Department for
Science, Innovation
& Technology

National Quantum Strategy

Additional Evidence

December 2023

Any enquiries regarding this publication should be sent to us at:
alt.formats@dsit.gov.uk.

Contents

Executive Summary

The National Quantum Strategy (NQS) sets out our plan for the next 10 years to realise the incredible potential of quantum technologies for the UK. This paper complements the NQS with further evidence on the current strengths and areas for improvement for the UK to deliver on this ambitious commitment to quantum technologies in the UK.

This evidence paper aims to give a fuller understanding of how the UK performs across a range of metrics in the following areas of the quantum landscape:

- UK research strengths in quantum technologies.
- Private equity investment trends into quantum technologies.
- Skills and talent for the quantum sector.
- Companies in the UK quantum sector.

UK research strengths in quantum technologies

Main findings:

1. Among the top ten nations producing quantum scholarly outputs, the UK ranks fifth for research outputs but third for the impact of its quantum technologies research.
2. The UK is fourth globally among inventor countries for International Patent Families (IPFs) in quantum technologies and first in Europe.
3. The UK is the second most specialised country in quantum technologies out of the top ten inventor countries for International Patent Families.

Private equity investment trends into quantum technologies

Main findings:

4. The UK is second in attracting private equity investment across 2012-2022, behind only the US. It has attracted 12% of global private investment into quantum technology companies between 2012 and 2022.
5. The UK has attracted $692 million in private equity investment between 2020 and 2022. However, other countries are seeing substantial investment into quantum in recent years.
6. Private equity investment is not evenly distributed across quantum technologies globally or in the UK. A majority of global private equity investment goes to quantum computing.
7. According to Quantum Insider, private equity investment in the UK is concentrated in early stages (Seed and Series A) funding compared to later stages (Series B+).

Skills and talent for the quantum sector

Main findings:

8. The UK is in the top five globally for number of researchers involved in quantum-related technologies.
9. The UK has five institutions in the top thirty for the number of researchers involved in quantum-related technologies.

Companies in the UK quantum sector

Main findings:

10. The UK is second for the number of quantum companies but in close competition with other nations, and behind the US.
11. The UK has approximately 11% of the world's quantum companies with 110 companies.
12. The UK ranks highly for the number of businesses we have compared with our international competitors, across a broad range of quantum technology areas.
13. The UK has strengths across all quantum technology areas in terms of company numbers and therefore is well poised to build a competitive sector.
14. UK quantum companies are generally small with around 80% having 50 or less employees.
15. There are centres of expertise and concentrations of activity across the UK.
16. A quarter of UK quantum companies have London-based headquarters and 47% have headquarters in either London or the South-East.

Introduction

This paper complements the policy direction set out in the National Quantum Strategy. It presents evidence on a non-exhaustive range of factors that give a fuller understanding of how the UK performs across the quantum landscape.

A range of data sources and publications have been included in this paper with all caveats and limitations discussed throughout. These sources are summarised below:

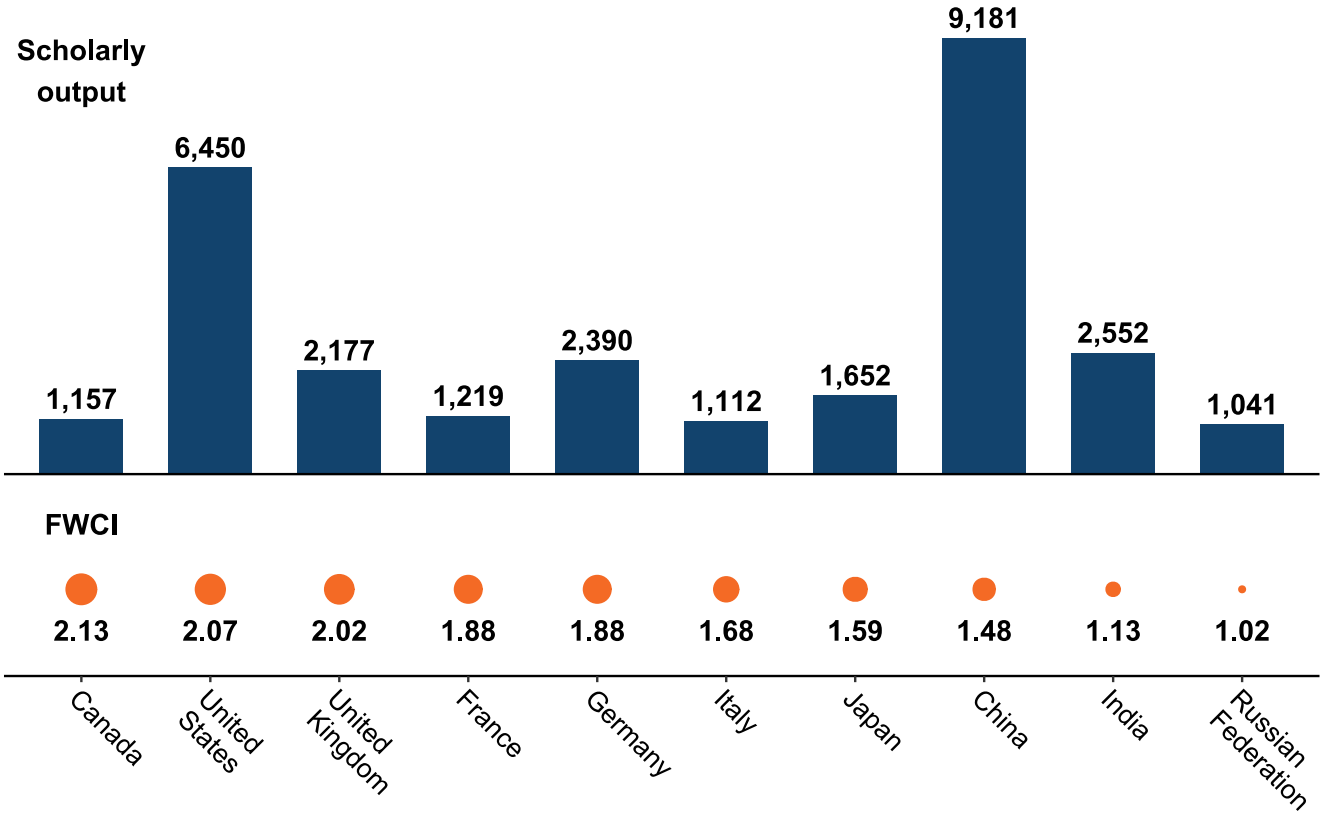
- UK research strengths in quantum technologies
    - Publication output and Field-weighted Citation Impact (FWCI): Scopus database (Elsevier) via SciVal portal (2023)
    - Number of International Patent Families (IPFs) and Relative Specialisation Index (RSI): UKIPO analysis of PatentSight (2023)
- Private equity investment trends into quantum technologies
    - Private equity investment by country, technology area and funding type: Quantum Insider (February 2023)
- Skills and talent for the quantum sector
    - Number of researchers in quantum-related technologies and top institutions for number of researchers: Zeki Research (September 2022)
- Companies in the UK quantum sector
    - Companies in the sector by country, technology area, by size and regional breakdowns: Quantum Insider (February 2023 and January 2023)

UK research strengths in quantum technologies

Scholarly output and Field-weighted citation impact (FWCI)

Among the top ten nations producing quantum scholarly outputs, the UK ranks fifth for research outputs but third for the impact of its quantum technologies research.

Figure 1: Scholarly outputs and FWCI values for the top 10 countries producing publications on quantum technologies (2017-2021)



Source: SciVal database, Elsevier BV Subscription Agreement, BEIS 2022 (accessed 2023)

Figure 1 and Table 1 rank the top 10 countries for quantum technology publications (2017-2021) by the scholarly impact – the Field-weighted Citation Impact (FWCI) – of its quantum publications.

FWCI is a measure of the scholarly impact of a set of publications. It compares how a number of citations for a given set of publications compares to the average number of citations received by all world publications in the same field. A value of 1.0 represents the world average FWCI.

The UK's FWCI for quantum technologies is above the world average of 1.0 indicating that publications with a UK author are cited more than expected according to the global average

and are cited more than comparable publications from researchers in nations like France and Germany. Citations give an indication of the impact of the research.

Table 1: Scholarly outputs and FWCI values for the top 10 countries producing publications on quantum technologies (2017-2021)

Country	Scholarly Output	FWCI
Canada	1,157	2.13
United States	6,450	2.07
United Kingdom	2,177	2.02
France	1,219	1.88
Germany	2,390	1.88
Italy	1,112	1.68
Japan	1,652	1.59
China	9,181	1.48
India	2,552	1.13
Russian Federation	1,041	1.02

Figure 1 and Table 1 shows that UK researchers published 2,177 outputs on quantum technologies in the period 2017 to 2021.

The UK ranks in fifth place for research outputs, behind China (9,181), the US (6,450), India (2,552) and Germany (2,390).

However, among these top 10 countries for quantum scholarly outputs, the UK ranks 3rd for its Field-weighted Citation Impact (FWCI) at 2.02, behind only Canada (2.13) and the US (2.07).

Some nations with a much lower level of publications can achieve a higher FWCI score, but these are not shown as we are only considering major international competitors.

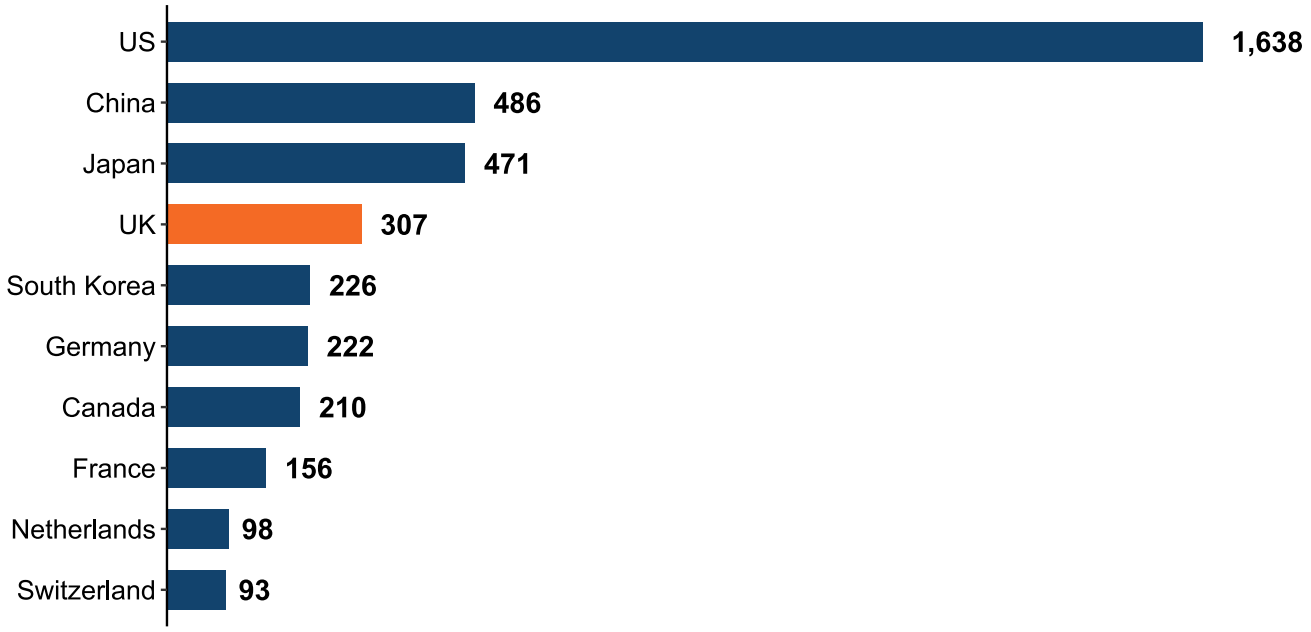
Data caveats and methodology notes

1. The dataset was restricted to only the larger producers of quantum technologies research, to avoid skewing the conclusions by the inclusion of a nation with a very small number of publications but a high FWCI. This is to make meaningful comparisons against major quantum nations.
2. Scholarly output in the SciVal platform is defined as the number of publications an entity (here, country) has indexed in Scopus.
3. Authorship is according to the location of the institution listed by the authors as their affiliation.
4. An internationally co-authored paper could be counted under the tally of two or more nations.
5. Different countries may have different propensities to publish their findings, due to culture, or incentives for researchers.
6. The source data does not have complete coverage of publications worldwide with higher coverage in Anglophone countries. For more details of database coverage, see Elsevier's Research Metrics Guidebook.
7. The research performance metrics are derived using bibliometric data from SciVal, which tracks bibliographic information from Scopus and other data sources (an abstract and citation database licensed by Elsevier). Scopus data has been used for former BEIS performance releases since 2011 and it covers multi-lingual and global peer-reviewed literature, published in journals, book series and conference proceedings among other features of research performance.
8. Bibliometric method: using a pre-defined research category for Quantum Technologies within the platform. This is used to help identify research in the sub domains of Quantum Computing, Quantum Simulation, Quantum Metrology, Quantum Sensing and Quantum Communications.
9. Citations will not always be an indicator of quality. For example, a publication could be cited a lot because a paucity of other sources – indicating impact perhaps but not necessarily quality – or even because it is being cited as being flawed.

Number of International Patent Families (IPFs)

The UK is fourth globally among inventor countries for International Patent Families (IPFs) in quantum technologies and first in Europe.

Figure 2: Top 10 inventor countries for number of IPFs in quantum technologies (2010-2022)



Source: UKIPO analysis of PatentSight, 2023

Figure 2 captures the top 10 inventor countries based on number of International Patent Families (IPFs) in quantum technologies across 2010-2022.

International Patent Families (IPFs) are patent families comprising applications for the same invention published in at least two different patent authorities.

The UK Intellectual Property Office (IPO) recommends using metrics based on IPFs as they are a better representation of inventive activity than absolute numbers of applications because they provide a degree of control for patent quality and value by only representing inventions deemed important enough to seek protection internationally. They are also used by the European Patent Office.

International Patent Families (IPFs) create a sufficiently homogeneous population of patent families that can be directly compared with one another, thereby reducing the national biases that often arise when comparing patent applications across different national patent offices. Click here for more details on patent family definitions.

For the period 2010-2022, Figure 2 shows that there were 307 International Patent Families (IPFs) published in quantum technologies that have at least one UK inventor. The leading nation is the US with 1,638 IPFs.

Data caveats and methodology notes

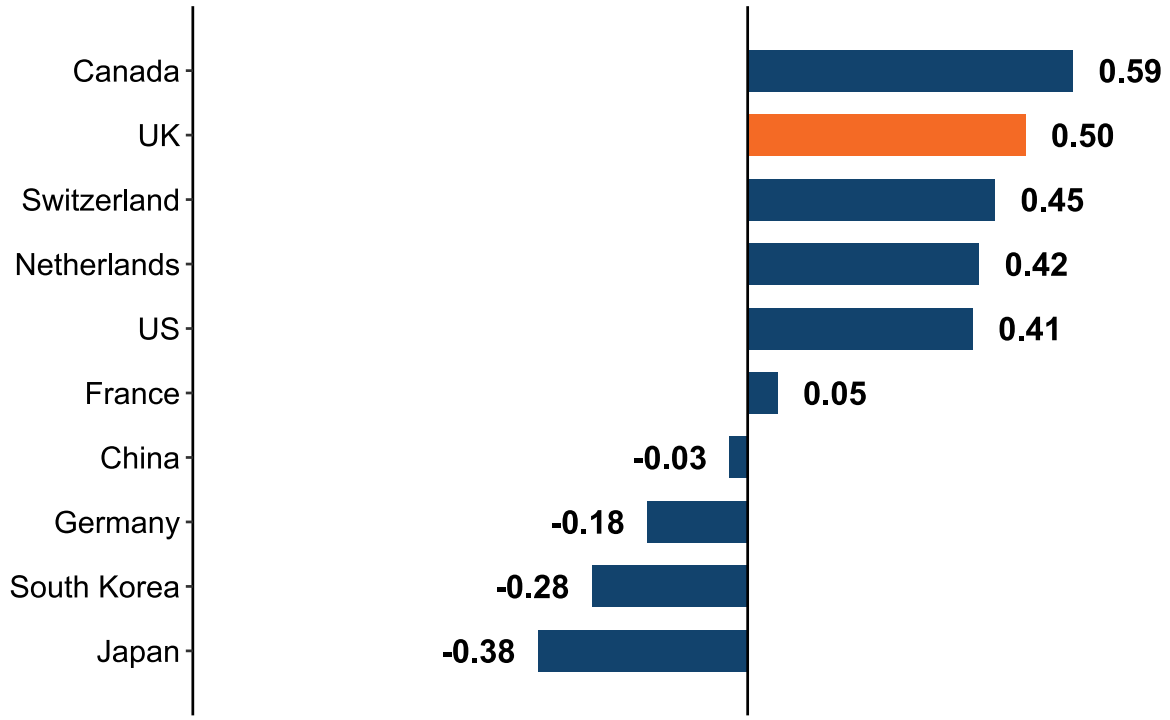
1. This analysis was conducted by the UK Intellectual Property Office, using PatentSight data. Patentsight is live and updated weekly. This analysis was based on a last update date of 21/02/2023, so figures may not be able to be replicated exactly.
2. Different databases use different definitions of patent families, meaning that family members for a particular invention may vary from one database to another.
3. Inventor country of residence is used as a proxy of where innovation has taken place since patents do not have a nationality. However, residency is self-reported and may not be an accurate measure in some cases. Missing data at source can also mean inventor address is recorded as unknown.
4. IPF data for 2022 may not be complete since some patent families may not yet have been published in multiple authorities.
5. If an IPF has more than one inventor country of residence, then it is counted for both inventor countries. The sum of IPF numbers per inventor country will be larger than the total number of IPFs.

Points 1 to 5 above apply to Figures 2 and 3

Relative Specialisation Index (RSI)

The UK is the second most specialised country in quantum technologies out of the top ten inventor countries for International Patent Families.

Figure 3: Normalised RSI of top 10 inventor countries for quantum technology IPFs (2010-2022)



Source: UKIPO analysis of PatentSight, 2023

Figure 3 ranks leading quantum nations (in terms of volume of IPFs) by their degree of specialisation in this field.

The Relative Specialisation Index (RSI) helps to account for the fact that some countries file more patent applications than others in all fields of technology. It controls, to an extent, for the effect of a country's size on a country's share of patents in that technology.

A value of above zero indicates that a country is more specialised in this field (a greater level of international patenting) compared to what would be expected given the general propensity to patent within the country.

The UK has the second highest level of specialisation in quantum technologies out of the top-10 inventor countries for number of IPFs. Canada has the highest RSI at 0.59, the UK has an RSI of 0.50.

Data caveats and methodology notes

1. The Relative Specialisation Index (RSI) shows the extent to which a country specialises in quantum technologies compared to the global average by comparing the fraction of a country's quantum-specific international patents out of all of its international patents across all fields of technology, with the corresponding fraction of quantum-specific international patents worldwide.

   It is calculated as:

$$RSI = \frac{n_c/N_c}{N_t/N}$$

   Where n_c = number of quantum technologies IPFs in country c; N_c = number of all IPFs in country c; N_t = sum of quantum technologies IPFs in all countries; N = sum of all IPFs in all countries.

   The RSI value is then normalised to take a value between -1 and 1.

2. RSI values for countries are relative to one another within that technology and are not absolute values. RSI is calculated solely on a specified technology area, it cannot be used to compare across different technologies and is limited to comparisons within the same technology.

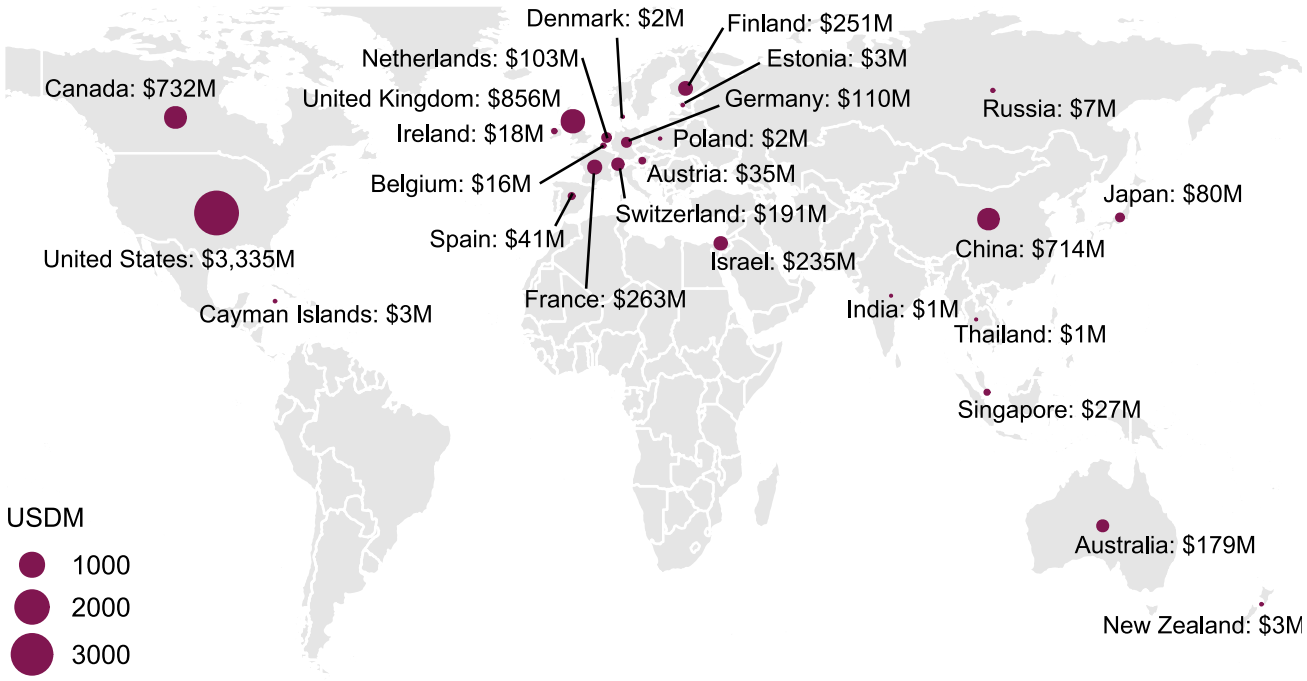
3. Refer also to points 1 to 5 in the 'Data caveats and methodology notes' section under 'Number of International Patents Families (IPFs)' on page 11.

Private equity investment trends into quantum technologies

Private equity investment by country

The UK is second in attracting private equity investment across 2012-2022, behind only the US.

Figure 4: Total private equity investment by country (2012-2022, USD$)



Source: Quantum Insider (February 2023)

Figure 4 shows the total private equity investment by country as covered by Quantum Insider's Intelligence platform.

Figure 4 and Table 2 show that, according to market specialist Quantum Insider, the UK has captured a 12% share of global private equity investment into quantum technology companies between 2012 and 2022. This equates to $856m.

Investment round counts have been added to Tables 2 and 3 to illustrate that the sector is still nascent with a low number of investment rounds. Therefore, one deal either being included or excluded from the dataset can create a change to the rankings. If we were to exclude one large merger in 2021 (Honeywell and Cambridge Quantum Computing)[1] then the UK would not be as highly performing.

Table 2: Total private equity amounts, global shares and investment round count for the top five countries for total private equity investment (2012-2022, USD$)

Rank	Country	Total private equity investment	Share of global private equity investment	Investment rounds (count)
1	US	$3,335m	46%	142
2	UK	$856m	12%	94
3	Canada	$732m	10%	67
4	China	$714m	10%	12
5	France	$263m	4%	38

Source: Quantum Insider (February 2023)

[1] Forbes, Quantinuum Launches With Over $270 Million To Tackle Quantum Computing's Biggest Challenges, 2021, Accessed April 2023.

Table 3 shows that the UK has attracted $692 million in private equity investment between 2020 and 2022. However, other countries are seeing substantial investment into quantum in recent years. In 2022 for example, Canada, China, France and Finland all saw higher reported private investment than the UK.

Table 33: Private equity investment trends over 2020-2022 and investment round count based on the top ten countries for total private equity investment over 2012-2022

Country	2020	2021	2022	2020-22	Investment rounds (count over 2020-22)
US	$417M	$1,232M	$1,038M	$2,687M	65
UK	$171M	$409M	$112M	$692M	43
Canada	$6M	$151M	$304M	$461M	24
China	-	$62M	$202M	$264M	10
France	$10M	$104M	$120M	$235M	20
Finland	$67M	-	$171M	$238M	8
Israel	$27M	$131M	$70M	$227M	10
Switzerland	$0M	$27M	$78M	$105M	8
Australia	$2M	$55M	$13M	$70M	10
Germany	-	$11M	$96M	$107M	13

Source: Quantum Insider (February 2023)

According to Pitchbook (a similar market data provider), between 2017 and 2022 UK quantum businesses were involved in ten mergers and acquisitions. Five of these were with other UK based companies and five with US based companies[2].

[2] Pitchbook is an online platform used to find deals and company information across the public and private equity markets. Pitchbook is interrogated using Quantum Technology search terms and defining this as a sector comes with inherent challenges. Search terms can be provided on request.

Data caveats and methodology notes

1. Companies in scope for tracking: sell hardware that are used in quantum computers and quantum devices; provide software that helps make quantum computers usable or useful; develop quantum computers (QPUs, chips, full stack offerings); provide hardware and software aimed at addressing quantum security and post quantum cryptography; provide quantum sensing and imagine technology; or, are involved in other parts of the quantum technology supply chain (e.g. Consultancy). Quantum Insider get their investment data for these companies by searching through publicly available sources and collating this for each company.
2. Investment figures may be incomplete due to the way data are collected and coverage may vary from one territory to another. In particular, figures are based on reported private investment only, not all deals are reported. And as a consequence of it not being a random sample of deals either, caution should be taken in making comparisons.
3. It may be possible to come up with a different estimate from other commercial platforms on equity funding data. However, these will all suffer from similar limitations.
4. Figures do not include internal investment by companies in their own activities (any large corporation's internal research spending into quantum); nor most UK and international grants.
5. Comparisons are complicated by merger activity and companies with headquarters (HQs) in different countries. For example, Cambridge Quantum Computing (UK) merged with US company Honeywell Quantum Solutions to form Quantinuum in November 2021. Honeywell agreed to invest $270m in the new company and retained a 54% stake in ownership[3]. Also note that in the Quantum Insider data, ArQit and Quantinuum are counted as having their HQs in the UK.

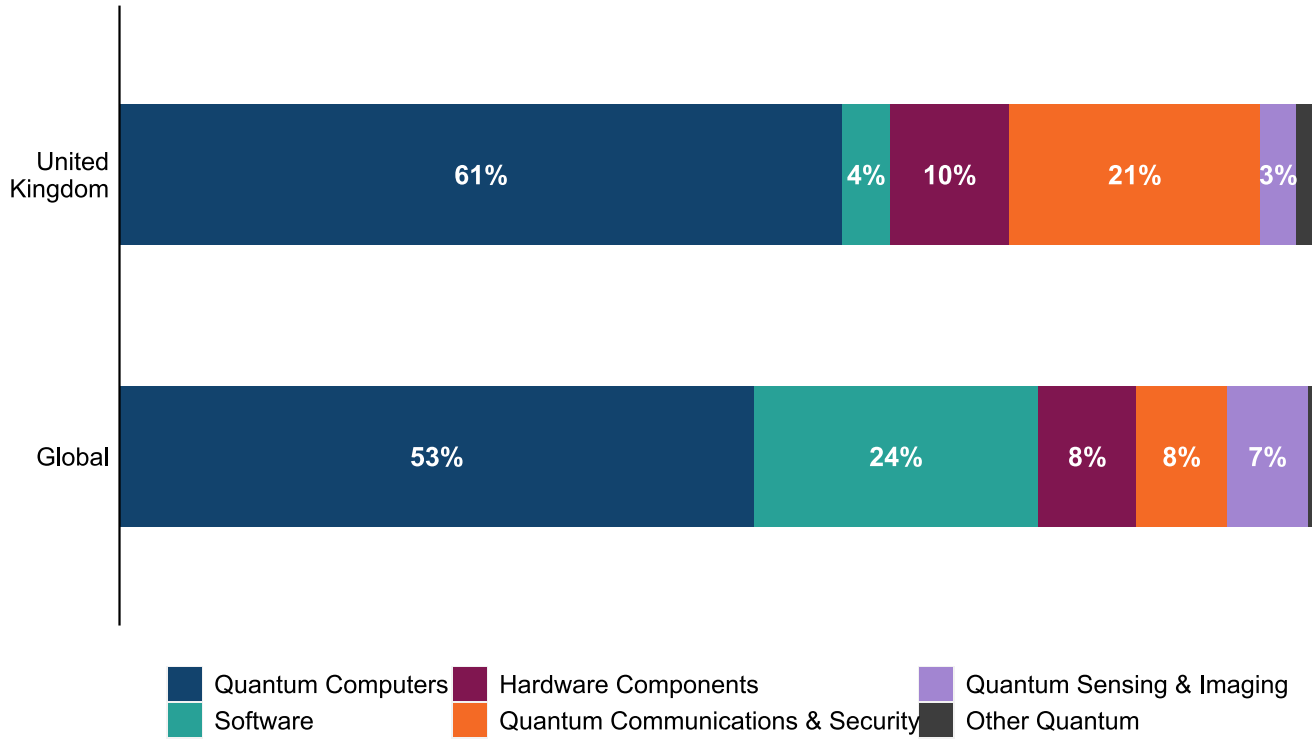
Points 1 to 5 above apply to Figures 4 to 6 and Tables 2 and 3

[3] Forbes, Quantinuum Launches With Over $270 Million To Tackle Quantum Computing's Biggest Challenges, 2021, Accessed April 2023

Private equity investment by technology area

Private equity investment is not evenly distributed across quantum technologies globally or in the UK. A majority of global private equity investment goes to quantum computers.

Figure 5: Proportion of total private equity investment by technology area, Global and UK, (2012-2022)



Source: Quantum Insider (February 2023)

Figure 5 compares the proportion of investment into UK quantum companies by technology area to global companies.

61% of investment over the 2012 to 2022 period in the UK has been in companies in the area of quantum computers, according to Quantum Insider.

The UK has seen relatively more investment into companies in quantum communications and security than the global average, a 21% share compared with 8%.

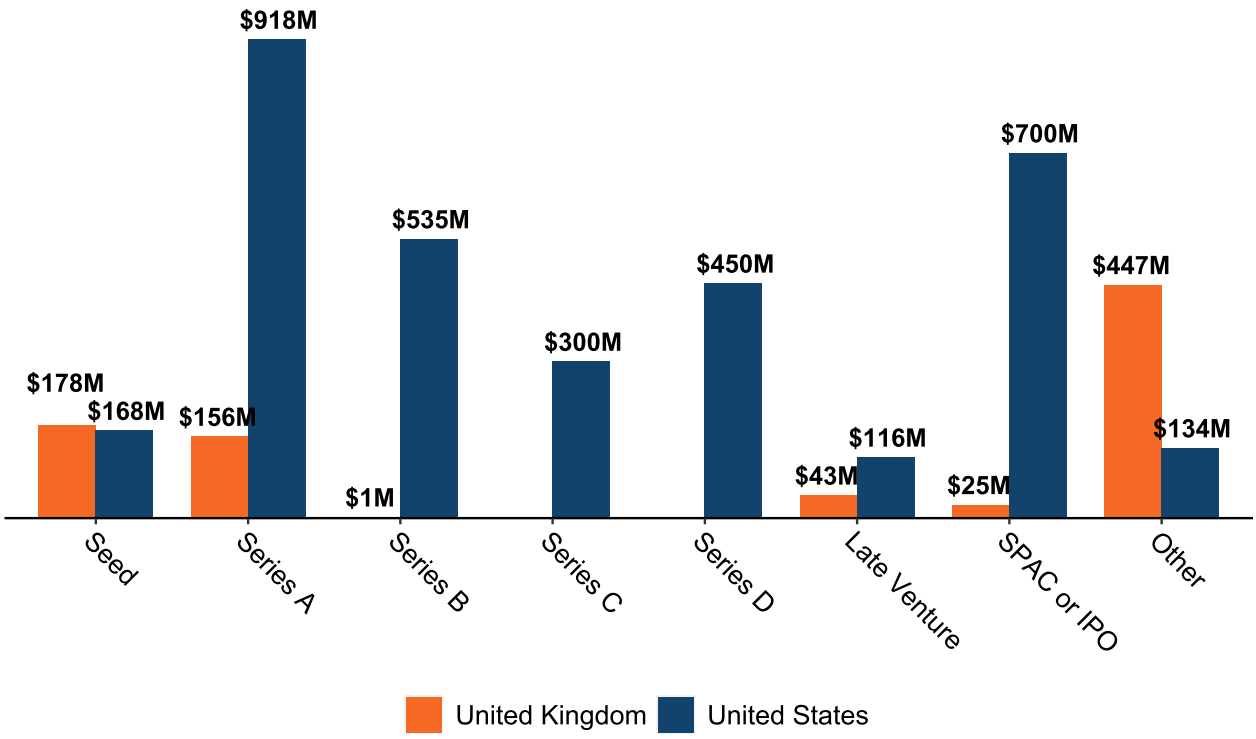
Data caveats and methodology notes

1. Refer to points 1 to 5 in the ‘Data caveats and methodology notes’ section under ‘Private equity investment by country’ on page 17.

Private equity investment by funding type

According to Quantum Insider, private equity investment in the UK is concentrated in early stages (Seed and Series A) funding compared to later stages (Series B+).

Figure 6: Total private equity investment by round type, UK and US, (2012-2022, $USDM)



Source: Quantum Insider (February 2023)

Figure 6 compares private equity investment in UK quantum companies across different stages to companies in the US.

The 'Other' funding round type is when the funding type is not specified and therefore may include some Series B-D funding as well as some mergers and acquisitions (M&A) activity (non-dilutive funding has not been included in the analysis).

UK quantum start-ups may face challenges to scaling up and competing with US counterparts due to the lack of domestic growth capital for deep technologies at later rounds (Series B+). Many UK quantum companies are still quite young and therefore this may be a partial explanation for lower funding at later stages. It is also the case, generally, that UK deep tech companies receive lower amounts of later stage funding than US counterparts[4].

[4] British Business Bank, Small Business Equity Tracker 2022, Accessed August 2023

In general, later and larger funding rounds in the UK tend to include more foreign investors[5]. Therefore, it seems likely that UK quantum companies will be reliant as they scale on foreign capital. This may increase the chance of UK based companies relocating abroad or listing on capital markets abroad. However international investors bring skills and expertise, access to markets and also enable companies to grow and potentially stay in the UK.

Data caveats and methodology notes

1. Refer to points 1 to 5 in the ‘Data caveats and methodology notes’ section under ‘Private equity investment by country’ on page 17.

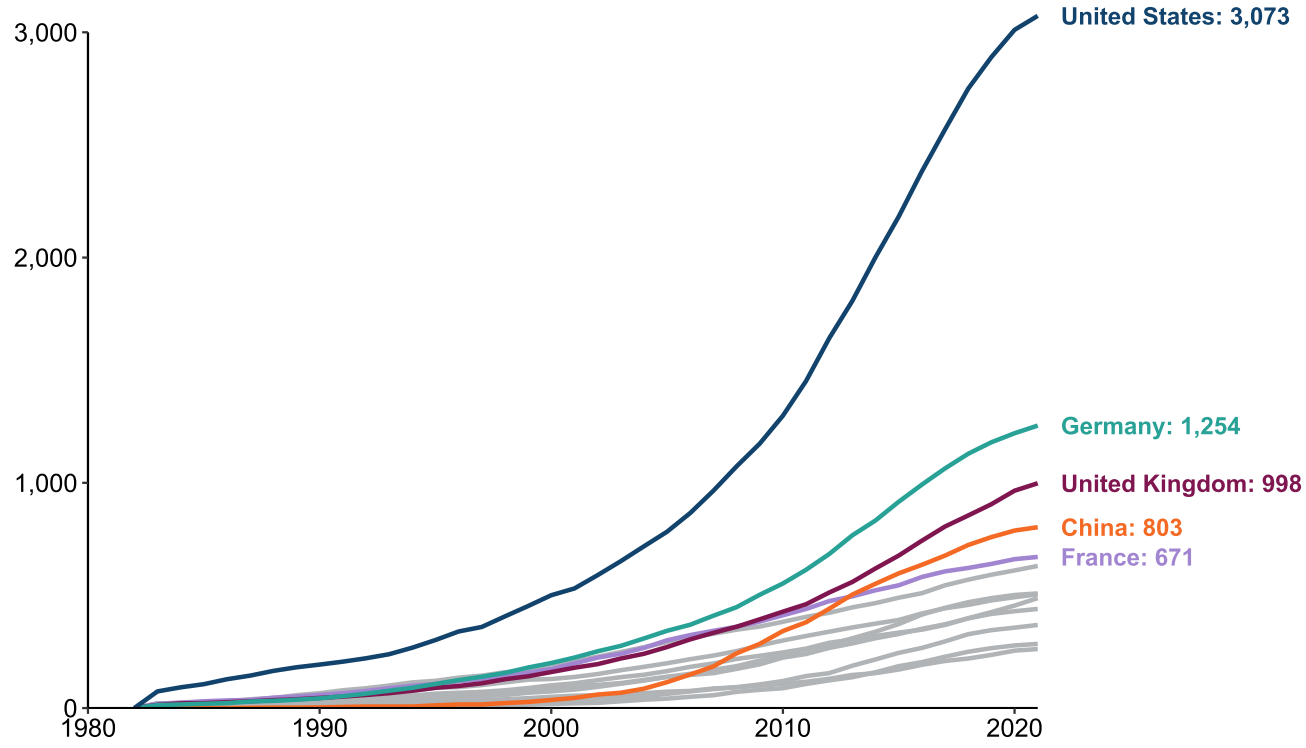
[5] Tech Nation, Tech Nation Report 2021, Accessed August 2023

Skills and talent for the Quantum Sector

Number of researchers in quantum-related technologies

The UK is in the top five globally for number of researchers involved in quantum-related technologies.

Figure 7: Top 10 countries for the cumulative sum of quantum-related researchers (1982-2021)



Source: 'Global Quantum Talent Report', Zeki Research September 2022

Figure 7 shows the top 10 countries for the cumulative sum of quantum-related researchers identified by Zeki Research across 1982-2021 Zeki's Global Quantum Talent Report identifies researchers involved globally in quantum-related technologies by the date of their first formal research publication.

Figure 7 shows that nearly 1,000 (998) UK researchers have published a research paper in quantum technologies between 1982-2021.

On this basis, the UK is in the top five globally for quantum researchers along with the US (3,073), Germany (1,254), China (803) and France (671).

Data caveats and methodology notes

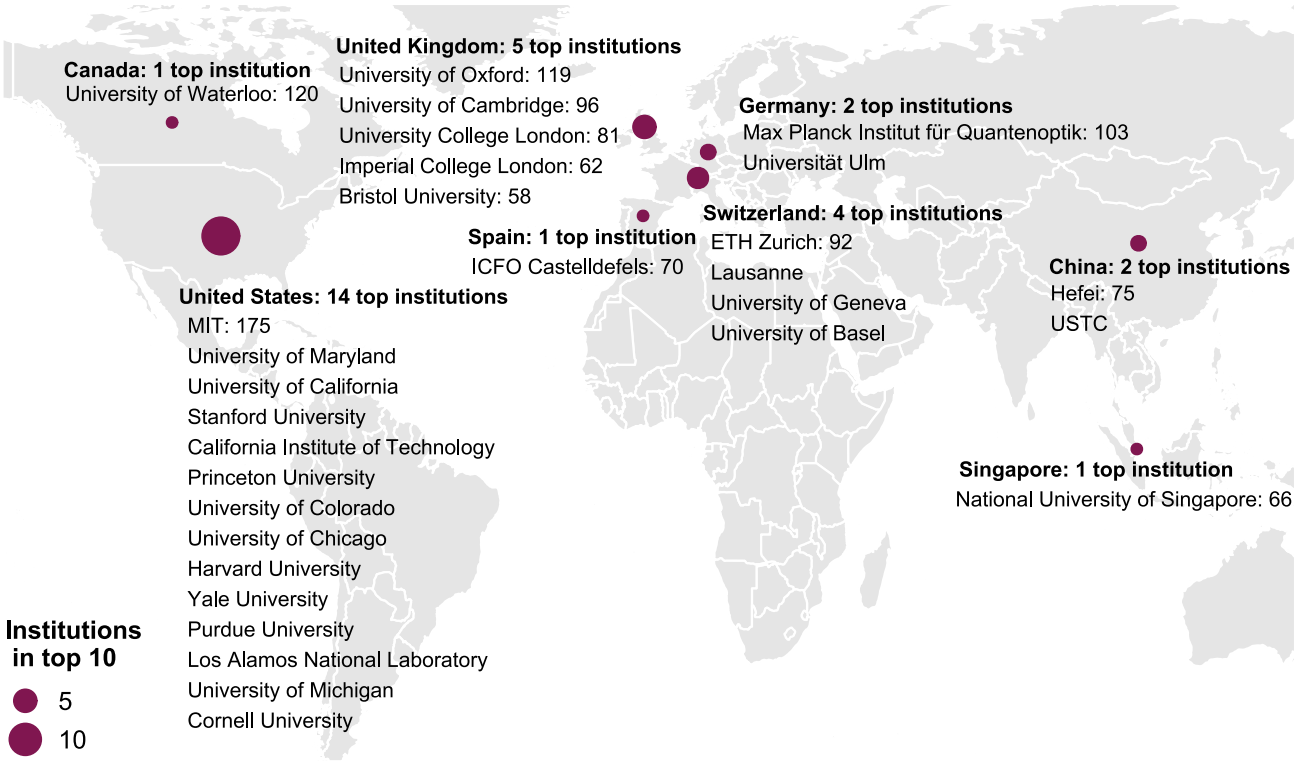
1. Zeki Research curate a database of all researchers globally involved in quantum-related technologies. It identifies researchers through natural language processing and other data analysis tools on open access academic archives. Researchers are added to the cumulative total in the year of their first formal research publication.
2. After Zeki have identified researchers active in the quantum technology sector, they match researcher profiles on scholarly literature platforms to explore further information on a researcher's institution and career.
3. The Zeki dataset is not exhaustive but at over 18K observations it is a broad sample.
4. The Zeki dataset likely undercounts lower-level Chinese researchers as they are thought not to register on open-access platforms for scholarly literature as much as researchers in other countries, but higher-level researchers are thought to be fully represented in the dataset.

Points 1 to 4 above apply to Figures 7 and 8

Top institutions for number of researchers

The UK has five institutions in the top thirty for the number of researchers involved in quantum-related technologies.

Figure 8: Top 30 institutions globally for number of quantum-related researchers (1982-2021)



Source: 'Global Quantum Talent Report', Zeki Research September 2022

Figure 8 shows which countries host the top 30 institutions globally for number of quantum technology researchers. The number of researchers is provided for the top institution in each country and for all UK institutions.

The Global Quantum Talent Report (Zeki Research) identifies researchers involved globally in quantum-related technologies by the date of their first formal research publication, then uses scholarly literature platforms to explore information on a researcher's institution and career.

Figure 8 shows that there are five UK research institutions in the top 30 globally, on the metric of those institutions with the most researchers involved in quantum-related technologies. The UK's five institutions puts us second only to the US, with 14 institutions.

Oxford University ranks fourth globally (119 researchers) and Cambridge University ninth globally (96 researchers). University College London is eleventh (81), Imperial College London (62) and Bristol University (58) also make the cut.

Data caveats and methodology notes

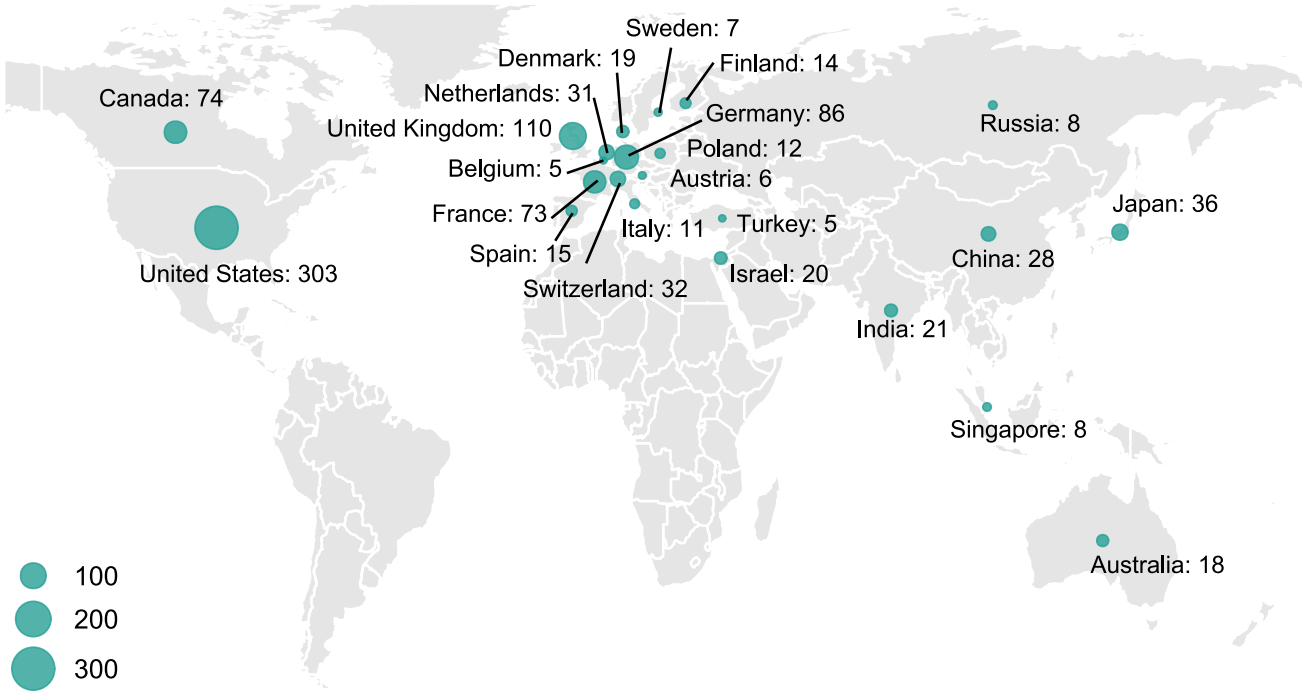
1. Refer to points 1 to 4 in the ‘Data caveats and methodology notes’ section under ‘Number of researchers in quantum-related technologies’ on page 22.

Companies in the UK Quantum Sector

Companies in the sector by country

The UK is second for the number of quantum companies but in close competition with other nations, and behind the US.

Figure 9: Total number of quantum companies by country (February 2023)



Source: Quantum Insider (February 2023)

Figure 9 shows the number of companies identified by Quantum Insider in February 2023 for all countries that have five or more quantum companies.

Figure 9 and Table 4 show that the UK has approximately 11% of the world's quantum companies in February 2023 with 110 companies.

Table 44: Number of companies and global share for the top five countries for total number of quantum companies (February 2023)

Rank	Country	Amount	Percent
1	US	303	31%
2	UK	110	11%
3	Germany	86	9%
4	Canada	74	8%
5	France	73	7%

Source: Quantum Insider (February 2023)

Data caveats and methodology notes

1. Countries with under five companies have not been included in Figure 9.
2. Certain companies that supply hardware that are used in quantum computers and quantum devices are included.
3. Company counts might be incomplete due to the way the data are collected and might not be capturing all the quantum technology organisations globally. Coverage may also vary from one territory to another.
4. The Quantum Insider provides structured global data on the quantum technology industry, including detailed data on quantum companies, investors, academic groups, government institutions and information on the wider quantum technology ecosystem including corporate end users. All records are classified according to a custom taxonomy developed through expertise in quantum technologies and market engagement.
5. Companies in scope for tracking by Quantum Insider: sell hardware that are used in quantum computers and quantum devices; provide software that helps make quantum computers usable or useful; develop quantum computers (QPUs, chips, full stack offerings); provide hardware and software aimed at addressing quantum security and post quantum cryptography; provide quantum sensing and imagine technology; or, that are involved in other parts of the quantum technology supply chain (e.g. Consultancy).

Points 2 to 5 above apply to Figures 9 to 13 and Tables 4 and 5

Companies in the sector by technology area

The UK ranks highly for its number of companies in February 2023 compared with our international competitors, across a broad range of quantum technology areas.

Table 5: Number of quantum companies by technology area for the top five countries for total number of quantum companies (February 2023)

Country	Hardware Components	Software	Quantum Computers	Quantum sensing and imaging	Quantum communications and security
US	118 (Rank 1)	60 (Rank 1)	16 (Rank 1)	19 (Rank 1)	32 (Rank 1)
UK	39 (Rank 3)	16 (Rank 3)	9 (Rank 2)	15 (Rank 2)	13 (Rank 2=)
Germany	49 (Rank 2)	13 (Rank 4)	5 (Rank 5 =)	5 (Rank 4 =)	7 (Rank 4 =)
Canada	16 (Rank 5 =)	24 (Rank 2)	5 (Rank 5 =)	5 (Rank 4 =)	13 (Rank 2=)
France	35 (Rank 4)	11 (Rank 6)	7 (Rank 3=)	9 (Rank 3)	7 (Rank 4 =)

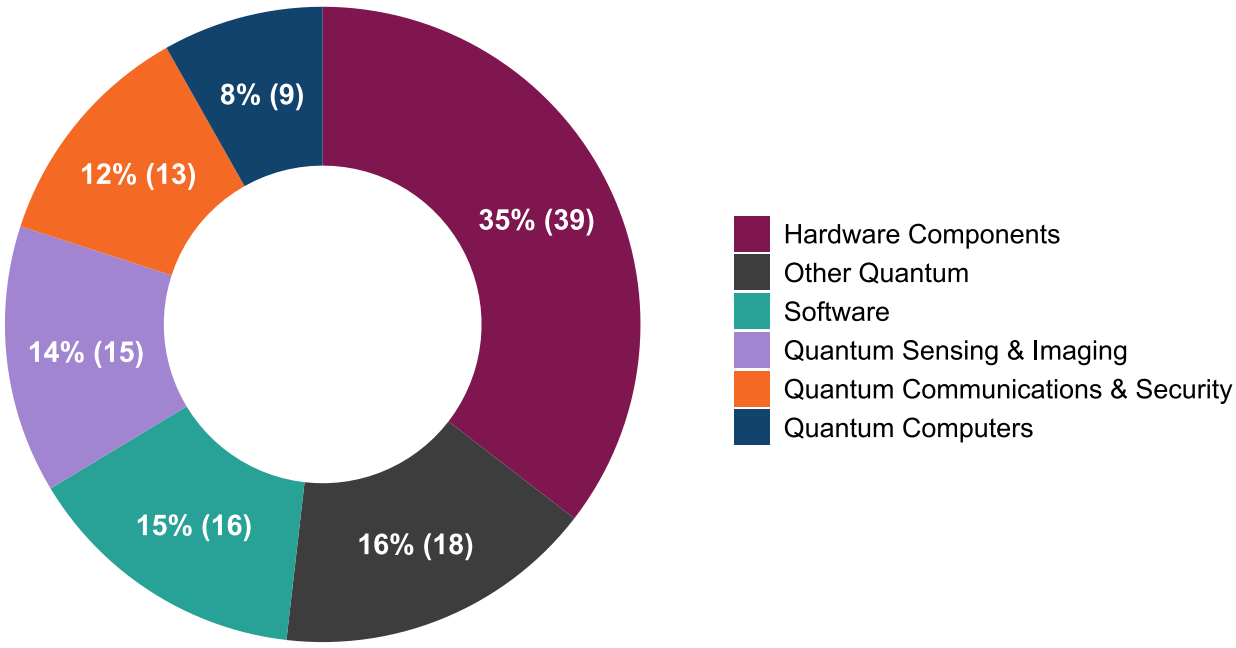
Source: Quantum Insider (February 2023)

Table 5 shows that in February 2023 the UK has the second highest number of companies in quantum computers, quantum sensing and imaging and quantum communications and security.

The UK has the third highest number of companies in hardware components and software.

The UK has strengths across all quantum technology areas in terms of company numbers and therefore is well poised to build a competitive sector.

Figure 10: Proportion of UK quantum companies by technology area (February 2023)



Source: Quantum Insider (February 2023)

Figure 10 shows the proportion (and number) of quantum companies in each quantum technology area.

35% of companies are classed under hardware components – the highest number of companies across the technology areas.

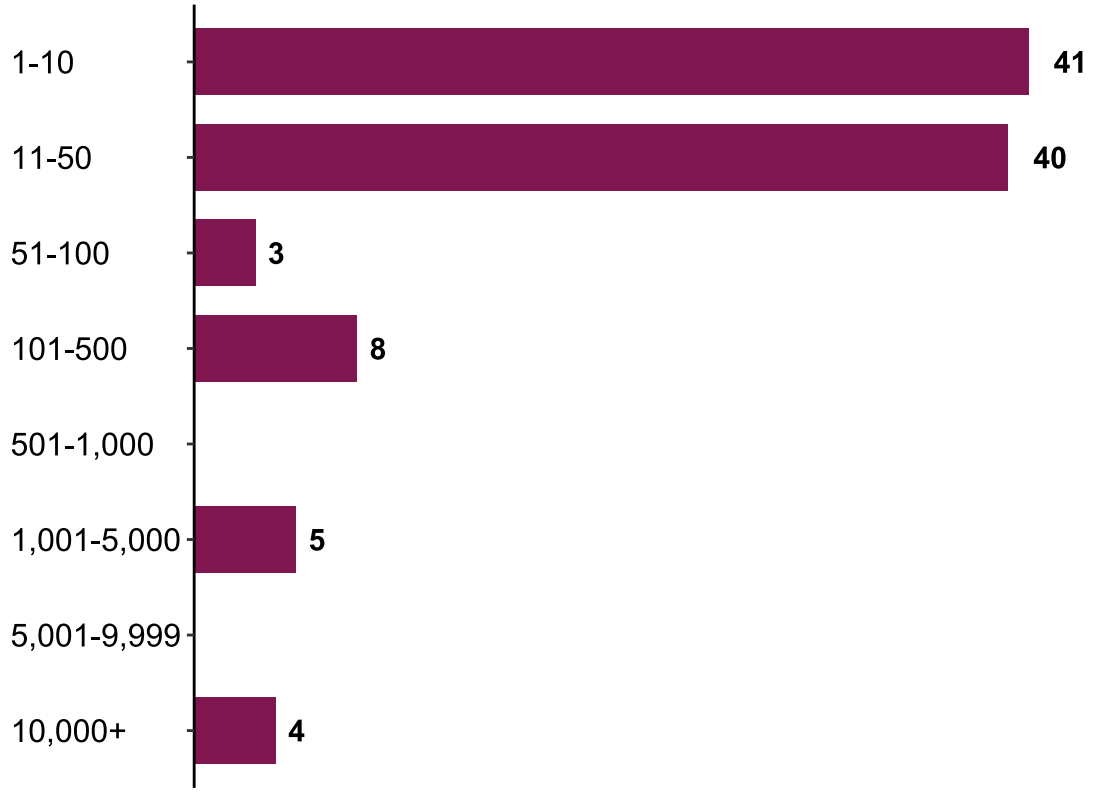
Data caveats and methodology notes

1. Refer to points 2 to 5 in the ‘Data caveats and methodology notes’ section under ‘Companies in the sector by country’ on page 26

Companies in the sector by size

UK quantum companies are generally small with around 80% having 50 or less employees.

Figure 11: Number of UK quantum companies by employee range (January 2023)



Source: Quantum Insider (January 2023)

Figure 11 shows the number of quantum companies in the UK in January 2023 by their number of employees, indicating company size.

The typical UK quantum technology company in 2023 is small, with less than 50 employees.

These small companies are not vertically integrated and can be vulnerable to foreign takeover or flight – in an increasingly competitive global environment that will see consolidation in the coming years.

Data caveats and methodology notes

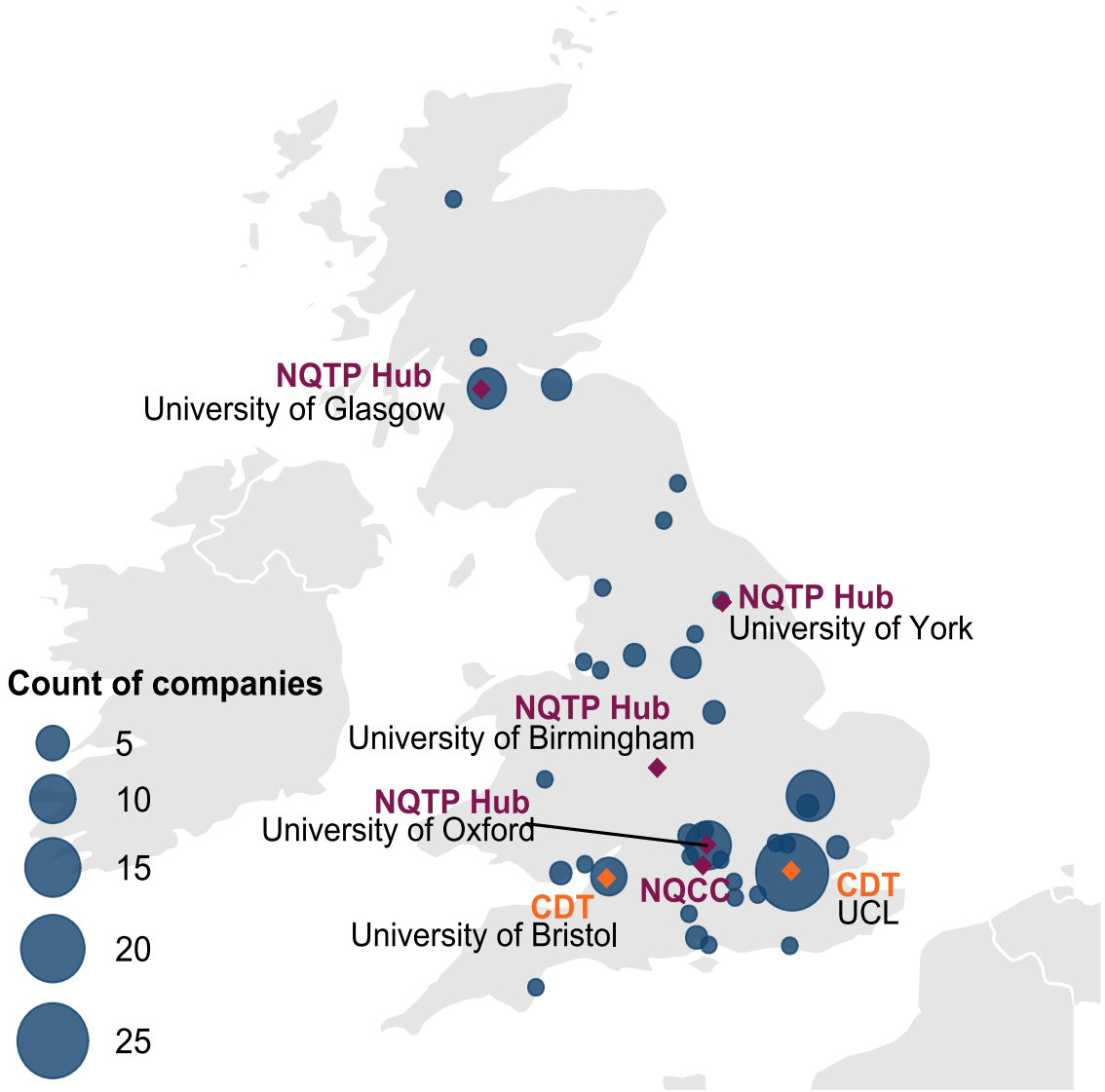
1. Quantum Insider January 2023 dataset contains 105 companies, compared to 110 companies in the February 2023 dataset.
2. Four companies in the Quantum Insider January 2023 dataset have missing data for employee range and are removed from the denominator in percentage calculations for 50 or less employees.
3. Refer also to points 2 to 5 in the ‘Data caveats and methodology notes’ section under ‘Companies in the sector by country’ on page 26.

Regional breakdown of UK company headquarters

There are centres of expertise and concentrations of activity across the UK.

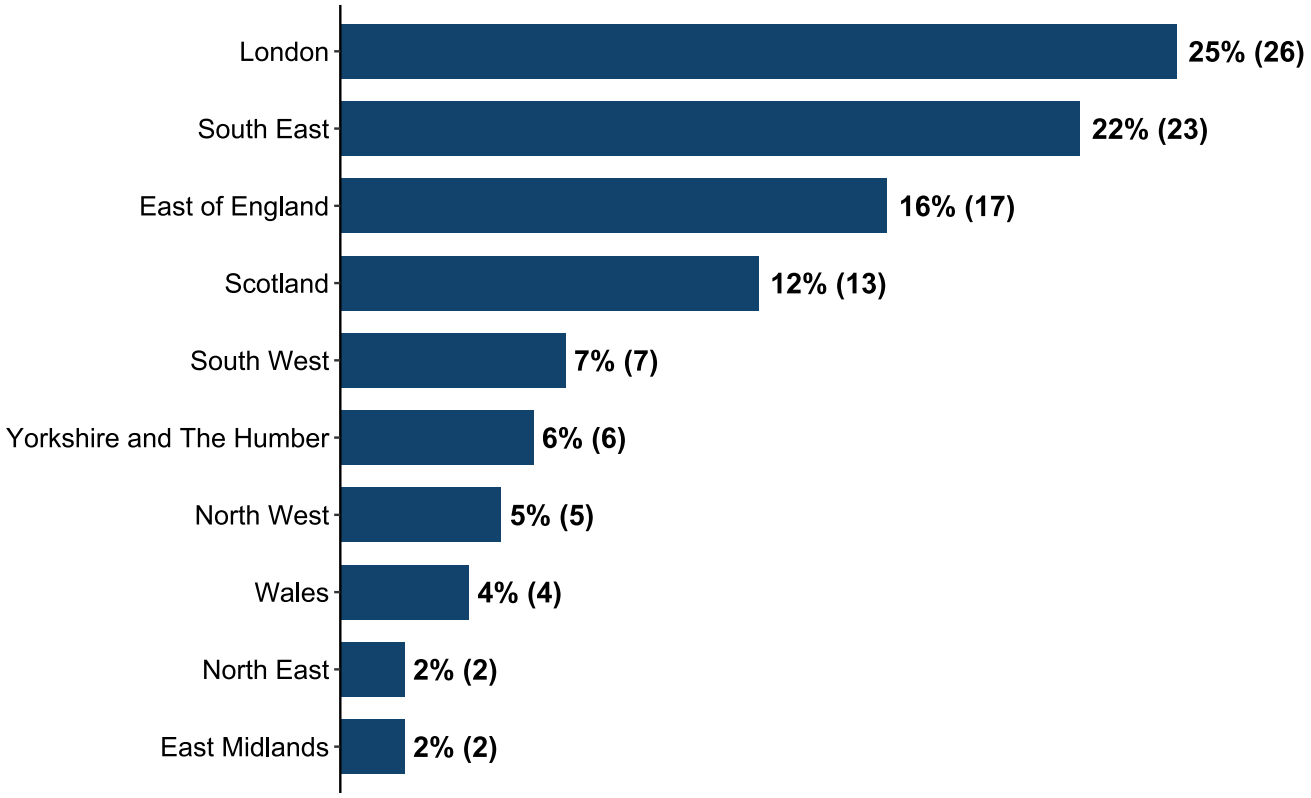
Figure 12 maps the Local Authority Districts that contain the headquarter locations of the 105 UK quantum companies from Quantum Insider (January 2023), except for London locations. The locations of the National Quantum Computing Centre (NQCC), National Quantum Technologies Programme (NQTP) Hub lead institutions and Centres for Doctoral Training (CDT) are also shown. The figure does not represent the concentrations of activity across the UK.

Figure 12: Number of UK quantum company headquarter locations by Local Authority District (LAD); the NQCC; NQTP Hub Lead institutions and CDTs



Source: Quantum Insider (January 2023)

Figure 13: Regional proportions of UK quantum company headquarters



Source: Quantum Insider (January 2023)

Figure 13 shows the proportion (and number) of the 105 UK quantum company headquarters from Quantum Insider (January 2023) in each UK region.

A quarter of UK quantum companies have London-based headquarters and 47% have headquarters in either London or the South-East.

Data caveats and methodology notes

1. The data provides the location of the company headquarters which might be different to the location where the main activities of the companies are carried out. This could influence the geographical data distribution.
2. The NQTP approach to commercialising quantum technologies is based around four hubs, which bring together a network of leading institutions across the UK, each with a university at the centre, and representing broad areas of focus into which the national programme is divided (UKQTP website). The four NQTP Hubs shown in Figure 12 will run until 2024 after which new Hubs will be assembled.
3. Quantum Insider provide company headquarter location by city which has been mapped to Local Authority Districts (LADs) and region using ONS's National Statistics Postcode Lookup (NSPL) data.

4. Quantum Insider January 2023 dataset contains 105 companies, compared to 110 companies in the February 2023 dataset.
5. Refer also to points 2 to 5 in the ‘Data caveats and methodology notes’ section under ‘Companies in the sector by country’ on page 26.
6. NQTP Hubs, the NQCC and CDTs are not included in the bar chart counts in Figures 13.

Point 1 and 5 above applies to Figures 12 and 13; point 6 only applies to Figure 13

This publication is available from: www.gov.uk/government/publications/national-quantum-strategy

If you need a version of this document in a more accessible format, please email alt.formats@dsit.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.