



Quarterly Journal - June 2018

NEWS COMMENT and ANALYSIS on SPINOUTS from UK HEIs

Measuring what is important

TEF, REF, then KEF – university staff are used to dealing with Government TLAs and the administration that they entail, and the KEF (Knowledge Exchange Framework) brings this activity into the space covered by Spinouts UK.

We are well aware that our focus on spinouts and start-ups is only one part of the picture; indeed, as stressed by the report by the MacMillan group in September 2016 on ‘University Knowledge Exchange (KE) Framework: good practice in technology transfer’, “the processes of exploiting university intellectual property through spinning out companies or licensing . . . is only one route to impact from the many being examined in the knowledge exchange (KE) framework.”

The development of the KEF was discussed in detail at the PraxisAuril conference in May, and some of the concerns and questions of the technology transfer and commercialisation professionals in the audience given a full airing. The KEF is due to be rolled out from late autumn onwards, but this timescale means that the first KEF will be restricted to existing data, with other data capture part of an ongoing process.

As Tamsin Mann, Head of Policy at PraxisAuril, noted in a blog about the conference discussion, “Evidence underpinning the KEF needs to be challenging and not just measure ‘the good stuff’. There is a clear desire, from PraxisAuril members at least, to capture the quality of engagement and not just the quantities.” Clarity is required, as the KEF is developed, on who it is for and the kind of feedback needed as outputs, and what the KEF can help institutions to do that is not possible with current arrangements.

Management guru Peter Drucker is credited with saying "If you can't measure it, you can't improve it," to which Tamsin adds “Metrics drive behaviours and there is clear awareness that KEF metrics should be about driving the right behaviour between actors”.

- Jonathan Harris, Editor

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New spinouts

The following companies are new to the Spinouts UK database. Further details, including dates of incorporation and websites, are given in the table on p10.

Disulfican

The University of Wolverhampton and steel company Caparo have agreed to invest in a spinout business that is developing a new anti-cancer drug. The new venture, Disulfican, has been formed to build on research carried out by Prof Weiguang Wang, professor of experimental cancer therapeutics at the University.

Disulfican will receive financial investment of approximately £200k from the University and the Caparo Angad Paul Fund.

Led by Prof Wang, the Cancer Research Group is developing a treatment based on Disulfiram, a drug used to treat alcoholism which is showing promising results in pre-clinical testing as a new anti-cancer therapy.

While standard Disulfiram shows strong anticancer activity in the laboratory, its application in cancer clinical testing has previously been inhibited by its very short half-life in the blood stream, where it breaks-down and loses its anti-cancer profile. By encapsulating Disulfiram within a poly lactic-co-glycolic acid (PLGA) nano-particle, Disulfican scientists are able to prolong the half-life of the drug in the blood stream and transport it to the tumour site where it is released, the university has said.

Viatem

A new spinout company, Viatem, has been formed by University of Birmingham Enterprise to develop and exploit the therapeutic potential of PEPITEM (peptide inhibitor of trans-endothelial migration).

The company's formation coincides with the presentation of new research showing that synthetic PEPITEM can prevent or delay the onset of rheumatoid arthritis (RA) in animal models of disease, and restore regulation of white blood cell migration in human tissues. RA is an autoimmune disease that affects over 20 million people worldwide. It results in extensive damage to joints and causes significant disability. Currently there is no curative treatment.

PEPITEM is a 14 amino acid peptide, and a naturally occurring mediator in the adiponectin pathway which controls the recruitment of immune cells into inflamed tissues. The pathway was discovered by researchers at the Institute of Cardiovascular Sciences at the University of Birmingham.

The adiponectin pathway is believed to be pivotal in protecting inflamed tissues from excessive damage, and is disordered in conditions such as rheumatoid arthritis, inflammatory bowel disease, and type 1 diabetes, all of which are characterised by chronic inflammation that destroys the patient's own tissues.

According to Dr Jonathan Watkins, Head of IP at University of Birmingham Enterprise, it was the foundational nature of the science that first attracted the attention of the University's technology transfer and commercialisation teams. He commented "It is extremely rare that a completely new regulatory pathway is discovered, and that it is possible to modulate it through an identified target."

Dr James Wilkie, CEO of University of Birmingham Enterprise, added "Despite substantial innovation over the last few decades, there are still significant unmet needs in rheumatoid arthritis treatment. We are delighted to be commercialising this novel therapeutic target which is supported by a robust and increasing body of evidence."

The University is a shareholder in Viatem, which has received funding from Innovate UK, the West Midlands Academic Health Science Network, and the University of Birmingham's Enterprising Birmingham Fund. Viatem is located in the BioHub Birmingham®, the University's bioincubator, which is based at the Birmingham Research Park.

Atelerix

This new biotech spinout from Newcastle University is offering encapsulated human cells in an alginate gel made from seaweed making them practical, adaptable and easy to store and transport, even at room temperature.

This overcomes the barriers presented by the current need for cryo-shipping as it is simple, cell-friendly and offers immediate access to stem cell therapy. This opens up the market for the supply of cells and assays in a ready-to-use format, allowing suppliers to increase the range of assays available to consumers and to scale up their businesses.

Scientific founder, Professor Che Connon of Newcastle University, has been working on the underpinning technology for five years. He said "Encapsulating cells in the alginate hydrogel is a simple, low cost system capable of preserving the viability and functionality of cells at temperatures between 4 and 21°C for extended periods of time.

"Used as a method of cell storage and transport, it overcomes the acknowledged problems associated with cryo-shipping. Cells are encapsulated by *in situ* formation of the gel for shipping in plates or vials, and can be rapidly released from the gel by the addition of a simple buffer."

There is more about Atelerix, and Newcastle University's approach to commercialisation, in our Spotlight feature on page 7.

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Mercia makes first investments from new collaborations



Mercia invests in high growth businesses concentrating on the Midlands, the North of England and Scotland, from managed funds and from its own balance sheet.

Last November Mercia extended to 19 the number of universities with which it has partnerships, by adding the University of Edinburgh, and earlier this year Mercia was appointed to manage to run the Proof of Concept and Early Stage Equity fund of the Midlands Engine Investment Fund (MEIF). The first investments from these agreements have already been completed.

Invizius

A spinout company from the University of Edinburgh whose technology could save the lives of thousands of dialysis patients has secured £500k investment from Mercia Fund Managers, in the first investment deal since Mercia's partnership with the University of Edinburgh was announced in November 2017.

Invizius (www.invizius.com) has developed a coating for dialysis filters which prevents the patient's immune system from reacting adversely and causing complications.

Despite improvements in dialysis therapy, cardiovascular disease remains the leading cause of death for dialysis patients. Today, almost half of all dialysis patients die from cardiovascular complications, and life expectancy on dialysis is just one-third of that for the general population. The patient's immune system sees the dialysis filter as a foreign body, creating inflammation that damages the cardiovascular system over time.

Invizius's H-Guard™ product is used as an anti-inflammatory primer to coat the filter surface which, when mixed with the patient's blood, makes the surface seem less foreign to the

patient's immune system. Unlike some other proposed solutions, H-Guard does not shut down the immune system but instead effectively 'hides' the device from it to prevent an immune response.

While the first product is aimed at kidney dialysis, there is also potential to use the technology with other devices or procedures such as catheters, stents, organ transplants and vascular grafts.

The University signed a partnership agreement with Mercia in November 2017, which included hosting Mercia staff on campus and Mercia earmarking funding for investment in technologies and business opportunities developed by the University.

Invizius stems from years of research by biologist Dr Andy Herbert and his team, who spent six years developing the technology with support from world-leading dialysis manufacturers, Kidney Research UK, and £600k from Scottish Enterprise's High Growth Spinout Programme. The company is led by CEO Richard Boyd, with Dr Herbert as CTO.

Locate Therapeutics

Regenerative medicine specialist Locate Therapeutics (www.locatetherapeutics.com), a spinout from the University of Nottingham, has received the first equity investment from the MEIF Proof of Concept & Early Stage Fund.

Part of a £2 million finance package, underwritten by Mercia Fund Managers, including MEIF POC and Mercia EIS funds, this cash injection will help the firm fast-track its medical inventions to market, as well as make six more expert hires.

Headquartered within MediCity in Nottingham (an incubator space for companies specialising in medical technology), Locate Therapeutics is leading the way in the development of a targeted drug and stem cells delivery system. This system enables doctors to administer treatments to delicate parts of the body where greater levels of precision are required, with the added investment bolstering Locate Therapeutics' business development capacity as it trademarks its inventions and begins to market it to medical providers all over the world.

The life sciences sector has been marked out by the government in its recent Industrial Strategy as being one of the UK's main growth sectors over the next 20 years, boasting a current national turnover of £64 billion – a figure that is set to increase significantly.

Commenting on the deal completion, Julian Dennard, Investment Director at Mercia, said "To be able to support innovative firms such as Locate Therapeutics is a key driver for Mercia Fund Managers. This is a great example of how finance available through the MEIF can be leveraged with private money to bring needed capital to a potentially high growth life sciences' business.

"We look forward to working with Locate Therapeutics and its partners to drive the business forward, allowing patients to benefit from new treatments by building an exciting next generation drug delivery business."

New spinouts

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FaceSoft

Imperial Innovations, the technology commercialisation partner for Imperial College London, has announced the launch of a new Imperial spinout company, FaceSoft.

FaceSoft uses proprietary machine learning models and databases to improve computer-generated 3D face reconstruction and facial recognition. The technology that drives FaceSoft was developed by Dr Stefanos Zafeiriou, Associate Professor in the Department of Computing at Imperial College London & part of the **iBUG group**, and Mr Allan Ponniah, a plastic surgeon at the Royal Free Hospital.

FaceSoft is one of the first two companies to have launched through Imperial's **Founders Choice** programme, which gives Imperial academic founders more choice regarding their service package from Imperial Innovations and resulting equity distribution. FaceSoft previously won the inaugural **Programm/able** software competition which provided initial proof-of-concept funding. Following spinout formation, FaceSoft secured an undisclosed SEIS seed investment including AISeed and several angel investors.

FaceSoft uses machine learning models for 3D face reconstruction and facial recognition. The team has trained its face reconstruction algorithm parameters using a proprietary database, consisting of 2.5 million high-resolution 3D scans of real faces. The trained reconstruction model allows FaceSoft to create billions of realistic computer-generated faces, far surpassing any existing database of real faces. These avatar faces can, in turn, be used to train FaceSoft's facial recognition algorithm, aiming to create the world's best facial recognition technology. The recognition algorithms have already attained a >98% accuracy in the **megaface** competition; ranking FaceSoft top in the world when dealing with raw data alone. FaceSoft's technologies have applications in biometric security systems, medicine, and entertainment.

One key application of FaceSoft's technology is in biometric security. Current facial recognition security applications usually rely on a photograph taken from a single reference point, such as a passport or ID photograph. In the every-day world, it is difficult to capture an image that will match with photographs of this sort, which are usually well-lit and taken face-forward. The FaceSoft algorithm can recreate an accurate model of a subject's face in 3D, meaning that a security system can match this against images taken from various angles, in low light, and even at low resolution. This can dramatically increase the accuracy of facial-matching and therefore increase security.

Glialign

Glialign was established in 2018 to take forward the work of UCL academics in engineering live neural tissue. Their current project has been funded by the UCL Technology Fund, UK

Innovation and Science: Seed Fund (UKI2S) and Innovate UK. The founders James Phillips and John Sinden are currently optimising a method for producing a living nerve growth guide designated "EngNT", which is intended as an 'off-the-shelf' nerve replacement – primarily for peripheral nerve repair. This represents an innovative engineering solution to an unmet clinical need.

Platinum Informatics

Platinum Informatics is providing software solutions for the management, visualisation and analysis of large and complex data sets in a wide range of laboratory and industrial environments. The company is commercialising software developed for more than ten years within the University of Dundee by Professor Angus Lamond's team in the School of Life Sciences.

Platinum Informatics has built upon software created for the analysis of biological big data, generated in Professor Lamond's Laboratory for Quantitative Proteomics. The software was originally created, with funding provided by the Wellcome Trust, to support the analysis of human disease mechanisms.

Platinum Informatics will be developing new software products with additional funding provided by a recent SMART:SCOTLAND feasibility grant from Scottish Enterprise.

Professor Lamond, co-founder of Platinum Informatics, said, "I am delighted that we have now been able to translate the innovative software we have spent over ten years creating for our academic research to generate tools that help solve the many challenges created by the growth of big data in research, industry and healthcare. Our software can now be used by customers around the world to make it easier to manage and analyse large and complex data sets."

Portage Glasgow

A new joint venture company which brings together the University of Glasgow and Portage Pharmaceuticals is aiming to develop more effectively targeted drugs to treat chronic conditions including cancer.

Portage Pharmaceuticals, a subsidiary of the British Virgin Islands-based Portage Biotech Inc., is providing an undisclosed funding injection to the new business, called Portage Glasgow Limited, along with a limited licence to its CellPorter™ peptide delivery technology.

Portage Glasgow will build on the University of Glasgow's expertise in precision medicine, a fast-developing area of treatment which aims to provide better outcomes for patients by providing drugs tailored to their specific needs.

Professor George Baillie is the academic founding director of the company. He is the Professor of Molecular Pharmacology at the University of Glasgow's Institute of Cardiovascular and Medical Sciences and worked for 15 years on publicly and privately-funded research in phosphodiesterase enzymes and protein-protein interactions. Prof Baillie will provide input on

therapeutic peptides and access to a therapeutic peptide discovery platform.

The new venture will focus on the commercialisation of new therapies aimed at disrupting protein-protein interactions (PPI) in disease pathways which give therapeutic benefit. Candidate peptides and PPI targets have already been identified from existing research at the University.

PlayerData

PlayerData is developing wearable technology to tell athletes how well they are performing in their sport, and suggest individual improvements based on learning their style.

Its first product, PlayerData EDGE, which is in its late development stages, combines a base layer garment with sensors and a removable control module. It is aimed at multi-sport professional and amateur athletes.

The company was co-founded in 2015 by University of Edinburgh computer science graduates Roy Hotrabhvanon and Hayden Ball, supported by Edinburgh Innovations.

Chief executive officer Hotrabhvanon, a former international archer who has represented Thailand, said “The motivation to create this product came from conversations with elite coaches from Scottish national sports squads. Their shared frustration is the lack of offerings available on the market and the prohibitively high cost of some of the simplest GPS solutions. We then set out to build a more capable product, for a fraction of the cost of existing solutions.

“With over six biometric performance indicators, we’re already ahead of all competitors in the market. Using the latest advances in artificial intelligence we are developing algorithms to give coaches actionable insight to athlete performances.”

At the end of December the company closed an early stage investment round (a “six figure sum”) from high profile backers including former Tesco CEO Sir Terry Leahy, Blackcircles.com founder Mike Welch, who has been appointed PlayerData’s chairman, and Quest Corporate’s Marcus Noble. The seed round will allow the company to expand development to a

... continued overleaf



UCL Business welcomes new spinout

As UCL Business marks its 25th year of technology transfer at UCL, it welcomes a new and exciting semiconductor company to its portfolio of spinouts.



Spun out from the UCL department of Electronic and

Electrical Engineering, Intrinsic Ltd was launched in February of 2018, to commercialise a novel memristive RRAM device technology developed by two of the university’s academics, Prof Tony Kenyon and Dr Adnan Mehonic.

Modern day computers have become very successful at managing ever larger numbers of tasks, at high speed. Such information processing does however come at a significant energy cost. Intrinsic’s patented RRAM technology aims to overcome this. It is low power, fast, with excellent cycling endurance and wholly based on silicon oxide, making it uniquely compatible with existing semiconductor industry fabrication methods.

Intrinsic’s RRAM memristive devices are the building blocks of an exciting range of new and disruptive technologies – from non-volatile memories to reconfigurable electronics, hardware

accelerators and, ultimately, neuromorphic devices that mimic the behaviour of biological neurons.

The research that led to the demonstration of the RRAM devices was supported by EPSRC and UCL Business Proof of Concept funding. The Intrinsic team is also supported by the UCL Technology Fund (www.ucltf.com), as recipients of funding through the Fund’s Proof of Concept investment programme.

Visit Intrinsic’s website, to find out more about its novel memristive RRAM devices:

www.intrinsicst.com

Learn more about UCLB and its spinouts at:

www.uclb.com

market-ready product by the end of 2018, with high value sports including running, football and golf being targeted.

Recent spinouts from the University of Oxford

Odqa Renewable Energy Technologies

Odqa is a partnership between clean energy entrepreneurs, scientists, Oxford Sciences Innovation, and the University of Oxford. Odqa was formed to develop next-generation clean energy technologies and to tackle world scale environmental and energy problems. Odqa recently closed a £400k seed round.

Morpheus Labs

Morpheus is developing machine learning technology for autonomous vehicles and traffic modelling applications. Its technology enables autonomous systems to learn to solve complex tasks from human demonstrations.

Pepgen

Pepgen is a therapeutics biotech company developing proprietary drug delivery platform technology.

PalaeoPi

PalaeoPi is developing integrated automated photogrammetry hardware and software platforms. Initially founded in 2014 as a website featuring tutorials on computational techniques in archaeological science, PalaeoPi was incorporated in 2018.

PalaeoPi now offers hardware and software solutions, following the development of a new prototype rig for automated photogrammetry. This prototype improves upon an earlier model constructed with Lego and 3D printed parts, first published in 2016.

Deepreason.ai

DeepReason.ai offers a KGMS (Knowledge Graph Management System) that leverages recent breakthroughs in logical reasoning and database theory developed at the University of Oxford.

Theolytics

Theolytics is a pre-clinical stage biotechnology company developing next-generation oncolytic viral therapies. The company was formed in 2017 to drive the development of a pipeline of clinical trial candidates, using an adenovirus platform to develop targeted, self-amplifying therapeutic agents.

Two more new spinouts are described in the relevant project partner pages:

Invizius (Mercia Technologies, page xx)

Intrinsic (UCLB, page xx)

Recent exits

The Fusion Antibodies IPO was missed from our previous Quarterly Journal, but is included here for the sake of completeness.

Fusion Antibodies

Fusion Antibodies was admitted to the AIM exchange on 18 December, having raised £5.5 million (before expenses) and with a market capitalisation of £18.1 million.

Fusion, a spinout from Queen's University Belfast, is a revenue generating and profitable CRO providing a range of antibody engineering services for the development of antibodies for both therapeutic drug and diagnostic applications. The company provides a broad range of services in antibody generation, development, production, characterisation and optimisation. These services include antigen expression, antibody production, purification and sequencing, antibody humanisation using Fusion's proprietary CDRx™ platform and the production of antibody generating stable cell lines to provide material for use in clinical trials. Since 2012, Fusion has successfully sequenced over 250 antibodies and successfully completed over 100 humanisation projects for its international, blue-chip client base, which includes eight of the top 10 global pharmaceutical companies by revenue.

The company was initially a drug development business but revised its operations to focus on CRO work in 2011.

The net proceeds of the IPO will be used to expand the company's existing laboratory space, increase its sales and marketing efforts, for development of the new service lines, as well as providing additional working capital.

Dr Paul Kerr, CEO of Fusion, commented "We are very pleased with the level of interest generated from new institutional investors in support of our admission to trading on AIM. We have established Fusion as a multi-service CRO for antibody engineering & humanisation, and cell line development for the world's largest developers of antibody-based therapeutics drugs and diagnostics companies. The move to AIM and the additional funding will allow us to continue this growth trajectory by expanding our capacity and developing our offering of new, high value, market differentiating products."

EMcision

EMcision, a spinout of Imperial College London, was founded in 1999 by Professor Nagy Habib, Professor of Hepatobiliary Surgery in the Department of Surgery and Cancer at Imperial College London.

EMcision's flagship product, the Habib™ EndoHPB, was the world's first bipolar radiofrequency endoscopic device for

tumour ablation via ERCP using radiofrequency energy in patients with advanced and inoperable pancreatic cancer and cholangiocarcinoma. The Habib EndoHPB probe is used by physicians in the treatment and palliative care of patients living with pancreaticobiliary cancers.

Boston Scientific (NYSE:BSX, www.bostonscientific.com) announced on 5 March that it had acquired EMcision, to expand the Boston Scientific Endoscopy portfolio to include the Habib™ EndoHPB probe. The financial terms of the transaction were not disclosed.

Autolus

A spinout from University College London in 2014, Autolus has developed T-cell programming and manufacturing technology pioneered by Dr Martin Pule. Its Chimeric Antigen Receptor (CAR) T cell therapies have been shown to be effective in some

haematological malignancies and may have wide applications as a cancer treatment, with the potential for cure in some patients.

Working in partnership with physicians and other healthcare providers, Autolus extracts immune cells from patients, equips them with a receptor that targets the cancer cell, and infuses them back into the patient in order to develop therapies which it is believed will offer cancer patients substantial benefits over the existing standard of care.

On 8 June the company announced that it is preparing for an IPO on the NASDAQ exchange in the USA, for an approximate total offering size of between \$117.2 million and \$132.8 million. The company has begun the roadshow for the IPO, but no date for its completion has yet been announced.

Current institutional investors in Autolus include Syncona and Woodford, who jointly hold 67% of the company's stock.



Spotlight on . .

Newcastle University

The third episode in our series looking at some of the UK's most innovative universities

One half of the Northern Accelerator program, Newcastle University is pushing academic innovation in the north-east of England, along with its partner university, Durham. Seeking to produce 15 successful high-tech spinouts by the end of the summer of 2019, the pairing is picking up momentum with 13 companies already in various stages of creation – four of them past the point of incorporation.

At the heart of Newcastle's spinout strategy is what it calls its 'management solution' policy, adopted five years ago. "Broadly it means that either the academic involved leaves their academic career to run the company full-time, or that we bring in an executive to work alongside them," said David Huntley, head of Company Creation at Newcastle University. Without one of these two routes being taken, the university does not spin companies out.

It is understood that teaching full time and running a start-up venture are not commitments that can be balanced together easily. In 80% of the cases it is the latter option of the outside CEO that is chosen. "There are occasions where we manage the company through one of the academics – particularly if they are junior – but this is the exception, not the rule," Huntley explained. Often the university will be loath to lose an important member of its teaching staff, or the academic might not

wish to move into a new, and far riskier, career track: so a business person stepping in to head up the company is usually seen as the best option.

This leaves the Company Creation team with the important task of finding the correct individual to step into the role of CEO. "That is difficult because you are trying to attract someone into an opportunity that has no staff, no sales, no cash, and no business plan," Huntley said. Upon introducing the academic and the potential executive, there is what Huntley likes to call the 'three yeses moment,' where the academic, the external, and Huntley himself all agree on the venture. Once this moment is reached, a deal can be signed.

Based on the transfer of equity to the new CEO, the deal is graduated with increasing levels of equity being transferred as certain thresholds are reached. Firstly, the CEO writes the business plan and invests in the venture; secondly the company is legally incorporated; and finally seed funding is raised – "the critical moment". The trick is convincing somebody who is talented enough to run the company – and therefore has other, less risky career options – that they can make more money through the successful commercialisation of a new technology. "All universities have great science and ideas - these are important but not sufficient. You need people who understand

how to make a business out of that,” said Dr Mick McLean, the CEO of **Atelerix** and one man who took Huntley up on that offer. Holding patents for an innovative method of storage and transportation of cells using hydrogels, Atelerix seeks to replace the standard practice of cryo-preservation. Rather than the expense and difficulties of keeping samples at -180 degrees, the Newcastle spinout’s tech can safely hold cells at room temperature, with applications in the drug discovery, therapeutics, and cell therapy industries.

A partnership of McLean, inventor Professor Che Connon, and Senior Applications Scientist Dr Stephen Swioklo, Atelerix is a case in point of the management solution driven spinout around which Newcastle builds its innovation policy. The key to this relationship, McLean suggested, is the correct division of labour.

Essential but unstimulating administration and company set-up activities are not best suited to inventors. Legal work, insurance cover, banking and shares, writing and refining the business plan, approaching potential investors and customers: “If you leave it to the academic to do, either it doesn’t get done or it’s done in a piecemeal fashion,” McLean said. Not only is this failing to efficiently capitalise on the IP’s potential but it is taking the academic away from what should be their key focus, developing the technology itself.

And although it is useful – in some sectors essential – for the business exec to have a basic grasp of the technology side of the business this will always be secondary to the academic’s. “I can act as the bridge between Che and potential investors, but fairly soon they will exhaust my knowledge and they’ll want to speak

directly with the inventor – but that’s fine, as I can work as a screen to present ‘qualified’ leads and not waste Che’s time.” McLean noted.

Much of this balance is common practice across spinout generation in the UK. What David Huntley sees as Newcastle’s novel factor is the support Company Creation is able to give to CEOs like McLean, through the Northern Accelerator programme. Backed by money from the European Regional Development Fund, a fee of £30,000 can be paid to the executive during the investor readiness process - something the University could not otherwise do.

Meant only to slightly de-risk the process, this sum is exclusively utilised when an outside CEO is brought in and is not designed to act as a regular wage or to replace the equity deal between the individual and the university. “What I tell the executive from the beginning is ‘don’t come for the £30,000’ – it is just a means to an end... to keep body and soul together,” Huntley said. The true prize is a healthy chunk of equity in a company that will go on to make plenty of money as it commercialises its innovative technology.

And Huntley believes it is working, pointing towards an increase in the pace of Newcastle University’s spinout activity and the growing awareness of the Northern Accelerator programme among local business people, with 50 individuals signed up to act as potential future CEOs.

- Robert Swift

Recent investments

This selection of reports from the deals listed on p11 is intended to illustrate the wide range of universities, market sectors, and deal sizes over the past few months

OxSyBio

OxSyBio, a biotech spinout from the University of Oxford, is developing 3D printer technology capable of printing biological materials with a diverse range of therapeutic purposes. The company has secured £10m in a Series A round led by Woodford Investment Management, with participation from IP Group and Parkwalk Advisors. The round, part of which is subject to the achievement of milestones, builds on the previous £1m seed funding, bringing OxSyBio’s total fundraising to date to £11m. The latest investment will enable the company to further develop its artificial cell platform and 3D bioprinting technology to develop disruptive products that harness the power of biology for impact in medicine.

OxSyBio’s ultimate ambition is to fabricate therapeutic tissues for patients using living cells or non-living ‘artificial’ cells, or

hybrid materials. These tissues have the potential to revolutionise the growing field of regenerative medicine, allowing for the printing of new tissues that can be used to repair or replace parts of the body damaged through disease or injury.

OxSyBio, which is underpinned by research conducted in the lab of Professor Hagan Bayley, the founding academic behind Oxford Nanopore Technologies, was spun out from Oxford University’s Department of Chemistry by the institution’s innovation arm Oxford University Innovation in 2014.

Skipping Rocks Lab

Imperial spinout Skipping Rocks Lab is pioneering the use of natural materials extracted from plants and seaweed, to create packaging with low environmental impact. Its first product is **Ohoo!** a biodegradable and edible capsule for water made from

seaweed. It is currently being trialled at events as an alternative to plastic bottles, and is now in use at Selfridges as part of the department store's wider efforts to eliminate single-use plastic bottles from its shelves.

Earlier this year Skipping Rocks Lab ran a campaign on crowd-funding platform Crowdcube, with a target on £400k. When the campaign finished, the company had raised £848.5k, more than double the target, with 898 investors acquiring 22.7% of the company's stock.

Oxford Flow

Oxford Flow, the pressure control equipment specialist for water and gas distribution, oil and gas and industrial process applications, has raised £6.1 million in a funding round to support its rapid growth, product optimisation, and customer base expansion.

The funding, secured from five new investors and two existing partners, was led by Parkwalk, which invested £2.5 million, with the remaining £3.6 million raised by six other investment groups, including Oxford University, Oxford Sciences Innovation (OSI), which already held stakes in Oxford Flow, and the Institute of Mechanical Engineering (ImechE). RT Capital Management, UK fund services group Thompson Taraz, and individual investor Simon Henry, former chief financial officer at Shell, make up the rest of the investment.

Oxford Flow designs and manufactures a new type of flow regulating valve for gases and liquids. With mechanical properties superior to any products currently in the market, valves designed using Oxford Flow's IP are lighter, cheaper and more reliable than existing comparable valves. Moreover, reducing the number of parts in valves to five from the hundred or so typically found in incumbent units, means that Oxford Flow's products are virtually maintenance free, thus offering significant savings in maintenance budgets.

Oxford Nanopore Technologies

Oxford Nanopore Technologies, the company behind the only portable real-time DNA/RNA sequencer MinION, has raised £100 million in new investment. Funds were raised from global investors including GIC (Singapore), CCB International (CCBI, China), Hostplus (Australia), and existing investors.

According to the FT, the company has raised £451 million in equity funding to date, and is now valued at £1.5bn.

3F BIO

A spinout from the University of Strathclyde, 3F BIO harnesses the production efficiency of natural processes to create high quality protein.

In nature, the smaller the organism, the more rapid and more efficient the protein development, and 3F BIO looked beyond the production of protein for human consumption by farming

large animals, to a method that produces protein so efficiently that you get more out than you put in.

3F BIO's technology transforms cereal crops such as wheat or maize into high-quality protein (ABUNDA®) with 3-15 times better conversion efficiency than traditional protein sources such as meat from farm animals.

The company recently completed a £6.16 million Series A financing round that will be used to scale up and commercialise its zero-waste process. The investment was supported by existing investors including the University of Strathclyde, the Scottish Investment Bank, the EOS Technology Investment Syndicate, US based venture capital fund Data Collective (DCVC), private investors including Nick Elmslie, the former CEO of BP's Global Petrochemicals business, and members of the 3F BIO management team.

This investment round will enable 3F BIO to progress its technology to industrial scale and expand its scope to compete in the global protein market.

Enterprise Therapeutics

Enterprise Therapeutics, a spinout from the University of Sussex, is developing muco-regulatory therapies to treat patients with respiratory diseases of high unmet medical need, where mucus obstruction reduces lung function, leading to difficulty in breathing and recurrent lung infections. In April the company closed an oversubscribed £29 million Series B round co-led by Versant Ventures and Novartis Venture Fund. The syndicate also included new investor Forbion, founding investor Epidarex Capital, and existing investor IP Group.

The investment will fund the company's drug discovery pipeline of muco-regulatory therapies into clinical development, enabling new treatment options for cystic fibrosis, chronic obstructive pulmonary disease and severe asthma.

Dr Alex Mayweg, a partner at Versant Ventures, commented "We are very encouraged by progress the Enterprise team made in generating candidates for highly sought-after but challenging targets. This financing should enable introduction of novel therapeutics for patients with cystic fibrosis and other respiratory diseases."

Sorex Sensors

Cambridge Enterprise, the Cambridge Angels and Cambridge Capital Group have completed an initial round of investment in Sorex Sensors, a spinout company from the Department of Engineering at the University of Cambridge.

Sorex Sensors has developed a mass sensor which is based on Film Bulk Acoustic Resonator (FBAR) technology. It has several advantages over existing sensors: (1) it has high mass sensitivity, down to 1 femtogram (the weight of the average virus particle); (2) it is extremely small, being about the same as a human hair in diameter, and can be arranged into arrays [on

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Recent spinouts

The following companies are new to the Spinouts UK database since the previous issue of our Quarterly Journal

company	university	sector	incorporated	web
MIRICO	STFC	instrumentation & sensors	07-Jan-15	mirico.co.uk
Glialign	UCL	life sciences	14-May-16	
Face Soft	Imperial	software	24-Jan-17	facesoft.co.uk
Morpheus Labs	Oxford	AI & machine learning	21-Feb-17	morpheuslabs.co.uk
Atelerix	Newcastle	life sciences	05-Jun-17	www.atelerix.co.uk
Disulfican	Wolverhampton	life sciences	16-Jun-17	
DIOSynVax	Cambridge	life sciences	11-Jul-17	diosvax.com
Viatem	Birmingham	life sciences	20-Jul-17	
PlayerData	Edinburgh	wearable technology	24-Jul-17	www.playerdata.co.uk
Theolytics	Oxford	life sciences	06-Oct-17	www.theolytics.com
ODQA Renewable Energy Technologies	Oxford	renewable energy	11-Oct-17	odqa.com
Kubos Semiconductors	Cambridge	micro- and opto-electronics	13-Nov-17	kubos-semi.com
Intrinsic Semiconductor Technologies	UCL	micro- and opto-electronics	07-Dec-17	www.intrinsicst.com
Portage Glasgow	Glasgow	life sciences	14-Dec-17	
GraphicsFuzz	Imperial	software	15-Dec-17	www.graphicsfuzz.com
PalaeoPi	Oxford	imaging technology	05-Jan-18	www.palaeopi.org.uk
Pepgen	Oxford	life sciences	25-Jan-18	
Invizius	Edinburgh	life sciences	26-Jan-18	www.invizius.com
Deepreason.AI	Oxford	AI & machine learning	29-Jan-18	deepreason.ai
Platinum Informatics	Dundee	data & analytics	10-Apr-18	www.pt-informatics.com

Recent exits

exit date	company	type	incorp	university	value	acquirer/market
18-Dec-17	Fusion Antibodies	IPO	29-Nov-00	QUB	£18.1m	AIM:FAB
05-Mar-18	EMcision	trade sale	16-Jun-99	Imperial	n/d	Boston Scientific
tba	Autolus	IPO (in prep)	03-Jul-14	UCL	\$125m	NASDAQ

Recent investments

date	company	university	amount (million)	investors
02-Feb-18	Disulfican	Wolverhampton	£0.20	Caparo Angad Paul Fund, U of Wolverhampton
23-Feb-18	ODQA	Oxford	£0.40	not disclosed
12-Mar-18	OxSyBio	Oxford	£10.00	Woodford Investment Management, IP Group, Parkwalk Advisors
20-Mar-18	Oxford Endovascular	Oxford	£2.10	Oxford Sciences Innovation, U of Oxford Innovation Fund, private investors (China)
20-Mar-18	Oxford Flow	Oxford	£6.00	Parkwalk Opportunities EIS Fund, OSI, IMechE
20-Mar-18	Oxford Nanopore Technologies	Oxford	£100.00	GIC (Singapore), CCB International (CCBI, China), Hostplus (Australia), existing investors.
28-Mar-18	Inflomatix	Imperial	n/d	Parkwalk U of Oxford IV, Parkwalk Opportunities Fund
03-Apr-18	Boxarr	Southampton	£2.10	Parkwalk U of Bristol Enterprise Fund
04-Apr-18	3F BIO	Strathclyde	£6.16	U of Strathclyde, EOS Technology Investment, SIB, Data Collective VC, individuals
09-Apr-18	Fieldwork Robotics	Plymouth	in kind	Frontier IP
12-Apr-18	Enterprise Therapeutics	Sussex	£29.00	Versant Ventures, Novartis Venture Fund, Forbion, Epidarex Capital, IP Group
13-Apr-18	Skipping Rocks Lab	Imperial	£0.85	Crowdcube
15-Apr-18	Sorex Sensors	Cambridge, Warwick, Madrid	£1.20	Parkwalk U of Cambridge EF, Cambridge Angels, Cambridge Capital Group
18-Apr-18	Impression Technologies	Imperial	£3.00	IP Group, Mercia Technologies
23-Apr-18	Qkine	Cambridge	n/d	Cambridge Enterprise, angels
30-Apr-18	Atelerix	Newcastle	n/d	UKI2S, Newable Private Investing, Oxford Technology Management
30-Apr-18	MIRICO	STFC	£3.50	STFC Innovation, UKI2S, new investors
30-Apr-18	PredictImmune	Cambridge	£4.30	Wellcome
01-May-18	Paragraf	Cambridge	£2.90	Cambridge Enterprise, Parkwalk Advisors, Amadeus Capital Partners, IQ Capital Partners, angel investors
01-May-18	Salunda	Oxford	n/d	Parkwalk U of Oxford Investment Fund
02-May-18	Invizius	Edinburgh	£0.50	Mercia Fund Managers
04-May-18	Glialign	UCL	n/d	UCL Technology Fund, UK Innovation & Science Seed Fund
08-May-18	MIP Diagnostics	Leicester	£1.50	Mercia Fund Managers, private investors
15-May-18	CellCentric	Cambridge	\$26.00	Morningside Venture Investments
15-May-18	PhoreMost	Cambridge	£11.00	Morningside Ventures, Jonathan Milner, Amadeus Capital Partners, Cambridge Enterprise, Parkwalk Advisors
16-May-18	Ceres Power	Imperial	£40.20	Weichai Power
29-May-18	Locate Therapeutics	Birmingham	£2.00	Midlands Engine Investment Fund (MEIF), Mercia EIS funds
31-May-18	Cambridge Touch Technologies	Cambridge	\$5.5	China Materialia (Shanghai), Downing Ventures, Parkwalk Advisors, Cambridge Enterprise, Amadeus Capital Partners



Oxford's vaccine legacy continues to grow

Universal flu vaccine spinout Vaccitech and biomolecular superglue firm SpyBiotech are the latest in a long line of vaccine innovations to emerge from Oxford University.

The introduction of vaccines in the last 100 years has transformed how we tackle many of the world's most serious and life-threatening diseases. They have saved countless millions of lives while generating profound economic impact. A recent economic analysis of 10 vaccines used in low/middle-income countries estimated that an investment of \$34 billion to provide the immunisations resulted in savings of \$586 billion in reducing the costs of illness and \$1.53 trillion including broader economic benefits.⁽¹⁾

While many infectious diseases are now prevented by safe and effective vaccines, a significant number, such as malaria, tuberculosis and Middle Eastern Respiratory Distress Syndrome (MERS), still present major healthcare challenges.

Oxford University has long been at the forefront of novel vaccine technologies, underscored in 2005 with the creation of the Jenner Institute, bearing the name of Edward Jenner – the Gloucestershire physician and “father of vaccinology”. The Jenner Institute combined the vaccine research and development activities of Oxford University and The Pirbright Institute (for Animal Health), and uniquely it focuses both on diseases of humans and livestock. A major theme is translational research involving the rapid early-stage development and assessment of new vaccines in clinical trials.

This translational focus has resulted in a close collaborative relationship between Jenner investigators and OUI, working together to assess and protect the intellectual property associated with new vaccine technologies, and to find either existing companies to partner in their future development and commercialisation, or increasingly working with external investors to spin out new vaccine-focused companies.

Vaccitech

Leading the charge in terms of recent vaccine spinouts is Vaccitech (www.vaccitech.co.uk), founded by Jenner investigators Profs Adrian Hill and Sarah Gilbert (pictured below), and led by vaccine industry veteran Dr Tom Evans.



Vaccitech's mission is to develop one of vaccinology's holy grails; a universal influenza vaccine. A universal 'flu vaccine elicits a protective immune response to the internal antigens which remain conserved across different strains of the virus. This would have the major benefit of removing the need to guess the prevalent strain ahead of each winter 'flu season, and then having to manufacture that year's vaccine based on this prediction – which is not always right.

Vaccitech is in the midst of a large Phase II clinical trial which is testing its universal 'flu vaccine in conjunction with the normal seasonal vaccine in people over 65 years old. Results are expected in the next 18 months and if positive could set the scene for a major change in how we protect against influenza.

Vaccitech is also using its technology platform of replication-deficient viral vectors to support a second clinical phase candidate; this time a vaccine against antigens associated with prostate cancer, which would be used to treat, rather than

prevent, the condition. Earlier stage programmes are addressing Hepatitis B and Human Papilloma Virus and the emerging pathogen MERS.

Established in 2016 with £10m investment, Vaccitech has proceeded to raise a further £20m from investors including Oxford Sciences Innovation (OSI), GV and Sequoia China.

SpyBiotech

Taking a different approach is another recent Jenner vaccine spinout – SpyBiotech (www.spybiotech.com). The company was established in 2017 with £4m seed funding, also from OSI and GV, and was founded by a multidisciplinary team including CEO Sumi Biswas, an Associate Professor in the Jenner Institute, her Jenner colleagues Prof Simon Draper and Dr Jing Jin, and Mark Howarth, a Professor in the University's Biochemistry department.



SpyBiotech is developing vaccines using virus-like particles (VLPs), which look like a virus on the outside but do not contain any viral genetic material, so they cannot cause disease. Uniquely, SpyBiotech has licensed IP from OUI for 'protein superglue', which enables the company to rapidly develop new vaccine candidates by decorating the outer coat of the VLP with

disease specific antigens, a process which has historically been slow, challenging and sometimes impossible. SpyBiotech is not yet in clinical trials with its vaccine candidates but its platform technology is applicable to a wide range of infectious diseases (viral, bacterial, parasitic) and potentially to cancer.

Vaccitech and SpyBiotech are just two examples of the pipeline of new vaccines and related technologies emerging from Oxford's research, and OUI would be keen to explore partnership opportunities for current licensing opportunities including

Dengue Fever, Malaria and Meningitis vaccines, novel adjuvants and innovative vector-related technologies.

Ref: (1) Ozawa S, et al. (2016) Return on investment from childhood immunization in low- and middle-income countries, 2011-20. *Health Aff (Millwood)* 35:199-207

Written by Adam Stoten,
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Oxford University Innovation



Recent investments

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the same chip] to measure different targets simultaneously; and (3) the sensors have a very low power requirement, allowing them to be operated from a coin cell, battery, mobile phone or even by energy harvesting from an RFID device.

Sorex Sensors was founded by Professor Andrew Flewitt, Dr Mario de Miguel-Ramos and Professor Bill Milne from Cambridge with co-Founders Dr Marina Cole and Professor Julian Gardner from the University of Warwick and Professor Enrique Iborra from the Universidad Politécnica de Madrid.

Impression Technologies (ITL)

Imperial College London spinout ITL, which is based in Coventry, has developed a technology called HFQ® for the mass production of complex, deep drawn, high strength aluminium structures for use in the automotive, aerospace, rail and industrial sectors.

Following the opening of the world's first HFQ® production facility in October 2016, the company is already supplying around 25,000 components every year to high-profile manufacturers, including Aston Martin and Lotus Cars. ITL is also in discussions with a number of other global automotive brands and recently secured significant grant funding of £9.5million as part of a leading consortium including Gestamp Washington UK Limited (a wholly-owned subsidiary of Gestamp Automoción, one of the world's largest suppliers of automotive components).

Mercia Technologies and IP Group have each invested £1.5m in a £3m follow-on funding round in ITL, which will enable the company to build its commercial and operations team to support the continued commercial adoption of its Hot Form Quench (HFQ®) technology.

Qkine

University of Cambridge spin-out Qkine has closed its seed investment round supported by Cambridge Enterprise, the commercialisation arm of the University, and a team of five angels led by Jim Warwick. The amount is undisclosed.

Qkine is a specialist manufacturer of proteins that are used for control of stem cell growth and differentiation. The backing of the experienced angel investors will drive Qkine forward to establish its UK manufacturing base and support its product development programme, using protein engineering techniques to optimise growth factors for stem cell and organoid biology.

MIRICO

Originally spun out of the RAL Space Department of the UK's Science and Technology Facilities Council (STFC) in late 2015, MIRICO produces equipment for high precision sensing of gases using next generation laser techniques.

Over the past two years MIRICO has developed a prototype system for remote detection of emissions for use in industrial facilities and scientific applications around the world. The company has secured £3.5 million investment in a round led by Longwall Ventures ECF along with STFC Innovation Ltd, UK Innovation and Science Seed Fund (UKi2S), and new investors Foresight Williams Technology EIS Fund, a London based investment fund for supporting disruptive technology.

On the back of successful trials with major industrial and scientific collaborators, this funding will support MIRICO in finalising its products and establishing a manufacturing capability. This includes the development of MIRICO's in situ sensor, the extractive gas analyser.

The equipment is used in a wide range of applications, including environmental monitoring to improve measurements for air quality and greenhouse gases and in industrial process control to measure a number of important gas molecules to improve process efficiency and product yield.

Paragraf

Graphene technology development company Paragraf, a recent spinout from the University of Cambridge, has closed a £2.9 million seed round to support the development of its first major products. The round was led by Cambridge Enterprise, the commercialisation arm of the University of Cambridge, with the participation of Parkwalk Advisors, Amadeus Capital Partners, IQ Capital Partners and angel investors.

Paragraf focuses on the production of ‘two-dimensional’ materials, primarily graphene, and the development of electronic devices based on these materials. Harnessing the extremely high conductivity, superb strength, very low weight and ultimate flexibility of graphene, Paragraf’s technology is the first ever commercial-scale method validated to reproducibly deliver functionally active graphene with properties targeted to its final device-specific application, with both high quality and high throughput.

Glialign

Glialign was established in 2018 to take forward the work of UCL academics in engineering live neural tissue. The company’s current project has been funded by the UCL Technology Fund, UK Innovation and Science: Seed Fund (UKI2S) and Innovate UK.

The founders James Phillips and John Sinden are currently optimising a method for producing a living nerve growth guide designated “EngNT”, which is intended as an ‘off-the-shelf’ nerve replacement, primarily for peripheral nerve repair.

Hundreds of thousands of people every year are affected by severe peripheral nerve damage, resulting in paralysis and loss of sensation, often accompanied by chronic pain. Current therapies are successful in fewer than half of cases and often require grafting of a nerve from another part of the body. UCLTF’s Proof of Concept funding model has supported key product development steps, with additional funding from UKI2S and from Innovate UK, as part of its ‘Investment Accelerator Pilot’, enabling crucial *in vivo* experiments to demonstrate the efficacy of the improved construct. Success on these studies will be a key step towards bringing this innovative cell therapy to the clinic.

UKI2S investment director Oliver Sexton commented “Glialign’s technology addresses a major unmet patient need and may help patients with peripheral nerve damage recover. UKI2S’ investment and Innovate UK’s support allows Glialign to de-risk the technology, gathering data to support product approval and hastening its availability.”

MIP Diagnostics

MIP Diagnostics was founded in 2015 as a spinout from the University of Leicester by several leading experts in the field, including Prof Sergey Piletsky, in order to commercialise various forms of Molecularly Imprinted Polymers (MIPs), sometimes called ‘plastic antibodies’.

The company’s technology includes a novel method to make nanoMIPs which circumvents the drawbacks of traditional MIP manufacturing methods. NanoMIPs are, as the name suggests, nanostructured polymer particles typically containing a single binding site for their target. Whilst MIPs are exceptionally robust polymers [plastics], nanoMIPs are sufficiently small to be essentially soluble. They can also be fused to solid substrates,

such as sensor surfaces, if required. The robust nature of MIPs and nanoMIPs make them ideal reagents for a wide range of applications including point-of-care diagnostics and in field based testing. They can withstand harsh chemical environments, such as extremes of pH, seawater or high concentrations of organic solvents.

MIP Diagnostics has closed a £1.5m Series A funding round supported by Mercia Fund Managers, which first invested in the business in 2015. The round was also supported by a number of private investors including Andrew Fisher and David Evans, and will allow the business to move out of the University complex into a new facility in Colworth Park, Bedfordshire and double its current five-strong team with four additional laboratory staff and a business development manager.

To further support its plans for expansion, MIP Diagnostics has appointed Jim Reid as chair to provide valuable commercial expertise. Jim has extensive experience in the diagnostics marketplace and was the winner of the Ernst & Young Entrepreneur of the Year for Science and Technology for both Scotland and the UK in 2005, and he has previously worked for blue-chip organisations including Organon, Roche and Trinity Biotech. Commenting on his new role, Jim Reid, said “MIPs offer many advantages and have the potential to satisfy a recognised gap in the market which antibodies have been unable to address. Through the continued support of Mercia, MIP Diagnostics is now perfectly placed to expand its operations to service these exciting market opportunities.”

CellCentric

CellCentric has raised \$26 million in private financing to fund clinical testing of its first-in-class oncology drug candidate CCS1477. The funds will be used to test the novel p300/CBP inhibitor in late stage, treatment-resistant prostate cancer (up to Phase IIb). The further funds come from one of CellCentric’s existing investors, Morningside Venture Investments.

Dr Will West, Chairman & CEO of CellCentric, commented: “There is a large and growing population of late-stage prostate cancer patients who have inherent or acquired resistance to current second-line anti-androgen therapies. CCS1477 has shown promise in addressing this. It is positioned after or in combination with second generation anti-androgen drugs such as abiraterone, enzalutamide and apalutamide.”

PhoreMost

PhoreMost’s SITESEEKER® phenotypic screening platform can identify the best new therapeutic targets for any chosen disease setting, and rapidly identify how to develop novel drugs to them, offering the potential to increase significantly the diversity and affordability of novel treatments for cancer and other unmet diseases. PhoreMost has completed an £11m Series A investment round, which will be used to expand

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Why 'IP' must be considered a potentially vital asset in the early stages of your start-up

Start-ups face numerous challenges, not only in getting their fledgling businesses off the ground, but in key considerations around financial management, regulation and compliance, monitoring performance, and much more.

It's understandable therefore that they may not place significant initial value on protecting their intellectual property (IP), preferring to postpone or neglect it in the early stages. However, it can represent a vital asset both for short and long-term prospects.

Indeed, innovation and creativity often play an essential role in both the launch and continued success of any new business. Therefore, it is important for owners of start-ups to carefully consider how a robust IP strategy will help to safeguard the commercial proposition and future growth of their business.

Intellectual Property (IP) in high profile cases

IP is not generally a widely understood term but is one that is increasingly brought to the fore by high profile cases involving household names. Casual observers may therefore be more familiar with IP concepts than they realise.

Tech giants Apple and Samsung continue to battle each other in the courts, with Samsung recently ordered to pay Apple \$539million for **five patent infringements**. A well-publicised case involved global chicken restaurant Nando's, which accused an independent restaurant named Fernando's of IP infringement through the replication of its name and images. More recently, the European Court of Justice ruled that the iconic **shape of KitKat's four-finger chocolate bar was not globally distinctive enough** to retain its EU-wide protected trademark status, meaning that it will lose this form of IP protection.

With such pertinent cases in mind, your own business might be well advised to consider trade marks, patents or design protection, or a combination of all three.

Certainly, IP protection can mean the difference between making money from an invention, design or brand, and losing out altogether. It can represent a vital edge, as demonstrated in the case of Alexander Graham Bell, who famously patented his telephone model just hours before a rival inventor. As a result of Bell's proactivity, he was able to change history and has since been lauded for his invention whilst his competitor remained in the shadows.

Why is IP so important for start-ups?

For start-ups, an effective IP strategy can make the difference between business success and business failure.

Some SMEs may not put IP at the top of their list of priorities when starting out, but ensuring these measures are in place early on in the business journey will prevent a headache further down the line. It is rare for a business to not have any ideas to protect, and consulting an appropriate organisation for advice is a good place to start.

Every business that uses a name, brand or logo should be considering trade mark protection. SMEs creating products that have a unique design should be considering registered design protection. Where a business is innovating new products or processes, patent protection may be the route to go down.

IP as an inherent part of your business journey

SMEs should consider the following points when embarking on their business journey:

The best time to consider IP protection is before a business is launched. This is most noticeably the case with patents, as demonstrated by the case of Alexander Graham Bell's competitor. With trade marks and logos, considering IP early on will help ensure that you are not accidentally infringing on another business' existing trademark, and prevent other businesses infringing on your trademark.

Design applications can be filed within twelve months of your design going to market, but it is normally safer to apply for registration beforehand, especially if you may need to seek protection outside of the EU. However, for patents, it is critical that an application is on file before any kind of public disclosure, written or verbal.

Many experts can lend you a hand – so make use of them

A vast pool of information, guidance and support is available for start-ups and SMEs. For instance, the **UK Intellectual Property Office (UKIPO)** provides free training, case studies, short guides and even an online IP health check to get you started, and to recommend what type of IP is most suitable for your business needs. The UKIPO can also point you in the right direction of a local patent or trade mark attorney who can offer professional advice.

Got a brilliant idea? Keep it to yourself

Understandably, you may be incredibly excited to shout about your innovative new product or service, but it is vitally important to keep quiet until the correct IP protection is arranged. It would be highly frustrating to lose your unique business idea to opportunistic competitors. Remember, even verbal disclosure could lose you your business success.

Don't hang around – develop your IP strategy right away

Don't wait until a competitor copies your idea, you inadvertently infringe someone else's IP, or it is too late to file an application. Developing a robust IP strategy does not need to be complicated. Your ideas will often be the lifeblood of your new business, so investing time and money in a strong IP strategy as early as possible in your business journey is very important. You never know, you may have more worth protecting than you first thought.

by Jennifer Bailey,
Chartered Patent Attorney,
Marks & Clerk



Recent investments

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operations on the Babraham Research Campus and progress several novel drug targets into first-in-class drug discovery programmes.

The new investment follows a successful validation phase, which saw PhoreMost grow from a Cambridge University spinout in 2015 with early proof-of-concept data, to a technically and commercially validated enterprise in 2017.

The Series A round was led by current investors Jonathan Milner, Amadeus Capital Partners, Cambridge Enterprise, and Parkwalk Advisors. Morningside Ventures, a prolific backer of global biotech enterprises, is the principal new investor, with Dr Gerald Chan from Morningside joining the PhoreMost board.

Ceres Power

Ceres Power, a spinout from Imperial College London which listed on the AIM market in 2004, is the developer of the SteelCell®, a low cost Solid Oxide Fuel Cell (SOFC) technology.

The company recently announced a strategic collaboration with China's Weichai Power, one of the leading automobile and equipment manufacturing companies in China.

The long term strategic relationship provides Ceres Power with access to the Chinese market, the world's fastest growing market for fuel cells. Initial plans are for Ceres Power and Weichai to jointly develop and launch a SOFC fuel cell range extender system for China's fast growing electric powered bus market.

The agreement includes a potential initial £17.0m equity investment by Weichai in Ceres Power and a potential further equity investment of £23.2m, which is triggered on signing further commercial agreements before 30 November 2018, both subject to approval by provincial PRC (People's Republic of China) governmental authorities and Ceres Power shareholder approval.

Weichai is listed in Hong Kong and Shenzhen with a market capitalisation of c.US\$10bn. It has a strategic investments with businesses around the world, including companies in France, the USA, and Germany.

Cambridge Touch Technologies (CTT)

CTT has completed a \$5.5m Series A1 round of investment, with existing investors Parkwalk Advisors, Cambridge Enterprise, and Amadeus Capital Partners, joined by new investors China Materialia of Shanghai, and Downing Ventures of London.

CTT's technology uses the world's simplest architecture to deliver an all-screen, multi-finger 3D touch solution that can scale to all device sizes at a fraction of the cost of existing approaches. CTT technology sits above or on the display due to its high transparency, not underneath as with current opaque approaches. It is fully compatible with OLED and LCD conventional or bezel-less 'infinity' screens, including flat, curved and newly emerging foldable and flexible devices.

University of Manchester is seventh most innovative in Europe

A list recently produced by Reuters ranks The University of Manchester as the seventh most innovative in Europe – jumping nine places from the 2017 report – and third in the UK.

The Reuters Top 100 Most Innovative Universities ranking is based on the number of academic papers, patents filed, and citations by other academics and industry which introduces a quality rather than a volume measure.

Clive Rowland, CEO of UMI3 Ltd, the University's agent for IP commercialisation, commented: "The University continues to promote its long-standing commitment to improving society through innovation, whether such positive impacts are achieved by our social enterprises or for commercial gain through our spinout company and technology licensing work.

"We recognise that to be an innovative organisation we need to look for quality as well as volume with our patenting – our patents need to be both thorough and defensible.

"It's pleasing to see that our results-focused approach and continuous improvement in our way of

working, that we introduced some time ago, is having an effect as shown by our upward movement in this index.

"The difference between us and those towards the top of the table, in respect of the impact measure, is narrowing too."

Since 2004, IP enterprises have generated over £115 million to the University through the sale of shares in spinouts, licensing income and through IP grants and contracts activity. Further-



more, over £430m has been invested by third party venture funders in the University's spinouts, a number of which have received national and regional enterprise awards.

Graphene

Manchester is synonymous with graphene following its isolation in 2004 by Nobel Prize winners Professors Geim and Novoselov. The University has one of the most extensive portfolios of IP rights relating to graphene and 2D materials with over 300 scientists engaged in 2D materials research in Graphene City®.

IP encompasses technologies in areas including the production of 2D materials, 2D inks, desalination and nano-filtration membranes, barrier coatings, polymer composites, thermoelectric composites, sensors, touch screen interfaces, printable electronics and wearable technologies to name a few.

Earlier this month the University, together with spinout Nanoco Group PLC, which develops and manufactures quantum dots and nano-materials, launched Nanoco 2D Materials Ltd to develop a new generation of nano-materials. Potential commer-

cial applications for these materials span across a wide range of sectors including novel catalysts, photo-detectors, photovoltaics, inverters and light emitting devices.

Spinouts

Spinout and AIM listed **SkinBioTherapeutics**, a skin health specialist, raised £4.5m when it listed on the London stock market last year. The company recently announced that its cream formulation has passed effectiveness studies in models of skin and will now undergo further testing for stability.

Earlier this year, another spin-out **MicroBioSensor** – which is behind a medical device designed to detect life threatening infections – received a £1.4m investment boost and has just successfully completed its first clinical trial.

Reuter's latest ranking follows recent news that the University has attracted the most research income from UK industry of any institution in the country, with £24.8m of research income in 2016-2017 from UK industry, commerce and public corporations.

ICURe extends nationwide

The **ICURe (Innovation-to-Commercialisation of University Research)** programme, which has been piloted by the **SETsquared** partnership in the South of England, is being rolled out across the UK.

ICURe's focus is on training early-career researchers to find the right route to commercialisation, and helping them develop the necessary business skills, connections and expertise. The pilot has engaged 160 university research teams to generate more than 11,000 business links worldwide and create 120 jobs in 44 new companies.

An £8 million Phase 2 expansion of the ICURe pilot sees the **University of Warwick** and **Queen's University Belfast** join the programme, which is supported by Innovate UK, part of the new national funding body UK Research and Innovation. The universities will work alongside the SETsquared partnership to run and grow the programme across the UK.

With this funding boost, the pilot programme will be able to support an additional 48 research teams nationwide. University researchers can get up to £35,000 to take their ideas out of the lab and validate them in the market.

A total of £3 million of the funding will go towards helping the start-ups that emerge from the programme to establish their businesses and support future growth. This will be competitively awarded by Innovate UK.

The ICURe programme will accept applications from teams based at all UK universities. The ICURe delivery partners will

actively recruit from their regions, but where timings or other factors dictate will accept applications from other regions.

The **Midlands ICURe** programme, led by Warwick, has a regional emphasis covering the mid-UK, from Wales to East Anglia, and will support up to 24 projects in two cohorts.

The **NxNW (North by North West) ICURe** programme, led by QUB, has a regional emphasis covering Northern Ireland, Scotland and the North of England, and will also support up to 24 projects in two cohorts.

This means that a full spread of dates can be provided. This year there have been cohorts starting in June, more will start in August and September, and two more in January 2019.

The next cohorts have the following dates:

- NXNW Cohort A: application deadline 6 July 2018, programme start w/c 6 August 2018
- SETsquared Cohort 14: application deadline 11 July 2018, programme start w/c 17 September 2018
- Midlands Cohort B: application deadline 25 August 2018, programme start w/c 24 September 2018

Teams participating in ICURe must have three core members:

- a post-doc researcher/entrepreneurial lead (the 'early-career researcher', or ECR);

- a senior researcher; and
- a business adviser with relevant industrial experience who can if necessary be recruited with help from the ICURE organisers.

The TTO from the researcher's university is expected to provide a shadow team member to give additional expert advice, and act as an essential link between the team and the university.

ICURE has four stages in its process:

1. BUSINESS MODEL GENERATION

ICURE kicks off with a 3-day residential bootcamp for the teams during which they are helped in forming a hypothetical business model for the commercialisation of their research. The team also has to produce a budget and action plan for the next stage.

2. MARKET VALIDATION

The next step is for the ECR Entrepreneurial Lead to spend approximately three months intensively testing the business model by having meaningful conversations with at least 100 prospective customers, regulators, suppliers, partners and competitors to validate the commercial potential of their research. ICURE funding buys out the ECR's time and provides sufficient funds for the ECR to travel to conferences or key target markets to meet with companies and experts who can help validate the business model.

3. OPTIONS ROUNDABOUT

On completion of this first-hand market research, the team presents to a panel of experts and investors on the results of the Market Validation stage. The panel assesses the development options for the next stage, which can include carrying out public or private sponsored research, exploring licensing opportunities, and seeking public or private funding for spinout. Those teams that have demonstrated evidence of significant market demand will proceed to the next stage.

4. BUSINESS PLANNING

Those teams with the potential for licensing or spinout may get up to £15k of additional funding to take part in business planning training and then three months of preparing a business plan they can use to pitch to investors and to apply for translational grant funding.

If there is a strong case, commercialisation staff from the universities and university incubators will work with each team so that they can be fast-tracked into creating a start-up company.

Successful applicants to the ICURE programme will receive a budget of up to £35k for Stages 1 through 3. This funding is not a grant, but is instead drawn down against expenditure through the university's research commercialisation office.

Don Spalinger, chairman of the SETsquared Partnership, and Director, Innovation and Entrepreneurship at the University of Southampton said

"SETsquared created ICURE to overcome some of the barriers of getting the outputs from the UK's world class universities research labs into the commercial marketplace.

"ICURE's results from its first three years of operation go beyond our expectations. This expansion of ICURE's nation roll-out will enable even more research teams at more UK universities to take advantage of its proven capabilities. ICURE enables university research teams to explore all avenues of commercialisation, from collaborative research to consultancy to licensing to spinouts.

"The ICURE experience empowers the university research teams to work more closely with businesses in all of their future activities."

Professor Stuart Croft, Vice-Chancellor of the University of Warwick, welcomed the extension of the ICURE programme to the Midlands.

"Warwick is renowned for the many ways it acts as a highly effective bridge for innovation between academic research and industry, and we are therefore delighted to be a key part of the national rollout of ICURE with its focus on helping early-career researchers taking their innovations into the marketplace.

"Warwick will also draw on the innovation-based partnerships across the Midlands such as Midlands Innovation, the Midlands Engine, and the Midlands Enterprise Universities teams, to ensure that this programme helps create even more innovation-based jobs and business growth across our region."

Brian McCaul, CEO of Qubis Ltd and Director of Innovation at Queen's University Belfast, also recognised the effective features of the programme.

"Having had nine teams graduate from ICURE, and having run three of our own Lean Launchpad programmes, Queen's and Qubis have been pioneers with lean start-up in tech transfer. The focus on the customer-need is the perfect antidote to tech-push.

"We have already seen significant commercial benefits, whether measured by deals done, or learnings achieved, especially with early-career researchers. We are convinced that 'lean changes', change everything.

"We're now keen to work with our partners to accelerate ICURE adoption across Northern Ireland, Scotland and the North of England. This is a vital initiative for rebalancing the UK innovation economy."

Collaboration and commercialisation

Two developments led by University of Birmingham Enterprise demonstrate how academic



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research can be brought to social benefit by working with other organisations

Midlands Innovation Commercialisation of Research Accelerator (MICRA)

The University of Birmingham is to lead a connected system of incubators and accelerators that will drive jobs and economic growth across the Midlands region, following a £5 million award announced in April by Research England.

The award will establish MICRA as the largest formal technology transfer collaboration in the UK, providing a single gateway to the collective intellectual property (IP) resources from the eight Midlands Innovation universities - Aston, Birmingham, Cranfield, Keele, Leicester, Loughborough, Nottingham, and Warwick.

The Midlands Innovation universities already generate more new inventions and patents per unit of research income than any other leading group of UK universities, and the funding is expected to be a key driver for significant new investment and jobs in the region.

Collaborating with industry and organisations from all sectors, the MICRA programme will provide support and access for enterprise development, investment and investor relationships to help entrepreneurs drive their ideas forward, meet a wider community of like-minded people and find the right targeted incubation support within the partnership.

Dr James Wilkie, Director of Enterprise & Innovation at the University of Birmingham, commented: "The Midlands of the UK has a strong track record of innovation and tremendous capacity for growth. We are very proud to be leading this initiative that brings together our leading universities to provide a single point of contact for investors."

Birmingham-China collaboration to develop new drugs for global epidemics

University of Birmingham scientists are working with partners at the Guangzhou Institutes of Biomedicine and Health (GIBH), China, to develop new drugs that could help tackle global epidemics.

University of Birmingham researchers have already identified a number of compounds that are looking promising as potential therapeutic treatments, and University of Birmingham Enterprise, the University's technology transfer company, is optimistic that the collaboration will result in novel drugs for infectious diseases.

The chemistry for drug candidates is designed by a team of Birmingham researchers led by Professor John Fossey, Reader in Synthetic Chemistry, and Dr Luke Alderwick, Director of the Birmingham Drug Discovery Facility.

The team of expert GIBH researchers then design and synthesise new molecules with better drug-like properties. The biological

activity of the resulting molecules is then tested by both institutions before the molecules are optimised further.

This process is expedited by the rapid sharing of data through the University of Birmingham's BEAR DataShare facility, which was developed by the University to enable secure sharing of project-related data across the world, even by mobile phone.

The University of Birmingham has a long-standing relationship with the city of Guangzhou, which is also the sister city of Birmingham itself. The University opened its Guangzhou Centre in 2011 and its China Institute has forged close links with partners in the city and beyond.

GIBH is a research institute run by the Chinese Academy of Sciences, the People's Government of Guangdong Province, and the People's Government of Guangzhou Municipality. Research areas include stem cell and regenerative medicine, chemical biology, public health, immunology and infectious diseases.

For further information contact **Ruth Ashton**, Reputation & Communications Development Manager, e: r.c.ashton@bham.ac.uk, t: 0121 414 9090, m: 07989 558041

Project partners

We are very grateful to the following organisations for their support



Imperial Innovations is focused on commercialising the best in UK academic research, drawn from academic centres within the 'golden triangle' formed by Cambridge, Oxford and London. We have end-to-end capability, taking research at the earliest stage and working with it right through to commercialisation. www.imperialinnovations.co.uk

IP Group works with leading universities to develop and commercialise some of the world's most exciting technology innovations. Offering more than traditional venture capital, IP Group provides its companies with business building expertise, networks, recruitment and business support.



The Group's portfolio includes early stage to mature businesses across the biotech, healthcare, technology and cleantech sectors. www.ipgroupplc.com



The University of Manchester Intellectual Property UMIP®

UMIP, a division of The University of Manchester IP Ltd, is the University's agent for IP commercialisation. UMIP brings the University's groundbreaking inventions and software into the commercial world by attracting entrepreneurs, investors and corporate venture partners to our campus and engaging with academic colleagues to license or spin out companies. umi3.com

Marks & Clerk is the UK's largest firm of patent and trade mark attorneys and advises companies on their intellectual property across a full range of sectors worldwide. www.marks-clerk.com



Mercia Technologies is a leading UK technology investor with a particular emphasis on the Midlands, North of

England and Scotland. We focus on high growth sectors leveraging the team's deep expertise across four fields including digital & digital entertainment; software & the internet; electronics, materials, manufacturing & engineering; and life sciences & biosciences. www.merciatech.co.uk

MFL Science & Technology is a specialist insurance broker risk management adviser to many of the UK's leading 'spin out' businesses.



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Oxford University Innovation (OUI) is the research commercialisation company of the University of Oxford, managing technology transfer and consulting activities. Having created more than 150 spinouts, Oxford



is first in the UK for number of spinouts, the number that survive, and jobs created. In the 2016~17 financial year OUI completed more than 50 licenses and consulting agreements every month. innovation.ox.ac.uk



PraxisAuril provides a single voice for 5,000+ university business collaboration specialists working in 200+ universities and stakeholder organisations around the world. Our members benefit from a unique and comprehensive range of training programmes, practical tools, advocacy and connectivity. PraxisAuril operates in the best interests of the sector, driving consistent professional standards, development, and recognition of the KE profession. www.praxisunico.org.uk



Scottish Enterprise helps translate ideas and research into more spinout and start-up companies, and encourages Scottish companies to make use of technology and research being developed. www.scottish-enterprise.com



UCLB is a technology transfer company commercialising on the research and innovations developed by UCL. Offering world-class expertise in areas from life sciences to engineering and

from the arts to the built environment, we work to make commercial connections between the expertise and innovations of UCL's academics and the needs of industry and the wider marketplace. www.uclb.com

University of Birmingham Enterprise supports academics



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who want to innovate, take their ideas to market, work with

businesses and social enterprises, or enrich their professional lives by doing academic consultancy projects. We do this by providing enterprise training, funding, office and laboratory space, and a full technology transfer service. University of Birmingham Enterprise also manages investment funds and the incubation services and facilities at the Birmingham Research Park. www.birmingham.ac.uk/enterprise