UNIVERSITY OF CAMBRIDGE
enterprise

Annual Review 2018

Contents

Who we are and what we do

Cambridge Enterprise was created by the University of Cambridge to help staff and students commercialise their ideas and expertise. Our role is central to the mission of the University, which for more than 800 years has contributed to society through the pursuit of education, learning and research at the highest levels of international excellence.

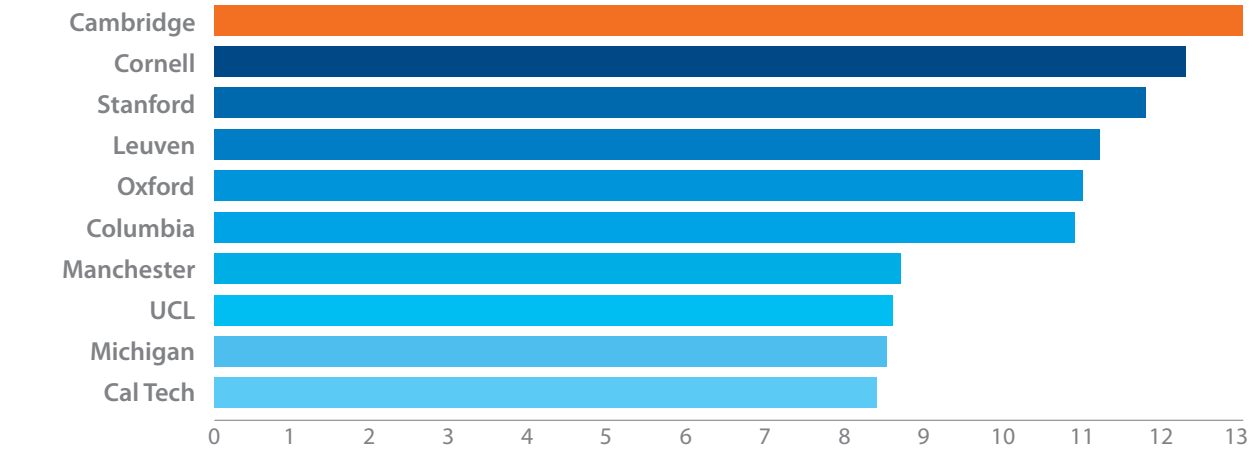
At Cambridge Enterprise we help University academics, researchers, staff and students achieve the impact that is essential to securing long-term funding for research. Our success is measured in the achievements of our academic partners as they bring their work to market.

We strive to make the world a better place by helping to create a legacy of products, services and advice that benefits not just the University and the UK, but everyone.

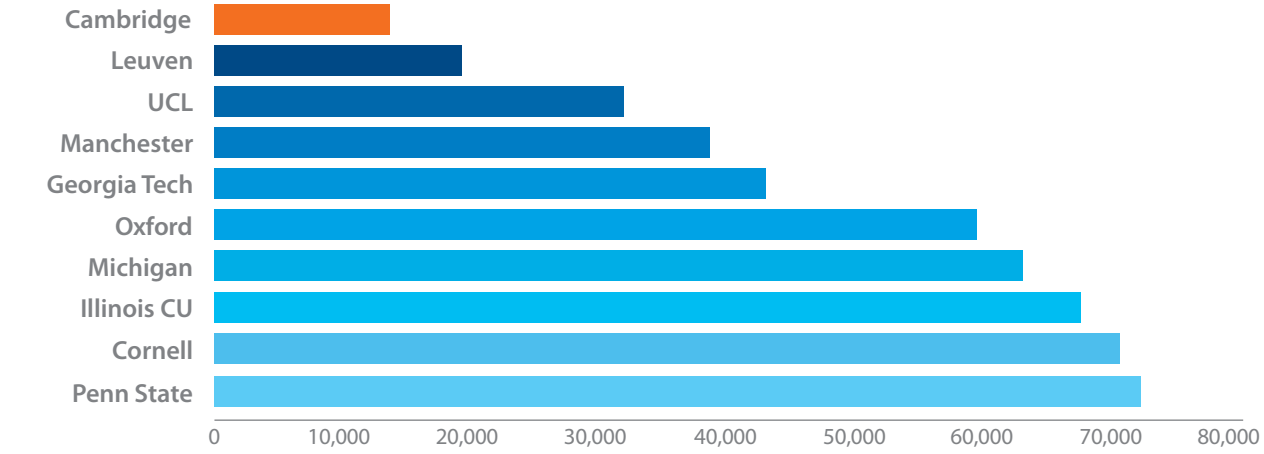
We accomplish this by helping to get ideas and inventions patented, licences granted and expertise shared. We help create and support new spin-out companies based on University intellectual property and people. Cambridge Enterprise provides funding, advice and contract management to members of the University, in departments from science, technology, maths and medicine to the arts, humanities and social sciences.

Performance compared to selected international peers

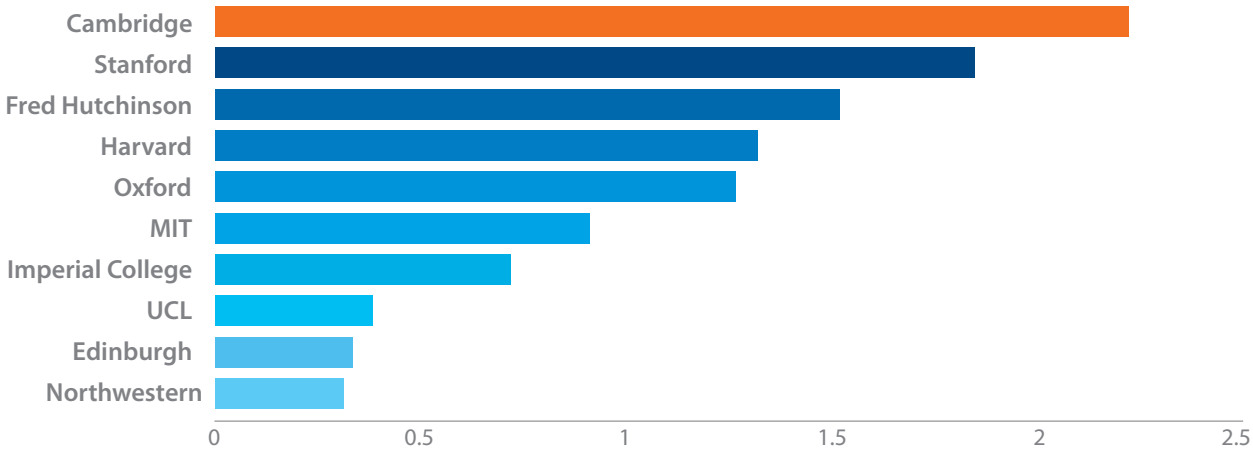
Top ten in number of licences[1] per $100m of research spending, 2011-15[2]



Lowest ten in IP expenditure per licence[1], 2011-15 ($)[2]



Top ten in capital raised by university spin-outs 2013-17 ($bn)[3]



A letter from the Chief Executive

It has been a good year for Cambridge Enterprise with remarkable discoveries and early stage technologies disclosed, exciting potential therapeutics pursued, licences signed, new ventures funded and a wide range of consultancies outside of the University supported. These successes are a tribute to the extraordinary community that we serve and the drive, creativity and brilliance of its researchers.

We were pleasantly surprised by a study published in May that put the University of Cambridge at the top of an international list of universities for the capital raised by their spin-outs from 2013-2017 (see chart opposite). Universities in the UK occupy five of the top ten places —a result that reflects the country's world-leading research base. These findings should lay to rest any doubts about the vitality and global standing of the university innovation sector in the UK.

This conclusion was reinforced by a recent study out of Imperial College London, which found that the UK outperforms the US on the number of invention disclosures per £100 million spent on research. In the UK the number is 74; in the US it is 58. In terms of IP income, the UK is catching up: the US achieves around 4 per cent of research resource, the UK 3 per cent. Similarly research commissioned by Cambridge Enterprise in 2017 showed four UK universities among the top ten for the number of licenses per $100 million of research (top chart, opposite). This licence productivity is paired with performance in cost-effective intellectual property protection.

There have been gratifying results closer to home as well. Cambridge Enterprise was awarded a Gold Accreditation in this year's Best Employers Eastern Region survey. The accreditation recognises Cambridge Enterprise as being among the best employers in the region—as judged by employees and based on a host of factors including turnover, career progression, working practices and values. Cambridge Enterprise exists to help usher inventions out of the lab and into practical use. We look forward to continuing to play our part in helping our academic colleagues translate their great research into great commercial success.

Dr Tony Raven

1 Licence as defined by AUTM.
2 Tomas Coates Ulrichsen, University of Cambridge. Private communication based on AUTM, NSF private data. Data for Imperial College London not available.
3 Source: Global University Venturing 2013-17 Data Review.

2017-18 in numbers

£1.1 million invested in patent
£21.6 million in translational f
258 patent applications filed.
licences signed. 401 consultan
extensions. 234 clients served
in operating income generated
£6.6 million invested in spin-o
follow-on funding raised by o
1995. 1,825 researchers suppo

s and proof of concept.
unding won with our support.
127 commercial and research
cy contracts signed, including
by consultants. £10.3 million
from licensing and consulting.
ut companies. £1.7 billion in
ur portfolio companies since
rted.

Our Mission and Values

We devoted time during the past year to checking our objectives and ensuring our course was clearly plotted for our second decade. We reaffirmed our organisational Mission, which states that "Cambridge Enterprise exists to help the University's innovators, experts and entrepreneurs make their ideas more commercially successful for the benefit of society, the economy, the individual and the University".

We also examined our core values, gathering thoughts from staff, senior management and our board. At the end of this process we hammered out six statements central to Cambridge Enterprise's culture and formally adopted them in July.

Impact—We are driven to make a better world. Individually and together, we care about the outcome of our work beyond the deal.

Excellence—We aim to deliver exceptional outcomes that inspire others.

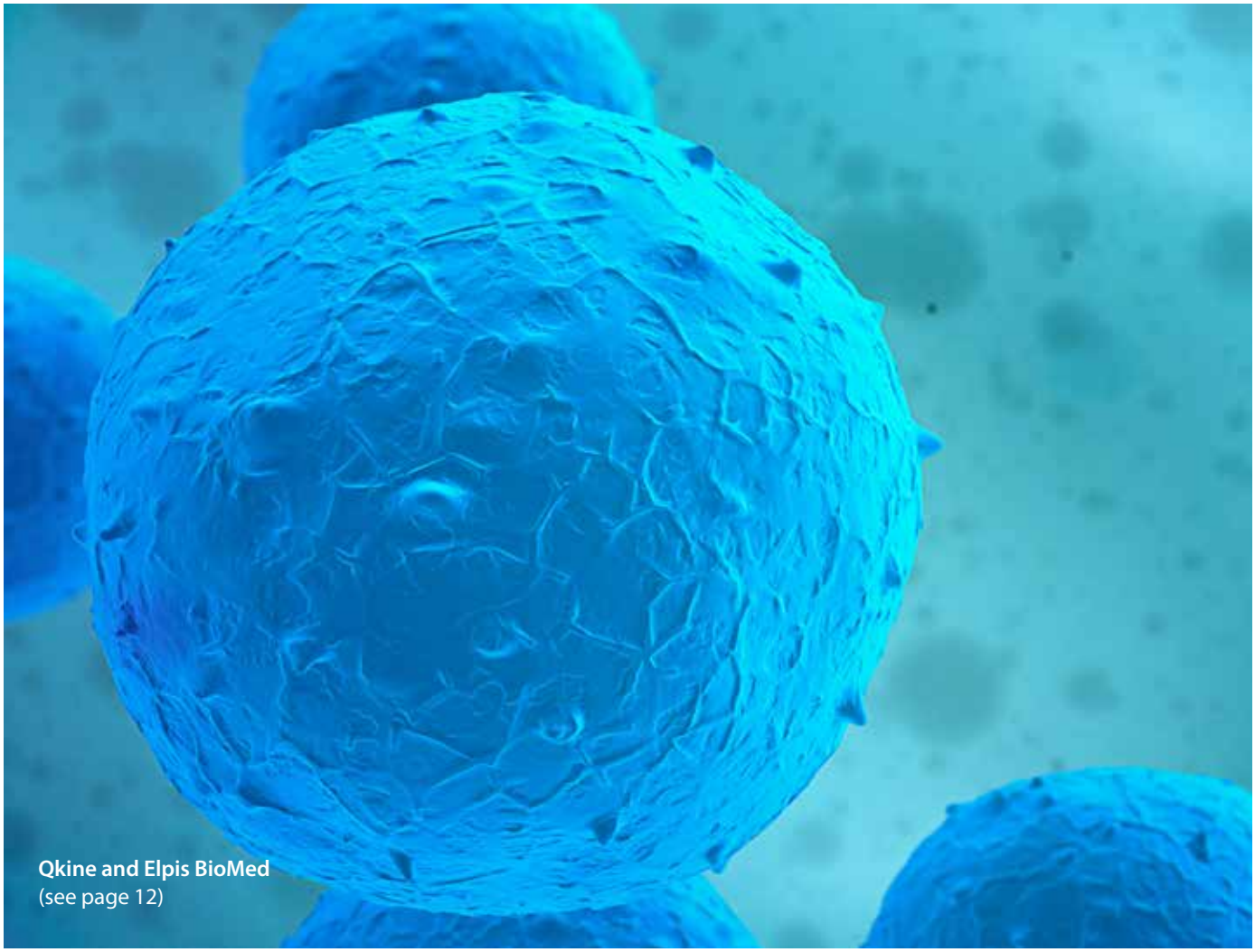
Innovative and Imaginative—We are excited about adventurous opportunities and imaginative solutions.

Sharing knowledge—We learn from and develop each other. We share expertise and experience with colleagues and partners, willingly and without prejudice.

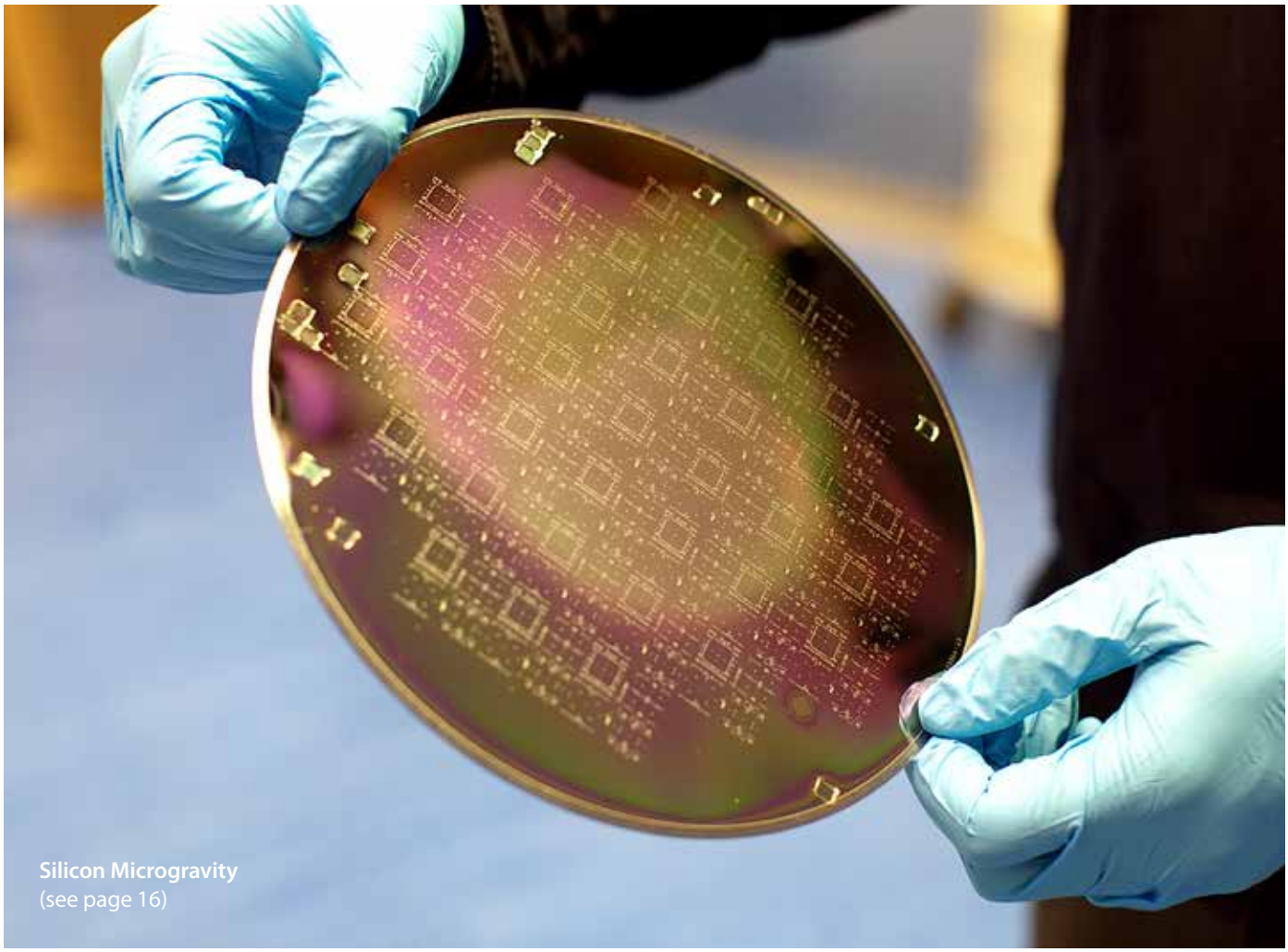
Working with others—We care about our relationships. We strive to work in ways that build confidence and trust, enabling us to make the right decisions, however difficult.

Empowered—We are empowered to act in ways that espouse and reinforce our values, and to challenge behaviours that do not.

Ideas *made real*



Qkine and Elpis BioMed
(see page 12)



Silicon Microgravity
(see page 16)

Technology Transfer
An introduction

Helping researchers, staff and students commercialise their most promising ideas is at the heart of Cambridge Enterprise and our Technology Transfer team is at the centre of that work.

The Life Sciences and Physical Sciences teams, both part of the Technology Transfer team, develop ideas and inventions into attractive licensing and investment opportunities and assist with the creation of new companies.

We often work with researchers whose ideas are in the earliest stages of development. Our job is to build substantial licensable or investable assets. This can include helping to secure proof of concept funding from public and charitable sources or investing our own proof of concept funds, sourcing the building of prototypes, accessing advice from external experts and, critically, understanding markets.

We seek development partners and licensees and subsequently negotiate and manage commercial deals through licensing intellectual property, including patents, know-how, data and copyright. This year, the Technology Transfer team signed 46 commercial licences and filed 258 patent applications.

A growing number of our licences now arise from the work of our Research Tools team, which is part of Technology Transfer as well. In 2017-18, £438,000 in income was generated by 48 Research Tools commercial licences.

Life Sciences
Getting more discoveries into development

The labs and hospitals of the University of Cambridge produce a wealth of knowledge. Transforming it into products and services that save and improve lives requires expertise from academia and industry as well as capital and customers. The Life Sciences team has created novel and ambitious collaborative ventures to bring these critical elements together to do this, yet more efficiently, with technologies from agriculture to therapeutics.

This year we applied what we learned with our Apollo Therapeutics fund to expand into a new arena with the creation of the Ceres Agri-Tech Knowledge Exchange Partnership with the universities of East Anglia, Hertfordshire, Lincoln and Reading (see page 14 for details).

Launched in 2016 Apollo Therapeutics is a novel collaborative venture designed to speed drugs towards the market. Now in full stride, Apollo supports the translational drug discovery community at Cambridge, Imperial College London and University College London. To date Apollo has funded seven projects from Cambridge researchers, the first of which is now attracting commercial interest.

Of the seven Cambridge projects Apollo has backed, three were chosen in the past year. The first, led by Professor Clare Bryant in the Department of Veterinary Medicine and Professor David Klenerman in the Department of Chemistry, aims to discover and develop a drug discovery programme to deliver therapeutic TLR4 antagonists as novel treatments for Alzheimer's Disease and Chronic Respiratory Disease.

The second, led by Dr Marko Hyvönen in the Department of Biochemistry and Professor David Spring in the Department of Chemistry, is based on their discovery of a unique, small molecule binding pocket adjacent to the ATP-binding site of the protein kinase CK2α and of fragments binding into it. Apollo and Cambridge teams are now collaborating on a drug discovery project to deliver potent, selective inhibition of CK2α, overexpression of which has been associated with malignancies.

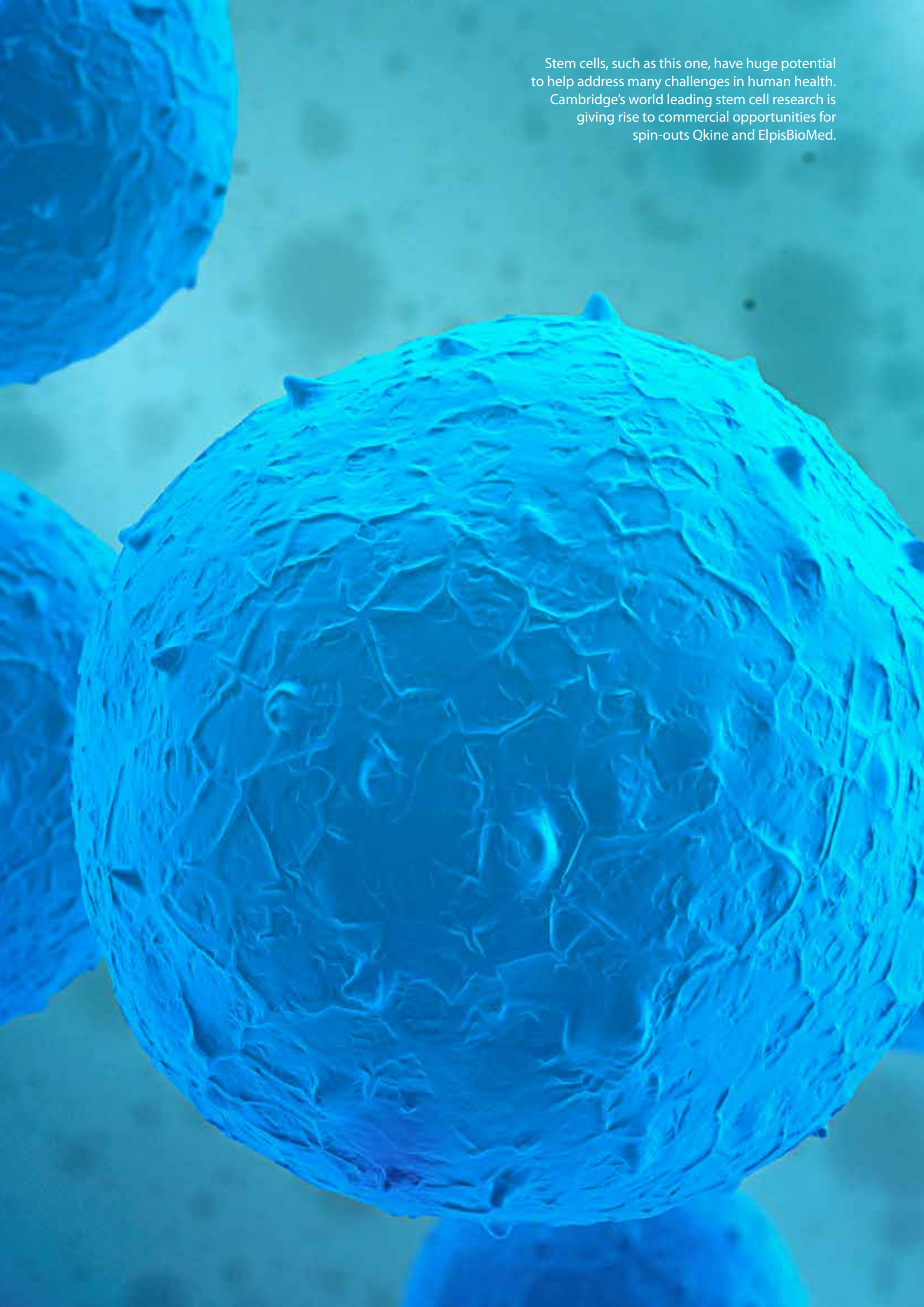
The third project is led by Professor Ashok Venkitaraman, Director of the MRC Cancer Unit, in collaboration with Professor Chris Abell of the Department of Chemistry, Professor Spring and Dr Hyvönen. They identified a novel small molecule binding site that permits strong, selective inhibition of Aurora A kinase.

In other work during the past year, Life Sciences aided DIOSynVax, a spin-out from the Laboratory of Viral Zoonotics at the Veterinary School, in securing translational funding, developing a business plan and obtaining cornerstone investment. Founded by Professor Jonathan Heeney and colleagues, DIOSynVax's new approach has the potential to dramatically reduce the time needed to create new vaccines and to change the way industry makes them.

In August the Life Sciences team signed a key licensing deal with Qkine, a recent spin-out from the Department of Biochemistry. The technology, developed by Qkine co-founder Dr Hyvönen, is used to make proteins for the control of stem cell growth and differentiation. The high quality reagents Qkine produces meet a growing demand for stem cells to use in disease modelling, drug screening, precision medicine and drug development.

Although human pluripotent stem cells can be transformed into virtually any tissue cell type in the body, it has been a laboriously slow process. Last year Dr Mark Kotter and his team in the Department of Clinical Neurosciences published a paper on "forward programming" pluripotent stem cells. The process, which they dubbed OPTi-OX, produced millions of identical cells in a matter of days. In September we licensed the technology to Elpis BioMed, the spin-out Kotter founded. Like Qkine, its goal is to become a leading global supplier for academic research, commercial drug discovery and cell therapy. In June we amended the licence so that Elpis could work with food company Meatable, which plans to produce animal-free meat from a single bovine cell.

Finally, the Life Sciences team supported a very different sort of invention, an exercise wheel for laboratory mice. Developed by the University's Central Biomedical Services, the team that cares for the University's laboratory animals, it is easy to fit, remove and sterilise. It also rotates in both directions, providing both physical and cognitive stimulation for mice. Tecniplast is taking the wheel to market.



Stem cells, such as this one, have huge potential to help address many challenges in human health. Cambridge's world leading stem cell research is giving rise to commercial opportunities for spin-outs Qkine and ElpisBioMed.

Case study

The Ceres Agri-Tech Knowledge Exchange Partnership

Agricultural science and technology are some of the world's fastest growing markets, with the East of England representing an internationally important agri-tech cluster, both in terms of its research capabilities and its industrial base. Advances in nutrition, genomics, informatics, artificial intelligence, remote sensing, automation and plant sciences have huge potential in precision agriculture and food production. Farmers, food processors and their suppliers, who range from engineers to plant breeders, are eager to explore and adopt new technologies to improve their competitiveness and efficiency, and so the time is ripe to catalyse early stage technology transfer in this globally critical sector.

The Ceres Agri-Tech Knowledge Exchange Partnership launched this spring to help drive this commercialisation of agri-tech research and innovation. Cambridge leads the effort with four other universities—University of East Anglia, University of Hertfordshire, University of Lincoln and University of Reading. Through collaboration, the Ceres Partnership brings together universities that have extensive and complementary research and commercialisation capabilities. The Ceres Partnership also draws on the capabilities of specialist agri-tech research institute partners in the region—the John Innes Centre, NIAB and Rothamsted Research—to leverage their combined expertise and approaches to agri-tech innovation. In this way, Ceres works to identify, build, invest in and run the most commercially viable development projects emerging from Ceres partner universities and focused on the innovation needs of the agri-tech sector.

In April Research England, a new council within UK Research and Innovation, awarded the Ceres Agri-Tech Knowledge Exchange Partnership £4.78 million from its Connecting Capability Fund, created to enable the sharing of commercialisation expertise. In addition to Research England's award, Ceres has also secured funding commitments of over £15 million from corporates and technology investors for further investment in high quality commercial opportunities.

ceres

Physical Sciences
Supporting innovation

The Physical Sciences team serves researchers in the University's School of Technology and its School of Physical Sciences as well as academics from other schools and departments. The team has helped identify, translate into opportunities and commercialise inventions ranging from rechargeable batteries to speech recognition and from nanomaterials to automobile components. These technologies have the potential to improve energy, infrastructure, transport, healthcare, manufacturing and more.

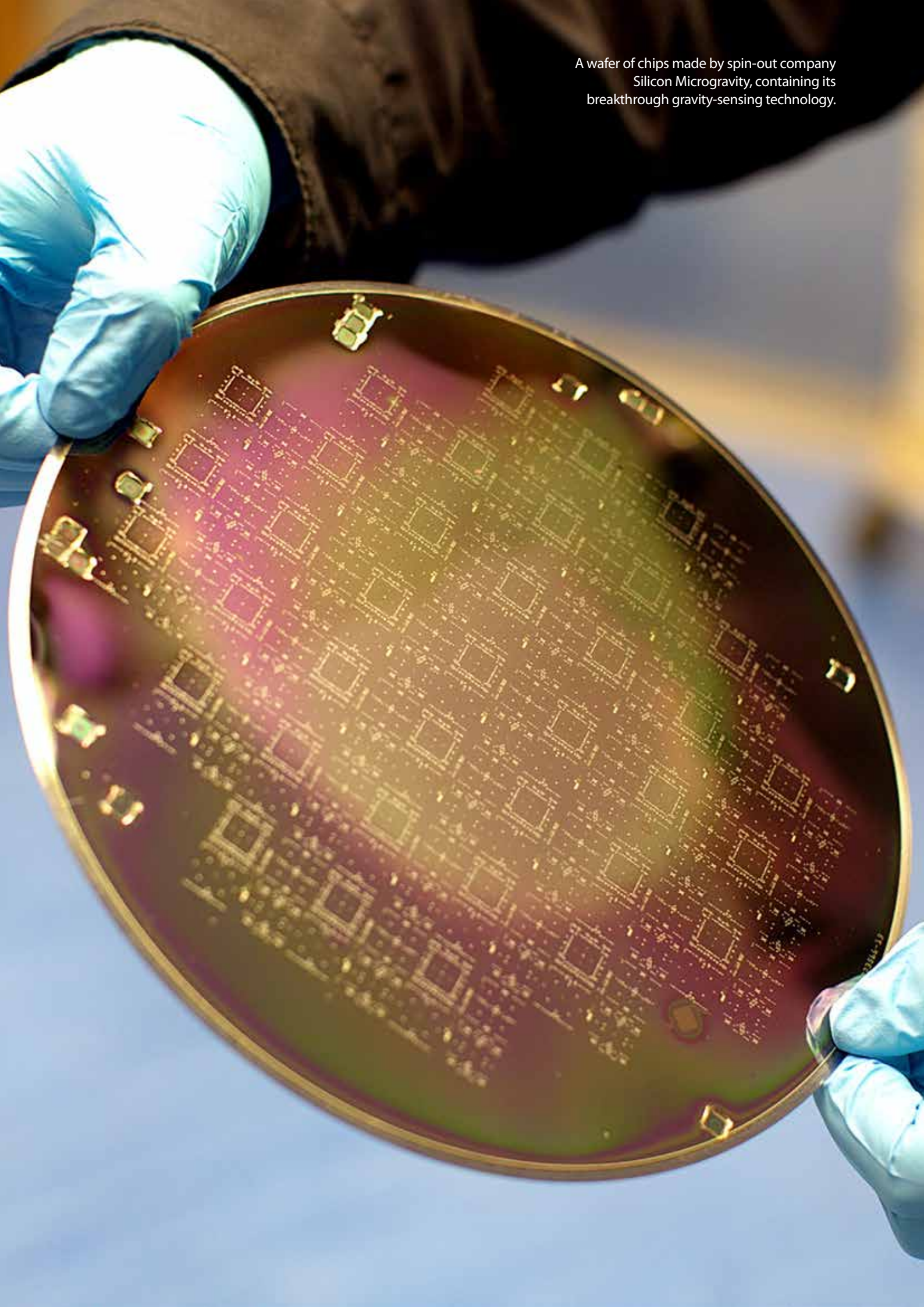
The science and technology of sensors is an area of particular strength at the University of Cambridge. In June two University spin-outs in this area that the Physical Sciences team has supported secured funding. Sorex Sensors, which has developed an exceptionally sensitive mass sensor based on Film Bulk Acoustic Resonator technology, raised £1.2 million. (See pages 18-19 for more information.)

Silicon Microgravity (SMG), a spin-out based on a decade of research led by Professor Ashwin Seshia of the Nanoscience Centre in the Department of Engineering, in collaboration with energy company BP, announced it had raised $7 million. SMG's technology is sensitive enough to measure one-billionth the level of Earth's gravity and robust enough to function deep within boreholes. It will initially be used to improve hydrocarbon recovery by distinguishing oil (and gas) from water, as well as for monitoring underground carbon storage and sequestration. The technology has applications across a number of other areas as well. These include ground water management, civil-geotechnical engineering, mining engineering and in the defence and space industries.

The Physical Sciences team licensed IP for a revolutionary technology in power semiconductor devices, which came out of the Department of Engineering, to Cambridge GaN Devices (CGD), a University spin-out company. CGD was founded by Dr Giorgia Longobardi and serial entrepreneur Professor Florin Udrea. Dr Longobardi was one of two winners in our Postdoc Business Plan Competition in 2016. Based on gallium-nitride on silicon substrates, the company's technology offers a radical step change in energy efficiency and compactness and permits high volume production at a very low unit cost.

The Physical Sciences team also licensed IP for slip-control pneumatic braking technology to Swedish brake systems maker Haldex, which will utilise it to develop an electronic braking system for trucks. The technology was jointly devised by a University team led by Professor David Cebon of the Department of Engineering, and colleagues at Haldex and CamCon (who have expertise on related pneumatic valve technology). The collaboration between the University, Haldex and CamCon took place as part of the Cambridge Vehicle Dynamics Consortium, which is a long running collaboration among a group of companies from the heavy truck industry and engineers from the University who have joined forces to develop better heavy goods vehicles.

We licensed intellectual property developed by Professor Usha Goswami in the Centre for Neuroscience in Education to Finnish company Grapho Group. Its product, GraphoGame, helps pre-school and primary school children learn letters, syllables and words by blending phonics and rhyming. The game adapts to a child's reading ability and is also effective for children with special needs.



A wafer of chips made by spin-out company Silicon Microgravity, containing its breakthrough gravity-sensing technology.

Case study

A tiny but exceptionally accurate sensor to check particulate air pollution

The phrase "technology transfer" suggests a swift and simple transaction. In reality the process of moving a brilliant but nascent technology out of the lab where it was conceived and into development and commercialisation is often lengthy and circuitous. Doggedness, expertise and effective teamwork are essential ingredients for success. The story of Sorex Sensors illustrates this well.

In 2011 Professor Bill Milne, Dr Andrew Flewitt and their postdoctoral researcher Dr Luis Garcia Gancedo of the Department of Engineering, along with collaborators Professor Jack Luo and Dr Greg Ashley at Bolton University, approached Cambridge Enterprise's Physical Sciences team to discuss an improved Micro-Electro-Mechanical Systems mass sensor they were developing.

MEMS sensors are exceptionally small (about the same as a human hair in diameter) and sensitive (the Sorex Sensor can detect the mass of a single virus particle), but their results can be thrown off by temperature fluctuations. The research team had devised a way to remove this temperature distortion and, indeed, the single tiny chip could measure temperature, as well as mass, simultaneously.

Impressed, the Physical Sciences team began working with the academics to investigate possible markets. Early interest came from the gas-sensing industry. A promising lead arose when a major consumer electronics firm solicited proposals for an "electronic nose". The Cambridge device was selected for further development and prototyping. Although the collaboration progressed well, it became clear that the technology was at too early a stage for the company to take on.

There was strong interest from the biomedical sector as well, but it was contingent upon adapting the sensor to function in liquid, instead of gas, and making it capable of simultaneously measuring several different particles.

In 2014 Dr Flewitt joined a consortium of researchers on an EC Horizon2020 Project to develop MEMS sensors. This allowed him to hire a postdoctoral researcher from a collaborator's lab in Madrid, Dr Mario de Miguel-Ramos. He brought the knowledge to overcome these challenges. At this point, however, the team had begun to consider the possibility of starting a new venture.

In 2015, using an award from the University's EPSRC Impact Acceleration Account, the team commissioned a market assessment to further explore the market opportunity, uncovering a class of near-term realisable products. A credible business plan began to take shape.

Sorex Sensors was co-founded in 2017 by Drs Flewitt and Milne along with Dr Miguel-Ramos; Dr Marina Cole and Professor Julian Gardner from the University of Warwick and Professor Enrique Iborra from the Universidad Politécnica de Madrid. In June 2018 Cambridge Enterprise and partners completed a £1.2 million investment in the company.

With their low power requirements and ability to detect multiple particles, Sorex Sensors are uniquely well-suited to tackling urgent problems such as particulate air pollution. In the future they could also be applied to a wide array of other uses, from explosives detection to biological sensing research equipment.

The investment of seven years preparing a University technology to enter the commercial world is only prelude to its decades of beneficial impact.

Seed Funds
Support from the start

Seed Funds supports the creation of companies founded on University research or people. This year we made 28 investments, totalling £6.6 million, in promising new companies—ranging from £20,000 Pathfinder pre-seed awards to £750,000 equity investments.

In April we joined forces with a team of five experienced angel investors to seed Qkine. Started as an embedded company within the Department of Biochemistry, Qkine makes high quality growth factors for stem cell science and regenerative medicine.

In May Seed Funds participated in a $5.5 million series A1 round of investment in Cambridge Touch Technologies. The company's technology uses extraordinarily simple architecture to deliver an all-screen, multi-finger 3D touch solution that can scale to every smart device size, at a fraction of the cost of existing approaches.

In the same month we led a £2.9 million seed round in graphene technology development company Paragraf, which spun out of the Centre for Gallium Nitride in the Department of Materials. Using a novel, patented approach, Paragraf aims to produce high quality, large-area graphene on a commercial scale, a goal that has eluded researchers for a decade and stymied the material's enormous commercial potential.

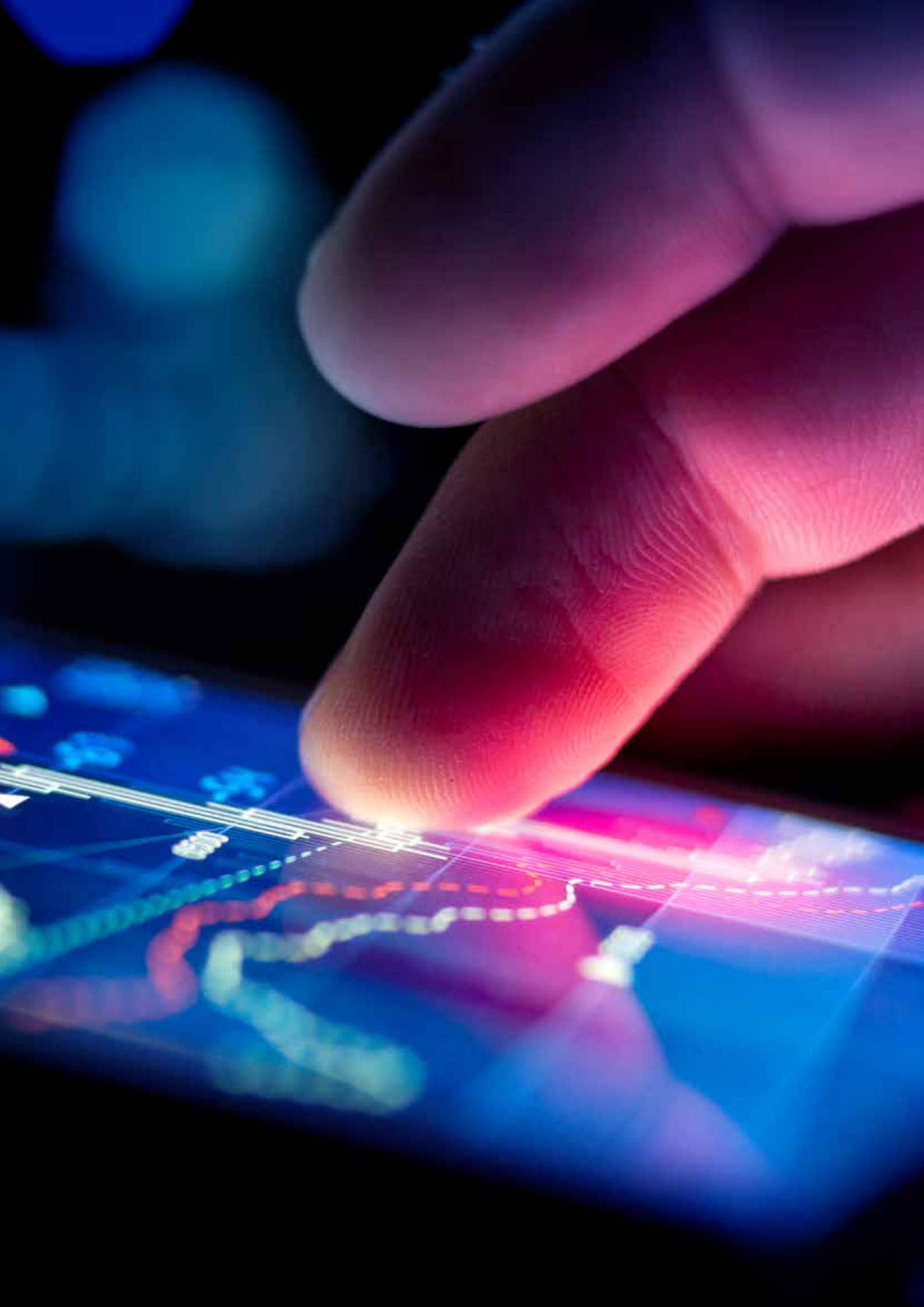
In June Seed Funds joined in a $7 million investment in Silicon Microgravity (SMG), a joint spin-out from the University and BP. Based on a decade of research, SMG's microelectromechanical system sensor will help improve reservoir surveillance and hydrocarbon recovery, so operators can achieve real efficiencies while meeting their desired social, safety and environmental goals.

Also in June we completed a £1.2 million initial round of investment in Sorex Sensors, a spin-out from the Department of Electrical Engineering that has developed a novel mass sensor. (See pages 18-19 for more information.)

In the same month we jointly participated in an £11 million series A round in PhoreMost, a biopharmaceutical company dedicated to drugging ostensibly "undruggable" disease targets. The company will use the funding to expand its operations on the Babraham Research Campus and move several novel drug targets into first-in-class drug discovery programmes. PhoreMost's overriding goal is to significantly increase the options and affordability of novel therapeutics for cancer and other unmet diseases.

During the past year we also piloted a new programme of investment in businesses driven by positive social impact. Working in tandem with Cambridge Social Ventures, a business support programme for social entrepreneurs that is part of the Cambridge Centre for Social Innovation at the Cambridge Judge Business School, we made £20,000 Pathfinder pre-seed investments in two companies: Netwookie, a professional networking tool that combats inequality by fostering informal employment in Africa, and Aspuna Group, the world's first commodity fair-trading house.

This year saw the sixth University of Cambridge Enterprise Fund (UCEF), which has helped support the University's efforts to stimulate economic growth. In total UCEF has raised £15.3 million from friends and alumni of the University to co-invest in our portfolio companies.



Case study

A new vision for saving glaucoma patients' eyesight

In 2014 Dr Peter Widdowson came across the research of Professor Keith Martin of the Department of Clinical Neurosciences. Professor Martin was working to develop a gene therapy for glaucoma, the leading cause of irreversible blindness worldwide. Dr Widdowson proposed that they work together to develop and enhance Professor Martin's original work, combining Dr Widdowson's pharmaceutical industry experience with Professor Martin's medical expertise to bring a new therapy to patients. The result was spin-out company Quethera. The company's mission was to slow or prevent the loss of sight in patients with glaucoma.

Glaucoma-associated blindness is caused by the death of the retinal nerve cells that carry visual signals to the brain. Because these cells cannot regenerate, therapies to protect them are essential. Lowering pressure within the eye using surgery or eye drops is the only treatment proven to reduce the risk of visual loss in glaucoma, but about one in eight patients will still become blind in at least one eye despite pressure-lowering therapy.

Quethera was created in order to pursue a very different approach: putting protective genes into the retinal cells. The delivery mechanism is a recombinant, adeno-associated viral vector system (rAAV). The goal is long-term control of the disease via a single injection. Cambridge Enterprise Seed Funds invested in Quethera in 2015. The money supported pre-clinical development of the therapy and establishment of a strong intellectual property platform. It also allowed Quethera to do research through the University, funding a postdoc in Professor Martin's lab to test the effectiveness of Quethera's gene therapy. In March 2016 Quethera won a Wellcome Trust Pathfinder Award to support further testing of the gene therapy constructs in experimental models of glaucoma.

When its lead preclinical candidate demonstrated significantly improved survival of retinal ganglion cells, Quethera caught the attention of Astellas Pharma, a global pharmaceutical company headquartered in Tokyo. In August they announced plans to acquire the spin-out. "I believe the rAAV program has potential as a new therapeutic option for the treatment of refractory glaucoma through an intraocular pressure-independent mechanism", said the firm's president and CEO Dr Kenji Yasukawa.

Under the terms of the deal, Astellas could pay as much as £85 million (in upfront and contingent payments) for Quethera, which becomes a wholly-owned subsidiary.

The deal will speed the development of Quethera's gene therapy construct. With such a high unmet medical need, this is good news for patients who are at risk of losing their sight.

Consultancy Services
Sharing knowledge and expertise

The mission of Consultancy Services is to support University staff and researchers serving as experts for external bodies, such as government agencies or corporations. The Consultancy Services team provides dedicated support to facilitate consultancy, including guidance on fees, contract negotiation and handling invoicing and distribution.

Working as a consultant is a highly effective way for University academics to share their expertise outside the University. In addition to income, consulting often yields concrete examples and data that subsequently inform researchers' work in lectures and labs.

In 2017-18 Consultancy Services signed off deals for 165 academics and 234 external clients. Including extensions of existing agreements, the team executed 401 contracts. One third of these agreements were completed in two weeks. The number of new consultants, who worked with the team for first time this past year, rose by 62 per cent.

The range and variety of consultancy projects supported by the Consultancy Services team is considerable. Professor Simone Hochgreb of the Department of Engineering was one recent client. A central theme of her research is understanding the physics of reacting flows in energy conversion devices, and the consequent trade-offs in stability, efficiency and emissions. Consultancy Services is well suited to facilitating practical aspects of this sort of work when contracts are involved. The Consultancy team supported a project Professor Hochgreb did for Roxel, a supplier of tactical propulsion systems, reviewing the technical state of art on rocket instabilities.

Kieran J Garvey and his colleagues at the Cambridge Centre for Alternative Finance at the Cambridge Judge Business School turned to Consultancy Services for help with three projects related to Africa. One was a project for The World Bank, examining financing for off-grid solar electrification schemes in Africa. The other two were with similarly named organisations: Financial Sector Deepening, Africa (or FSD Africa), a UK-government-supported organisation working to reduce poverty through development of the financial sector, and the other with Financial Sector Deepening, Uganda, an independent not-for-profit company committed to promoting greater access to financial services in Uganda.

Yet another example is the project undertaken by Professor Michael Coleman and his colleagues in the Department of Clinical Neurosciences. They are carrying out a project for Tak-Celerator, a subsidiary of Takeda Pharmaceutical, examining the modulation of axonal transport in axon degeneration disorders using histone deacetylase 6 inhibitors, which protect against neuronal damage and have therapeutic potential.

Consultancy Services supported an academic examining financing for off-grid solar electrification programmes in Africa for The World Bank.

Case study

University expertise for a new local landmark

The work done by University of Cambridge consultants has impacts around the world. Sometimes, however, its benefits can be seen very close to home. This past year the Consultancy Services team supported Dr Chris Moses, an anthropologist of religion in the Faculty of Divinity, who was hired by the Trustees of the Cambridge Mosque Trust to prepare a report looking ahead to the institution's opening in 2019.

The Trustees, led by Dr Timothy Winter, oversee a remarkable new mosque, now under construction on Mill Road in Cambridge. When it opens, it will be the only eco-mosque in Europe. Incorporating the latest conservation technology and green roofs, it will have close to zero carbon footprint. It is likely to have a significant impact on conversations around mosque architecture, sustainability and the environment.

It will also be Cambridge's first purpose-built mosque, dedicated to the spiritual and social welfare of the city's estimated 6,000 Muslims, including many visiting students. Its founders intend for it to be a cultural bridge in the city, fostering greater understanding among communities.

Dr Moses's assignment was to prepare an in-depth report to inform the Trustees' perspectives on key sociological, political and organisational issues that the mosque might face. He drew on a wide range of sources, including local views, Census and Charity Commission data and extant accounts of religious organisations, as well as his prior ethnographic research on Islamic institutions and the public sphere.

The report covered a number of topics, including the demographics of Cambridge's Muslim population, community needs, financial and organisational aspects of the mosque's incipient stages and existing good practice among Islamic institutions nationwide. A section on Cambridge-specific dynamics considered how the mosque might best engage with characteristics unique to the city, including the linguistic and ethnic diversity of its Muslim population, its permanent and transient populations, prevailing socio-economic trends, opportunities for social and religious outreach and major events in the local calendar.

Cambridge Innovation Capital
Growing companies in the Cambridge Cluster

Established by Cambridge Enterprise in 2013, Cambridge Innovation Capital plc (CIC) develops IP-rich companies emerging from the University of Cambridge or based in the Cambridge Cluster. It is a preferred investor for the University and has financial support from the Cambridge University Endowment Fund and the University itself.

During 2017-18, CIC invested £32.6 million in twelve existing and three new portfolio companies, all of which have strong Cambridge connections.

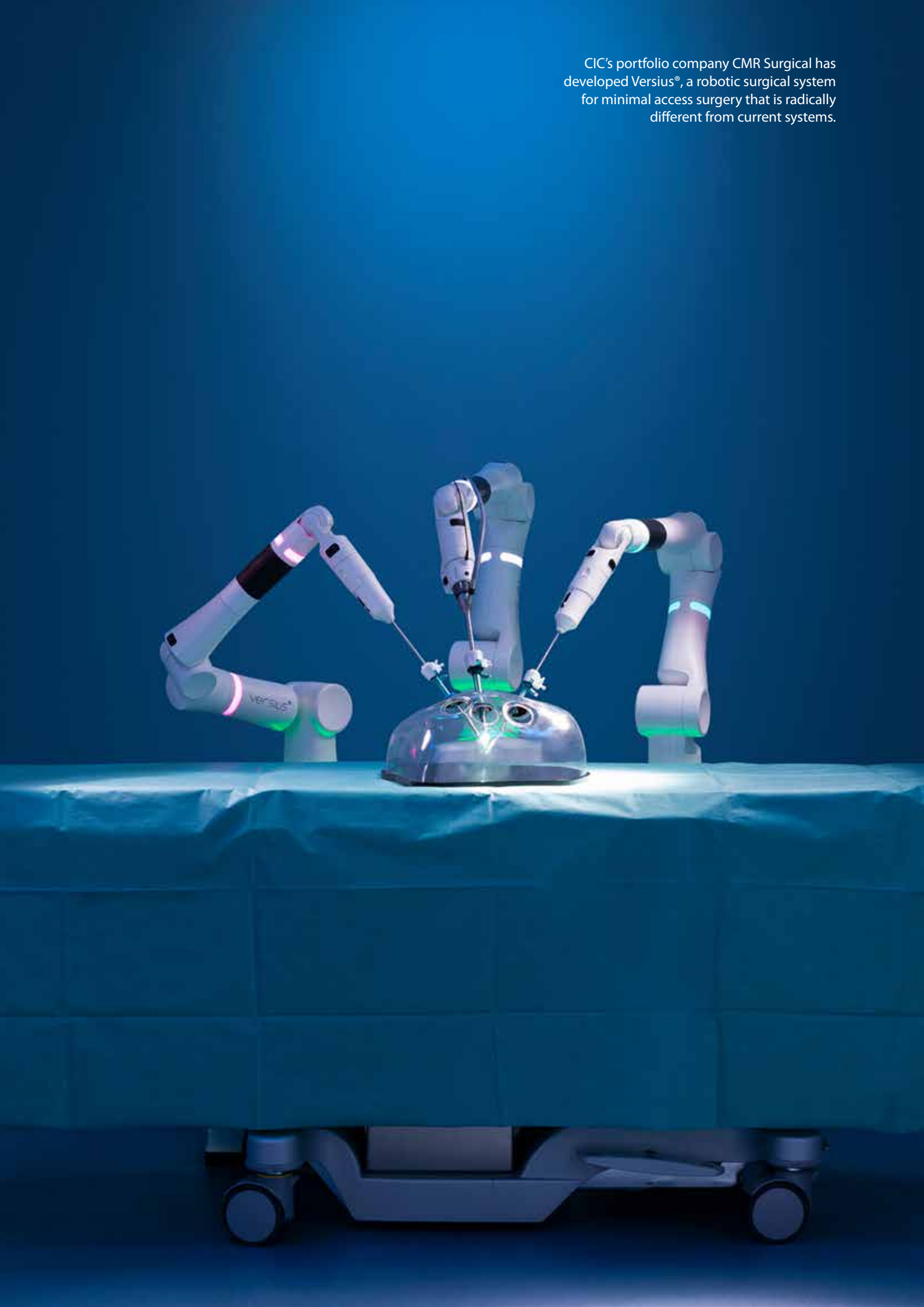
CIC's new portfolio companies include two University of Cambridge spin-outs: Cytora, which applies artificial intelligence to commercial insurance, enabling insurers to underwrite more accurately and deliver fairer prices to their customers, and AudioTelligence, which improves speech recognition in noisy environments. It was spun-out of CEDAR Audio, one of Cambridge Enterprise's longest-standing investments.

The third new addition to CIC's portfolio is SWIM.ai, which was founded in California. The company is developing edge intelligence software. CIC provided funding for SWIM.ai to establish a Cambridge-based research and development centre, capitalising on the artificial intelligence expertise available in the Cambridge Cluster.

Within the existing portfolio, CIC participated in the $100 million Series B funding round closed by CMR Surgical, which is developing a next-generation surgical robot. CMR Surgical is using these funds to prepare its Versius® system for planned commercialisation in 2019. Activities being undertaken include: the completion of validation studies for regulatory approval processes in both Europe and the US, international expansion and commercial scale-up in response to considerable industry interest in this new product.

Progress is also being made elsewhere in the CIC portfolio. Carrick Therapeutics and Bicycle Therapeutics now possess potential therapeutics undergoing clinical trials. PragmatIC has installed and commissioned its first FlexLogIC "fab in a box"; Microbiotica signed a major collaboration with Genentech worth up to $534 million and several technology companies within the portfolio, including Audio Analytic, Origami Energy and Geospock, have signed notable commercial partnership deals.

CIC's portfolio company CMR Surgical has developed Versius®, a robotic surgical system for minimal access surgery that is radically different from current systems.



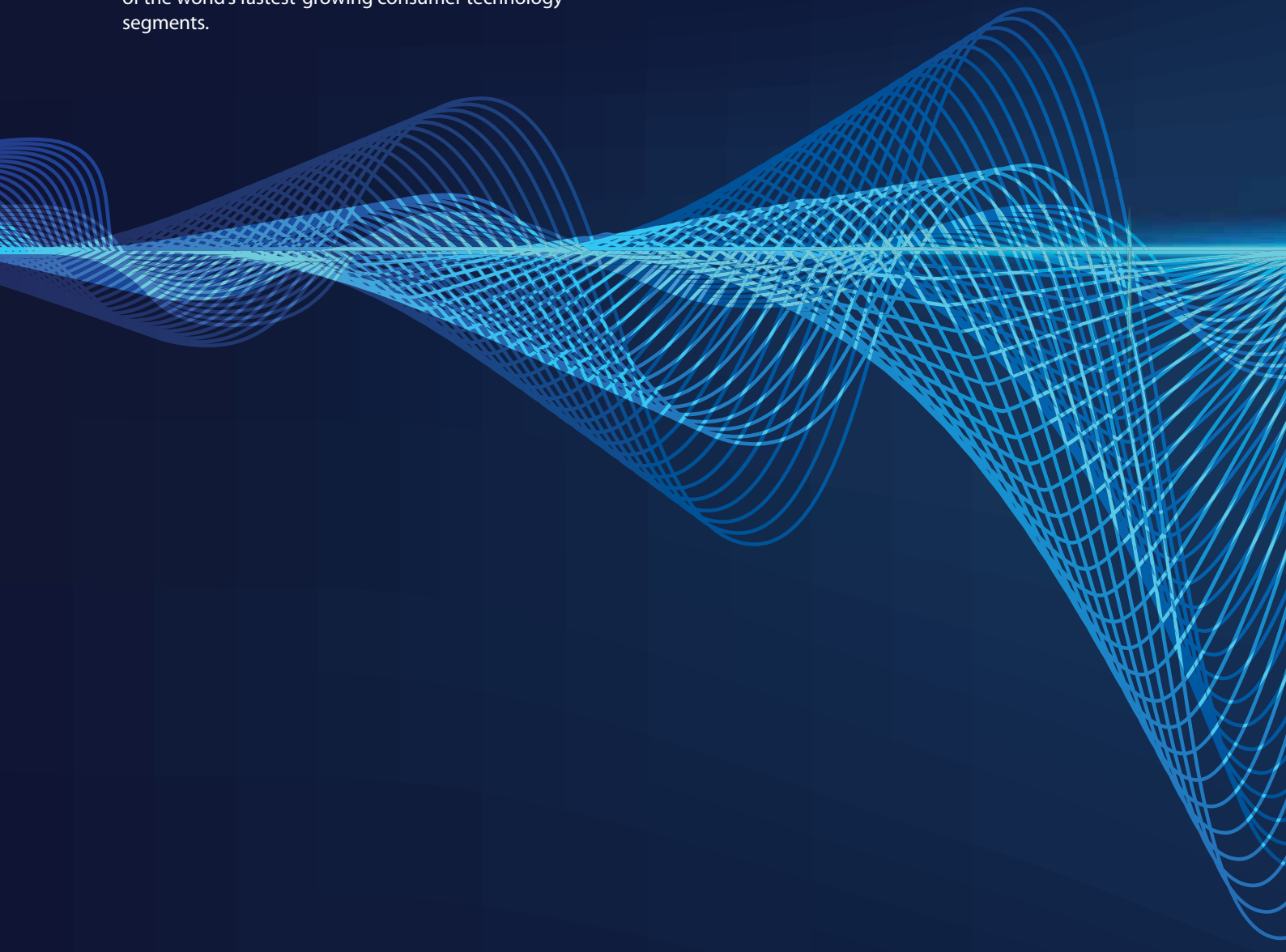
Case study

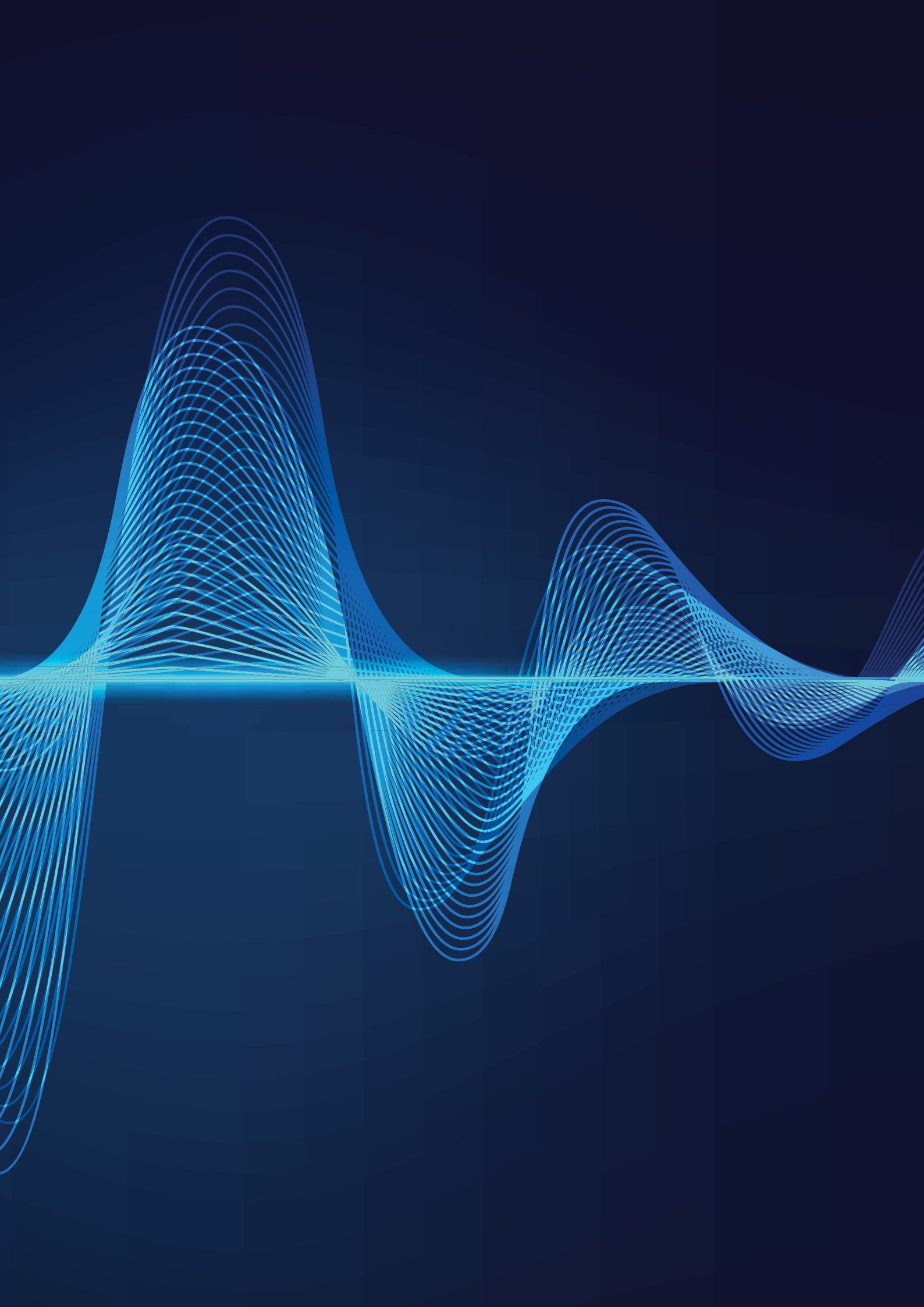
Separating signal from noise

AudioTelligence has developed a digital solution to the "cocktail party" problem—loud background noise that makes it difficult for both humans and voice-activated devices to hear or understand a conversation.

CIC led the £3.1 million seed funding round, in which Cambridge Enterprise also participated, to develop the company's real-time audio processing technology for the enhancement of Automatic Speech Recognition (ASR) systems. Speech control is being used increasingly in consumer electronics, with smart speakers being one of the world's fastest-growing consumer technology segments.

AudioTelligence's technology separates a speaker's voice from background noise and other conversations without the need for specialist equipment, dramatically enhancing the accuracy of ASR systems, such as those found in Siri and Alexa, and improving the performance of hearing assistance products.





By the *numbers*

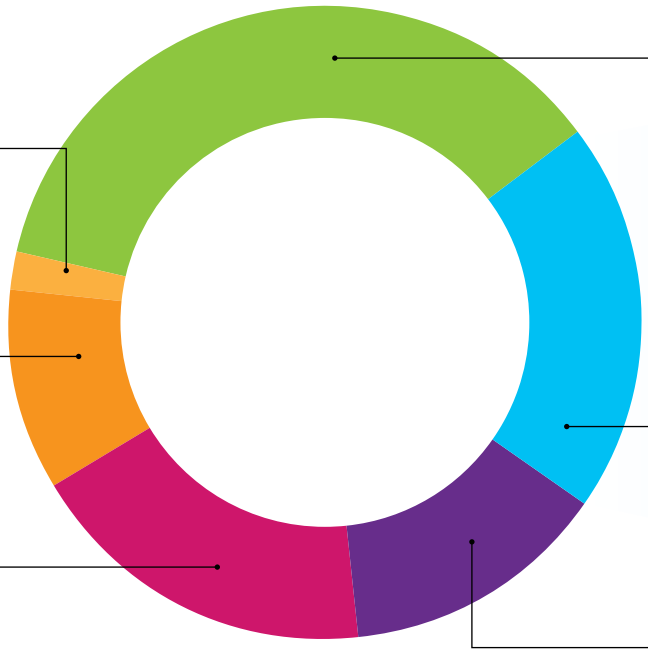
Financial performance 2017-18

Cambridge Enterprise income

Years to 31 July

	2017-18 £'000	2016-17 £'000
Income generated by Cambridge Enterprise operations	10,288	16,914
University and Higher Education Innovation Fund (HEIF) funding	2,199	2,199
Income for services & other income	1,056	991
Income before returns from equity realisation	**13,543**	**20,104**
Equity realisation income to Cambridge Enterprise and University Seed Funds	597	3,679
Total Income	**14,140**	**23,783**

Where Cambridge Enterprise's income goes (£'000)



Academics & others
£3,939

Returned to University Seed Funds
£185

Investment in patent assets and proof of concept
£1,129

Departments
£2,195

Charitable donation to the University
£1,972

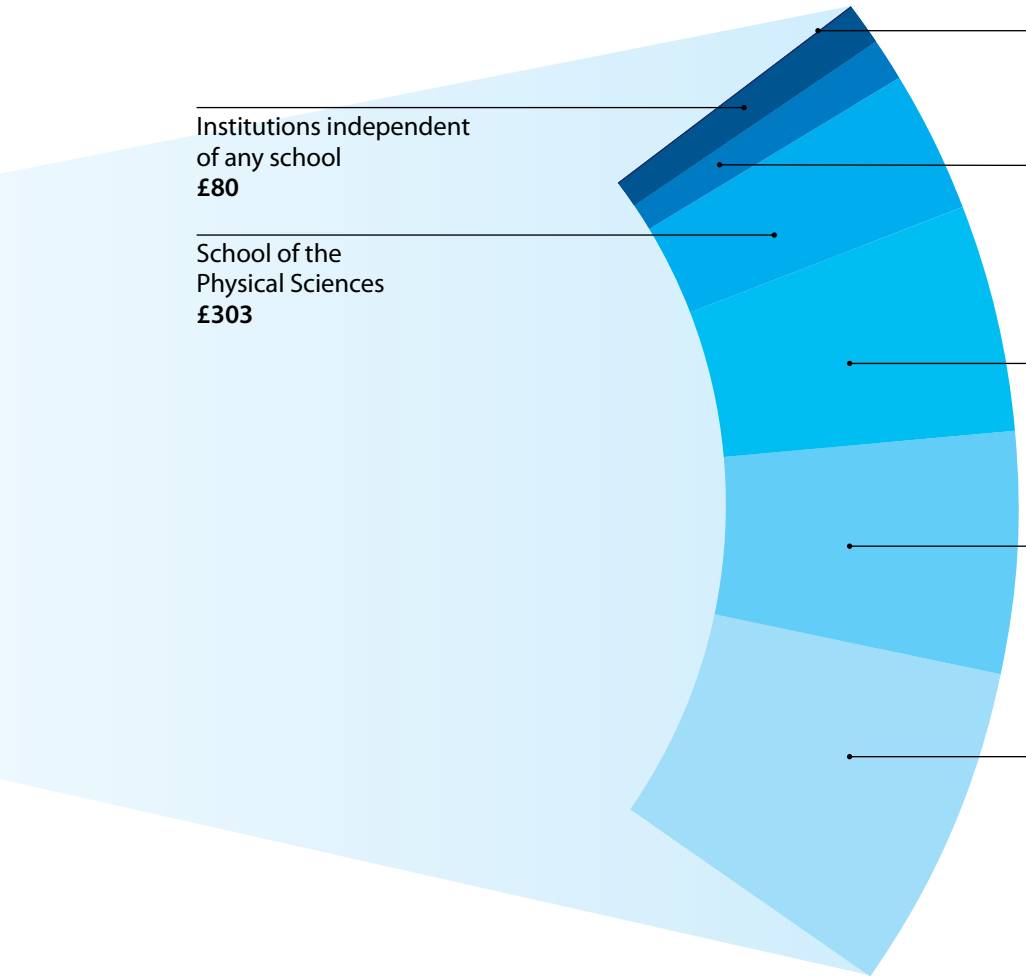
Support for Cambridge Enterprise
£1,465

Cambridge Enterprise IP investment, distributions and operating costs

Years to 31 July

	2017-18 £'000	2016-17 £'000
Investment in IP assets (patent and proof of concept)	(1,129)	(1,060)
Distributions to academics and external parties	(3,940)	(9,616)
Distributions to University (departments' share of IP income and Gift Aid from academics)	(2,195)	(5,583)
Returns to University of Cambridge Seed Funds (USF)	(185)	(1,109)
Operating costs (staff and other costs)	(4,813)	(4,569)
Total Expenditure	**(12,262)**	**(21,937)**
Net Income/(Expenditure) for the Year	**1,878**	**1,846**

and departments' share by school (£'000)



Equity portfolio

In 2018 there were 86 companies in the Cambridge Enterprise portfolio. As spin-outs grow and succeed, they exit the portfolio, either via sale or public listing. Collectively this process has generated billions of pounds in value. Here are a few examples of the current holdings.

Governance and structure

Chair

Sir Keith O'Nions

Non-Executive Directors

Professor Alan Blackwell	Professor of Interdisciplinary Design
Charles Cotton	Cambridge Phenomenon Limited
Professor Andrew Neely	Pro-Vice-Chancellor, Enterprise and Business Relations
Anthony Odgers	Chief Financial Officer, University of Cambridge
Dr Jane Osbourn	Vice President of Research & Development, MedImmune
Debu Purkayastha	Entrepreneur-in-Residence, Octopus Investments
Professor Florin Udrea	Professor of Semiconductor Engineering

Executive Directors

Dr Tony Raven	Chief Executive
Dr Paul Seabright	Deputy Director

Company Secretary

Emma Rampton	Registrary, University of Cambridge

Nominated Officer of the Shareholder

David Hughes	Director of Finance, University of Cambridge

Senior Management Team

Dr Tony Raven	Chief Executive
Dr Paul Seabright	Deputy Director
Boris Bouqueniaux	Head of Support Services
Dr Anne Dobrée	Head of Seed Funds
Dr Malcolm Grimshaw	Head of Physical Sciences
Shirley Jamieson	Head of International Relations and Outreach Programmes
Mark Parsons	Head of Finance and Accounting
Christian Pratt	Head of Marketing and Communications
Ruth Queen	Head of Human Resources
Dr Iain Thomas	Head of Life Sciences
Dr Amanda Zeffman	Head of Consultancy Services

Investment Committee

Professor Chris Abell	Pro-Vice-Chancellor, Research
Dr Keith Blundy	STORM Therapeutics Limited
Charles Cotton	Cambridge Phenomenon Limited
Dr Barbara Domayne-Hayman	Biotechnology entrepreneur
Pam Garside	Healthcare investor
Dr Iris Good	Biotechnology entrepreneur
John Halfpenny	Technology entrepreneur
Dr Hermann Hauser	Amadeus Capital Partners Limited
Dr Andrew Herbert	Computer technology entrepreneur
Derek Jones	Babraham Bioscience Technologies Limited
John Lee (Chair)	DisplayLink Limited
Professor Patrick Maxwell	Regius Professor of Physic
Andrew Sandham	Biotechnology entrepreneur
Professor Steve Young	Apple Inc
Dr Tony Raven	Chief Executive
Dr Richard Jennings	Technology transfer consultant

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