



A review of the UK's semiconductor clusters

September 2023

 **BARCLAYS** | Eagle Labs

 Funded by
UK Government

 **Beauhurst**

Executive summary

Amidst the ongoing global demand for semiconductors, high-growth semiconductor companies in the UK are securing record levels of investment to support their growth.

The UK's 79 active, high-growth semiconductor companies are concentrated in different specialised clusters across the country. Notably, the Central Belt spanning Glasgow to Edinburgh has emerged as an IP-rich region, due to its electronics and photonics industry. Meanwhile, the area surrounding Cambridge stands out as a hub for semiconductor growth, fueled through the support provided by the University of Cambridge, through its research facilities and academic expertise.

Across these companies, the top application sectors include electrical components, materials technology, as well as chips and processors. With 21 active companies, the electrical components sector is driven by the widespread integration of semiconductor components in electronics and hardware. The chips and processors sector follows closely with 17 active companies operating in this area.

Companies with mixed-gender teams constitute 8.77% of the total founder population across active high-growth semiconductor businesses. Male founders dominate the industry, accounting for 87.7% of the active population. Founders aged 50-59 at incorporation account for 30.9% of founders

in the sector. This experienced demographic is likely empowered by industry expertise plus enhanced access to capital and networks. Founders aged 40-49 at incorporation constitute 21.3% of the total, followed by founders aged 60-69.

In 2022, active high-growth semiconductor companies in the UK secured a record £160m in equity investment via 24 deals. Funding volumes have increased during the last decade. However, larger deals have contributed substantially, especially in latter years. The consistent number of deals within this sector suggests continuous support from investors over time. Top funders into high-growth semiconductor companies include Parkwalk Advisors with 26 deals, Scottish Enterprise with 20, and Cambridge Enterprise with 16.

Grant funding reached a peak in 2019 with £29.5m provided across 33 grants. Despite 2022 experiencing lower grant funding at £14.6m, there was a comparatively higher number of grants, totalling 53.

Introduction to semiconductors

Semiconductors are materials that can control the flow of electricity. The ability of semiconductors to control and amplify electrical currents puts them at the heart of modern electronics, making it possible for microchips to become smaller, faster, and more efficient. Notably, semiconductors play pivotal roles in strategic technologies such as artificial intelligence, quantum computing, and the evolution of 6G networks.

There are three main categories of semiconductor materials: silicon, compound materials, and advanced materials. Silicon dominates the industry due to its mature technology. In contrast, the exploration of advanced materials like graphene or diamond represents an emerging frontier.

The industry is segmented into design, manufacturing, testing, and packaging. Given the

significant capital and technical expertise required, it is fragmented globally. Specific regions or countries specialise in different segments, creating areas of strength and specialised clusters. A prime example is the compound semiconductor cluster in Newport, South Wales.

Over a trillion semiconductors are manufactured annually, with demand set to increase significantly going forward.¹ These vital components find application across various sectors, including telecommunications, consumer electronics, and healthcare. Most advanced computer chip manufacturing takes place in Taiwan and South Korea, with the UK accounting for only 0.5% of sales worldwide.² However, over 90% of silicon semiconductors created in the UK are exported³, highlighting its global reach. Furthermore, the UK has extensive compound semiconductor capabilities across the supply chain, alongside pioneering research and commercialisation in the sector. Its range of clusters nationwide, including Scotland, the South West, and Cambridge, work alongside innovation centres, which include the Cambridge Centre for Gallium Nitride and the Scottish Microelectronics Centre in Edinburgh.

The global semiconductor industry has increasingly experienced periods of high demand and low supply, with this last culminating in 2020 due to the COVID-19 pandemic, causing widespread disruption across many industries. Shortages led to significant price increases, extensive wait times, and reselling. Acknowledging the industry's strategic significance, the UK government launched the National Semiconductor Strategy in May 2023—a 20-year plan designed to support the semiconductor ecosystem. The £1bn strategy aims to secure the UK's position as a global science and technology powerhouse, further driving investment into the sector.

This report is focused on the 79 active, high-growth semiconductor companies in the UK, as well as 29 historically active companies. This latter category includes companies that have exited via acquisition or initial public offering (IPO) as well as those that have ceased operations.

¹ Department for Science, Innovation and Technology, [New £1 billion strategy for UK's semiconductor sector](#)

² Business, Energy and Industrial Strategy Committee, Q40 [Oral evidence: The Semiconductor Industry in the UK, HC291](#)

³ Business, Energy and Industrial Strategy Committee, Q10 [Oral evidence: The Semiconductor Industry in the UK, HC291](#)

Business demography in the UK

A large proportion of high-growth semiconductor companies are concentrated in the South West, with large clusters of research and manufacturing present in South Wales and Scotland. The industry's main application sectors include electrical components, materials technology, as well as chips and processors. There is a low representation of women within founding teams. Founders aged between 50 to 59 years are the most prevalent. Spinout companies account for 39.2% of the current high-growth semiconductor population.

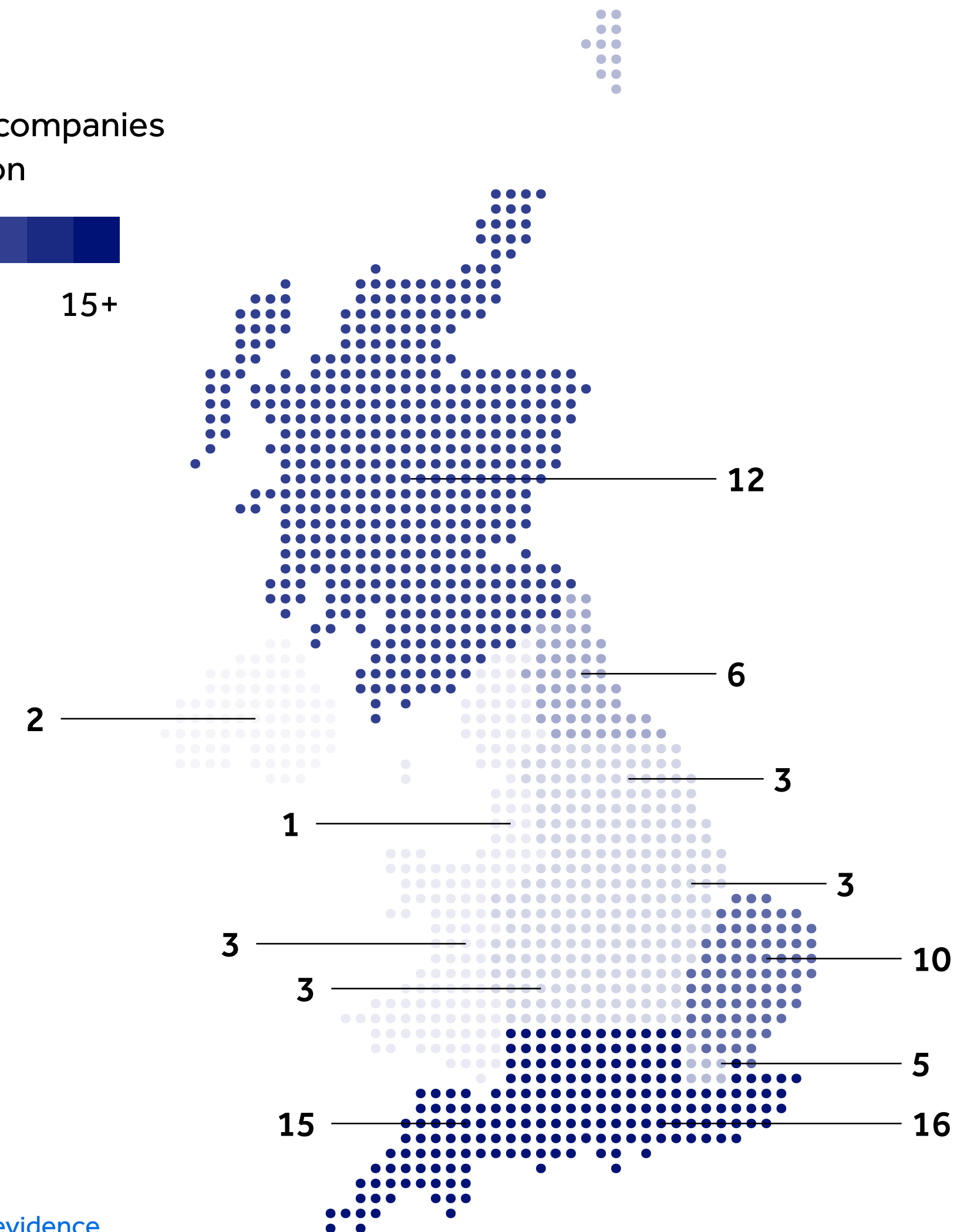
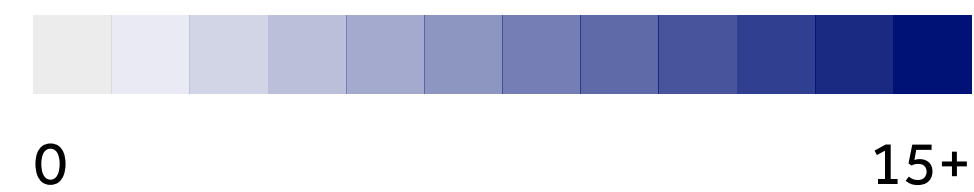
Regional distribution

There are several specialised clusters of companies across the country. Notably, the high-tech triangle of Bristol, Swindon, and Gloucester—dubbed Silicon Gorge—has become a hub for advancements in semiconductor development, particularly within photonics and electronics. Scotland, particularly the Central Belt stretching between Glasgow and Edinburgh, is another highly-concentrated area, hosting ten of the total 12 high-growth semiconductor companies in the region.

South Wales has become the world's first compound semiconductor cluster. With annual sales of £500m,⁴ this cluster employs over 2,300 highly skilled staff and benefits from a robust support infrastructure, including the Institute for Compound Semiconductor Technology at Cardiff University. Despite the presence of compound semiconductor activities in Wales, this prominence is not yet reflected in its high-growth population.

Regional distribution of high-growth semiconductor companies (August 2023)

Number of semiconductor companies headquartered per UK region



⁴ CSconnected
CSconnected response to call for evidence



Dr Simon Thomas
Co-founder and Chief
Executive Officer

Company spotlight: Paragraf

“Semiconductors are the lifeblood of the world and are only becoming ever more important over time”, says Dr Simon Thomas, co-founder and Chief Executive Officer at Paragraf. The company has brought the world’s first mass-produced graphene electronic devices to market—a feat that has eluded major players in the industry for years.

Thomas, alongside co-founder and Chief Scientific Officer Sir Colin Humphreys and Ivor Guiney, founded Paragraf in 2016 as a spinout from the University of Cambridge. The company develops graphene-based electronic devices that can be mass produced with standard semiconductor processes and toolsets. The breakthrough products Paragraf is bringing to market have been adopted by research institutes and companies operating in sectors such as agritech, automotive, and quantum computing. Paragraf has so far raised £67.0m in equity funding, with support from investors including Parkwalk Advisors and Cambridge Enterprise.

The journey, however, has not been without challenges. “There’s a lot of uncertainty in the world at the moment, so it’s taken a lot of work and a lot of effort

to get the business to where it is”, Thomas explains, outlining the arduous task of scaling up a capital-intensive business in the UK semiconductor sector. “It’s easy enough to get early-stage investment, as long as you’ve got a good idea. It’s the larger amount of money that you need for scaling that is difficult to access here in the UK”. Paragraf is facing a range of challenges as it scales, such as creating manufacturing capacity, acquiring talent, and establishing suitable infrastructure.

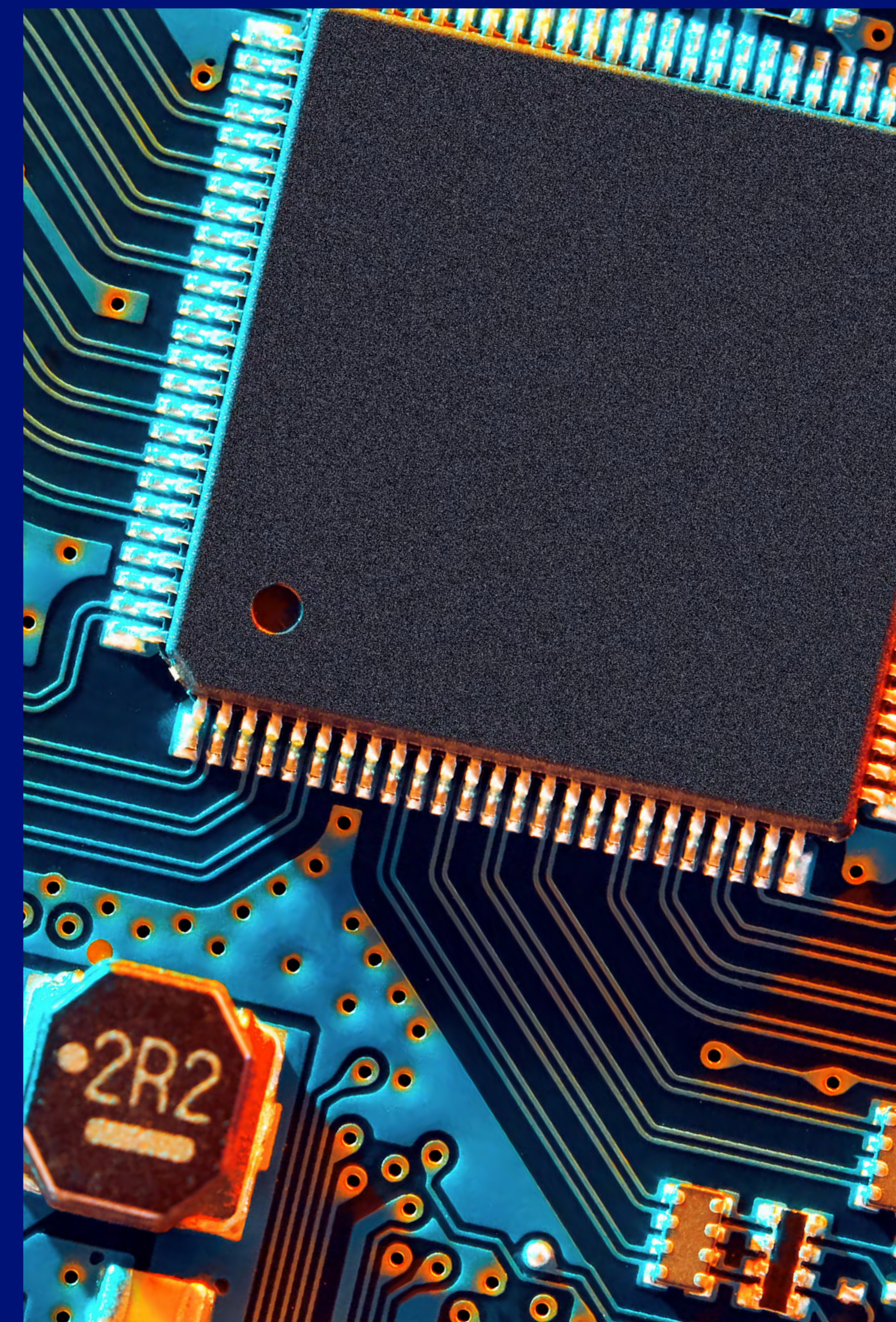
According to Thomas, the semiconductor industry in the UK is at a critical juncture—at the same time that the sector’s pivotal role has become apparent. The UK’s semiconductor industry boasts some of the world’s most innovative technologies, emerging from universities and early-stage companies. However, these innovations are often attracted abroad by more readily available financing, mature ecosystems, large local markets and foreign ownership. Speaking of companies and individuals, Thomas says, “We often seem unable to hold them in the UK”. He identifies some of the challenges in limited access to funding, lack of strong international partnerships, and a scarcity of talent. Of particular concern is the ageing expert workforce.

Amidst these challenges, Paragraf's achievements shine even brighter, including its recent acquisition of a US-based company, marking a milestone rarely achieved by early-stage businesses. Paragraf is expanding internationally, with three sites worldwide and channel partners in Asia. Despite the challenges in the industry, Thomas explains: "The core of what we're doing is to try and benefit the world, with most of our technologies going into places that will help people and society". Paragraf intends for its innovations to create a better world—Thomas says that it is focused on healthy people, healthy cities, and a healthy planet. Its sensors contribute to safer batteries, and its upcoming solid-state biosensor promises to enhance disease detection, potentially saving countless lives. Thomas attributes Paragraf's accomplishments to its employees, explaining, "Paragraf's achievements are not down to me; they are down to the incredible team that we've hired. We've got great people here, and I'm really proud of what they've delivered."

Despite being a young company, Paragraf continues to make strides in the UK's semiconductor industry and worldwide.

The company's success is not only driven by its unique product offering but also by its activities to nurture talent and foster technology partnerships with academia and within the industry.

Acknowledging the difficulty of building industry-relevant skills, the company runs apprenticeship programs and internships for entry-level candidates, demonstrating its commitment to growing the next generation of innovators.



Application sectors

The leading application sector in the UK's high-growth semiconductor industry, with 21 companies, is electrical components. This prominence can be attributed to a range of factors, including the important role semiconductors play in electronics, as they are crucial components in the automotive, telecommunications, and industrial sectors.

Companies in this area include Southampton-based HiLight Semiconductor, which designs and produces components for use in high-speed fibre optic communications. The company secured £31.8m via eight rounds of funding and received four innovation grants totalling £2.44m.

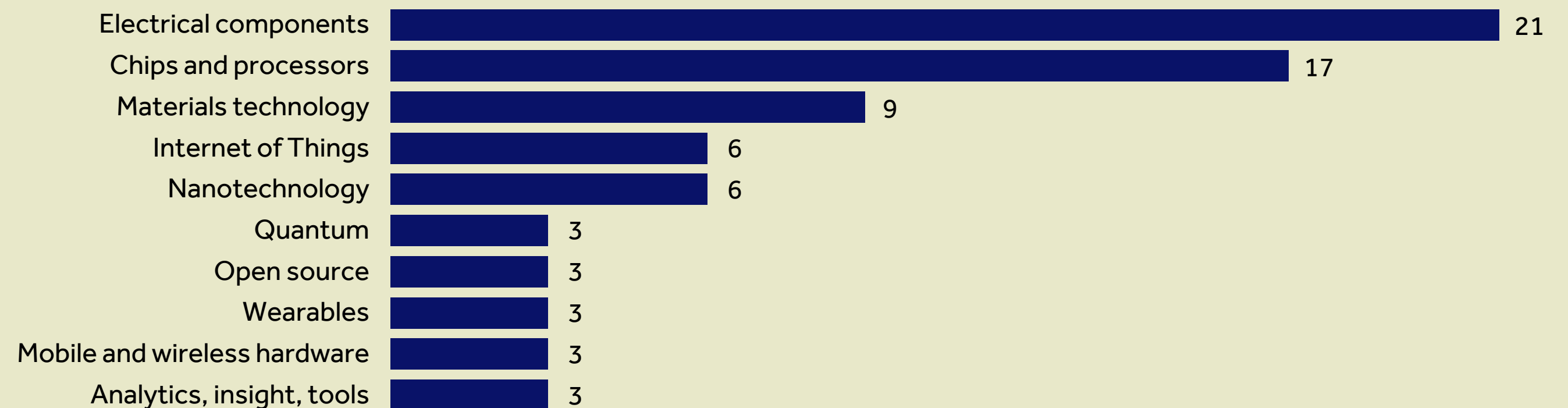
The chips and processors sector follows closely with 17 companies. With a focus on the design, production, and deployment of integrated circuits, this sector includes companies such as Saliency Labs. The Oxford University spinout specialises in a multi-chip processor which combines photonics

and electronics to accelerate advancements in the AI sphere. The company has secured one £9.42m equity investment and £1.99m grant to date.

Many high-growth semiconductor companies have some overlap with the materials technology sector. This discipline overlooks the research and development of materials to enhance their applications. Companies at the forefront of this

sector include Poro Technologies, a University of Cambridge spinout that develops porous gallium nitride (GaN) semiconductor material to enhance microLED technology.

Top application sectors by number of active high-growth semiconductor companies (August 2023)





David Moore
Chief Executive Officer

Company spotlight: Pragmatic

“Pragmatic’s technology is already at the forefront of innovation”, says Pragmatic CEO David Moore, explaining the company’s unique product offering. “No other organisation produces the thin, flexible integrated circuits (‘chips’) that we do, but we are continuously challenging ourselves to advance our technology and further expand our market opportunity.”

The semiconductor landscape is rapidly evolving, and it is within this environment that Pragmatic is innovating; developing thin, flexible chips that come at a fraction of the cost of conventional silicon chips. This results in the potential for integration across a wide range of products, in multiple sectors, where the chips effectively add intelligence to numerous objects. Moore explains, “There is a tremendous market opportunity and customer demand for our product offering”. In addition to fast-growing high-volume consumer goods applications, the company envisions novel uses for its distinctive technology, spanning healthcare, smart manufacturing, logistics and security sectors. Many of these applications require immense chip volumes and, in an already-challenged semiconductor supply chain, the unique form factor and cost point of Pragmatic’s technology emerges as the clear alternative to silicon.

The Cambridge company was founded in 2010 by Chief Technology Officer Richard Price and Executive Director Scott White.⁵ It operates a production facility in Sedgefield, in the North East of England and is building a new manufacturing facility (Pragmatic Park) in County Durham. This will be the first ever 300mm wafer fabrication plant in the UK, capable of manufacturing billions of chips per year and will make Pragmatic the UK’s highest-volume semiconductor manufacturer. A distinctive trait of the company’s approach is its unique ‘Fab-as-a-Service’ manufacturing model, offering clients the potential of cost-effective, localised semiconductor fabrication. According to Moore, “the cost and environmental footprint of a Pragmatic fab are orders of magnitude less than a silicon fab”. This paradigm lends itself to modular and inherently scalable production, as evidenced by the company’s vision to deploy over 100 fabrication facilities globally over the next decade.

“The UK has deep strength and expertise across the applied sciences and engineering fields, with a strong track record of IP and design leadership, innovation in materials science and a clear heritage in semiconductor manufacturing”, says Moore. Despite these strengths,

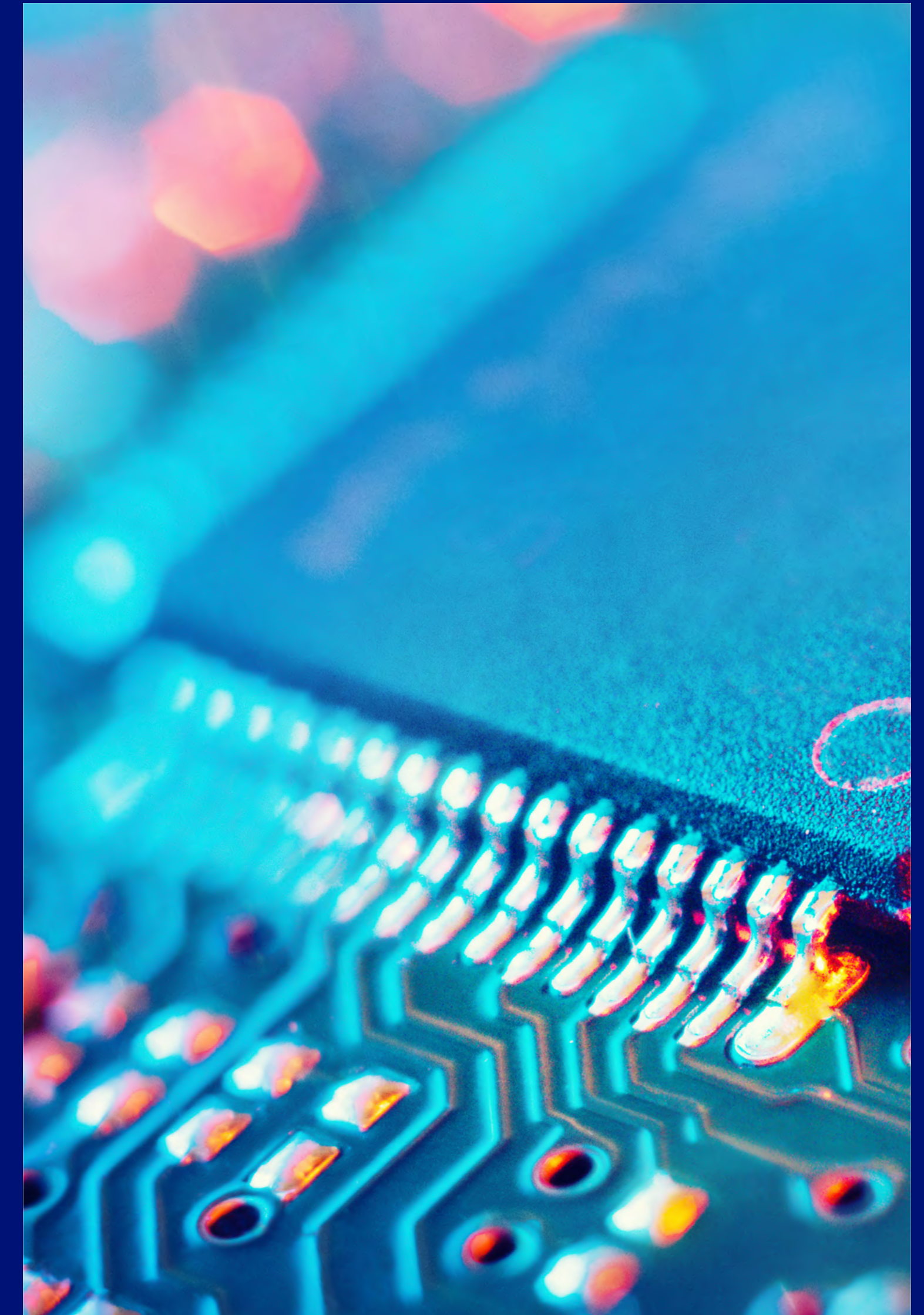
⁴ Pragmatic Semiconductor Announces Appointment of Semiconductor Industry Veteran, David Moore, as CEO, Pragmatic Press Releases

advanced-node silicon manufacturing capability requires immense funding and resources, which, according to Moore, “has resulted in the UK lagging behind other countries in this specific area”. However, despite potential limitations in advanced-node silicon, “the UK has considerable strengths in innovation in semiconductor manufacturing, particularly with advanced materials”, Moore explains, focusing on the strengths of thin-film metal-oxide and compound semiconductors as alternatives to silicon. “These give the country an opportunity to take a global leadership position in the industry”.

Commenting on the National Semiconductor Strategy, Moore’s views reflect a measured optimism, acknowledging that the strategy “is an important step in recognising how critical the sector is to the UK’s economic and national security”. He further emphasises the importance of investments that align with the UK’s strengths including semiconductor manufacturing, noting,

“The key now is to ensure the investment is directed to the areas where the greatest return in the UK’s national interest can be realised.”

Pragmatic has raised £144m in equity funding. Its most recent Series C round closed in December 2022 and was backed by investors including British Patient Capital, Aramco Ventures and Cambridge Innovation Capital.



Founder diversity

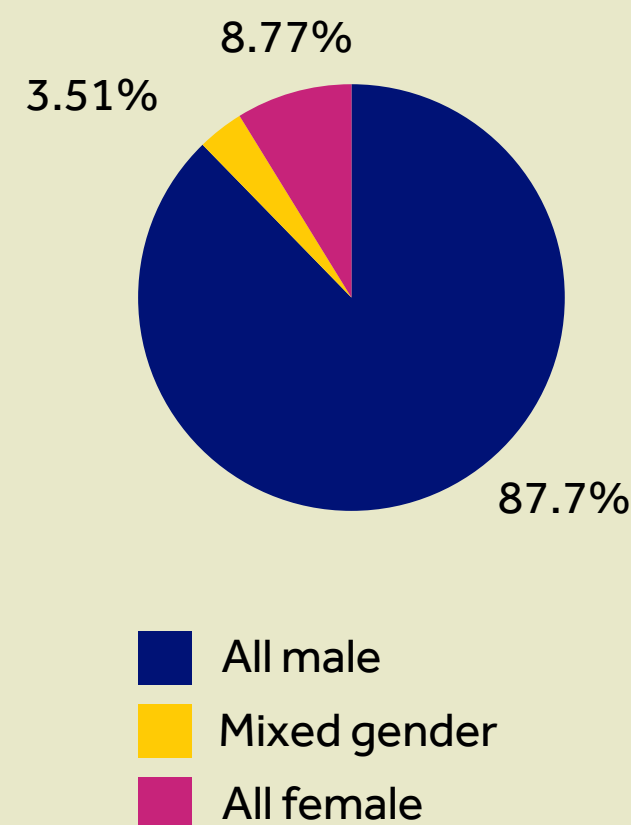
In the UK's high-growth semiconductor sector, only 8.77% of companies boast mixed-gender founding teams, while a mere 3.51% have entirely female founding teams. This starkly contrasts the dominant 87.7% of companies with all-male founding teams. For comparison, 57.3% of all UK high-growth companies have all-male founding teams, emphasising the gender disparity within the high-growth semiconductor sector in particular.

Founders in the sector exhibit a diverse range of ages. Notably, the 50-59 bracket constitutes a substantial portion, accounting for 30.9% of the founder population. This prevalence could stem from the extensive expertise, robust networks, and enhanced access to financial capital that individuals within this age range have accumulated over time. Founders aged 40-49 comprise 21.3% of the total demographic. The 70-79 age group holds a strong representation at 11.0%, surpassing the 1.47% of founders aged 20-29.

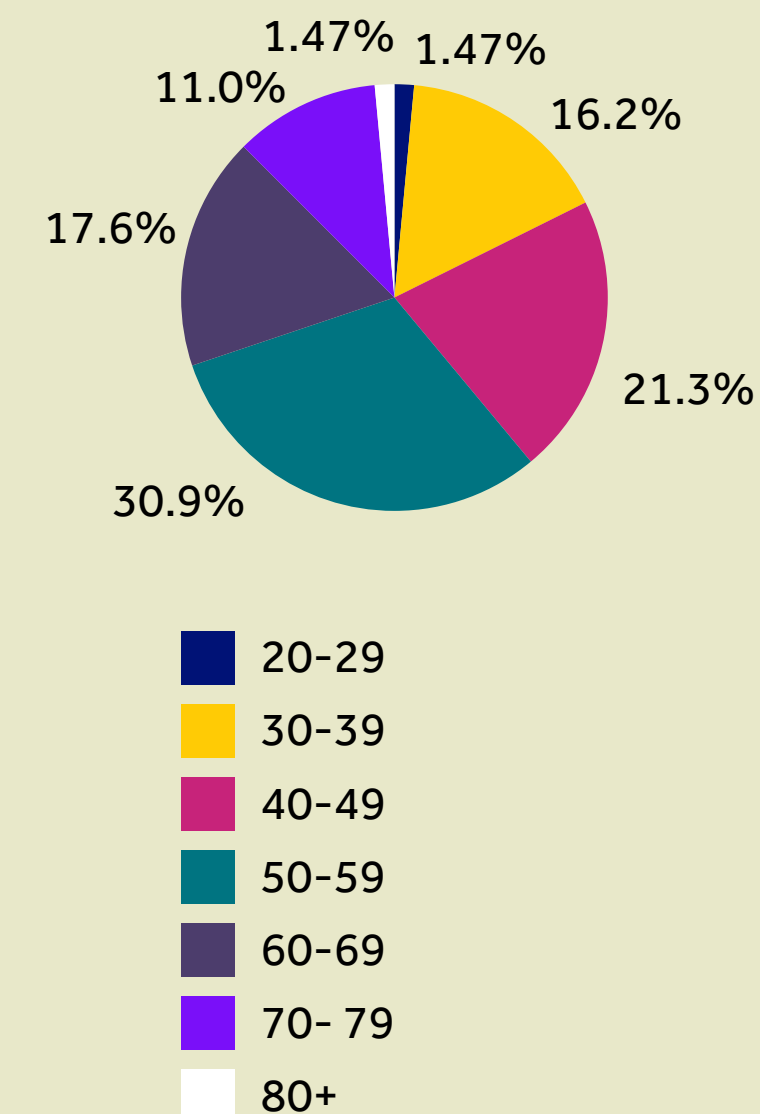
The majority of active high-growth semiconductor company founders (80.9%) are UK nationals. European nationals only account for 14.0% of company founders, with an even smaller proportion of founders from the rest of the world (5.15%). Despite the UK being a major hub for research and development within the semiconductor ecosystem, the retention of talent continues to remain a challenge⁶.

⁶ Business, Energy and Industrial Strategy Committee, Q39
Oral evidence: [The Semiconductor Industry in the UK, HC291](#)

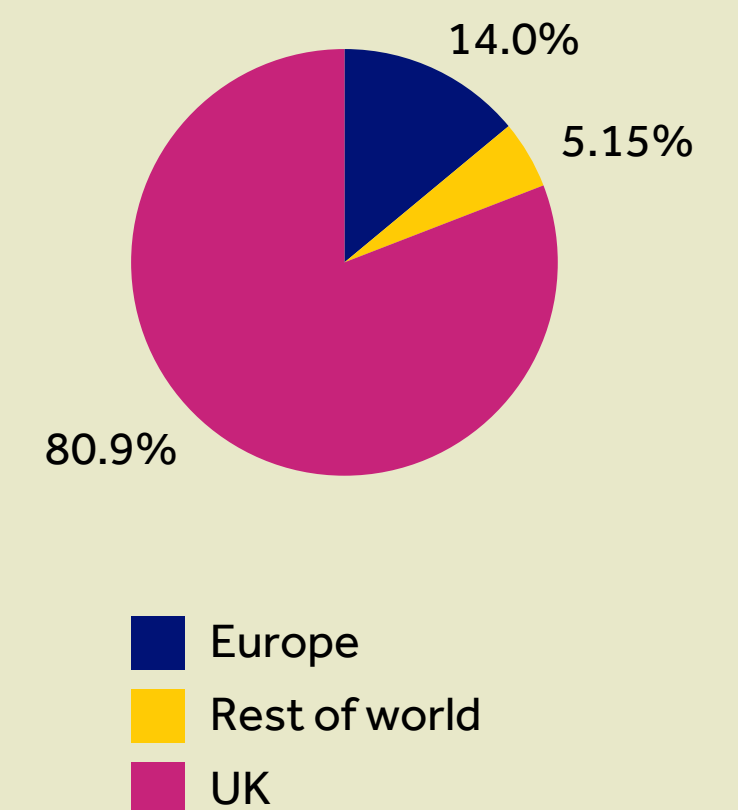
Gender composition of high-growth semiconductor company founders (August 2023)



Age composition of high-growth semiconductor company founders (August 2023)



Nationality composition of high-growth semiconductor company founders (August 2023)

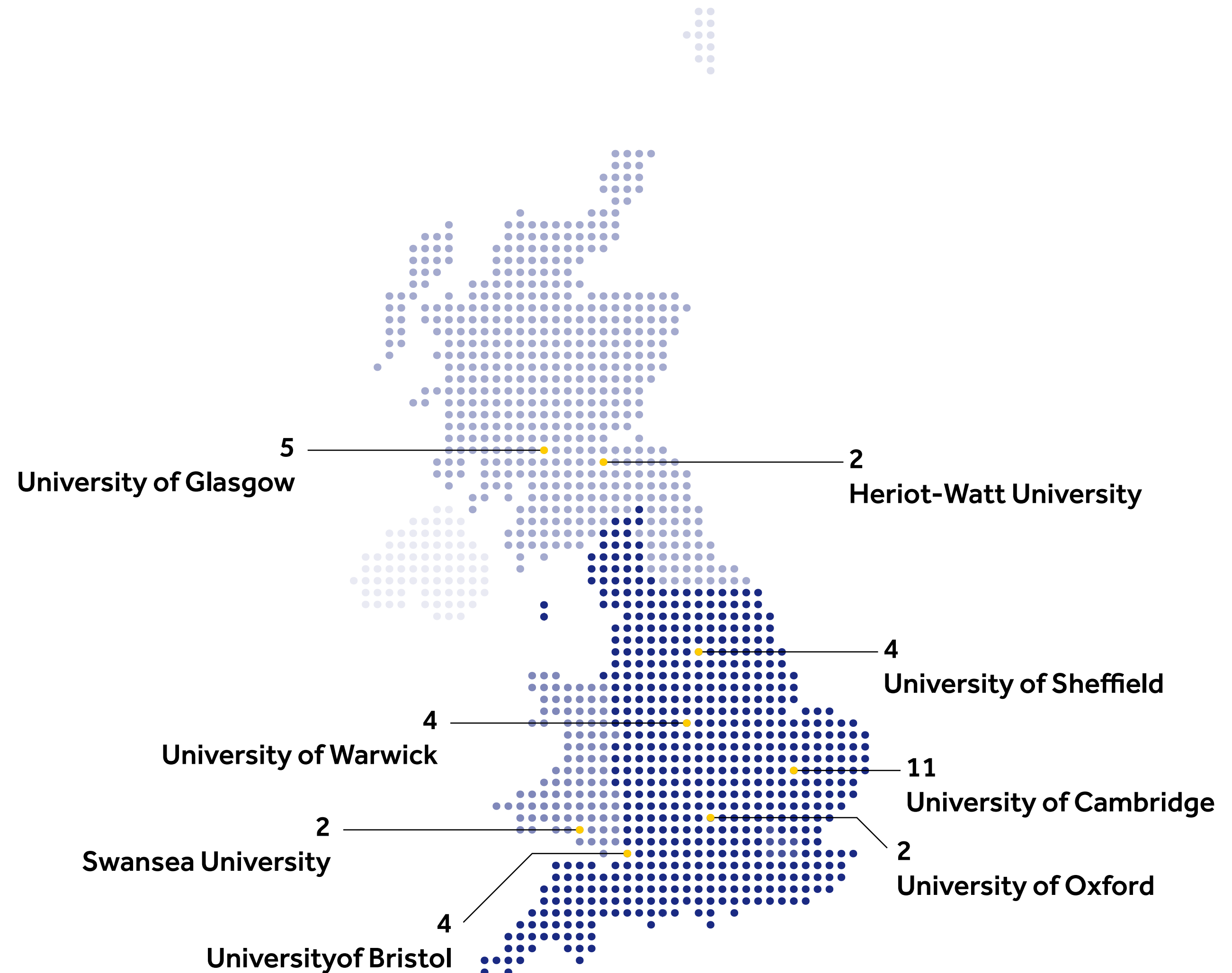


Spinout distribution

Academic spinouts are an important way for universities to commercialise IP. These companies comprise 39.2% of the active high-growth semiconductor population, and have collectively raised £273m in equity funding from 2013–2022. The University of Cambridge is a notable contributor, having spun out 11 companies—four of which have exited. Its portfolio includes Cambridge GaN Devices, which develops Gallium Nitride technology for applications in energy-saving electronics. The company secured £24.1m via four rounds of funding, with the backing of Parkwalk and Cambridge Enterprise.

The East of England region where the university is based benefits from an established electronics cluster, where initiatives such as the Cambridge Centre for Gallium Nitride have helped conduct research and innovation. Notably, the University of Bristol and the University of Glasgow also rank high on the list, with four and five spinouts respectively.

Regional distribution of high-growth semiconductor spinouts (August 2023)





Company spotlight: Salience Labs

The boom in startups building products and services built on the back of the wave of generative AI models has driven demand for a vital resource—computing power—driving a shortage in graphics processing units (GPUs). Amidst this backdrop, Oxford-based Salience Labs is working to develop cutting-edge processing units that package a photonics chip along with standard electronics. Unlike traditional processors, this chip uses light to execute operations. This innovation will enable Salience Labs to deliver massively parallel, ultra-high throughput processing performance on a single chip. The plan is to supply a power-efficient solution that can be deployed in a wide range of new and existing AI processes and applications.

Salience Labs was spun out of the University of Oxford in 2021 by CEO Vayshnavee Kewada, CTO Johannes Feldmann, and academic founders Harish Bhaskaran and Wolfram Pernice. In May 2022, it raised £9.42m from a diverse group of investors, including Oxford Sciences Enterprises, Cambridge Innovation Capital, DeepTech Labs, and notable figures from the global semiconductor industry, such as Jalal Bagherli, the former CEO of Dialog Semiconductor. In February 2023, the company won a £1.99m Innovate UK grant to support the development of its photonic chip,

known as a tensor processing unit (TPU). TPUs are custom-built for machine learning applications, and the incorporation of photonics elevates their efficiency and speed significantly. This unique blend of technologies represents a leap in processing capabilities and offers an edge in AI applications, ranging from natural language processing to computer vision.

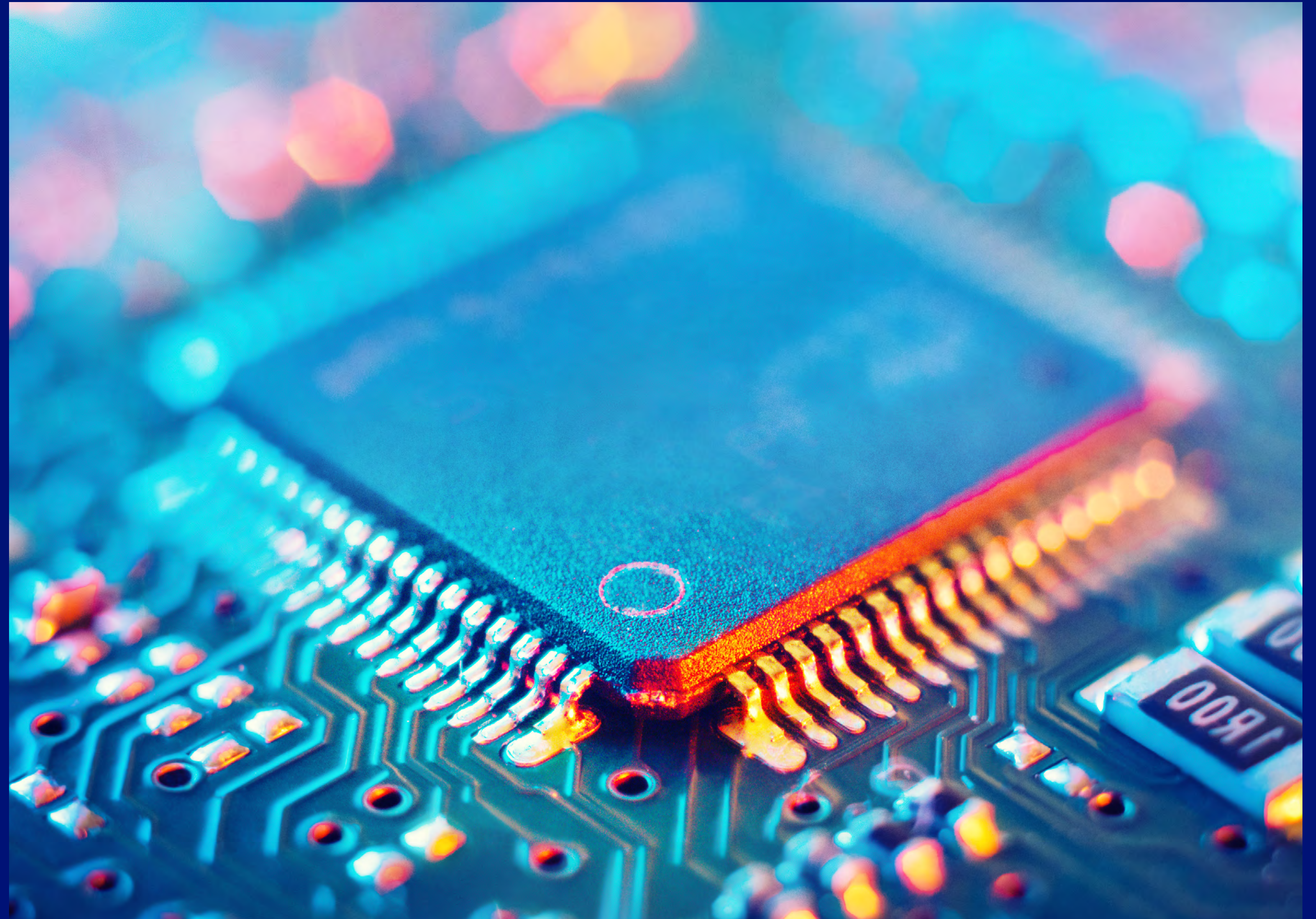
While the company is well capitalised, starting a deeptech hardware company during a global pandemic and chip shortage is not without its challenges. When interviewed, Vayshnavee Kewada highlighted the importance of relationships between foundries, explaining that the semiconductor shortage "put even more pressure on the importance of being able to build close relationships with the foundry – helping them understand why they should invest their time and resources in our prototyping".⁷

The financial backing Salience Labs has received speaks volumes about its potential. With support from well-established investment firms and industry veterans, the company is well-positioned to make a significant impact on the AI and semiconductor sectors. Salience Labs has also convinced high-profile industry figures to join the company such as

Chris Porthouse who signed on as Chief Product Officer in April this year. Porterhouse previously held the CPO role at chip designer Imagination Technologies and senior roles at Arm, a semiconductor firm designing processing units for different applications.

The recognition of the potential behind silicon photonic has allowed Saliency Labs to identify customers across a range of market vehicles. Many are attracted to the adaptability of the technology.

It is a challenging and exciting moment for companies innovating in semiconductors and processors. Saliency Labs has an ambitious mission to revolutionise AI processing with its TPU technology. Backed by a strong portfolio of investors and with a growing team, Saliency Labs is a company to watch closely, as it pursues its ambition of reshaping the future of computing.



Funding and innovation

The UK's high-growth semiconductor landscape has experienced remarkable growth in regards to investment over the past ten years. Companies secured an unprecedented £160m in equity funding during 2022 alone. Similarly, the number of published patent applications surged from 154, in 2012 to 276 in 2020.



Public funding

Public funding is crucial in propelling the industry’s growth and development, providing funding and a framework for academic collaboration with industry. In 2019, the high-growth semiconductor industry witnessed a significant surge in grant funding, with companies receiving £29.5m. This figure marked the highest annual total for semiconductor companies in the past decade. Despite this positive trend, the number of grants awarded in 2019 was the lowest in the last 10 years at 33, reflecting a notable 45.9% decrease from the previous year. Among the grant funders, Innovate UK accounted for 20 grants amounting to £3.11m, while the European Regional Development Fund made a significant impact with a single contribution of £12.8m. Other grant funders in 2019 included Scottish Enterprise and the Royal Academy of Engineering.

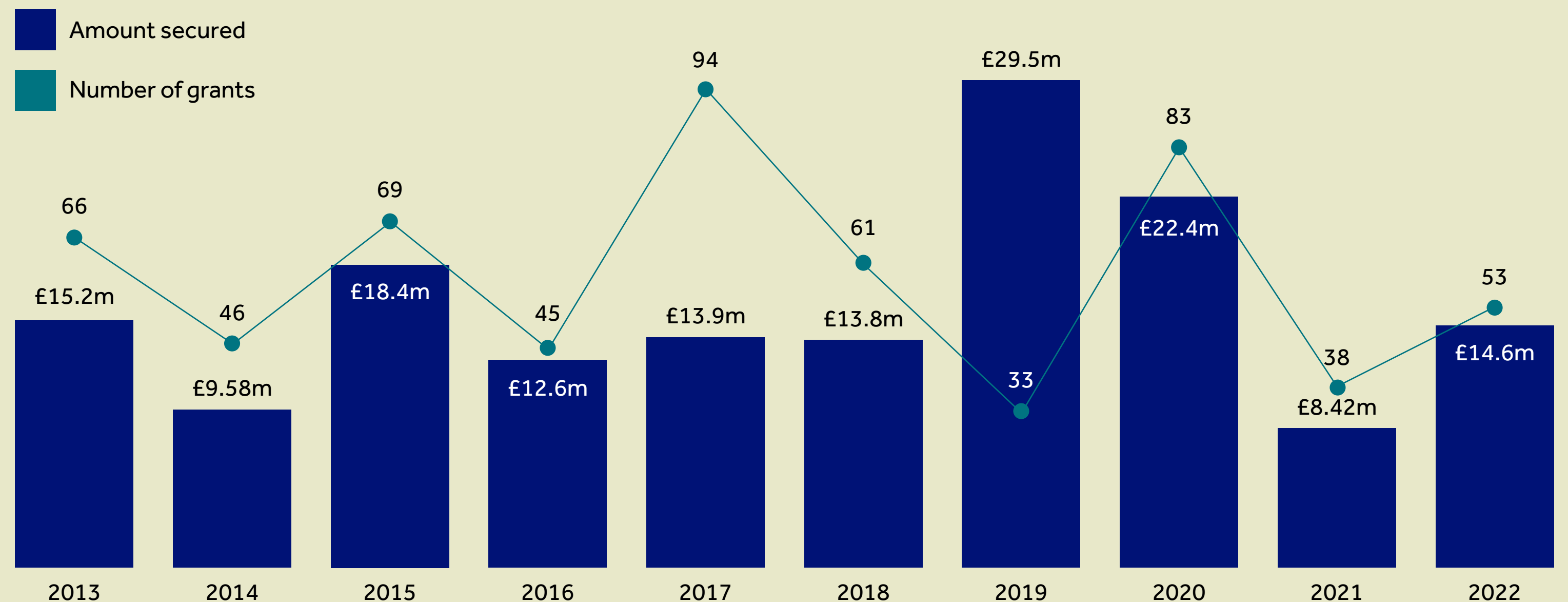
In 2020, there was notable growth in the number of grants awarded to semiconductor companies, 83 in total—representing a 151% increase from the previous year with 33. However, while the number of

grants grew, the overall value of grants in the sector decreased by 24.1%. Innovate UK retained a prominent role through a collective contribution of £17.9m, which accounted for 79.9% of the total grant money secured in 2020.

In 2021, there was a downturn in both the number and value of grants, hitting a decade-low value of £8.42m, a steep decrease of 62.5% from the preceding year. The

large concentration of grant funding in the years prior may also have contributed to a reduced need for additional funding in subsequent years. The figures for 2022 paint a more optimistic picture however, with the number of grants rebounding to 53, totalling £14.6m.

Grant funding secured by high-growth semiconductor companies (2013–2022)



Private funding

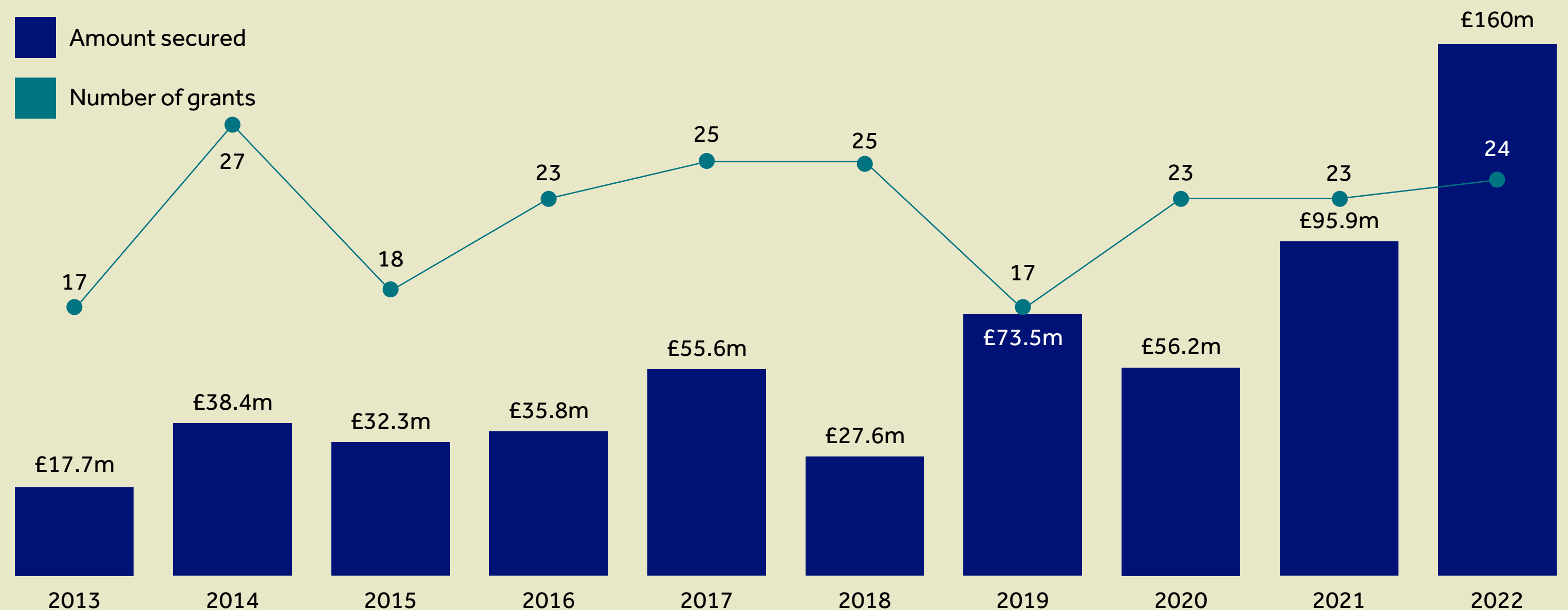
Over the last decade, equity investment into high-growth semiconductor companies has increased substantially. However, a handful of large deals take up a high portion of the total investment each year. There are also a small number of companies relative to the overall population that receive consistent year-on-year investment.

In 2022, semiconductor companies secured an unprecedented £160m in funding via 24 deals. This was due to two large deals: a £45.0m round in February secured by Paragraf, and a £28.2m deal by integrated circuits manufacturer Pragmatic in December 2022. The latter company additionally secured a £65.5m deal the previous year, which accounted for 68.3% of all deals in 2021. Excluding this deal by Pragmatic, the total investment would have been £30.4m, marking a 45.9% decrease from 2020.

While investment has increased over the past decade for high-growth semiconductor companies, there seems to be some general risk avoidance from investors. The number of deals remains particularly consistent, with several companies receiving recurring investment from a small pool of investors. This includes Cambridge-based Poro Technologies, which received £20.7m over five rounds of funding,

with the continuous backing of investors IQ Capital Fund, Cambridge Enterprise, and Martlet Capital. Foreign investment volumes remain low, as of the total population of 108 high-growth companies, only 18 companies secured investment from non-UK investors between 2013 and 2022, across a total of 29 fundraising rounds.

Equity investment secured by high-growth semiconductor companies (2013–2022)



Top fund managers

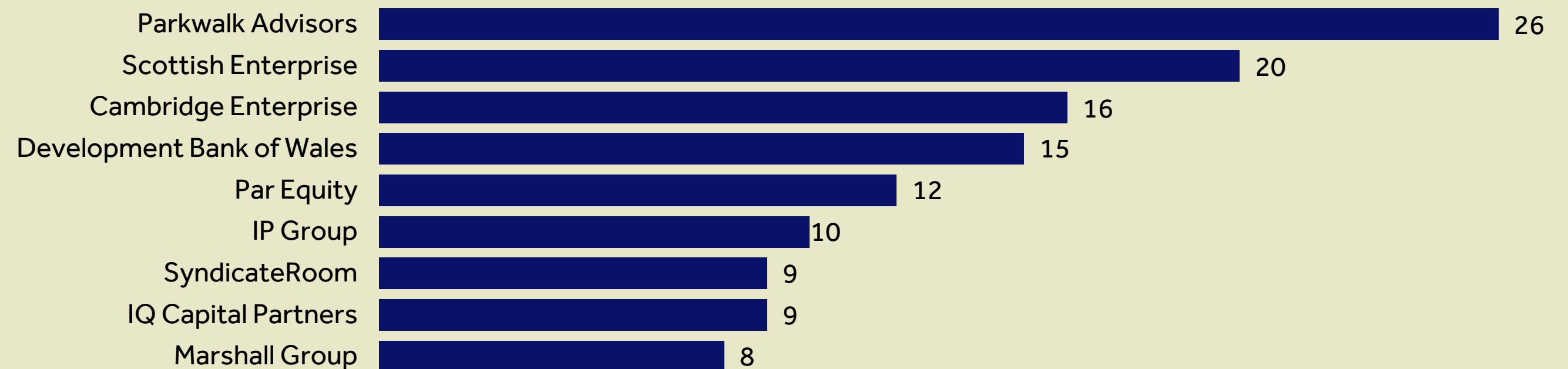
Parkwalk Advisors is at the forefront of investment into high-growth semiconductor companies, having participated in 26 deals between 2013 and 2022. The fund invests into university spinouts through early-stage Enterprise Investment Scheme (EIS) funds in collaboration with the Universities of Cambridge, Oxford, Bristol, and Imperial College. It manages the Parkwalk Opportunities EIS Fund, which has made ten semiconductor deals in the last decade, including Cambridge GaN Devices' £15.0m funding round in July 2022, following a previous investment made in January 2021.

Trailing closely is Scottish Enterprise with 20 deals. The economic development agency invests in companies located in Scotland or those with significant operational presence in the region. It manages the Scottish Co-Investment Fund, which participated in 11 fundraisings, including Chromacity's £1.20m funding round in June 2021, as well as Skylark Lasers' £1.04m funding round in February 2022.

Cambridge Enterprise is the University of Cambridge's commercialisation arm, facilitating knowledge transfer and commercialisation services to its spinouts. The subsidiary arm provides investment into its spinouts through Cambridge Seed Funds. The fund participated in 16 deals from 2013–2022, including multiple deals for ROADMap and Cambridge CMOS Sensors.

The university also launched a fund in conjunction with Parkwalk Advisors, which invests in companies selected by Cambridge Enterprise.

Top fund managers by number of equity deals into high-growth semiconductor companies (2013–2022)



Clas-SiC Wafer Fab

£25.7m

amount raised

Jun 2022

Date

Clas-SiC Wafer Fab operates a silicon carbide foundry, an emerging semiconductor technology enabling smaller, lighter, and more energy-efficient connectivity. The company operates an award-winning facility in Lochgelly, Fife. Founded in 2017 by Steve Dunn, the company is led by managing director Rae Hyndman and provides services, including process design, innovation, and manufacturing for silicon carbide devices. The company has raised £29.2m in equity via two rounds, with its latest deal in June 2022 totalling £25.7m. In addition, Clas-SiC has also received a further £1.66m via four grants.

Pragmatic

£28.2m

amount raised

Dec 2022

Date

Pragmatic manufactures low-cost, flexible integrated circuit technology as an alternative to traditional silicon production. The company leverages thin-film semiconductor technology to make integrated circuits more affordable and faster to produce than conventional silicon chips. Founded in 2010 by Executive Director Scott White and Chief Technology Officer Richard Price, the company is headquartered in Cambridge, with production facilities in Sedgefield, Durham. Since its launch, Pragmatic has secured £143m in equity funding across six deals, with its most recent round in December 2022 totalling £28.2m. Notable investors included Finance Durham, Future Fund: Breakthrough, and the North East Development Capital Fund. The company has received 43 grants totalling £9.30m to support its research, development, and operations.

Future of the sector

There has been a notable surge in patent applications, soaring from 73 in 2011, to 227 in 2021. Amidst global demand and chip shortages worldwide, the UK government has unveiled its National Semiconductor Strategy, to boost existing strengths within the domestic semiconductor industry.

UK patents

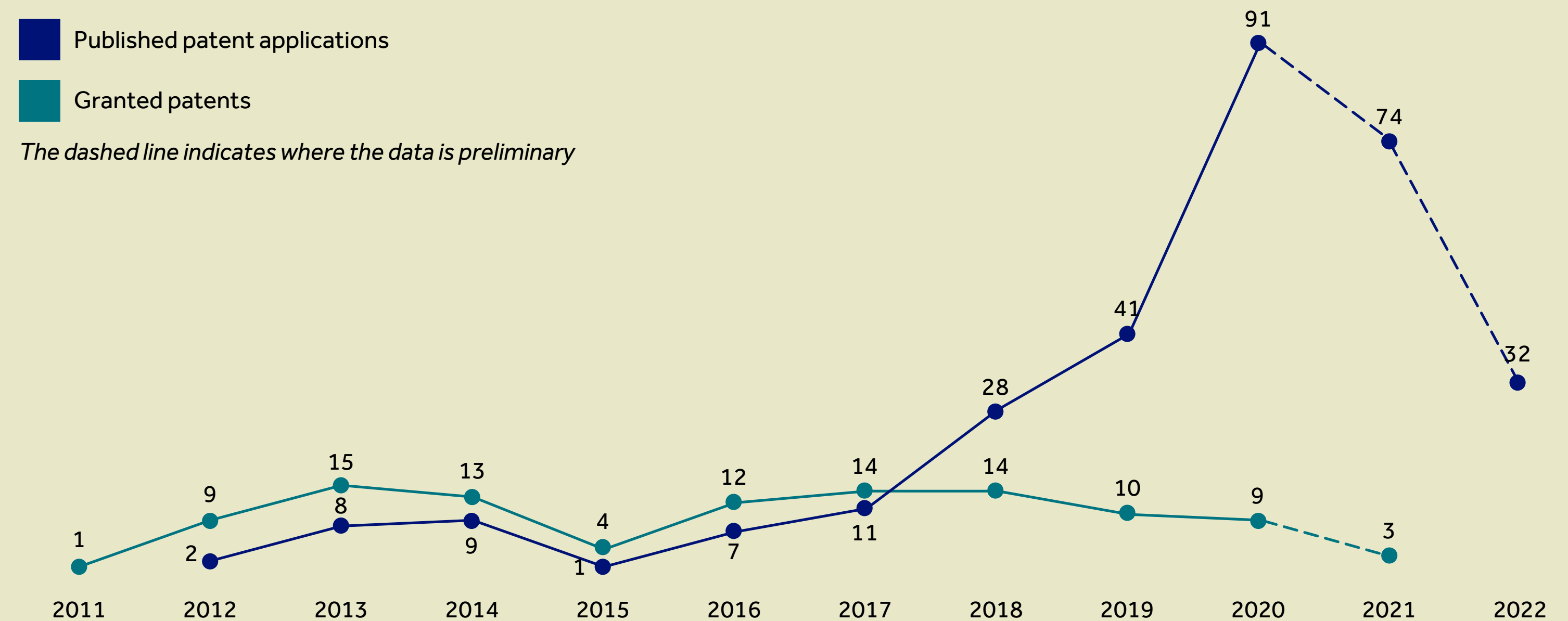
Innovation is at the heart of semiconductor companies, with the constant aim to improve processes to achieve a product that is increasingly faster, cheaper and more accessible. Patents are a mechanism to protect intellectual property, incentivising companies to pursue additional innovation. Patent filing is a critical measure in safeguarding the investments a company has channelled into research, development, and innovation across its designs and methodologies.

The patent applications filed by high-growth companies range from integrated circuit design, refining manufacturing processes, improving chip packaging, to developing new materials for enhanced chip performance. This spectrum of potential applications underscores the existing innovation landscape within the high-growth semiconductor industry.

Over the past decade, there has been a notable increase in the number of patent applications submitted by high-growth semiconductor companies. From 2012 to 2016, approximately two-thirds (64.5%) of these patent applications were granted. However, despite this increase in the number of applications from 2016 onwards, the percentage of approvals experienced a notable decline.

However, the data spanning 2020–2022 provides a preliminary snapshot of the patent landscape within the industry. This is subject to change, due to the 18-month latency period existing between the submission and public disclosure of patent publications. As such, it might be the reason why there is a reduced ratio of granted patent applications to the total number of applications.

Patent activity by high-growth semiconductor companies (2013–2022)



UK innovation and semiconductor strategy

Ongoing chip shortages and geopolitical tensions have accelerated international competition within the semiconductor ecosystem. Governments have introduced new strategies and increased investment plans in the sector to grow and strengthen semiconductor capabilities, with an eye toward safeguarding against future shortages. The UK has outlined its vision for its own semiconductor industry through the unveiling of the National Semiconductor Strategy. The strategy aims to draw upon areas of advantage, such as a robust research and development ecosystem and existing strengths in compound and advanced material semiconductors and chip design, while simultaneously tackling the industry's pressing challenges—ranging from access to finance and talent, to supply chain resilience.

The centrepiece of this strategy is a substantial funding package totalling £1b over a 10-year span, with a specific allocation of up to £200m set aside for the years 2023–25. While this allocation may fall short of the levels seen in the United States and European Union, the UK's strategy diverges in objectives: rather than expanding manufacturing capabilities, it seeks to enhance existing strengths in chip design and compound semiconductors, which are less cost-intensive.

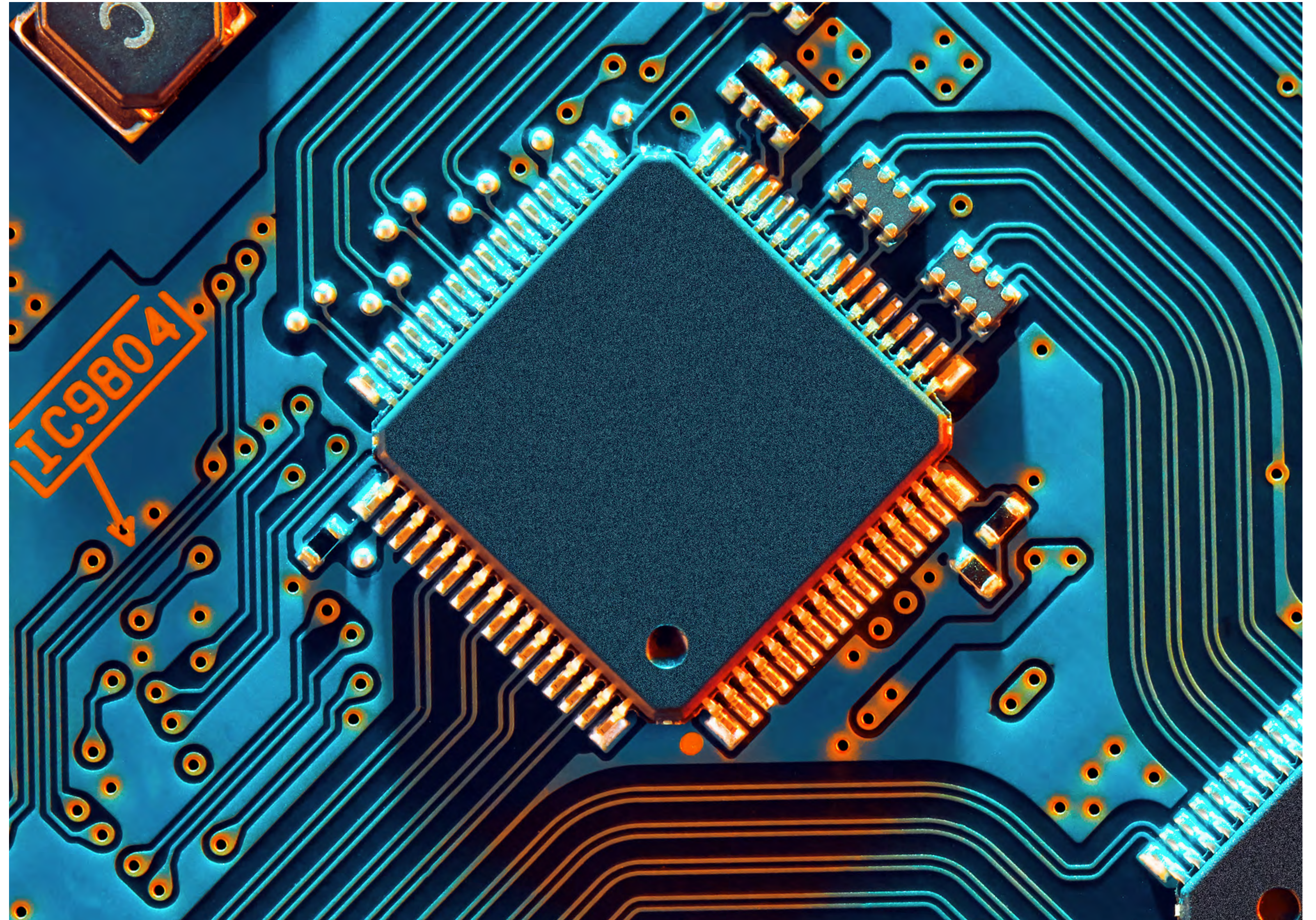
Regions with existing semiconductor clusters, including South Wales, Cambridge, and Scotland, stand to benefit from the forthcoming opportunities outlined in the strategy. Skill development and exchanges are crucial aspects to be considered during implementation, as they will not only support these clusters but also foster economic and technological leadership on both regional and national scales. To ensure a cohesive connection with the industry, the government has also selected an advisory panel featuring key figures from industry, government, and academia. This collaboration aims to ensure a balanced approach towards decision-making and to provide a conduit for policymakers to gain insight and receive feedback from experts within the sector.

The strategy sets forth a roadmap aimed at enhancing the UK's semiconductor industry, with funding allocations to be detailed in upcoming government announcements. Observers note that these allocations will likely align with historical funding patterns, helping to create continuity. Scaling the industry is a universal challenge, made more complex by robust international competition. In this global landscape, the UK engages alongside larger players like the US, Taiwan, and China, who invest billions of dollars into their respective industries. Collaborative efforts throughout the supply chain stand as a key factor in bolstering domestic growth. Effective communication and engagement with stakeholders across the industry will be instrumental in the strategy's implementation.

Beyond the ambition of the Semiconductor Strategy, the UK boasts an extensive network of initiatives that drive growth and foster innovation. Initiatives such as the Compound Semiconductor Applications Catapult and the National Epitaxy Facility elevate the existing network of research and IP that forms the backbone of the UK's semiconductor ecosystem. These initiatives support companies and researchers across the nation, by granting them access to expertise and resources.

The National Semiconductor Strategy serves as a foundation to leverage domestic semiconductor

knowledge, expertise, and potential. The intersection of government and industry will establish a prominent standing for UK semiconductor companies within the rapidly evolving and highly competitive global landscape.



Methodology

Defining startup and high-growth companies

Beauhurst identifies high-growth startup companies using eight triggers (outlined on this page) that it believes suggests a company has high-growth potential. More detail on Beauhurst's tracking triggers is available via its website.

Defining semiconductors

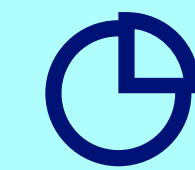
Semiconductors are materials that can control the flow of electricity. The ability of semiconductors to control and amplify electrical currents puts them at the heart of modern electronics, making it possible for microchips to become smaller, faster, and more efficient. Notably, semiconductors play pivotal roles in strategic technologies such as artificial intelligence, quantum computing, and the evolution of 6G networks.

Equity investment

To be included in our analysis, any investment must be:

- Some form of equity investment
- Secured by a UK company
- Issued between 1 January 2013 and 31 December 2022.

High growth triggers



Equity investment



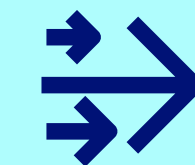
Academic spinouts



Scaleups



High-growth lists



Accelerator attendances



Major grant recipients



Management Buy-outs/
Buy-ins



Venture debt

Barclays Eagle Labs

Barclays Eagle Labs is a growing national network that provides business incubation, dedicated growth programmes, mentoring as well as co-working, and office space for ambitious high-growth businesses.

By cultivating a community of like-minded entrepreneurs and providing a collaborative work environment, access to peers, and opportunities to maximise growth through digital connections and growth programmes, curated events, and funding opportunities, Eagle Labs is able to help startups to grow at pace.

Eagle Labs also specialises in positively disrupting key industries by bringing together key corporate players, industry bodies, leading universities, and startups to enable rapid innovation and investment, by asking them to collaborate and currently have dedicated lawtech, healthtech, energytech and agritech industry-aligned programmes.

With various Eagle Labs dotted all across the UK and many more in the pipeline, our focus is to help to connect, educate, inspire, and accelerate ambitious UK businesses and entrepreneurs.

Find out more at labs.uk.barclays.

Important Information

We have pulled together the resources in this document for you to help with your independent research and business decisions. This document contains opinions from independent third parties and link(s) to third party websites and resources that we (Barclays) are not providing or recommending to you.

Barclays (including its employees, Directors, and agents) accepts no responsibility and shall have no liability in contract, tort, or otherwise to any person in connection with this content or the use of or reliance on any information or data set out in this content unless it expressly agrees otherwise in writing.

It does not constitute an offer to sell or buy any security, investment, financial product or service and does not constitute investment, professional, legal, or tax advice, or a recommendation with respect to any securities or financial instruments.

The information, statements, and opinions contained in this document are of a general nature only and do not take into account your individual circumstances including any laws, policies, procedures, or practices you or your employer or businesses may have or be subject to. Although the statements of fact on this page have been obtained from and are based upon sources that Barclays believes to be reliable, Barclays does not guarantee their accuracy or completeness.

Beaurourst

Beaurourst 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 Britain. 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 beaurourst.com

Contact

4th Floor, Brixton House
385 Coldharbour Lane
London
SW9 8GL

www.beaurourst.com

T: +44 (0)20 7062 0060

E: consultancy@beaurourst.com



Before you go

Get in touch if you would like to find out how we can support you and your business. We'd love to hear from you.



eaglelabs@barclays.com



labs.barclays



[Barclays Eagle Labs](#)



[@Eagle_Labs](#)



[Barclays Eagle Labs](#)



[@eaglelabs](#)



[EagleLabs](#)



Barclays Bank UK PLC is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority (Financial Services Register No. 759676). Registered in England.
Registered No. 9740322. Registered Office: 1 Churchill Place, London E14 5HP. Barclays Bank UK PLC adheres to The Standards of Lending Practice which is monitored and enforced by The Lending Standards Board. Further details can be found at www.lendingstandardsboard.org.uk.

Disclaimer

We're not responsible for, nor do we endorse in any way, third party websites or content.

The views and opinions expressed in this report don't necessarily reflect the views of Barclays Bank UK PLC, nor should they be taken as statements of policy or intent of Barclays Bank UK PLC. Barclays Bank UK PLC and its employees have made every attempt to ensure that the information contained in this document is accurate at the time of publication. No warranties or undertakings of any kind, whether express or implied, regarding the accuracy or completeness of the information is given. Barclays accepts no liability for the impact of, or any loss arising from, any decisions made based on information contained and views expressed in this document.