Insights from the UK Innovation Diffusion & Adoption Survey

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1 Executive Summary

1.1 Policy context

The UK's Modern Industrial Strategy 2025[1] identifies innovation as essential to develop the UK's growth-driving sectors. But innovation will only take us so far – the brilliant new technologies created in UK businesses, universities and the public sector are not enough to drive economic growth on their own. These technologies must be made available (diffused) and used (adopted) by business to unlock their true potential. Policymakers and economists have long championed the importance of innovation diffusion and adoption, but struggled to support these processes due to a lack of data. The Department for Science, Innovation and Technology (DSIT) commissioned this research back in 2023, recognising the importance of this evidence gap to maximising the impact of the Government's investment in research and innovation. The new government, recognising the importance of technology adoption, commissioned the Technology Adoption Review[2]. This report provides key evidence that can help unlock the transformative power of technology to drive economic growth.

1.2 Importance of this survey

The first of its kind, this survey gives policymakers unprecedented insights into the innovation diffusion and adoption processes within UK businesses across 20 innovations (henceforth 20 technologies[3]). This survey achieved a total sample of 4,595 responses from businesses across the UK, covering different business sizes, sectors and regions/nations. This survey is unique as it covers both adoption and diffusion, while most other large surveys of this kind focus solely on adoption.

For the purposes of this research and report, adoption and diffusion are defined as follows:

- **Adoption:** An organisation has fully adopted an innovative technology, or elements of it, into its operations.
- **Diffusion:** An organisation is currently selling, or has previously sold, an innovative technology to others.

1.3 Key findings on innovation adoption

More than half of businesses (56%) said they were existing adopters of at least one of the technologies covered in the survey. This headline 'technology adoption rate' varies by business characteristics and across technologies.

- **Business size:** Technology adoption increases with business size: 80% of large businesses; 71% of medium businesses; 63% of small businesses; and 48% of micro businesses.
- **Region/nation:** There is no overarching geographic pattern. The regions/nations with the highest overall level of technology adoption are the North East (66%) and London (65%). The regions/nations with the lowest level of technology adoption are Northern Ireland (42%) and the South West (47%).
- **Sectors:** There is no overarching sector pattern. Over half the sectors surveyed had similarly high levels of adoption in the range 55-62%. The top sector is Finance and Insurance (62%). Two sectors have adoption rates below 50%: Construction (47%); and Transportation and Storage (35%).
- **Internationalisation:** Businesses with some overseas activity are more likely to adopt technology. 68% of businesses owned by overseas entities are adopting technology, compared to 44% of businesses with no overseas ownership or activity.
- **Technologies:** The three most commonly adopted technologies are: Remote Working Systems (24%); Future Telecoms (18%); and Sustainable Business Practices (16%). These are generally more established technologies. Meanwhile, the least adopted technologies are Quantum (6%) and Biotechnologies (5%). These are more nascent, less established technologies.

[1] DBT (2025). The UK's Modern Industrial Strategy. Available here.
[2] DBT/DSIT (2025). Technology Adoption Review. Available here.
[3] Not all these innovations are technological in nature, some are explicitly non-technological, but we refer to them as the 20 technologies and use the terms tech adoption/ tech diffusion for simplicity throughout this report

Technology adoption journeys tend to differ along one key dimension – how established the technology is. More nascent technologies, such as Quantum, tend to be more likely to require financial/ non-financial support; incur high acquisition/integration costs; take longer to adopt; and be sourced from overseas. Meanwhile, more established technologies, like Future Telecoms and Artificial Intelligence, are more likely to drive higher productivity.

Source and support

- **Source country:** UK businesses are sourcing most technologies from the UK (64%), followed by the rest of the world (19%) and EU/EFTA (17%). More established technologies are more likely to be sourced from the UK; such as Future Telecoms (80%), and Artificial Intelligence (63%).
- **Non-financial support:** 85% of technology adoption journeys required non-financial external support. The top four sources of non-financial support are a mix of government and industry support: namely professional and industry associations (28%); Help to Grow (24%); technical, industry or service standards (23%); and UKRI/IUK (23%). Less widely adopted technologies tend to be more reliant on UKRI/IUK for non-financial support, while more widely adopted technologies are more reliant on industry (inc. industry standards).
- **Financial support:** 73% of businesses accessed some form of financial support during their technology adoption journeys. The three most common sources of financial support were banks (27%); private investors/venture capital (23%); and UKRI/IUK (22%). More widely adopted technologies, such as Artificial Intelligence and Future Telecoms, are less likely to require financial support for adoption compared to newer technologies.

Time and costs

- **Time taken:** 19% of technology adoption journeys take more than a year. Biotechnology adoption journeys are most likely to take more than a year (38%); followed by Robotics, Drones and Autonomous Systems (31%). The technology least likely to take more than a year to adopt is Photonics and non-Quantum Sensors (4%).
- **Acquisition/integration costs:** These costs exceed 10% of annual turnover for 25% of businesses. Quantum placed a particularly large financial demand on firms, with 38% of adoption journeys incurring acquisition/integration costs over 10% of annual turnover, compared to 15% of Future Telecoms adoption journeys.

Enablers, barriers, and impact

- **Enablers:** The top enablers of technology adoption are *mostly* people related: leadership/management (41%); proven evidence of tech effectiveness (40%); employee capabilities (39%); and employee openness to change (39%). Financial factors, while still seen as important enablers by a sizeable proportion of respondents, sit in the bottom half of the list. Governmental factors are considered to be the least strong enablers.
- **Barriers:** The top barriers to technology adoption are: UK government regulation (19%); data privacy/security concerns (17%); and ease of integrating technologies (16%). For all factors, businesses were more likely to view them as an enabler rather than a barrier. However, the gap in scores between enablers and barriers is smallest for UK government regulation; with 28% of businesses stating this is an enabler compared to 19% who said it was a barrier.
- **Impact:** Technology adoption has enabled businesses to achieve several positive outcomes; including improving productivity of workforce (39%); developing new, improved or more flexible processes or operations (31%); and reducing production/operating costs (29%). More established technologies, such as Future Telecoms and Artificial Intelligence, were particularly likely to drive productivity improvements.

1.4 Key findings on innovation diffusion

Almost a quarter of businesses (24%) said they were existing diffusers of at least one of the technologies covered in the survey. This headline 'technology diffusion rate' varies by business characteristics, and across technologies.

- **Business size:** Technology diffusion increases with business size: 49% of large businesses; 42% of medium businesses; 30% of small businesses; and 17% of micro businesses.
- **Region/nation:** There is no overarching geographic pattern. The regions/nations with the highest level of technology diffusion are London (32%) and Scotland (31%). The regions/nations with the lowest level of technology diffusion are the South West (17%) and South East (17%).
- **Sectors:** There is no overarching sector pattern. Businesses in the Information and Communication sector are most likely to be diffusing technology (31%); followed by the Wholesale and Retail sector (27%); and Finance and Insurance sector (26%). Businesses in the Construction sector are the least likely at 14%; followed by the Real Estate sector (15%).
- **Internationalisation:** Businesses with some overseas activity were noticeably more likely to diffuse technology, ranging from 29% to 43% depending on the type of overseas activity. In comparison, only 8% of businesses with no overseas ownership or activity are diffusing technology.
- **Technologies:** The four technologies most likely to be diffused are: Artificial Intelligence (6%); Future Telecoms (6%); Recycling and Waste Technology (6%); and Remote Working Systems (6%). The order of technologies is broadly similar to that seen for adoption, with more established technologies more likely to be diffused than more nascent technologies.

Technology diffusion journeys can face several barriers and enablers that hinder businesses from successfully selling their innovations to others.

- **Enablers:** The top four enablers of diffusion are: employee capabilities (47%); demand for the technology (46%); scalability of the technology (43%); and proven evidence of technology effectiveness (43%). These enablers are a mix of behavioural, technological and economic factors; as well as being a mix of internal and external factors. Government factors – such as funding, regulation, and non-financial support – appear nearer the bottom of the list.
- **Barriers:** The top three barriers are UK government regulation/regulatory requirements (24%); intellectual property rights (20%); and non-financial government support (19%). At the technology level, the top three barriers are broadly consistent, with two noticeable exceptions. First, UK government regulation is the top barrier for all but one technology: Novel Electronics, Position, Navigation and Timing. Second, for Novel Electronics, Position, Navigation and Timing, both internal investment and external investment appear in the top three, despite not appearing in the global top five. Internal investment also appears in top three for Medical Technologies.

1.5 Key findings on innovation culture

When asked to rate how innovative they considered their businesses on a scale of 1-10, with one being 'Not at all Innovative', and 10 being 'Extremely Innovative', respondents were consistently likely to place their business towards the upper end of the scale. Some 64% of businesses ranked themselves between 7 and 10, with 26% placing themselves as a 9 or a 10 on the scale. We explored the innovation practices of businesses and asked them about the issues they faced with adoption. We uncovered the following:

- **Innovation practices are widespread**: Most businesses surveyed display regular innovation behaviour: 80% say that they regularly discuss across teams how they can be more innovative; while 80% also say that teams and individuals are recognised and rewarded for their contribution to innovation. Both these behaviours are more prevalent in organisations that are adopting technologies, and among larger firms.
- **Non-adopters often identify as innovative:** Non-adopters also tend to rank themselves as highly innovative, although less so than the total sample: 47% of non-adopters ranked their innovation level between 7 and 10 on the innovativeness scale. This suggests that innovative firms generally do not see a need to adopt the 20 technologies included in this survey. This is a surprising finding. There are different possible explanations, but all suggest information asymmetries; either in innovation or adoption.

- **Innovators are not always adopters**: 25% of businesses consider themselves more innovative than their competitors, but are adopting fewer technologies than the average for their sector. We see the same pattern across business sizes, regions/nations, and sectors. The only exceptions were adopters of less widely adopted technologies, such as Quantum and Biotechnologies, who were much more likely to be adopting more innovative technologies than the average firm in their sector. If businesses believe they are leading innovators in their sector, they may not be sufficiently motivated to adopt new technology.
- **There are three big issues in technology adoption – identification, acquisition and integration**. 59% of all businesses stated that it is hard to get impartial advice on the appropriate application of new technologies. 69% of all businesses said that innovative technologies that could benefit their organisation were prohibitively expensive. 60% of all businesses stated that they recognise the long-term benefits of adopting new technologies, but struggle with the short-term impact. These issues were more common among those who had adopted than those who had not.

2 Introduction

2.1 Background

The UK's Modern Industrial Strategy Green Paper[4] identifies innovation as essential to develop the UK's growth-driving sectors. Innovation is also a critical driver for positive social impact - driving societal change in areas such as health and climate change, while also being an enabler for improved productivity. The government spends billions on research, development and innovation (RD&I) but productivity remains an issue in the UK[5]. Had UK productivity growth not stalled in the past decade and instead maintained its historic average of 2%, something other countries have been able to achieve, each worker would now be earning an extra £5,000 per annum[6].

The UK ranked 5th in the Global Innovation Index (GII) 2024[7], which assesses countries on their innovation capabilities. The GII consists of roughly 80 indicators – and the UK scores less well on those relating to adoption and diffusion. For instance, on knowledge absorption – a critical indicator of using innovation for productivity gains – the UK drops to 31st worldwide. Furthermore, while the UK remains a strong environment for starting a business, it is a more challenging one for scaling it[8].

2.2 Aims and objectives

Previous DSIT-commissioned research identified the lack of a robust dataset and an established framework[9] as one of the largest barriers to understanding the barriers to diffusion and adoption. As a result, DSIT commissioned PA to conduct the UK's first large-scale business survey of innovation diffusion and adoption in the UK. PA developed an online survey of decision-makers/influencers at businesses across the UK, with the following aims:

- Quantify the adoption/diffusion of technologies in 20 technology areas, through asking each business whether they have already or are considering adopting/diffusing each of the 20 technologies.
- Deep dive into the technology adoption/diffusion journey, including perceived barriers/enablers, and financial and non-financial support.
- Learn more about the innovation culture of businesses to explore the link between innovation culture and adoption.

In addition to UK-level insights, we also sought to understand what was happening at the business size, sector, and region/nation level. We provide several breakdowns in this report, but even more data is available in the statistical annex published alongside this report.

2.3 Key definitions

For the purposes of this research and report, adoption and diffusion are defined as follows:

- **Adoption:** An organisation has fully adopted an innovative technology, or elements of it, into their operations.
- **Diffusion:** An organisation is currently selling, or has previously sold, an innovative technology to others.

[4] DBT (2024). Invest 2035: the UK's modern industrial strategy. Available here.
[5] House of Commons Library (2025). Productivity: Economic indicators. Available here.
[6] NIESR (2022). Productivity in the UK: Evidence Review. Available here.
[7] WIPO (2024). Global Innovation Index 2024. Available here.
[8] Economist (2022). Britain is a great place to start a company, but a bad one to scale it up. Available here.
[9] PA Consulting (2023). Making Innovation Matter. Available here.

2.4 Report structure

This remainder of this report is structured as follows:

- **Section 3** outlines the survey methodology, including survey design, sampling, and response rate.
- **Section 4** provides a breakdown of respondents and discusses survey weighting.
- **Section 5** provides the whole sample findings around technology adoption, including adoption rates, co-adoption, and adoption intensity.
- **Section 6** covers deep dives on the technology adoption process, including technology country of origin, financial and non-financial support access, time and financial costs, enablers, barriers, and impact.
- **Section 7** provides the whole sample findings around technology diffusion, including diffusion rates, co-diffusion, and diffusion intensity.
- **Section 8** covers deep dives on the technology diffusion process, including enablers and barriers.
- **Section 9** covers innovation culture, including perceptions around innovation levels, competitor practices, and challenges when adopting technology.
- **Section 10** is our conclusion and summary of key findings from the survey.

3 Methodology

3.1 Design

PA designed a 15-minute survey in collaboration with DSIT and DSIT's project steering board, containing representatives from government, academia, and the third sector. The survey consisted mostly of closed-ended questions, which allow for responses to be easily summarised on a range of factors. We also included some open-ended questions, which provided qualitative nuance on key themes identified throughout the study. Broadly, we asked respondents about their business demographics; adoption/diffusion of 20 technologies chosen by DSIT; the adoption/diffusion journey for one to two technologies in detail; and the innovation culture in their business.

3.2 Technologies Chosen

DSIT identified a list of 20 innovations (henceforth 20 technologies)[10] in close collaboration with the Government Office for Science (GO-Science) and Innovate UK – the UK's innovation agency. These were designed to cover the most important technologies to government policy; and included a mixture of nascent, emerging technologies and more established technologies.

In the survey, we asked all respondents to assess their adoption and diffusion levels for all 20 technologies on the six-point scale below. We then asked follow-on questions on a maximum of two technologies being adopted and two technologies being diffused per respondent. We refer to these as 'deep dives' in this report. This meant that if a business said it was adopting all 20 technologies, they were only asked about two in detail, not all 20. We applied a funnel method when selecting which technologies to ask follow-up questions on. We prioritised the four critical technologies[11] included in the survey (Artificial Intelligence, Biotechnologies, Future Telecoms, and Quantum); followed by other technologies important to DSIT; other technologies important to government; and innovations that are not technological in nature. We only report on 'deep dives' for the first two groups, as we did not receive enough responses for robust estimates for the other technologies.

Full response scale for adoption is as below:

1. We've fully adopted elements of this into our organisation's operations
2. We're in the process of adopting elements of this into our organisation's operations
3. We're actively considering adopting elements of this at some point in the future
4. We may adopt elements of this at some point, but have no active plans to do so
5. I'm aware of this, but it's not relevant to my organisation
6. I'm not aware of this

And full response scale for diffusion is as below:

7. We currently sell this, or have done in the past
8. We're currently developing/producing this, with the intention of selling
9. We plan to develop/produce and sell this in future, but don't currently do so
10. We may develop/produce and sell this in future, but have no active plans to do so
11. I'm aware of this technology, but it's not relevant to my organisation
12. I'm not aware of this

[10] Not all these innovations are technological in nature, some are explicitly non-technological, but we refer to them as the 20 technologies and use the terms tech adoption/ tech diffusion for simplicity throughout this report

[11] We did not include semiconductors due to the unique nature of semiconductor adoption (i.e. where the type of semiconductor adopted is most important, given that most businesses use semiconductors in some capacity)

Fig. 1 – Twenty technologies covered in the survey

Category	Technology	Examples given ('including, but not limited to…')
Critical technologies	Quantum	Sensing and Metrology
	Future Telecoms	5G/6G, Wireless Communications, Cloud Communications, Satellite Communications
	Artificial Intelligence	Machine Learning
	Biotechnologies	Engineering Biology
Other technologies important to DSIT	Novel Electronics; and Position, Navigation and Timing Technology	Flexible Electronics, Printed Electronics
	Photonics and Non-Quantum Sensors	Light Detection and Ranging (LIDAR), Radio Detection and Ranging (RADAR), Quantum Photonics, Biophotonics
	Future Computing and Data Management Technology	Future Computing Paradigms, Big Data Infrastructure, Privacy Enhancing Technology
	Extended Reality, Immersive and Synthetic Environment Technologies	AR, VR, Digital Twins
	Robotics, Drones and Autonomous Systems	N/A
	Medical Technologies	Devices, Therapeutics
Other technologies important to HMG	Low Carbon Energy, Heating and Propulsion Technologies	Nuclear, Renewables
	Recycling and Waste Technology	CC(U)S
	Manufacturing Technologies, including Additive Manufacturing	3D/4D printing
	Advanced Materials	Novel or Complex Metal Alloys, Advanced Composites, Engineering and Technical Polymers and Ceramics
	Battery and Energy Storage Technologies	BESS
Innovations that are not technological in nature	Advanced Business Intelligence Technologies	Software for Large-Scale Data Processing, IaaS
	Advanced Project Management Tools	Agile Project Management, Project Portfolio Management (PPM)
	Sustainable Sourcing Practices	Ethical Supply Chain Management, Green Procurement
	Remote Working Systems	Virtual Meeting Platforms, Cloud-Based Collaboration Tools
	Sustainable Business Practices	Corporate Social Responsibility (CSR), Diversity and Inclusion (D&I) Initiatives

3.3 Screening Criteria

We implemented robust screening criteria, agreed upon with DSIT, to ensure a high-quality sample of individuals with intimate knowledge of their organisation's innovation practices. In doing so, we prioritised fewer but richer responses over more but shallower responses. Nonetheless, the final dataset is statistically significant and fully representative of the UK business population (more information on sample representativeness can be found below). The following groups were screened out of the survey:

- Those with a tenure at their organisation of less than six months, as it was agreed that they had likely not yet been at the organisation long enough to speak accurately to their innovation history and innovation culture.
- Those who did not class themselves as a decision-maker, influencer, or decision-aware when relating to the adoption of innovation in their organisation. This ensured that all respondents had sufficient knowledge or influence over innovation decisions within their organisation.
- Those who declined to share their business name. This ensured all responses belonged to a unique business (i.e. no duplication).
- Those who entered a company name that did not match with Companies House. This ensured all responding individuals were from legitimate, UK based organisations. This was done using probabilistic data linkage[12], followed by manual checks for any unmatched companies.

The above criteria ensured that the final sample consists of responses from senior individuals with a long tenure from different organisations, who are happy to share their company name.

3.4 Sampling Design

For this study, our target sample was all members of UK businesses who had sufficient knowledge of their organisation's relationship with innovation, adoption, and diffusion. We crafted and sourced the sample using a two-track methodology. First, we used multiple quantitative fieldwork panels, sourced in collaboration with our fieldwork partner 3Gem Media. 3Gem were able to access most online panels in the UK, to achieve maximum sample reach. We initially adopted a random sample with the aim of maximising sample size. We also publicised the survey through social media channels and newsletters of different industry bodies and government groups. We later implemented a sample booster targeted at micro firms, when it became clear we had under-sampled these. We took great care to ensure that the sample was as proportional and representative as possible on business size, region/nation and sector; although caveats were factored into this process as below.

- **Caveat 1 – sharing business name discouraged micro/small businesses**. We required respondents to share their business name for the reasons explained above. This was a barrier for many micro/small firms, who often dropped out of the survey at this stage – perhaps due to concerns around their privacy. Most business surveys tend to oversample large businesses, because there are a similar number of people working in micro/small and large firms overall. To control for this, we weighted the final sample by business size. We applied weighting in collaboration with professional statisticians; this is explained in more detail below.
- **Caveat 2 – random sampling led to oversampling of certain groups.** We adopted a random sampling approach, but this led us to oversample large firms and firms in the Information/Communication sector. When constructing the weighting criteria, we considered multiple weighting options, including weighting by sector. Survey findings suggest adoption and diffusion do not vary strongly across sectors. Therefore, we followed Market Research Society (MRS) best practice, and did not weight by sector so as to preserve the integrity of our analysis. Notwithstanding this, our sample is generally representative across business sectors (see Section 4 for a breakdown of respondents by sector).
- **Caveat 3 – online panels are not necessarily representative of the UK business population**. Care should therefore be taken when interpreting results, particularly for those subgroups with smaller samples.

[12] Short explainer on probabilistic data linkage available here.

3.5 Data Weighting

We followed Market Research Society (MRS) best practice when weighting the data. After testing multiple weighting configurations, we decided to weight on business size using the random iterative weighting (rim weighting) approach – in line with industry best practice. We used three business size bands: 'Micro/Small', 'Medium' and 'Large'. We combined 'Micro' and 'Small' businesses into one weighting category to prevent heavily skewing our data. By weighting our data by business size[13], we have sought to make our data as representative of the UK business population as possible. This weighting was applied as below:

Fig. 2 – Respondents by business size – weighted vs. unweighted

Business Size	Weighted	Unweighted
Micro/ Small	94%	29%
Medium	4%	25%
Large	2%	45%

Source: Business population estimates for the UK and regions 2023 (DBT, 2023). Numbers may not sum to 100% due to rounding.

The above weighting results in a weighting coefficient of 34%. While there is no specified optimal weighting efficiency, MRS best practice requires that, when applying any weighting coefficient, great care is taken to ensure that survey results are not distorted and remain representative of respondents.

Having tested multiple weighting approaches, and having thoroughly reviewed and compared both weighted and unweighted numbers through the lens of each individual cohort on which we have applied the weighting (business size cohorts), we are confident that all insights and findings remain consistent, as each cohort shows strong relative consistency with their responses to questions across the board. For example, the ordering of the most adopted technologies by micro and small businesses is very similar to the ordering of the most adopted technologies by large businesses. This means that, although by adding weighting we may be downweighing the absolute numbers, the relative numbers remain consistent. In this study it is the relative numbers that are of most salience.

All statistics included in this report and the associated data tables are based on weighted data. Despite our best efforts, it is important to note that the sample of businesses in this survey represents a fraction of the UK business population, meaning the numbers in this report are estimates of a figure's 'true' value. Further information on sample sizes for individual subgroups can be found in the accompanying statistical annex.

[13] DBT (2023). Business population estimates for the UK and regions 2023. Available here.

4 Breakdown of Respondents

Through 3Gem, we reached out to more than 40,000 individuals working in UK organisations and achieved a final sample of 4,595 responses. In addition to the screening criteria mentioned in the previous section, we also cleaned out any responses that failed to pass our more standard data quality control checks. This included screening out anyone who 'straight-lined' or 'speed-ran' the survey (sped through the survey picking answers that clearly had no thought put into them), and anyone who provided particularly poor-quality verbatim responses, as is standard practice for all quantitative research surveys.

The sample collection achieved statistically robust numbers for individual analysis of all key subgroups (any individual subgroup analysis needs a minimum of 30 instances to be robust, which we have achieved across all key subgroups), across business size, region/nation, and sector. This section profiles the businesses who responded and their proximity to national market representation – referred to as 'National Representation' – based on the Department for Business and Trade's (DBT) business population estimates for the UK as of 2023[14].

On business size, there are robust and usable base sizes to report in all three size bands: Micro/Small, Medium, and Large. As mentioned in the previous section, we oversample large firms relative to their national representation, and hence weight by business size.

Fig. 3 – Business size: Survey responses (weighted) vs national representation

Business Size	Weighted Survey Representation	National Representation
Micro/ Small	94%	96%
Medium	4%	3%
Large	2%	1%

Source: Survey QA3. Please indicate the total number of staff currently employed by your organisation in the UK. Base: Total Sample (n=4595). Numbers may not sum to 100% due to rounding. We define micro here as two or more employees, meaning sole traders are excluded.

On region/nation, there are robust and usable base sizes to report in all 12 UK regions and nations at the ITL1 level. We slightly oversample some regions and under-sample others, but we are always within four percentage points of the national representation, and hence are broadly in line with the true business population. In this report, we sometimes report regional results by Greater South East (London, South East and East of England) and non-Greater South East (all other ITL1 regions/nations).

Fig. 4 – ITL1 region/nation: Survey responses (weighted) vs national representation

Business Location	Weighted Survey Representation	National Representation
East Midlands	6%	7%
East of England	8%	10%
London	24%	19%
North East	5%	3%
North West	12%	10%
Northern Ireland	2%	2%
Scotland	7%	5%
South East	11%	15%

[14] DBT (2023). Business population estimates for the UK and regions 2023. Available here.

South West	7%	9%
Wales	4%	4%
West Midlands	8%	8%
Yorkshire and the Humber	7%	7%

Source: Survey QA7. Where is your organisations head office/ main UK office located? Base: Total Sample (n=4595). Numbers may not sum to 100% due to rounding.

On SIC sector, there are robust and usable base sizes to report for 16 SIC sector groupings, as shown in the table below. We oversample businesses in the Information and Communication sector, but otherwise sample broadly in line with the national representation.

Fig. 5 – SIC sector: Survey responses (weighted) vs national representation

Sector	Weighted urvey Representation	National Representation
ABDE – Agriculture, mining, electricity, gas, water and waste	1%	4%
C – Manufacturing	6%	5%
F – Construction	8%	16%
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	11%	10%
H – Transportation and storage	2%	6%
I – Accommodation and food service activities	5%	4%
J – Information and communication	24%	6%
K – Financial and insurance activities	2%	2%
L – Real estate activities	4%	3%
M – Professional, scientific and technical activities	11%	14%
N – Administrative and support service activities	8%	9%
OP – Public administration and defence; compulsory social security and education	2%	6%
Q – Human health and social work activities	4%	6%
R – Arts, entertainment and recreation	2%	5%
S – Other service activities	4%	6%
No sector given[15]	2%	N/A

Source: Sector data based on SIC codes obtained through data linkage done by DSIT. Numbers may not sum to 100% due to rounding.

[15] This is common for entities other than private or public limited company, including limited liability partnerships and UK establishments (i.e. of foreign entities).

The survey also provides breakdowns that explore the overseas activities of UK businesses. Among survey respondents, 26% are UK businesses that wholly or partially own companies overseas; 12% are wholly or partially owned by an overseas entity; and 24% export products overseas. In total, 54% have some form of overseas activity in one of the three aforementioned capacities. There are no national representation numbers for comparing these against.

From the above, we believe our dataset is representative of the UK population. Furthermore, as can be seen below, our screening criteria has ensured that our dataset is of a sufficiently high quality; with most responses coming from those who are either key decision makers on (58%), or key influencers of (31%), the adoption of innovative technologies/processes in their organisation.

Fig. 6 – Respondent seniority within organisation

57%

'**I am a key decision maker** when it comes to adoption of innovative technologies in my organisation'

33%

'**I am an influencer** over adoption innovative technologies in my organisation, but I'm not a key decision maker'

11%

'**I have some knowledge** of the adoption of innovative technologies in my organisation, but I have little or no influence over it''

Source: Survey QA2. Which of the following most applies to you? Base: Total Sample (n=4595)

5 Technology Adoption – Full Sample

Reminder: Adoption was defined in the survey as the adoption of elements of innovative new technologies or processes. Adopters had fully adopted elements of at least one of the 20 technologies covered in the survey.

5.1 Key Findings

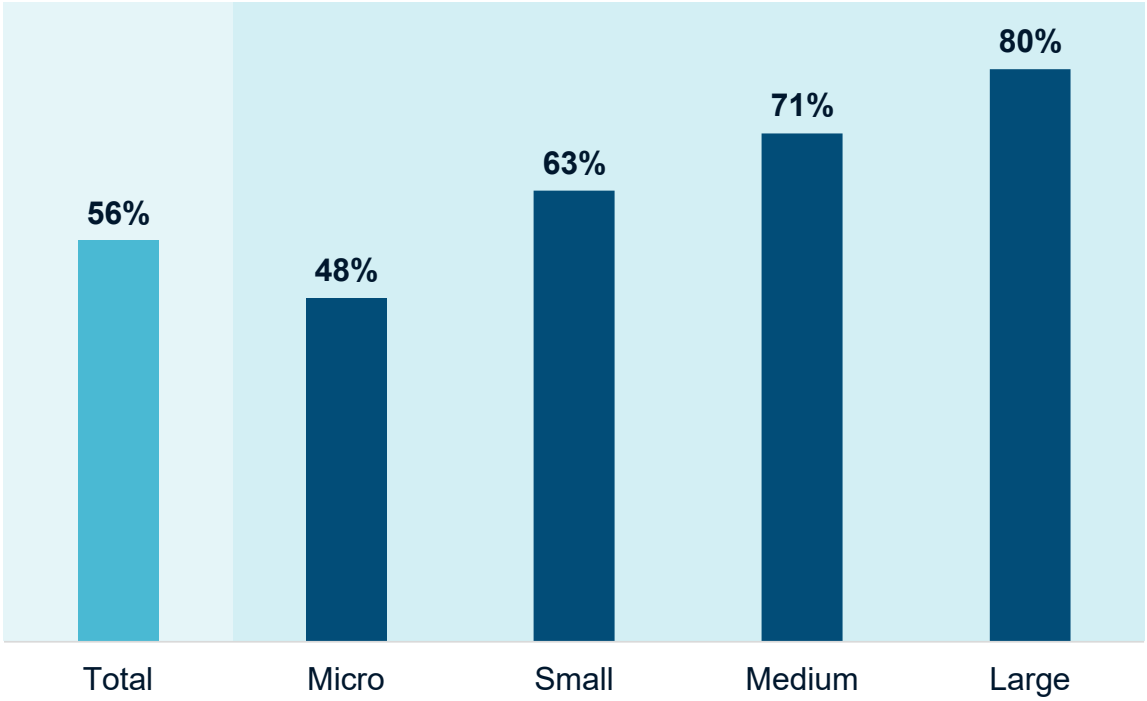
Over half of businesses (56%) said they were existing adopters of at least one of the technologies covered in the survey. This headline 'technology adoption rate' varies by business characteristics and across technologies.

- **Business size:** Technology adoption increases with business size: 80% of large businesses; 71% of medium businesses; 63% of small businesses; and 48% of micro businesses.
- **Region/nation:** There is no overarching geographic pattern. The regions/nations with the highest level of technology adoption are the North East (66%) and London (65%). The regions/nations with the lowest level of technology adoption are Northern Ireland (42%) and the South West (47%).
- **Sectors:** There is no overarching sector pattern. Over half the sectors surveyed had similarly high levels of adoption in the range 55-62%. The top sector is Finance and Insurance (62%). Two sectors have adoption rates below 50%: Construction (47%), and Transportation and Storage (35%).
- **Internationalisation:** Businesses with some overseas activity are more likely to adopt technology: 68% of businesses owned by overseas entities are adopting technology; compared to 44% of businesses with no overseas ownership or activity.
- **Technologies:** The three most commonly adopted technologies are Remote Working Systems (24%); Future Telecoms (18%); and Sustainable Business Practices (16%). These are generally more established technologies. Meanwhile, the least adopted technologies are Quantum (6%) and Biotechnologies (5%). These are more nascent, less established technologies.

5.2 Technology Adoption Rates

Our research shows that 56% of businesses are existing adopters of at least one of the technologies covered in the survey. Among businesses that are adopting, the average number of technologies being adopted is two. Adoption is driven by scale; it is most common among large organisations (80%), and least common among micro businesses (48%).

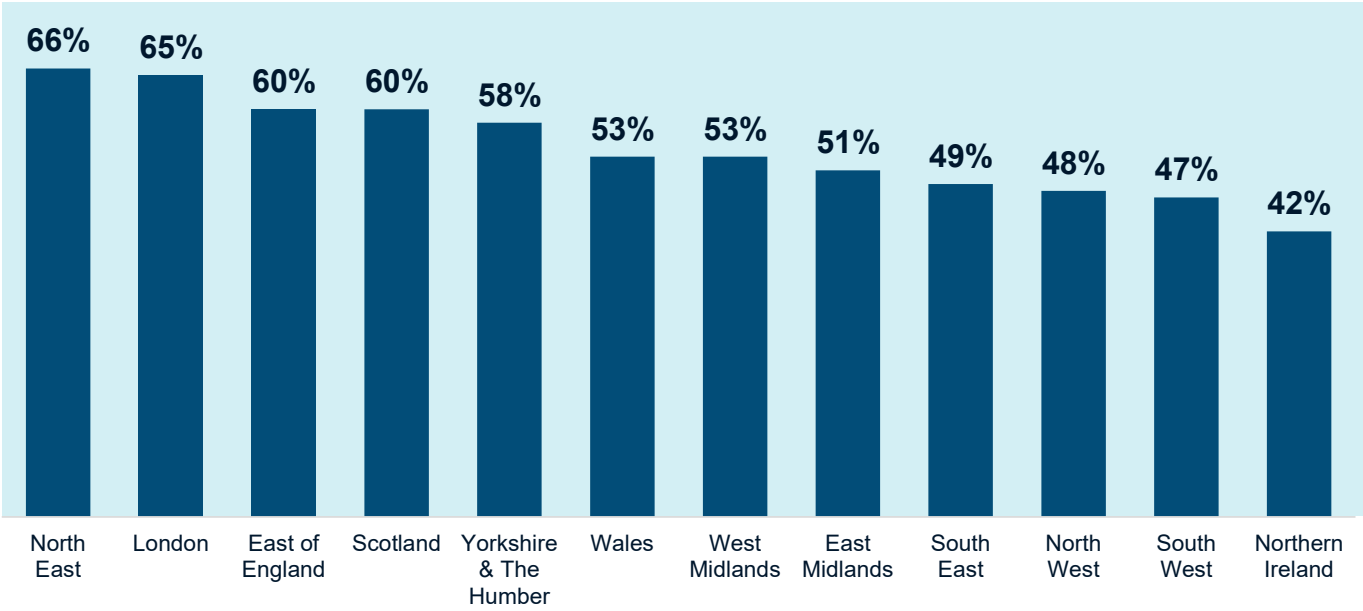
Fig. 7 – Businesses adopting in at least one of the 20 technologies in the survey by business size



Source: Survey QB1A. Thinking about your organisation's adoption of elements of the following innovative new technologies or processes, which of the following statements best applies to each of these? (We have fully adopted elements of this into our organisation's operations). Base: Total Sample (n=4595)

The ITL1 region/nation with the highest level of technology adoption is the North East (66%), while the ITL1 region/nation with the lowest level of technology adoption is Northern Ireland (42%). The North East ranks highly across most individual technologies, but particularly high on Future Telecoms, Artificial Intelligence; and Sustainable Business Practices.

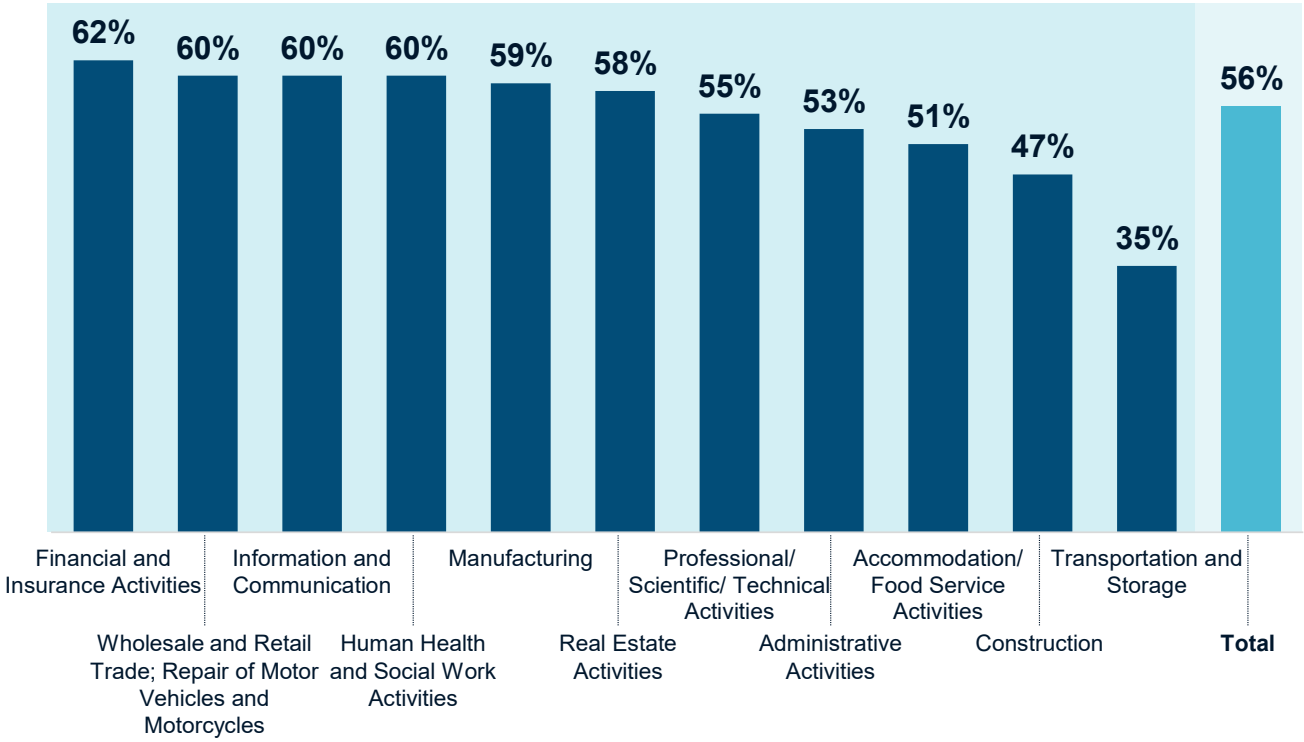
Fig. 8 – Businesses adopting in at least one of 20 technologies by ITL1 region/nation



Source: Survey QB1A. Thinking about your organisation's adoption of elements of the following innovative new technologies or processes, which of the following statements best applies to each of these? (We have fully adopted elements of this into our organisation's operations). Base: Total Sample (n=4595)

Over half the sectors surveyed had similarly high levels of adoption in the range 55-62%. The top sectors is Finance and Insurance (62%). Two sectors have adoption rates below 50% – Construction (47%); and Transportation and Storage (35%). Businesses in this latter sector did recognise a business need to adopt, but encountered issues with skills shortages and were particularly put off by the short-term transition period for implementing these technologies.

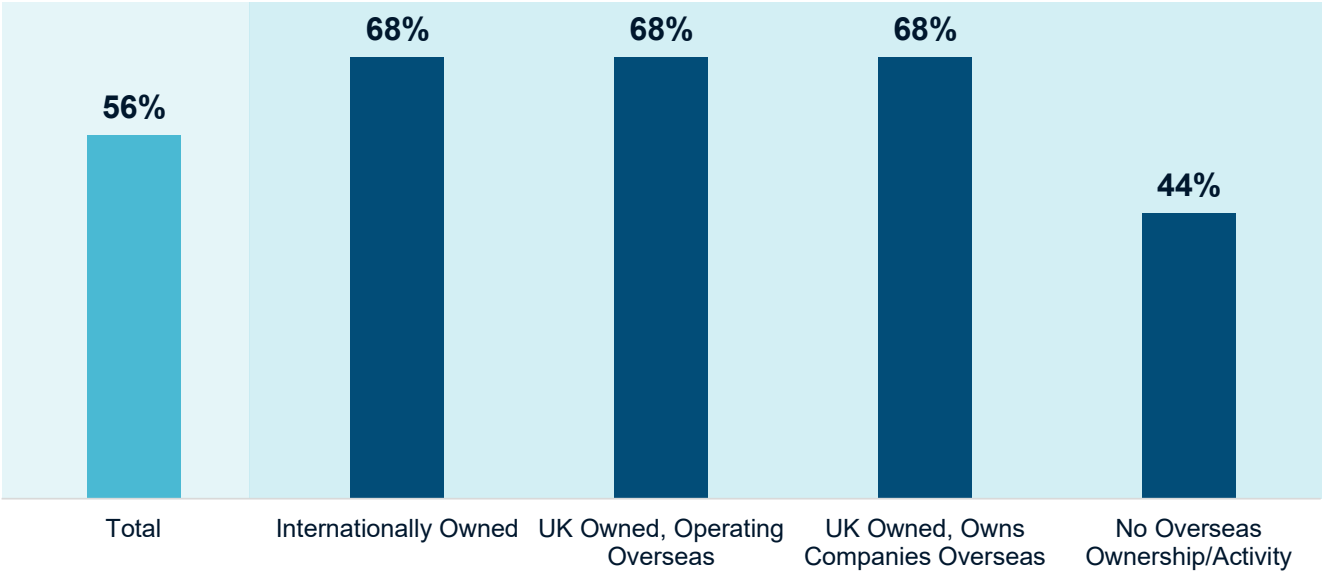
Fig. 9 – Businesses adopting in at least one of 20 technologies by sector (Base >100)



Source: Survey QB1A. Thinking about your organisation's adoption of elements of the following innovative new technologies or processes, which of the following statements best applies to each of these? (We have fully adopted elements of this into our organisation's operations). Base: Total Sample excluding no sector or sectors with low base size (n=4141)

In addition, businesses with some overseas activity are more likely to adopt at least one technology than those with no overseas ownership or activity. There are two possible explanations for this. First, larger businesses are more commonly active overseas, and large businesses have higher adoption rates. Second, in the open text boxes in the survey, some respondents stated that issues with recruiting talent from the EU was a key barrier to adoption.

Fig. 10 – Businesses adopting in at least one of 20 technologies by overseas activity

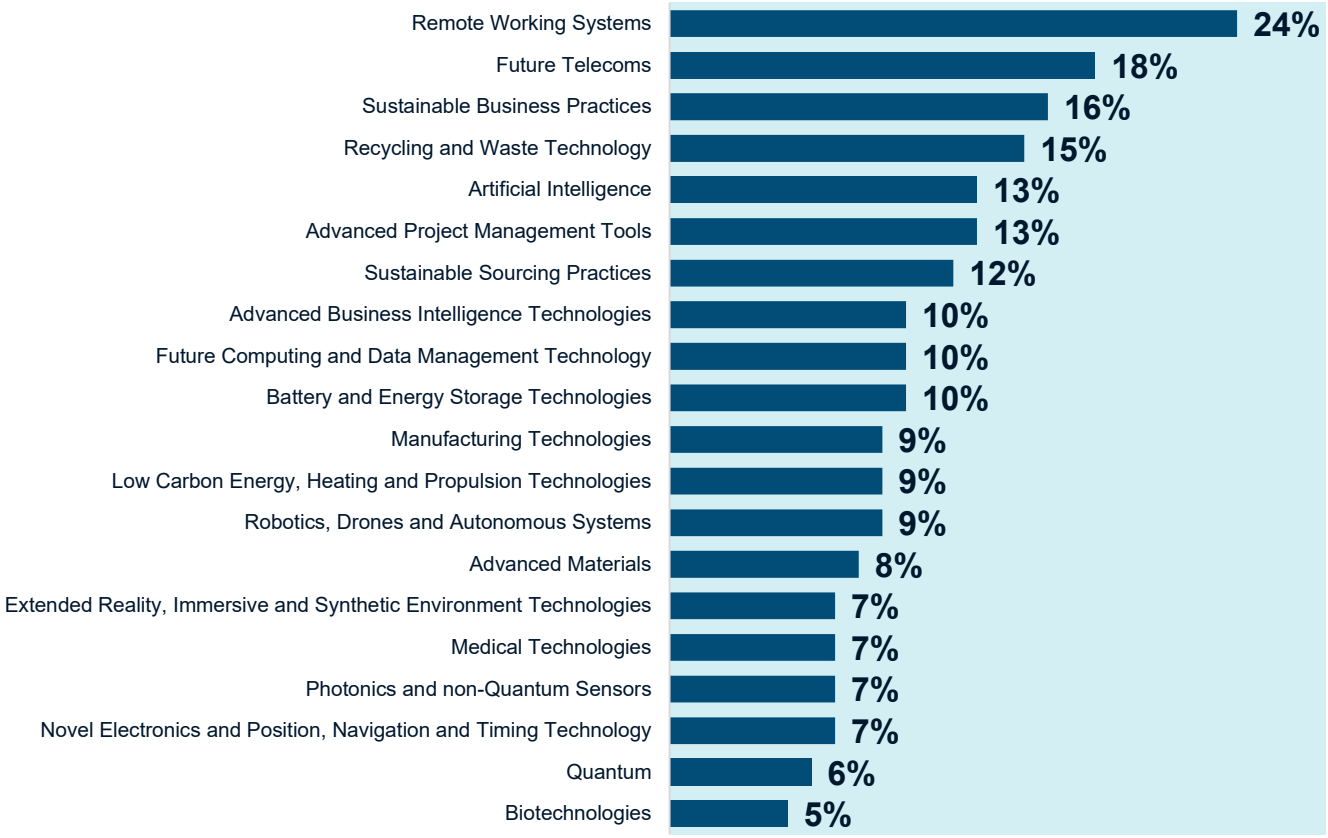


Source: Survey QB1A. Thinking about your organisation's adoption of elements of the following innovative new technologies or processes, which of the following statements best applies to each of these? (We have fully adopted elements of this into our organisation's operations). Base: Total Sample (n=4595)

5.3 Technologies Being Adopted

When looking at the technologies themselves, the results are somewhat intuitive. The three most widely adopted technologies are Remote Working Systems, Future Telecoms and Sustainable Business Practices. These are generally more established technologies. Meanwhile, the least adopted technologies are Quantum and Biotechnologies. These are more nascent, less established technologies.

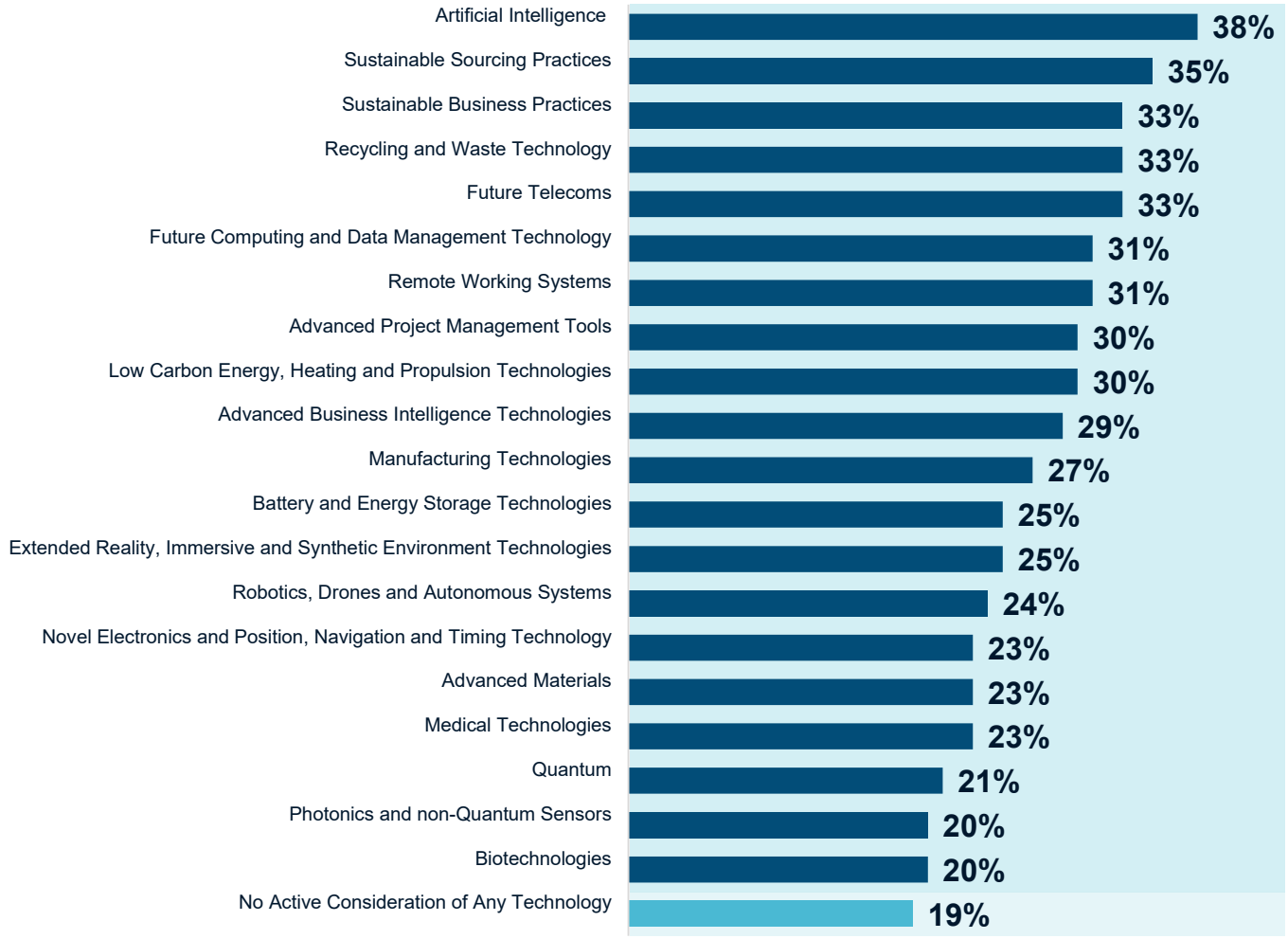
Fig. 11 – Technology Adoption Breakdown – Total Sample



Source: Survey QB1A. Thinking about your organisation's adoption of elements of the following innovative new technologies or processes, which of the following statements best applies to each of these? (We have fully adopted elements of this into our organisation's operations). Base: Total Sample (n=4595)

Many more businesses indicated that they are actively moving to increase adoption, with 81% stating that they had either begun to or were considering adopting one of the 20 technologies. The two technologies most likely to be under consideration were Artificial Intelligence (38%) and Sustainable Sourcing Practices (35%). The two technologies least likely to be under consideration were Photonics and non-Quantum Sensors (20%) and Biotechnologies (20%). It is important to remember that consideration does not guarantee future action.

Fig. 12 – Technology Adoption Considerer Breakdown – Total Sample

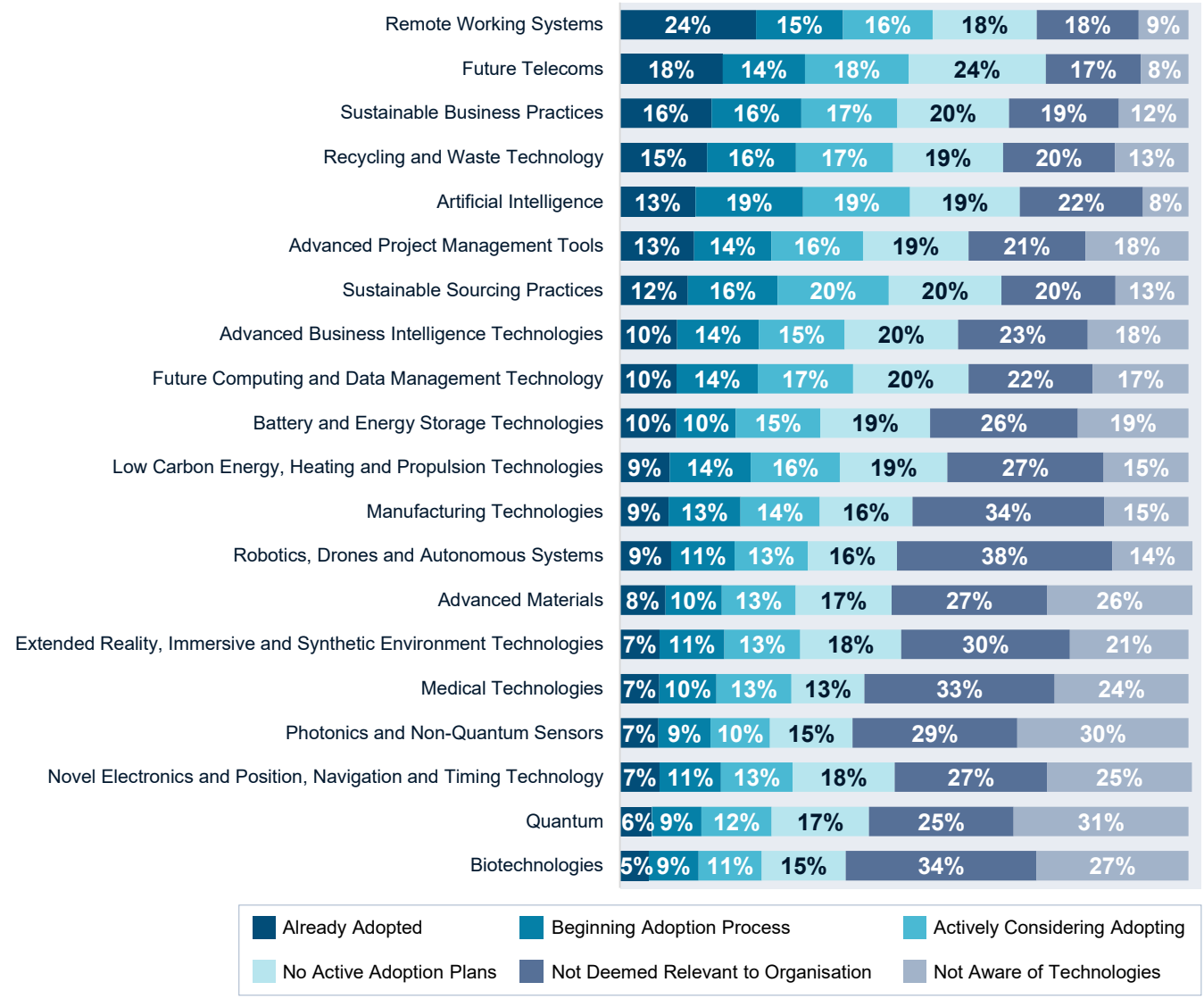


Source: Survey QB1A. Thinking about your organisation's adoption of elements of the following innovative new technologies or processes, which of the following statements best applies to each of these? (We're in the process of adopting elements of this into our organisation's operations/we're actively considering adopting elements of this at some point in the future). Base: Total Sample (n=4595)

5.4 Adoption Intensity and Consideration

Looking in even deeper detail at the technology adoption process, one other key finding stands out: that most organisations are aware of each of these technologies. Those who are not either existing adopters or active considerers are most likely to not deem the technology relevant to their organisation. Many firms would likely appreciate help through the short-term adoption period, and may also value education about the benefits of these technologies; but raising awareness of the existence of these technologies does not need to be a priority.

Fig. 13 – Technology Adoption/Adoption Considerer Breakdown – Total Sample



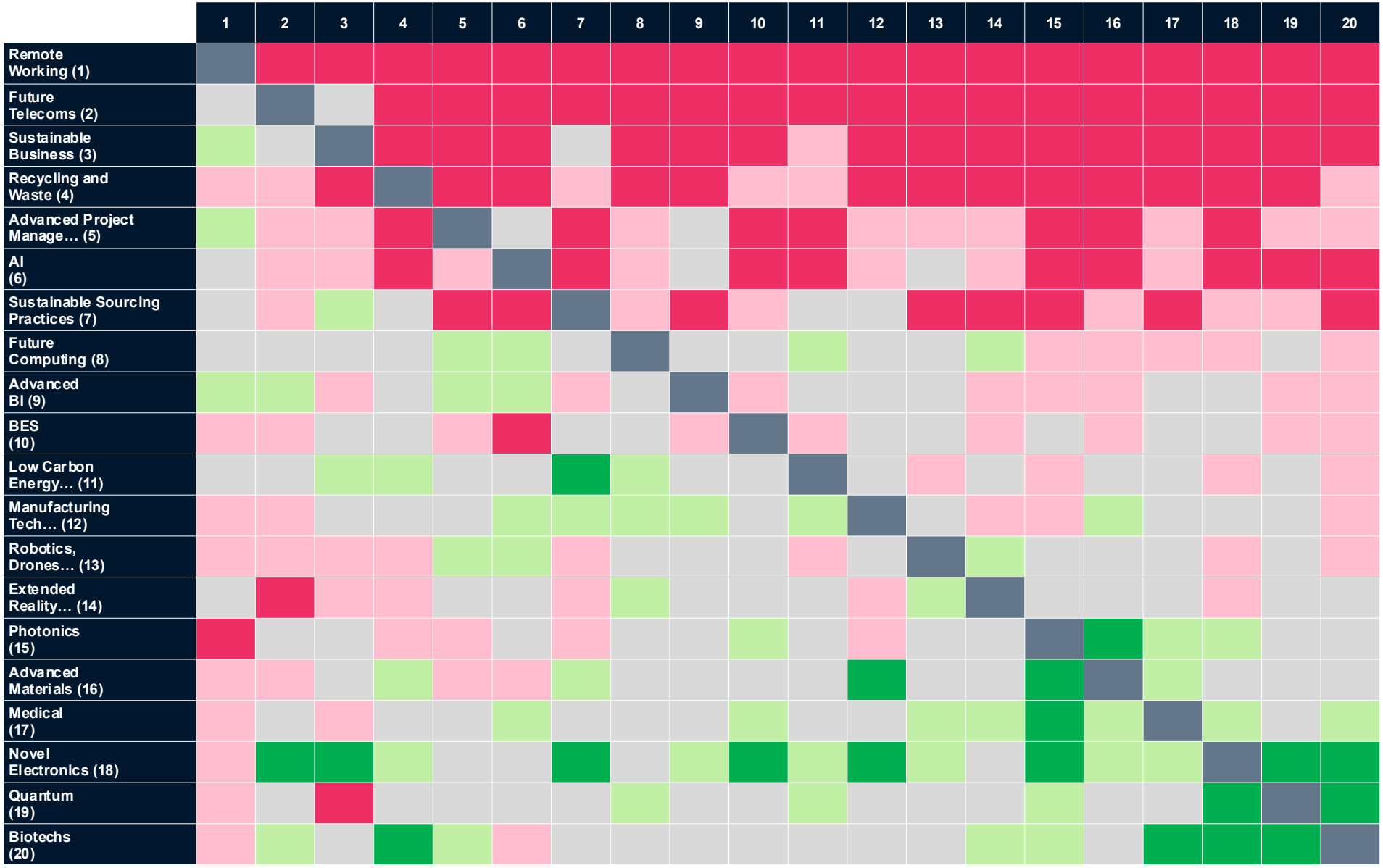
Source: Survey QB1A. Thinking about your organisation's adoption of elements of the following innovative new technologies or processes, which of the following statements best applies to each of these? (Those who have not fully adopted any technology) Base: Total Sample (n=4595)

5.5 Technology Co-adoption

The grid below (Fig. 14) shows a technology adoption correlation matrix, outlining which technologies are most likely to be adopted in conjunction with each other (the key for the colour scheme used is shown below). The chart should be read with the technologies on the left, listed vertically, considered as the independent variable; and the technology numbers listed horizontally along the top considered as the dependent variable. For example, we can see from Row 1 (Remote Working Systems), Column 2 (Future Telecoms), that adopters of Remote Working Systems are substantially less likely to be adopting Future Telecoms than the average technology adopter. In Row 18, Column 2, adopters of Novel Electronics are considerably more likely to be adopting Future Telecoms than the average technology adopter.

At a high level, the findings are somewhat intuitive: the adopters of the most commonly adopted technologies are less likely to be adopting most other technologies. By nature, the most commonly adopted technologies are at the furthest stage of the adoption curve and so will have reached many businesses, including late and/or reluctant adopters. And vice versa for the most rarely adopted technologies such as Biotechnologies and Novel Electronics: adopters of these technologies showed a high likelihood to be adopting many other technologies.

Fig 14 – Technology Adoption Correlation Matrix



6 Technology Adoption – Deep Dive

Reminder: Each respondent was asked detailed follow-up questions about the nature of technology adoption for a maximum of two technologies. This was done to minimise respondent burden. The results in this section pertain to these follow-up questions.

6.1 Key Findings

Technology adoption journeys tend to differ along one key dimension – how established the technology is. More nascent technologies, such as Quantum, tend to be more likely to require financial/ non-financial support; incur high acquisition/integration costs; take longer to adopt; and be sourced from overseas. Meanwhile, more established technologies, like Future Telecoms and Artificial Intelligence, are more likely to drive higher productivity.

Source and support

- **Source country:** UK businesses source most technologies from the UK (64%), followed by the rest of the world (19%) and EU/EFTA (17%). More established technologies are more likely to be sourced from the UK; such as Future Telecoms (80%) and Artificial Intelligence (63%).
- **Non-financial support:** 85% of technology adoption journeys required non-financial external support. The top four sources of non-financial support are a mix of government and industry support: namely professional and industry associations (28%); Help to Grow (24%); technical, industry or service standards (23%); and UKRI/IUK (23%). Less widely adopted technologies tend to be more reliant on UKRI/IUK for non-financial support, while more widely adopted technologies are more reliant on industry (inc. industry standards).
- **Financial support:** 73% of businesses accessed some form of financial support during their technology adoption journeys. The three most common sources of financial support were banks (27%); private investors/venture capital (23%); and UKRI/IUK (22%). More widely adopted technologies, such as Artificial Intelligence and Future Telecoms, are less likely to require financial support for adoption compared to newer technologies.
-

Time and costs

- **Time taken:** 19% of technology adoption journeys take more than a year. Biotechnology adoption journeys are most likely to take more than a year (38%); followed by Robotics, Drones and Autonomous Systems (31%). The technology least likely to take more than a year to adopt is Photonics and non-Quantum Sensors (4%).
- **Acquisition/integration costs:** These costs exceed 10% of annual turnover for 25% of businesses. Quantum placed a particularly large financial demand on firms; with 38% of Quantum adoption journeys incurring acquisition/integration costs over 10% of annual turnover, compared to 15% of Future Telecoms adoption journeys.
-

Enablers, barriers, and impact

- **Enablers:** The top enablers of technology adoption are *mostly* people related: leadership/management (41%); proven evidence of technology effectiveness (40%); employee capabilities (39%); and employee openness to change (39%). Financial factors, while still seen as important enablers by a sizeable proportion of respondents, sit in the bottom half of the list. Governmental factors are considered to be the least strong enablers.
- **Barriers:** The top barriers to technology adoption are: UK government regulation (19%); data privacy/security concerns (17%); and ease of integrating technologies (16%). For all

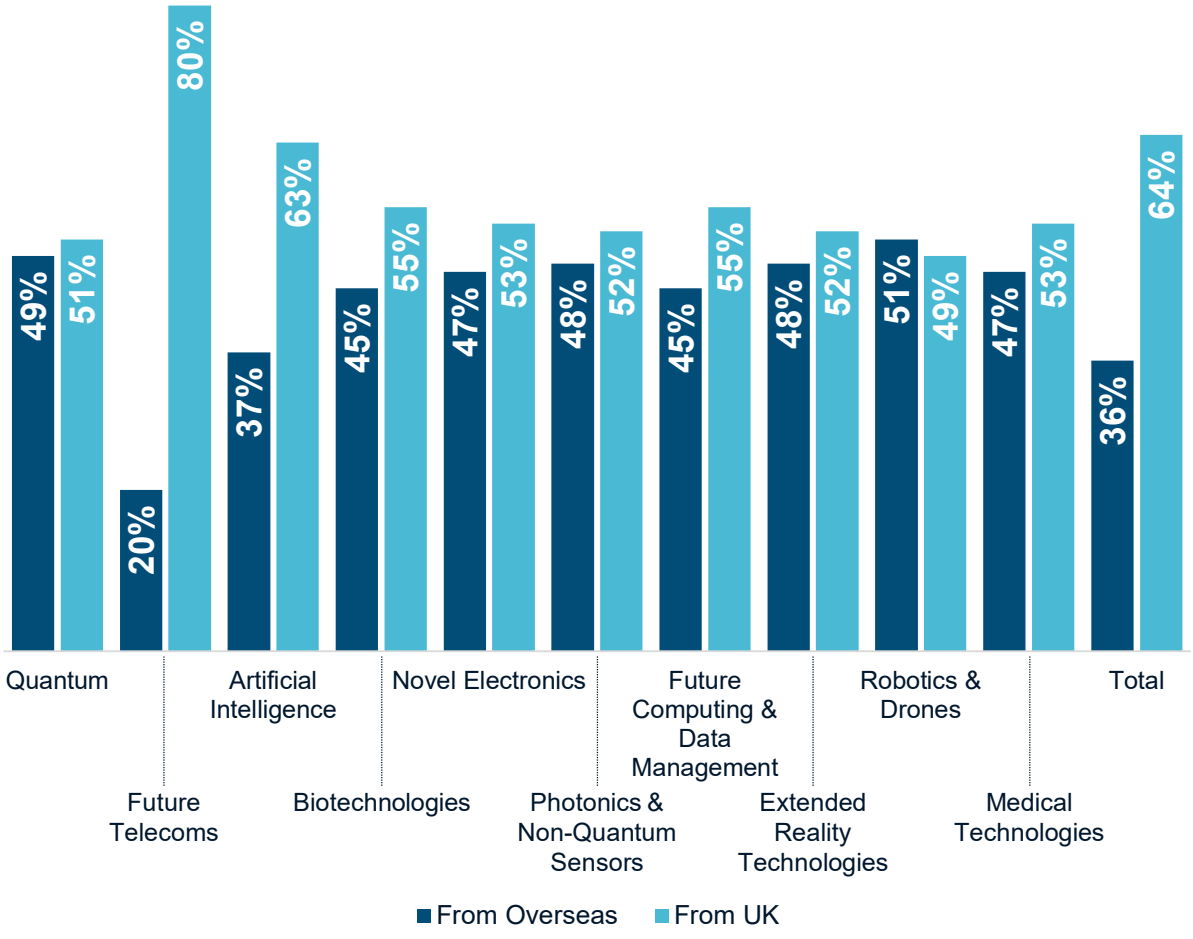
factors, businesses were more likely to view them as an enabler rather than a barrier. However, the gap in scores between enablers and barriers is smallest for UK government regulation, with 28% of businesses stating this is an enabler compared to 19% who stated it to be a barrier.

- **Impact:** Technology adoption has enabled businesses to achieve several positive outcomes; including improving productivity of workforce (39%), developing new/improved/more flexible processes or operations (31%), and reducing production/operating costs (29%). More established technologies, such as Future Telecoms and Artificial Intelligence, were particularly likely to drive productivity improvements.

6.2 Sourcing of Adopted Technologies

Overall, UK businesses source the majority of adopted technologies from the UK (64%), followed by the rest of the world (19%) and EU/EFTA (17%). The technologies most likely to be acquired from the UK were Future Telecoms (80%) and Artificial Intelligence (63%). Meanwhile, those least likely to be acquired from the UK (and therefore most reliant on overseas suppliers) are Robotics, Drones and Autonomous Systems (49%) and Quantum (51%).

Fig. 15 – Sources Adopted Technologies From – Total Sample

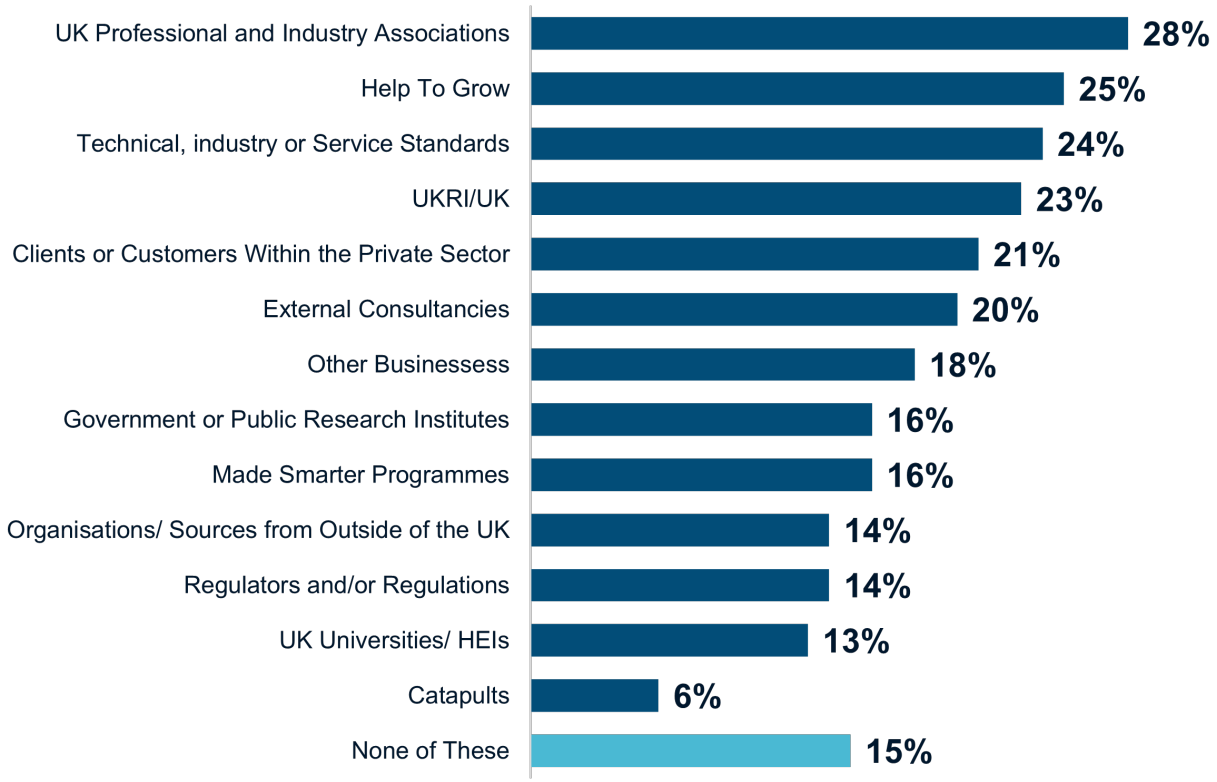


Source: Survey QB8. Thinking about your organisation's adoption of [ALLOCATED TECHNOLOGY], what proportion of these technologies were acquired from the following geographies? Base: All adopters of innovative technologies (n=3,282)

6.3 Non-Financial Support for Adoption

Respondents stated that 85% of adoption journeys required non-financial external support. The top four sources of non-financial support are a mix of government and industry: namely professional and industry associations (28%); Help to Grow (25%), technical, industry or service standards (24%) and UKRI/IUK (23%).

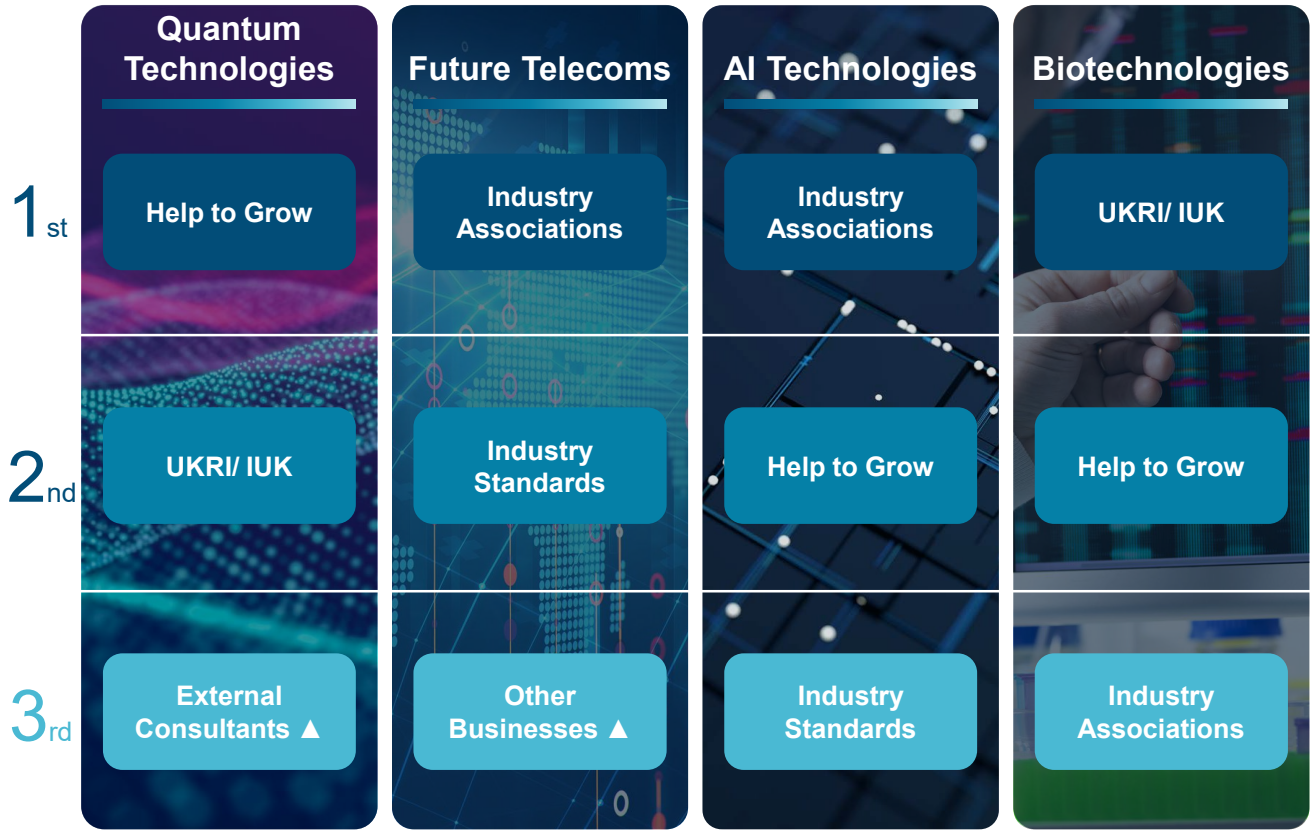
Fig. 16 – Non-Financial Support Sought During Technology Adoption Process



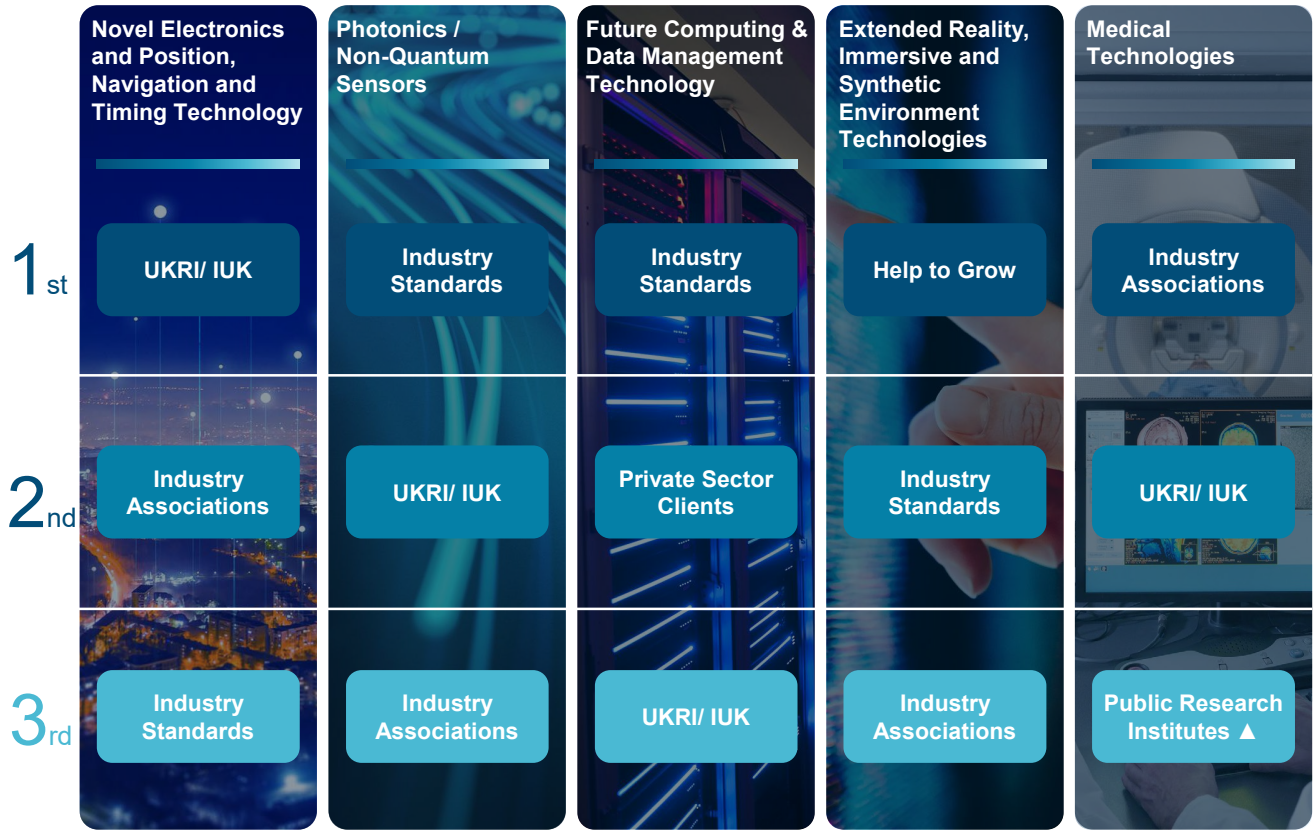
Source: Survey QB10. Did you seek information or support from any of the following sources during the process of adopting [ALLOCATED TECHNOLOGY]. Base: All adopters of innovative technologies (n=3,282)

The general pattern is the same when looking at individual technologies, with some nuance. In particular, Help to Grow is the most common source of non-financial support for firms adopting Quantum (32%); Biotechnologies (29%); and Novel Electronics and Position, Navigation and Timing Technology (42%). Overall, more nascent and less widely adopted technologies tend to be more reliant on UKRI/IUK for non-financial support, while more widely adopted technologies are more reliant on industry (either through industry associations or industry standards).

Fig. 17 – Non-Financial Support Sought during Technology Adoption Process – By Technology



▲ = Not in Total Level Top 5



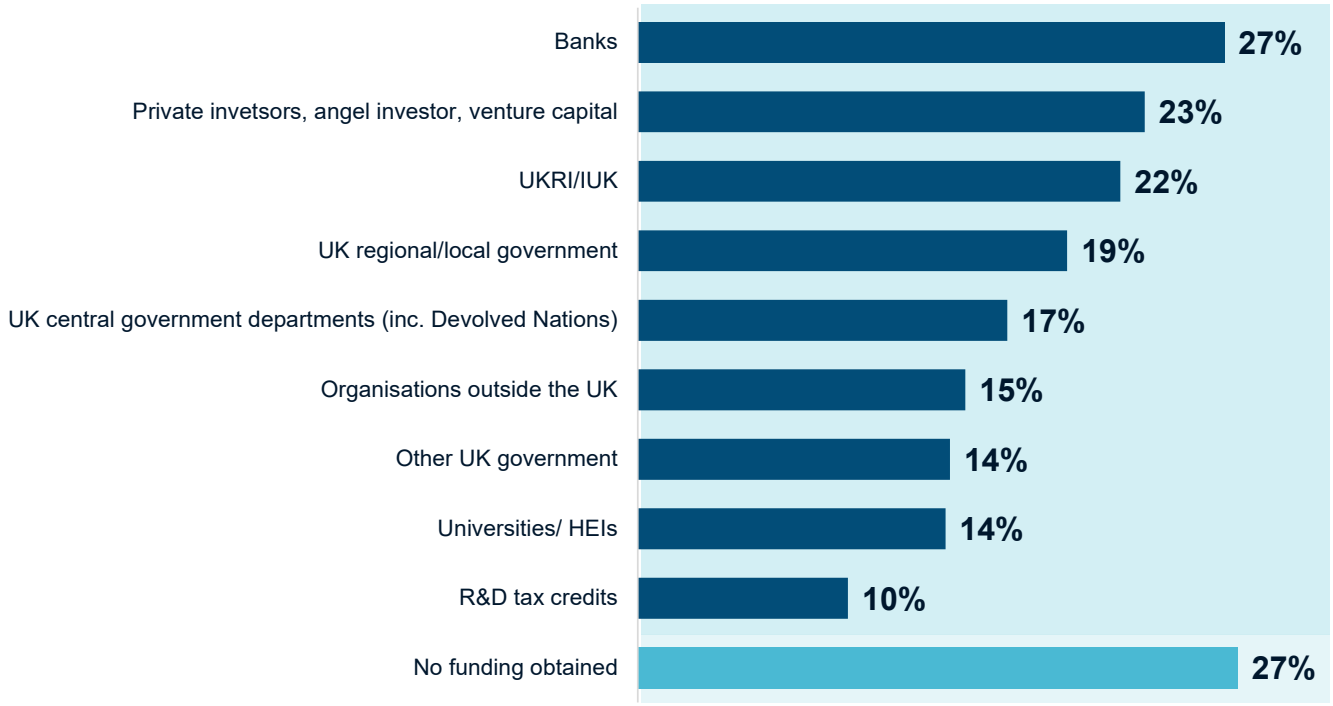
▲ = Not in Total Level Top 5

Source: Survey QB10. Did you seek information or support from any of the following sources during the process of adopting [ALLOCATED TECHNOLOGY]. Base: All adopters of innovative technologies (n=3,282)

6.4 Financial Support for Adoption

Overall, 73% of businesses accessed some form of financial support during their technology adoption journeys. The three most common sources of financial support were banks (27%), private investors/venture capital (23%) and UKRI/IUK (22%). UKRI/IUK appears towards the top of the list for both financial and non-financial support, suggesting it plays a key role in driving technology adoption in businesses.

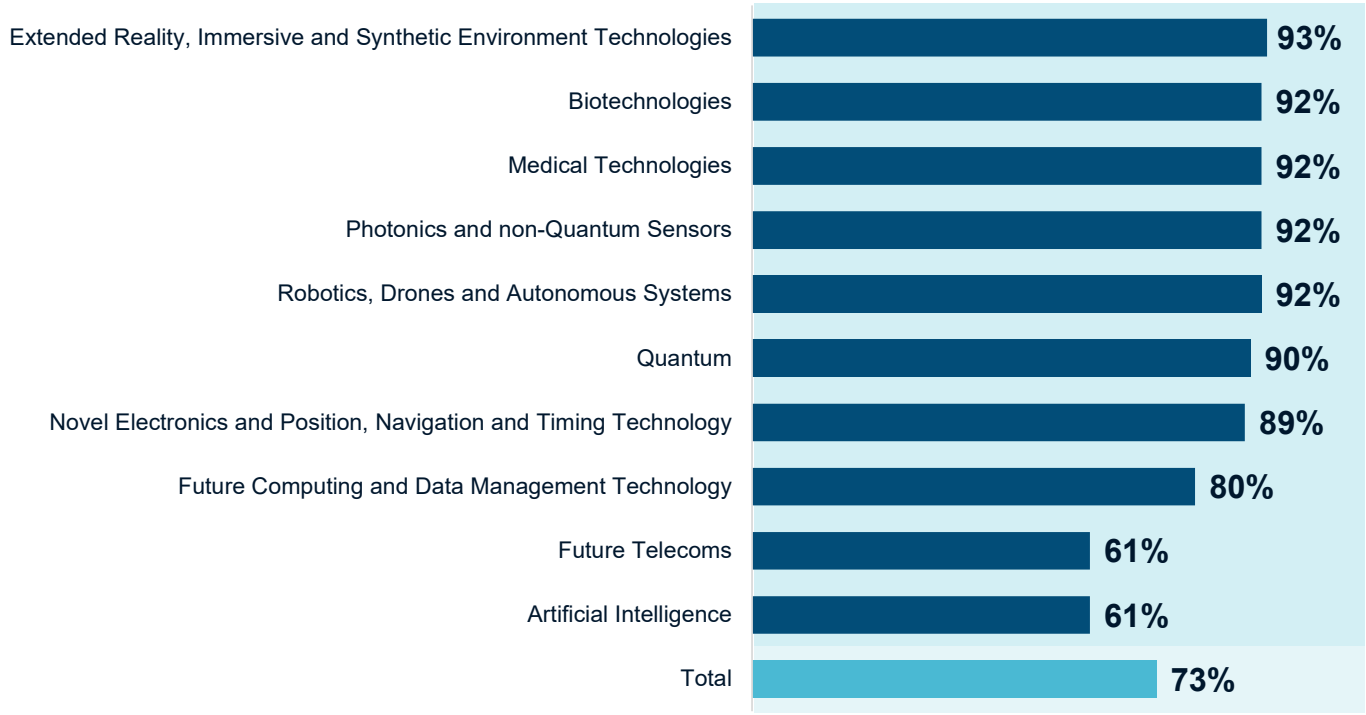
Fig. 18 – Sources of Financial Support During Adoption



Source: Survey QB13B. From which source, if any, did you obtain funding to help you adopt [ALLOCATED TECHNOLOGY]. Base: All adopters of innovative technologies (n=3,282)

We see a similar picture with financial support as we saw previously for non-financial support. More widely adopted technologies such as Artificial Intelligence and Future Telecoms are less likely to require financial support for adoption compared to newer technologies. Financial support tends to be more important for those technologies that rely on physical infrastructure: such as Biotechnologies; and Robotics, Drones and Autonomous Systems.

*Fig. 19 – Technologies Most Likely to Require Financial Support During Adoption Process**



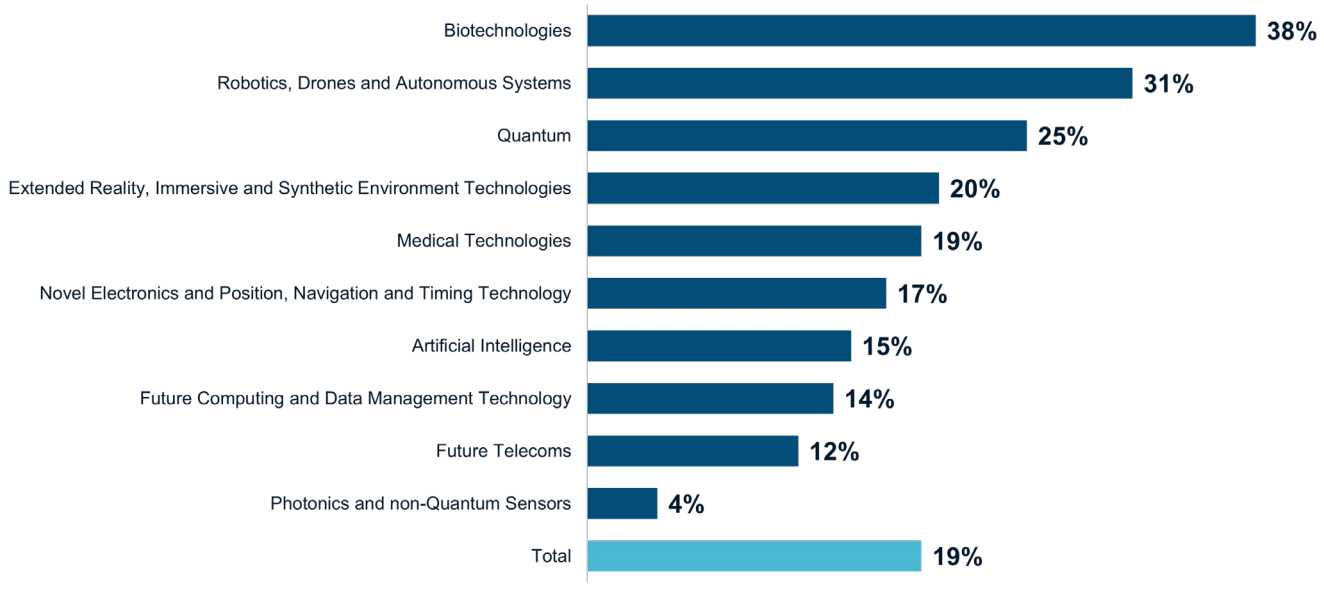
***As this was part of the technology deep dive, all other technologies have too low a base to analyse**

Source: Survey QB13B. From which source, if any, did you obtain funding to help you adopt [ALLOCATED TECHNOLOGY]. Base: All adopters of innovative technologies (n=3,282)

6.5 Time Taken to Adopt

Technology adoption takes time – with 19% of technology adoption journeys taking more than a year. Biotechnology adoption journeys are most likely to take more than a year (38%), followed by Robotics, Drones and Autonomous Systems (31%); Remote Working Systems (25%); and Quantum (25%). The technology least likely to take more than a year is Photonics and non-Quantum Sensors (4%). Time taken does not seem to depend on technology maturity, with more nascent and more established technologies among those most likely to take more than a year.

Fig. 20 – Technologies For Which Organisation's Acquisition/Integration Took More Than a Year



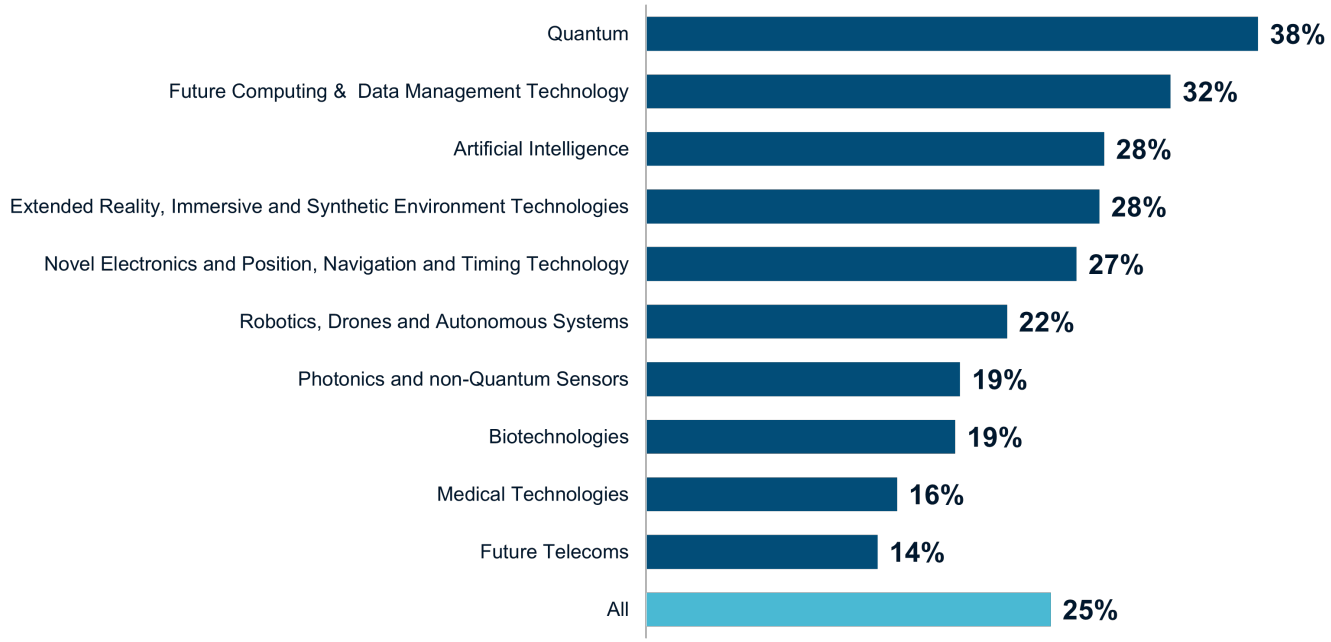
***As this was part of the technology deep dive, all other technologies have too low a base to analyse**

Source: Survey QB8B. Thinking about your organisation's adoption of [ALLOCATED TECHNOLOGY], from initial introduction to full use/integration, roughly how long was the process of adoption? Base: All adopters of innovative technologies (n=3,282)

6.6 Acquisition and Integration Costs

Technology adoption is costly – with acquisition and integration costs exceeding 10% of annual turnover for 25% of businesses. Quantum placed a particularly large financial demand on businesses, with 38% of Quantum adoption journeys incurring acquisition/integration costs over 10% of annual turnover. Businesses cite lower acquisition/integration costs for Future Telecoms (14%) and Medical Technologies (16%). The relative ranking of technologies by acquisition/integration costs do not generally mirror the relative ranking for financial support accessed. One possible explanation here is that business struggle to access support, or are reluctant to seek funding for acquisition/integration costs specifically (as opposed to purchase costs).

*Fig. 21 – Technologies For Which Business's Acquisition/Integration Demanded >10% of Annual Turnover**



***As this was part of the technology deep dive, all other technologies have too low a base to analyse**

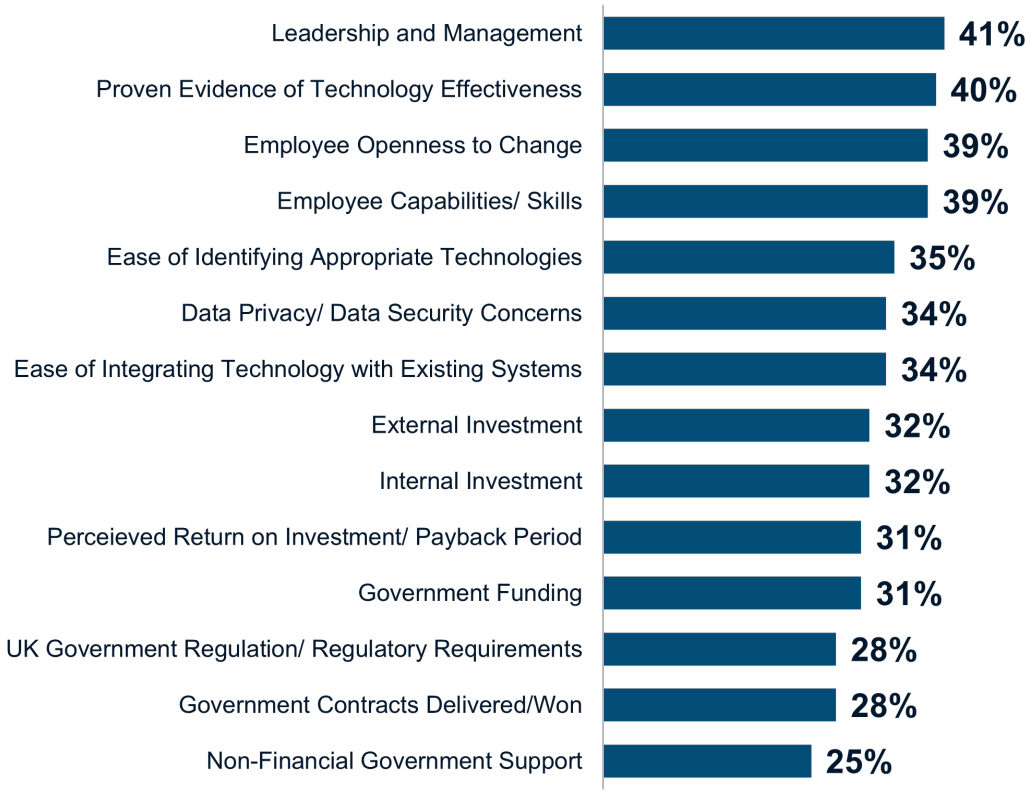
Source: Survey QB8C. Thinking about your organisation's adoption of [ALLOCATED TECHNOLOGY], from initial introduction to full use/integration, please select which point on the scale best describes the costs of adjustment and integration (Not including purchase costs). Base: All adopters of innovative technologies (n=3,282)

6.7 Enablers of Adoption

The top enablers of technology adoption are *mostly* people related – leadership/management (41%), proven evidence of technology effectiveness (40%), employee capabilities (39%), and employee openness to change (39%). This underlines the importance of businesses having the right skillset - whether through training and upskilling their existing workforce, or via recruitment. From the qualitative responses, businesses told us that they successfully adopted new technologies thanks to their people: their employees have the right skills and mindset to embrace the change, and leadership has the vision to see it through.

Financial factors – such as return on investment, government funding and internal/external investment – are still seen as important enablers by a sizeable proportion, but sit in the bottom half of the list. Governmental factors are considered to be the least strong enablers, but are still considered to be enablers by around three in ten.

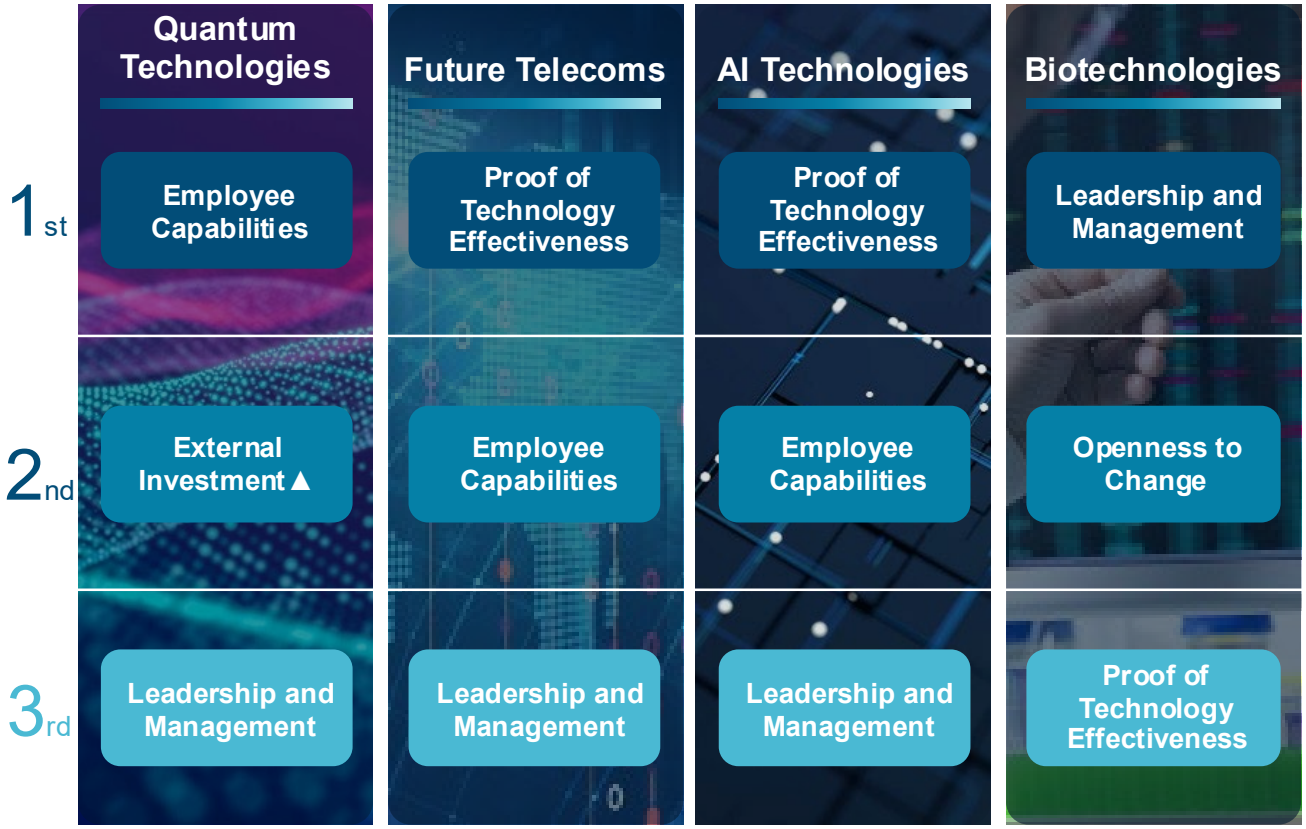
Fig. 22 - Perceived Enablers of Technology Adoption – Total Across all Technologies



Source: Survey QB11A. What impact, if any, did each of the following factors have when adopting [ALLOCATED TECHNOLOGY]. Moderate positive/Significant positive impact. Base: All adopters of innovative technologies (n=3,282)

At the technology level, the top three enablers are broadly consistent across technologies, with some exceptions. For Quantum, external investment is the second most frequent enabler, despite not being in the top five across technologies. Similarly, for Medical Technologies, data privacy/security is the second most frequent enabler, despite not being in the top six across technologies. For Future Telecoms and Artificial Intelligence, the most frequent enabler is not about employee skills, but rather proof of technology effectiveness.

Fig. 23 – Perceived Enablers of Technology Adoption – Top 3 Factors by Technologies



▲ = Not in Total Level Top 6

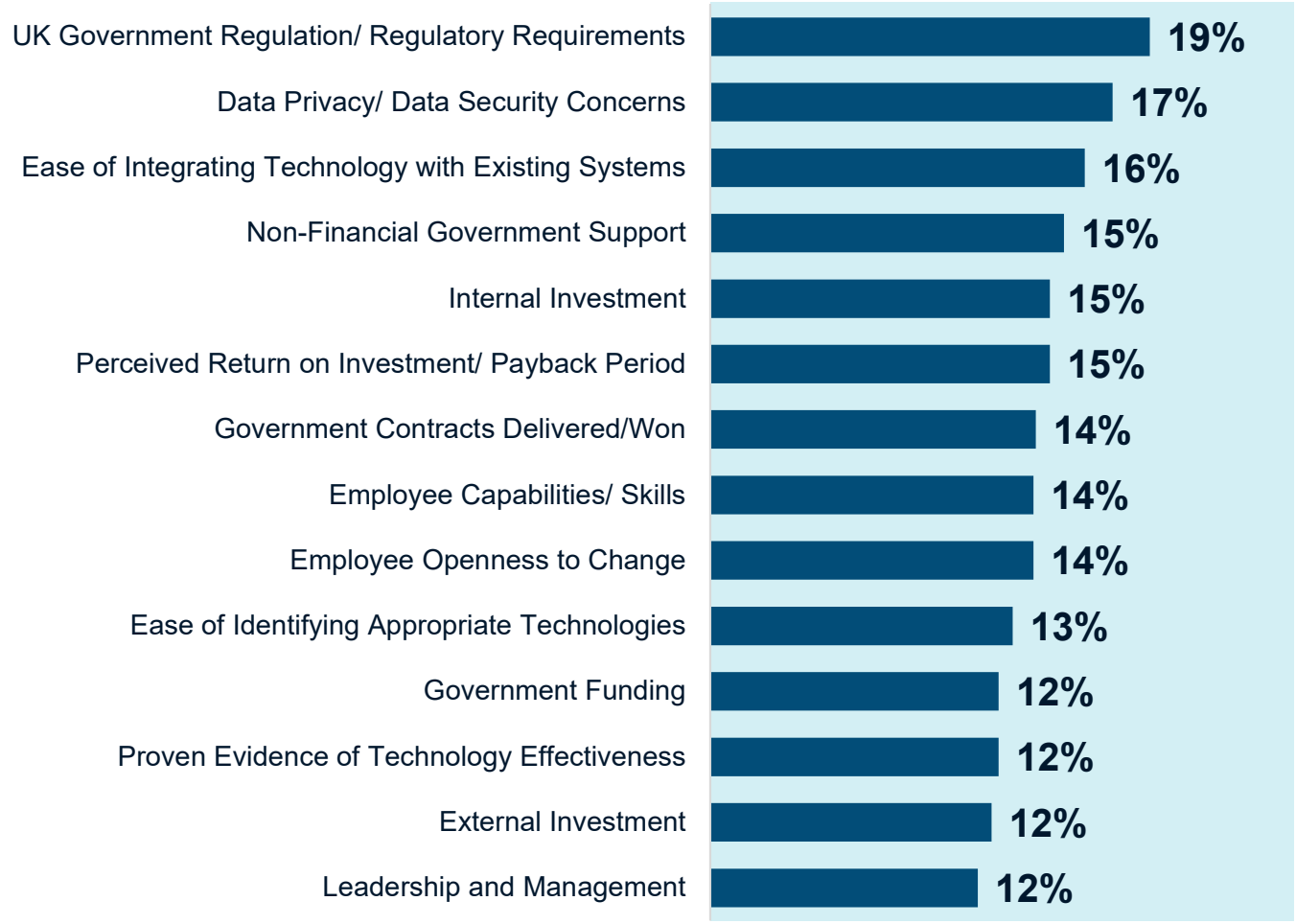
▲ = Not in Total Level Top 6

Source: Survey QB11A. What impact, if any, did each of the following factors have when adopting [ALLOCATED TECHNOLOGY]. Moderate positive/Significant positive impact. Base: All adopters of innovative technologies (n=3,282)

6.8 Barriers to Adoption

The top three most common barriers to technology adoption are UK government regulation (19%), data privacy/security concerns (17%) and ease of integrating technologies (16%). For all factors, businesses were more likely to view them as an enabler rather than a barrier. However, the gap in scores between enablers and barriers is smallest for UK government regulation, with 28% of businesses stating this is an enabler compared to 19% stating it to be a barrier.

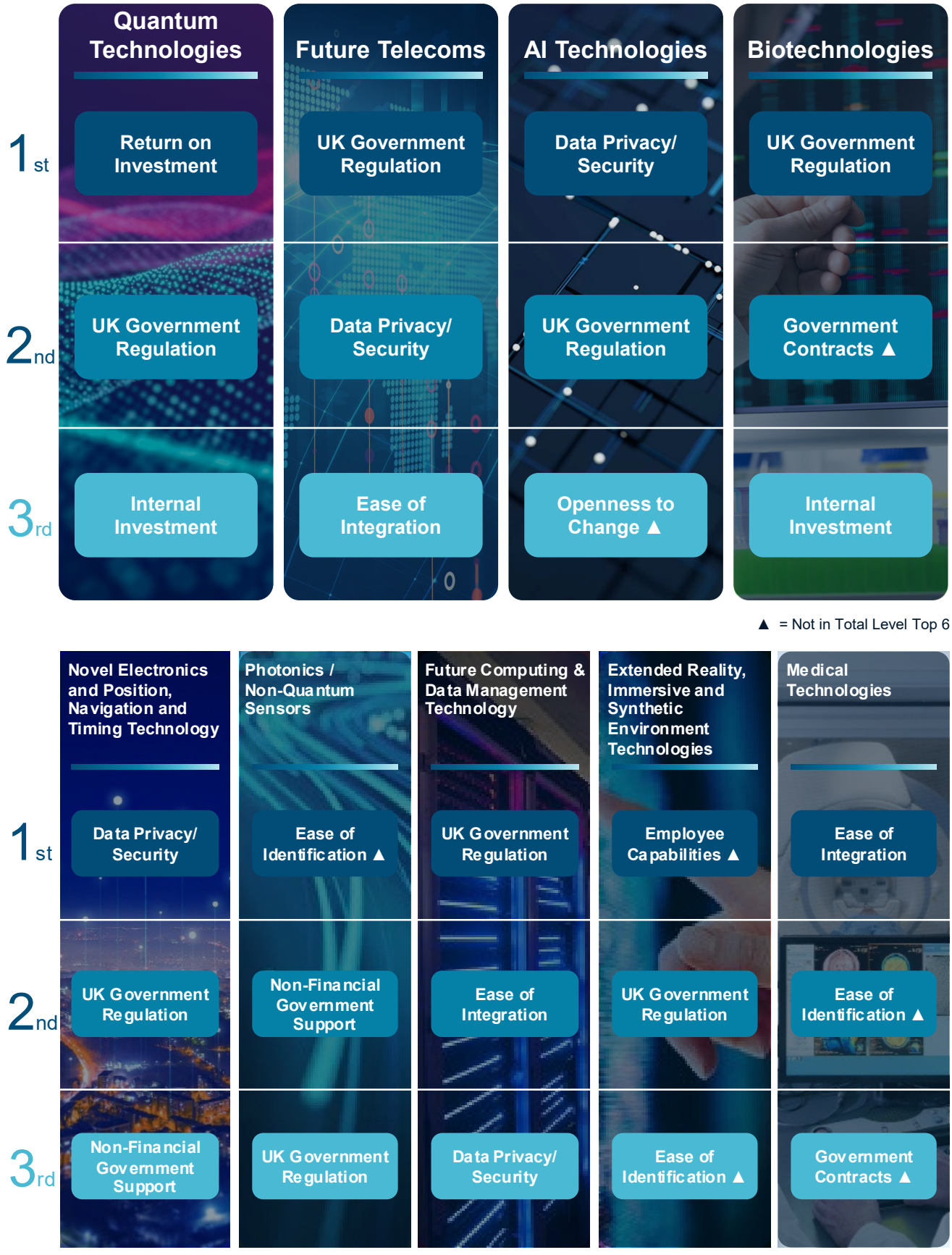
Fig. 24 - Perceived Barriers to Technology Adoption – Total Across all Technologies



Source: Survey QB11A. What impact, if any, did each of the following factors have when adopting [ALLOCATED TECHNOLOGY]. Slight negative/Moderate negative/Significant negative impact. Base: All adopters of innovative technologies (n=3,282)

At the technology level, the top three barriers are not consistent across technologies; except for UK government regulation, which appears in the top three for all technologies. For Quantum, internal investment is the third most common barrier, despite not appearing in the global top five. For Biotechnologies, government contracts and internal investment are the second and third most common barriers respectively, despite not appearing in the global top five. For both Future Computing and Data Management, and Medical Technologies, ease of integration is in the top three, despite not appearing in the global top five. For Extended Reality, Immersive and Synthetic Technologies, employee capabilities is the top barrier, despite not appearing in the global top five.

Fig. 25 – Perceived Barriers to Technology Adoption – Top 3 Factors by Critical Technologies

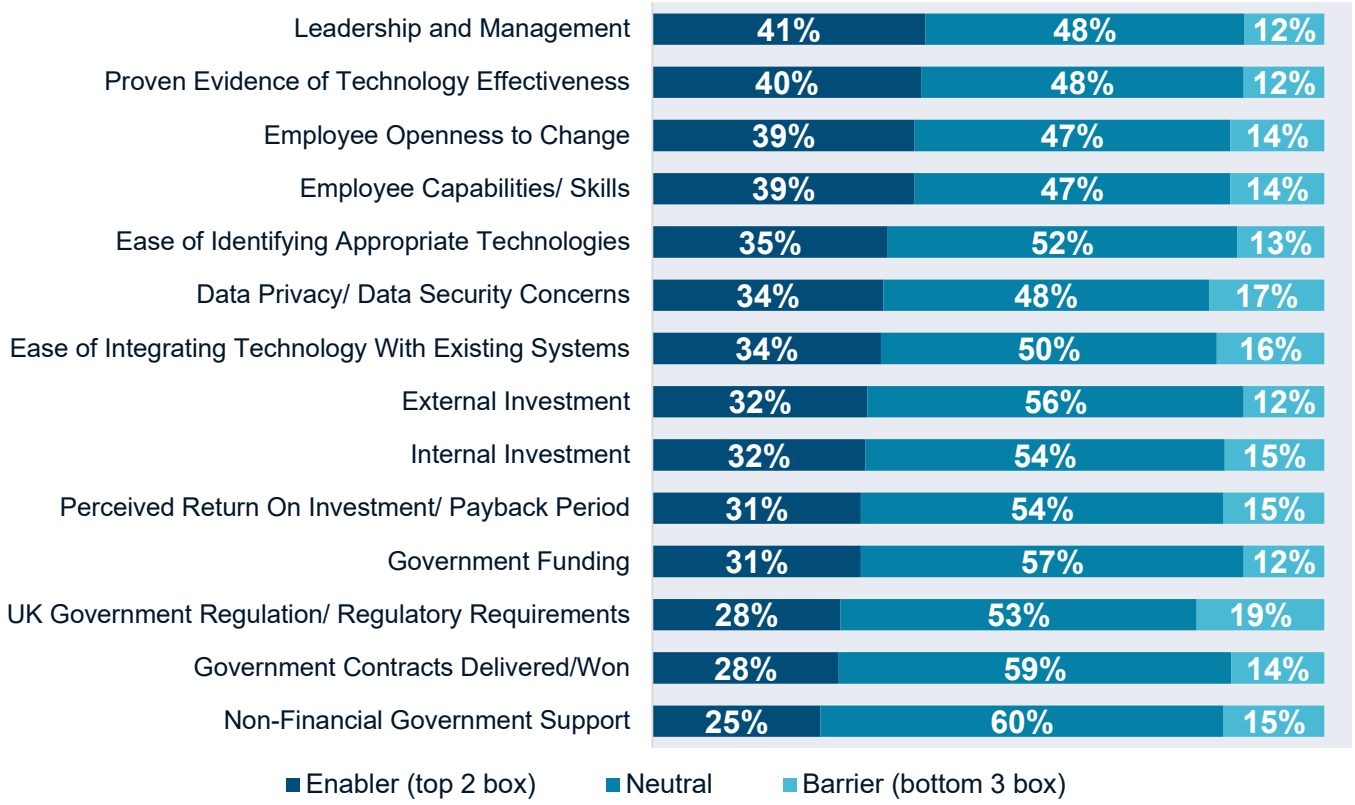


Source: Survey QB11A. What impact, if any, did each of the following factors have when adopting [ALLOCATED TECHNOLOGY]. Moderate positive/Significant positive impact. Base: All adopters of innovative technologies (n=3,282)

6.9 Adoption Enablers vs Barriers

Overall, businesses were much more likely to consider something an enabler than they were a barrier. The reasons for this came through qualitatively: **an organisation needs multiple compelling reasons to adopt a technology, but they only need one reason to stop an adoption journey**. There are two possible explanations here. First, there may be no silver bullet solution to improving innovation adoption – as adoption depends on several interconnected factors. The solutions to boosting adoption are therefore similar to those for boosting innovation or growth more generally in businesses. Second, as most factors were considered 'neutral' by respondents, it may be that these factors are not the most important things businesses consider when adopting technology.

Fig. 26 – Full Breakdown of Technology Adoption Enablers/Barriers



Source: Survey QB11A. What impact, if any, did each of the following factors have when adopting [ALLOCATED TECHNOLOGY]. Base: All adopters of innovative technologies (n=3,282)

6.10 Impact of Adoption

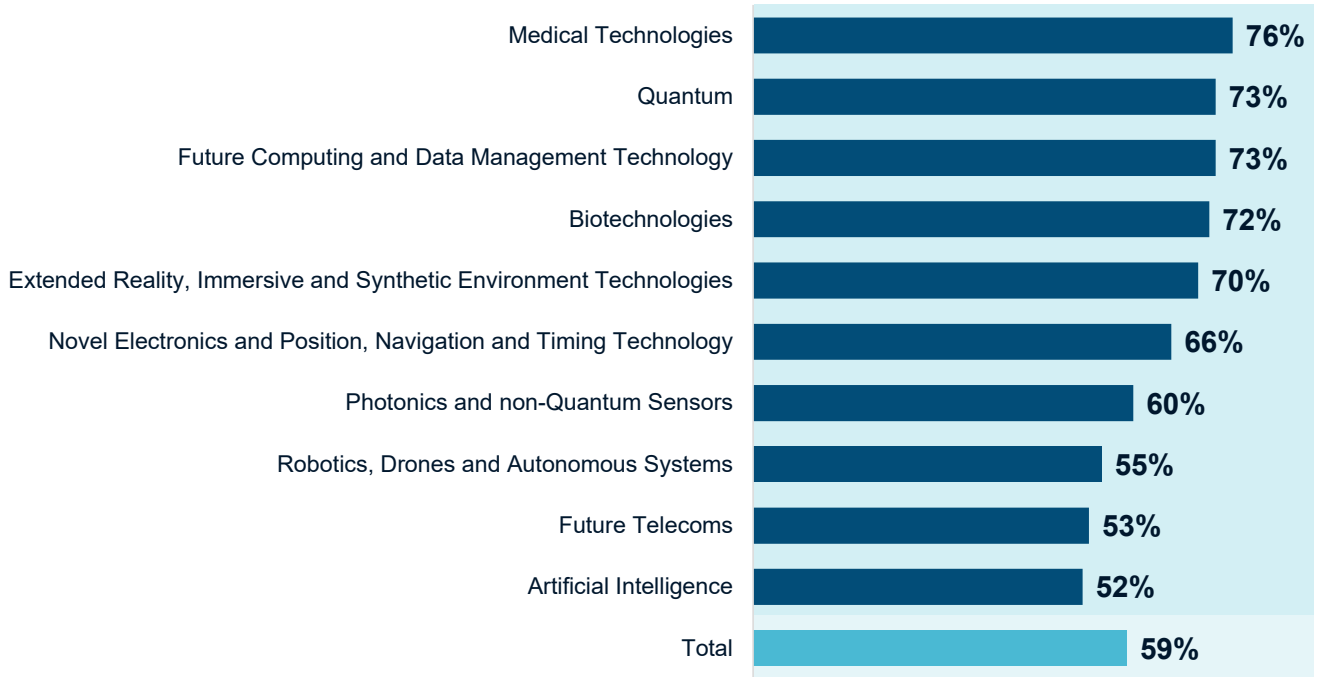
Technology adoption has enabled businesses to achieve several positive outcomes, including improving productivity of workforce (39%); developing new/improved/more flexible processes or operations (31%); and reducing production or operating costs (29%). Frontier technologies, such as Future Telecoms and Artificial Intelligence, were particularly likely to drive productivity improvements.

Fig. 27 – What Technology Adoption Enables once Adopted

Source: Survey QB9A. Which of the following has the adoption of [ALLOCATED TECHNOLOGY] enabled your organisation to do? Base: All adopters of innovative technologies (n=3,282)

Overall, 59% of businesses rated one or more adopted technologies as critical to their operations once adopted. The three technologies most likely to be rated as crucial by adopting businesses were: Medical Technologies (76%); Quantum (73%); and Future Computing and Data Management (73%). These are technologies that overall had lower adoption rates. The two technologies least likely to be rated as critical to adopting business were Future Telecoms (53%) and Artificial Intelligence (52%) - two technologies that had higher adoption rates.

*Fig. 28 – Importance of Technology to Company once Adopted – NET: Important**



***As this was part of the technology deep dive, all other technologies have too low a base to analyse**

Source: QB9B. Thinking about your organisation's use of [TECHNOLOGY], please indicate where it sits on the following scale. Base: All adopters of innovative technologies (n=3,282)

7 Technology Diffusion – Total Sample

Reminder: Diffusion was defined in the survey as an organisation's developing and selling of innovative new technologies. Diffusers were currently or previously selling at least one of the 20 technologies covered in the survey. As with adoption, we only asked businesses about a maximum of two technologies they were diffusing, to minimise respondent burden.

7.1 Key Findings

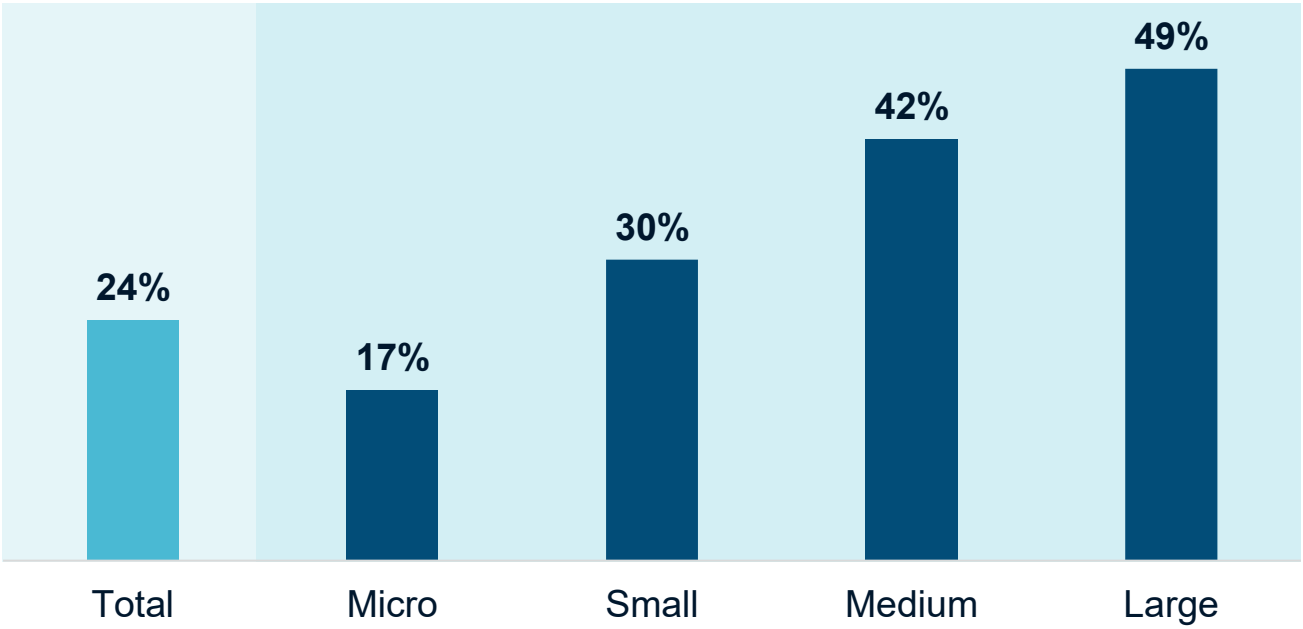
Almost a quarter of businesses (24%) said they were existing diffusers of at least one of the technologies covered in the survey. This headline 'technology diffusion rate' varies by business characteristics and across technologies.

- **Business size:** Technology diffusion increases with business size: 49% of large businesses; 42% of medium businesses; 30% of small businesses; and 17% of micro businesses.
- **Region/nation:** There is no overarching geographic pattern. The regions/nations with the highest level of technology diffusion are London (32%) and Scotland (31%). The regions/nations with the lowest level of technology diffusion are the South West (17%) and South East (17%).
- **Sectors:** There is no overarching sector pattern. Businesses in the Information and Communication sector are most likely to be diffusing technology (31%); followed by the Wholesale and Retail (27%) sector; and the Finance and Insurance sector (26%). Business in the Construction sector are the least likely at 14%; followed by the Real Estate sector (15%).
- **Internationalisation:** Businesses with some overseas activity are noticeably more likely to diffuse technology, ranging from 29% to 43% depending on the type of overseas activity. In comparison, only 8% of businesses with no overseas ownership or activity are diffusing technology.
- **Technologies:** The four technologies most likely to be diffused are: Artificial Intelligence (6%); Future Telecoms (6%); Recycling and Waste Technology (6%); and Remote Working Systems (6%). The order of technologies is broadly similar to that seen for adoption, with more established technologies more likely to be diffused than more nascent technologies.

7.2 Technology Diffusion Rates

Overall, 24% of UK organisations are diffusing at least one of the 20 technologies covered. Diffusion increases with business size, with 49% of large businesses diffusing vs 42% of medium businesses, 30% of small businesses, and 17% of micro businesses.

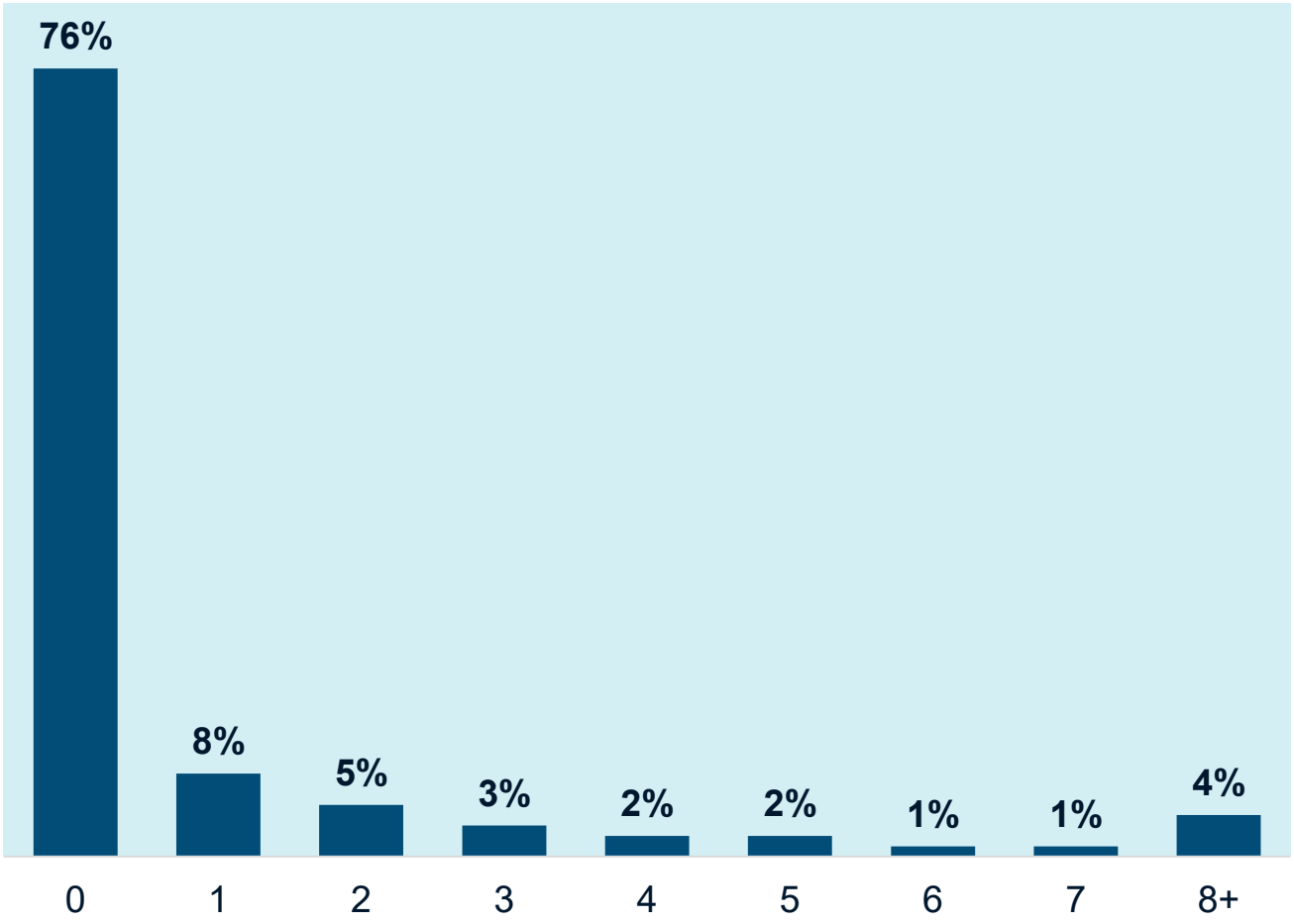
Fig. 29 – Proportion of businesses diffusing at least one technology – by business size



Source: Survey QB2A. Thinking about your organisation's developing and selling of innovative new technologies, which of the following statements best applies to each of these? (We currently sell this, or have done in the past). Base: Total Sample (n=4595)

Most businesses are not diffusing technologies (76%). There is a small but sizeable set of businesses that are diffusing in eight or more technologies (4%). While many businesses are adopting technologies, diffusing technologies is much less common. 'Super diffusers' are generally the largest businesses operating across huge sections of the economy.

Fig. 30 – Number of Innovative Technology Areas Diffused in by Each Organisation

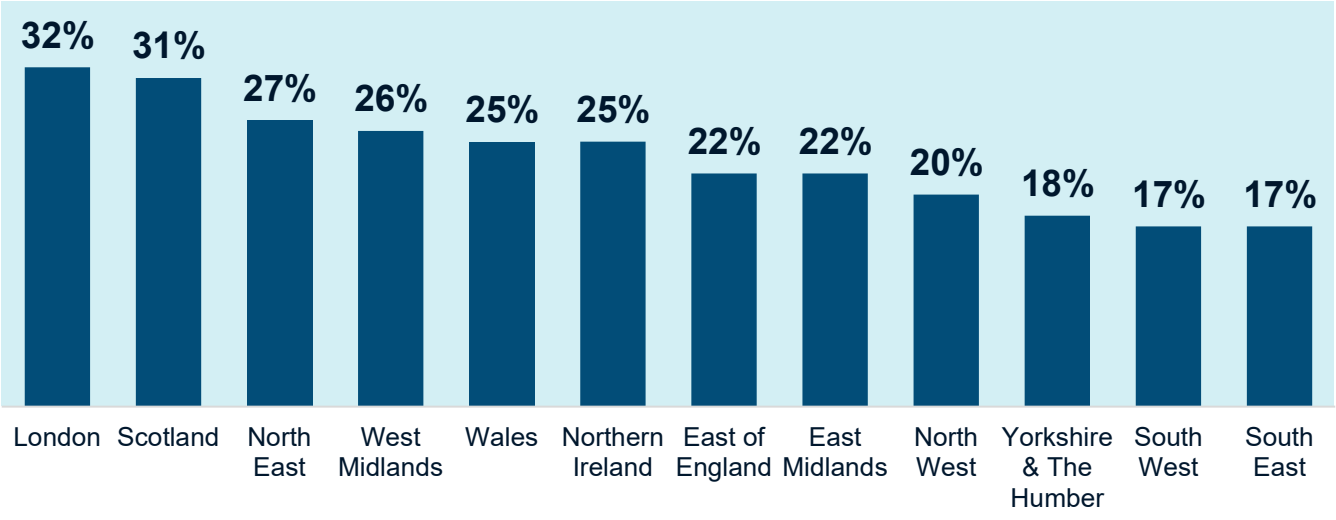


Source: Survey QB2A. Thinking about your organisation's developing and selling of innovative new technologies, which of the following statements best applies to each of these? (We currently sell this, or have done in the past). Base: Total Sample (n=4595)

7.3 Diffusion Rates in Detail

The top three regions/nations for technology diffusion are London (32%), Scotland (31%) and the North East (27%). The bottom three regions/nations are Yorkshire and The Humber (18%), South West (17%) and South East (17%). For many regions/nations, the relative rankings for diffusion mirror adoption – regions/nations with higher levels of adoption tend to have higher levels of diffusion. Northern Ireland is one noticeable exception, ranking bottom for adoption yet middle for diffusion.

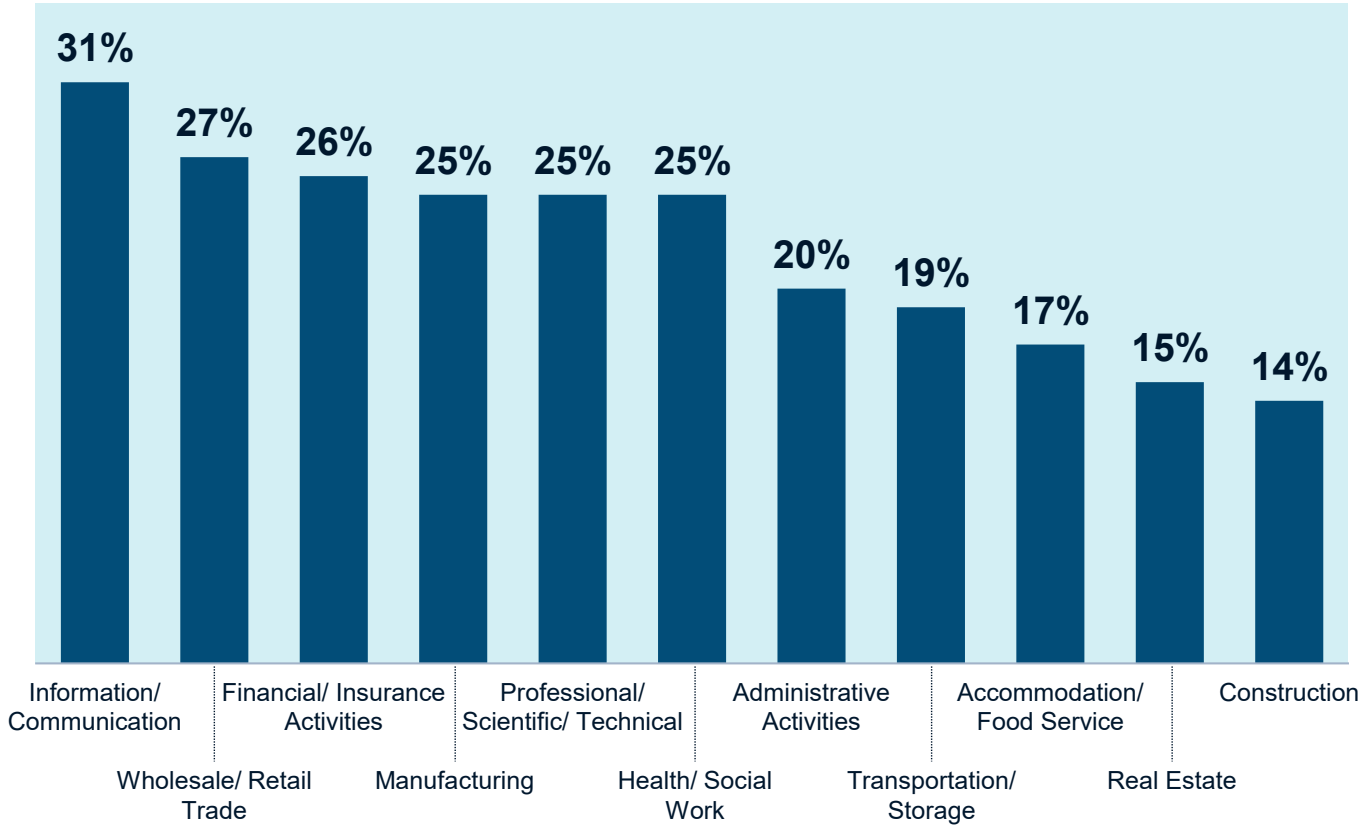
Fig. 31 – Proportion of Organisations Diffusing in at Least one Innovative Technology Area – By Region



Source: Survey QB2A. Thinking about your organisation's developing and selling of innovative new technologies, which of the following statements best applies to each of these? (We currently sell this, or have done in the past). Base: Total Sample (n=4595)

Businesses in the Information and Communication sector are most likely to be diffusing at least one technology (31%); followed by the Wholesale and Retail sector (27%) and the Finance and Insurance sector (26%). Businesses in the Construction sector are the least likely (14%), followed by the Real Estate sector (15%). For most sectors, the relative rankings for diffusion mirror adoption – sectors with higher levels of adoption tend to have higher levels of diffusion.

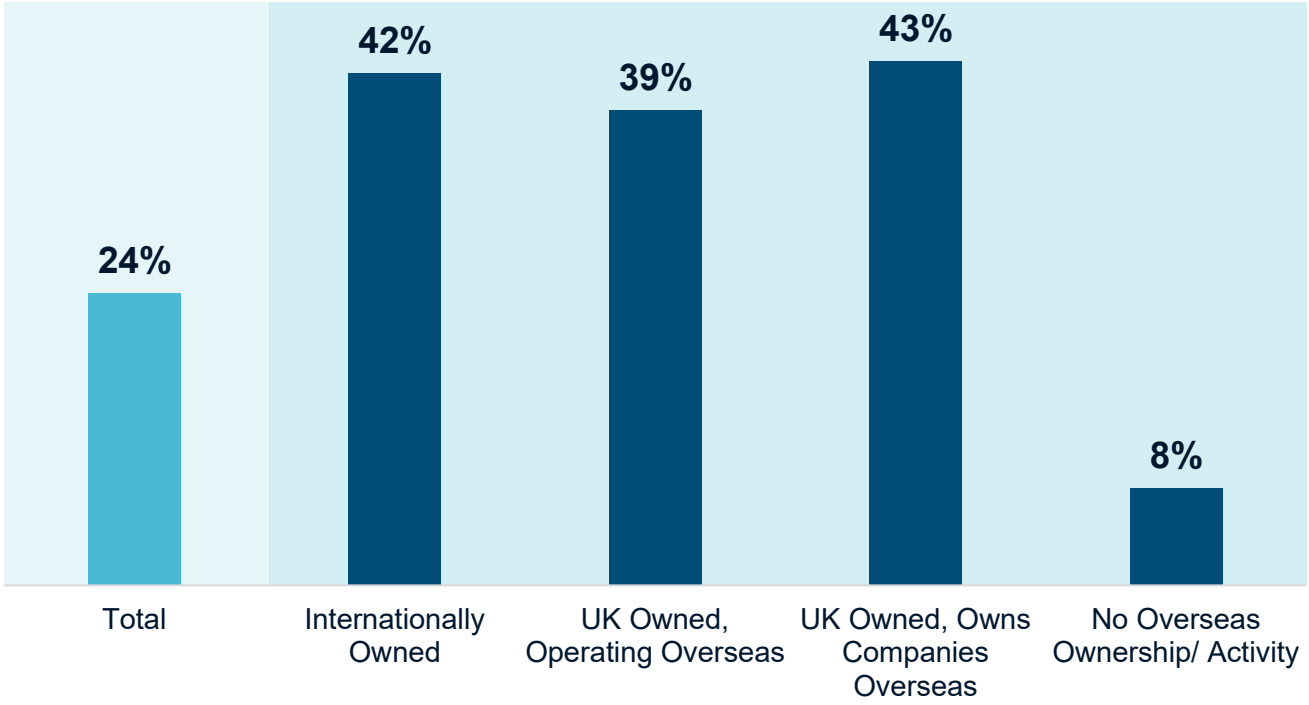
Fig. 32 – Proportion of Organisations Diffusing at least one Innovative Technology Area – By Sector (Base >100)



Source: Survey QB2A. Thinking about your organisation's developing and selling of innovative new technologies, which of the following statements best applies to each of these? (We currently sell this, or have done in the past). Base: Total Sample (n=4595)

Businesses with overseas activity were noticeably more likely to be diffusing, ranging from 29% to 43% depending on the type of overseas activity. In comparison, only 8% of businesses with no overseas ownership or activity are diffusing technology. This may be linked to business size, but another hypothesis is that exposure to international activity drives up productivity because it widens the competition pool.

Fig. 33 – Proportion of businesses diffusing at least one technology by overseas activity

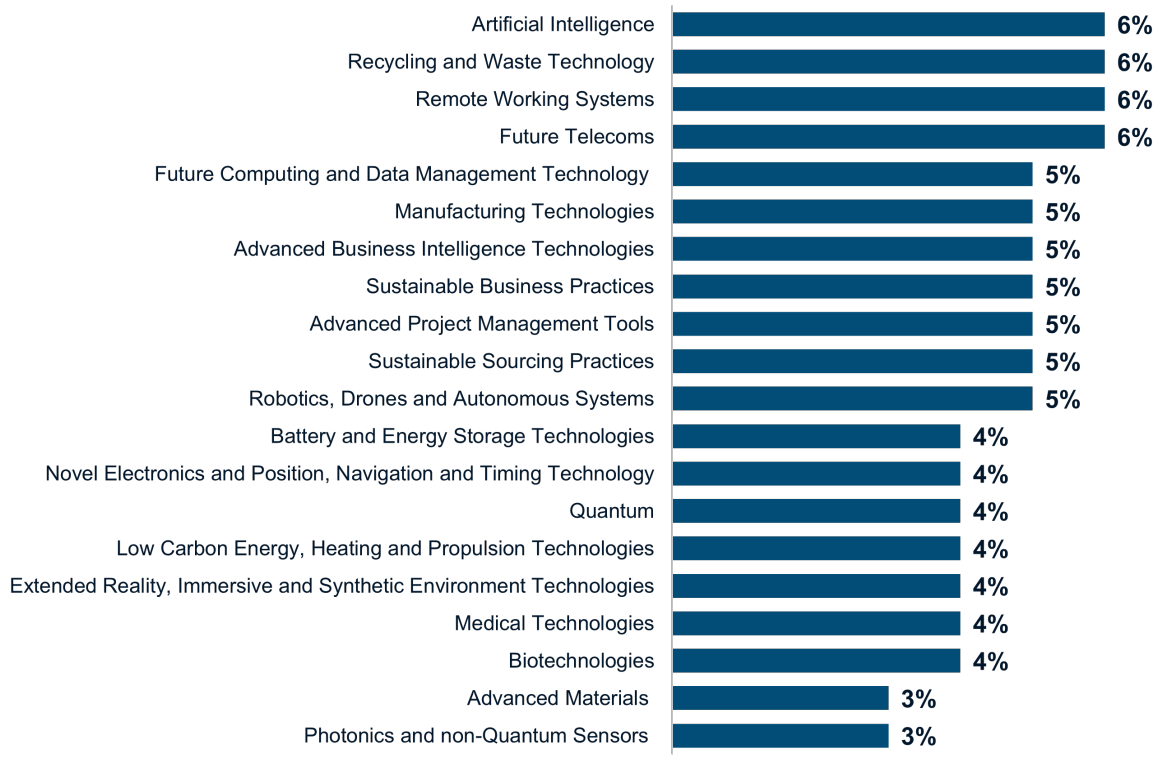


Source: Survey QB2A. Thinking about your organisation's developing and selling of innovative new technologies, which of the following statements best applies to each of these? (We currently sell this, or have done in the past). Base: Total Sample (n=4595)

7.4 Technologies Being Diffused

The four technologies most likely to be diffused are: Artificial Intelligence (6%), Future Telecoms (6%), Recycling and Waste Technology (6%) and Remote Working Systems (6%). The order of technologies is broadly similar to that seen for adoption, with more established technologies more likely to be diffused than nascent technologies.

Fig. 34 – Technologies Diffused – Total Level



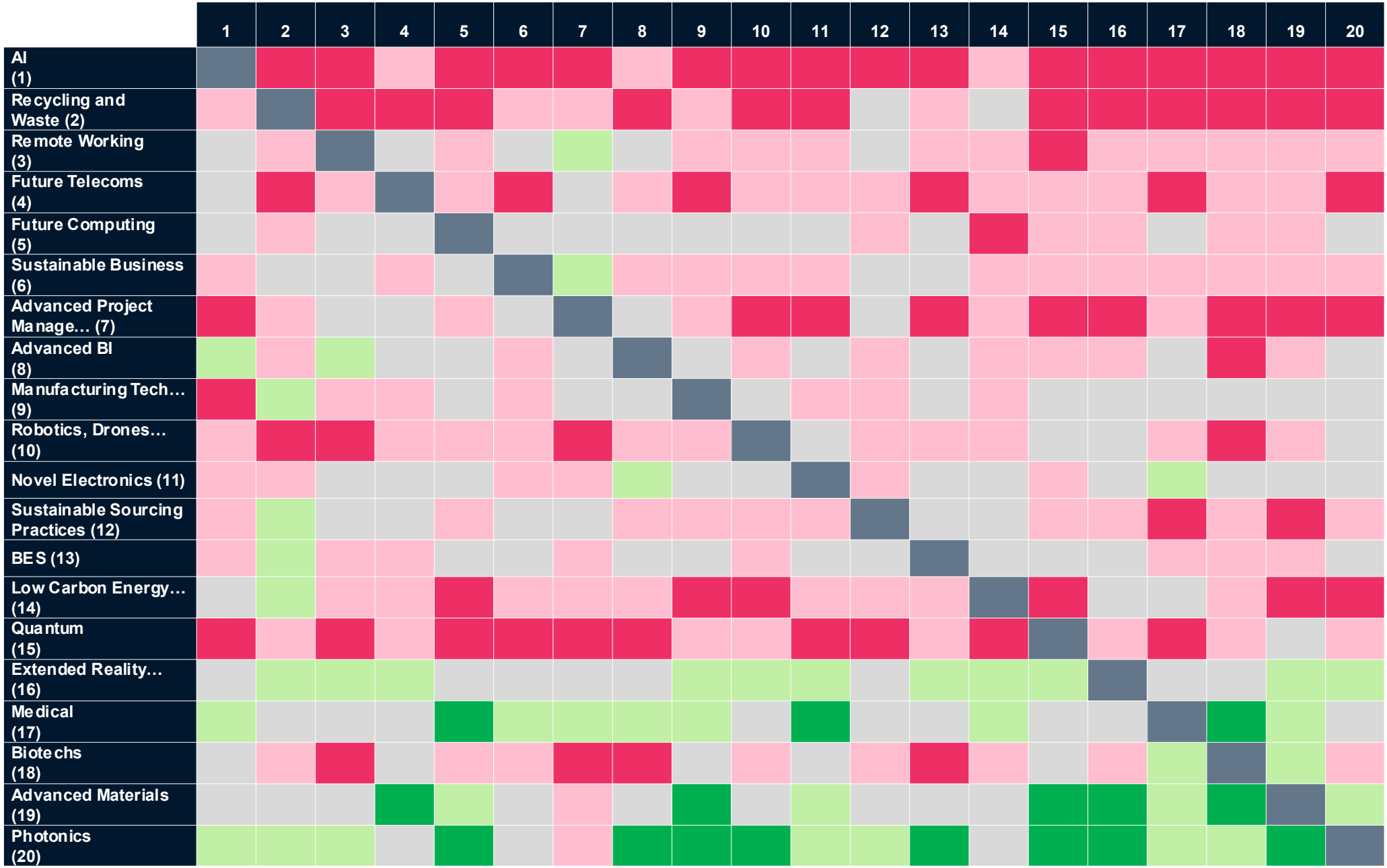
Source: Survey QB2A. Thinking about your organisation's developing and selling of innovative new technologies, which of the following statements best applies to each of these? (We currently sell this, or have done in the past). Base: Total Sample (n=4595)

7.5 Technology Co-diffusion

Fig. 35 below shows a technology diffusion correlation matrix, outlining which technologies are most likely to be diffused in conjunction with one another (please refer to the key below). The chart should be read with the technologies on the left, listed vertically (and in order of diffusion level), considered the independent variable. The corresponding technology numbers listed horizontally along the top should be considered the dependent variable. For example, we can see from Row 1 (AI), Column 2 (Recycling and Waste Technologies) that AI diffusers are substantially less likely to be adopting Recycling and Waste Technology than the average technology diffuser. While Row 17 Column 5 shows that Medical Technology diffusers are considerably more likely than average to be diffusing Future Computing.

Overall, the most diffused technologies are less likely to be co-diffused. This suggests businesses tend to focus on a single technology when there is a sufficient market for it. Meanwhile, some businesses may prefer to diffuse multiple technologies to avoid dependence on a small market. A similar pattern was seen for adoption (see Fig. 14). It is worth noting that Quantum, while being fairly low on the list of diffused technologies, stands out in being less likely to be co-diffused than technologies with a similar diffusion level. This suggests that organisations diffusing quantum are more likely to specialise in this.

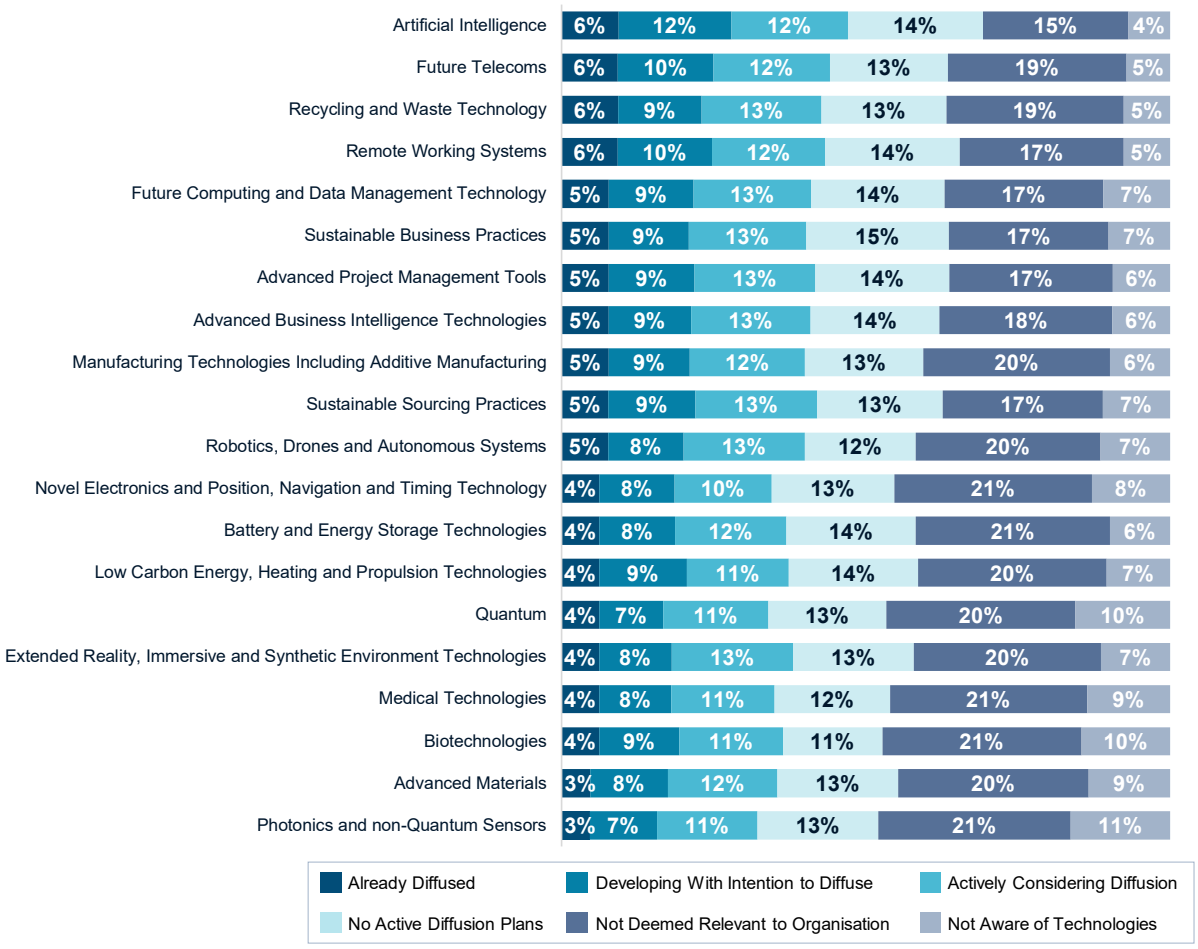
Fig. 35 – Technology Diffusion Correlation Matrix



7.6 Diffusion Intensity

Overall, 52% of businesses are in the process of developing a technology with the intention of selling. The percentages of those developing each technology are roughly proportional to the percentages currently diffusing, so the most widely diffused technologies (e.g. AI) are more likely to be being developed for future diffusion compared to the less commonly diffused technologies. The proportions of businesses saying they may diffuse in future (either have active plans to develop and sell, or may do so but have no active plans) stay broadly consistent for all technologies. Note that 35% of businesses were not asked this question, as they said they were neither developing nor selling any innovative technologies.

Fig. 36 – Technology Diffusion Stage/ Intensity – Total Level



Note: 35% skipped this question as they were not diffusing any technologies, hence percentages do not total 100%

Source: Survey QB2A. Thinking about your organisation's developing and selling of innovative new technologies, which of the following statements best applies to each of these? Base: Total Sample (n=4595). Numbers may not sum to 65% due to rounding.

8 Technology Diffusion – Deep Dive

Reminder: Diffusion was defined in the survey as the selling or previous selling of innovative new technologies or processes. Diffusers were selling (or had previously sold) at least one of the 20 technologies covered in the survey.

8.1 Key Findings

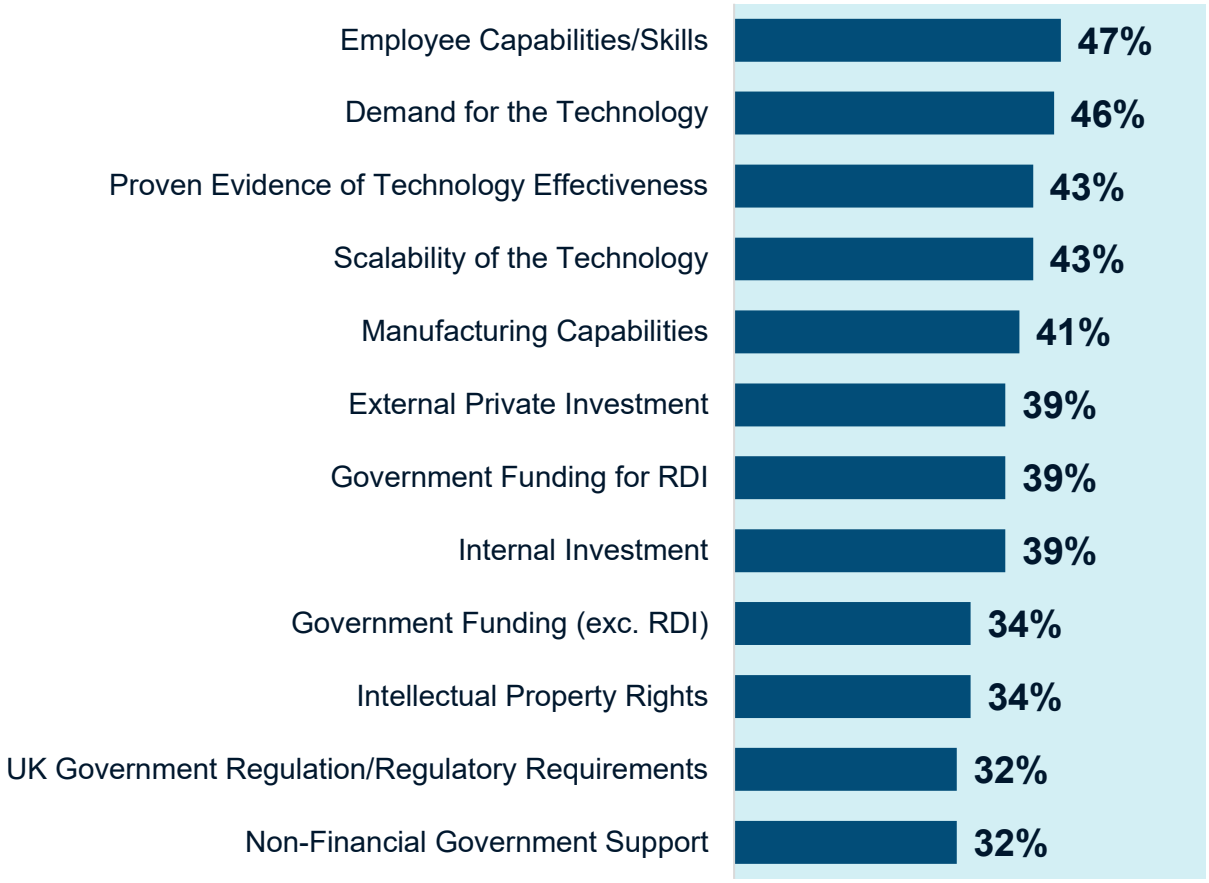
Technology diffusion journeys can face several barriers and enablers that hinder businesses from successfully selling their innovations to others.

- **Enablers:** The top four enablers of diffusion are: employee capabilities (47%); demand for the technology (46%); scalability of the technology (43%); and proven evidence of technology effectiveness (43%). These enablers are a mix of behavioural, technological and economic factors; as well as being a mix of internal and external factors. Government factors – such as funding, regulation, and non-financial support – appear nearer the bottom of the list.
- **Barriers:** The top three barriers are UK government regulation/regulatory requirements (24%); intellectual property rights (20%); and non-financial government support (19%). At the technology level, the top three barriers are broadly consistent, with two noticeable exceptions. First, UK government regulation is the top barrier for all but one technology: Novel Electronics, Position, Navigation and Timing. Second, for Novel Electronics, Position, Navigation and Timing, both internal investment and external investment appear in the top three, despite not appearing in the global top five. Internal investment also appears in top three for Medical Technologies.

8.2 Enablers of Diffusion

The top four enablers of diffusion are: employee capabilities (47%), demand for the technology (46%), scalability of the technology (43%) and proven evidence of technology effectiveness (43%). These enablers are a mix of behavioural, technological and economic factors, as well as being a mix of internal and external factors. Government factors – such as funding, regulation, and non-financial support – appear nearer the bottom of the list, but are still considered enablers in approximately one third of cases.

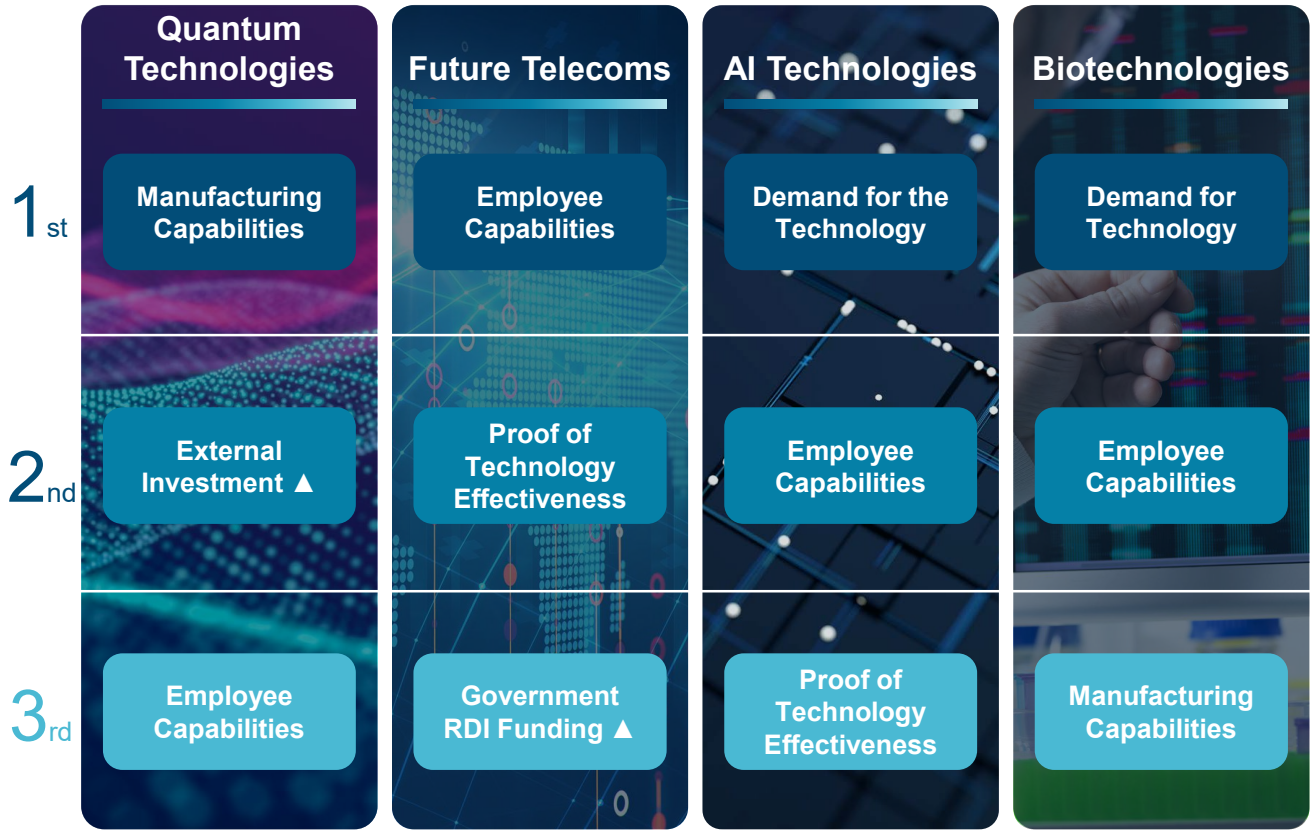
Fig. 37 – Perceived Enablers of Technology Diffusion – Total Across All Technologies



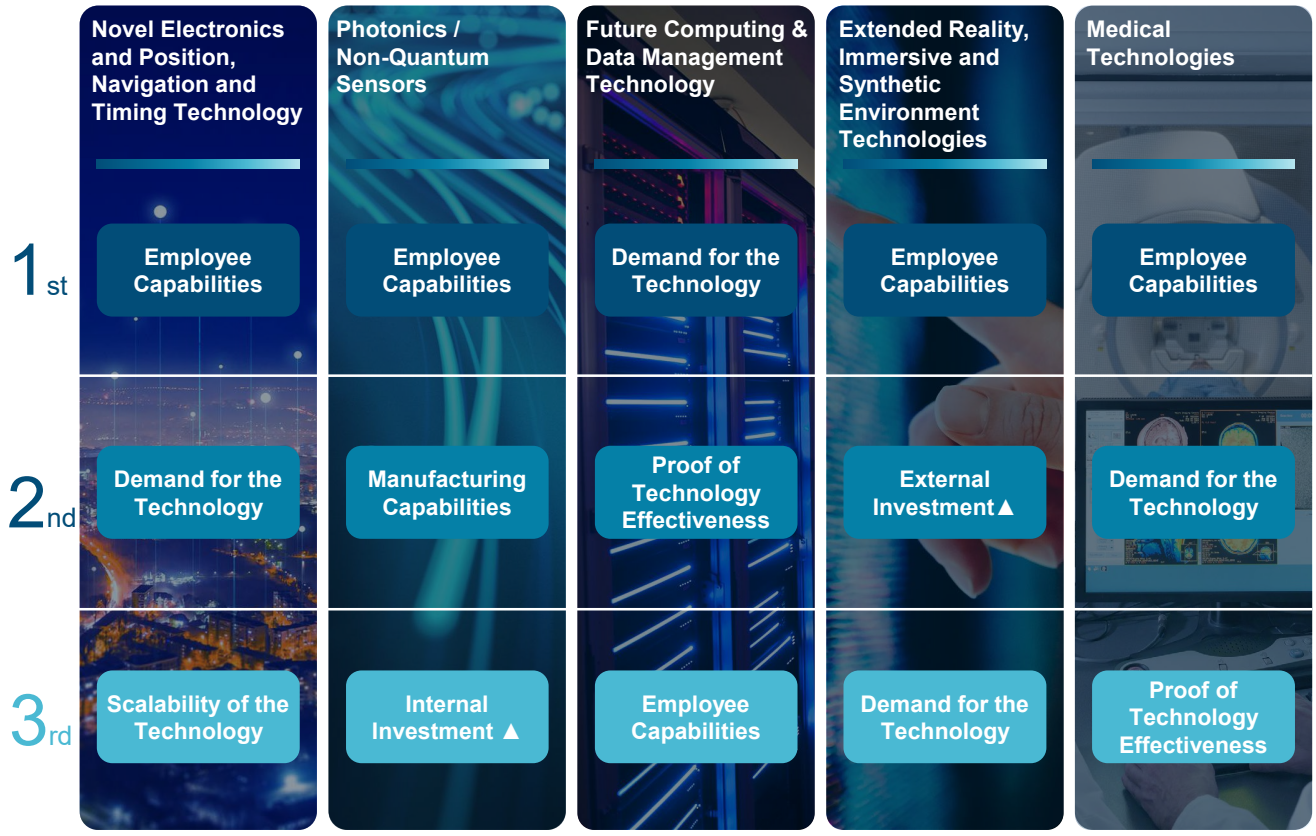
Source: Survey QB5. What impact, if any, has each of the following factors had when developing and selling [ALLOCATED TECHNOLOGY] in the UK market? Moderate/ significant positive impact. Base: All innovative technology diffusers (n=1846)

At the technology level, the top enablers tend to be the same, with some notable differences. Employee capabilities are seen as crucial to the successful diffusion of all the critical technologies; as is, perhaps more intuitively, demand for and scalability of the technology. Internal investment appears in the top three enablers for Future Telecoms and Artificial Intelligence, despite not appearing in the global top five. External investment appears in the top three for Quantum, Biotechnologies, and Extended Reality, despite not appearing in the global top five. Internal investment is more important for these two more widely diffused and adopted technologies, while external investment is more important for these three less widely diffused and adopted technologies.

Fig. 38 – Perceived Enablers of Technology Diffusion – Top 3 Factors by Technologies



▲ = Not in Total Level Top 5



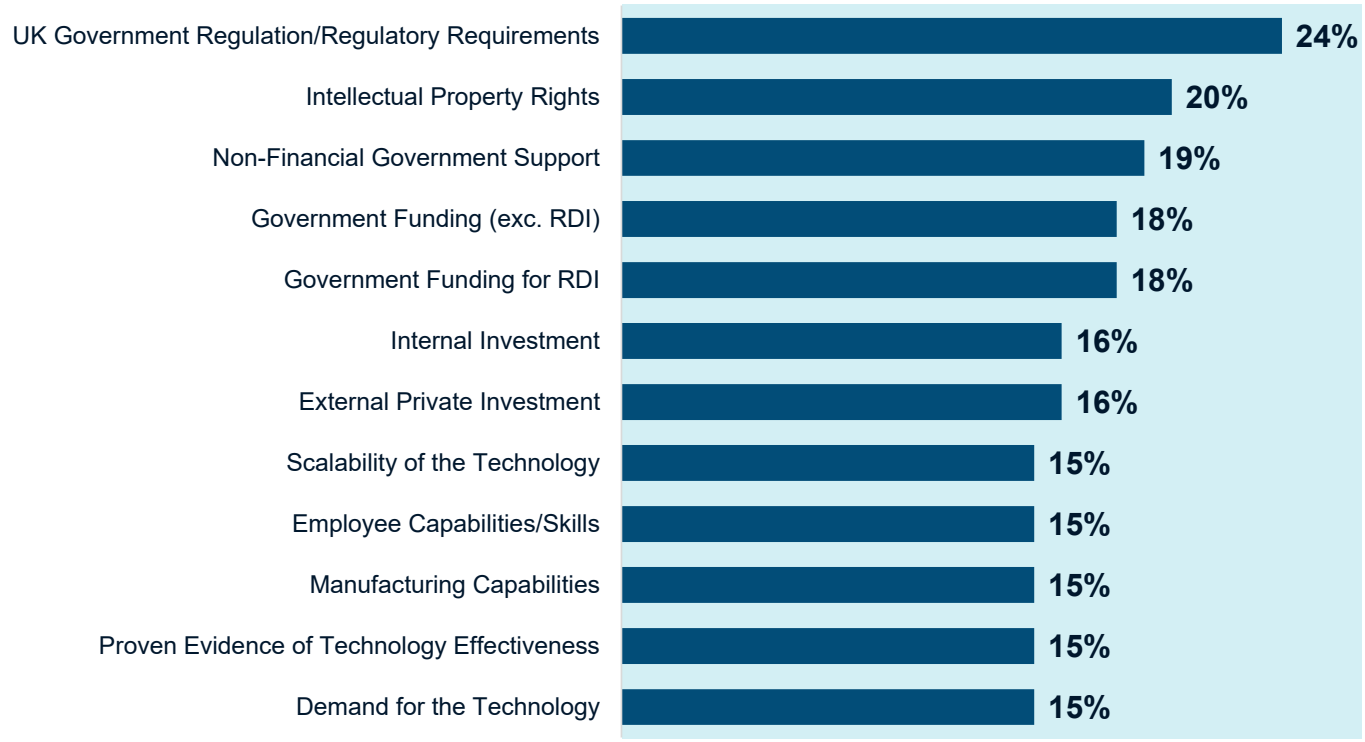
▲ = Not in Total Level Top 5

Source: Survey QB5. What impact, if any, has each of the following factors had when developing and selling [ALLOCATED TECHNOLOGY] in the UK market? Moderate/significant positive impact. Base: All innovative technology diffusers (n=1846)

8.3 Barriers to Diffusion

The top three barriers are UK government regulation/regulatory requirements (24%), intellectual property rights (20%) and non-financial government support (19%). Remember that respondents were asked to rate whether these factors were either an enabler or barrier, so 'barrier' should be interpreted as the lack of (or lack of access to) funding and other support where appropriate. Moreover, as these are perceived barriers, firms may not be fully aware of the support available to them.

Fig. 39 – Perceived Barriers to Technology Diffusion – Total Across All Technologies

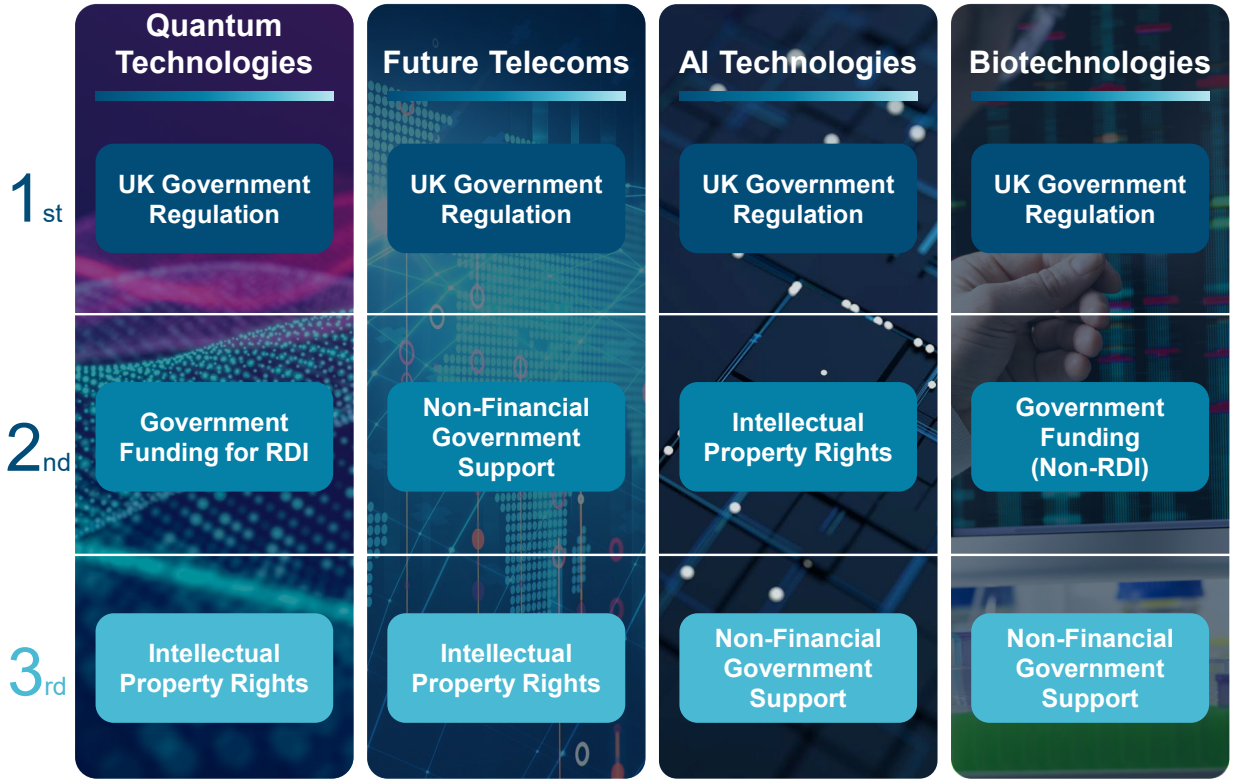


Source: Survey QB5. What impact, if any, has each of the following factors had when developing and selling [ALLOCATED TECHNOLOGY] in the UK market? Slight/moderate/significant negative impact. Base: All innovative technology diffusers (n=1846)

8.4 Diffusion Barriers in Detail

At the technology level the top three barriers are broadly consistent, with two noticeable exceptions. First, UK government regulation is the top barrier for all but one technology: Novel Electronics, Position, Navigation and Timing. Second, for Novel Electronics, Position, Navigation and Timing, both internal investment and external investment appear in the top three, despite not appearing in the global top five. Internal investment also appears in top three for Medical Technologies.

Fig. 40 – Perceived Barriers to Technology Diffusion – Top 3 Factors by Technologies



▲ = Not in Total Level Top 5

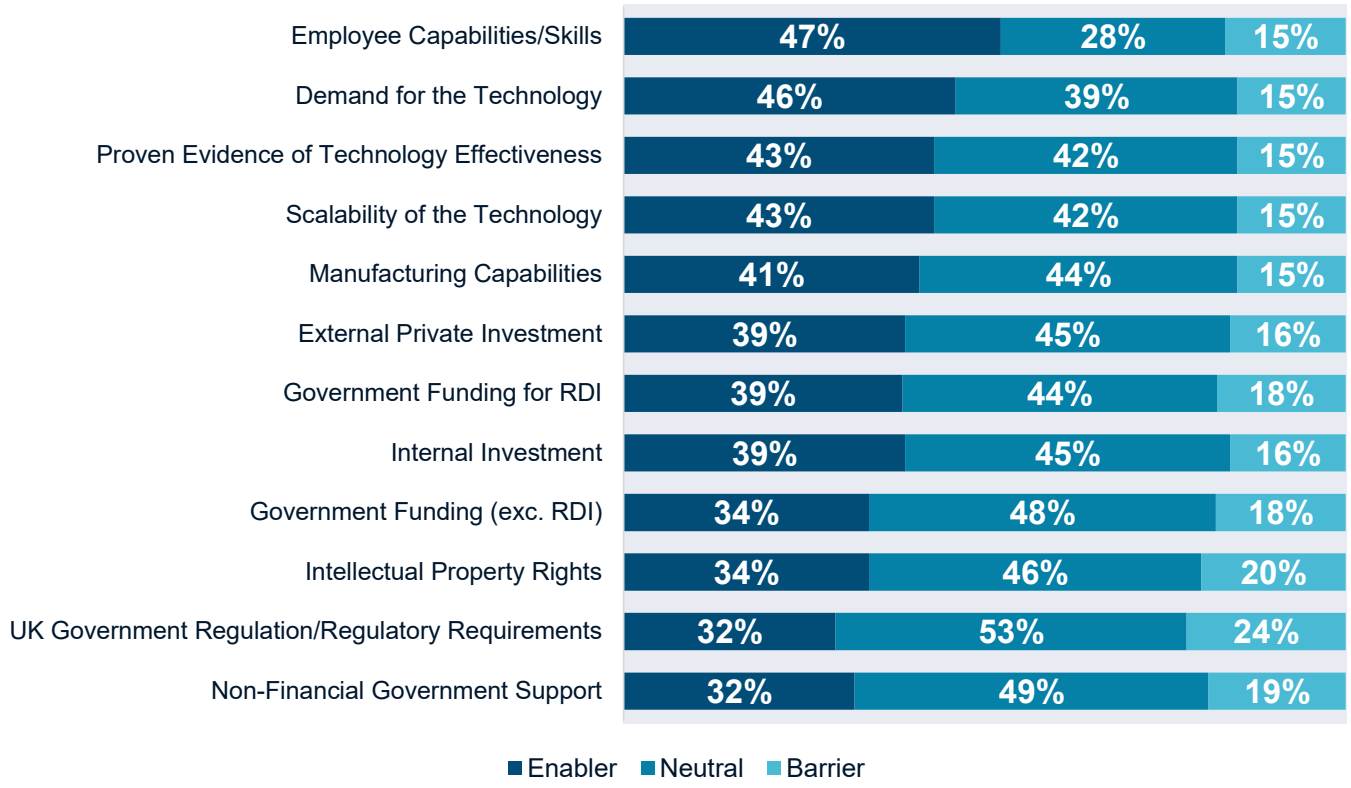
▲ = Not in Total Level Top 5

Source: Survey QB5. What impact, if any, has each of the following factors had when developing and selling [ALLOCATED TECHNOLOGY] in the UK market? Slight/moderate/significant negative impact. Base: All innovative technology diffusers (n=1846)

8.5 Diffusion Enablers vs Barriers

Overall, businesses were much more likely to consider something an enabler of technology diffusion, rather than a barrier. Businesses were more likely to feel neutral about approximately half of the given factors, rather than consider them an enabler or a barrier. As with the factors considered for adoption, this may suggest that these are not the most important things businesses consider when diffusing technology.

Fig. 41 – Perceived Enablers of and Barriers to Technology Diffusion – Total Across All Technologies



Source: Survey QB5. What impact, if any, has each of the following factors had when developing and selling [ALLOCATED TECHNOLOGY] in the UK market? Base: All innovative technology diffusers (n=1846)

9 Innovation Culture

9.1 Key Findings

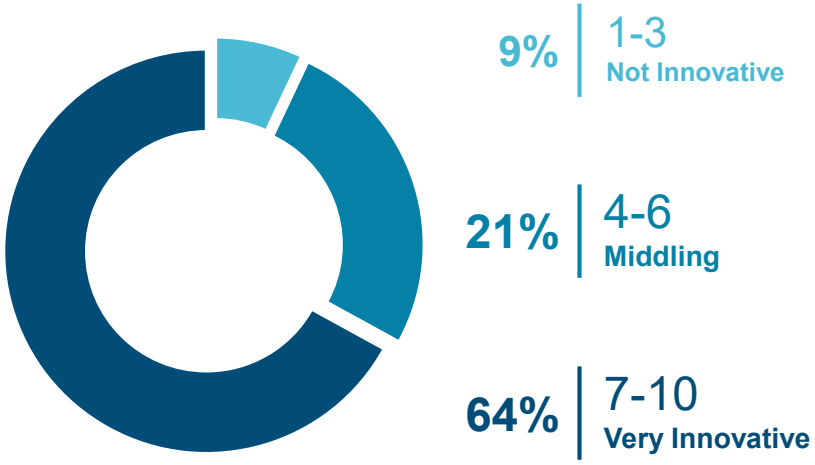
When asked to rate how innovative they considered their businesses on a scale of 1-10, with one being 'Not at all innovative', and 10 being 'Extremely Innovative', respondents were consistently likely to place their firm towards the upper end of the scale. 64% of businesses ranked themselves between 7 and 10, with 26% placing themselves as a 9 or 10 on the scale. We explored the innovation practices of businesses and asked them about issues faced with adoption. We uncovered the following:

- **Innovation practices are widespread:** Most businesses surveyed display regular innovation behaviour. 80% of businesses agreed that they regularly discuss across teams how they can be more innovative, while 80% also said that teams and individuals are recognised and rewarded for their contribution to innovation. Both these behaviours are more prevalent in businesses that are adopting technologies, and among larger firms.
- **Non-adopters often identify as innovative:** Non-adopters also tend to rank themselves as highly innovative, although less so than the total sample: 47% of non-adopters ranked their innovation level between 7 and 10 on the innovativeness scale. This suggests that innovative firms generally do not see a need to adopt the 20 technologies included in this survey. This is a surprising finding. There are different possible explanations, but all suggest information asymmetries – either in innovation or adoption.
- **Innovators are not always adopters:** 25% of businesses consider themselves more innovative than their competitors, but are adopting fewer technologies than the average for their sector. We see the same pattern across business sizes, regions/nations, and sectors. The only exceptions here were adopters of less widely adopted technologies – such as Quantum and Biotechnologies – who were much more likely to be adopting more innovative technologies than the average firm in their sector. If businesses believe they are leading innovators in their sector, they may not be sufficiently motivated to adopt new technology.
- **There are three big issues in technology adoption – identification, acquisition and integration:** 59% of all businesses stated that it is hard to get impartial advice on the appropriate application of new technologies. 69% of all businesses said innovative technologies that could benefit their organisation were prohibitively expensive. 60% of all businesses stated that they recognise the long-term benefits of adopting new technologies, but struggle with the short-term impact. These issues were more common among those who had adopted, than those who had not.

9.2 Perceived Innovation Levels

When asked to rate how innovative they considered their businesses to be on a scale of 1-10, with 1 being 'Not at all innovative', and 10 being 'Extremely Innovative', respondents were consistently likely to place their firm towards the upper end of the scale.

*Fig. 42 – Perceived Organisation Innovation Culture (Self-Assessed) Amongst Total Sample – 1-10 Scale**



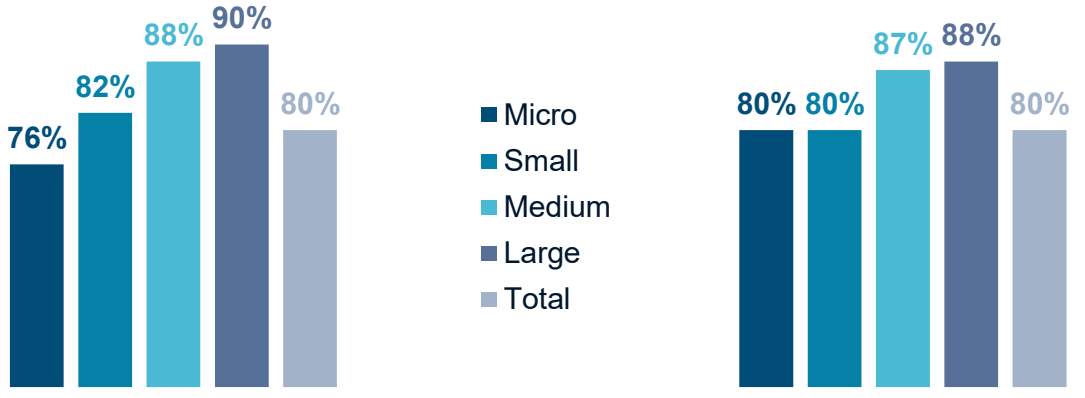
*6% declined to answer

Source: Survey QC2. Overall, how innovative do you consider your organisation to be in general? By innovative, we mean openness to changing an organisation's operations through technology, processes and products / services to improve an aspect of that organisation (e.g. efficiency, productivity, profitability)… Please select an answer between 1 and 10, where 1 means 'not at all innovative', and 10 means 'extremely innovative'. Base: Total Sample (n=4595)

9.3 Wider Innovation Culture

Most businesses surveyed also display regular innovation behaviour: 80% said they regularly discuss across teams how they can be more innovative, while 80% also said teams and individuals are recognised and rewarded for their contribution to innovation. Both these behaviours are more prevalent in businesses that are adopting technologies, and among larger firms.

Fig. 43 – Regular Innovation Behaviours – Total Sample and by business size

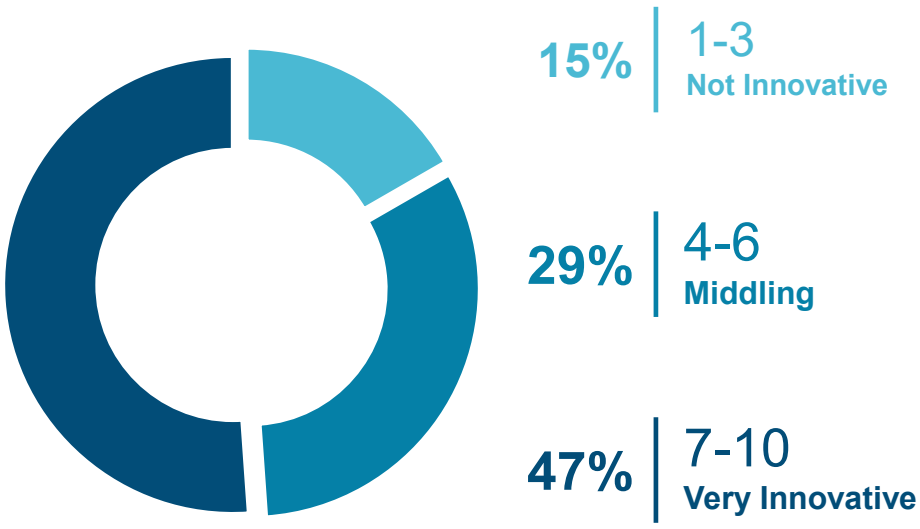


Source: Survey QC4. Please indicate where your organisation sits on the following scales. You can choose any point on each scale. How we can be more innovative is not discussed or communicated regularly/How we can be more innovative is discussed and communicated regularly by all teams and colleagues. Base: Total Sample (n=4595)

9.4 Innovation Levels among Non-Adopters

Non-adopters also tend to rank themselves as highly innovative, although less so than the total sample. In our survey, 47% of non-adopters ranked their innovation level between 7 and 10 on the innovativeness scale. This suggests that innovative firms generally do not see a need to adopt the 20 technologies included in this survey. This is a surprising finding. One possible explanation is that some businesses may be over-rating themselves. Another possible explanation is that these innovative firms do not fully understand the range of technologies available to them, and how these technologies could benefit them.

*Fig. 44 – Perceived Organisation Innovation Culture (Self-Assessed) Amongst Non-Adopters of Innovative Technologies – 1-10 Scale**



*10% declined to answer

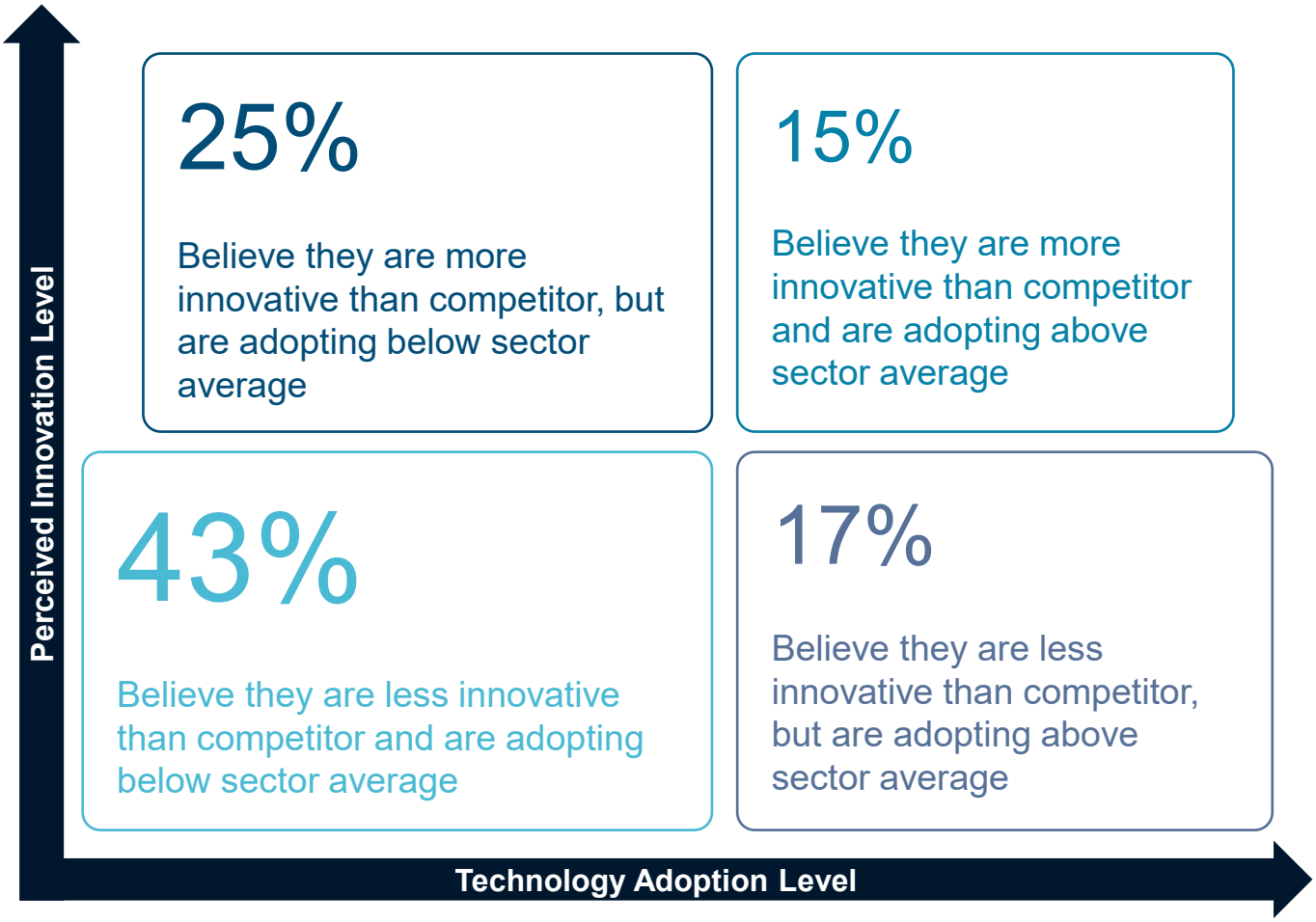
Source: Survey QC2. Overall, how innovative do you consider your organisation to be in general? By innovative, we mean openness to changing an organisation's operations through technology, processes and products / services to improve an aspect of that organisation (e.g. efficiency, productivity, profitability. Please select an answer between 1 and 10, where 1 means 'not at all innovative', and 10 means 'extremely innovative'. Base: Those who have not adopted any innovative technologies (n=1376)

9.5 Perceived Innovation vs Competition

We also asked businesses to rate how innovative they consider their one main competitor to be, to better understand the link between innovation, competition, and adoption. Overall, 40% of businesses said they were more innovative than their main competitor, while 60% considered themselves less innovative.

We found that 25% of firms feel they are more innovative than their competitor, but are adopting fewer technologies than the average for their sector. We saw the same pattern across business sizes, regions/nations, and sectors. The only exceptions here were those businesses who have adopted less widely adopted technologies, such as Quantum and Biotechnologies, who were on average adopting more innovative technologies than the average firm in their sector. This points towards not just a possible lack of understanding of the technologies available, but also an under-estimation of what is taking place in the market – potentially leading to a lack of urgency to adopt further to keep up.

Fig. 45 – Perceived Innovation Level vs Technology Adoption Level



9.6 Issues Encountered with Technology Adoption

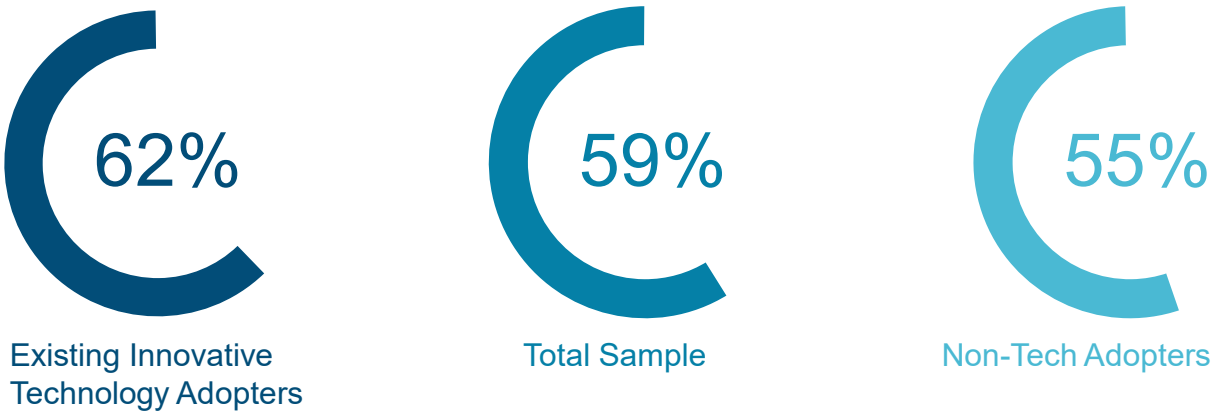
Most businesses consider themselves innovative and engage in regular innovation behaviours, such as discussing and rewarding innovation. However, many innovative businesses are not adopting technologies. This section highlights three issues in the technology adoption process that are holding businesses back: Identification, Acquisition and Integration.

Identification

59% of all businesses said it is hard to get impartial advice on the appropriate application of new technologies. This issue was more common among those who had adopted than those who had not. This pattern is broadly consistent across business size and region/nation, but differs strongly across sectors. This could suggest differences in either the availability or quality of impartial advice across sectors.

Fig. 46 – Organisation Innovation Statement Agreement (Identification)

> “It can be hard for our organisation to get impartial advice on the appropriate application of new technologies.”



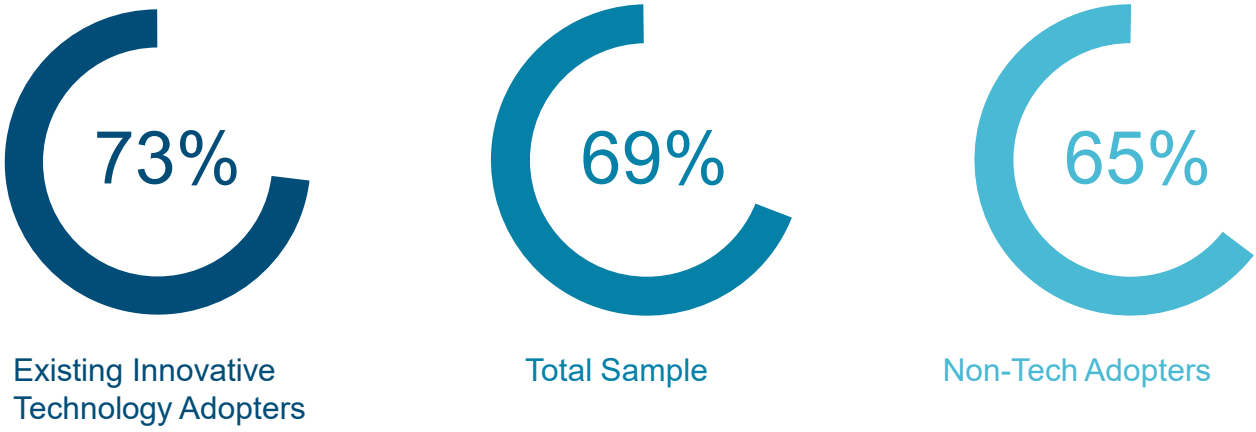
Source: Survey QC5. Thinking about the adoption or distribution of new technologies and innovations in your organisation, to what extent would you agree or disagree with the following statements? ‘It can be hard for our organisation to get impartial advice on the appropriate application of new technologies’ Strongly agree/ Somewhat agree/ Slightly agree Base: Total Sample (n=4595)

Acquisition

69% of all businesses said innovative technologies that could benefit their organisation were prohibitively expensive. Again, this issue was more common among those who had adopted than those who had not. This pattern is broadly consistent across business size and region/nation, but differs strongly across sectors. This may be driven by sector-specific use cases, or the types of technologies being adopted in different sectors.

Fig. 47 – Organisation Innovation Statement Agreement (Acquisition)

> “Some innovative technologies that could benefit my organisation are prohibitively expensive.”



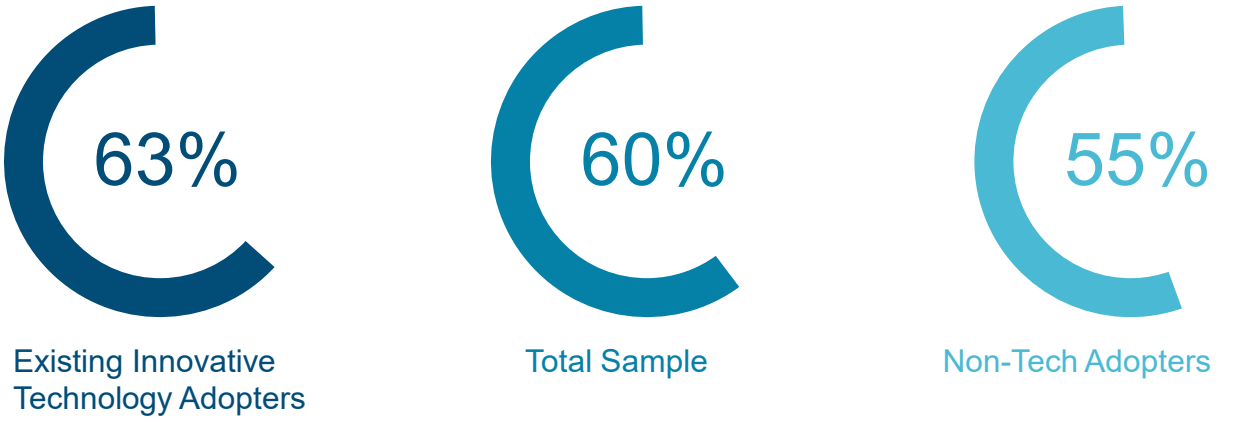
Source: Survey QC5. Thinking about the adoption or distribution of new technologies and innovations in your organisation, to what extent would you agree or disagree with the following statements? ‘Some innovative technologies that could benefit my organisation are prohibitively expensive Strongly agree/ Somewhat agree/ Slightly agree Base: Total Sample (n=4595)

Integration

60% of all businesses recognise the long-term benefits of adopting new technologies, but struggle with the short-term impact. Again, this issue was more common among those who had adopted than those who had not. This pattern is broadly consistent across business size and region/nation, but differs strongly across sectors. This may be driven by sector-specific transition costs, or perhaps risk appetite and the types of technologies being adopted in different sectors. This pattern is also consistent across businesses active in all technology areas – even businesses who have adopted 10 or more technology areas are being put off from further innovation by a perceived transitional period.

Fig. 48 – Organisation Innovation Statement Agreement (Integration)

> “My organisation recognises the long-term benefits of adopting new technologies, but such adoption would hinder us in the short term while we make the transition.”



Source: Survey QC5. Thinking about the adoption or distribution of new technologies and innovations in your organisation, to what extent would you agree or disagree with the following statements? ‘Our organisation recognises the long-term benefits of adopting new technologies, but such adoption would hinder us in the short term while we make the transition. Strongly agree/Somewhat agree/Slightly agree Base: Total Sample (n=4595)

10 Summary and Future Considerations

Innovations can only drive growth when they are successfully diffused through the economy and ultimately adopted by business – this is ultimately what drives productivity growth. This survey is a world-first insofar as it covers innovation diffusion and adoption in such detail. In this section, we conclude with some of the most salient findings from the survey and reflect on their implications.

Technology adoption is not evenly distributed across the country

Technology adoption tends to be higher in large businesses, the Finance and Insurance sector, the North East and London. Technology adoption also tends to be higher in businesses with overseas activity (operation or ownership). Unsurprisingly, technologies with broader appeal and that are more established tend to be more widely adopted: such as Remote Working Systems, Future Telecoms and Sustainable Business Practices. The technology adoption journeys differ noticeably between these more established technologies and more nascent technologies, such as Quantum. The biggest impact of technology adoption to date has been to drive workforce productivity, especially for more established technologies such as Artificial Intelligence and Future Telecoms.

Technology adoption journeys tend to differ along on key dimension – how established the technology

More nascent technologies, like Quantum, tend to be more likely to require financial/ non-financial support; incur high acquisition/integration costs; take longer to adopt; and be sourced from overseas. UKRI/IUK plays a crucial role in the provision of both financial and non-financial support to businesses adopting technologies. UKRI/IUK is a particularly important source of non-financial support for more established technologies (i.e. Future Telecoms), and an important source of financial support for more nascent technologies (i.e. Quantum). It is not all down to government – industry and professional associations play a crucial role in enabling technology adoption, with people the most important factor for adoption success. Ensuring businesses can access the right support at the right time is paramount to driving technology adoption.

Technology diffusion is not evenly distributed across the country, and is influenced greatly by regulation

Technology diffusion tends to be higher in large businesses, the Information and Communication sector, London and Scotland. Technology diffusion also tends to be substantially higher in businesses with overseas activity (operation or ownership).. While adoption was primarily enabled by people, diffusion is enabled by a mixture of behavioural, economic and technological factors. Regulation plays a crucial role as both a barrier and enabler. While more can be done to ensure regulation drives innovation and supports technology diffusion, it is worth highlighting that more businesses saw regulation as an enabler than a barrier. Further work is needed to understand what type of regulation hampers diffusion and in what circumstances.

Businesses are innovating, but they're not adopting when they perhaps should be

When half of non-adopters consider themselves innovative, it is worth considering whether businesses even want to adopt in the first place. Our survey suggests yes, given the sheer number of adoption considerers. However, businesses face many barriers in the adoption journey including identification, acquisition, and integration. More than half of businesses struggle to get impartial advice on the appropriate application of new technologies, cannot afford technologies that could benefit them, and struggle with the short-term impact of adoption. Businesses need more support to adopt the technologies that will drive future economic growth.