Diverse Founders in Advanced Digital Technology

2023

Beauhurst

CATAPULT Digital

Contents

Introducing the digital technologies

2,865

active digital technology companies

£20.6b

total equity investment raised by digital technology companies (2013–2022)

Digital Catapult collaborates with organisations across five key advanced technologies: immersive technologies, quantum computing, distributed systems, future networks, and artificial intelligence and machine learning (AI and ML). This report examines the diversity of founding teams within companies operating in these sectors, analysing equity investment flows based on gender, age, ethnicity, and educational background.

Immersive technologies, including virtual and augmented reality, have surged in popularity, revolutionising various industries and enhancing customer experiences. Quantum computing leverages quantum mechanics to tackle complex problems beyond the reach of classical computers. Distributed systems, such as blockchains and cryptocurrencies, facilitate resource sharing and promote efficiency across industries. Future networks, encompassing IoT and 5G technologies, form the connective infrastructure for modern economies. Lastly, AI and ML are instrumental in processing and extracting insights from the vast amounts of data generated daily.

Evaluating the diversity landscape of companies receiving equity investments in these core technology sectors is essential. By doing so, we can determine how to effectively encourage and support diversity within these innovative fields.

High-growth company activity

2,076
number of high-growth companies in AI and ML

£12.7b
equity investment secured 2013-2022

736
number of high-growth companies in future networks

£2.83b
equity investment secured 2013-2022

492
number of high-growth companies in distributed systems

£3.68b
equity investment secured 2013-2022

549
number of high-growth companies in immersive tech

£2.03b
equity investment secured 2013-2022

118
number of high-growth companies in quantum

£501m
equity investment secured 2013-2022

“The UK must foster an inclusive investment ecosystem, where the strength of founder diversity is harnessed.

Foreword

Jessica Rushworth

Chief Strategy and Policy Officer at Digital Catapult

This report is an important step towards understanding the opportunity for increased funding of diverse founders across the advanced technology landscape in the UK and pinpoints specific high potential deeptech areas where better access to capital will enable diversity of thought, problem-solving and innovation for the overall benefit of UK companies, investors and technology advancement. In collaboration with Beauhurst, we have examined aspects of founder diversity by equity investment across the advanced technology landscape in the UK, looking at AI and machine learning, immersive, distributed system technologies (blockchain), future networks (5G, IoT) and quantum, in order to support our mission of supporting advanced technology founders across the UK.

In this report, we have applied five lenses of diversity to the advanced technology landscape: gender, ethnicity, age, nationality and educational background. We acknowledge that the rich intersectionalities of diversity extend far beyond these five lenses, and we recognise that there are many more layers of diversity: LGBTQIA+, socio-economic backgrounds, regional disparities, religious beliefs, and disability. The five diversity lenses examined in this report have been selected as a starting point, where data and methodologies are available and can lead to useful insights and analysis. While this report marks a significant step in understanding the impact of some diversity characteristics on investment opportunities, it does not encompass the entirety of diversity, and we must continue our commitment to broadening this perspective in future analyses as more data and new methodologies become available.

Digital Catapult’s mission is to drive the UK’s digital economy forward, harnessing the power of innovation and technology. Part of our role is focused on supporting early-stage tech founders to access the capital they need

Foreword (cont.)

to grow, alongside access to the technical expertise, facilities and labs needed to develop technology applications. We have supported over 600 founders on their tech development and investment journeys via our FutureScope acceleration programme. These companies have gone on to successfully raise over £577m of private investment. However, from our work with these companies, from collaboration with ecosystem partners, from insights generated by this report, and from the growing body of research in this area, we recognise that significant gaps remain in access to capital. We are committed to supporting founders to overcome these barriers and to supporting the investment ecosystem to become more equitable and inclusive. This report benchmarks the current levels of private investment into diverse founders across the advanced technology landscape, which we hope will enable the ecosystem to spot opportunities and measure progress.

Whilst the UK is well known for its SEIS and EIS schemes and strong support mechanisms for early-stage founders seeking investment, we believe that in order to continue to be an attractive place to start and scale a business, the UK must foster an inclusive investment ecosystem, where the strength of founder diversity is harnessed leading to better returns for investors. For the UK to be a global leader across rapidly developing areas of the advanced technology landscape, such as generative AI, quantum computing and 6G, the UK will need to leverage diversity of problem-solving and expertise to navigate this advancement successfully.

The report finds that in some areas we have seen some great progress, and we must celebrate the progress that has been made. However, in many areas, many sectors are still not reaching their full potential of investment going towards the diverse founders that exist in those categories.

Our objective in sharing this insight and analysis is to highlight that across almost every diversity lens examined in this report, there is significant opportunity for funding to flow more equitably to founders.

We would like this report to be a starting point for investment initiatives, a more conscious and deliberate approach to finding the best diverse founders across different tech areas, and for the funding to follow.

We would like to extend our gratitude to our ecosystem spotlight partners and contributors, the UK Business Angels Association, Deep Science Ventures, and MSDUK, all of whom have contributed first-hand perspective to the data and insights generated in this report. Together with our partners, we are committed to increasing understanding of the opportunity areas for greater investment into underrepresented founders and driving ecosystem change to enable more equitable access to capital for the long-term benefit of UK companies and investors. Digital Catapult's FutureScope accelerator programmes, such as the Black Founders Programme with Sony Music, are one such way in which tailored interventions are providing large corporate partners with access to a more diverse network of innovators that they might not be able to reach otherwise.

“We believe this report establishes a measurable benchmark for the contribution of diverse founders to the UK’s digital economy.

Executive summary

Henry Whorwood

Head of Research and Consultancy at Beauhurst

Beauhurst are very pleased to be presenting in this report new analysis on the population of diverse founders who starting and running businesses in advanced digital sectors. This report analyses founders by gender, age, ethnicity, nationality and educational background at companies from five digital sectors across the UK. In particular this report looks at the success of those founders in winning external equity finance.

The charts and commentary that follow are detailed analyses of complicated datasets. Each diverse category that has been analysed has required its own methodology, and each of those methodologies necessarily has caveats. Despite the necessary limitations of the datasets and the complexities of the required analyses, we believe this report establishes a measurable benchmark for the contribution of diverse founders to the UK’s digital economy, and in particular the support they have received to date from investors.

But it’s worth prefacing this report overall by stating clearly that most of the analyses confirm the difficulties faced by founders from diverse categories in winning funding. It is nonetheless pleasing to see in at least the majority categories that investment has been moving towards funding a greater diversity of founders in recent years; perhaps best summarised as most of the bars get more colourful towards the bottom of the charts on each page.

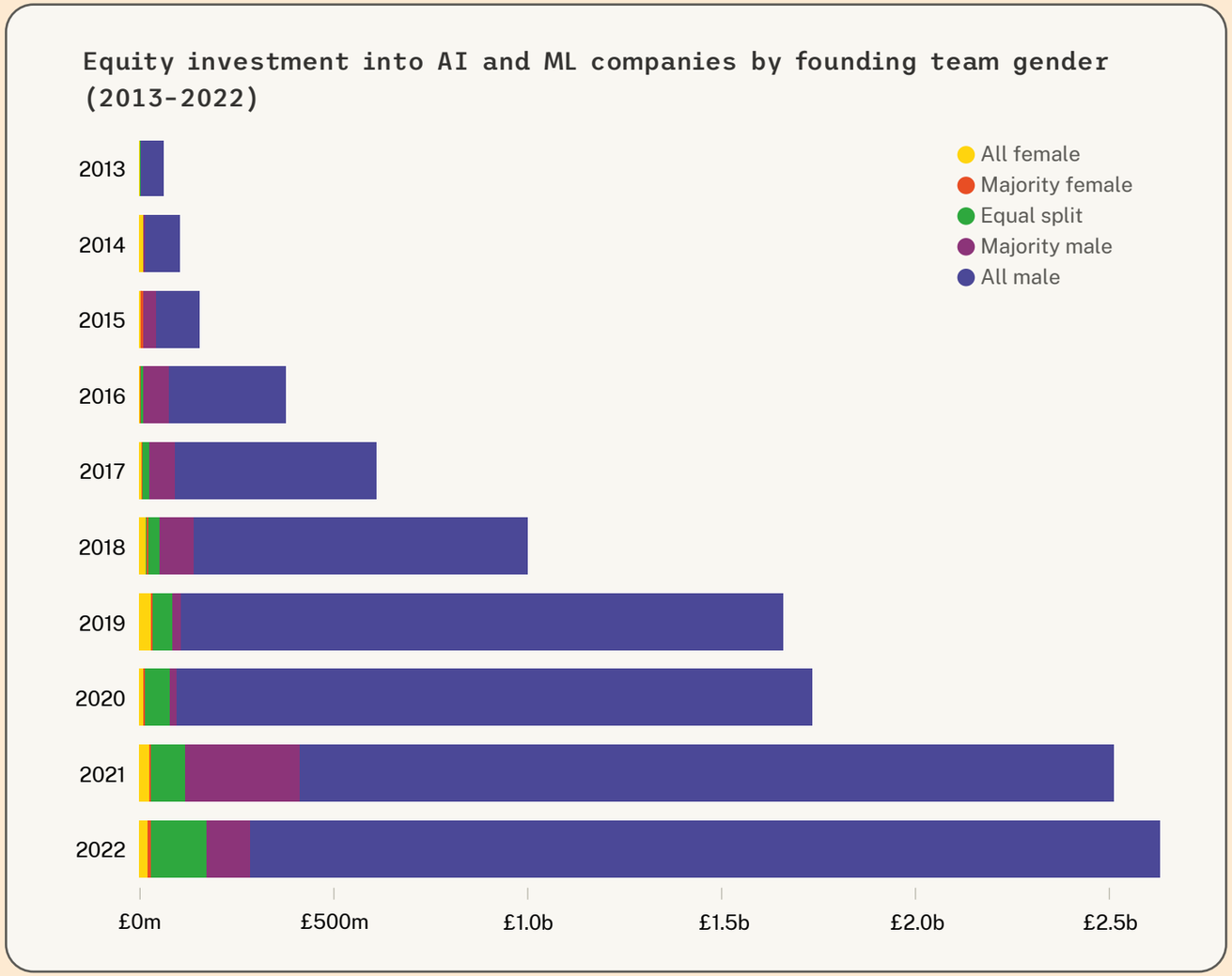
Harder to summarise are the differences across the different digital sectors. It’s worth noting that particularly large deals can skew numbers. Because larger deals are won by more established businesses, positive changes in the ecosystem can take a while to have a significant measurable impact. Nonetheless the differences between sectors in this report should be instructive to pinpoint where interventions might have most impact. As an example, the preponderance of founders in the quantum sector with a PhD is not surprising (p.33), but its confirmation in this report means that efforts to improve diversity in the sector overall need to happen in higher education. We hope this report will guide those efforts.

Gender

A considerable disparity exists in equity investment between founding teams based on gender across five key technology sectors, most notably in AI and ML, distributed systems, and future networks. In 2022, over 70% of total equity investment in these areas was secured by all-male founded companies. This discrepancy is partly due to the significantly smaller number of mixed-gender and all-female founded firms.

Key findings:

- In AI and ML, all-male founded companies secured a significant £9.58b of equity investment over the past decade compared to £1.14b for mixed-gender teams and £136m for all-female founders
- Future networks companies founded by all-male teams secured £2.19b, or 89.7% of the total £2.44b raised between 2013 and 2022
- In distributed systems, all-male founded companies received 93.2% of equity investment in 2022, aligning with their representation in the active high-growth population. Across the decade, they received 94.8% (£3.09b) of the £3.26b total investment
- In the immersive tech sector, the investment gap shows signs of narrowing in 2022, with all-female teams securing 13.7% of the annual total and mixed-gender teams securing an all-time high of 16.6%
- Quantum computing sector saw mixed-gender teams secure the majority of total funding (61.9%) in 2022, despite all-male founded teams attracting most of the investment over the past decade (£379m, 79.9%)



AI and ML: investment by gender

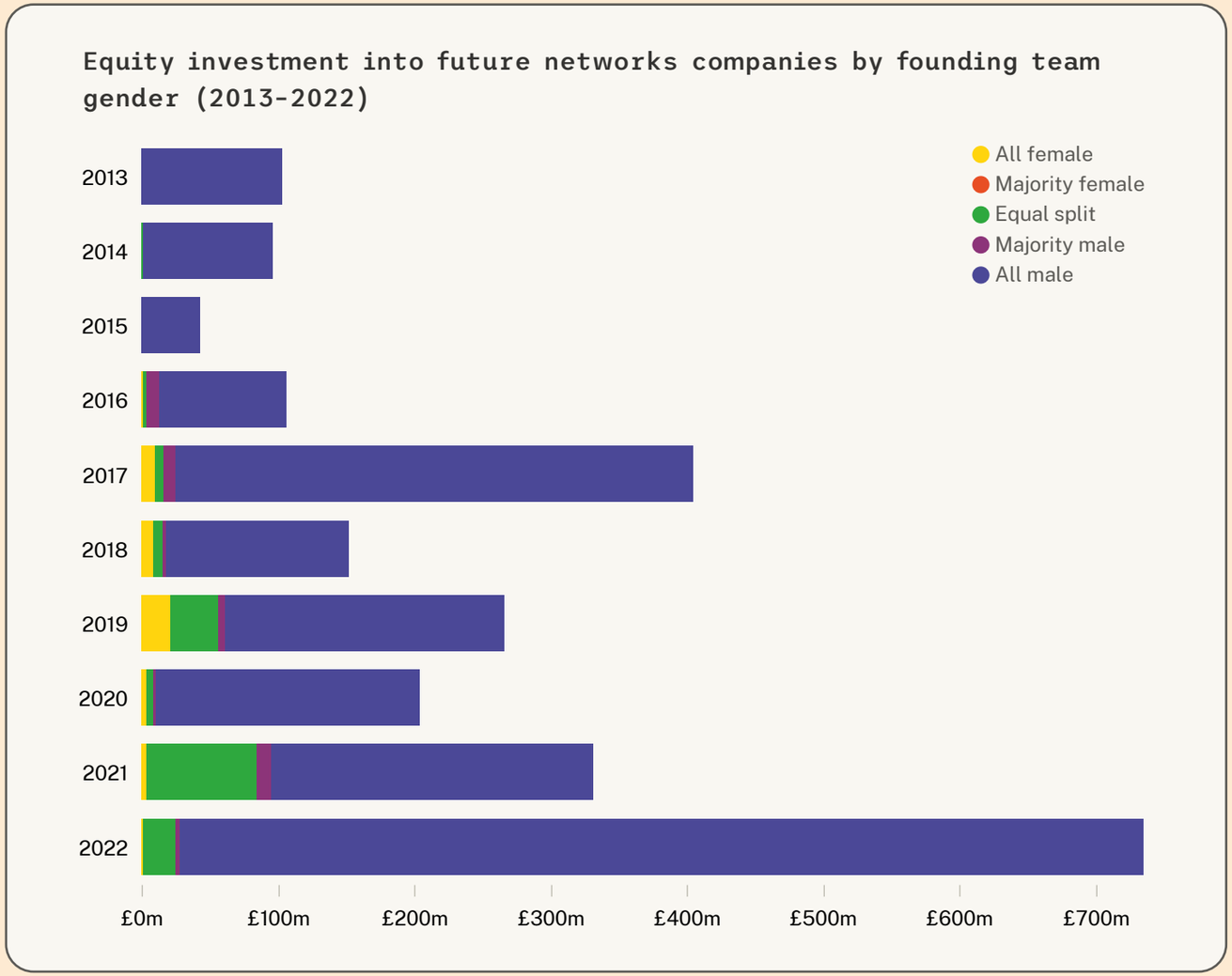
All male-founded companies secured a significant £9.58b of equity investment over the past decade, in contrast to £136m for companies with exclusively female founders and £1.14b for mixed-gender teams. This disparity partially reflects the high number of companies that have all male founders. All-male founded companies make up 79.3% of the total active high-growth company population in the technology area, while companies with all-female and mixed-gender founding teams account for only 6.74% and 13.9% of the active population.

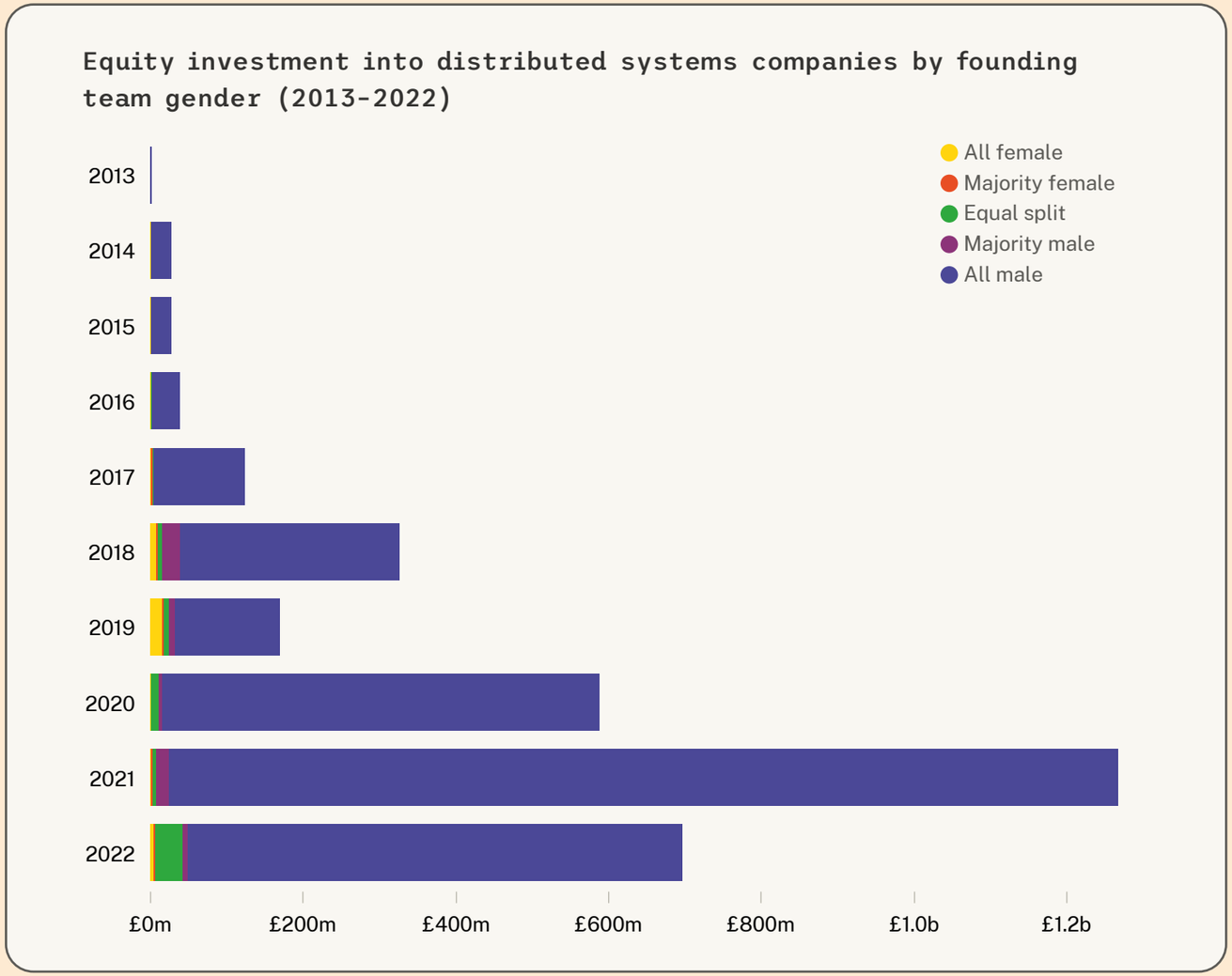
In 2022, all-male founded companies accounted for 89.2% of investment raised in the sector, while mixed-gender teams received nearly 10% (9.93%) of the total, amounting to £262m. In contrast, all-female founded companies accounted for less than 1% of investment in 2022, showing that these companies are receiving a disproportionately low share of investment.

Future networks: investment by gender

Over the past decade, all-male founded future networks companies have secured significantly more equity investment than companies with more gender-diverse founding teams. Between 2013 and 2022, all-male teams secured £2.19b, or 89.7% of the total £2.44b raised. This reflects the high percentage of all-male founded companies (82.6%) in the active company population compared to mixed-gender founding teams (11.7%), and all-female founding teams (5.72%).

In 2022, funding for all-female founded future networks companies was even lower than in AI and ML, with these companies securing 0.14% of the total raised. Mixed-gender teams accounted for 3.61% of the total raised, a figure drastically lower than the previous year, when these teams secured 27.4% of all investment. All-male founded companies took the lion's share of funds in 2022, accounting for 96.2% of total investment; however, this is skewed by one large deal.





Distributed systems: investment by gender

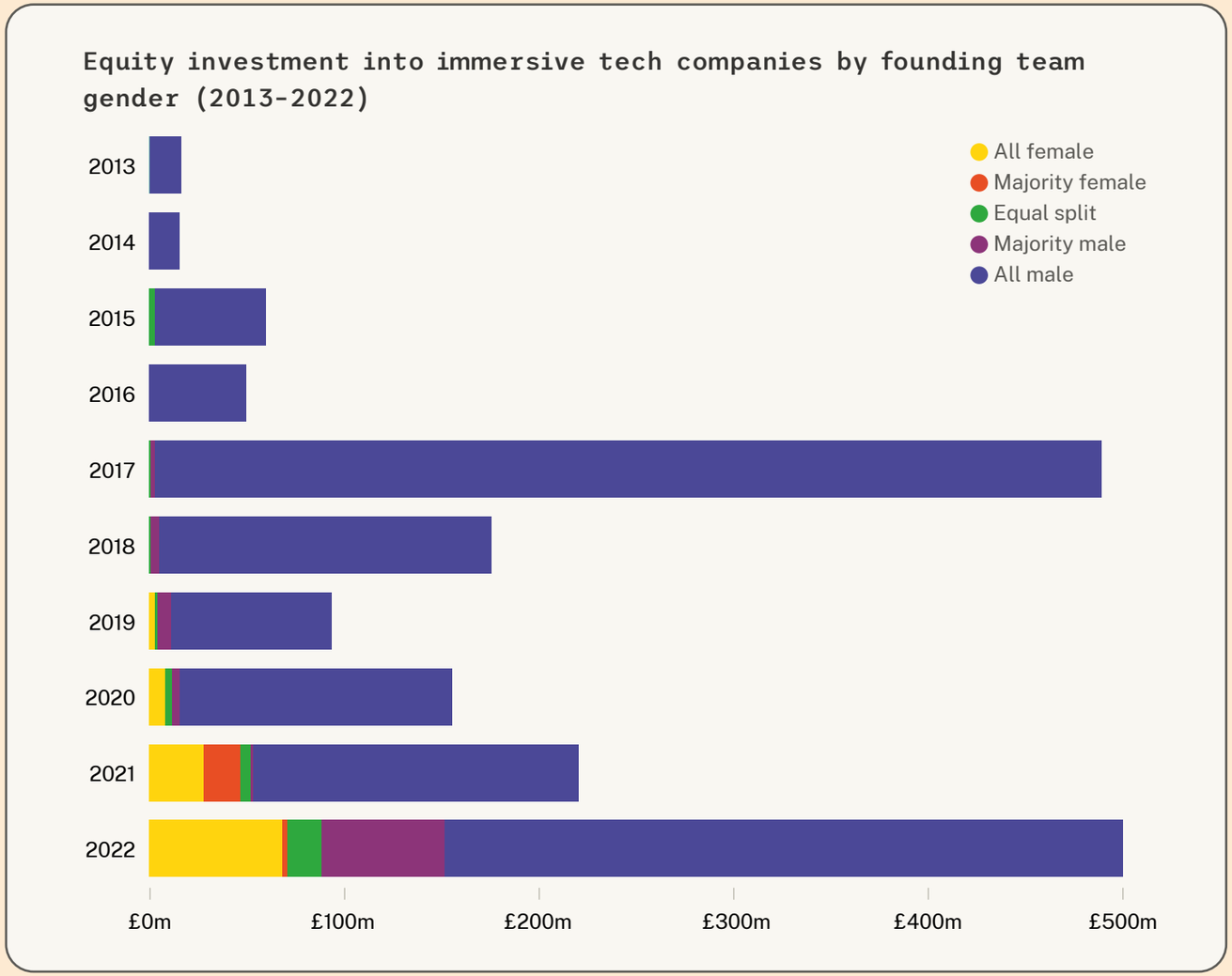
In 2022, all-male founded companies received 93.2% of equity investment in distributed systems. Mixed-gender teams accounted for 6.06% of the total equity raised, while all-female founded companies secured less than 1%. This aligns with the distribution of teams in the base population: companies with all-male founding teams represent 84.4% of the active population compared to 11.1% for mixed-gender teams and 4.53% for all-female founding teams.

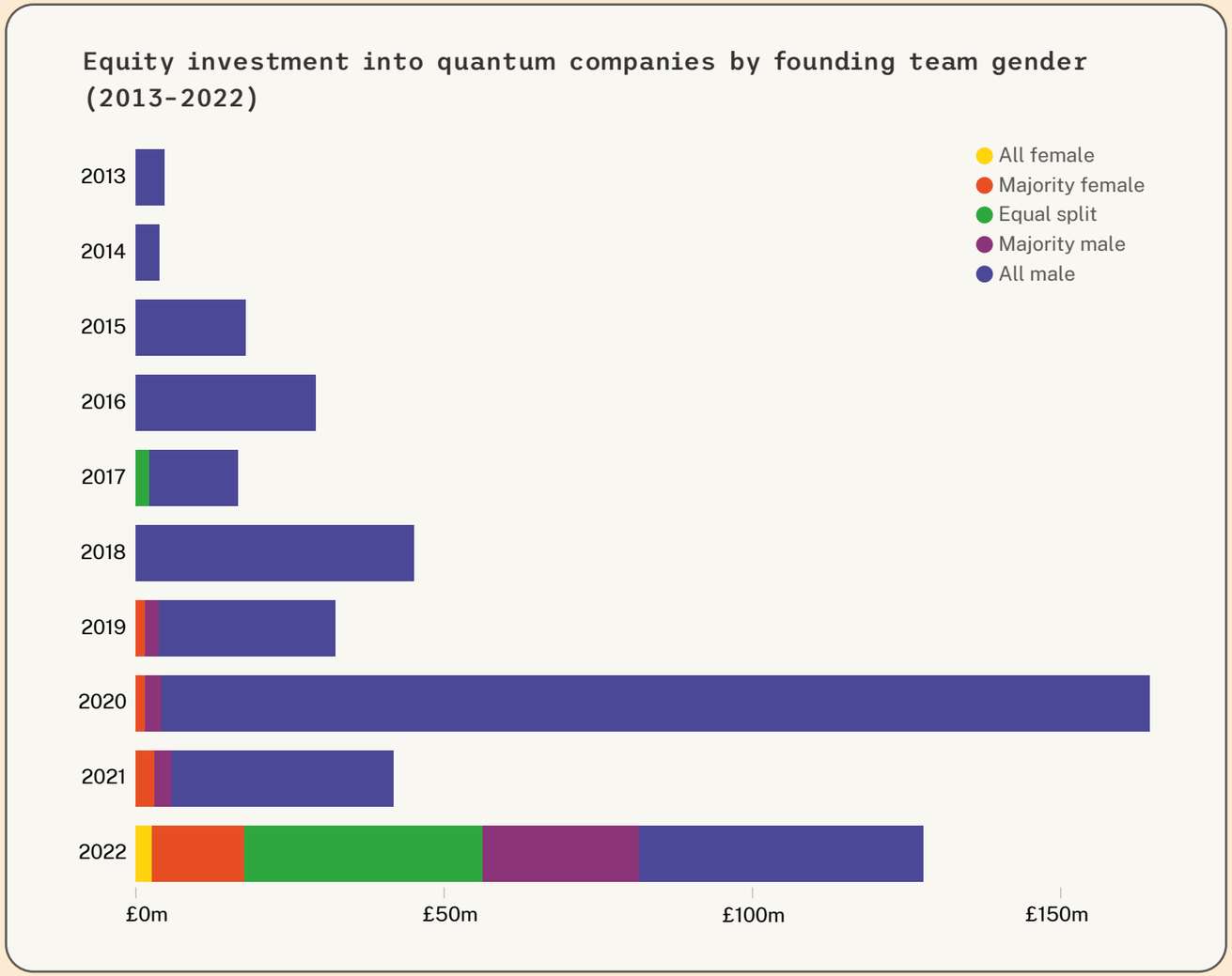
This pattern of investment is mirrored across the decade with all-male founded companies receiving 94.8% (£3.09b) of the £3.26b total investment from 2013 to 2022. Companies with mixed-gender teams secured 4.00% (£130m), despite the lack of deals during 2013–2015, while all-female founded companies secured under 1.00%.

Immersive tech: investment by gender

Between 2013 and 2022, all male-founded immersive tech companies garnered £1.53b (86.3%) in equity finance in comparison to mixed gender teams which secured £135m (7.62%) and all-female founded teams which secured £108m (6.08%). All-female founded companies account for 11.0% of the total immersive tech population, compared to 12.5% for mixed-gender teams and 76.5% for all-male teams.

The investment gap in immersive technology is showing some signs of narrowing, particularly in 2022. All-female founded companies secured 13.7% of total funding during the year, whereas all-male founded teams secured 69.7%. Notably, mixed-gender teams secured an all-time high of £83.0m (16.6%) of equity funding. However, one large deal in 2022 plays a significant role in the overall total raised by all-female founded companies.





Quantum: investment by gender

All-male founding teams have historically attracted the most investment in the quantum computing sector, receiving £379m (79.9%) over the past decade. However, in 2022 these companies secured £45.2m (36.1%), while mixed-gender founding teams secured £77.5m, or 61.9% of total funding during the year. Meanwhile, all-female founding teams secured only £2.58m, or 2.06% of the funding in 2022.

Similar to the other tech areas, all-male founded companies constitute 80.9% of the active quantum population, with mixed-gender and all-female founded companies represent 14.7% and 4.41%, respectively.

UKBAA
UK Business Angels Association

“For many of these women founders, there remain key challenges and barriers to attracting investment.

Ecosystem spotlight

Jenny Tooth

Executive Chair of the UK Business Angels Association

I would like to begin by thanking Digital Catapult and Beauhurst for this report, bringing very valuable new insights on investment in diverse founders in advanced digital technology. We recognise the important contribution that innovating women founders who are drawing on the advances in key technologies are making in areas such as artificial intelligence and machine learning, future networks, distributed systems, immersive technologies and quantum computing to bring vital new solutions to many of our core challenges. Yet it is clear from this new report that for many of these women founders, there remain key challenges and barriers to attracting the investment they need to successfully build and scale their businesses.

This new comparative data enables us to better understand how women in the different areas of advanced digital technology are progressing in terms of access to investment. It is notable that in both future networks and distributed systems all male teams continue to attract the lion’s share of investment, with only a slightly better picture in AI and ML. The data shows that women are participating at a very low level in most of these areas. This will automatically result in a far smaller proportion of women founders in the deal pipeline, which directly impacts the number of women going forward to achieve investment.

It is also significant that the gap between levels of investment in all male teams compared with women founders in most of these digital tech sectors has hardly changed over the 10 years reviewed in this report. Any improvements are mainly in mixed gender teams. However, it is good to see that there has been an improvement in immersive tech where all women teams are showing a greater strength in securing

“We need to all work together to redress this gender imbalance in access to investment, enabling many more of these innovating women founders to access the investment they need.

Ecosystem spotlight (cont.)

Jenny Tooth

Executive Chair of the UK Business Angels Association

investment. Quantum meanwhile, perhaps one of the most challenging areas for investors, has proved to be a more successful area for women founders in mixed teams attracting investment, with male founders attracting significantly less. However, the data shows unfortunately, the needle has hardly moved for all female digital technology teams who are continuing to face the greatest challenges, attracting minimal levels of investment in some areas such as future networks and distributed systems, although a more positive picture for all female teams is seen in immersive.

We also recognise at UKBAA that these challenges in access to investment for women founders in digital technology has a clear correlation with the lack of women investors across the UK, especially those with technology backgrounds. This situation was underlined in the data gathered by Beauhurst with UKBBA on Female Angels in 2022, which identified that only 14%, 5,000 of the total 37,800 angels identified in the UK, are women angels and that women investors have a significantly higher proportion of women founders in their portfolio than their male colleagues. That is why we have formed the Women Angel Investment Task Force and the Women Backing Women campaign to focus actions on empowering many more women across the UK to become Angel investors.

We very much support the valuable work that Digital Catapult is doing to boost the growth and investment potential of diverse founders in advanced digital technology. We need to all work together to redress this gender imbalance in access to investment, enabling many more of these innovating women founders to access the investment they need to achieve their growth ambitions.

Age

The median age of founders at company incorporation does appear to play an important role in how equity investment is distributed across the five technology areas, with the majority of funding going to companies with more mid-career founder ages at incorporation. This roughly reflects that the majority of companies in the current high-growth population are focused in the mid-career brackets, though with some exceptions in areas such as AI and ML and quantum computing.

Key findings:

- AI and ML companies with founders aged 40-49 and 50-59 attracted the most investments, with younger founders aged 20-29 showing significant growth in investments from 2019 to 2022, culminating in over £512m in 2022, despite representing only 5.85% of the active population

- In the future networks digital technology area, companies with founders aged 40-49 and 50-59 secured the most substantial investments, while those aged 20-29 struggled to secure significant funding, representing only 2.66% of the total active population

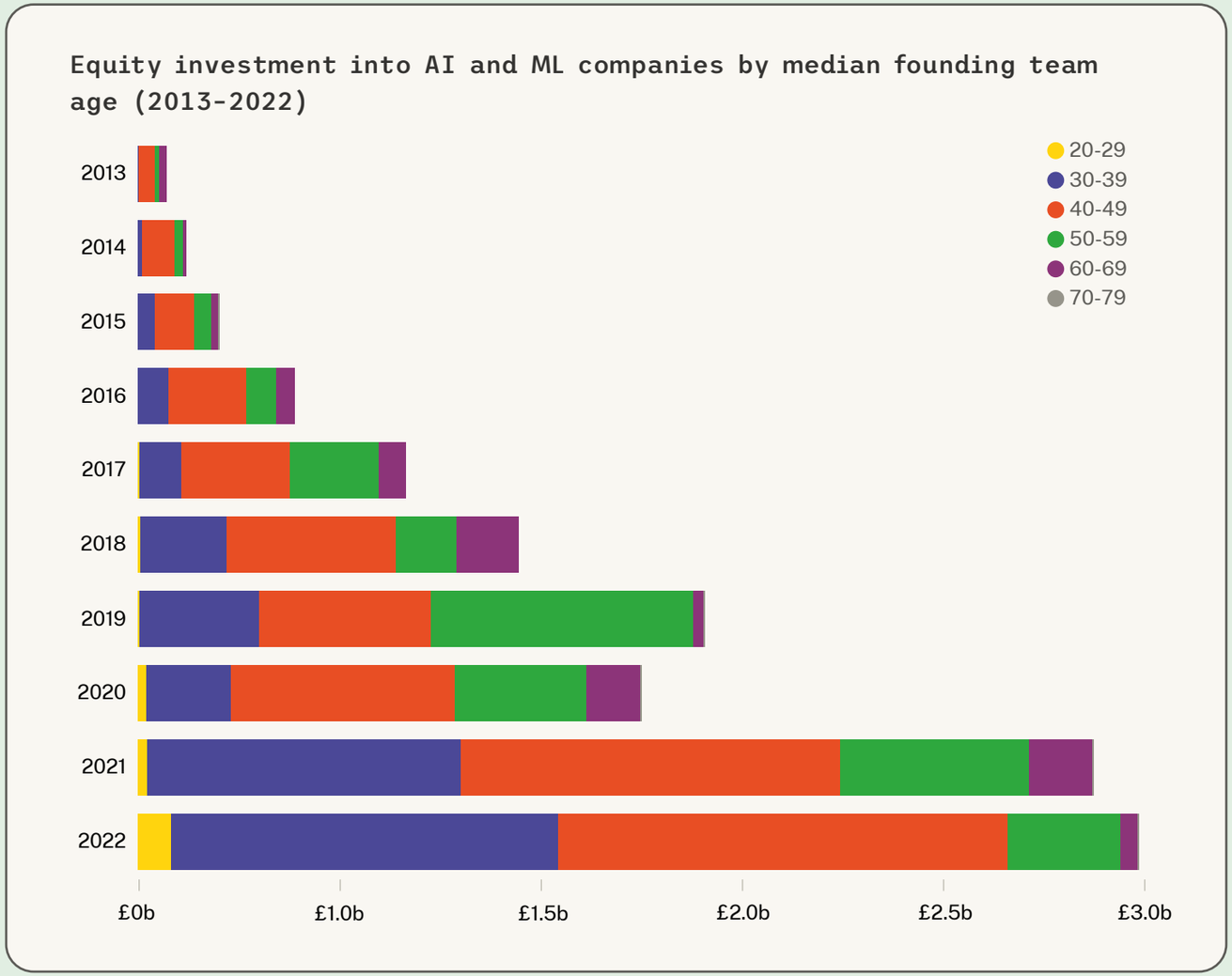
- Distributed systems investments were concentrated around companies with a median founder age of 30-49, with the 60-69 age group securing a noteworthy share of investments (6.02%), despite representing only 2.58% of the active population

- In the quantum computing tech area, founders aged 40-49 raised a record-breaking £55.2m in 2022 (43.5% of the total), followed closely by the 30-39 age group, securing £50.3m (39.7% of the total investments). This marks a shift in investment landscape dynamics toward companies with lower median founder ages at incorporation

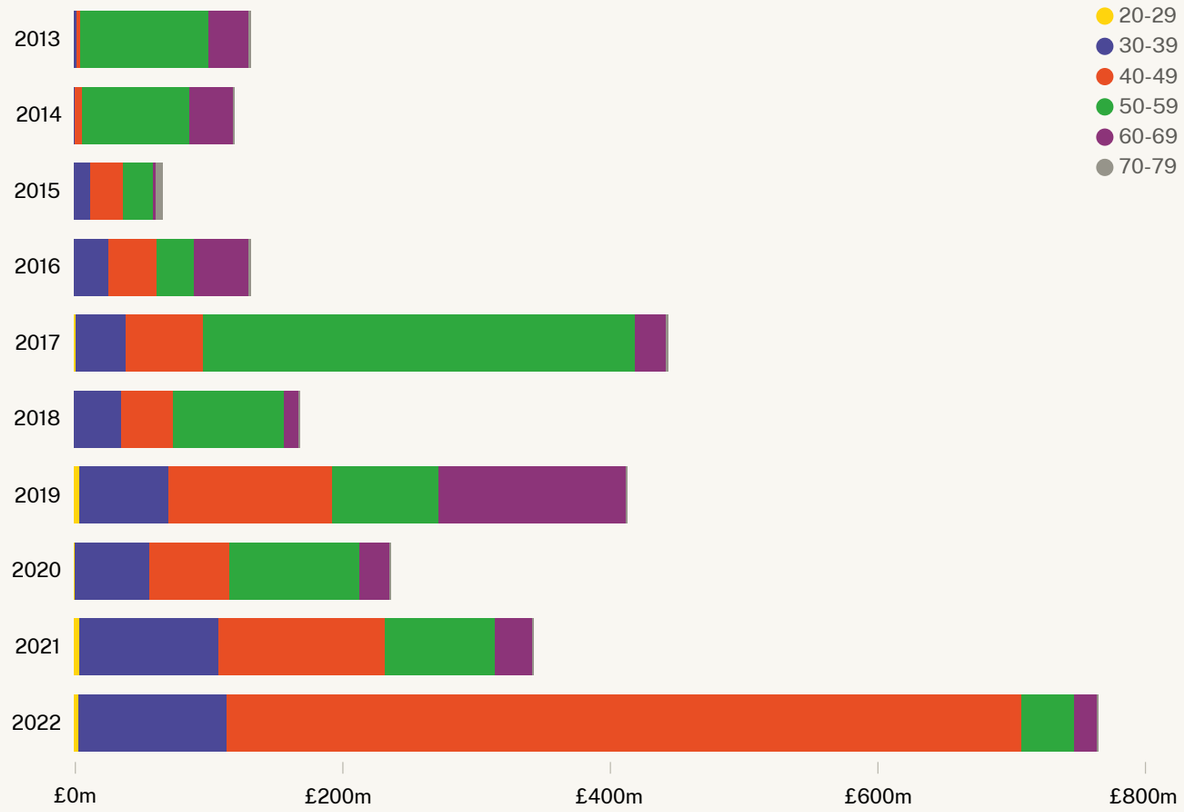
AI and ML: investment by age

It is evident that AI and ML companies with median founder ages in the 40-49 and 50-59 brackets attracted the most substantial investments, demonstrating the value of experience in securing funding. The 50-59 age group has consistently received the highest amounts, peaking in 2021 with over £358m. Similarly, the 40-49 age bracket saw a remarkable increase in investments, reaching over £635m in 2021. These two groups also account for high proportions of the current active population in the tech area. Companies falling into the 40-49 category make up 34.0% of the active population and those in the 50-59 bracket account for 22.5% of companies.

Younger founders, aged 20-29, have shown significant growth in attracting investments, with a notable surge in 2019-2022, culminating in over £512m in 2022. This suggests that younger entrepreneurs are increasingly able to convince investors of their potential in the AI and ML technology area, despite only accounting for 5.85% of the currently active population of AI and ML companies.



Equity investment into future networks companies by median founding team age (2013-2022)



Future networks: investment by age

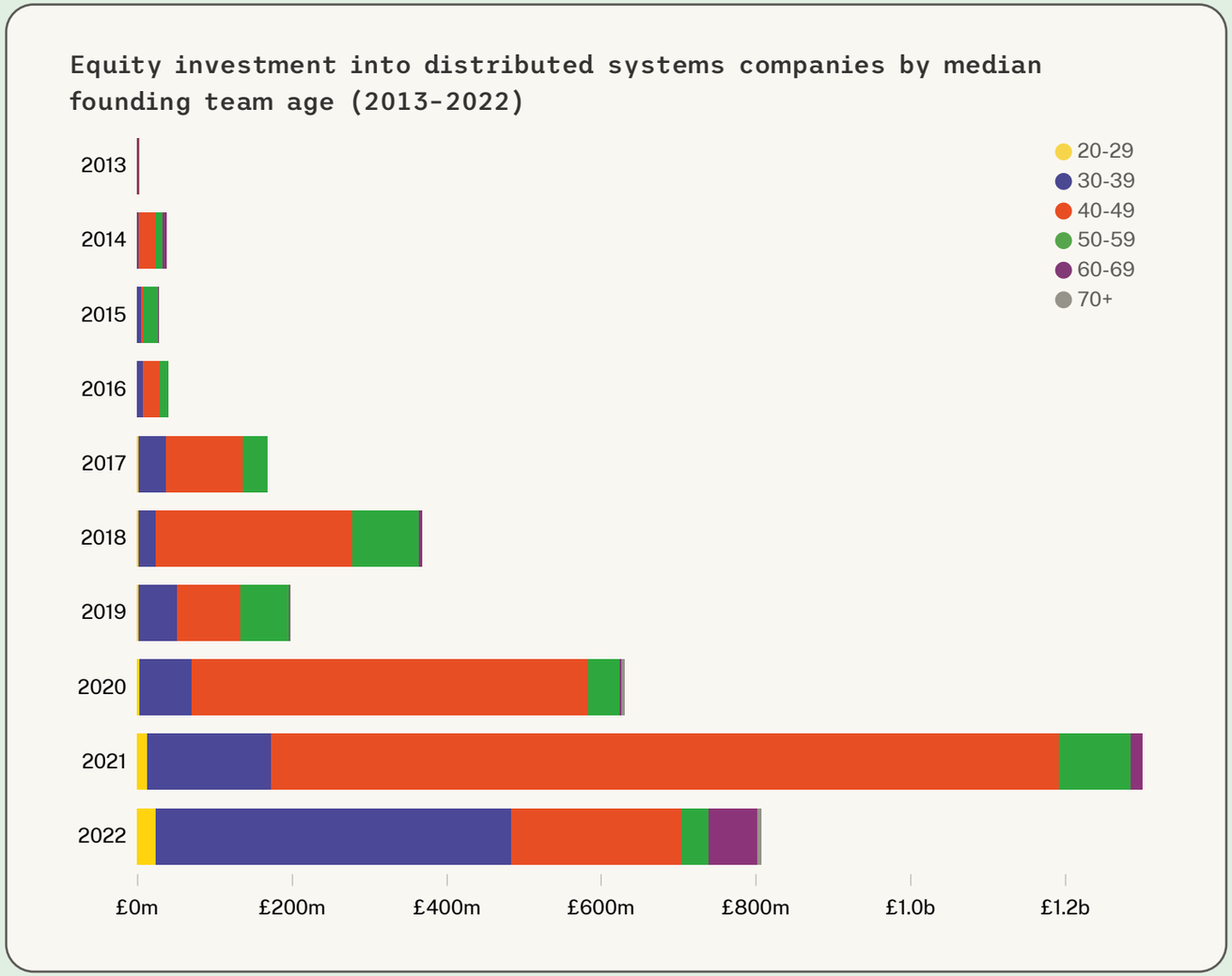
Companies with founders aged 40-49 and 50-59 at incorporation received the highest investments, potentially reflecting the significance of experience in obtaining funds. In 2017, £315m was invested in the 50-59 age group, while £579m (77.8% of the total) was invested in the 40-49 age group in 2022.

Younger founders (20-29 age group) struggled to secure substantial investments compared to older counterparts. The highest investment in this age group was £4.3m in 2019. In the previous year, they secured £3.11m, less than 1% of the total investment. Furthermore, younger founders are underrepresented in the active population. Companies in the 20-29 age group represent only 2.66% of all active companies, while those in the 40-49 and 50-59 age groups account for 29.7% and 33.0%, respectively.

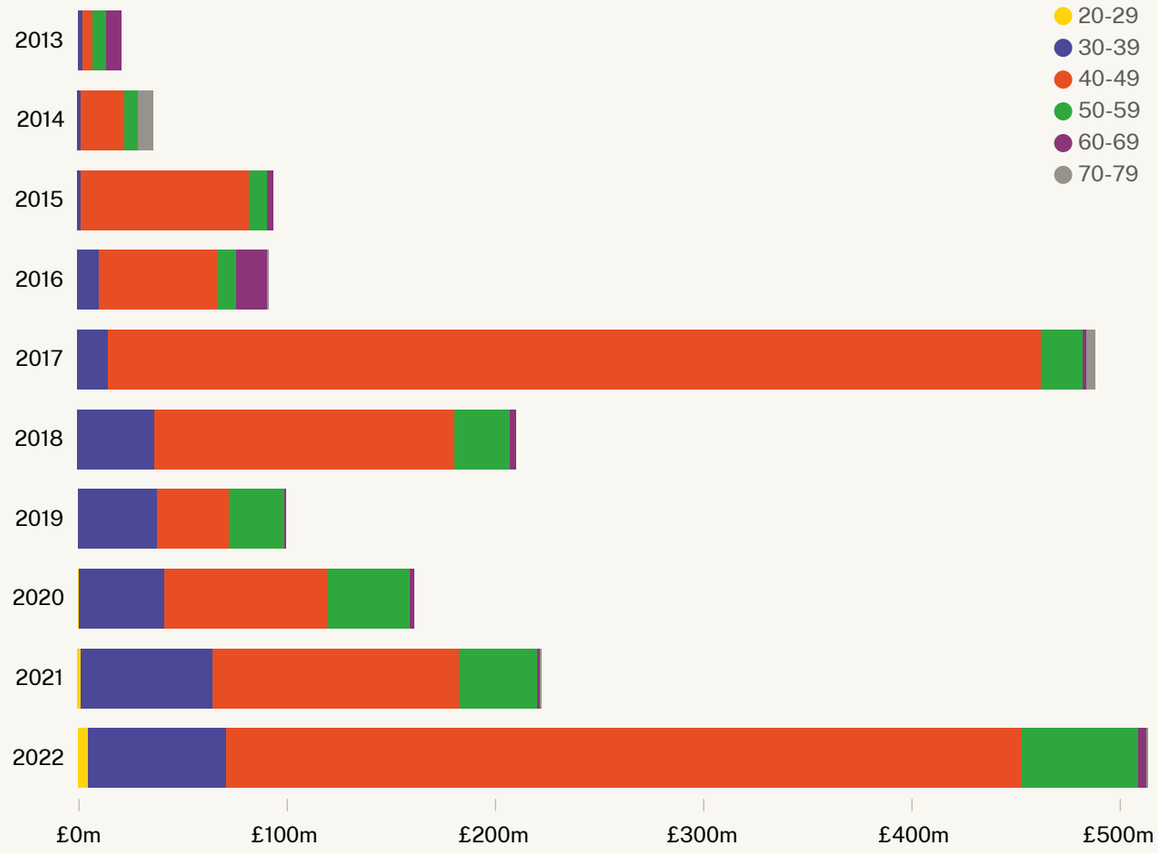
Distributed systems: investment by age

In 2022, distributed systems companies secured notable equity investments across diverse founder age groups. Companies with founders aged 30-39 received the largest share, £459m (43.3%), followed by those aged 40-49 with £221m (20.9%). Founders aged 50-59 and 60-69 secured £34.5m (3.26%) and £63.6m (6.02%), while the youngest (20-29) and oldest (70+) brackets got £24.2m (2.29%) and £4.61m (0.44%).

Though comprising only 2.58% of active companies, the 60-69 group secured a significant investment share, possibly due to founder experience. In contrast, the 20-29 group, representing 7.45% of active companies, received a lower investment share, potentially reflecting their limited experience. The majority of investments centered around companies with median founder ages of 30-49, with other age groups achieving varying degrees of funding success.



Equity investment into immersive tech companies by median founding team age (2013-2022)



Immersive tech: investment by age

During 2022, the largest share of investment in immersive tech was secured by companies with founders aged 40-49 which secured £381.8m (68.5% of the annual total). This was followed by the 30-39 bracket, obtaining £65.8m (11.8%). Companies with founders aged 50-59 and 20-29 at incorporation received £55.6m (10.0%) and £5.18m (0.93%) respectively, while the 60-69 and 70+ age groups attracted £3.92m (0.70%) and £306k (0.05%) respectively.

Despite accounting for 6.83% of the active immersive tech company population, companies in the 60-69 bracket secured a relatively lower share of investments, potentially indicating challenges faced by companies in this group in attracting funding. Conversely, companies led by founders aged 20-29, representing 5.19% of the active immersive tech population, secured a disproportionately lower share of investments, possibly due to the limited experience of their founders. Overall, the majority of equity investments were concentrated around companies in the 40-49 bracket.

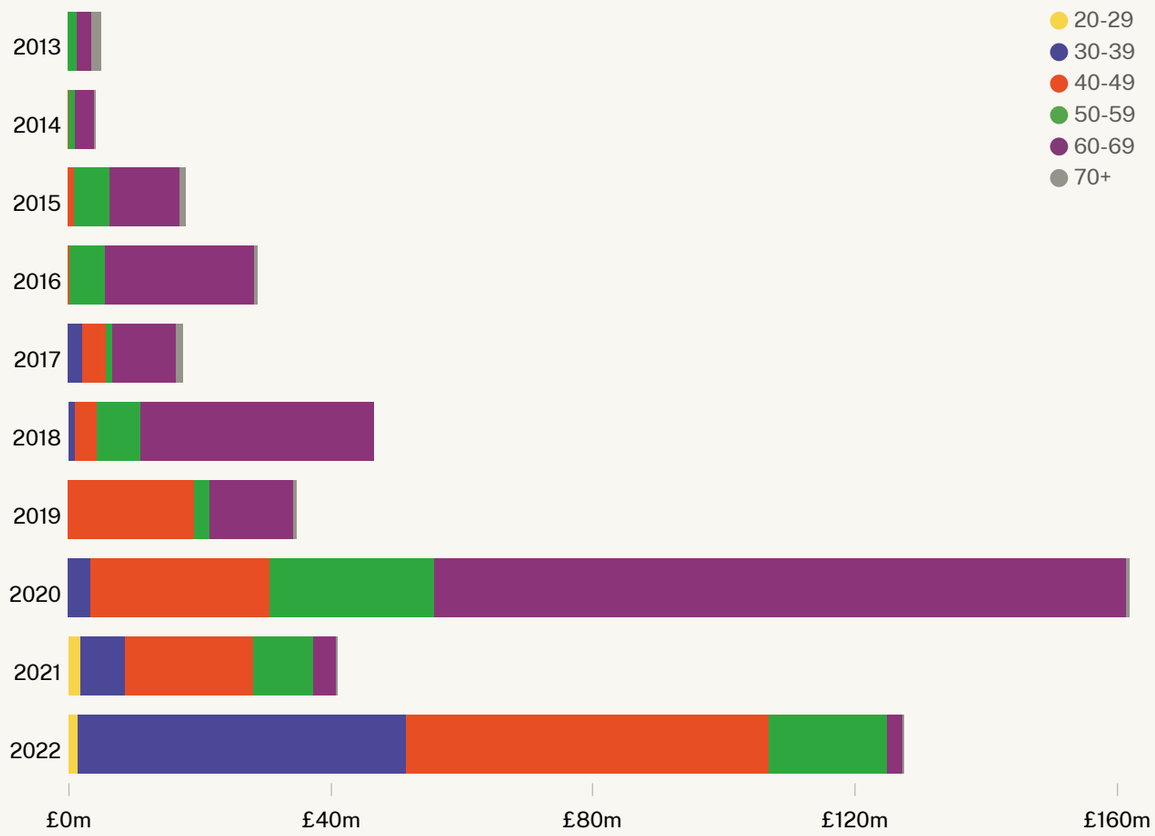
Quantum: investment by age

Over the past four years, there has been a notable increase in investments in companies in the 40-49 age group of founders in the quantum computing tech area. In 2022, this age group raised a record £55.2m, marking a shift in the investment landscape dynamics as they took the lead in attracting funding.

In the same year, quantum computing companies with founders aged 30-39 followed closely, securing £50.3m (39.7% of the total investments). The 50-59 age group attracted £18.1m (14.2%), while those in the 60-69 and 20-29 age groups raised £2.23m (1.8%) and £1.41m (1.1%), respectively. The 70+ age group secured the smallest amount of investment, at only £88.3k.

Interestingly, despite making up 16.4% of the active quantum company population, companies with founders aged 60-69 received a disproportionately low share of investments. In contrast, the 30-39 age group, which accounted for 21.9% of the active population, attracted a higher proportion of investment.

Equity investment into quantum companies by median founding team age (2013-2022)



Ethnicity

Equity investment in five technology areas across the past decade revealed varying funding distribution based on the founding team's ethnicity. While some tech areas showed reasonable access to funding for ethnically diverse teams, others saw a more significant discrepancy in investment allocation.

Key findings:

- AI and ML companies with at least one Asian founder secured a record £708m in 2022, while those with a Black founder secured £44.8m or 1.83% of equity investment for that year
- Companies with a Black founder in distributed systems raised £7.51m in 2022 the second highest amount recorded following a peak of £11.2m in 2018
- Asian founders in immersive technologies secured £325m, comprising 63.9% of total investment in 2022. They garnered the largest proportion of investment among companies with Asian founders across all five digital technology areas that year
- Quantum companies with at least one Asian founder secured £8.45m (7.47%) in 2022, while companies with a Black founder obtained less than 0.1% of the annual total
- Future networks companies with an Asian founder secured £17.0m, or 2.33%, of equity investment in 2022, while those with a Black founder secured £60.1k (less than 0.01% of total investment)

Ethnicity data methodology

The founder ethnicity data in this report has been generated using the Onomap software tool, which classifies individuals' names into a category called the 2001 Census Ethnic Group, which aligns with the UK 2001 Census Ethnicity Classification. Onomap combines multidimensional facets of ethnicity, such as language, religion, geographical region, and culture, as contained in people's names. It was used to assign each of the founders to one of the 12 2001 Census Ethnic Groups. There is more information available about Onomap on its website: Onomap.org.

The analysis in this section of the report is focused on the equity investment going to companies with Asian or Black founders. In this context, Asian refers to founders with Asian or Asian British ethnicities using the 2001 Census Ethnic Groups:

- Asian or Asian British – Indian
- Asian or Asian British – Pakistani
- Asian or Asian British – Bangladeshi
- Asian or Asian British – any other Asian Background

Any company with one or more founders with any of the listed ethnicities has been classified as Asian. As per the UK 2001 Census Ethnicity Classification, founders with Chinese ethnicity have not been included in this classification.

Similarly, in this chapter, Black refers to founders with Black or Black British ethnicities using the 2001 Census Ethnic Groups:

- Black or Black British – African
- Black or Black British – Caribbean

Any company with one or more founders with any of the listed ethnicities has been classified as Black.

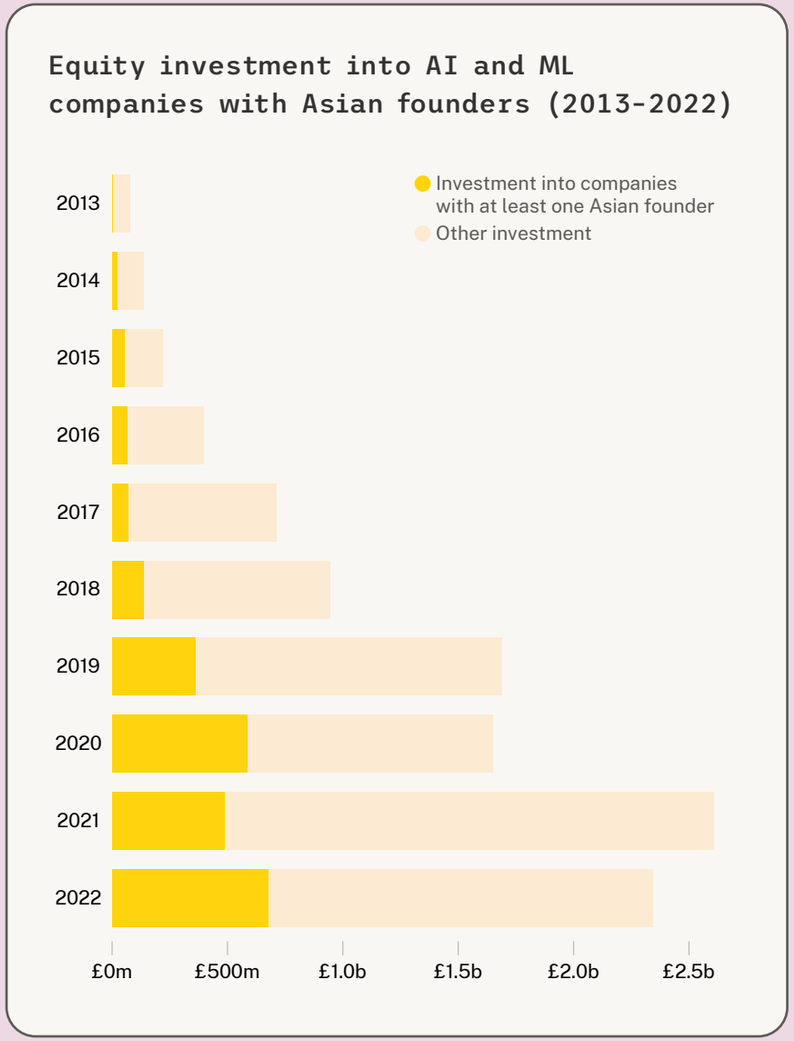
Where a company has a founder with an unknown ethnicity (where Onomap was unable to classify the individual), the company has been excluded from the analysis. Companies, where a founder cannot be identified (i.e. a company that has no individual with the title "founder" or "owner") have also been excluded.

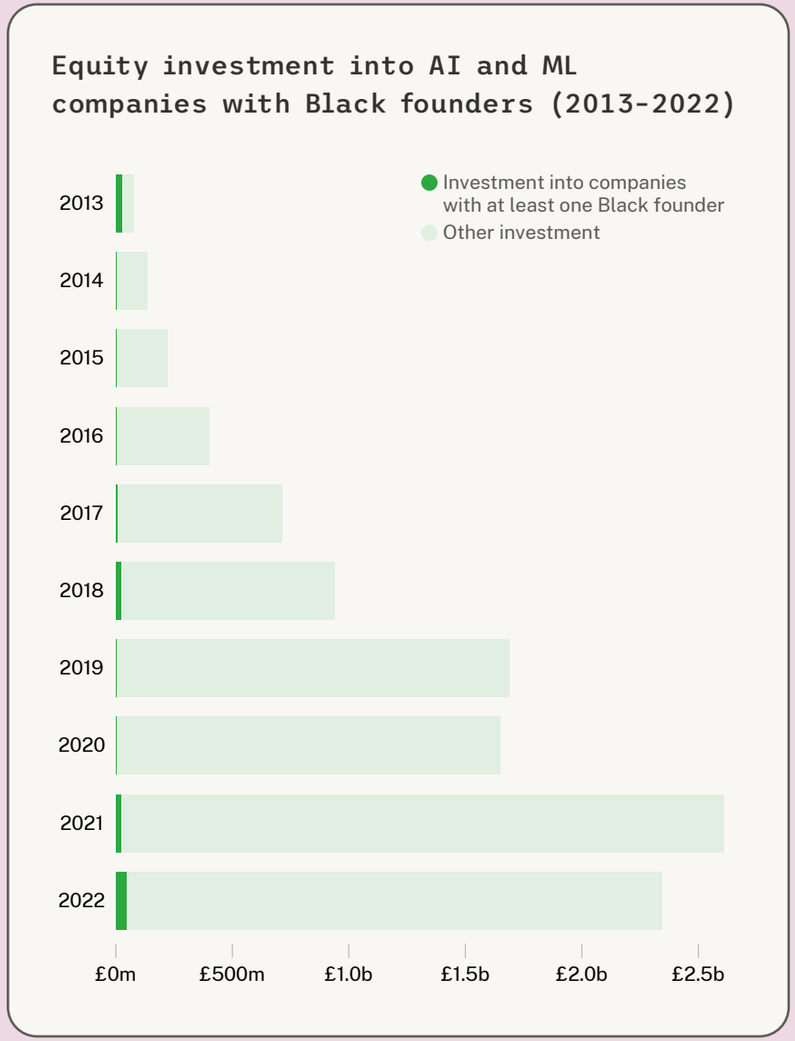
2001 Census Ethnic Groups (from Onomap)
Asian or Asian British – any other Asian Background
Asian or Asian British – Bangladeshi
Asian or Asian British – Indian
Asian or Asian British – Pakistani
Black or Black British – African
Black or Black British – Caribbean
Other Ethnic Groups – any other ethnic group
Other Ethnic Groups – Chinese
Unclassified
White – any other white background
White – British
White – Irish

AI and ML: investment by ethnicity

AI and ML companies with an Asian founder account for 17.3% of the active population. These companies raised £708m or 29.0% of total funding in 2022. Investment in AI and ML has increased notably over the years, as has the proportion of funding received by companies with an Asian founder. From 2018 to 2020, the proportion of investment secured by companies with at least one Asian founder increased from 14.9% to 35.5%.

Our methodology estimates that AI and ML companies with a Black founder account for 2.32% of the population. These companies secured £44.8m or 1.83% of total investment in 2022; around half can be attributed to a single deal.

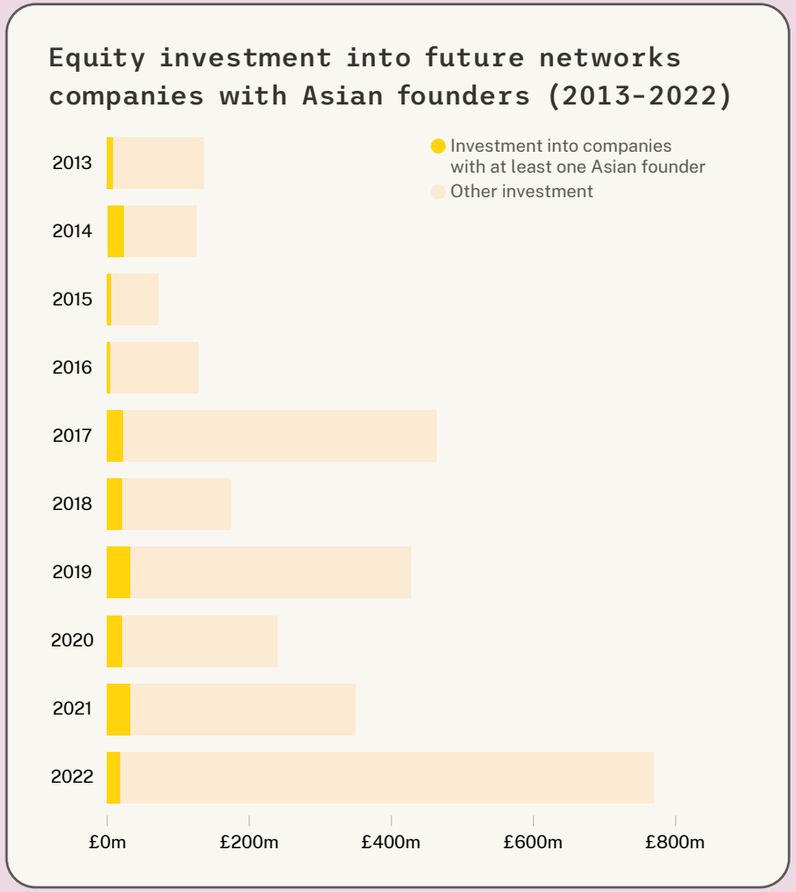


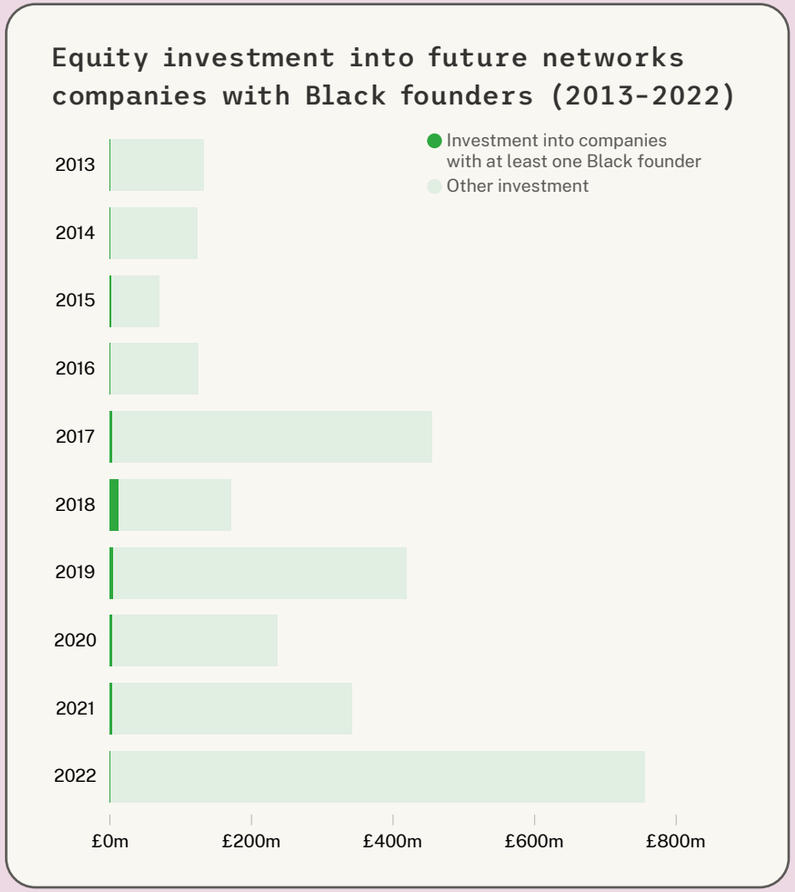


Future networks: investment by ethnicity

Companies with an Asian founder raised £17.0m or 2.33% of equity investment in 2022. Historically, these companies have averaged 9.16% of the total, aligning with the proportion of this group (10.6%) in the active population. The proportional decline in 2022 is due to a large deal by a company with no Asian founders. When this deal is excluded, companies with an Asian founder secured a similar proportion of equity investment by value to previous years.

Our methodology estimates that companies with a Black founder secured £60.1k or less than 0.01% of the total investment in 2022. This finding partially reflects the low proportion of companies (1.55%) in the technology area with a Black founder.

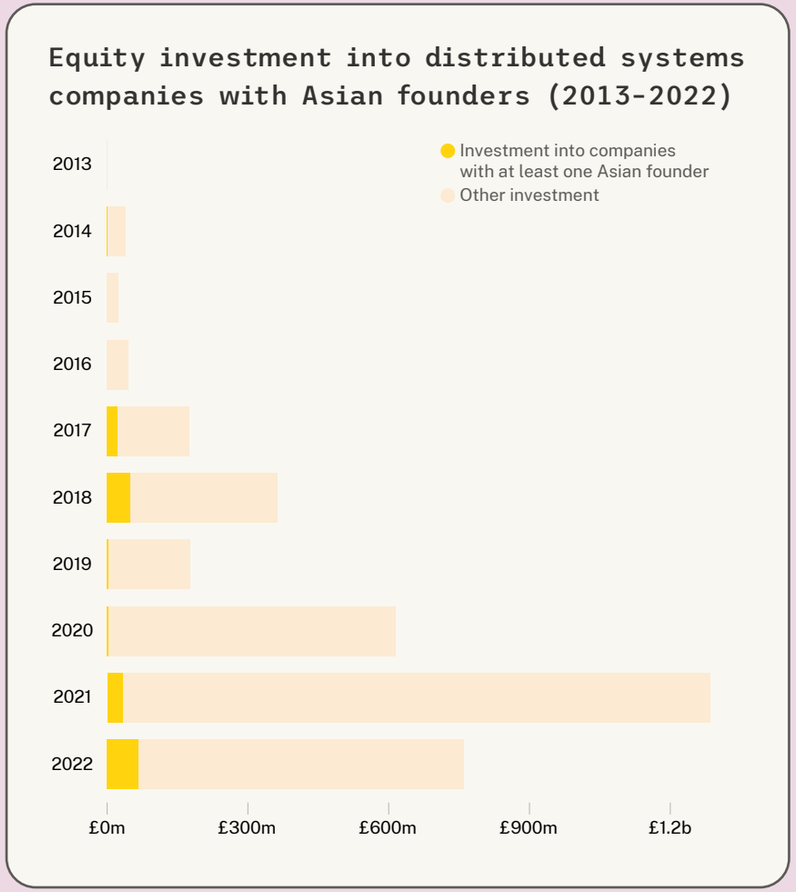


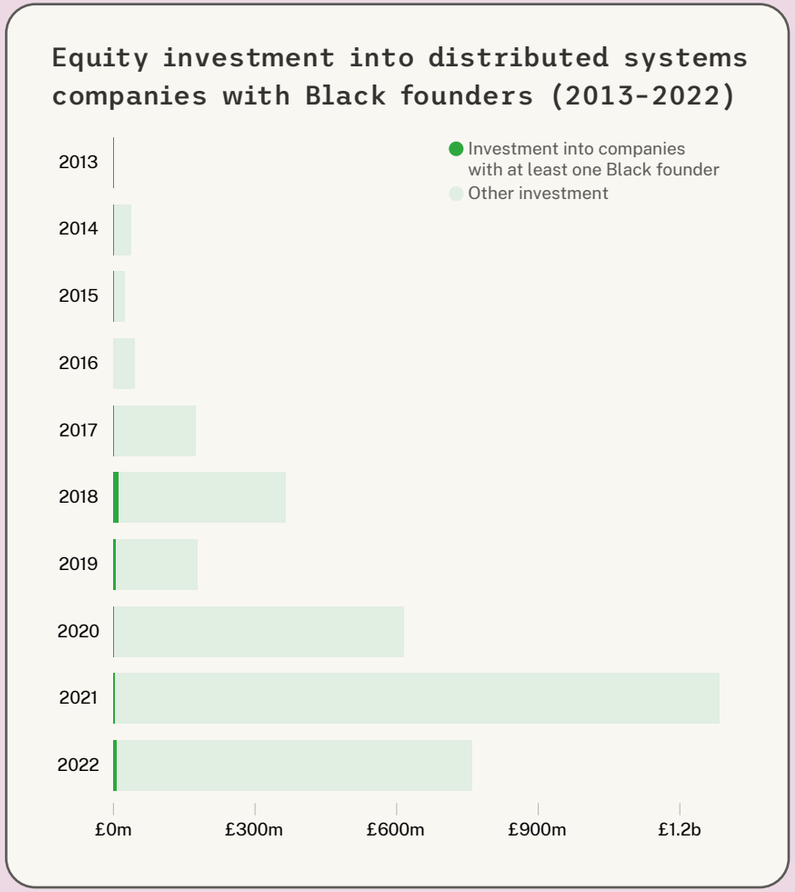


Distributed systems: investment by ethnicity

In 2022, distributed systems companies with at least one Asian founder only raised £67.0m, or 8.86% of total investment, despite comprising 16.0% of the active company population. Before 2017, there was little investment in teams with Asian founders. In 2018 investment surged to £49.8m, up from £23.3m the previous year. However, since 2018, the total proportion of investment received by these companies has remained low against increasing annual investment in the technology area.

Teams with a Black founder raised £7.51m in 2022, the second highest amount recorded following a peak of £11.2m in 2018. Over the last three years, distributed systems companies with a Black founder received less than 1.00% of total annual investment per year. The low investment figures partially reflect the low proportion (2.41%) of companies with a Black founder in the technology area.

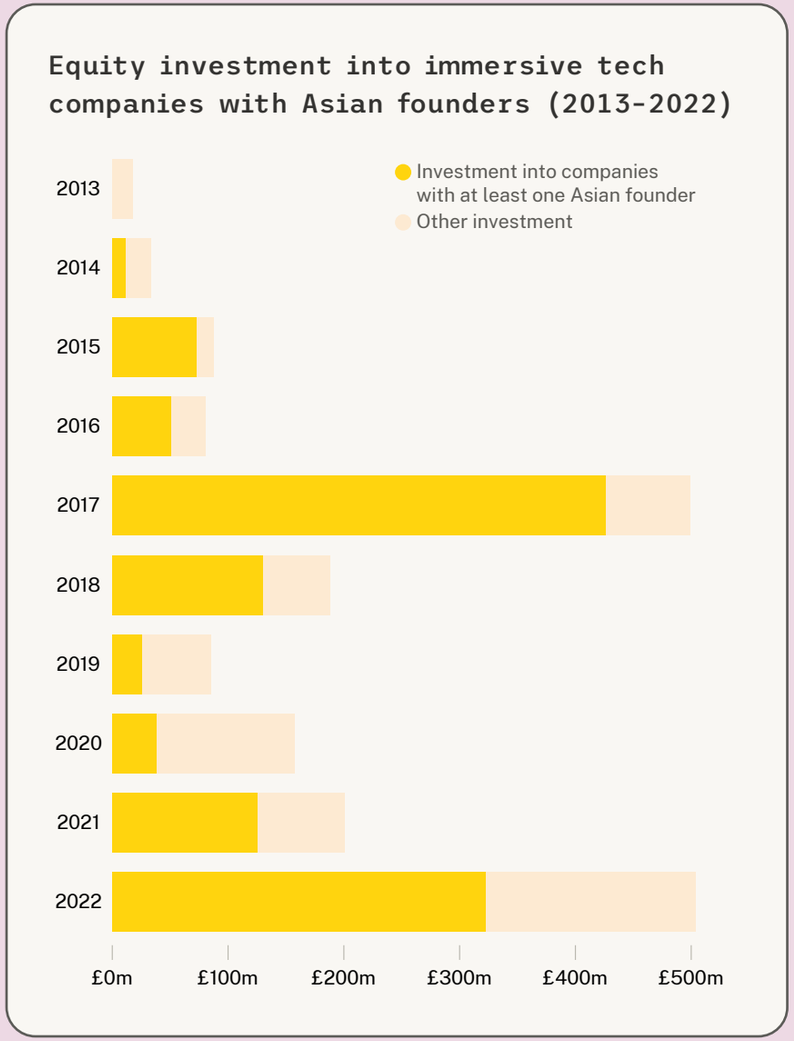


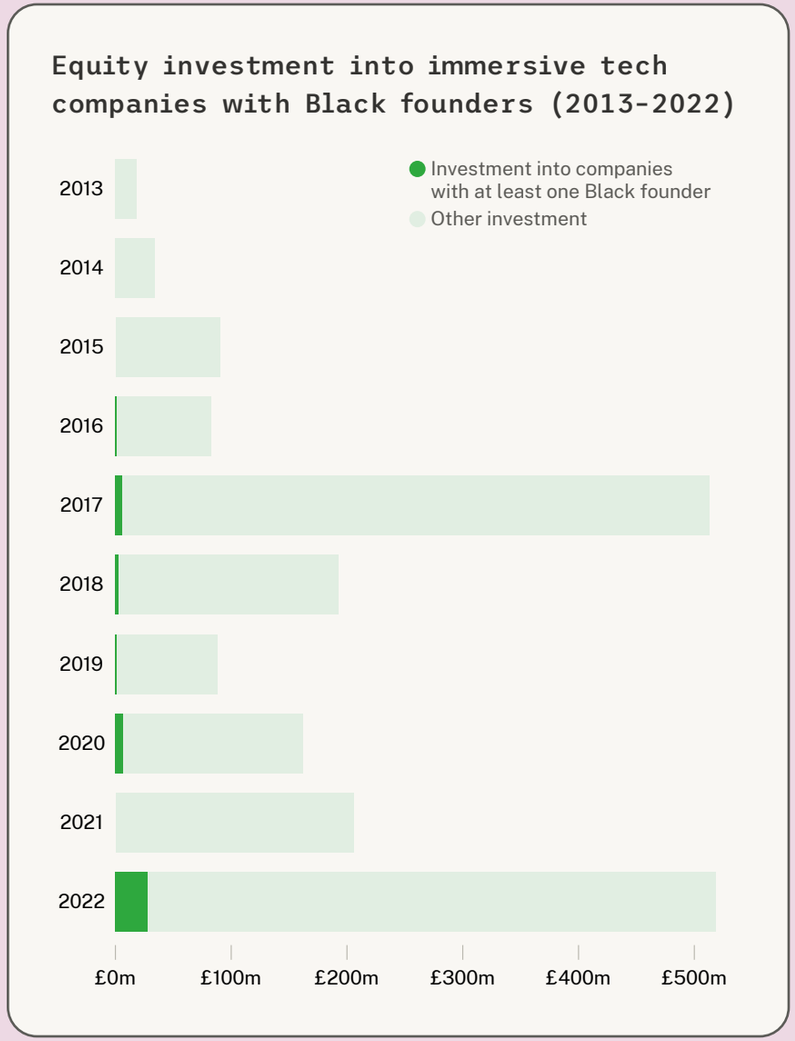


Immersive tech: investment by ethnicity

Immersive tech companies with an Asian founding team member secured £325m or 63.9% of investment in 2022, despite accounting for a small proportion (8.26%) of the total population. Investment in this group reached an all-time high of £429m or 85.4% in 2017. The significant funding received in 2017 is due to one large deal, while the high total in 2022 is due to two significant deals involving companies with Asian founders.

According to our methodology, companies with a Black founder account for 1.93% of the active company population. These companies raised an all-time high of £27.0m in 2022, representing 5.32% of annual investment. Over 90.0% of this total can be attributed to one significant deal.

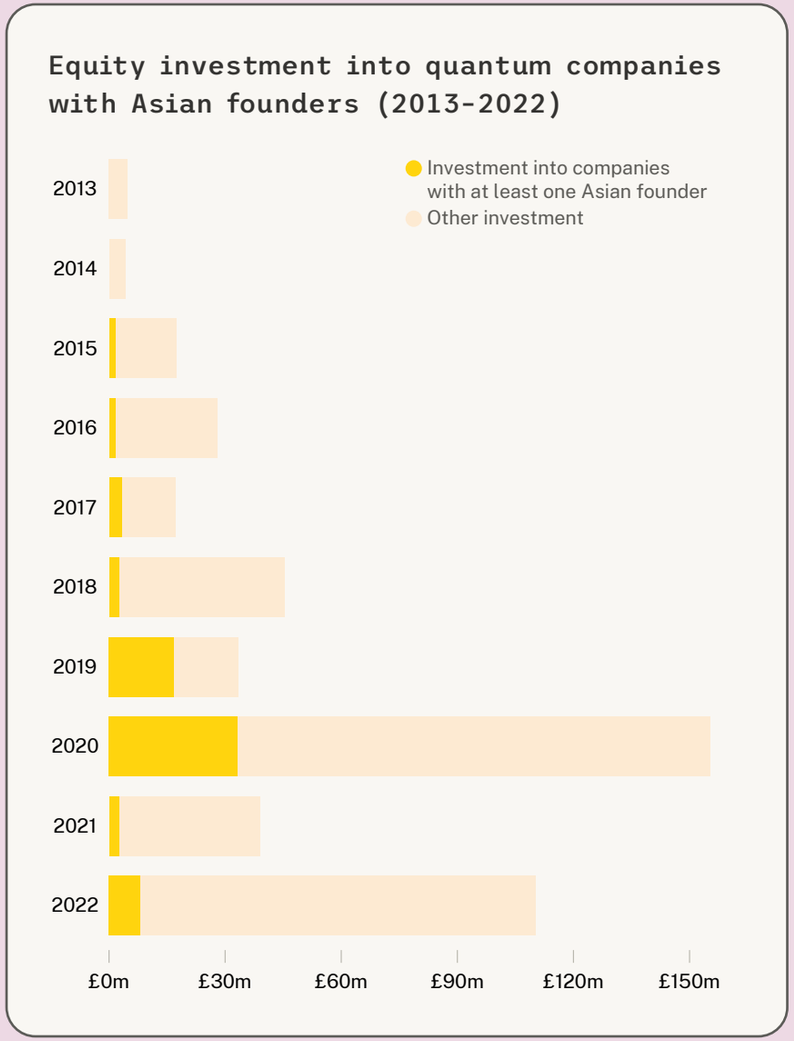


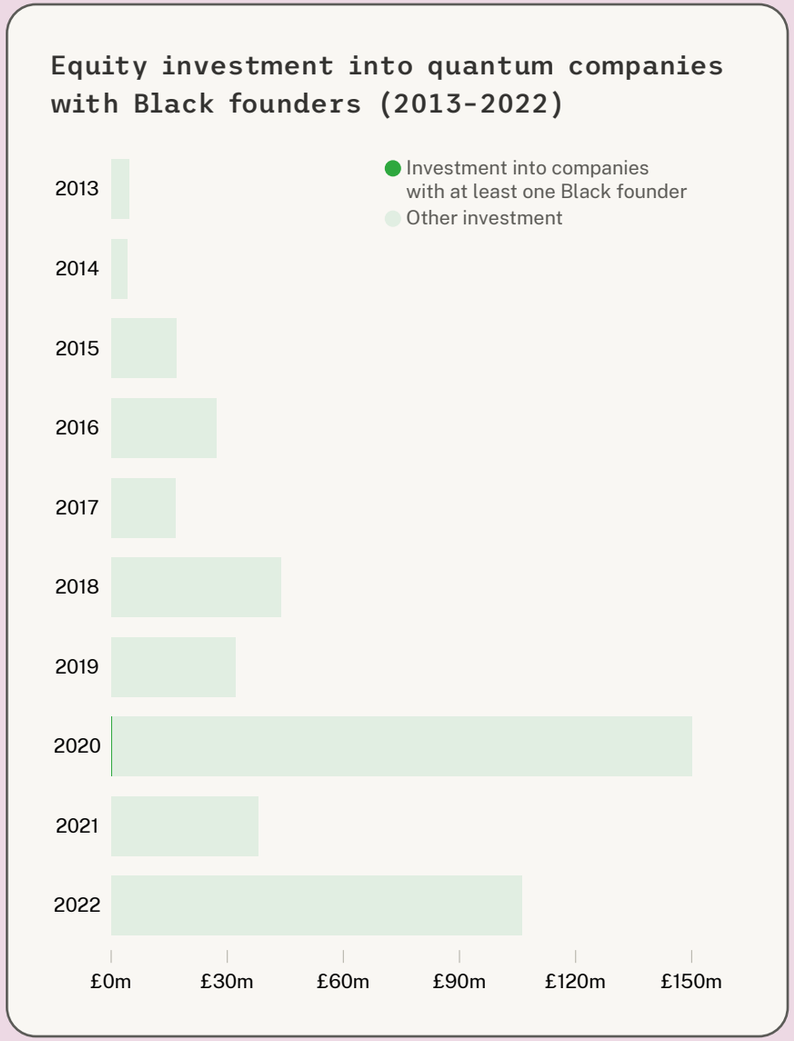


Quantum: investment by ethnicity

In 2022, quantum companies with an Asian founder raised £8.45m or 7.47% of total investment, aligning with the low percentage of these companies (4.35%) in the technology area. In 2019, however, this group received a high proportion of investment — constituting 50.9% of total investment via two deals.

Our methodology estimates that teams with a Black founder received less than 0.1% of the annual total in 2022. This finding aligns with the low proportion of companies in the area — companies with Black founders represent 2.90% of the active population. It also reflects the state of the tech area over the past decade, where companies with Black founders secured less than 0.01% of total investment.





MSDUK

> *It is analysis and reports like this that hopefully can lead to change.*

Ecosystem spotlight

Bao Tieu

Head of Business and Ventures at MSDUK

This is an insightful analysis to quantify ethnic founders in digital technologies and verify the funding of ethnic minority teams. It was interesting to see that even within different technology verticals that ethnic minorities fare better in some verticals than others. For Asian founders, progress is visible in AI and ML as well as immersive tech, whilst future networks and distributed systems have not moved the needle as much.

What is still of concern is the data confirms what is already known and that is Black founders have minimal representation when it comes to investment funding across the digital technology verticals. It is analysis and reports like this that hopefully can lead to change; to improve the representation of ethnic minorities securing funding can happen.

Ultimately, this analysis cannot identify the issues around why ethnic minorities face more challenges with raising investment funding. There does appear to be a correlation on education level and investment funding but the same, if not more so, could also be said for age of founder and investment funding, where almost all funding is over the age of 30.

MSDUK as an organisation that supports and works with ethnic minority businesses and startups, conducted our own research in our report Minority Business Matters. Its findings show Black people were three times more likely to start a business than White people but for some reason this does not necessarily translate into business success. We can speculate and hypothesize but more focused research is needed to understand why ethnic minorities still face funding challenges. Our own view from working with diverse businesses is that certain

> *Interventions such as dedicated investment funds for ethnic minorities and VC initiatives to get more diverse people into the industry are helping.*

Ecosystem spotlight (cont.)

Bao Tieu

Head of Business and Ventures at MSDUK

industries or business sectors have higher barriers to entry for diverse entrepreneurs, which may be reflected in this research report. In our membership, we have more businesses in certain industries and sectors than others as well. It will be through understanding why this is that we can develop better strategies or interventions to make more positive change.

Our own recommendations to support ethnic minority entrepreneurs identified tackling discrimination, creating better connections and improving self-confidence as important interventions. However, we also acknowledge factors such as culture, financial restrictions, lack of privileges and risk perception, as well as many others not listed, all contribute to the complicated situation ethnic minority entrepreneurs contend with on their startup journeys.

Specifically in raising investment, interventions such as dedicated investment funds for ethnic minorities and VC initiatives to get more diverse people into the industry are helping. However, it would be great to see more collaboration within the ecosystem to provide more targeted short, mid and long-term interventions across the range of factors mentioned.

Nationality

The majority of investment over the last decade has been concentrated in UK nationality founding teams. However, investment in mixed nationality founding teams has increased, particularly in AI and ML. For the first time, mixed founding teams in AI and ML secured more investment than UK nationality founding teams, accounting for £1.48b or 49.8% of total equity-backed investment in 2022. Similarly, investment in European nationality founding teams has increased steadily in distributed systems and immersive technologies.

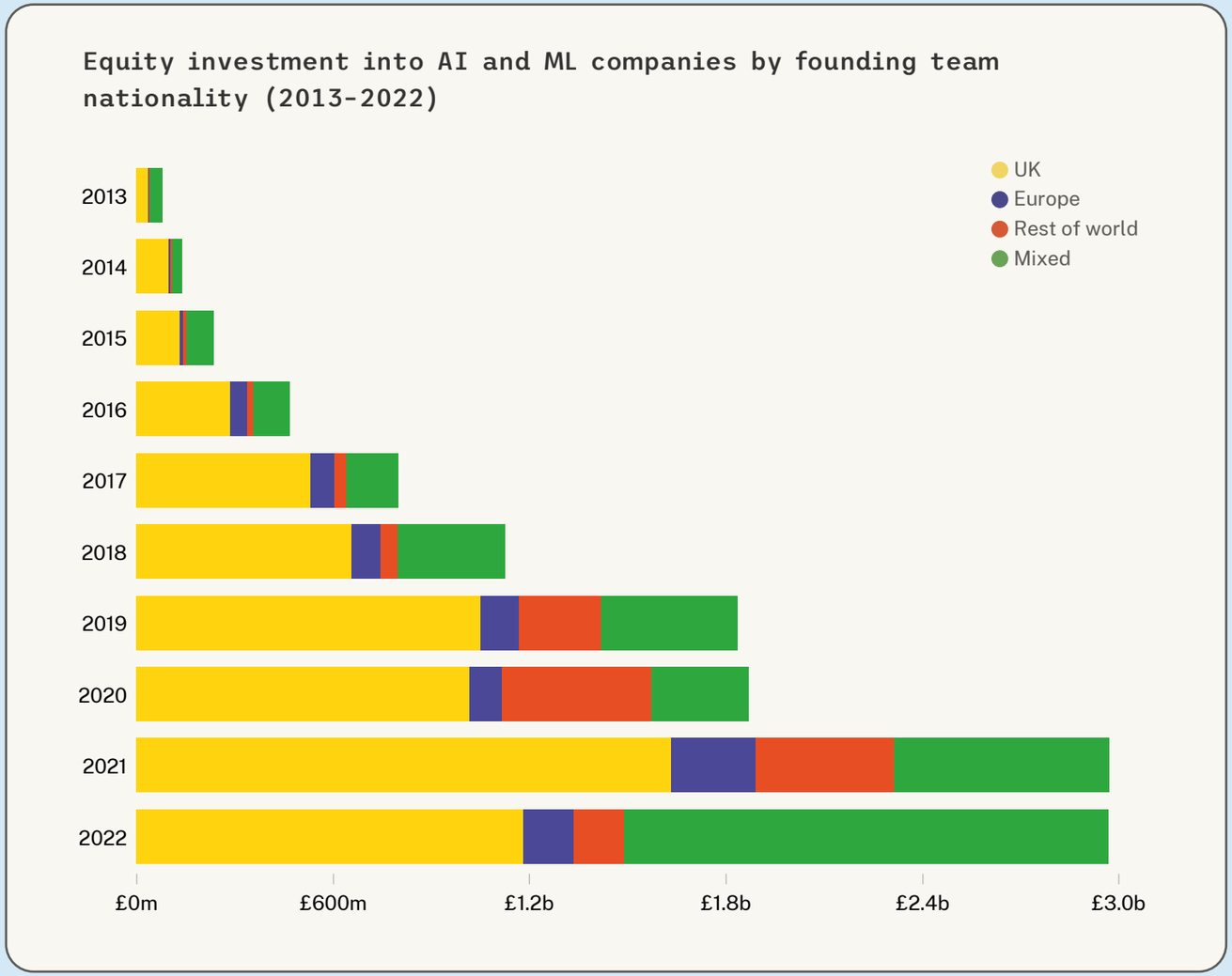
Key findings:

- UK nationality founding teams dominate the high-growth landscape and rank first in each technology area by number of companies
- Quantum companies with exclusively UK national founders secured £62m or 50% of total investment in 2022
- European nationality founders in future networks also performed well, securing a total of £517m (70% of the total) in finance in 2022 due to a large deal by SumUp
- Immersive technology companies with UK nationality teams secured over 63.1% of total investment in the area in 2022

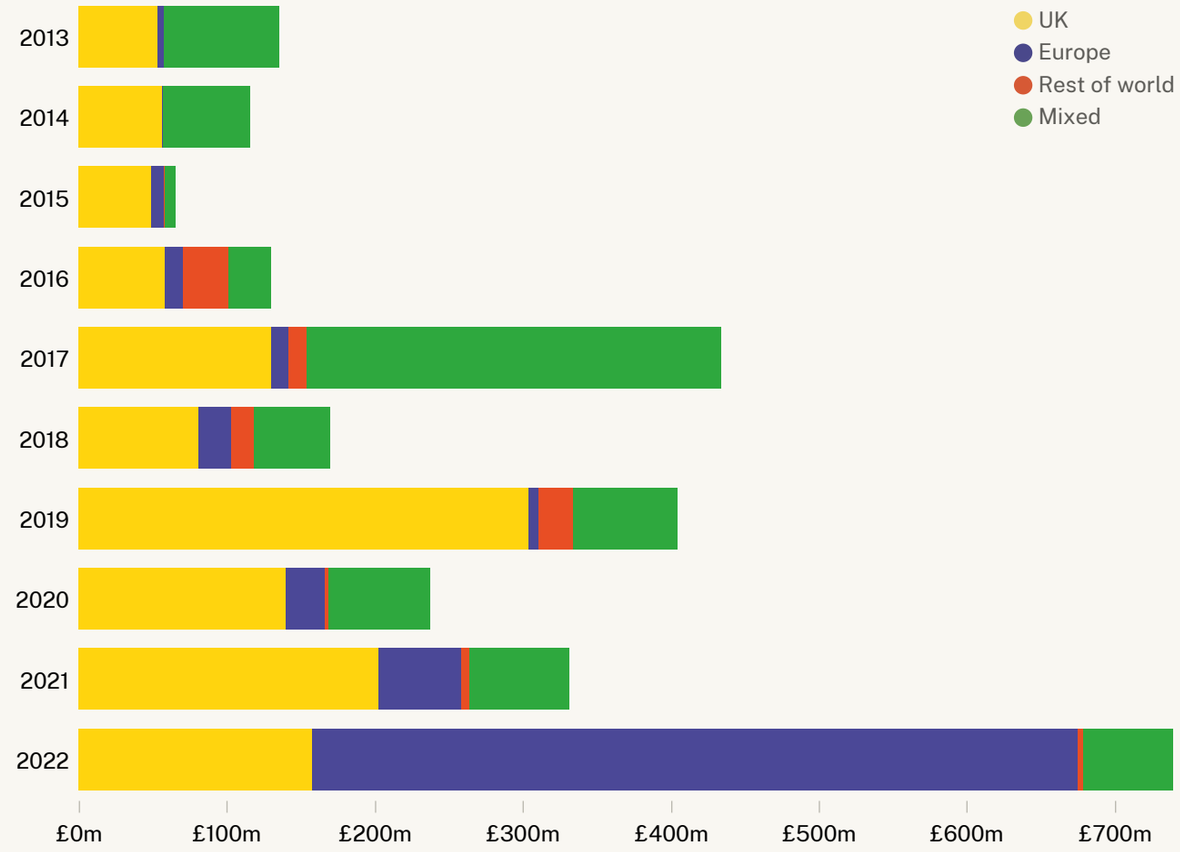
AI and ML: investment by nationality

Founding teams comprised entirely of UK nationals have historically secured a substantial share of investments in the AI and ML tech area, securing a reasonably consistent proportion of investment each year even as the total funding in these areas has grown. This aligns with the high proportion of AI and ML companies (57.5%) in the active company population.

However, last year marked a slight shift in this pattern, with mixed nationality founding teams capturing the majority of investments (49.8%) for the first time since 2013. This change can be partially attributed to several sizeable deals secured by companies led by mixed nationality teams. Companies with mixed nationality teams account for 23.9% of the active company population.



Equity investment into future networks companies by founding team nationality (2013-2022)



Future networks: investment by nationality

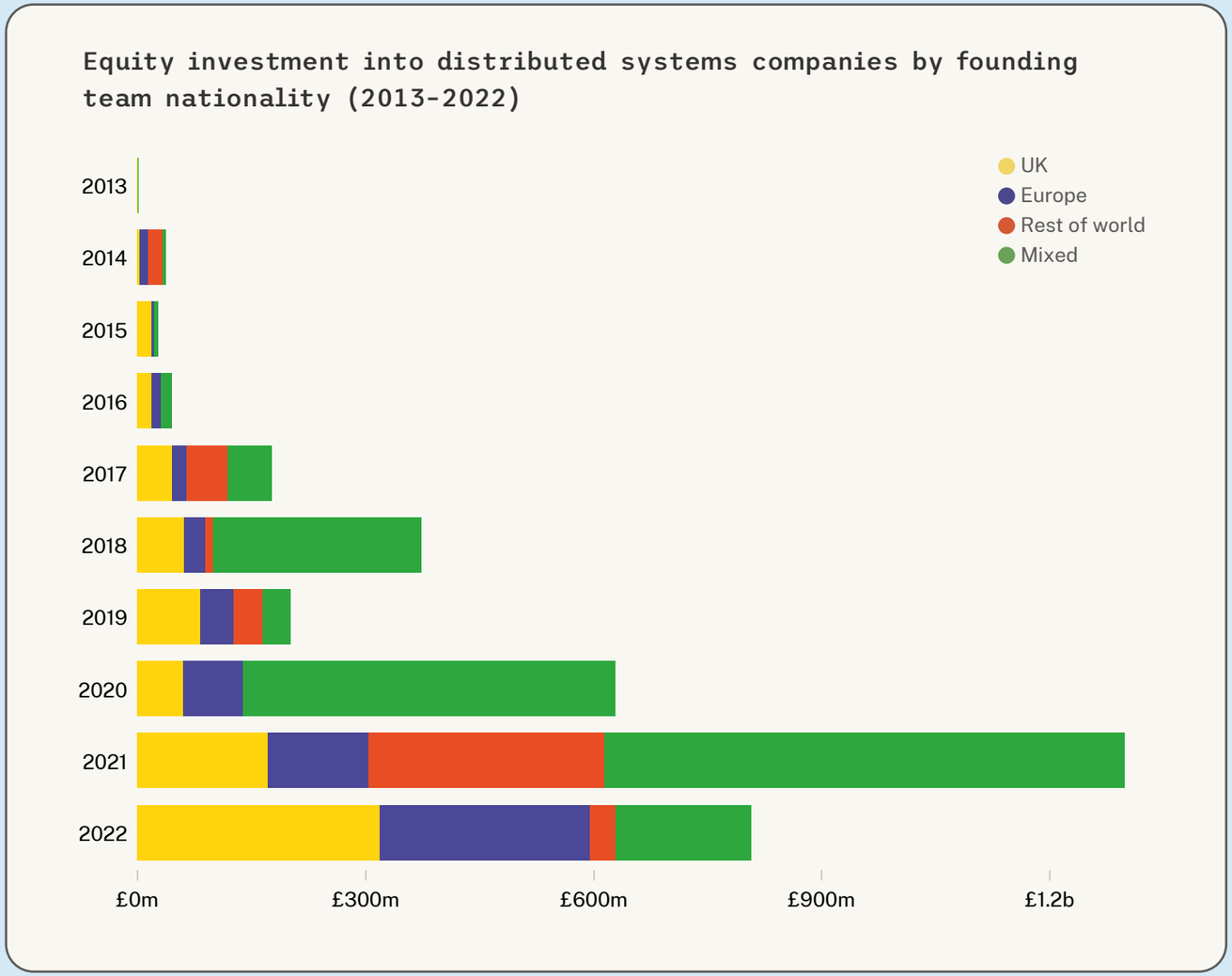
The £506m equity and debt round raised by SumUp in June 2022 plays a considerable role in the substantial total investment garnered by companies led by European founders. Based in London, SumUp specialises in developing payment processing systems, incorporating IoT devices like card readers to enable sellers to process online and in-store payments.

Before 2022, the investment landscape indicated a higher level of funding directed towards companies founded by individuals of UK nationality or mixed nationality teams. These groups have a prevalence in the active future networks company population of 72.3% and 14.9%, respectively.

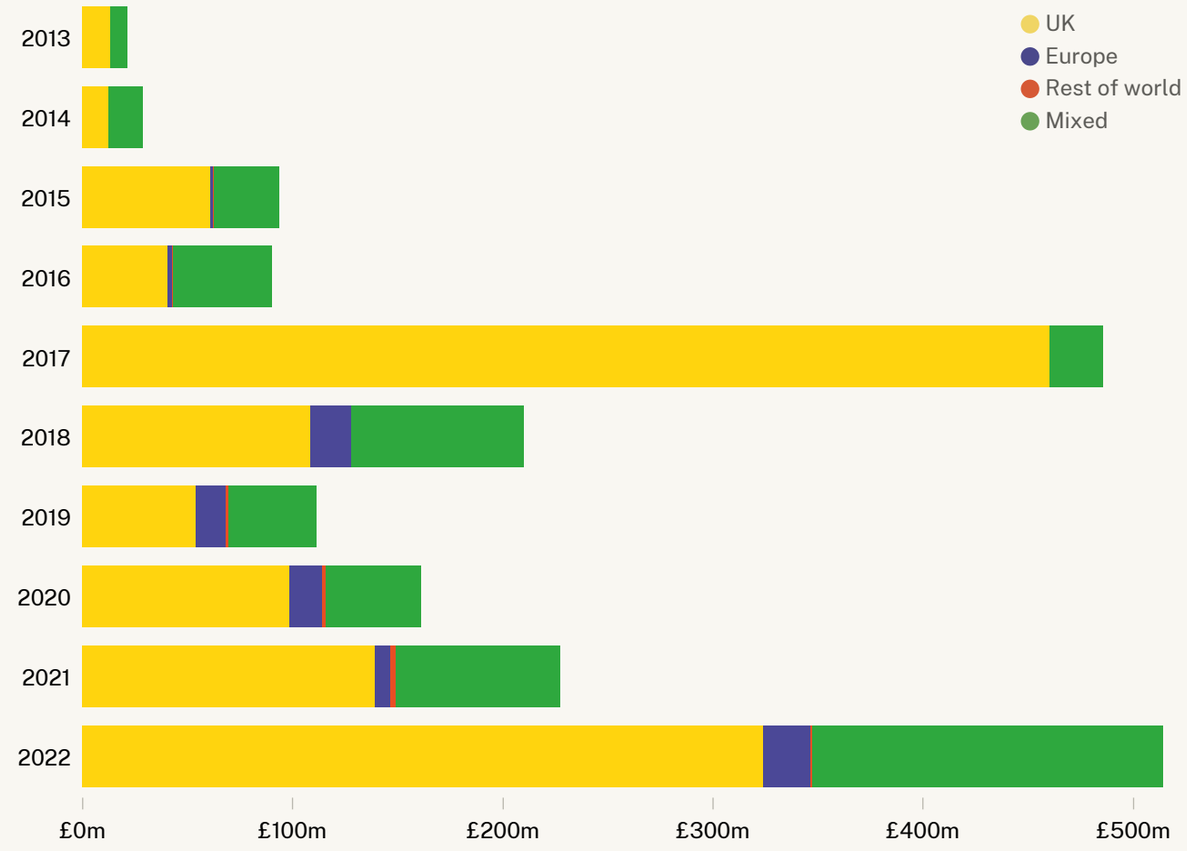
Distributed systems: investment by nationality

Of the five advanced technologies, distributed systems have the most proportional investment in companies with founding teams other than UK nationality. Nearly 80% of the total equity investment in distributed systems companies over the last decade has gone to companies with at least one international founder.

Given that UK nationality founding teams account for 47.6% of the active company populated in distributed systems, companies with non-UK nationality founders are effective at securing a disproportionate share of total equity investment.



Equity investment into immersive tech companies by founding team nationality (2013-2022)



Immersive tech: investment by nationality

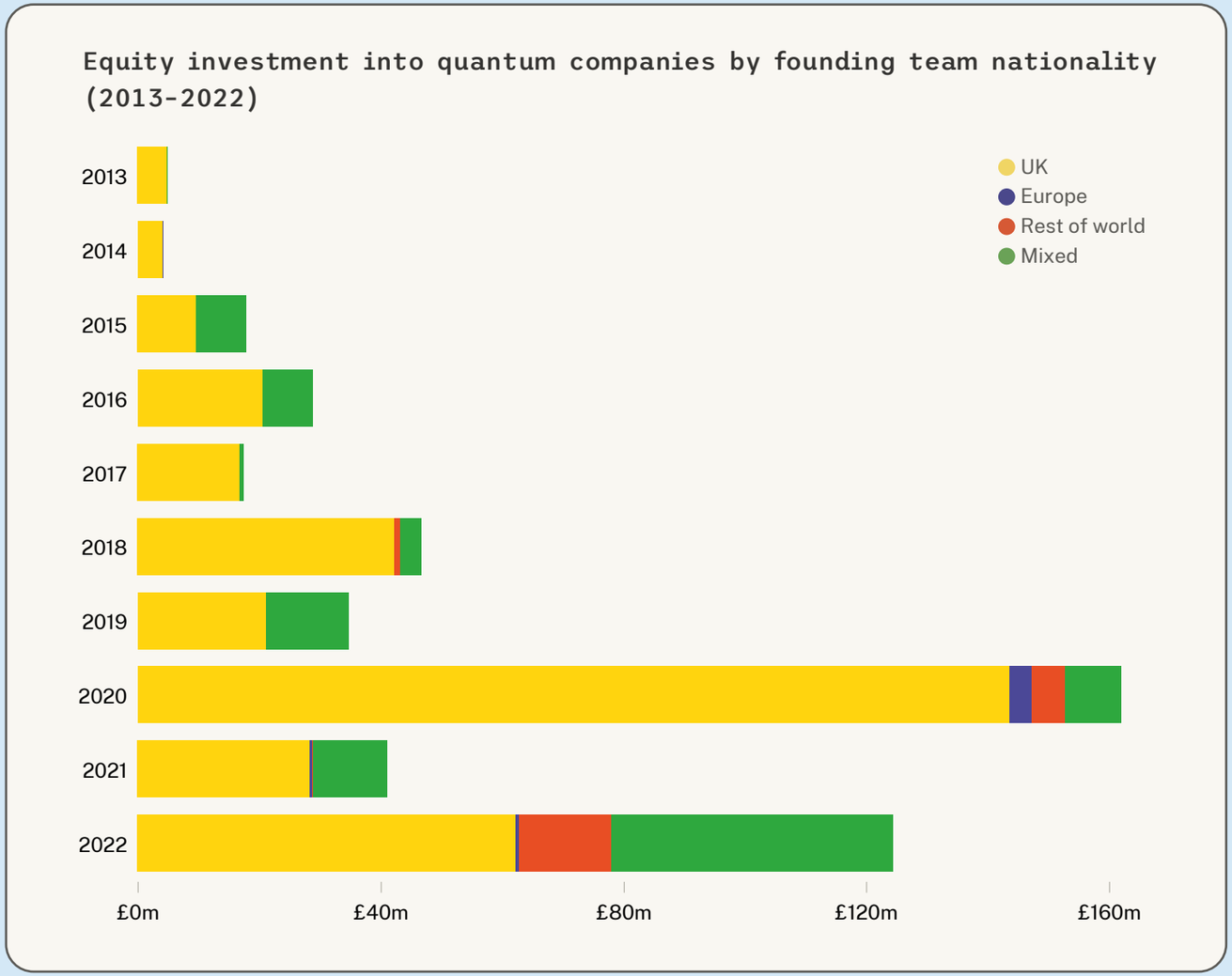
As with AI and ML, founding teams of UK nationals have historically secured the majority of investment in the immersive tech area, aligning with the high prevalence of these companies in the active company population (75.7%). This trend continued in 2022 with founding teams of UK nationality securing the largest proportion of equity-backed financing (63.1%), followed by mixed nationality teams (32.4%) and European founding teams (4.34%).

Mixed nationality teams account for 14.2% of the active companies in immersive technology and European teams account for 6.83%. This suggests that mixed nationality teams are effective at raising disproportionate amounts of equity investment relative to their prevalence in the active company population.

Quantum: investment by nationality

The equity investment landscape for UK quantum companies is primarily dominated by firms with founding teams consisting exclusively of UK nationals, who have received 73.4% of the total investment in this field since 2013. This broadly aligns with the 65.8% of UK nationality companies in the active quantum company population.

Last year saw mixed nationality teams secure 37.4% of total funding — the highest proportion secured by this group since 2017. Mixed nationality teams currently account for 20.6% of the active quantum company population.



Top founder nationalities per digital technology

After UK founders — which top every category — European founders feature prominently across the five technology areas and within the UK's high-growth company landscape. Naturally, this can be attributed to the UK's proximity to other European nations and the accessibility of living and working in the UK during its EU membership. Given the knowledge-intensive nature of these five technology areas, it is plausible that European students transitioning into entrepreneurship have played a significant role in this pattern. This can be partially credited to initiatives such as the Erasmus Programme, which fosters student mobility within the EU.

Beyond Europe, American founders consistently rank high in several areas, a testament to the historical connections between the UK and the US, the advantages of a shared language, and the allure of British universities for American students. This enduring relationship between the two nations reinforces the UK's position as a global technology hub, attracting talented entrepreneurs from both sides of the Atlantic.

All high-growth companies

1. Ireland
2. France
3. United States
4. Italy
5. Germany

AI and ML companies

1. Germany
2. France
3. India
4. United States
5. Italy

Future networks companies

1. United States
2. India
3. Germany
4. Italy
5. France

Distributed systems companies

1. United States
2. France
3. Germany
4. Poland
5. Italy

Immersive tech companies

1. France
2. United States
3. Italy
4. Ireland
5. Germany

Quantum companies

1. Germany
2. China
3. Ireland
4. Russian Federation
5. Sweden

These lists exclude the UK, which is the top founder nationality for all digital technologies.

Educational background

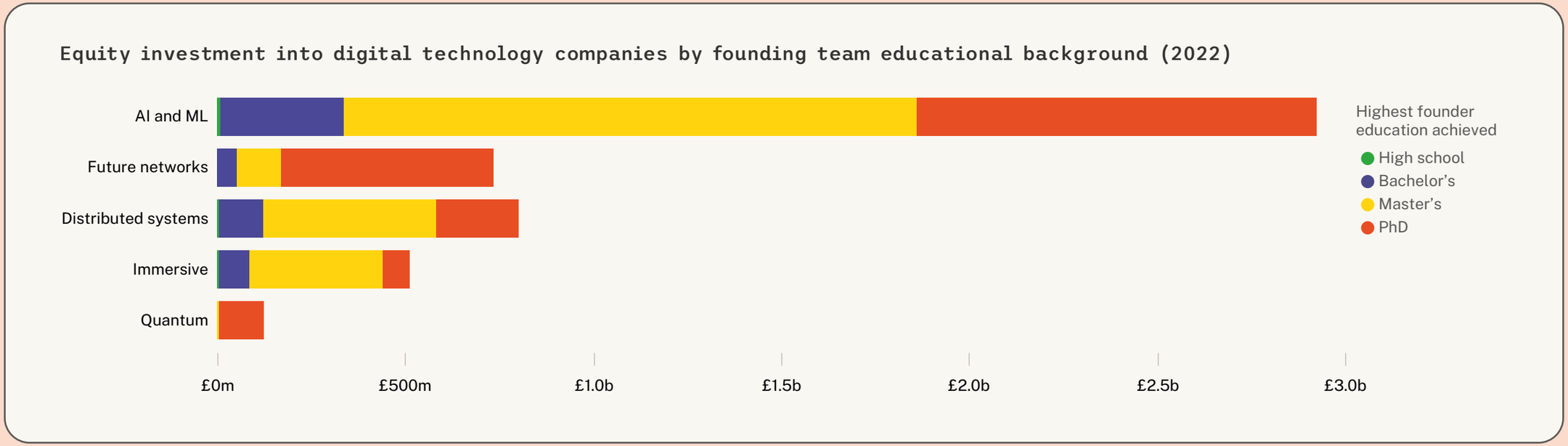
In the quantum computing technology area, companies with a founder with a PhD secured the majority of equity investment in 2022. However, a PhD is not a prerequisite for investment. Companies with a founder possessing a master's degree secured more investment in immersive technologies, distributed systems, and AI and ML than those with a PhD.

Key findings:

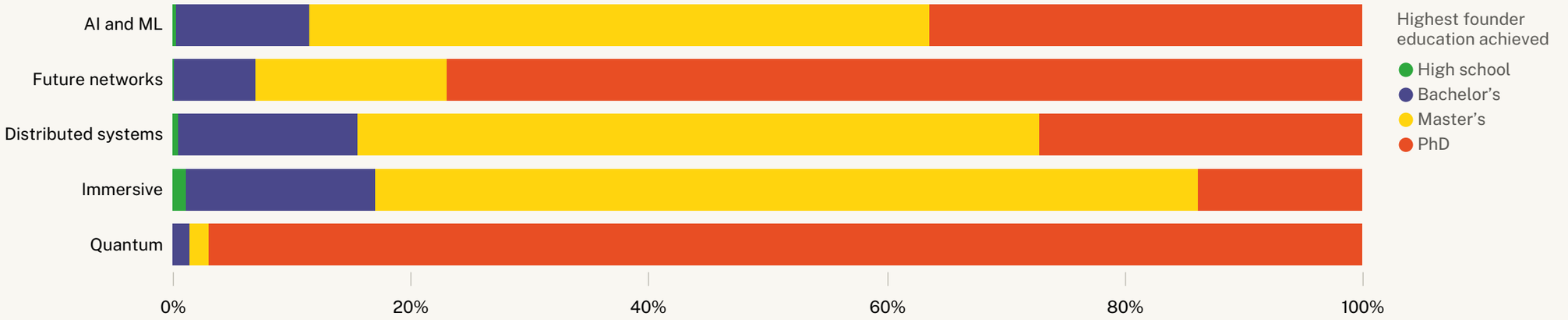
- AI and ML companies with at least one founder holding a master's degree secured the largest share of equity investment in 2022, amounting to £1.52b
- In 2022, quantum companies within the scope raised £123m, of which 96.9% was secured by companies with a founder holding a PhD
- Companies with founders holding bachelor's degrees in the immersive, distributed systems, and AI and ML technology areas received a higher proportion of investment than their counterparts in other areas

Digital tech: investment by educational background

The analysis presented on this page breaks down the equity investment received by companies in the five core technology areas in 2022 based on the highest educational attainment achieved by their founders. This page presents the investment volumes in absolute values, while the following page presents the same data as a proportion of the total investment in each technology area. During 2022, AI and ML companies with at least one founder with a master's degree received the largest share of equity investment, collectively securing £1.52b or 50.2% of the annual investment. Companies in this category account for 45.4% of the population. The high proportion of companies in this category may be related to recent breakthroughs in AI and ML, which have made it more feasible for founders to establish companies relatively early in their careers. In contrast, quantum companies raised £123m, 96.9% of which was secured by companies with at least one founder with a PhD. This figure reflects the base population, where 73.1% of companies have at least one founder with a PhD.



Equity investment by proportion into digital technology companies by founding team educational background (2022)



Investment by educational background (proportional)

In the quantum and future networks technology areas, companies with founders holding PhDs secured the vast majority of equity investment. This trend may reflect the technical complexity and challenges associated with the quantum technology areas and also investor perception of what it takes to succeed in the area. In contrast, companies with founders holding bachelor's degrees in the immersive, distributed systems, and AI and ML technology areas received a higher proportion of investment than their counterparts in other technology areas. This trend may indicate that these technologies are more readily applicable across various industries, creating opportunities for entrepreneurs to gain traction and secure investment earlier in their careers.

Deep Science Ventures

Ecosystem spotlight

Dr. Thane Campbell

Dean, Venture Science Doctorate at Deep Science Ventures

Opportunity

Across sectors, deeptech founders with a master's degree secure £0.5b more than those holding PhDs. By revisiting recruitment and shared decision-making, more empowered PhD founders could unlock the missing £0.5b[1],[2] and we could welcome 1% more of the UK's 800,000 racially diverse undergraduates into deeptech, every year.[3]

Structured recruitment

At Deep Science Ventures, we find determined, magnetic and technical people thrive as deeptech founders but these skill sets and mindsets are not actively sought in postgraduate education. From three archetypes, we use over 30 indicators to detect "Venture Scientists", precisely and without bias. We simply must find innovators who will thrive in our programmes because we're invested in their long-term success. Inclusive recruitment is just and it's key to finding the best.

Systematic recruitment frameworks can double as training and learning assets used to i) audit bias in recruitment, ii) retroactively explore correlations between founder performance and scores at application, iii) deliver personalised pedagogy for founders who think and act differently. We can accelerate personalised training by specifying the learning nuances and alternative strategies students bring from their gender, racial or national identities.

Intellectual freedom

We can use first-principles, shared decision-making protocols to roadmap deeptech innovation.[4] Our founders start with a global outcome, engage academia, industry and policymakers and systematically log market and scientific research findings. Early-stage "ventureable hypotheses" with little evidence behind them are classed as "low scoping completeness" and founders bring many approaches to "high scoping completeness" in parallel, comprehensively mapping the best possible venture for their outcome and their career. Scoping produces a dynamic knowledge artefact called an "Outcomes Graph" with several advantages over conventional ideation.[5]

Ecosystem spotlight (cont.)

Dr. Thane Campbell

Dean, Venture Science Doctorate at Deep Science Ventures

The Venture Science Doctorate[6] combines structured recruitment and shared decision-making with inclusive mentors to put venture at the heart of research. More students can become independent researchers, network widely, practise good mental health[7,8] and create high-skill jobs as founders. We're actively transforming the diversity and fundraising potential of PhD founders, enabling more diverse founders to build more valuable deeptech companies. As we transition from scarcity to an abundance of diverse Venture Scientists, the world gains the moonshot leaders industrial policy needs[9] and more ambitious regional economies. We will train one thousand Venture Scientists every year, working with Schmidt Futures, Anglo American, Innovate UK, Digital Catapult, and global partners.

[1] Stern, S. (2004, June). Do Scientists Pay to Be Scientists? Management Science, 50(6), 835-853.

[2] Nobles, M., Womack, C., Wonkam, A., & Wathuti, E. (Guest Eds.). (2022, October 20). Overcoming racism in science: A Nature special issue. Nature.

[3] Higher Education Statistics Agency (HESA). (2023, January 31). Who's studying in HE?

[4] Deep Science Ventures. (n.d.). Outcomes Graph: A protocol for applied science coordination.

[5] Deep Science Ventures. (n.d.). Accelerating venture creation using our Outcomes Graph.

[6] Deep Science Ventures. (n.d.). Venture Science Doctorate.

[7] Arday, J. (2018). Understanding Mental Health: What Are the Issues for Black and Ethnic Minority Students at University? Social Sciences, 7(10), 196.

[8] Editorial. (2019, November 13). The mental health of PhD researchers demands urgent attention. Nature, 575, 257-258.

[9] Bonvillian, W. B. (2021, October 4). Emerging industrial policy approaches in the United States. Information Technology and Innovation Foundation.

Flavilla Fongang

Founder of 3 Colours Rule, BBC Brand Advisor, GTA
Black Women in Tech and Serial Entrepreneur

“Education is the foundation upon which every successful journey in tech begins. However, we must acknowledge that barriers exist, especially for Black students in STEM fields. To succeed in deeptech, diverse students need to see more diverse heroes innovating. The Venture Science Doctorate is a game-changer for UK innovation and diversity because it’s creating the stories that will inspire generations.

Priya Guha, MBE

Venture Partner, Merian Ventures and Non-Executive Director, UKRI

"The Venture Science Doctorate is a great initiative to support different types of PhDs, which will equip students with the skills and funding to commercialise and scale their research whilst pursuing their academic studies. Society needs this.

Data methodology

Data sources
The gender data in this analysis is primarily based on the honorifics founders have chosen for their directorship records at Companies House. If this data is insufficient, other sources like company websites, professional profiles, and press materials are used to determine an individual's gender. Companies with unidentifiable founder genders are excluded from the analysis.

Nationality and age data is sourced from the information founders have associated with their Companies House directorship records.

Ethnicity data is generated using the Onomap software tool, which classifies names into the 2001 Census Ethnic Group, aligning with the UK 2001 Census Ethnicity Classification. More information on Onomap can be found in the Ethnicity chapter and at onomap.org.

Founder education data is gathered from sources such as company websites, professional profiles, press materials, and director qualifications filed at Companies House. Founders are assigned to four education categories: high school, undergraduate, master's, and PhD, based on their highest level of educational attainment. Founders who cannot be assigned to a category are excluded from the analysis.

High-growth companies
Beauhurst identifies ambitious businesses using eight triggers (outlined on the right) that we believe suggests a company has high-growth potential. More detail on Beauhurst's tracking triggers is available via our website.

Equity investment
To be included in our analysis, any investment must be:
- Some form of equity investment
- Secured by a non-listed UK company
- Issued between 1 January 2013 and 31 December 2022

Announced and unannounced fundraisings
An unannounced fundraising is an investment made into a private company that is completed without press coverage or a statement from the recipient company or funds that made the investment. These transactions are an integral part of the UK's high-growth economy, accounting for around 70% of all equity transactions.

High-growth tracking triggers

- Equity investment
- Scaleups
- Accelerator attendances
- MBOs/MBIs
- Academic spinouts
- High-growth lists
- Major grant recipients
- Venture debt

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Beauhurst is a searchable database of the UK's high-growth companies.

Our platform is trusted by thousands of business professionals to help them find, research and monitor the most ambitious businesses in the UK. We collect data on every company that meets our unique criteria of high-growth; from equity-backed startups to accelerator attendees, academic spinouts and fast-growing scaleups.

Our data is also used by journalists and researchers who seek to understand the high-growth economy, and powering studies by major organisations — including the British Business Bank, HM Treasury and Innovate UK — to help them develop effective policy.

For more information and a free demonstration, visit beauhurst.com

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Digital Catapult is the UK authority on advanced digital technology.

We bring out the best in business by accelerating new possibilities with advanced digital technologies.

We work with a range of organisations — including startups and scaleups, established businesses, investors, government and public sector, research and academia — to discover new ways of solving industry challenges, increase productivity and open up new markets.

We're proud to be part of the Catapult Network. Supporting businesses in transforming great ideas into valuable products and services, we are a network of world-leading technology and innovation centres established by Innovate UK.

Discover more about us on digicatapult.org.uk

Beauhurst

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