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Scottish Technology Industry Survey 2020

To: **Scotland (All)**   Cc Bcc

Subject: **Introduction**

Reliable information on Scotland's digital technologies sector, it's performance, needs and emerging opportunities is hard to get. Official statistics struggle to keep up with our fast moving industry and more responsive surveys often cover only the UK as a whole and do not provide Scotland specific data. The Scottish Technology Industry Survey is a crucial contribution to filling this information gap, especially during the current time of crisis.

For nearly 15 years, we have been surveying not only ScotlandIS members but all digital technologies related businesses with a presence in Scotland. The initial results for this report were collected in December and January, before the COVID-19 crisis reached Europe. To make sure that we took the latest developments in the sector into account, we asked the sector to respond to a short follow-up survey between 1st and 8th April.

The survey report provides information on the sector's performance during the past year, expected opportunities and challenges, (including Covid-19). It also provides details on skills requirements for the year ahead, all specifically for Scotland.

This information is sought after by individual companies and investors in the digital technologies sector and beyond to inform business and investment decisions. The results are also used by government, public sector and education organisations to shape policies and initiatives in support of digital technologies companies and employers.

ScotlandIS would like to thank everyone who took part in this year's Scottish Technology Industry Survey for their invaluable input. Special thanks go to the University of Edinburgh's Data Driven Innovation Initiative for sponsoring this years' survey and providing input and commentary on data related issues.

Jane Morrison-Ross
Chief Executive, ScotlandIS

Send

Top Trends

General optimism dampened by pandemic

At the start of the year, 79% of respondents were optimistic for the next 12 months. It is no surprise that the outlook for 2020 is considerably more pessimistic now. Nevertheless, about a third of respondents in April reported no change or an optimistic outlook. The top three challenges for 2020, identified in December and January, are staff recruitment and retention, mentioned by 58% of respondents, followed by the current political situation (38%) and sales and winning new business (36%). Concerns about the impact of the political situation have decreased slightly but remain at a higher level than pre-2018. However, despite these concerns, 83% of respondents (same as last year) expected in December and January to increase sales in 2020. In April, only 33% think the same.

About a third of April respondents think that business opportunities over the next 9 months, will arise due to increased or new demands related to the pandemic, e.g. for cloud services, digital connectivity, remote working technology or digital health solutions. Others identify opportunities in their increased ability to work and deliver services remotely or expect more business through expansion into new international markets.

Scotland's tech sector continued to grow in 2019 with 72% survey participants increasing their sales and 53% increasing their profit margins. The share of businesses seeing rising profit margins has gone up for the third year in a row.

Engagement in international markets has increased again after a drop last year. 58% of respondents reported that they are already exporting (up from 53%) and another 24% have plans to do so in the future. The top three current export markets remain the same as in previous years, the Rest of the UK (RUK), Europe, and North America. However, Europe is now leading the ranking (79%), ahead of RUK (66%) and the US (59%). This is a 15% increase for Europe compared to 2018. Europe and RUK are also seen as the most attractive markets for 2020 (both 69%), followed by the UK (61%).
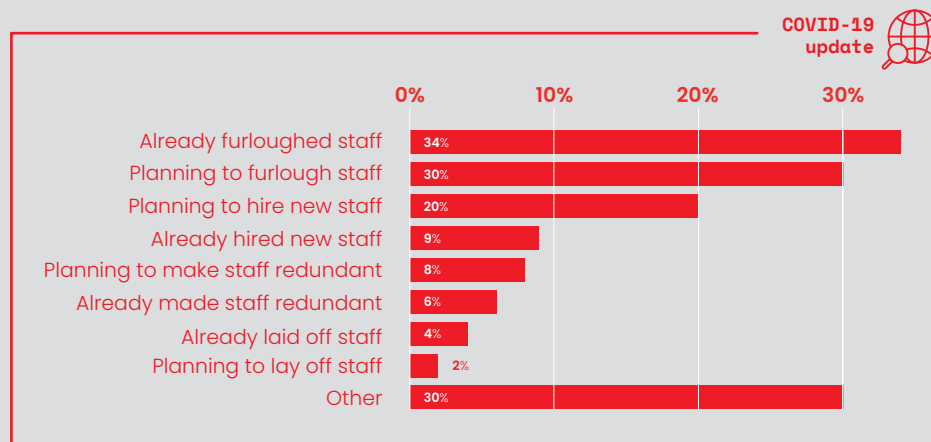
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Ever growing need for new staff

Expectations for employment growth remained high at the start of the year, with 81% of respondents forecasting an increase in their employee numbers in 2020. In April, 71% of respondents expect employee numbers to stay the same or increase until the end of the year which is encouraging given the disruption to our economy.
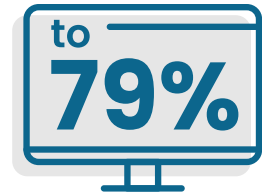
Looking at the results from December and January again, demand for the recruitment of university graduates has increased with 81% of responding businesses reporting that they are likely to recruit this type of talent in the next 12 months, up from figures around 70% over the last 5 years. Demand for college graduates has increased slightly, from 43% to 46%. Nearly two thirds of respondents said they are likely to take on students for work placements.

Graduate apprentices are the most popular type of apprentice, like last year, with 44% of respondents reporting they are likely to recruit someone for a Graduate Apprenticeship (up from 38% in 2019). Interest in modern apprentices decreased (from 32% to 28%) as well as foundation apprentices (from 26% to 14%). 45% of respondents are likely to recruit someone who underwent retraining (CodeClan or other).

The majority of survey participants are taking proactive steps to widen their talent pool with more than two thirds offering flexible working patterns and just over half offering staff the option to work part-time.

COVID-19 update

	0%	10%	20%	30%
Already furloughed staff	34%			
Planning to furlough staff	30%			
Planning to hire new staff	20%			
Already hired new staff	9%			
Planning to make staff redundant	8%			
Already made staff redundant	6%			
Already laid off staff	4%			
Planning to lay off staff	2%			
Other	30%			

. . . demand for data skills has INCREASED to 79%

Increasing demand for data skills

The most in demand skills sets this year are sales & marketing and data skills such as analytics, architecture and visualisation, closely followed by software & web development. 86% of respondents indicated a requirement in sales & marketing, while 79% need data skills and 77% software & web development skills.

When we asked companies about the greatest opportunities for their business over the next 18 months, the top three answers were all data related. This is reflected in respondents skills requirements where the demand for data skills has increased considerably from 59% to 79%. The increase for artificial intelligence and machine learning (AI&ML) skills has also been significant (from 57% of respondents needing them to 72%).

Respondents showed a continuing strong demand for software development skills, with JavaScript, Python and .NET leading the ranking of specific technical skills companies have the greatest demand for. Demand for cloud computing skills has increased significantly from 33% to 52%.

Industry Overview

Scotland's digital technologies sector

In 2019, about 9,700 digital technologies businesses were registered in Scotland (about 40% with more than 1 employee) which makes up 5.5% of the Scottish business base and 5% of the UK's digital technologies business base.[1] After very slow growth of the sector between 2017 and 2018, the pace has picked up again. In 2019, we had 2.3% more digital technologies business than in the year before. In the UK as a whole the sector grew by 3.1%.

According to data from the Office of National Statistics (ONS), 'computer programming and consultancy' is the largest sub-sector, making up 85% of all digital technologies businesses (employing 62% of the tech workforce) followed by 'telecommunications' with 4% of the company base (24% of the workforce).
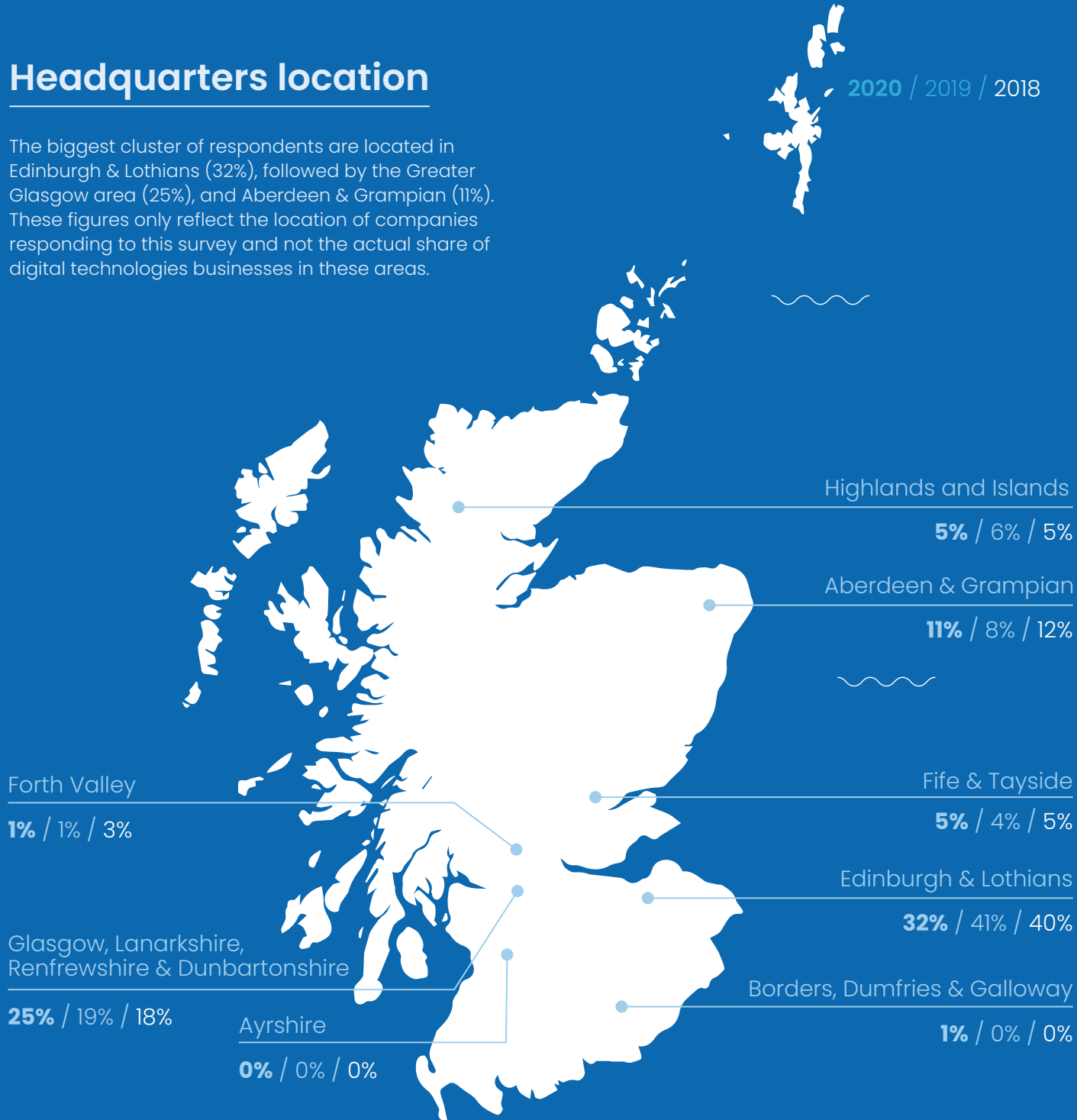
In 2018 (latest available data), the digital technologies sector contributed £7.5bn to the Scottish economy, 5.3% of Scottish GVA. This is not directly comparable to the figure of £5.9bn that we reported in last year's survey report for 2017 as the Office for National Statistics has changed the way they calculate GVA. Until 2029, the digital technologies industry is forecasted to be the second fastest growing sector in Scotland (1.5 times faster than overall economy), only behind the child day-care sectors which is set to grow significantly due to the expansion of free provision.

10% (or about £3.3bn) of Scotland's international sales were generated by digital technologies companies in 2018 (latest available data). This makes the digital technologies sector the fourth strongest sector for exports after food & drink, refined petroleum products and professional services. Compared to 2017, the figures remained largely stable, after a steep rise of 39% between 2016 and 2017. 47% of our sector's exports went to EU countries and the value of exports to the EU has grown by 3% between 2017 and 2018, compared to 0.3% for exports to non-EU countries. Sales by digital technologies businesses in Scotland to the rest of the UK had a value of £3.2bn in 2018. However, actual export figures for the digital technologies sector will be higher since the majority of sales are in the form of services, which are not comprehensively captured by official trade statistics.

1. Please see the chapter on methodology at the end of the report for details on the definition of the digital technologies sector and sources of the figures in this industry overview.

Headquarters location

The biggest cluster of respondents are located in Edinburgh & Lothians (32%), followed by the Greater Glasgow area (25%), and Aberdeen & Grampian (11%). These figures only reflect the location of companies responding to this survey and not the actual share of digital technologies businesses in these areas.

Highlands and Islands
5% / 6% / 5%

Aberdeen & Grampian
11% / 8% / 12%

Forth Valley
1% / 1% / 3%

Fife & Tayside
5% / 4% / 5%

Edinburgh & Lothians
32% / 41% / 40%

Glasgow, Lanarkshire, Renfrewshire & Dunbartonshire
25% / 19% / 18%

Ayrshire
0% / 0% / 0%

Borders, Dumfries & Galloway
1% / 0% / 0%

UK outwith Scotland
9% / 10% / 11%

EU headquartered
1% / 1% / 2%
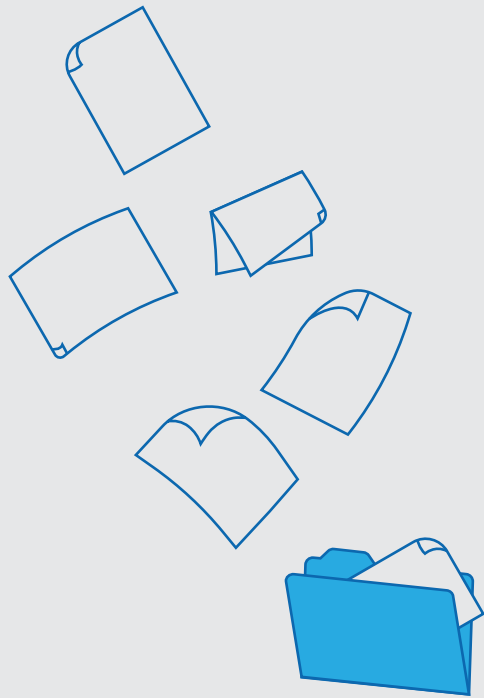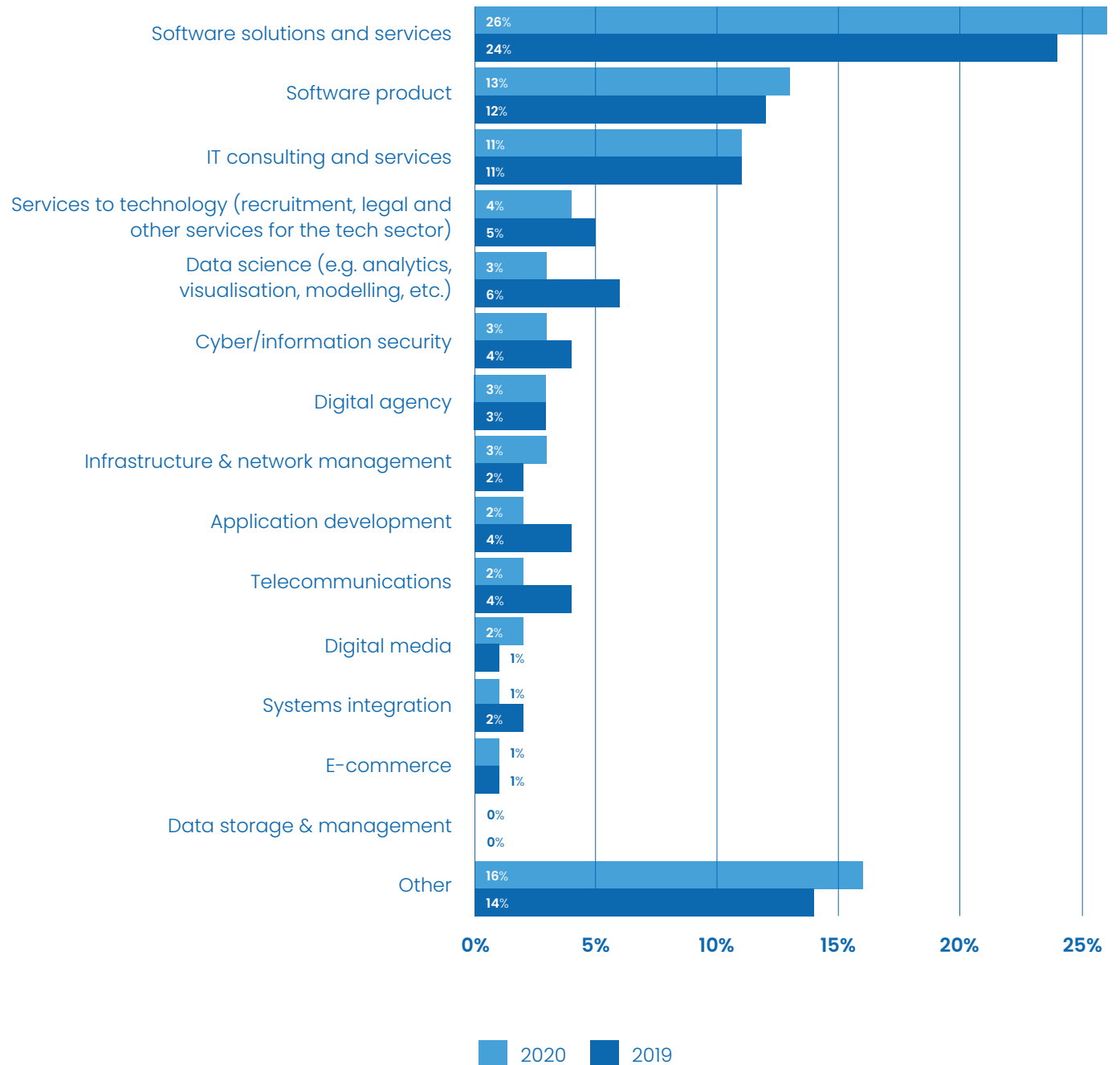
US headquartered
8% / 6% / 4%

Other
2% / 2% / 1%

Main activity of business

Software solutions and services (26%) and software products (13%) continue to be the most significant activities respondents are engaged in.

the main activity of business is
SOFTWARE SOLUTIONS & SERVICES

Activity	2020	2019
Software solutions and services	26%	24%
Software product	13%	12%
IT consulting and services	11%	11%
Services to technology (recruitment, legal and other services for the tech sector)	4%	5%
Data science (e.g. analytics, visualisation, modelling, etc.)	3%	6%
Cyber/information security	3%	4%
Digital agency	3%	3%
Infrastructure & network management	3%	2%
Application development	2%	4%
Telecommunications	2%	4%
Digital media	2%	1%
Systems integration	1%	2%
E-commerce	1%	1%
Data storage & management	0%	0%
Other	16%	14%

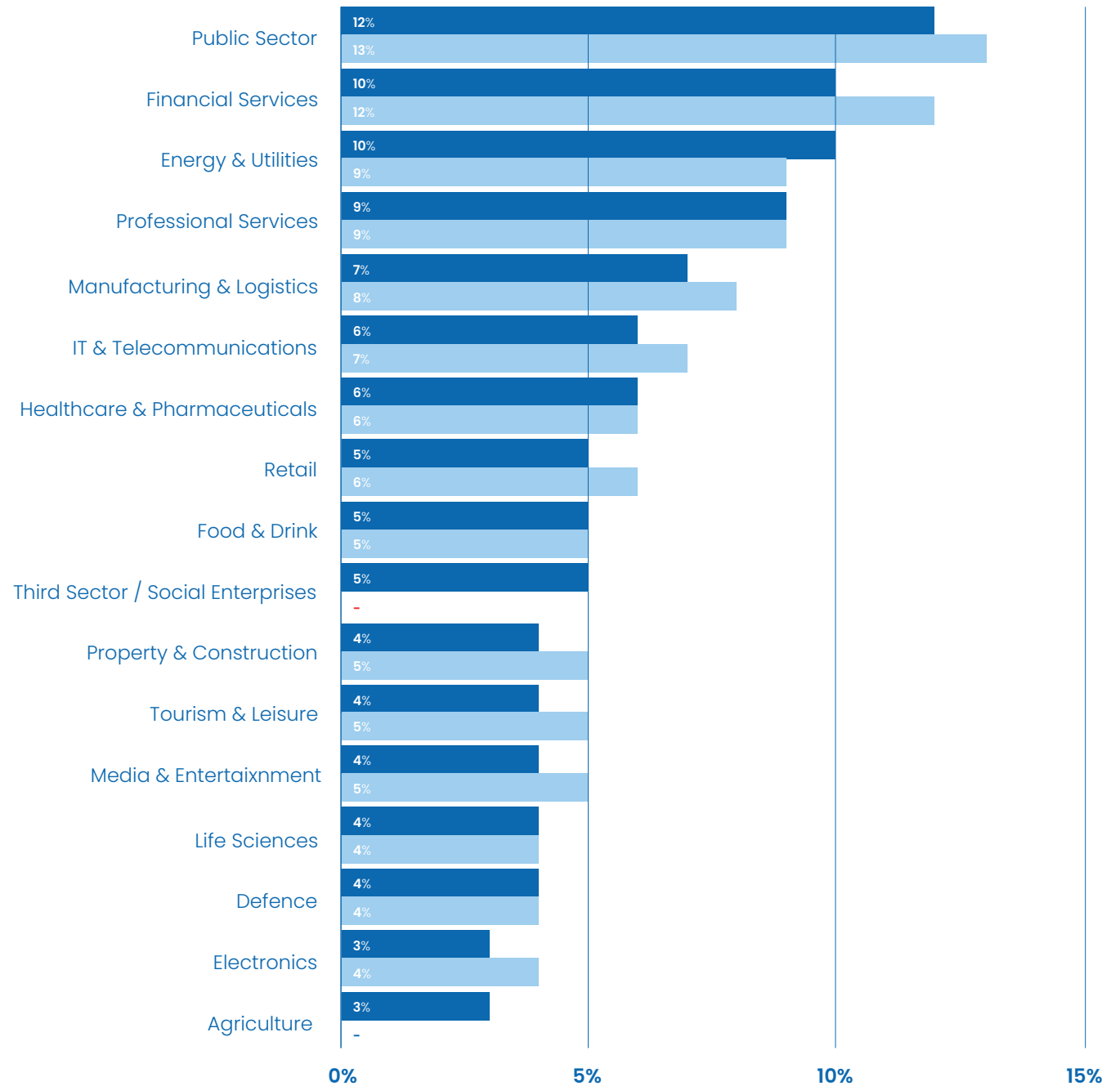0%   5%   10%   15%   20%   25%

■ 2020   ■ 2019

Sectors being supplied

The industry supplies a wide range of sectors - the top four being the public sector (12%), financial services (10%), energy & utilities (10%) and professional services (9%). Changes between 2018 and 2019 are small, with a slight decrease for financial services and electronics and slight increase for IT & telecommunications. For the first time, we added agriculture (3%) and third sector/social enterprises (5%) as answer options.

Asked about expected demand for the next 12 months, 81% of respondents supplying the professional services sector expect an increase in business from this sector, followed by 78% of those supplying the financial services, energy & utilities (72%) and public sector (72%). A decline in demand is anticipated by 12% of public sector and 11% of agricultural sector providers.
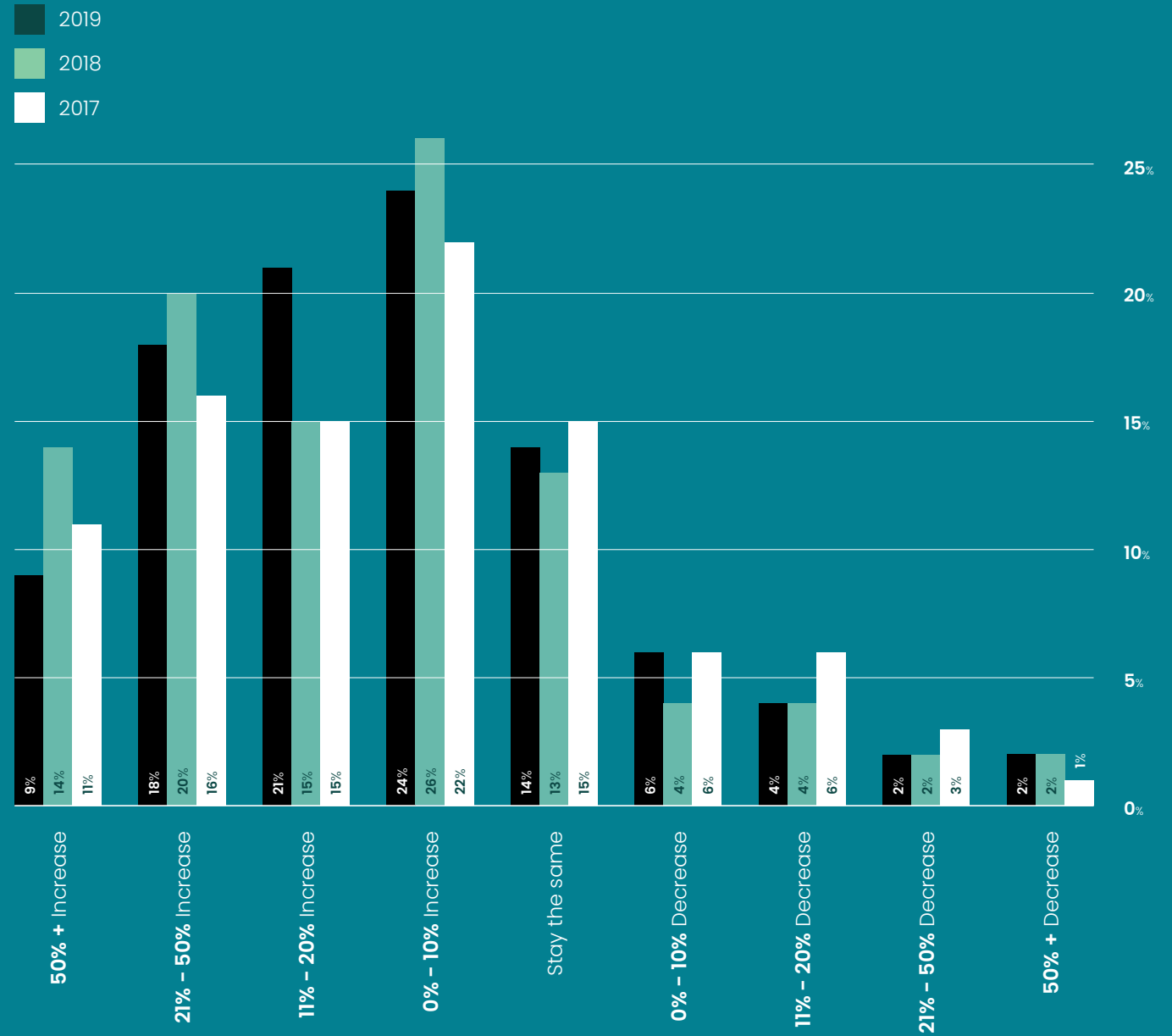
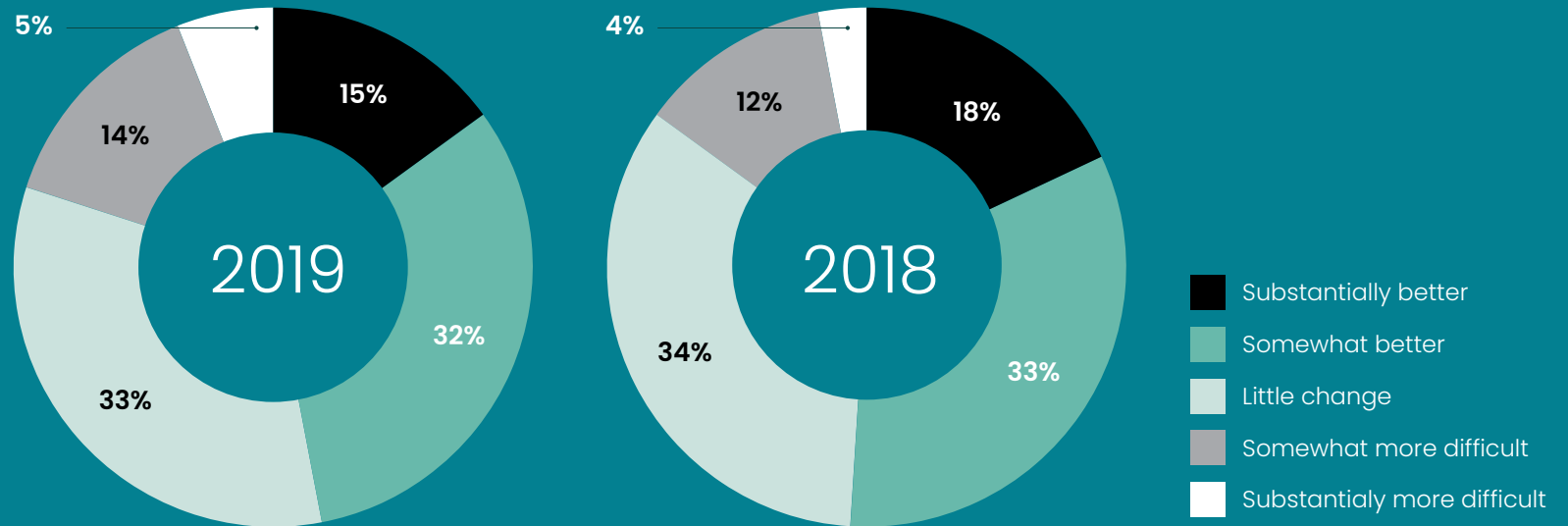| Sector	2020	2019
Public Sector	12%	13%
Financial Services	10%	12%
Energy & Utilities	10%	9%
Professional Services	9%	9%
Manufacturing & Logistics	7%	8%
IT & Telecommunications	6%	7%
Healthcare & Pharmaceuticals	6%	6%
Retail	5%	6%
Food & Drink	5%	5%
Third Sector / Social Enterprises	5%	-
Property & Construction	4%	5%
Tourism & Leisure	4%	5%
Media & Entertaixnment	4%	5%
Life Sciences	4%	4%
Defence	4%	4%
Electronics	3%	4%
Agriculture	3%	-

2020   2019

Review of 2019

Sales levels

The share of companies seeing sales increases has gone down slightly with 72% of companies reporting increased sales for 2019, compared to 75% in the previous year. At the same time, slightly more companies reported a decrease in sales in 2019 (14%) than in 2018 (14%).

Legend:
- 2019
- 2018
- 2017

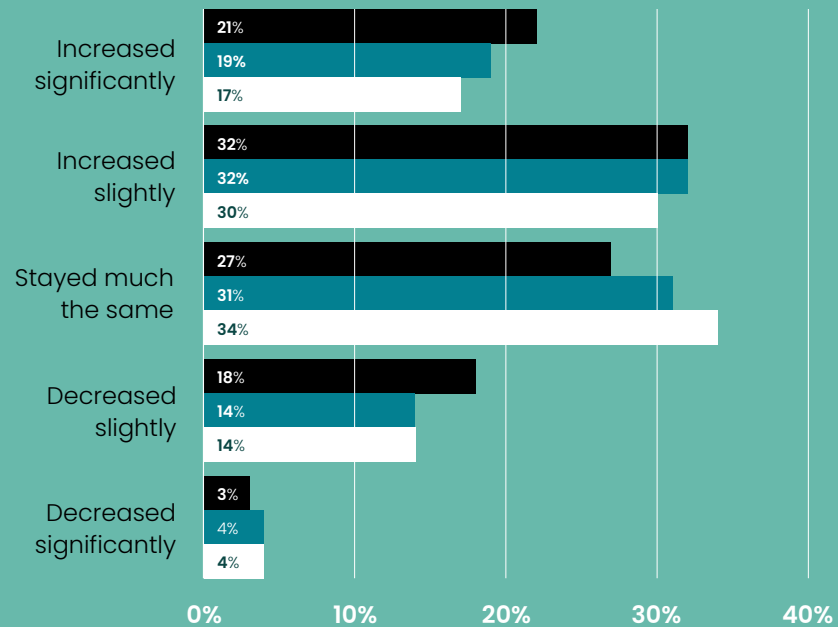| Category	2019	2018	2017
50% + Increase	9%	14%	11%
21% – 50% Increase	18%	20%	16%
11% – 20% Increase	21%	15%	15%
0% – 10% Increase	24%	26%	22%
Stay the same	14%	13%	15%
0% – 10% Decrease	6%	4%	6%
11% – 20% Decrease	4%	4%	6%
21% – 50% Decrease	2%	2%	3%
50% + Decrease	2%	2%	1%

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Cashflow

The cashflow situation of respondents remained largely positive with 47% reporting that cashflow in 2019 was better than 12 months earlier. This has gone down slightly, from 51% in the previous year, whilst the share of companies seeing little change in cashflow remains stable.

2019

- 15%
- 32%
- 33%
- 14%
- 5%

2018

- 18%
- 33%
- 34%
- 12%
- 4%

- ■ Substantially better
- ■ Somewhat better
- ■ Little change
- ■ Somewhat more difficult
- □ Substantialy more difficult

Profit margin performance in 2019 compared to 2018

For the third year in a row, the share of businesses that reported increased profit margins compared to the previous year has grown. In 2019, 53% of respondents saw profit margins rise, compared to 51% in 2018 and 47% in 2017. The share of business experiencing decreasing profit margins remained at a low level.

Increased significantly
- 21%
- 19%
- 17%

Increased slightly
- 32%
- 32%
- 30%

Stayed much the same
- 27%
- 31%
- 34%

Decreased slightly
- 18%
- 14%
- 14%

Decreased significantly
- 3%
- 4%
- 4%

0% 10% 20% 30% 40%

profit margins
ROSE
FOR
53%
of respondents

- ■ 2019
- ■ 2018
- □ 2017

Outlook for 2020

At the beginning of the year, respondents were nearly as optimistic as they were at the beginning of 2018. After a dip in 2019, 79% of said they are very optimistic about the next 12 months, compared to 72% in 2019 and 80% in 2018.
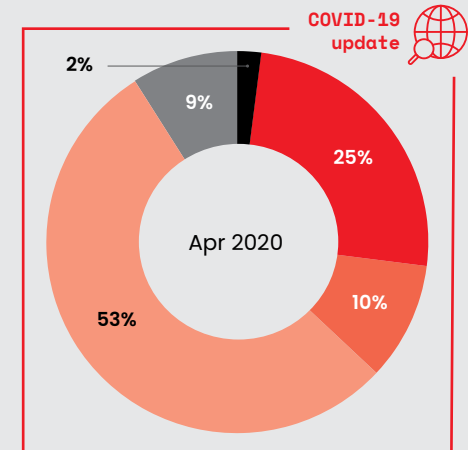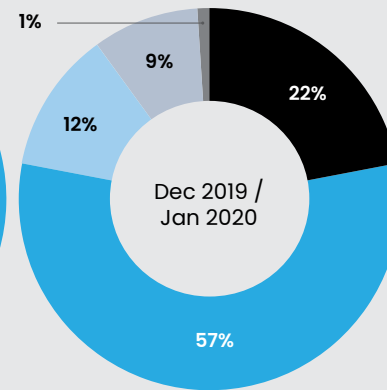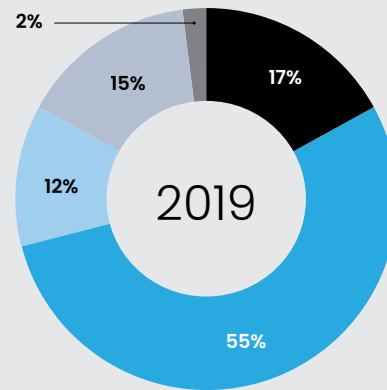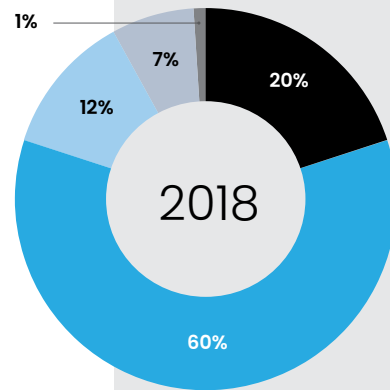
It is no surprise that the outlook for 2020 is considerably more pessimistic now. 62% of April respondents were pessimistic or very pessimistic for the rest of 2020, compared to only 10% at the start of the year. Nevertheless, about a third of respondents in April reported no change or an optimistic outlook. Most respondents with an optimistic outlook are either confident that their business is able to adapt to the new situation or they sell products or services that are in particular demand during the current crisis.

48% of respondents in December and January linked their optimism to the introduction of new products, strong demand for existing products and services or a growing market (up from 31% in 2019). 8% of companies are optimistic because of a generally good situation in their market. The share of respondents indicating that they are pessimistic because of political uncertainty, mainly due to Brexit, has remained largely stable (20% this year, 18% in 2018).

The top three challenges for 2020 are staff recruitment and retention, mentioned by 58% of respondents, followed by the current political situation (38%) and sales and winning new business (36%). The share of respondents identifying the political situation as a challenge has decreased slightly by 4 percentage points but remains at a much higher level than pre-2018.

The most common challenges April respondents expect to face for the rest of the year are securing new business (76%), cashflow and income management (66%) and staff health and wellbeing (33%). Only one in ten respondents indicated that avoiding insolvency is among their top 3 challenges.

2018
- 1%
- 7%
- 12%
- 20%
- 60%

2019
- 2%
- 15%
- 12%
- 17%
- 55%

Dec 2019 / Jan 2020
- 1%
- 9%
- 12%
- 22%
- 57%

Apr 2020
COVID-19 update
- 2%
- 9%
- 25%
- 10%
- 53%

Legend:
- ■ Very optimistic
- ■ Optimistic
- ■ No change
- ■ Pessimistic
- ■ Very pessimistic
- ■ Very optimistic
- ■ Optimistic
- ■ No change
- ■ Pessimistic
- ■ Very pessimistic

Expected change in sales over the next 12 months

At the beginning of the year, businesses were as optimistic about expected sales levels for the next 12 months as last year, with 83% of companies predicting an increase and 8% expecting sales to stay the same (both same as in 2019).

A comparison over the last 4 years shows that 2018 was a year of exceptionally high sales expectations whereas expectations for 2020 are similar to those in 2019 and 2017.
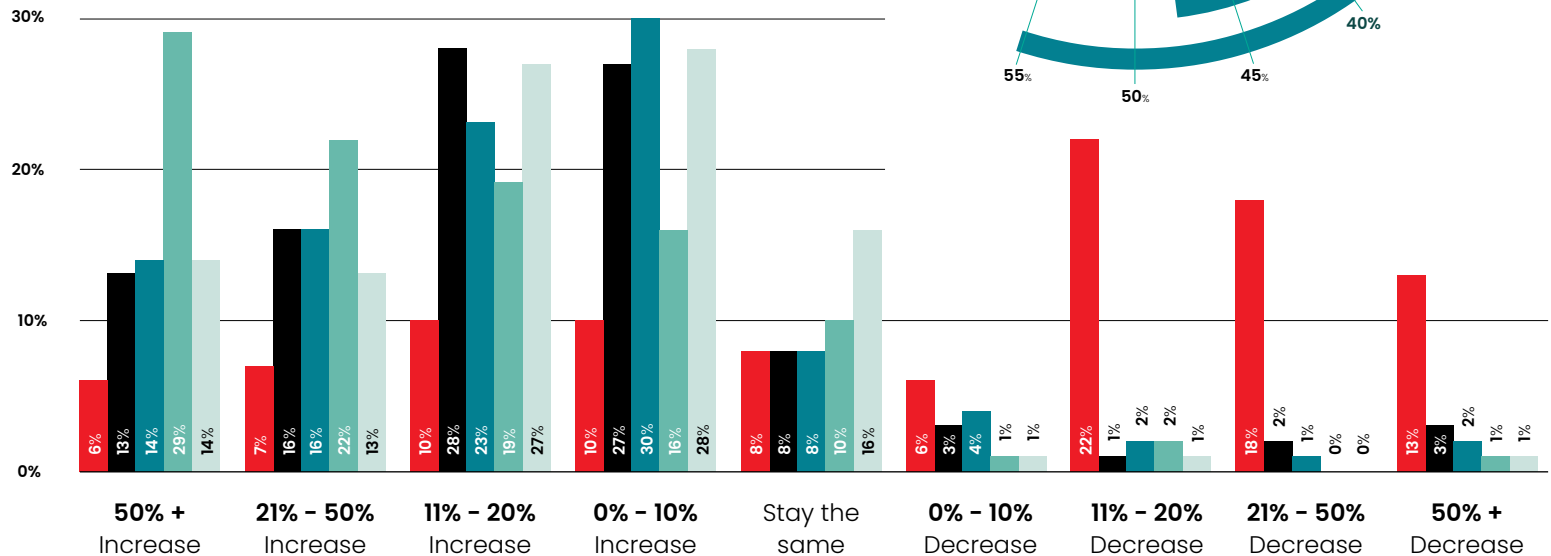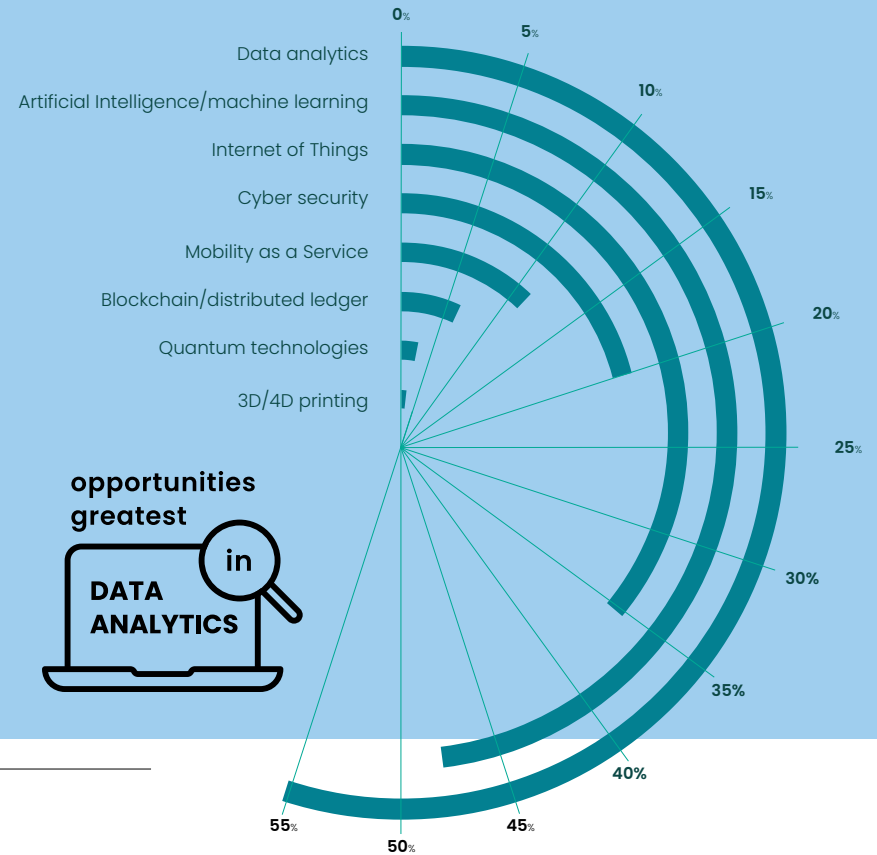
In line with the general outlook for 2020, expectations for sales until the end of the year have also deteriorated. In April, only 33% of respondents expect sales increases for the rest of 2020.

April 2020 COVID-19 update 🌐
Dec 2019 / Jan 2020
2019
2018
2017

New opportunities

In December and January, companies reported seeing the greatest opportunities for their business over the next 18 months in data analytics (55%), followed by artificial intelligence and machine learning (48%) and Internet of Things (36%). Quantum technologies and 3D/4D printing are generally not perceived as key opportunities over the next 18 months. These results are largely similar to last year, however the share of respondents naming data analytics as a key opportunity increased by 10%.

In April, about a third of respondents think that business opportunities over the next 9 months, will arise due to increased or new demands related to the pandemic, e.g. for cloud services, digital connectivity, remote working technology or digital health solutions. 17% identify opportunities in their increased ability to work and deliver services remotely. 11% mention that they expect more business through expansion into new international markets. 9% see partnerships and collaborations as key opportunities.
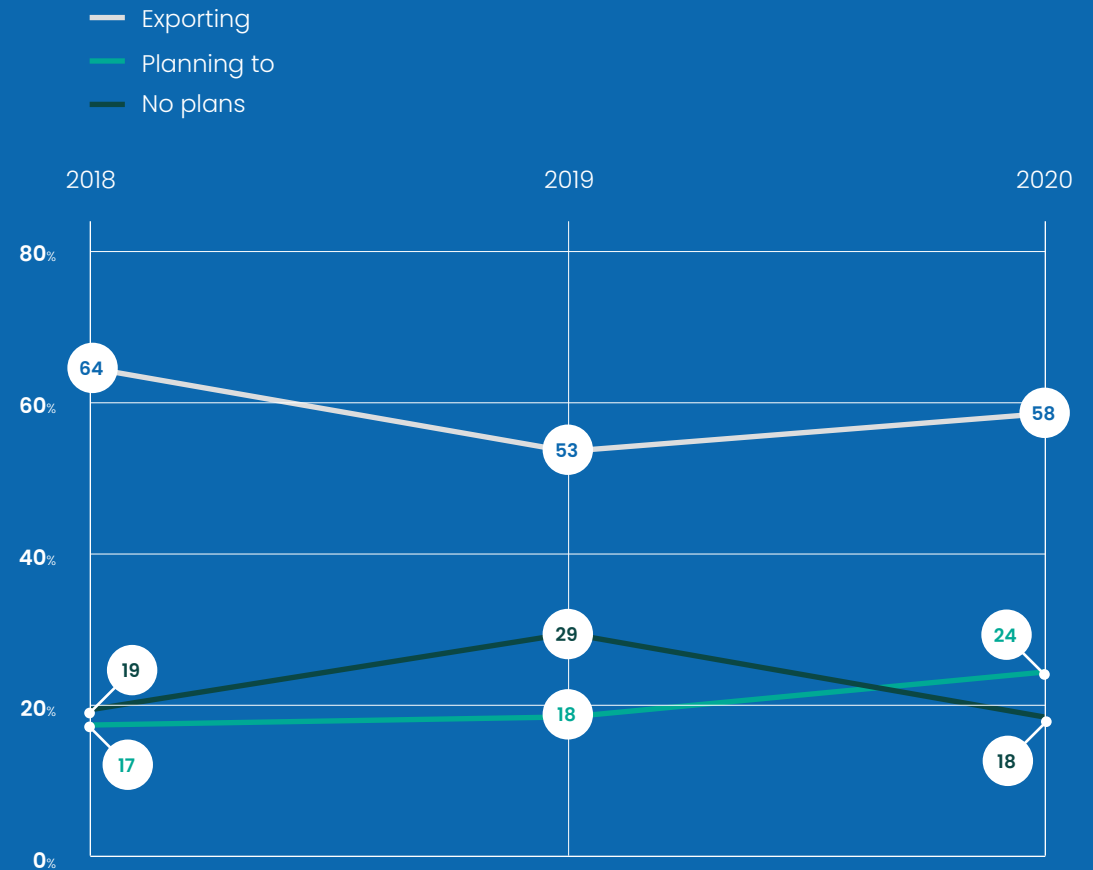
Data analytics
Artificial Intelligence/machine learning
Internet of Things
Cyber security
Mobility as a Service
Blockchain/distributed ledger
Quantum technologies
3D/4D printing

opportunities greatest in **DATA ANALYTICS**

0% · 5% · 10% · 15% · 20% · 25% · 30% · 35% · 40% · 45% · 50% · 55%

	50% + Increase	21% – 50% Increase	11% – 20% Increase	0% – 10% Increase	Stay the same	0% – 10% Decrease	11% – 20% Decrease	21% – 50% Decrease	50% + Decrease
April 2020	6%	7%	10%	10%	8%	6%	22%	18%	13%
Dec 2019 / Jan 2020	13%	16%	28%	27%	8%	3%	1%	2%	3%
2019	14%	16%	23%	30%	8%	4%	2%	1%	2%
2018	29%	22%	19%	16%	10%	1%	2%	0%	1%
2017	14%	13%	27%	28%	16%	1%	1%	0%	1%

International Opportunities

Export levels

Engagement of respondents in international markets has increased again after a drop last year. 58% of respondents reported that they are already exporting and another 24% have plans to do so in the future.

- Exporting
- Planning to
- No plans

	2018	2019	2020
Exporting	64	53	58
No plans	19	29	18
Planning to	17	18	24

EUROPE

was one of the top 3
export markets

Export markets

The top three current export markets remain the same as in previous years, the Rest of the UK (RUK), Europe, and North America. However, Europe is now leading the ranking (79%), ahead of RUK (66%) and the US (59%). This is a 15% increase for Europe compared to 2018.

Europe and RUK are also seen as the most attractive markets for 2020 (both 69%), followed by the US (61%). These figures are largely similar to last year's survey.

Top markets in 2019 / Most attractive in 2020

North America
59% / 61%

Rest of the UK
66% / 69%

Europe
79% / 69%

Africa
4% / 4%

Middle & South America
5% / 6%

Asia
24% / 23%

Middle East
11% / 12%

Australia & New Zealand
14% / 12%

Employment & Skills

Digital technologies employment in Scotland

In 2018 (the latest available ONS data), 76,000 people were employed in digital technologies companies, which is an increase of 26% compared to 2017. This is a remarkable growth after the sector workforce contracted by 6% between 2016 and 2017. The majority of these additional employees work in computer programming and consultancy businesses or data and information services companies. In Great Britain (no UK data available), the number of employees in digital technologies companies decreased by 1% which makes the increase in Scotland even more noteworthy.

Research commissioned by Skills Development Scotland has shown that between 2016 and 2018, the number of people working in digital technologies professions has grown by 9% to around 100,000, 23% of which are female. The growth has been strongest in web design and development, IT business analysts, architects and systems designers, programmers and software development professionals. [1]

Digital technologies roles offer both a wide variety of career opportunities and above average compensation, even though the average salary for digital technologies jobs decreased slightly. In 2018, the average annual salary for people working in digital technologies occupations was £36,900, 26% higher than the Scottish average of £29,200, but about 1.5% lower than in 2016. Since 2013, digital technologies salaries have increased at a faster rate (15%) than salaries across the wider economy (11%).

Around 13,000 digital technologies job opportunities are created every year, partly in response to people retiring from or leaving the industry but also through growing demand for these skills. There continues to be a gap between the number of job opportunities and the number of college and university leavers, apprentices and career changers that enter the labour market with relevant skills.

However, progress is being made, for example by a 15% increase in computing science graduates between 2014/15 and 2017/18. This was substantially more than the previous increase of 5% in the two years from 2012/13. The number of young people starting Modern Apprentices in digital technologies continues to double about every two years and reached 1,800 in 2017/18. Another 300 people had started a Graduate Apprenticeship related to digital technologies in 2018/19.

Over the last year, ScotlandIS has started some new initiatives to address the digital technologies skills gap. Find out more about it in the chapter "ScotlandIS commentary" at the end of this report.

1. Please see the chapter on methodology at the end of the report for details on the definition of the digital technologies sector and sources of the figures in this employment overview.
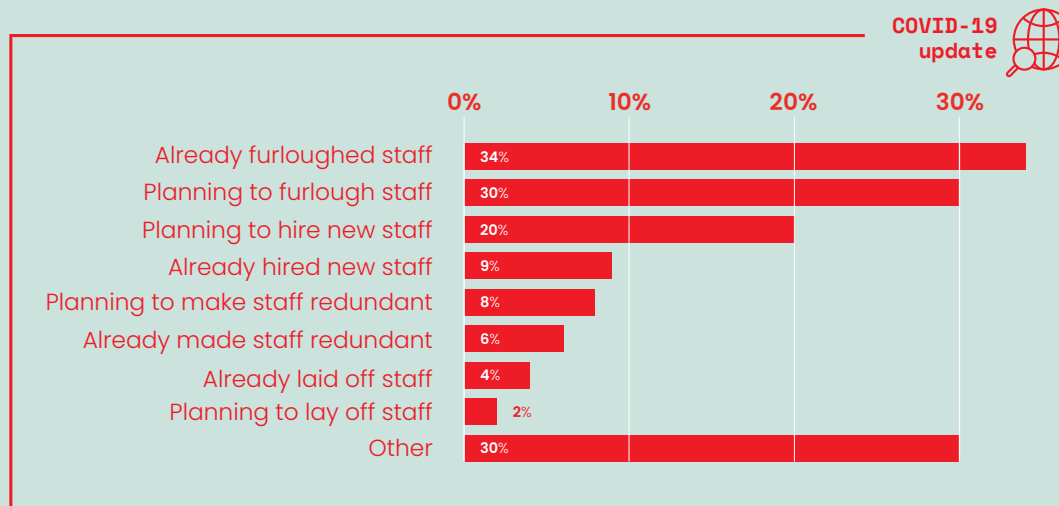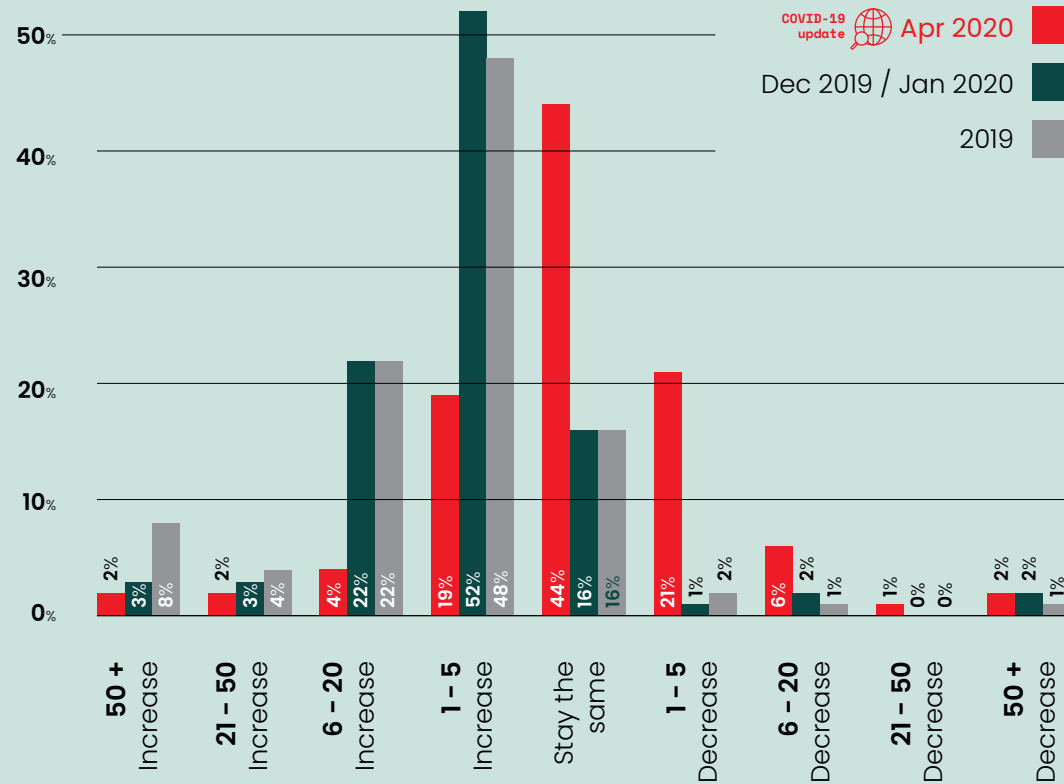
Change in employee numbers over the next 12 months

At the start of 2020, expectations for employment growth were high, with 81% of respondents forecasting an increase in their employee numbers. Forecasts have been at this high level for the last 4 years (81% in 2019, 80% in 2018 and 78% in 2017).

In April, 44% of respondents expect their employee number to stay the same until the end of 2020 with 27% forecasting an increase in headcount. This is certainly less positive than before, but it is still very encouraging to see that 71% are forecasting no change or an increase in staff numbers, given the current situation. It is also reassuring that the vast majority of those companies now forecasting shrinking staff levels expect only a decrease between 1 and 5 employees.

Looking closer at the current situation, about one third of respondents have already furloughed staff and 30% are planning to do so in the next weeks. 29% have already hired new people or are planning that in the near future. Only 8% have already or are planning to make staff redundant and lay offs are also rare. The other employment related measures mentioned include pay cuts, reduced working hours or no action at all because the company's situation doesn't require any cost reductions.

71%
OF RESPONDENTS STILL PLAN TO
RETAIN / HIRE
NEW STAFF

Chart: Change in employee numbers over the next 12 months

Legend:
- COVID-19 update — Apr 2020 (red)
- Dec 2019 / Jan 2020 (dark green)
- 2019 (grey)

Category	Apr 2020	Dec 2019 / Jan 2020	2019
50 + Increase	2%	3%	8%
21 – 50 Increase	2%	3%	4%
6 – 20 Increase	4%	22%	22%
1 – 5 Increase	19%	52%	48%
Stay the same	44%	16%	16%
1 – 5 Decrease	21%	1%	2%
6 – 20 Decrease	6%	2%	1%
21 – 50 Decrease	1%	0%	0%
50 + Decrease	2%	2%	1%

COVID-19 update bar chart

Already furloughed staff	34%
Planning to furlough staff	30%
Planning to hire new staff	20%
Already hired new staff	9%
Planning to make staff redundant	8%
Already made staff redundant	6%
Already laid off staff	4%
Planning to lay off staff	2%
Other	30%

Location of talent

The majority of respondents (70%) continue to expect to find most of new staff in Scotland. Companies seem to be slightly more confident in their ability to recruit from Europe again after a dip last year.

2020 / 2019 / 2018

Scotland

70% / 70% / 70%

Rest of the UK

**15%** / 17% / 12%

Europe

9% / 5% / 11%

Rest of the World

6% / 9% / 7%

Recruitment from colleges and universities

Demand for the recruitment of university graduates has increased with 81% of responding businesses reporting that they are definitely or quite likely to recruit graduates in the next 12 months, up from figures around 70% over the last 5 years.

Interest in college graduates has increase slightly with 46% definitely or quite likely to hire them, up from 43% last year.

For the first time, we asked companies how likely they are to take on students for work placements. 63% of respondents are likely to recruit them whilst 28% are unlikely to do so.

University graduates

College graduates

Students for work placement
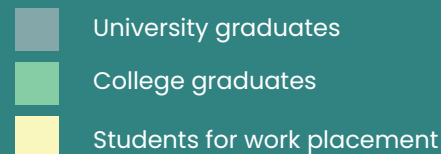
Definitely will recruit

37%

8%

21%

Quite likely to recruit

44%

38%

42%

Not applicable / Not aware of

5%

11%

9%

Unlikely to recruit

14%

44%

28%

Recruitment of apprentices

Graduate apprentices are the most popular type of apprentice, like last year, with 44% of respondents reporting they are likely to recruit someone for a Graduate Apprenticeship (up from 38% in 2019). Interest decreased for modern apprentices (from 32% in 2019 to 28%) as well as foundation apprentices (from 26% to 14%).

For the first time, we asked companies how likely they are to take on someone who underwent retraining (CodeClan or other). 45% of respondents are likely to recruit such a person whilst 35% are unlikely to do so.

Legend:
- Modern Apprentices
- Graduate Apprentices
- Foundation Apprentices
- Retrained

Definiteliy will recruit
- 7%
- 10%
- 5%
- 7%

Quite likely to recruit
- 21%
- 34%
- 9%
- 38%

Unlikey to recruit
- 51%
- 39%
- 55%
- 35%

Not applicable / Not aware of
- 21%
- 17%
- 32%
- 20%

(x-axis: 0%, 10%, 20%, 30%, 40%, 50%)

Legend (top right chart):
- Tried it & it helped
- Tried it but it didn't help
- Would consider it
- Unlikely to use it

Offering flexible work patterns
- 66%
- 3%
- 26%
- 5%

Offering option to work part-time
- 44%
- 7%
- 35%
- 14%

Reviewing language & tone of job adverts
- 34%
- 5%
- 46%
- 15%

Reviewing required qualifications & experiences
- 30%
- 5%
- 42%
- 23%

Expanding your talent pool

Given the persistent skills gap in our industry, we asked survey participants this year what steps they have taken to expand the talent pool they can recruit from.

Offering flexible work patterns is the most common measure taken by respondents. 66% of respondents have tried it and found that it helped with recruitment. This is an increase from 2018, when we asked a very similar question and 55% of respondents had tried it successfully.

Larger businesses are more likely to have taken all of these steps than small and medium companies. There is a particularly stark difference between larger and small businesses when it comes to reviewing language and tone of job adverts. 75% of larger companies having tried it successfully but only 23% of small businesses.

Other measures mentioned by respondents were homeworking, diversity friendly recruitment processes and new formats of job adverts, e.g. videos.
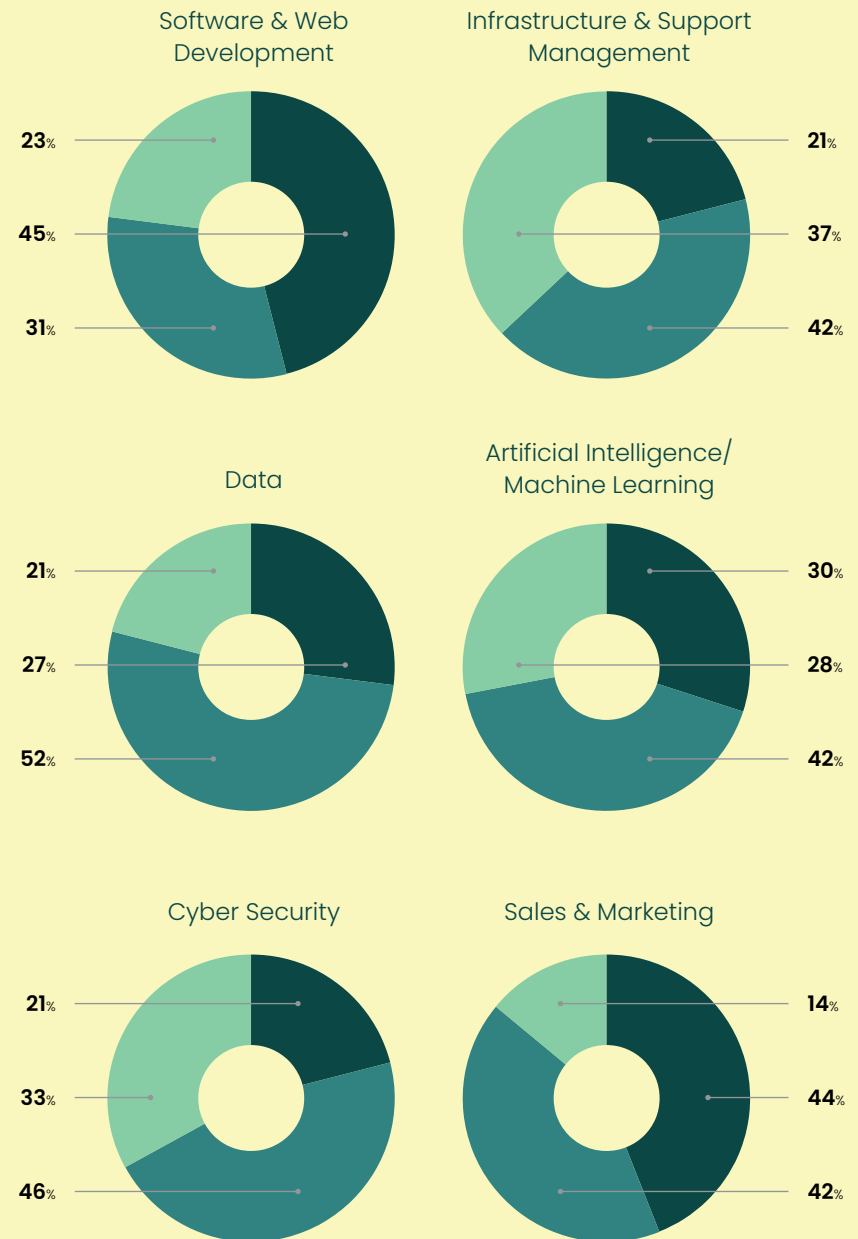
Most in demand skill sets

Sales and marketing remains the most in demand skills set with 86% of respondents indicating some or a high requirement in that area (same as last year), followed by 79% with a requirement for data skills such as analytics, architecture and visualisation and 77% with a requirement for software and web development skills. The demand for data skills has increased considerably from 59% to 79%. The increase for artificial intelligence and machine learning (AI&ML) skills has also been significant (from 57% to 72%).

Amongst larger companies the greatest demand is for data and AI/ML skills, with 100% each, which is considerably higher than in the overall sample. 95% of larger companies require cyber security skills, compared to 67% in the overall sample.

Medium sized businesses have strong demand for data skills (89%), followed by sales and marketing skills (87%) and AI&ML skills (80%). The demand for all skills sets included in the questions is higher amongst mid-sized businesses than in the overall sample.

For smaller businesses, sales and marketing (86%) and software and web development (75%) are the most in demand skill sets. Data skills are required by 72% to aid business growth in smaller companies, followed by AI&ML skills (63%) and cyber security skills (58%).

High Requirement
Some Requirement
No Requirement
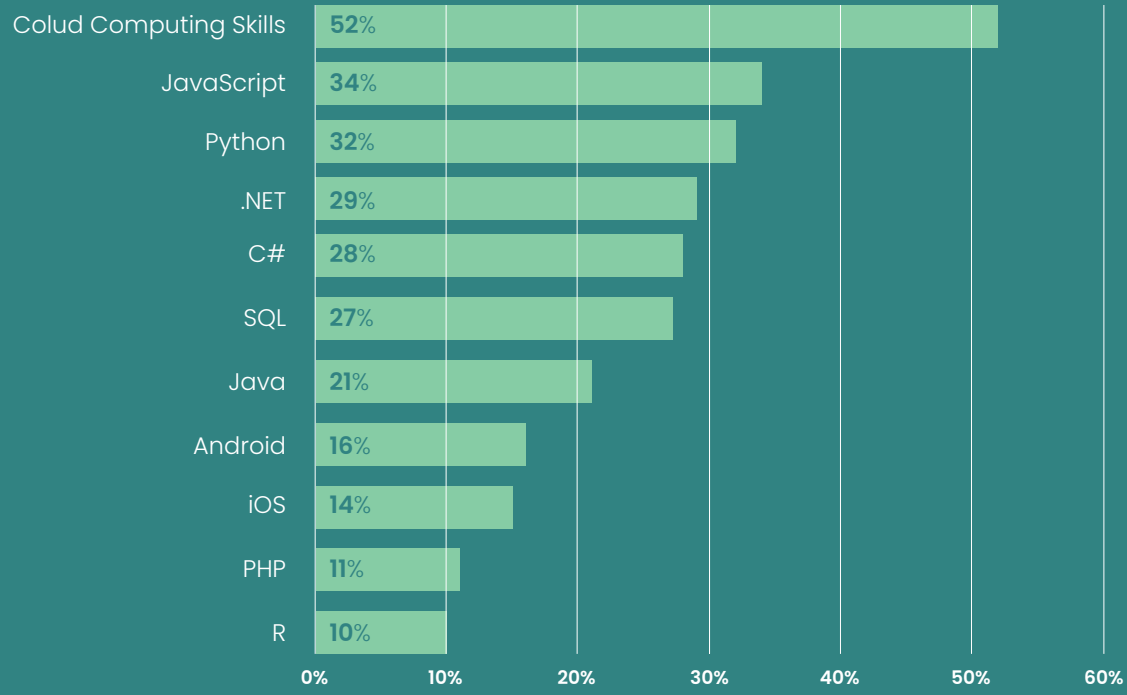
Software & Web Development
23% 45% 31%

Infrastructure & Support Management
21% 37% 42%

Data
21% 27% 52%

Artificial Intelligence/ Machine Learning
30% 28% 42%

Cyber Security
21% 33% 46%

Sales & Marketing
14% 44% 42%

Technical skills

Skill	%
Colud Computing Skills	52%
JavaScript	34%
Python	32%
.NET	29%
C#	28%
SQL	27%
Java	21%
Android	16%
iOS	14%
PHP	11%
R	10%

Respondents showed a continuing strong demand for software development skills, with JavaScript, Python and .NET leading the ranking of specific technical skills companies have the greatest demand for. R remains at the bottom of the list but was chosen by 10% of this year's respondents as their top tech skills requirement, compared to 5% last year.

Demand for cloud computing skills has increased significantly from 33% last year to 52%.

cloud computing
is top
tech skills requirement

Data

In cooperation with the University of Edinburgh's Data-Driven Innovation Initiative, part of the Edinburgh and South East Scotland City Region Deal, we included a number of questions on the use of data and the need for data related skills in this year's survey.

When we asked companies about the greatest opportunities for their business over the next 18 months, the top three answers were all data related, for the second year in a row. 55% of respondents see the greatest opportunities in analytics, followed by artificial intelligence and machine learning (48%) and Internet of Things (36%).

Data maturity

Asked about their maturity in using data to drive value across the organisation, about a third of respondents reported having identified a need and are taking the first steps towards a strategy and pilots. 30% have already defined a strategy and are actively implementing it. 24% of respondents identify as a mature data driven organisation, up from only 15% in 2019. The share of companies having no active focus in using data strategically remained stable at about one quarter.

Mature data driven organisation, with a well understood data strategy infused across the organisation.	Defined data strategy and actively executing this in one or more areas of the organisation.	Identified a need and working towards a data strategy and initial pilots/experimentation.	No active focus in using data strategically across our organisation.
24%	**30**%	**34**%	**24**%

Data use

We asked survey participants in which areas data is being used in their organisation to improve outcomes. Two thirds of respondents use it to gain customer insights, followed by process optimisation (60%) and marketing (55%). Some respondents indicated that they use data also to improve sales performance.

Data related needs

Improving their ability to turn data insight into business action is the most common data related need of respondents (55%), followed by data analysis skills and capabilities (39%) and the extraction of data from the organisation's own systems.

- ■ Improving data insight into business action
- ■ Data analysis skills/capabilities
- ■ Getting data out of your own systems
- ■ Access to data, held by someone else
- □ Data wrangling skills/capabilities

19%
18%
27%
39%
55%

Sponsor Commentary

THE UNIVERSITY of EDINBURGH

DDI Data-Driven Innovation

Part of the Edinburgh & South East Scotland City Region Deal

As highlighted in last year's survey, there is a huge potential for Scotland to benefit both economically and socially through data innovation.

The desire to embed data into the mainstream continues to represent a significant opportunity, a key activity in which the University of Edinburgh's Data-Driven Innovation initiative wants to play a supportive role for organisations from many different sectors. This is highlighted in the survey with almost 50% of companies identifying data analytics and Artificial Intelligence/Machine Learning technologies as those areas where they need additional skills to aid business growth.

This is supported by the number of companies now operating as mature data-driven organisations - with a well understood data strategy infused across the organisation – running at 23%. A further 47% have either identified the need to work towards a data strategy through initial pilots/ experimentation, or have moved to a defined data strategy and are implementing this in one or more areas of the organisation. There remains a high percentage of companies who have yet to embark on this journey, with 30% yet to focus on using data strategically across their organisations.

To address this, as in previous years, there is a need to understand the challenges that impede adoption and execution of data activities.

I was fascinated, but not surprised, by how this differs by company size. Whilst for smaller enterprises, getting access to data held by someone else presented a greater challenge, for more mature organisations getting data out of their own systems represented more of a challenge.

Whilst data wrangling skills/capabilities and data analysis skills/capabilities also featured highly, particularly for small and medium sized enterprises, the largest challenge identified, at 33%, was improving how to turn data insight into business action.

This is an interesting finding beyond those identified in previous years, and talks to the need to increase adoption within companies to realise the value from data, integrating it more completely into those areas of enterprises that execute business action.

This report provides clear signals that Scottish companies, whether recent start-ups, or large enterprises, continue to move in a positive direction. It also highlights that, as we are seeking through the Data-Driven Innovation Programme, there needs to be a combination of talent, adoption, data and enterprise to drive the full value of data both in companies and for individuals. As part of the Edinburgh and South East Scotland City Region Deal, the DDI initiative will be playing its part to promote investment in delivery in all these aspects to realise the full potential for Scotland, and beyond.
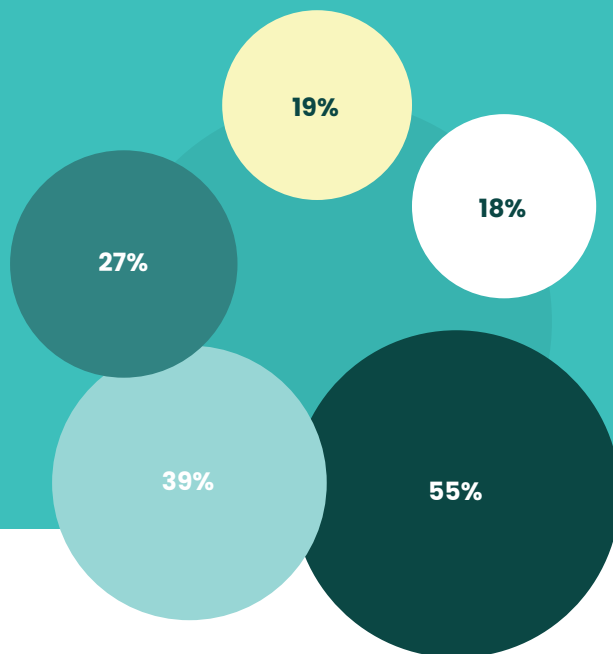
Ritchie Somerville
Head of Strategy, Data-Driven Innovation initiative

Benchmark 1:

## Smaller Companies (up to 35 employees)

Reflections on 2019

2019 was largely a good year for smaller businesses, with 68% experiencing an increase in sales (down from 74% in 2018) and 51% reporting increased profit margins (up from 43%).

68%
INCREASED
SALES IN 2019

International sales

47% of smaller businesses are selling internationally, up from 46% last year. Another third are planning to export in the future, which is nine percentage points higher than in the previous year.

2020
2019

	Already exporting	Planning to export	Unlikely to export
2020	47%	33%	20%
2019	46%	24%	30%

Legend
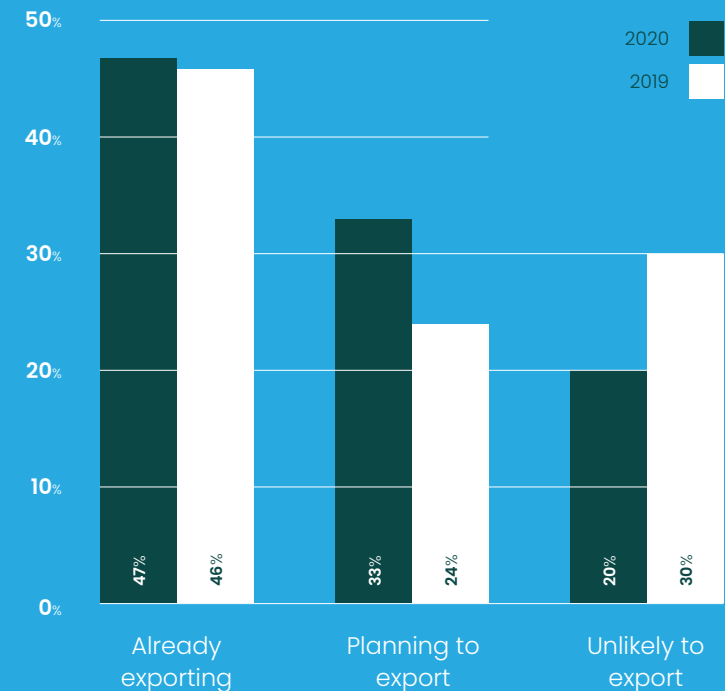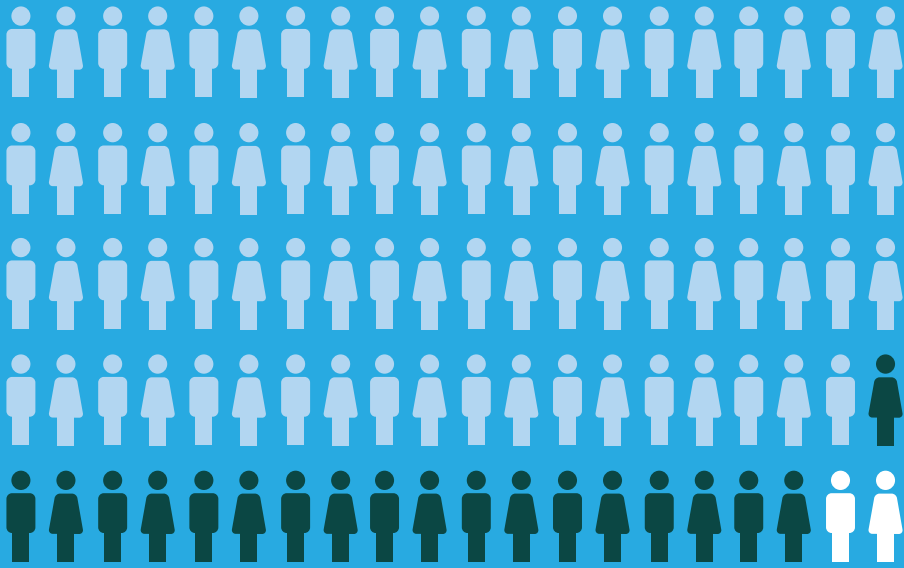
- Recruit more staff
- Stay the same
- Decrease in staff

People and skills

79% of small businesses expect to increase staff numbers, slightly up from last year.

75% of respondents are likely to recruit university graduates (up from 64% in 2019) and 42% think that they will take on college graduates (down from 44%). Graduate apprentices are the most popular type of apprentice, with 39% of respondents from smaller companies saying they are likely to recruit them, followed by 22% for modern apprentices and 8% for foundation apprentices. 45% reported that they are likely to employ someone who underwent retraining (CodeClan or other) in the next 12 months.

Financial environment

Turnover for 96% of smaller businesses was in the region of £0-£5M. The figures are similar to previous years.

18% £501k – £1M

17% £1.1M – £5M

20% £251k – £500k

100%

41% £0 – £250k

2% £10M +

2% £5.1M – £10M
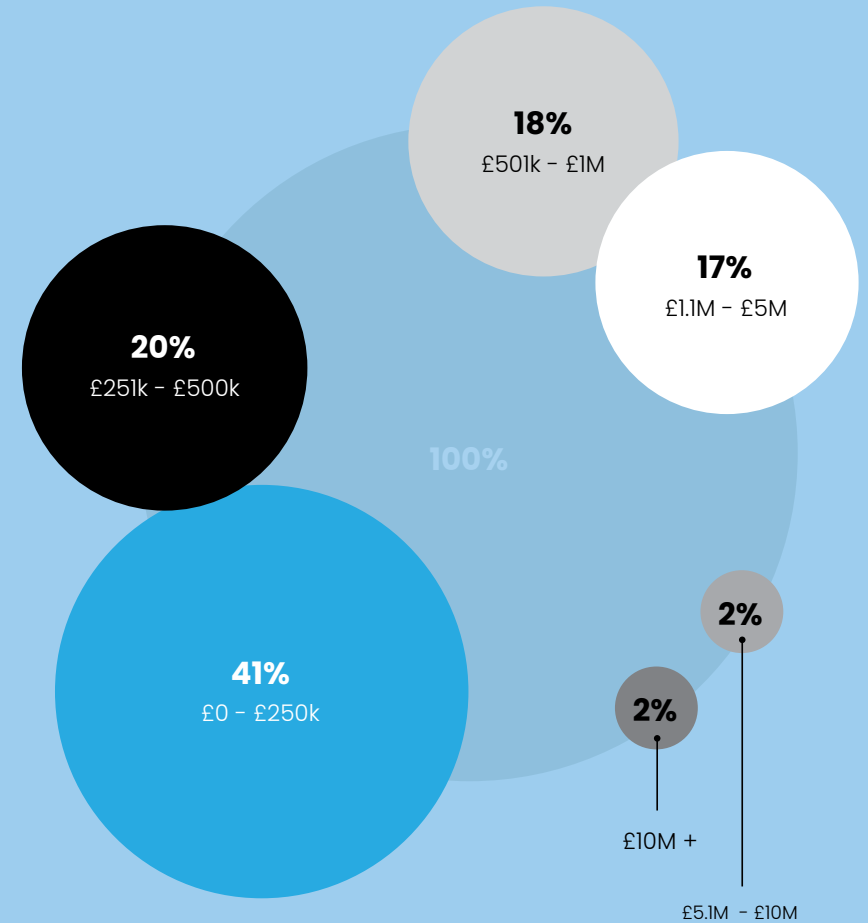
Funding needs

For the majority of smaller businesses that need additional finance, e.g. for growth in 2020, grant funding is the preferred option, followed by private investment and venture capital. The need for grant funding has increased significantly from 31% last year to 58% in 2019.
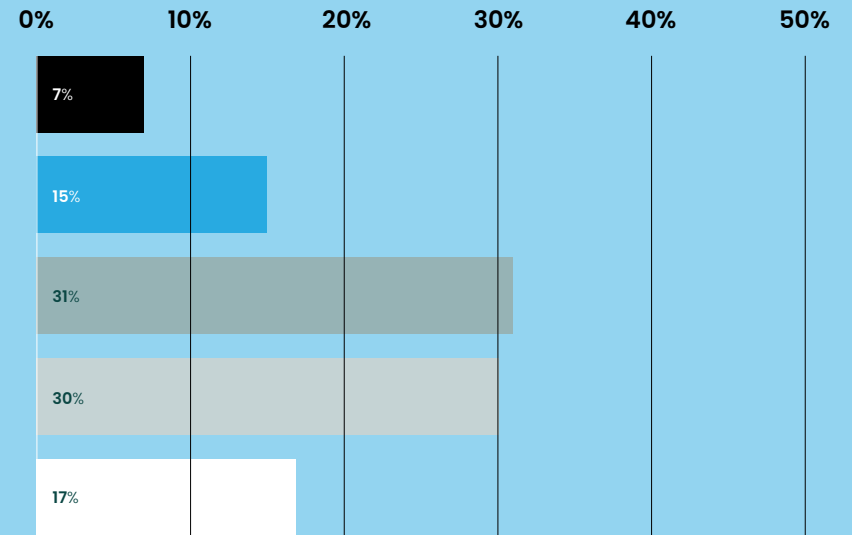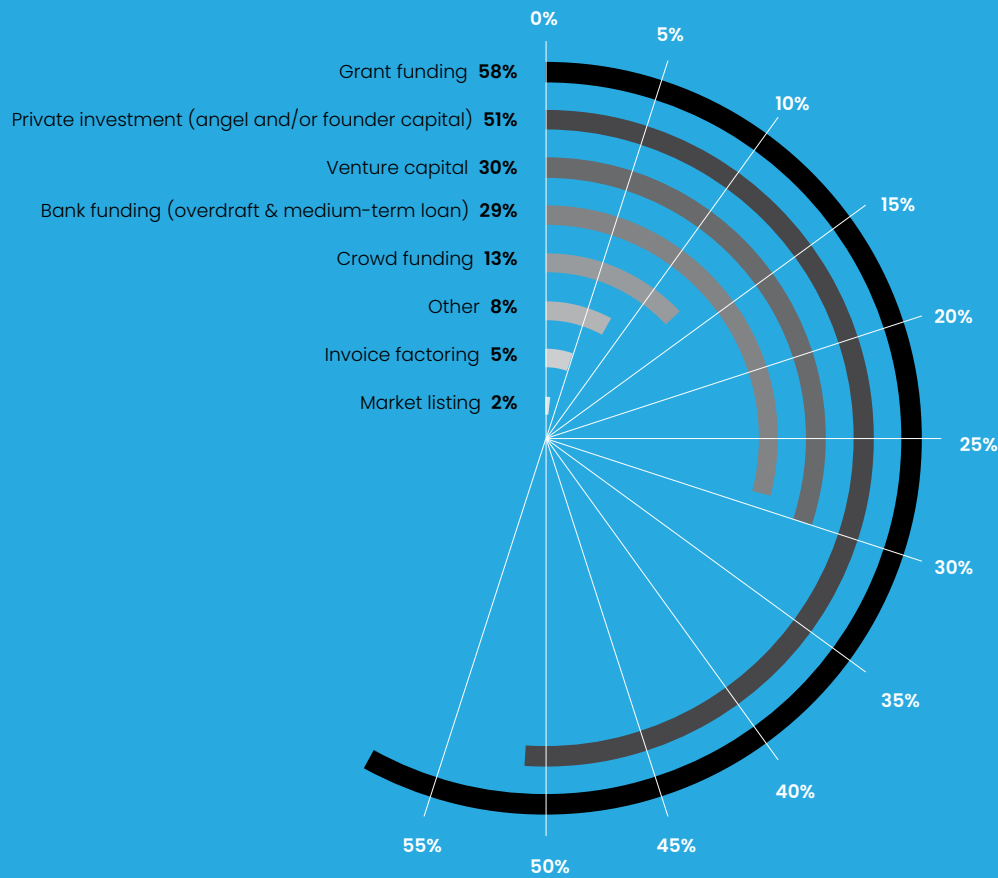
Grant funding **58%**
Private investment (angel and/or founder capital) **51%**
Venture capital **30%**
Bank funding (overdraft & medium-term loan) **29%**
Crowd funding **13%**
Other **8%**
Invoice factoring **5%**
Market listing **2%**

7%

15%

31%

30%

17%

Substantially more difficult

Somewhat more difficult

Little change

Somewhat better

Substantially better

47%
improved
CASH FLOW
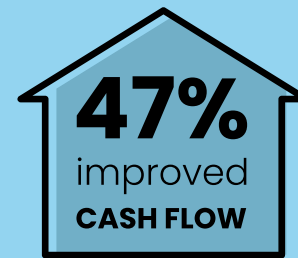
Cashflow compared to last year

Smaller businesses reported a slightly more difficult cashflow situation than last year. Whilst 47% experienced improvements (up from 46%), 22% reported difficulties (up from 18%).

2019 sales levels compared with 2018

In 2019, 68% of smaller businesses reported an increase in sales compared with 2018, which is down from the previous year (74%). The share of businesses seeing sales levels fall has increased to 17% (from 13% in 2018).
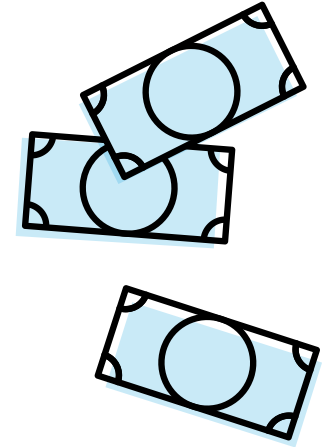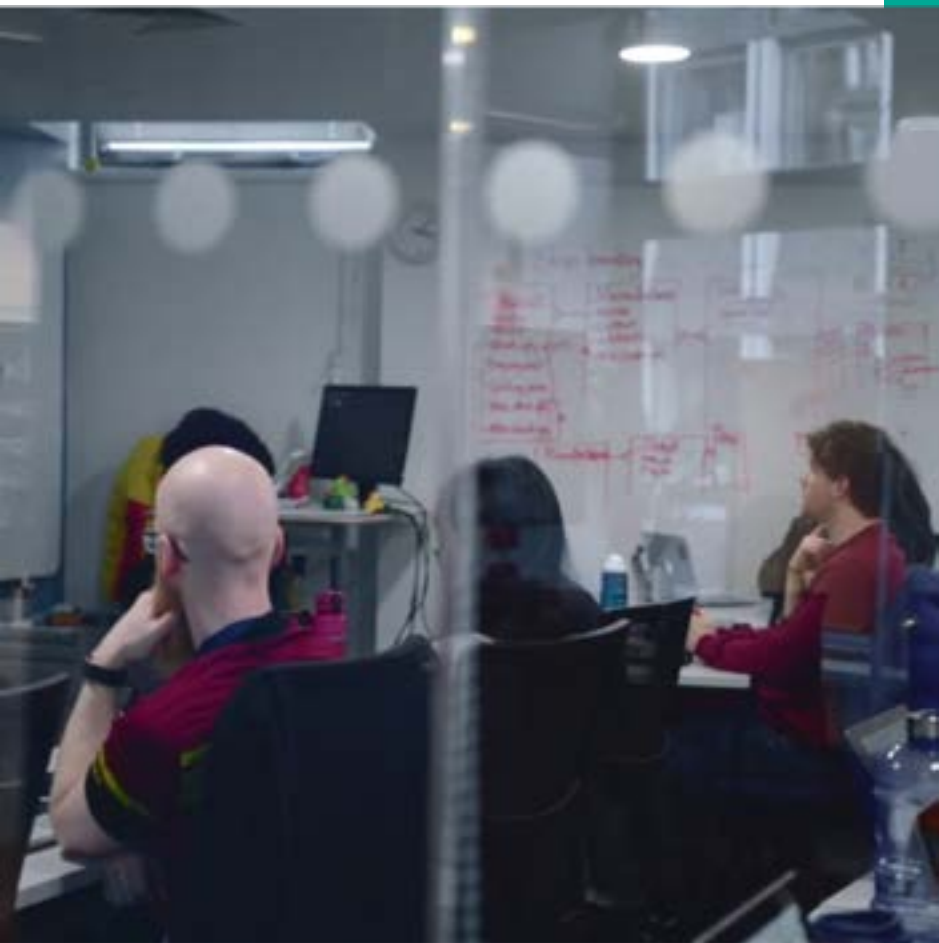
13%
50% Increase

20%
21% - 50% Increase

16%
11% - 20% Increase

19%
0% - 10% Increase

15%
Stay the same

5%
11% - 20% Decrease

3%
50% + Decrease

6%
0% - 10% Decrease

3%
21% - 50% Decrease

0%

100%
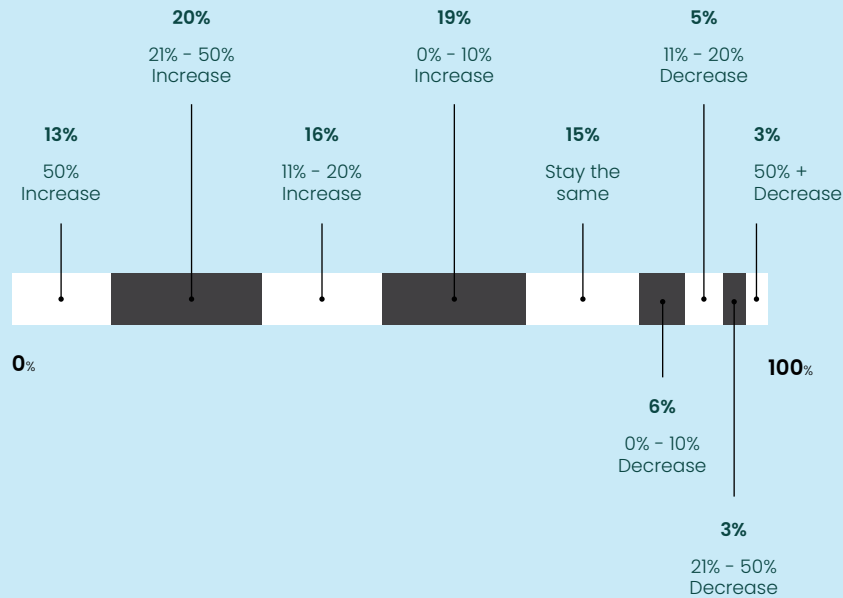
68% reported an
INCREASE
IN SALES

Profit margins

In 2019, more smaller companies (51%) reported increased profit margins than previously (43%). Particularly the share of smaller companies seeing significantly increased profit margins went up by eight percentage points.

3%
Decreased significantly

17%
Decreased slightly

23%
Increased significantly

28%
Increased slightly

29%
Stayed much the same
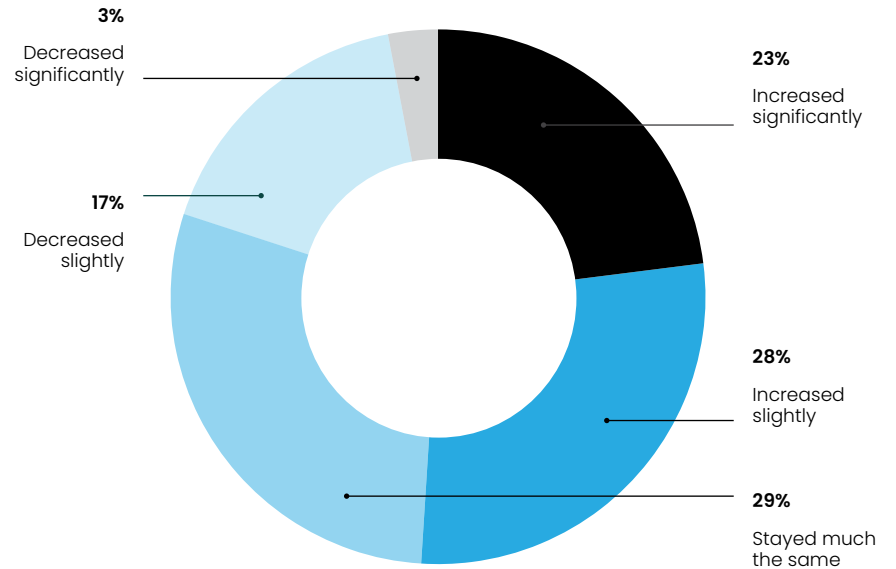
Benchmark 2:

Medium-sized Companies (36 – 500 employees)

Reflections on 2019

The performance of medium-sized businesses in 2019 has been similar to the previous year, with 74% reporting an increase in sales (down from 76%) and 54% increased profit margins (up from 50%).

74%

REPORTED AN **INCREASE IN SALES**

International sales

The share of medium-sized business that are already exporting increased from 61% in 2019 to 65% and more companies are planning to export in the future (9% in 2019, 17% in 2020).

2020
2019

65%	17%	17%
61%	9%	30%
Already exporting	Planning to export	Unlikely to export

60%
50%
40%
30%
20%
10%
0%
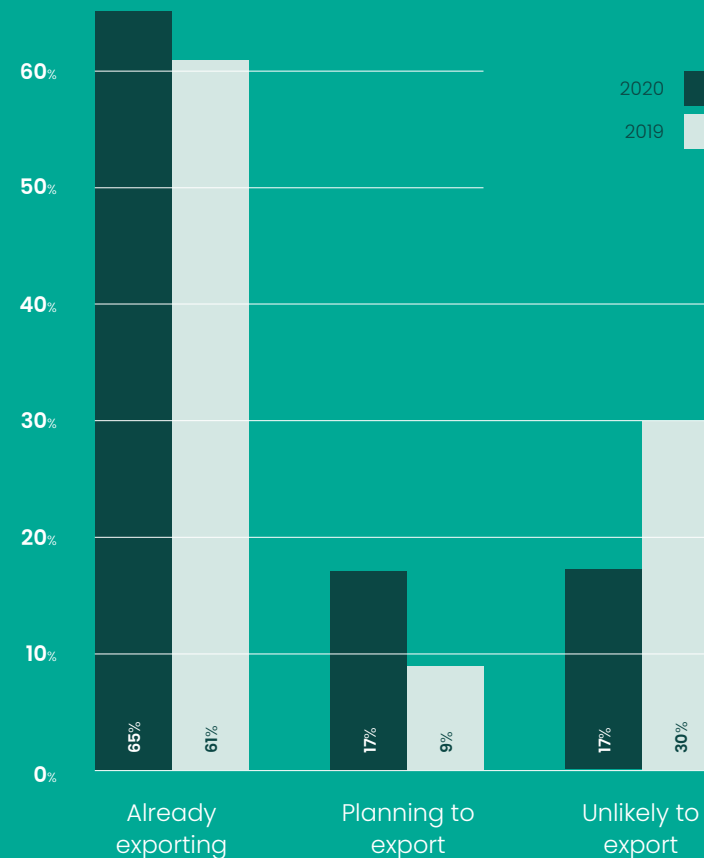
Recruit more staff

Stay the same

Decrease in staff

People and skills

90% of medium-sized businesses expect to increase staff numbers which is in line with expectations for 2019. 92% of respondents are likely to recruit university graduates (up from 81% in 2019) and 42% are likely to take on college graduates (44% last year). 37% of medium businesses are likely to recruit graduate apprentices (up from 15%), whilst interest in modern apprentices halved from 47% to 23%. Demand for foundation apprentices remained at the same level (16%). 42% of medium-sized companies are likely to hire someone who underwent retraining, e.g. CodeClan.

Financial environment

The majority of medium-sized businesses (52%) report turnover between £1-10M and 22% have more than £20M turnover.

£20.1M – £50M

20%
£10.1M – £15M

4%

11%
£20.1M – £50M

24%
£5.1M – £10M

100%

4%

28%
£1.1M – £5M

7%
£100M +

2%

£0 – £250k

£50.1M – £100M
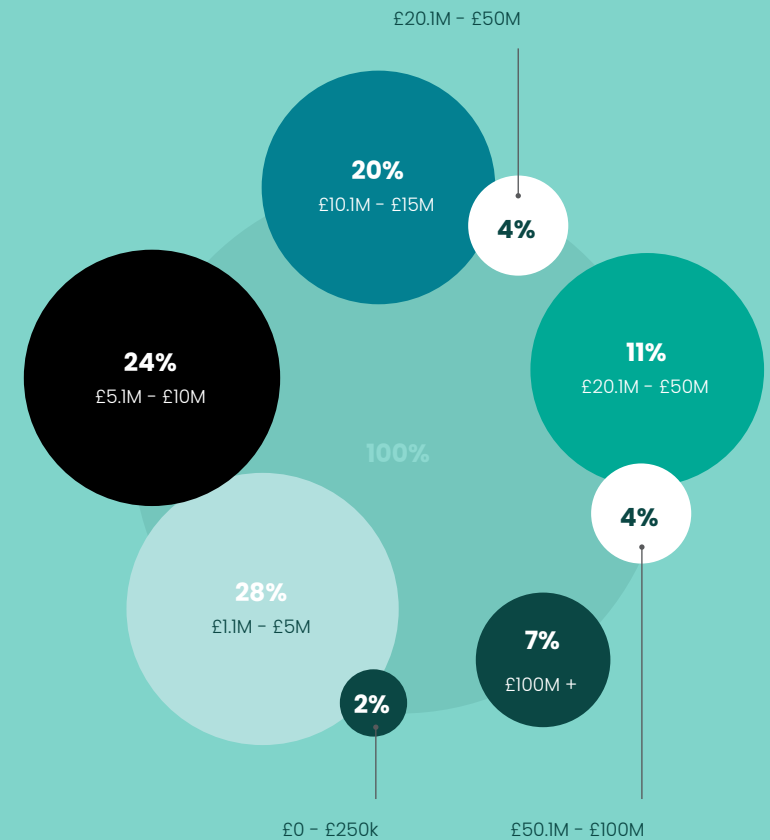
Funding needs

Medium-sized companies needing additional finance in 2020 identified bank funding, grant funding and venture capital as their top three options. The demand for bank funding increased significantly from 20% to 32%.
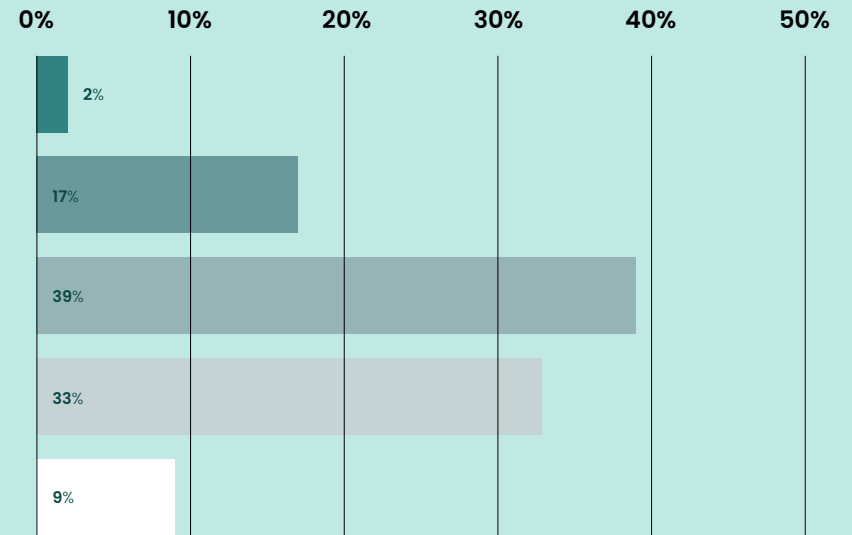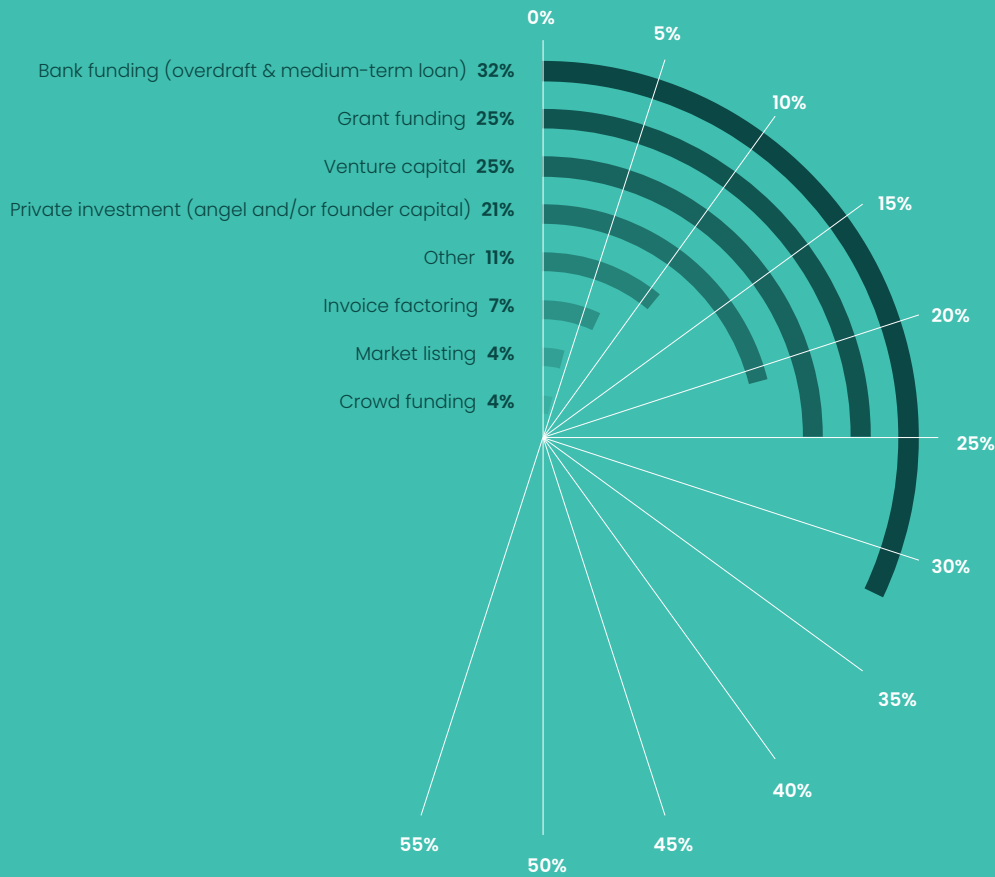
Bank funding (overdraft & medium-term loan) **32%**
Grant funding **25%**
Venture capital **25%**
Private investment (angel and/or founder capital) **21%**
Other **11%**
Invoice factoring **7%**
Market listing **4%**
Crowd funding **4%**

2%
17%
39%
33%
9%

- Substantially more difficult
- Somewhat more difficult
- Little change
- Somewhat better
- Substantially better

41% improved **CASH FLOW**

Cashflow compared to last year

The cashflow situation of medium-sized businesses is less positive than last year. 41% reported improvements in cashflow, down from 51%, and 19% experienced difficulties, up from 12%.

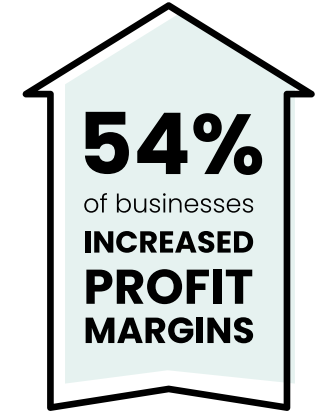## 2019 sales levels compared with 2018

In 2019, the sales performance of medium-sized businesses remained largely similar to last year. 74% reported an increase in sales (75% last year) and 11% saw a decrease in sales levels (up from 9%).

4%
50% Increase

20%
21% - 50% Increase

24%
11% - 20% Increase

26%
0% - 10% Increase

15%
Stay the same

4%
0% - 10% Decrease

3%
21% - 50% Decrease

4%
11% - 20% Decrease

0%

100%

74%
reported an
INCREASE IN SALES
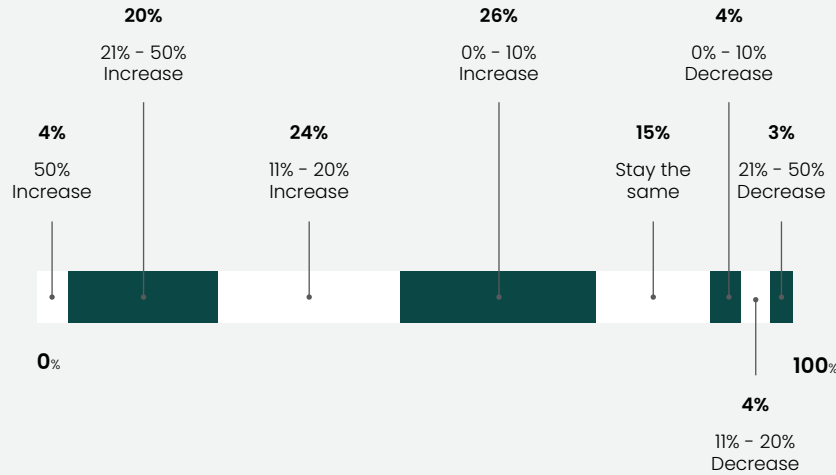
Profit margins

In 2019, 54% of medium-sized businesses increased their profit margins which is a slight improvement compared to 2018. At the same time, more medium companies (26%) experienced decreases in profit margins (up from 19%).

54%
of businesses
INCREASED PROFIT MARGINS

2%
Decreased significantly

24%
Decreased slightly

17%
Increased significantly

37%
Increased slightly

20%
Stayed much the same
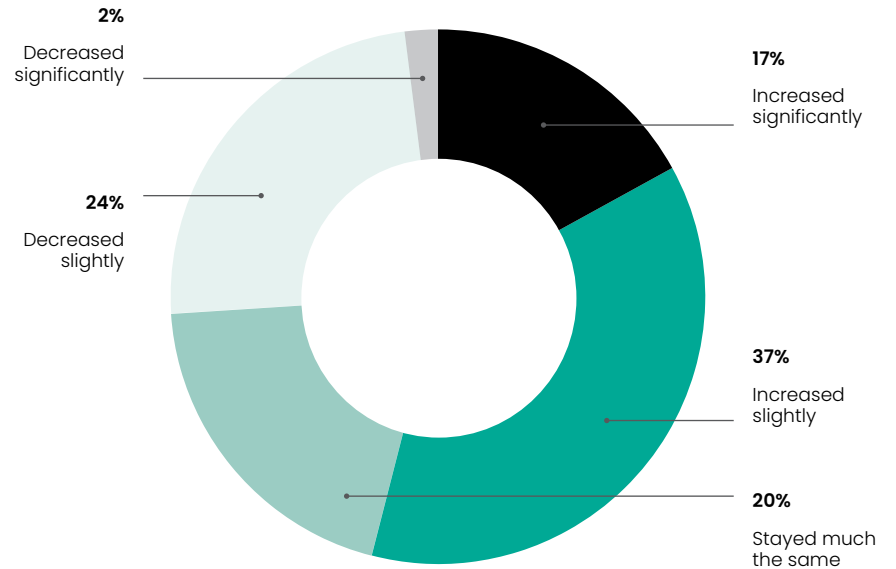
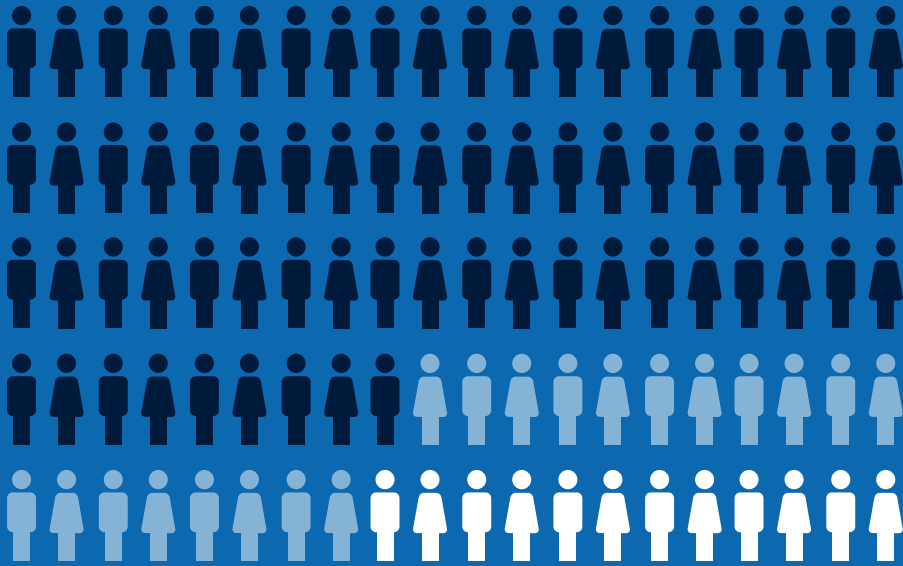# Benchmark 3:

Larger Companies (500+ employees)

Reflections on 2019

The performance of larger companies in 2019 was mixed. The share of larger businesses reporting increased profit margins has decreased significantly from 85% in 2019 to 59% this year. Sales levels in 2019 (83%) remained similar to 2018 (85%).

International sales

The share of larger businesses that are already exporting has increased from 75% last year to 91%. The remaining 9% of larger companies are not exporting and don't plan to do so in the future. These figures are similar to the responses in 2018, after a drop in 2019.

Legend: 2020 (dark), 2019 (light)

	2020	2019
Already exporting	91%	75%
Planning to export	0%	20%
Unlikely to export	9%	5%

ScotlandIS

Legend:
- Recruit more staff
- Stay the same
- Decrease in staff
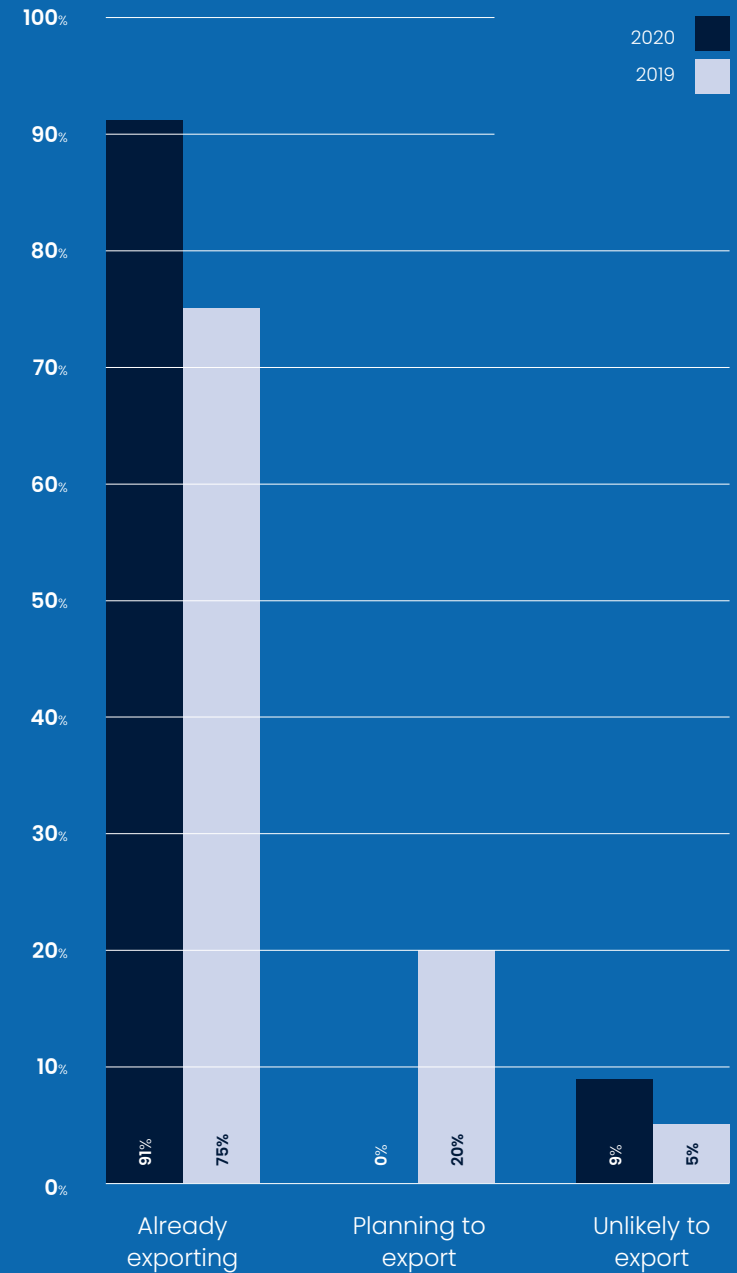
People and skills

With 69% of respondents expecting to increase their employee numbers this year, the recruitment outlook for larger businesses is less positive than previously (down from 83% in 2019). 88% of respondents are likely to recruit university graduates (up from 81% last year) and 67% are likely to hire college graduates (up from 33%). Graduate apprentices are the most popular type of apprentice (72%, up from 41%), followed by modern apprentices (63%, up from 59%) and foundation apprentices (35%, up from 32%). 48% of large businesses are likely to hire a person that underwent retraining, e.g. CodeClan.
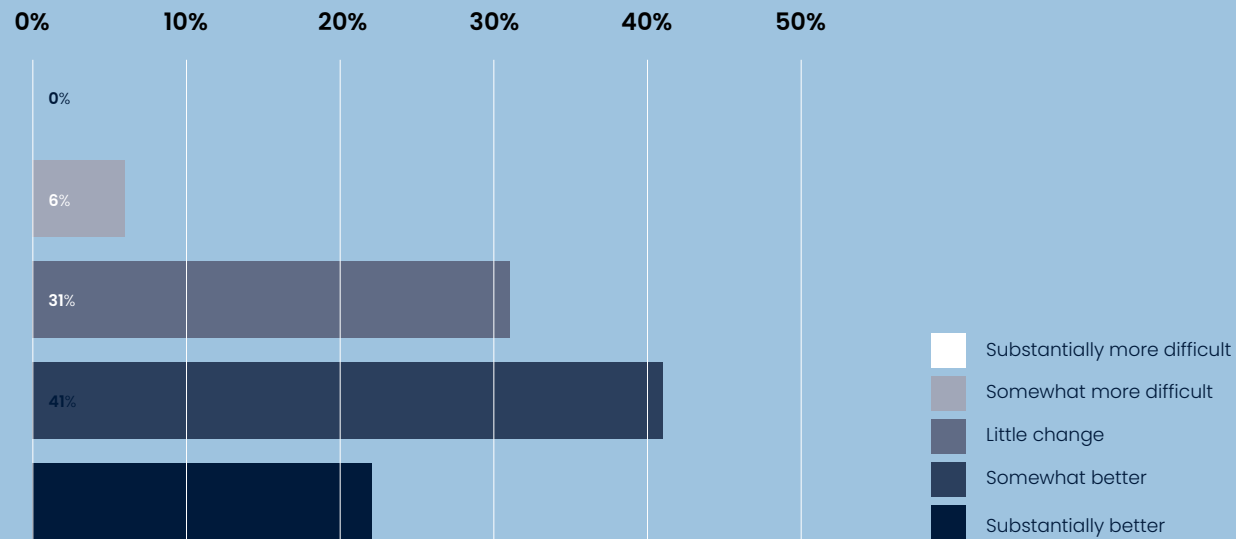
Financial environment

94% of larger businesses have a turnover of more than £100M or more and 6% have a turnover between £50.1M and £100M.

94%
have a turnover of
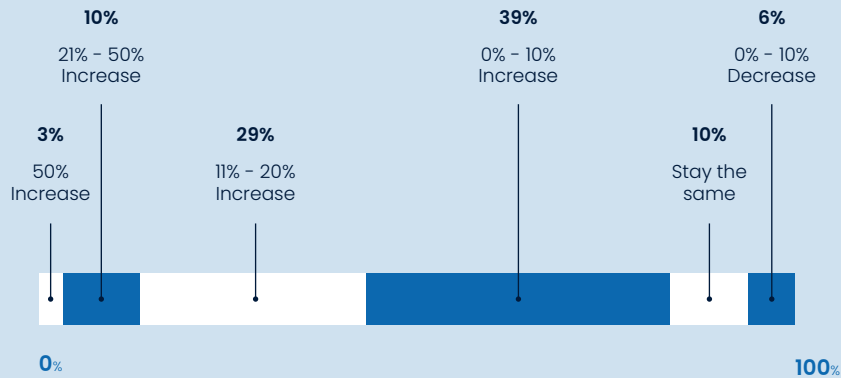# £100M
or more

Cashflow compared to last year

The cashflow situation of larger businesses has remained largely the same as last year with 63% reporting an improved situation (65% last year). 6% of respondents experienced difficulties (down from 15%).

63% improved **CASH FLOW**

| | | | | | |
|0%|10%|20%|30%|40%|50%|

0%

6%

31%

41%

- ☐ Substantially more difficult
- ☐ Somewhat more difficult
- ☐ Little change
- ☐ Somewhat better
- ☐ Substantially better
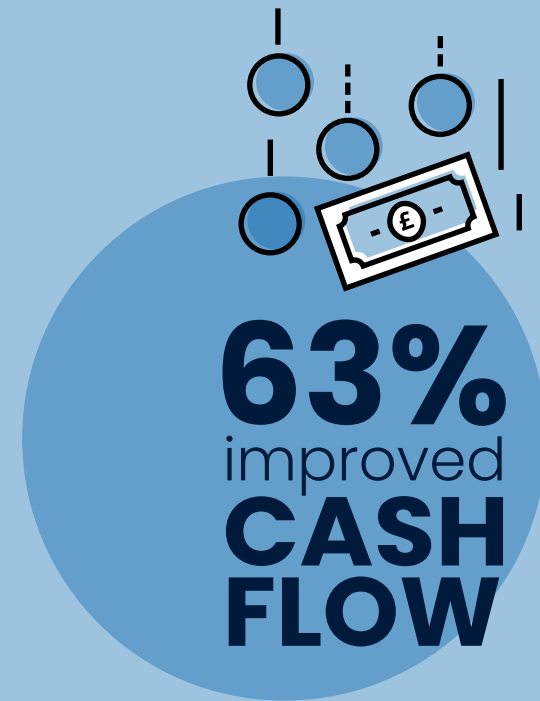
2019 sales levels compared with 2018

The sales situation in larger businesses remains very positive with 83% reporting an increase in the last 12 months, compared to 85% in the previous year. The percentage of larger businesses reporting lower sales decreased from 10% to 6%.
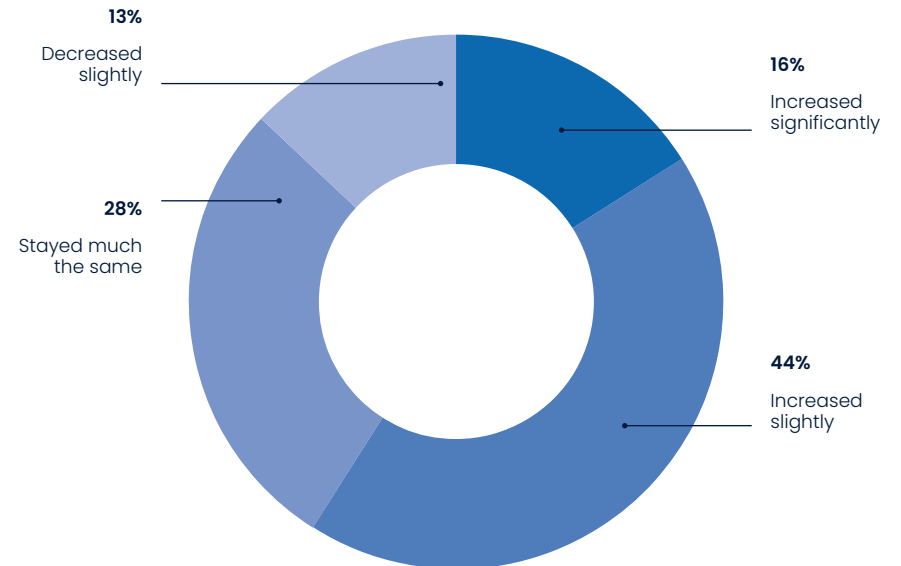
10%
21% – 50% Increase

3%
50% Increase

29%
11% – 20% Increase

39%
0% – 10% Increase

10%
Stay the same

6%
0% – 10% Decrease

0%   100%

83%
reported an
INCREASE IN SALES

Profit margins

The share of larger businesses reporting increased profit margins has decreased significantly from 85% in 2019 to 59% this year. Whereas 13% of respondents saw profit margins decrease, there were none in 2019.

59%
of businesses increased
PROFIT MARGINS

13%
Decreased slightly

16%
Increased significantly

28%
Stayed much the same

44%
Increased slightly

ScotlandIS commentary

Facing the COVID-19 crisis from a position of strength

Every year, we conduct our Scottish Technology Industry Survey at the start of the calendar year. This means that most of the information you find in this report is based on responses collected before anyone could guess how much our everyday life and the operating and trading conditions for businesses would change. We tried to get a first indication of the impact Scotland's digital technologies companies are expecting by doing a short follow-up survey at the beginning of April. The results showed unsurprisingly that the sector is less optimistic for 2020 than at the start of the year and more companies expect falling sales. Looking at the impact on employment, it is encouraging to see that nearly three quarters of respondents expect their staff numbers to stay the same or increase until the end of 2020. Companies selling products or services that are in particular demand during the crisis, like remote working solutions, connectivity or health tech, are seeing their business grow. However, nobody knows how long social distancing measures will have to remain in place, so these results provide only limited insight.

Instead, let's have a look at what we do know: The results of the Scottish Technology Industry Survey 2020 confirmed that our sector was in good shape before the COVID-19 crisis started. After a drop last year, optimism levels are up again to 79% of respondents having a positive outlook for the next 12 months. The review of 2019 shows that the sector's performance has remained stable, with sales levels, cashflow situation and profit margins having only changed by two to four percentage points compared to 2018. Since the EU referendum, our survey showed that a considerable proportion of respondents is concerned about the impact of political uncertainty and decisions on their business. However, neither our survey results nor other statistics seem to suggest that the Brexit vote and its consequences have led to a significant downturn in growth. This could obviously change in the future, but our sector has so far proofed to be resilient.

This resilience is one of the factors that make us optimistic that Scotland's digital technologies industry is in a good position to weather the current crisis. Another reason for optimism is the fact that our sector is much better placed than others to continue to operate with all or a large proportion of staff working from their homes. A lot of jobs are entirely computer-based, the necessary equipment usually exists already and some of the workforce were working remotely for parts of their working weeks anyway. A third factor is the increased demand from all parts of economy and society for remote working which our industry has been busy trying to meet since the start of the crisis. Many companies have offered their products and services discounted or for free but hopefully some of this demand can be sustained in the longer term as more employers realise that remote working is an option, at least for a few days per month or week. Finally, a lot of ScotlandIS members and companies in the wider sector have rallied together to offer support for other businesses, public sector organisations and the Scottish Government or vulnerable people in our society which shows an amazing willingness to help each other in the face of adversity. This willingness to collaborate is also a key strength.

Evolving ScotlandIS services to help our industry grow

To make sure that our industry grows and prospers, even in the face of adversity, we continue to evolve and increase our support for ScotlandIS members which also benefits the wider sector. Over the last 12 months, we further developed our capabilities as the cluster management organisation for data and cyber security companies in Scotland. We recruited Katy Guthrie, who is heading up the work for the data cluster, and Ciara Mitchell, who is leading on our support for the cyber security cluster. Katy and Ciara have been working closely with companies, academic and other stakeholders in their respective ecosystems to develop initiatives that help them grow and improve Scotland's data and cyber security capabilities. As one of the first major services, directories of Scotland-based companies offering cyber security and data related services have been launched to help raise their profile and map the clusters.

We have also been working on improving our own capabilities and processes as a cluster management organisation. This allows us to utilise our resources as effectively as possible and to deliver maximum value for our members. We've asked the European Secretariat for Cluster Analysis (ESCA) to assess our progress. We achieved their Bronze label for cluster management excellence in 2015 and hope to have now fulfilled the criteria for the Silver label. This would put us in an excellent position to initiate further cooperation with relevant clusters across Europe and beyond and thus providing a window to international markets for our members as one of our strategic goals for 2020 and beyond. Taking some of our members to the UK-Netherlands Cyber & FinTech Summit in The Hague in February was one of the first steps to present the cyber security cluster and its capabilities abroad.

Keep on innovating to tackle the skills gap

The survey results have once again shown a relentless demand for digital technologies skills in our sector. We continue to innovative to address this skills shortage, most recently through two new initiatives. The Digital Skills Partnership, delivered by ScotlandIS, has launched a coaching programme, called Developer to Engineer, for early career software developers to accelerate their development and equip them with the skills to move into more experienced roles. This pilot started in January 2020 with 20 participants from 18 different companies and is a direct response to the lack of experienced developers reported by industry.

To grow the talent pool available to our sector whilst also tackling unemployment, we have launched a National Progression Award (NPA) in the Fundamentals of Computing in partnership with the University of the Highlands and Islands. The fully funded 10-week course covers cyber security, networking and server technology giving participants not only their NPA but also a CISCO cyber security accreditation. The first cohort of students will be from previously hard to reach groups who may not have engaged with education in the past, or who are not currently employed to offer them a new pathway into the digital sector. We will work with our members and the wider industry to secure at least one job interview for everyone who successfully completes the course.

We are in the process of developing a new ScotlandISskills strategy to make sure we keep delivering what is needed.

results have shown a relentless demand for

DIGITAL TECHNOLOGIES SKILLS

About ScotlandIS

→ ScotlandIS is the membership and cluster management organisation for Scotland's digital technologies industry.

→ ScotlandIS represents Scotland's digital technologies industries, including software, telecommunications, IT and digital media businesses.

→ ScotlandIS members vary from global companies and internationally recognised exporters to very small start-ups and cover a wide range of skills and markets.

→ ScotlandIS is at the heart of Scotland's digital economy, shaping, changing and driving it forward. We work with members and partners to support the wider digital transformation of business and society.

→ ScotlandIS provides members with connections up, down and across the industry, relevant market intelligence and we act as a single voice to policy makers. Ensuring a continuing supply of current and future skills is a major area of focus and we facilitate a range of special interest groups and clusters including cyber, infrastructure, software engineering and Mobility as a Service.

→ ScotlandIS works closely with Scottish Government, Highlands and Islands Enterprise, Scottish Enterprise and Skills Development Scotland to underline the importance of our industry to the Scottish economy.

For more information on

SCOTLANDIS

visit
scotlandis.com/about-us

Methodology

The Scottish Technology Industry Survey 2020 was conducted between 16 December 2019 and 3 February 2020 through an online survey platform. The survey received 287 responses in total, of which 210 have been selected for analysis after discounting duplicates and unusable responses. To take the recent changes to market and trading conditions due to the corona virus pandemic into account, we asked the sector to respond to a short follow-up survey between 1st and 8th April and collected 124 usable responses. The respondents to both surveys include both ScotlandIS members and non-members. The respondents to the follow-up survey include both respondents to the initial survey and new companies.

For the overviews on Scotland's digital technologies sector and on digital technologies employment the following standard industrial classification (SIC) and standard occupational classification (SOC) codes have been used to define digital technologies businesses and jobs:

→ **Number and size of digital technologies businesses**
UK Business Counts, compiled from the Inter Departmental Business Register (IDBR), available through the Nomis service provided by the Office for National Statistics.

→ **GVA**
Regional gross value added (balanced) information, provided by the Office for National Statistics, December 2018. Available at: https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry. Based on SIC 2007 divisions 26 and 58-63 as more detailed figures not available. For more information about the change in methodology for calculating GVA, please see "Information" tab of the data spreadsheet. Information on the forecast GVA growth is available in: Digital Scotland, Scotland's Digital Technologies: Summary Report 2019, September 2019 https://www.skillsdevelopmentscotland.co.uk/media/43306/scotlands-digital-technologies-summary-report.pdf

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	Publishing of computer games
5829	Other software publishing
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