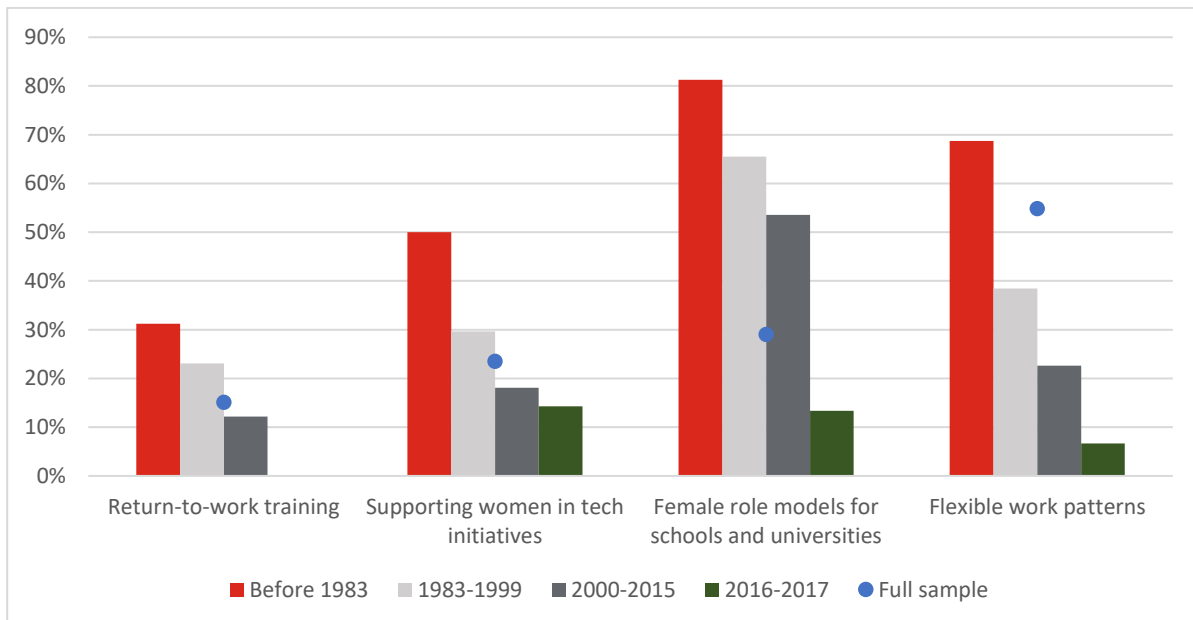
Figure 19 - Steps to address gender gap - answer option "Tried and it helped" -companies by size



Correlation with company age

Companies established before 1983 were considerably more likely than younger businesses to report that they found flexible work patterns, female role models and support for women in tech initiatives to help with attracting more female staff. Start-ups (less than two years old) are much less likely to have taken any of the steps.

Figure 20 - Steps to address gender gap - answer option "Tried and it helped" -companies by year of establishment

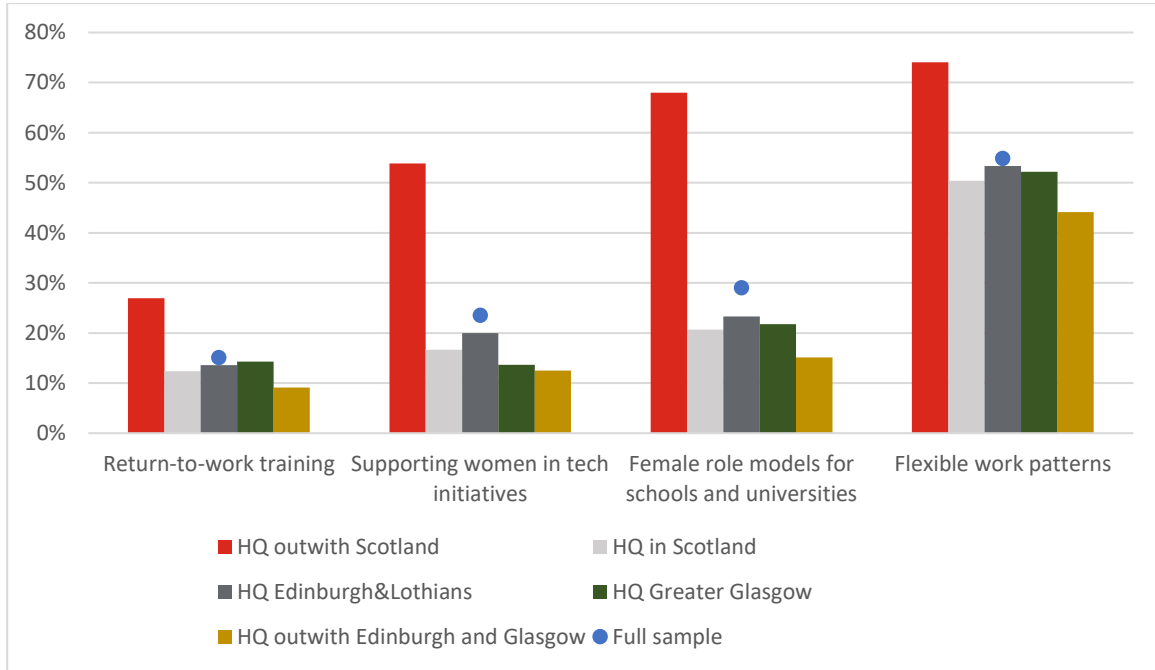


Correlation with headquarter location

Companies with head offices based outside of Scotland are considerably more likely to have successfully taken steps to attract more women than businesses with headquarters

in Scotland. Companies with head offices outside of Edinburgh & Lothians and Greater Glasgow are slightly less likely to offer flexible work patterns, female roles models and return-to-work training.

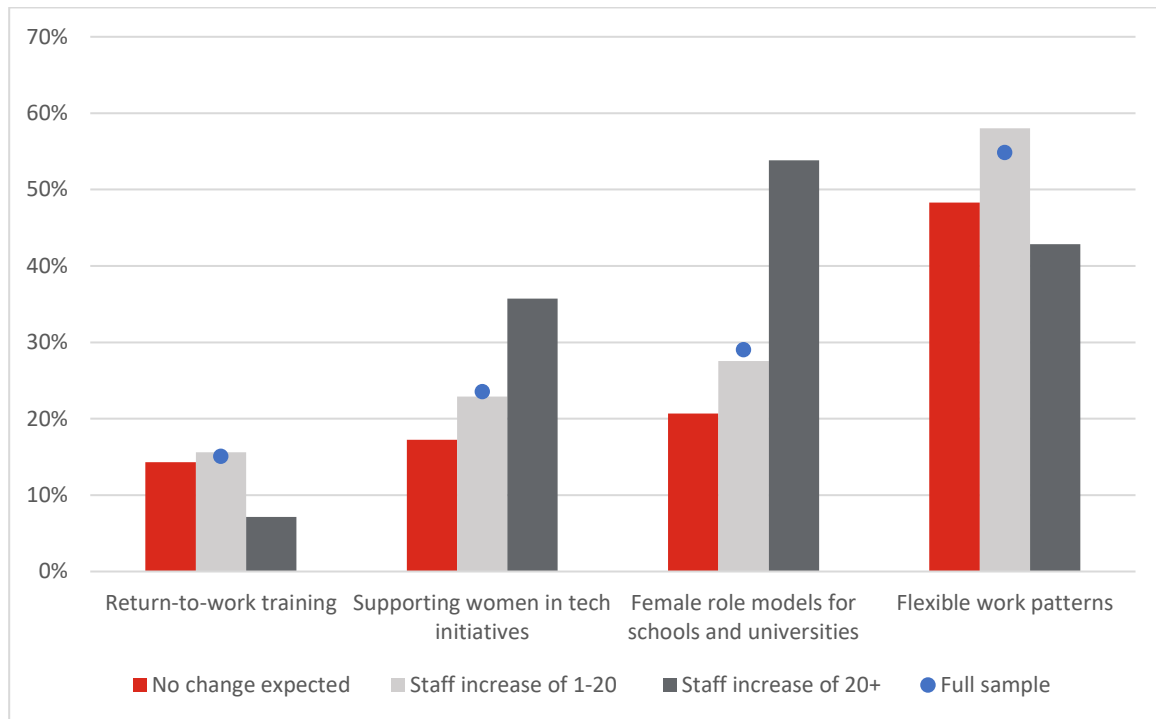
Figure 21 - Steps to address gender gap - answer option "Tried and it helped" -companies by HQ location



Correlation with expected employment growth

Companies that are expecting to take on more than 20 new employees over the next 12 months are more likely than others to support women in tech initiatives and to provide female role models for schools and universities. At the same time, they are less likely to have successfully tried flexible work patterns. Businesses planning to hire up to 20 new people are more likely than the two other company groups to offer flexible work patterns.

Figure 22 - Steps to address gender gap - answer option "Tried and it helped" -companies by change in headcount



a. Survey results in perspective

In 2016 (the latest available ONS data), 63,000 people were employed in digital technologies companies; approximately 60% in technology focused roles and 40% in non-technology roles. The number of people working in digital technologies roles across the whole economy (including in the tech sector) is even higher, at around 90,000 people, representing 4% of the Scottish workforce and growing rapidly (by 10% between 2015 and 2016).¹¹

Despite an evident skills gap in our sector, the proportion of women in digitally focused roles is 18% as opposed to 48% in the workforce as a whole and 39% in other skilled occupations¹². This gender gap has remained largely stable over the last years as e-skills UK (now named TechPartnership) reported in 2011 that 17% of IT & Telecoms professionals (across the wider economy) in Scotland were female.¹³ In the UK as a whole the proportion of female digital technologies professionals is similar with 17% reported by TechPartnership and BCS in 2015 and this figure has not changed significantly since

¹¹ Please see p.30 of the ScotlandIS Scottish Technology Industry Survey 2018, available [here](#), for details on the definition of the digital technologies sector and sources of these figures.

¹² Edinburgh Napier University, Women in ICT and Digital Technologies, Executive Summary, November 2016, p.2.

¹³ E-skills UK, Technology Insights 2012 Scotland, p.17, available [here](#).

2005.¹⁴ A comparison with other European countries shows that the UK ranks in the middle just below the EU average and similar to Germany and Portugal.

Table 3 - Share of women amongst employed ICT specialists in European countries, 2016¹⁵

Country	2016
Bulgaria	30.2%
Romania	26.3%
Latvia	24.8%
Lithuania	24.8%
Iceland	22.0%
Finland	21.9%
Sweden	20.8%
Denmark	20.0%
Cyprus	19.8%
Ireland	19.5%
Norway	19.4%
Estonia	18.7%
France	18.1%
Slovenia	17.3%
Austria	17.2%
European Union	16.7%
Germany	16.6%
United Kingdom	16.2%
Portugal	16.1%
Netherlands	15.6%
Spain	15.4%
Switzerland	14.6%
Poland	14.5%
Italy	14.2%
Belgium	14.1%
Luxembourg	13.7%
Croatia	13.3%
Hungary	13.1%
Greece	12.7%
Malta	11.7%
Czech Republic	11.2%
Turkey	9.9%
Slovakia	9.2%

¹⁴ TechPartnership and BCS, The Women in IT Scorecard 2016, p.35, available [here](#).

¹⁵ Eurostat, Employed ICT specialists by sex, last updated March 2018, available [here](#) , metadata including definition of ICT specialists available [here](#) .

Several other STEM sectors also have low shares of women in their workforce in Scotland. Only 22% of the engineering workforce is female¹⁶, 25% of people working in the energy industry¹⁷ and 13% of the construction workforce¹⁸. Smaller gender gaps exist in creative industries, with 38% women¹⁹, and the life sciences sector with 46% females although stronger imbalances exist in some sub-sectors²⁰.

It is well recognised and evidenced that the underrepresentation of women in STEM starts in the education system. The proportion of females studying computing related subjects in school and university is similar to the proportion of women in the workforce. Females make up 20% of those studying National 5 Computing Science in school, and 16% of computing students at university in Scotland.²¹

Scotland has been impacted by the well-documented digital technologies skills shortage currently experienced across the UK, Europe and the US. There is an enormous opportunity to meet many of the industry's skills needs by closing the technology gender gap. This has been an important driver of change in mindsets and activities in Scotland's digital technologies industry. Over the last few years, an increasing number of companies have started taking action within their organisation and working in partnership with education institutions and the skills agencies to attract and retain more women to the sector.

This is also reflected in the survey results as only 96.6% of respondents have either tried the listed measures to attract more women or would consider them.

Flexible work patterns

The option tried and considered by the largest number of respondents, "offering flexible work patterns", was also the most popular option with 1100 women studying STEM subjects or working in STEM when asked by Equate Scotland what initiatives they felt would increase the number of women working in STEM, if it would be introduced as a standard in all companies.²² Flexible working options are not only likely to help with recruiting more women but also to retain them. Family Friendly Working Scotland found in a survey of over 600 working parents that 65% were more likely to stay with their

¹⁶ Skills Development Scotland, Skills Investment Plan for Scotland's engineering and advanced manufacturing sector, 2014, p.7, available [here](#).

¹⁷ Skills Development Scotland, Skills Investment Plan for Scotland's energy sector, 2014, p.7, available [here](#).

¹⁸ Skills Development Scotland, Skills Investment Plan for Scotland's construction sector, 2014, p.5, available [here](#).

¹⁹ Skills Development Scotland, Skills Investment Plan for Scotland's creative industries sector, 2014, p.6, available [here](#).

²⁰ Skills Development Scotland, Skills Investment Plan for Scotland's life sciences sector, 2014, p.6, available [here](#).

²¹ Digital Scotland, Tackling the Technology Gender Gap Together, 2016, p. 7, available at: http://www.rse.org.uk/wp-content/uploads/2016/09/Tapping-talents-report_FINAL.pdf .

²² Digital Scotland and Equate Scotland, Tackling the Technology Gender Gap Together: A Best Practice Guide for Employers, April 2017, p.13.

employer if they offered flexible working and 62% were more motivated and productive at work.²³

It is difficult to find reliable statistics about the availability and use of flexible working options in Scotland's digital technologies sector. However, data about the share of women working part-time in the sector (16% compared to 33% in other skilled roles²⁴) indicates that flexible working is less prevalent. An analysis of the jobs market in Scotland by Timewise in 2017 showed that only 6.2% of ICT jobs paid £20,000 FTE or more were advertised with flexible working options at the point of hire. This is slightly higher than for roles in engineering (5.3%) and manufacturing (4.6%) but lower than in science/R&D (10%) and below the Scottish average across all roles (11.9%).²⁵ The significantly higher percentage of survey respondents indicating that they tried to offer flexible work patterns to attract more women (58%) probably includes a number of companies that do not advertise this offer in job adverts and/or have not offered flexible working options at point of hire but at a later stage of an employee's career.

Flexible working is also included as one of the measures suggested in a best practice guide for digital technologies employers created by Digital Scotland in partnership with Equate Scotland. This guide also includes case studies of companies like FanDuel, CompanyNet and Quorum that have successfully introduced flexible working to attract a more diverse workforce.²⁶

Role models for school and university students

Providing female role models to engage with girls and young women is a well recognised way to dispel myths and stereotypes about digital technologies related jobs and potentially inspire more females to pursue a career in this or a related field. It helps to address the key problem most STEM companies face when trying to recruit more: the limited number of women with relevant qualifications and experiences on the labour market. As pointed out in some of the comments from survey respondents and highlighted in academic research, the technology gender gap already opens up in the education system.

In a report for Digital Scotland, researchers from Edinburgh Napier University found that "secondary school girls are not overwhelmingly negative towards ICT at school, or to the possibilities of ICT careers, but they are more ambivalent than their male counterparts. They appear not to be engaged by the curriculum, although a number of extra-curricular initiatives have seen good uptake and stimulated enthusiasm among girls. Women studying the subject at university may experience isolation and a feeling of not belonging,

²³ Family Friendly Working Scotland, Time to Rebalance, 2016, p. 6, available [here](#).

²⁴ Digital Scotland, Scotland's Digital Technologies: Summary Report, p. 12, available [here](#).

²⁵ Timewise, The Timewise Flexible Jobs Index Scotland, p. 10, available [here](#).

²⁶ Digital Scotland and Equate Scotland, Tackling the Technology Gender Gap Together: A Best Practice Guide for Employers, April 2017, p.13.

and they are less likely to move into an ICT role after graduation (58% do, compared with 73% of male computing graduates)."²⁷

Role models can help address these issues and several initiatives are underway in Scotland to prepare potential role models for their engagement with young people and encourage employers to support their employees in these activities. Girl Geeks Scotland together with the Digital Technologies Skills Group developed a webinar, guidance materials and classroom activities to help females interested in becoming a role model to get started.²⁸ More formal training is being provided by organisations such as STEM Ambassadors and STEMettes.

Employers could actively encourage female employees to consider becoming a role model and support them by allowing them to do the necessary training and the actual engagement in schools or universities during working hours. Compared to the provision of flexible working options, these activities will not have a direct and short-term impact on an employer's chances to recruit more women. However, they will help to widen the talent pool in the longer term.

Supporting "women in/into technology" initiatives

Women working in technology roles are also increasingly engaged in networking, sharing knowledge and experiences with each other over the last few years through groups such as Women Who Code (Edinburgh group established in December 2016), Ladies of Code (Glasgow group launched August 2016) or Scotland Women in Technology (SWIT). Other groups like Girl Geeks Scotland, Stemettes or SmartSTEMs are focusing on inspiring girls and young women into STEM and digital technologies and supporting them throughout their studies with role models, mentoring and other activities. SWIT also organised the first awards ceremony to champion and celebrate women in the technology industry or technology education in Scotland (October 2017).

In a report on women in ICT and digital technologies, researchers from Edinburgh Napier University pointed out that "previous research has noted the role of gendered informal networks in giving men an advantage in competitive workplace environments, and compounding the issue of women feeling that they do not fit in. Female networks can help women build confidence and feel more a part of the sector."²⁹

Businesses can support such networks, e.g. through sponsorship, by hosting meetings at their premises or providing speakers for events. This can have a direct positive impact on the recruitment of women due to the exposure of the company brand to potential female candidates and also by being seen to actively support women in technology. Supporting

²⁷ Edinburgh Napier University, Women in ICT and Digital Technologies, Executive Summary, November 2016, p.12.

²⁸ The resources are available [here](#).

²⁹ Edinburgh Napier University, Women in ICT and Digital Technologies, Executive Summary, November 2016, p.11.

such networks potentially also has the longer term effect of retaining more women in the sector by helping to create a supportive environment for them.

Return-to-work training

The provision of return-to-work training for women after a career break was clearly the option least used by survey respondents. The results also indicate that larger companies are more likely to offer this kind of training. This seems to be confirmed by a web search for returnship and returner opportunities in the UK which produced mainly results from large employers, e.g. Capgemini, Amazon, EY or Morgan Stanley.³⁰ Data collated by Women Returners Ltd. shows that the number of returnship programmes launched in the UK increased from three in 2014 to 37 in 2017 and many of them are being repeated annually.³¹

Return-to-work training can help employers access a significantly sized pool of women who have left the digital technologies and other STEM sectors and would like to return after a career break. Equate Scotland reports that in the UK “there are 427,000 women currently on career break who wish to return to work at some point in the future”.³² However, they often require support to update their skills and improve their confidence before re-joining the sector. Returner programmes can offer this support but are more resource intensive than the other measures included in the survey question which probably explains why fewer respondents have tried this option.

Advice and guidance for businesses that would like to offer returnships is available, for example through Equate Scotland and best practice guidelines from the Government Equalities Office³³.

The survey results indicate that many Scotland’s digital technologies companies are trying to address the technology gender gap through various actions or would at least consider such actions. The insights presented in this report could help to encourage other companies to also take action and to identify which groups of companies (e.g. small and medium businesses) needs particular support in addressing the technology gender gap.

³⁰ See for example [this list](#) compiled by Women Returners Ltd.

³¹ <http://corp.womenreturners.com/uk-returnships/>

³² <http://www.equatescotland.org.uk/projects/women-returners/>

³³

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685064/Returner_Programmes_-_Best_Practice_Guidance_for_Employers.pdf

Annex

Survey questions

13. Regarding innovation in the past 12 months, which (if any) of the following are true for your operations in Scotland?

- No innovation activities during the past 12 months
- All significant innovation in our business is done outside Scotland
- We have developed new platform technologies
- We have developed new products
- We have developed new services
- We have developed new business models
- We have undertaken organisational or process innovation

21. Innovation - Which (if any) of the following partners or support mechanisms are you aware of and/or would you use in your innovation process when developing new platforms, products or services?

	Have used before and may use again	Have used before but wouldn't use again	Aware of and may use in future	Aware of but unlikely to use	Not aware of yet
Innovation Centres (e.g. The Data Lab)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Catapult Centres (e.g. Digital Catapult)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interface	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Universities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R&D tax credits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EU (e.g. Horizon 2020 funding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Innovate UK (e.g. challenge funding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other companies (e.g. suppliers, partners, customers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scottish Enterprise or Highlands and Islands Enterprise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public sector open innovation competitions (e.g. Scotland CAN DO, CivTech)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you see a gap in the network of innovation support, or would you like to comment on your experiences?

25. There is a digital skills shortage in Scotland, yet the digital technologies industry employs a low proportion of female workers particularly in skilled technical roles.

What steps (if any) has your company taken to attract more female workers?

	Tried it and it helped	Tried it but it didn't help	Would consider it	Unlikely to use it
Providing female role models to engage with schools and universities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Offering flexible work patterns compatible with child care commitments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing return-to-work training for women after a career break	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supporting initiatives such as SWIT, Girl Geeks etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Have you taken any other steps or would you like to comment further on your experiences?