Playing to one’s strengths

As we have frequently remarked, and as the figures given in our Quarterly Journals demonstrate, spinout activity—new spinouts created, investment, exits—is highly concentrated in the South East of England.

While universities such as Oxford and Cambridge, Imperial and UCL, go from strength to strength, making the most of their favourable environment—business, technology, investment—outside the ‘golden triangle’ it is not possible for universities to replicate the same conditions, and they must identify their own strengths and put them to maximum effect. We have two examples in this issue: University of Birmingham Enterprise’s account of the commercialisation collaboration between eight Midlands universities (p17), and our Spotlight feature on Swansea University (p15), which has evolved a technology transfer model tailored specifically to its own circumstances.

Encouragingly, the Knowledge Exchange Framework (KEF) currently under development acknowledges this issue, and has set out to group universities in clusters, so that universities in the most favoured environments can be assessed against their peers, and others judged by criteria more relevant to their own environments; see our report on p13.

Since the publication of our previous Quarterly Journal, the sale of Spinouts UK to Beauhurst has been completed. Henry Whorwood of Beauhurst explains what this means in terms of tracking and profiling spinout companies on p8. There will be a transitional handover period, with Spinouts UK founder and editor Jonathan Harris continuing to produce the Quarterly Journals, while Beauhurst gradually takes over the data collection activities.

- Jonathan Harris, Editor
New spinouts

The following companies are new to the Spinouts UK database. Further details of these and other recent spinouts are given in the table on p10.

**Amprologix**

Amprologix is a spinout from the University of Plymouth, established to introduce new antibiotics. It will commercialise the work of Dr Mathew Upton, Professor in Medical Microbiology at the University’s School of Biomedical Sciences. Professor Upton initially developed the patented technology working closely with UM13 Ltd at the University of Manchester, which now takes a 13 per cent stake in the new business.

The first product from the company is expected to be a cream containing epidermicin, which can rapidly kill harmful bacteria including MRSA, Streptococcus, and Enterococcus at very low doses, even if they are resistant to other antibiotics.

No new classes of antibiotics have been introduced into clinical use for the past 30 years, and Amprologix is aiming to meet a growing need for new antibiotics as harmful microbes become increasingly drug resistant. It has already secured industry involvement through a partnership with biotechnology and synthetic biology company Ingenza.

In a relevant infection model, a single dose of epidermicin was as effective as six doses of the current standard of care. The antibiotic was initially recovered from a skin bacterium named Staphylococcus epidermidis, but can now be produced in a microbe suitable for industrial scale-up, using synthetic biology methods developed by Ingenza.

Frontier IP, which specialises in commercialising university intellectual property, has taken a 10% stake in Amprologix.

**AudioTelligence**

AudioTelligence is a spinout from Cambridge-based CEDAR Audio, a leader in audio restoration, dialogue noise suppression and speech enhancement for the entertainment and audio forensic sectors. The company uses technology developed by the Signal Processing Group of the University of Cambridge.

AudioTelligence recently secured £3.1 million seed funding in a round led by Cambridge Innovation Capital (CIC) together with The University of Cambridge Enterprise Fund V, managed by Parkwalk, and two Cambridge-based business angels.

The company explains “Although the technology was initially developed by CEDAR Audio, the CEDAR team recognised that it required a different business model. So they decided to spin out a new company, AudioTelligence, to license the technology for consumer products. At this point, it was clear that a sizeable funding round was required to enable the company to secure contracts with industry leaders, and the team looked to Cambridge Innovation Capital (CIC) for support. CIC was established to help companies with significant IP and strong Cambridge connections to stay and grow within the Cambridge cluster.”

AudioTelligence is delivering 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 the world’s fastest-growing consumer technology segment in the first quarter of 2018 driven by Amazon’s Echo, Google’s Home, and several recent entrants such as Xiaomi.

AudioTelligence’s technology delivers significant improvements in separating a speaker’s voice from background noise and other conversations. The technology also addresses other applications, such as the hearing assistance market.

**Fotenix**

University of Manchester spinout Fotenix, co-founded by Professor Bruce Grieve, Director of eAgri Sensors Centre at the University, and Dr Charles Veys, offers a new online crop analysis tool, that aims to help improve yield quality and shelf life significantly. Fotenix’s technology is the result the work that Veys carried out during his PhD at the eAgri Sensors Centre in the School of Electrical and Electronic Engineering.

“Our technology looks at the ripeness of fruits on the plants,” said Veys, following recent research field trips to Canada, China and multiple European countries. “Fotenix’s ultimate aim is to increase efficiency in the agri-food industry across the world.

“With our technology, producers and agronomists can identify plant characteristics earlier in the season, well before they become visible to even the sharpest agricultural eye.

“This real-time information means that appropriate action can be made sooner and better informed, particularly when paired with the latest machinery – a huge advantage that will improve agricultural production efficiency and reduce its environmental footprint.”

“At present the large manufacturers use cameras on field machinery to identify areas to apply fertiliser or herbicide and even when to harvest horticultural produce. Our idea is to enhance this with our technology. We look at many different colours beyond the human eye – in some ways similar to night vision but with more colour.”

**Grafine**

Grafine Ltd is a new spinout from the University of Manchester, created to develop high-performance rubbers, elastomers and other soft materials enhanced with graphene, the 2-dimensional material first isolated in Manchester.
The business was founded by two University of Manchester academics, Dr Maria Iliut and Dr Aravind Vijayaraghavan. Both founders are world experts in graphene, and its use in making rubbers and elastomers stronger and more durable. Elastomers and rubbers are used world over in products such as tyres, shoes, gloves, industrial components, construction materials, coatings, and medical devices. Graphene can enhance the properties of rubber and elastomers by improving their strength, elasticity, flexibility, thermal stability, resistance to chemicals and durability.

Grafine is offering a range of technical development services to manufacturing companies who wish to profit from the performance benefits that graphene can add to their products. Grafine will be based at The University of Manchester’s Innovation Centre and will use the University’s facilities including the new Graphene Engineering Innovation Centre (GEIC) for its product development work.

**Vitamica**

Research led by Dr Massimo Antognazzi at the University of Bristol has shown that measuring tiny internal movements within bacteria could help doctors prescribe antibiotics more effectively in future. These internal vibrations cease when microbes are killed by antibiotics. Vitamica is a spinout from the University created to commercialise this technology.

Rapid antimicrobial susceptibility testing (AST) of patient samples could inform doctors which antibiotics are effective and to which the bacteria show resistance. Crucially, the test results could be available in time for the first antibiotics to be prescribed, rather than 48 hours later as is typical for current testing methods.

Vitamica is developing a rapid AST which can tell in a few seconds whether the cells are alive or not. The testing is based on a recently developed imaging technique - Sub-cellular Fluctuation Imaging (SCFI) - that directly detects nanoscale fluctuations that are present in bacteria when they are alive. These fluctuations are too small to be seen using an optical microscope, but the optical set up of SCFI enables the company to image them directly in real time.

With the support of a grant from Innovate UK, the company has made good progress with laboratory tests to study the interaction between commonly used antibiotics and a range of bacteria. In November Vitamica closed its initial seed funding round with investment from the University of Bristol Enterprise Fund, managed by Parkwalk, Wyvern Seed Fund, and a group of individual investors. The investment will support further development of the prototype instrument and the expansion of validation trials.

**Cytecom**

Cytecom is a spinout company from the University of Warwick which is developing a bacterial monitoring technology that can discern whether bacteria are present in a liquid solution, and critically whether those bacteria are alive or dead, all within a matter of minutes.

The company has identified a clear need for a fast reliable and accurate bacteria detector. Current (reliable) methods require 48-72 hours, causing causes delays and uncertainty during manufacture of beverages and food, and during medical evaluations.

The technology allows the detection and identification of live bacteria in under an hour without sacrificing accuracy. Cytecom is currently developing its laboratory prototype detector to make a version which is compact and can be deployed in the field.

**Taraz Metrology**

University of Nottingham spinout Taraz Metrology is developing optical metrology systems for manufacturers who use additive manufacturing (3D printing) techniques. Additive Manufacturing can create challenges for metrology systems, in terms of complex shapes, and factory environments. Taraz Metrology has extensive knowledge of the processes and materials involved, and its advanced optical techniques can inspect very complex shapes, with systems optimised to cope with shock and vibrations.

**New spinouts from Oxford**

Oxford University Innovation (OUI) announced in its Q3 2018 Update that it had launched five new spinouts in the quarter, bringing 2018’s spinout haul to the end of September to 16. They latest spinouts are:

**Edtopia**

Edtopia enables personalised education to be added into children’s apps and games, typically in place of adverts.

**PQShield**

PQShield develops cybersecurity technology using post-quantum algorithms.

**Oxford Molecular Biosensors**

Bacterial biosensors for detection of environmental contamination.

**Caristo Diagnostics**

Caristo develops clinical diagnostic tools designed to test patients who are at risk of cardiovascular disease by increasing the accuracy of CT scans via artificial intelligence.

**1715Labs**

1715 Labs was set up to make commercial use of the software created by the Zooniverse team to categorise images, text and videos.
Accurately ranking university innovation

Impact, innovation and the whole process of turning research into reality have an ever-growing role in university life yet remain overlooked by global rankings. Should the rankings adapt to reflect this?

Oxford is the world’s number one university three years running, according to the Times Higher Education (THE) World University Rankings. Obviously, with Oxford University Innovation (OUI) being an integral part of the Oxford machine, this was excellent news for us. It also reflected a strong performance by UK universities in general, with Oxford, Cambridge and Imperial all in the top 10, and, of course, the results confirmed the THE as the only rankings that really matter (for this year at least).

Tempting as it was to sit back on the shoulders of Oxford’s many giants, I felt compelled to better understand the methodology that goes into generating the rankings. In particular, to what extent do OUI’s activities in supporting impact contribute to the overall result?

The weightings make for interesting reading. Teaching, Research and Citations each comprise 30% of the overall score. Of the remaining 10%, International Outlook constitutes 7.5%. Finally, sneaking in with a mere 2.5% is Knowledge Transfer. The methodology defines this as “A university’s ability to help industry with innovations, inventions and consultancy” and confirms it “has become a core mission of the contemporary global academy”. All well and good, but how do you – or rather the THE analysts – measure Knowledge Transfer? The metric used turns out to be how much research income an institution earns from industry. This figure is then adjusted for purchasing power parity (as for other income metrics in the methodology) and scaled against the number of academics the university employs.

Compare this with the definition of impact used as part of the Research Excellence Framework, the exercise by which UK university research quality is assessed; “...an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia”. The contrast is striking; the THE ranking definition very narrow, the REF definition very wide. Now clearly we are comparing apples and pears, but if the Knowledge Transfer category in the THE ranking aims to capture how good a given institution is at transferring its knowledge, then surely part of that equation must be an assessment of the impact said dissemination has in society – the “so what?” question.

In the world of knowledge transfer, institutional income from industry is a valid and important metric and is certainly a good indicator of the ability of an institution to engage with the private sector. However, it is only part of the picture, and to put all our eggs in that basket risks ignoring other very important – and impactful - forms of knowledge transfer. For instance, while OUI spins out around 20 new companies every year based on research outputs, we are witnessing an increasing number of projects proceeding down a social enterprise route, with a social mission written into their corporate DNA (i.e. Articles of Association). These include diverse offerings such as a validated index to help corporations and governments understand if and how they are contributing to poverty amongst their people (sOPHla), and a smart phone-based game to help train healthcare workers in Africa to respond to paediatric emergencies (LIFE). These are projects that may be hugely impactful but may well not return huge amounts of money to the University. It is also worth noting that for the majority of universities the main source of commercial income will be sponsored research, rather than revenue derived from more conventional downstream knowledge transfer activities such as IP licensing and spinout creation. This is a very important activity for universities, especially where industry is able to pay the full cost of research, but again it potentially distorts the picture.

There are also issues in terms of timing. As with most offices supporting technology transfer, we are focused on long term value creation associated with early stage, high risk technologies and IP. This means that a) most of the licence deals we conclude or spinouts for which we secure investment will never yield a product due to high risk of technical failure, b) even when we get lucky and a product makes it to the market, very few of these ever return really significant quantities of money, and c) the very occasional big payday typically comes many years after the point at which the technology transfer activity took place, and so doesn’t really reflect the current ability of an institution.

If the above picture sounds a little depressing, it shouldn’t. If technology transfer offices can’t take a punt on potentially world-changing technologies when they are in their infancy (or even, to stretch the analogy, neonatal) then who can? We expect most of our technologies to fail for many different reasons (technical, changing market, left-field competition) but we shouldn’t forget that along the way our licensees and spinouts build further on the transferred knowledge, develop new products, employ people, use 3rd party services and at some point might even pay taxes. Likewise, our academic consultants contribute to commercial product development programmes, training of industry personnel and many other activities across a
wide range of sectors. The point being that the economic impact is much wider than simply how much cash a university receives from industry, and hence why Oxford and many of its peers have commissioned Economic Impact Assessment reviews to better understand and communicate this.

www.ox.ac.uk/about/facts-and-figures/economic-impact

So should THE consider a more inclusive approach to Knowledge Transfer metrics? Ideally, almost certainly yes. While the fundamental mission of most universities remains teaching and research, their ability to generate impact in society from both through knowledge transfer and entrepreneurial activities is of increasing importance not only within governments but also amongst prospective staff and students. In terms of the former, the UK government has set itself the goal of increasing the percentage of GDP spent on R&D to 2.4% by 2027 – bringing us in line with the 2014 OECD average - with a longer-term goal of hitting 3%. This will only be achieved through more investment in public sector research that translates into growth in private sector R&D. For staff and students, the ability and reputation of a university to support translational and entrepreneurial activities is a material factor in where they choose to work or study; in fact, a colleague at UC Berkeley’s technology transfer office told me earlier this year that the main reason they exist is for staff retention purposes, such was the extent of entrepreneurial culture amongst their academics. Practically, however, there are of course challenges. Accessing a metric that is both fully inclusive of knowledge transfer and can be reliably derived for universities not just in the UK but globally is difficult, and perhaps impossible. It is also noteworthy that two of the other major global university rankings (QS World University Rankings and Academic Ranking of World Universities) do not allocate any portion of the overall score to knowledge transfer activities, so arguably THE is already ahead of the game. Nonetheless, in the absence of any reliable metric that truly captures downstream impact, I would advocate re-focusing on numbers of transactions that reflect a genuine transfer of knowledge, and which could include IP licences, spinout and social enterprise creation, academic consulting agreements and commercially sponsored research – all which include both direct and indirect benefits and which I would argue are better predictors of future societal benefit. Unless of course this would jeopardise our number one spot, in which case just leave well alone.

Written by Adam Stoten, Chief Operating Officer, Oxford University Innovation

Recent exits

CrownBio Inc

In June the University of Nottingham sold its shares in cancer research spinout CrownBio Inc in a deal worth £3.6 million. CrownBio Inc, which is using pre-clinical cancer models developed at the University’s Medical School to increase the chances of success of cancer drug development, has been acquired by the Japanese firm JSR Corporation. The University’s spinout portfolio, managed by Nottingham Technology Ventures Ltd, includes more than 20 companies ranging from early stage to quoted businesses.

Andrew Naylor, Chief Executive of Nottingham Technology Ventures, said “The sale of shares in CrownBio is the third exit from the Medical School’s spinout portfolio this year and is in line with the University’s policy to realise value from its equity in listed companies.”

In February this year, the University raised over £5m selling some of its shares in Oncimmune, a Nottingham spinout specialising in early diagnosis of lung and liver cancers which listed on the AIM market in May 2016. Oncimmune’s EarlyCDT-Lung test has now completed more than 150,000 commercial tests from its US base in Kansas and the test is now formally part of the Medicaid programme helping millions of patients across the US.

Nottingham Medical School also sold its stake in Nurture Fertility, established in 1991 by the University of Nottingham to study the science behind IVF and develop new techniques and treatments, and consistently rated one of the top three fertility clinics in the UK.

All three of these spinouts have retained and expanded their bases in Nottingham, supporting the growth and prosperity of the region.

This success in 2018 follows the successful sale of spinout Monica Healthcare, whose technology enhances obstetric care by the use of wireless foetal monitoring devices, to GE Healthcare in 2017.

Kinetic Discovery

Exscientia, itself a spinout from the University of Dundee using Artificial Intelligence (AI) in drug discovery, last month acquired fellow Dundee spinout Kinetic Discovery for an undisclosed amount. Kinetic Discovery brings specialist protein engineering, biophysical screening and structural biology expertise that is highly synergistic to Exscientia’s current drug design, pharmacology and computational science platform. The integration of these capabilities will scale Exscientia’s ability to discover new drug molecules for its portfolio plans.

www.spinoutsuk.co.uk
Both companies have had investment from Frontier IP. As at 30 June 2018 Frontier IP held a 4.1 per cent equity stake in Exscientia, and has received Exscientia shares for its 5% Kinetic holding.

The acquisition allows Exscientia to create an AI-driven drug discovery company to go rapidly from gene to clinical candidate for any druggable target of choice. It is part of Exscientia’s growth strategy to develop a proprietary drug pipeline and to enhance its support of existing and future partnerships. The company is collaborating with several leading pharmaceutical and life sciences companies, including GSK, Sanofi, and Evotec, which invested €15 million in Exscientia in 2017.

The largest exits over the past few months are the IPOs of two UCL life sciences spinouts.

**MeiraGTx**

MeiraGTx Holdings plc, a clinical stage gene therapy company, raised $75 million at IPO in July.

MeiraGTx was founded in the UK in 2015 in a deal which combined the assets and expertise of Kadmon Corporation, a US specialty pharmaceutical company and UCLB spinout Athena Vision. Athena Vision was created by UCL Business (UCLB), UCL’s commercialisation company, who owned the rights and options to Professor Robin Ali’s ophthalmic gene therapy programmes. MeiraGTx is developing gene therapies for diseases of the eye, salivary gland and central nervous system.

MeiraGTx is the first investment to IPO for the UCL Technology Fund (UCLTF), managed by Albion Capital in collaboration with UCLB. The UCLTF first supported MeiraGTx as part of a $50m Series B investment round in 2017 to fund the continuation of its clinical trials.

The company, based in London and New York, has four ongoing clinical programmes, one compassionate use programme and a broad pipeline of preclinical and research programmes. The funds raised from its flotation will enable it to progress its treatments for inherited rare eye diseases, xerostomia (dry mouth) and neurodegenerative diseases.

**Orchard Therapeutics**

In November Orchard Therapeutics, a biotechnology company dedicated to transforming the lives of patients with rare disorders through innovative gene therapies, announced the closing of its initial public offering on the NASDAQ exchange, issuing 16,103,572 American Depositary Shares, each representing an ordinary share at the IPO price of $14.00 per share. The gross proceeds from the offering were $225.5 million before deducting underwriting commissions and estimated offering expenses.

Orchard Therapeutics is based upon research arising from the groups of Prof Bobby Gaspar and Prof Adrian Thrasher at the UCL Institute of Child Health, and has been supported by UCLTF since its first investment round in 2016.

Prior to the IPO, and since the previous Spinouts UK Quarterly Journal, Orchard Therapeutics announced in August the completion of an oversubscribed $150 million Series C financing. Deerfield Management led the financing with significant new investments from RA Capital Management, Venrock, Foresite Capital, Perceptive Advisors, Cormorant Asset Management LP, ArrowMark Partners, Sphera Global Healthcare, Medison Ventures, Driehaus Capital Management and Ghost Tree Capital Group, LP, as well as additional US based healthcare focused funds. Existing investors also participated including Temasek, Baillie Gifford, RTW Investments, LP, Cowen Healthcare Investments and Agent Capital.

Proceeds from the Series C financing will be used to progress Orchard’s three most advanced clinical programmes, and will also support the clinical and preclinical development of the company’s rare disease gene therapy pipeline.

---

**Recent investments**

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

**Alusid**

Alusid, a spinout from the University of Central Lancashire, uses a patented process to manufacture sustainable, high-quality building materials by recycling industrial waste ceramics and glass, which would otherwise go to landfill. Currently the company makes table tops, tiles and other surfaces through a batch process using three kilns at its plant in Preston, Lancashire. Products are sold under the brand name SilicaStone.

Alusid has raised £1.34 million through a private funding round to support the design, planning and location of a new factory to transform its production capacity. The fundraising was supported by new and existing investors, including Frontier IP.

The new factory based on a continuous flow process, where products are fired by being fed onto a conveyor belt system, called a roller hearth tunnel kiln, in a steady stream. The plant is expected to start production in 2020.
The move follows the successful testing of a pilot production line with Italian ceramic-equipment company, Sacmi Group, which will also help to design the new factory. The Alusid process means the factory will be much more energy efficient than those used for making conventional tiles. Alusid is attracting strong interest, and currently has more than 100 projects in its pipeline. SilicaStone buyers include Amazon, Four Seasons Hotels, Nando’s and Wells Fargo bank, which is using the material in its new London HQ.

The fundraising will enable Alusid to move to the next stage in development where it can capitalise on the economies of scale coupled with lower energy and material costs.

Clin-e-cal

Clin-e-cal, a spinout from The University of Manchester (through its agent for IP commercialisation UM3 Ltd) and the Manchester University NHS Foundation Trust, has secured investment from the GM&C Life Sciences Fund, managed by Catapult Ventures, to expand its development of a new approach to training and compliance in respiratory medicine. Clin-e-cal is developing several mobile applications in partnership with pharmaceutical and medical device companies to improve inhaler technique and medication compliance, both well-recognised needs within the respiratory field. Using its Tone Analysis technology, the company’s first product Rafi-Tone uses gamification techniques to help young children take their medication more effectively. Clin-e-cal was founded by clinical academic Tariq Aslam, in response to his own son’s breathing problems and his resistance to using his inhaler, and maintains strong links to the clinical and academic communities.

Exonate

Bristol spinout Exonate is developing small molecule drugs that modulate alternative mRNA splicing, with an initial focus on ophthalmologic indications.

The early research and development was undertaken in the Bristol MVRL laboratories of Professors David Bates and Steve Harper and continues in their laboratories in Bristol and Nottingham Universities, and also in the laboratory of Associate Professor Jonathan Morris in the University of New South Wales in Sydney.

Alternative mRNA splicing is modulated in disease states resulting in pathological blood vessel formation (angiogenesis), which is a key driver of disease progression in ophthalmic conditions and cancer. Exonate’s founders have identified and generated a novel class of SRPK1 inhibitors that modulate alternative mRNA splicing. The company’s eye drop formulations of the inhibitors could be safer than marketed anti-angiogenic therapies for wet age-related macular degeneration (AMD).

Exonate is now seeking to develop safer, more effective, therapies for the treatment of cancer and eye disease. The same approach will also allow the development of treatments for severe pain, and also the eye, nerve and kidney complications that occur in patients with diabetes.

The company recently secured investment from the University of Bristol Enterprise Fund II, managed by Parkwalk.

Fluidic Analytics

Fluidic Analytics’ products are based on a proprietary technology platform from the University of Cambridge. This platform was designed explicitly to give deep insights into the way that proteins fold, aggregate and interact by characterising them in solution – precisely as they exist in the body. These products have the potential to help researchers understand the mechanisms underlying conditions like Alzheimer’s disease, pharmaceutical companies to develop more effective drugs, and patients to gain access to more accurate diagnostics.

The company has raised $31 million to continue developing its products for characterising proteins and their behaviour. The proceeds of the financing will be used to continue the commercial roll-out of the company’s lab-tools pipeline and to develop further high-value clinical applications of its technology.

The financing was led by VC firm Draper Esprit, joined by new investors Delin Ventures and BGF, making its largest life-sciences investment to date and its first in Cambridge. IQ Capital and Amadeus Capital Partners also invested in Fluidic Analytics for a third successive time since the company’s first financing in 2015.

Gelmetix

University of Manchester spinout Gelmetix has raised £1.2 million in funding on crowdfunding website SyndicateRoom to help develop non-surgical treatment for chronic lower back pain. The company, previously named Gelexir Healthcare, recently changed its name to reflect its new multi-product positioning and strategy.

Gelmetix, which was founded on the back of discoveries made at the University, has had a primary focus on the development of a non-invasive injectable microgel as a cost-effective alternative treatment to surgery for chronic lower back pain. The gel is delivered into the gaps left by degenerating discs to help restore functionality and relieve lower back pain.

Despite innovation-related technical hurdles, the gel has now been fully validated for human application and a manufacturing process has been designed to produce the gel to scale with all the required quality and regulatory assurance. The company has obtained a Medical Device Manufacturer ISO certification and is currently in discussion with the MHRA and the FDA.

Whilst the company’s initial product for the spine is anticipated to enter first-in-man clinical trials in the first quarter of 2019, a
second product is being developed to address pain and loss of mobility in osteoarthritic small joints.

**Genomics**

Genomics, a spinout from the University of Oxford, is a data science company specialising in the use of human genetic information to improve drug development. Genomics has developed an analysis engine which uses genetics to understand human biology and the likely efficacy and safety of potential novel medicines. The Genomics engine is the largest of its kind in the world, with over 100 billion data points. It links human genetic variation at over 14 million positions in the human genome to changes in 7,000 molecular, cellular, and physiological measurements and disease outcomes. The company uses proprietary machine learning and statistical algorithms to predict the impact of therapeutic interventions. The company has raised £25 million in an oversubscribed Series B financing round led by Vertex Pharmaceuticals, and has signed a three-year collaboration agreement with Vertex.

Other investors in the round included IP Group, Woodford Investment Management, Invesco Perpetual, Oxford Sciences Innovation (OSI), Lansdowne Partners, and Tanarra.

Genomics will use the proceeds of the fundraising to enable further expansion, to continue to enhance its database and to pursue opportunities that emerge in this fast-growing space. The collaboration will further advance Vertex’s efforts to develop transformative medicines for people with serious diseases.

**Hazy**

Hazy, a UCL spinout that enables ethical, effortless and GDPR-compliant data sharing for responsible businesses, has announced a further $1.8 million seed funding led by UCL Technology Fund, alongside Nationwide Building Society, Pentland Ventures (the investment division of Pentland Group plc), Amadeus Capital Partners, London-based VC fund AI Seed, and other investors.

Its online platform is the only product on the market to allow businesses to share data responsibly and securely through a workflow tool that automatically anonymises and adapts to changing datasets. Hazy’s artificial intelligence engine is able to seek out and anonymise personal data buried in datasets, ensuring companies stay fully GDPR-compliant when sharing data.

This takes Hazy’s total seed funding to $2.8 million following a $1 million investment from M12 (Microsoft’s corporate venture arm) and VC firm Notion in May, after Hazy was declared the European winner of global startup competition Innovate.AI. Hazy previously raised £340k pre-seed in October 2017 in a round led by the UCL Technology Fund, which is managed by Albion Capital in collaboration with UCLB.

**Healx**

Healx, a Cambridge start-up, was founded in 2014 by Dr Tim Guillas, a biochemical engineer and founder of the Cambridge Rare Disease Network, Dr David Brown, the inventor of Viagra and ex-global head of drug discovery at Roche, and Dr Andreas Bender, a lecturer and researcher at Cambridge University’s Centre for Molecular Sciences Informatics. At the heart of Healx is HealNet, a comprehensive knowledgebase for rare disease, mapping over one billion unique disease, patient, and drug interactions. HealNet was built using a variety of machine learning methods applied to a wide range of data types from both publicly available and exclusive sources including scientific literature, patents, clinical trials, disease symptoms, drug targets, multi-omic data and underlying chemical structures. HealNet facilitates highly parallelised, automated, large scale drug discovery that drastically reduces time and cost to discovery compared with traditional processes. Most recently, a drug for Fragile-X Syndrome that was discovered by Healx’s platform was ready for the clinic in less than 15 months, cutting typical drug development timelines by 80% and doing so at a substantially reduced cost.

In July Healx closed a $10 million Series A funding round, led by Balderton Capital, together with existing investors, Jonathan Milner and Amadeus Capital Partners. The investment will be used to more than double Healx’s team of software engineers, data scientists, pharmacologists and drug development experts.

**Micrima**

University of Bristol spinout Micrima’s MARIA breast cancer screening system is currently for use in symptomatic clinics, and it is intended that it will eventually be widely adopted as a viable alternative to mammography breast screening. Unlike mammography that uses ionising radiation, MARIS uses harmless radio-waves to detect breast cancer, and requires no breast compression, so is a painless procedure.

Micrima has raised £4.4 million in additional equity funding led by Technology Venture Partners, the Angel CoFund, and Venture Founders, plus returning and new individual investors, bringing total investment in the company to £10.7 million.

**NuNano**

University of Bristol spinout NuNano designs cantilever-based sensor devices and probes for atomic force microscopy (AFM), a very high resolution process with results 1,000 times better than the limits of optical diffraction. Microcantilevers are the
simplest form of microelectromechanical systems (MEMS), and are typically used to measure and image the topographical surface of an object, to measure electrostatic or capillary forces, conductivity and other properties, or to manipulate objects on an atomic scale.

The company recently secured a second round of an undisclosed amount from the University of Bristol Enterprise Fund II, managed by Parkwalk

OMass

OMass Therapeutics uses structural mass spectrometry to discover novel medicines. The technology enables detection of drug leads that not only bind to the target complex, but also exert a functional effect through modulation of complex formation.

Last month the company announced completion of a £14 million Series A investment led by new investor Syncona, alongside Oxford Sciences Innovation (OSI). The financing supports development of a pipeline of drug development programmes.

OMass Technologies was formed in 2016 as a spinout from the University of Oxford. Its structural mass spectrometry technology was developed in the laboratory of Prof Dame Carol Robinson to investigate protein structures and their interactions. The company was founded to provide research and consultancy to pharmaceutical and biotechnology companies, but was relaunched as OMass Therapeutics to develop its own novel medicines.

Oxbotica

Oxbotica is an autonomous vehicle software company, whose software using computer vision, machine learning, and artificial intelligence has been deployed across multiple projects where the future application of autonomy is being trialled, such as with Ocado, at Heathrow Airport, and on major city streets.

Oxbotica announced in September the completion of a £14 million investment from IP Group, Parkwalk Advisors, and AXA XL (formerly XL Catlin). The investment will be used to further accelerate Oxbotica’s growth, which has already seen it generate significant revenues from an international customer base in sectors including aerospace, automotive, construction, logistics and mining.

The making of bioscience spinout companies in the UK

Spinouts UK has been working with The Biotechnology and Biological Sciences Research Council (BBSRC) and the Intellectual Property Office on a BBSRC paper which considers the links between spinout companies, the industrial sectors they service, the research topics funded by BBSRC leading to the creation or development of these spinout companies, and the intellectual property rights in the form of published patents held by some of these. This analysis is used to consider the implication for a research funder, how successes can be measured, and what interventions might be required to facilitate and sustain the creation of new bio-science ventures arising from investments in research and capabilities.

The paper is due to be published shortly, and we will send a copy to all readers of our Quarterly Journals. In the meantime, if you would like further details, please contact:

Dr Alex Chaix, Joint Head of Knowledge Exchange and Commercialisation, BBSRC - UKRI
+44 1793 413237; +44 795048885; Alex.Chaix@bbsrc.ukri.org

UK’s Best Breakthroughs List

A new list has been compiled by Universities UK, the umbrella group for UK universities, to show that universities do much more than just teach students, and to bring to life the difference they make to everyone’s lives.

The objective is to celebrate the inventions, discoveries and social initiatives from UK universities which have had a transformational impact on people’s everyday lives, including the development of penicillin, the invention of the portable defibrillator, work tackling plastic pollution, ultrasound scans, MRIs, and the establishment of the Living Wage.

Universities across the country were invited to nominate the one innovation, discovery or social initiative from their institution which they believe has had a significant impact on society. Over 100 universities submitted a nomination. The entries cover health, technology, environment, family, community, and culture & sport.

The full List can be seen at madeatuni.org.uk
Recent spinouts

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

<table>
<thead>
<tr>
<th>company</th>
<th>university</th>
<th>sector</th>
<th>incorporated</th>
<th>web</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edtopia</td>
<td>Oxford</td>
<td>software B2B</td>
<td>22-Feb-16</td>
<td><a href="http://www.edtopia.io">www.edtopia.io</a></td>
</tr>
<tr>
<td>AudioTelligence</td>
<td>Cambridge</td>
<td>software B2B</td>
<td>01-Mar-17</td>
<td><a href="http://www.audiotelligence.com">www.audiotelligence.com</a></td>
</tr>
<tr>
<td>Hazy</td>
<td>UCL</td>
<td>software B2B</td>
<td>06-Jun-17</td>
<td>hazy.com</td>
</tr>
<tr>
<td>Oxford Molecular Biosensors</td>
<td>Oxford</td>
<td>instrumentation &amp; sensors</td>
<td>08-Jun-17</td>
<td><a href="http://www.gra-fine.com">www.gra-fine.com</a></td>
</tr>
<tr>
<td>Grafine</td>
<td>Manchester</td>
<td>nanotechnology</td>
<td>13-Jun-17</td>
<td></td>
</tr>
<tr>
<td>Oxhex</td>
<td>Oxford</td>
<td>3D printed helmet technology</td>
<td>05-Oct-17</td>
<td><a href="http://www.oxhex.london">www.oxhex.london</a></td>
</tr>
<tr>
<td>Vitamica</td>
<td>Bristol</td>
<td>medical devices</td>
<td>29-Jan-18</td>
<td><a href="http://www.vitamica.co.uk">www.vitamica.co.uk</a></td>
</tr>
<tr>
<td>Cytecom</td>
<td>Warwick</td>
<td>medical devices</td>
<td>20-Mar-18</td>
<td>cytecom.co.uk</td>
</tr>
<tr>
<td>PQShield</td>
<td>Oxford</td>
<td>software B2B</td>
<td>30-May-18</td>
<td>pqshield.com</td>
</tr>
<tr>
<td>Amprologix</td>
<td>Plymouth</td>
<td>drug discovery</td>
<td>19-Jun-18</td>
<td></td>
</tr>
<tr>
<td>Caristo Diagnostics</td>
<td>Oxford</td>
<td>drug discovery &amp; diagnostics</td>
<td>22-Jun-18</td>
<td>caristo.com</td>
</tr>
<tr>
<td>Taraz Metrology</td>
<td>Nottingham</td>
<td>micro &amp; opto electronics</td>
<td>13-Jul-18</td>
<td>taraz-metrology.com</td>
</tr>
</tbody>
</table>

Recent exits

<table>
<thead>
<tr>
<th>exit date</th>
<th>company</th>
<th>type</th>
<th>incorp</th>
<th>university</th>
<th>value raised</th>
<th>acquirer/market</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-Jun-18</td>
<td>CrownBio Inc</td>
<td>trade sale</td>
<td>2006</td>
<td>Nottingham</td>
<td>n/d</td>
<td>JSR Corporation, Japan</td>
</tr>
<tr>
<td>15-Nov-18</td>
<td>Kinetic Discovery</td>
<td>trade sale</td>
<td>22-Oct-08</td>
<td>Dundee</td>
<td>n/d</td>
<td>Exscientia, UK</td>
</tr>
<tr>
<td>24-Jul-18</td>
<td>MeiraGTx</td>
<td>IPO</td>
<td>20-Mar-15</td>
<td>UCL</td>
<td>$72m</td>
<td>NASDAQ:MGTX</td>
</tr>
<tr>
<td>05-Nov-18</td>
<td>Orchard Therapeutics</td>
<td>IPO</td>
<td>02-Sep-15</td>
<td>UCL</td>
<td>$225.5m</td>
<td>NASDAQ:ORTX</td>
</tr>
</tbody>
</table>
## Recent investments

The following list gives a representative sample of investments in spinout companies over the past few months:

<table>
<thead>
<tr>
<th>Date</th>
<th>Company</th>
<th>University</th>
<th>Amount ( Million )</th>
<th>Investors</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-Jun-18</td>
<td>Micrima</td>
<td>Bristol</td>
<td>£4.40</td>
<td>Technology Venture Partners, Angel CoFund, Venture Founders</td>
</tr>
<tr>
<td>26-Jul-18</td>
<td>Healx</td>
<td>Cambridge</td>
<td></td>
<td>Balderton Capital, Jonathan Milner, Amadeus</td>
</tr>
<tr>
<td>01-Aug-18</td>
<td>Hazy</td>
<td>UCL</td>
<td>£1.37</td>
<td>UCL Technology Fund, Nationwide, Pentland Ventures, Amadeus, AI Seed, others</td>
</tr>
<tr>
<td>30-Aug-18</td>
<td>Genomics</td>
<td>Oxford</td>
<td>£25.00</td>
<td>Vertex Pharmaceuticals Inc, IP Group, Woodford, Invesco, OSI, Lansdowne, Tanarra</td>
</tr>
<tr>
<td>09-Sep-18</td>
<td>AudioTelligence</td>
<td>Cambridge</td>
<td>£3.10</td>
<td>Cambridge Innovation Capital, Cambridge Enterprise</td>
</tr>
<tr>
<td>17-Sep-18</td>
<td>Exonate</td>
<td>Bristol</td>
<td>n/d</td>
<td>U of Bristol Enterprise Fund (Parkwalk)</td>
</tr>
<tr>
<td>18-Sep-18</td>
<td>Alusid</td>
<td>UCLan</td>
<td>£1.34</td>
<td>Frontier IP, new and existing investors</td>
</tr>
<tr>
<td>18-Sep-18</td>
<td>NuNano</td>
<td>Bristol</td>
<td>n/d</td>
<td>U of Bristol Enterprise Fund (Parkwalk)</td>
</tr>
<tr>
<td>19-Sep-18</td>
<td>Oxbotica</td>
<td>Oxford</td>
<td>£14.00</td>
<td>IP Group, Parkwalk Advisors, AXA XL</td>
</tr>
<tr>
<td>25-Sep-18</td>
<td>PervasID</td>
<td>Cambridge</td>
<td>£1.84</td>
<td>CIC, Martlet, Parkwalk Opportunities EIS Fund, U of Cambridge EF (Parkwalk)</td>
</tr>
<tr>
<td>09-Oct-18</td>
<td>Clin-e-Cal</td>
<td>Manchester</td>
<td>£0.13</td>
<td>GM&amp;C Life Sciences Fund (Catapult Ventures)</td>
</tr>
<tr>
<td>19-Oct-18</td>
<td>Oxford Nanopore</td>
<td>Oxford</td>
<td>£49.91</td>
<td>Amgen Ventures</td>
</tr>
<tr>
<td>21-Nov-18</td>
<td>Gelmetix</td>
<td>Manchester</td>
<td>£1.20</td>
<td>SyndicateRoom</td>
</tr>
<tr>
<td>21-Nov-18</td>
<td>OMass</td>
<td>Oxford</td>
<td>£14.00</td>
<td>Syncona, OSI</td>
</tr>
<tr>
<td>26-Nov-18</td>
<td>Fluidic Analytics</td>
<td>Cambridge</td>
<td>£24.21</td>
<td>Draper Esprit, Delin Ventures, BGF, IQ Capital, Amadeus</td>
</tr>
</tbody>
</table>

*This list, and our investment deal reports on p6ff, cover only some of the many investments made in university spinout companies over the past few months. A comprehensive list of investments is maintained by Spinout UK’s new owner, Beauhurst—see the article on p8.*
Celebrating a year of achievement

This has been a year of milestones for UCL spinouts, especially fitting in UCLB’s 25th year of commercialising the research and ideas of UCL academics. Throughout 2018 UCL spinouts have achieved large-scale investments and award wins, as well as the exciting acquisition of one of its computer science spinouts and the launch of a new pilot programme.

Record Investments

UCLB previously announced record investments for three UCL biopharmaceutical spinouts, Autolus, MeiraGTx, and Freeline Therapeutics, who between them have raised in excess of £265 million this year alone.

In November Orchard Therapeutics, a spinout dedicated to transforming the lives of patients with serious and life-threatening diseases through autologous ex vivo gene therapies, added to this figure through its initial public offering on NASDAQ, raising $225 million.

The capital raised builds upon three previous financing rounds, including a $150 million series C round in August of this year. The spinout, based upon research arising from the groups of Prof. Bobby Gaspar and Prof. Adrian Thrasher at the UCL Institute of Child Health, also celebrated an award win in 2018, taking home the Global University Venturing 2018 Deal of the Year Award, for its oversubscribed $110 million series B financing round which closed in December last year, to which the UCL Technology Fund (UCLTF) contributed. UCLTF is a £53m fund established by UCLB and Albion Capital to invest in commercialisable technologies emerging from UCL.

Advancements in Artificial Intelligence

Data protection has become a key focus for companies, particularly with the introduction of GDPR this year. Software developer Hazy uses advanced AI to automate the anonymisation of data, making it easier for developers and data scientists to share data securely. This year Hazy has raised over $2.8 million investment. $1 million of these funds were awarded to the London-based AI start-up when it won Microsoft’s venture fund, M12’s Innovate AI Award in May. The competition recognises and awards capital to high growth machine learning and AI start-ups. The remaining $1.8 million was raised in a funding round led by the UCL Technology Fund. Founded less than two years ago, Hazy was set up by two experienced software engineers in collaboration with Dr Fintan Nagle, a machine-learning researcher in UCL’s Department of Cognitive, Perceptual and Brain Science.

An exciting acquisition also took place in March for UCL machine vision start-up Matrix Mill when it was acquired by Niantic Inc., the makers of popular mobile game app Pokémon Go. Matrix Mill was co-founded by Dr Gabriel Brostow (UCL Computer Science) with two of his researcher team Dr Michael Firman and Dr Daniyar Turmukhambetov, following years of pioneering research into building and perfecting deep neural networks that can infer information about the surrounding world from one or more cameras. The acquisition of Matrix Mill will assist Niantic Inc. in the advancement of its computer vision and machine learning efforts.

Supporting New Ventures

In recognition of UCL academics’ keen interest in entrepreneurship, UCLB – in collaboration with UCL Computer Science and UCL Innovation & Enterprise – launched Portico Ventures: a pilot programme that incentivises commercially-minded researchers to invest their time and effort into building successful spinouts. It does so by offering them a larger shareholding in the newly formed entity and a clean intellectual property (IP) licence for non-patentable technologies. Currently being trialled in UCL Computer Science, the programme aims to demonstrate that academic impact can be amplified through the translation of new ideas, algorithms or models into solutions that transform markets and are adopted by industry. For example, recent Portico Ventures spinout Maxatta is transforming trading desk processes through the application of Robotic Process Automation (RPA) and Machine Learning (ML) innovations coming out of the university.

25 Years of Commercialisation

As UCLB reaches the close of its 25th year, it celebrates some important achievements with its spinouts. This year has been a big milestone for the UCLB team and Cengiz Tarhan, who after guiding the commercialisation efforts of UCL since 1993, retired from his role as UCLB’s Managing Director in October. Cengiz was involved in many successful spinout journeys and licence transactions in his time with UCLB.

Next year looks to be an exciting time for UCL technologies, with the recent launch of spinouts such as Intrinsic, a semiconductor company launched earlier this year, based upon the
“We’re thrilled to see some great achievements from UCL spinouts this year. The year of successes is a testament to the hard work and innovative ideas of UCL researchers and the foresight of the UCLB team in recognising commercial opportunities.”
Anne Lane, Interim Managing Director, UCLB

KEF – you get what you measure

Readers of our Quarterly Journals who work in TTOs (technology transfer offices) at universities will be only too well aware of the discussions surrounding the KEF (knowledge exchange framework).

Other readers may well be bemused by the profusion of TLAs (three letter acronyms) in the sector, but the KEF is shaping up to be very influential for everyone involved in the commercialisation of research and technology emerging from the UK’s universities and research institutes.

Teaching and research have long been the core activities of universities, and are measured under the TEF (Teaching Excellence Framework) and REF (Research Excellence Framework). In recent years the importance of a “third leg”, representing knowledge exchange and engagement with society at large, and the benefits which universities can return to their communities, has been recognised. The KEF is being developed to measure what is happening in this respect with a view to encouraging best practice and promoting effective outcomes. It will be obvious to anyone who has observed the regular REF assessments, and the increasing focus on the impact made by universities, that the measures used have had a considerable influence on how universities operate. In a nutshell, you get what you measure. An article in the Harvard Business Review some time ago (2010) on the subject of CEO remuneration emphasised the point, which remains valid: “It can’t be that simple, you might argue— but psychologists and economists will tell you it is. Human beings adjust behaviour based on the metrics they’re held against. Anything you measure will impel a person to optimise his score on that metric. What you measure is what you’ll get. Period.”

For this reason, it is crucial that the KEF sets metrics which are accepted by all parties concerned as giving a reasonable picture of performance in knowledge exchange. As defined by Research England, which is leading the development of KEF, the purposes of the KEF are to provide:

- Greater public visibility and accountability of university KE activities.
- Universities with new tools to understand, benchmark and improve their individual performance.
- Businesses and other collaborators or users with more information on universities’ individual strengths in KE.
- Businesses and other collaborators or users with more information on universities’ individual strengths in KE.

Research England goes on to say that “Since the KEF aims to benchmark and compare universities’ performance in KE, it is important that the metrics collected are fair (their use allows for a fair comparison between institutions), informative (metrics are related to KE activities and say something useful about them) and linked to performance in KE (not just a reflection of the scale of activity, or resources available).”

Research England recently published three documents to help higher education institutions (HEIs) prepare for the upcoming consultation on the KEF.

The first report, Summary of KEF call for evidence responses, summarises the key points that have emerged from the exercise which sought suggestions on how to make sure the KEF compares HEIs in a fair and meaningful way, what data could be used to inform the KEF, and how KEF metrics should be visualised in an accessible and useful way.

Excerpts from the report include the following observations:

- The majority of responses expressed a cautiously positive tone, essentially ‘this could be useful if done well’.
- The most negative sentiments were because responders believed benchmarking was unhelpful, there was already sufficient existing data, or that their perception was that the definition of KE was too narrow.
- The most common positive sentiment was around the potential of the KEF to raise the profile of the value of KE within institutions, to support the case for funding, and to demonstrate the large volume of good work going on in this area.
- The most common positive sentiment was around the potential of the KEF to raise the profile of the value of KE within institutions, to support the case for funding, and to demonstrate the large volume of good work going on in this area.
- There was almost universal support for supplementation of metrics by additional narrative or contextual information. The most commonly expressed view from Universities of all types was for the institution to be able to supplement metrics with detailed contextual infor-
Overall, the call for evidence helped to provide evidence of the strength of feeling that this should not be a purely metrics-driven exercise. While sympathising with the final point made above, observers from outside the university community are clear that some form of comparison is essential if the sector is to develop to its full potential; adverse rankings may be felt to be unfair, but without any measurement little improvement is possible.

The second report, KEF Cluster Analysis Report, includes an initial cluster analysis of English HEIs that will inform the development of KEF metrics (universities outside England are not covered by the analysis). The clusters to which universities are assigned are subject to change, as discussed in the report, but once established, the clusters will provide important benchmarks for comparison between universities.

Comments from the report include:

- This report presents a clustering of English HEIs into groups with similar sets of knowledge and physical assets... This recognises that the diversity of HEIs in the UK national innovation system is critical, with different universities working with different types of economic and social actors, and contributing in different ways to different specific socio-economic, technological, industrial and regional challenges. Importantly, these structural differences between HEIs, coupled with their local economic context, shape KE opportunities and barriers; i.e., their KE opportunity potential.

- HEIs play important roles in the innovation system of a nation. However, the diversity of this type of actor is frequently overlooked, with institutions treated as similar, generating and diffusing knowledge, and developing the next generation of the labour force, particularly in simple ranking systems. These simple rankings typically compare metrics of ‘performance’ with no attempt to control for structural differences between HEIs. By contrast, this diversity must be celebrated and strengthened in order for the national innovation system to meet the many and complex knowledge needs across a broad range of industrial, technological, regional, and societal challenges.

- Any attempt to develop a metrics framework to explore KE performance needs to account for this diversity of KE opportunity potential. Assessments of KE performance can then focus on how well a university, given its particular ‘quasi-fixed’ knowledge and physical asset base, is able to marshal these resources to pursue KE opportunities and, through these, deliver socio-economic impacts.

- We also know that HEIs of all types – research-intensive, teaching-intensive and specialists – engage in wide varieties of KE from commercialisation, to contract and collaborative research, to consulting, provision of training, and the provision of testing and other facilities and equipment related services.

Finally, a KEF Technical Note describes the role of UK Research and Innovation data in the development of the KEF. The quotations above give no more than a flavour of the approach and conclusions; full texts are available on the Research England website re.ukri.org.

The date for consultation on the KEF is due to be announced before Christmas.

Tamsin Mann, Head of Policy at PraxisAuril, has commented “The KEF is an institutional measure but KE is a people business and ultimately comes down to individuals and the interactions between them: researcher, PhD student, collaboration manager, IP officer, R&D manager, investor, and so on. PraxisAuril wants to understand the value and impact of training in KE; how skilled staff can enhance those KE opportunities and reduce the challenges.”

PraxisAuril welcomes comments from members at any time on the KEF’s development and eventual implementation; contact Tamsin Mann at tamsin.mann@praxisauril.org.uk
Swansea Innovations

For Spinouts UK readers, the most interesting aspect of Swansea’s commercialisation activities is represented by Swansea Innovations Ltd, a wholly owned subsidiary of the University which manages the commercial pipeline emerging from the University’s research base.

The Swansea Innovations website promotes the growing portfolio of technologies available for licensing, and the University’s high-tech spinout companies seeking industrial collaborations.

Swansea embarked upon a deliberate programme to deliver ambitious plans for commercialisation at the University by recruiting Dr Gerry Ronan as Head of Intellectual Property in 2011. Dr Ronan has worked in industry in corporate, SME and start-up companies for 25 years. Before joining Swansea, he worked with an academic spinout from Durham University where he led the growth of the company selling scientific instrumentation for drug discovery, and in 2010, with the company trading profitably across 24 countries worldwide, he took the business to a trade exit. At Swansea University, he has driven a progressive approach to technology transfer.

The new approach has been welcomed by the University, which has a strong history of delivering technologies used in a wide range of industries usually through collaborative programmes with large companies. Dr Ronan believes the University, as a top-30 UK university for the quality of its research, has a responsibility to play a larger role in supporting the development of a modern knowledge-led economy.

One of the first initiatives to implement the University’s plans for commercialisation was its InvestorG8 investor readiness pilot programme in 2014. The £450,000 initiative funded by the Welsh Government Innovation Team supported nine projects over a ten month period, with the launch of eight new companies or joint ventures as a result. These companies went on to raise over £4 million. At a cost of approximately £60k per company, the programme saw an excellent return on the public funding committed.

Swansea University Innovation Fund (SUIF)

The success of the InvestorG8 programme led Dr Ronan to propose an investment fund for the University, which could accelerate the commercialisation of its academic research. He said “InvestorG8 has delivered a step change in spinout activity at Swansea University. The decision to launch an Innovation Fund is part of a broader strategy to support spinout formation and to ensure that such companies are properly financed. We fully expect to leverage significant additional investment from third party venture capital funds and business angel networks.”

The Innovation Fund, set up in 2015, offers two interlinked funding streams. Firstly, smaller amounts of capital (up to £5,000) are available for activities that ensure a long term pipeline of investible projects. Such activities include the commissioning of market and technical reports as part of the investment due diligence process. Secondly, debt or equity investment of circa £50,000 is offered to Swansea University spinout companies as part of syndicated deals with third party venture capital or business angel investors. This co-investment strategy is designed to ensure that only spinouts that are deemed investable by professional fund managers are eligible.

The Swansea University Innovation Fund has now completed its third year, with a growing balance sheet valued at £2.46 million. The total market capitalisation of the portfolio companies is now in excess of £100 million.

A significant proportion of the combined investments return to support further research at Swansea University.

AgorIP (OpenIP)

SUIF underpins the matched funding required for the £13.5 million Welsh Government (WG) and European Regional Development Fund (ERDF) AgorIP (Open Innovation) programme at Swansea University. AgorIP is a new approach to innovation which provides a team of experts to help academics realise the potential of their ideas, products, or research, taking IP to the marketplace and making it a commercial success.

Using SUIF as matched funding means that for every £1 invested in a University start-up, £2 of WG/ ERDF money is received by Swansea University to prepare additional projects for investment. The funders have been sufficiently impressed
with economic progress (as evidenced by investment secured and associated employment) that they are willing to double the scale of AgorIP to circa £25 million over the coming year, which of course will require SUIF to scale in proportion.

**Why innovation and commercialisation matter**

Dr Ronan is quite clear that supporting businesses emerging from university research is an activity which is disproportionately important to regional Government, and one that will be increasingly important post Brexit. He sees his activity as an agent for change in the region, but one that is shaped by the local economic environment, probably unable to effectively copy what is evidentially successful in the likes of the Golden Triangle or around other civic universities, making the most of local opportunities.

This is demonstrated by Swansea’s willingness to support IP from any source, UK or overseas, provided that the University can add value and benefit from the venture. A major feature of the approach is to encourage collaboration with corporates, and build long-lasting relationships that make the most of the University’s academic strengths. For example, Swansea is currently in discussions on several prospects from Uruguay and the Czech Republic amongst others, which will result in spinout companies, attracting investment and corporate engagement to the region.

Dr Ronan believes that technology transfer operations in the past have been overly selective, taking forward maybe only one prospect in ten, which he describes as “a process that says no”. As the cost of supporting early stage ventures is small, he believes it is “cheaper to say yes” and allow the successful opportunities to emerge. This perspective underpins the University’s position on equity holding when a spinout is formed; if the University is to take only 10%, he would ask, “are we adding enough value to support?” However, if it takes 20% or more, it is taking on to its balance sheet the early losses the spinout is bound to make before breaking even and growing. Therefore, with the University normally taking between 10% and 20% of a spinout when investing, this leaves a larger share for others, which is perceived as a good incentive for working with the University.

He also observes that the problem in funding early stage technology businesses, often referred to as a lack of ‘patient capital’, is rather a question of lack of liquidity (in addition to the high risk of success). As it commonly takes some ten or more years to get a technology spinout to a point where investors can secure a return on their money (trade sale, or IPO), this money is out of circulation, and not available to help other deserving ventures. Early stage investors are naturally wary, avoid engagement and move up the value chain, avoiding this seed-funding arena. AgorIP solves this market failure by Government intervention, which funds the pipeline every time a seed investment occurs as described above.

**The approach in action**

Over the past six years there have been 40 spinout companies formed at Swansea University. Two of these companies illustrate aspects of Swansea’s approach to commercialisation.

**Bionema Ltd**

Bionema ([www.bionema.com](http://www.bionema.com)) has championed the deployment of non-chemical, bio-friendly methods of pest control. Its technologies encompass biological organisms such as fungi and nematodes that target species specific to crop failure, and intellectual property associated with their formulation, and delivery of its products into the environment.

Bionema secured investment funding of circa £500k in 2018 and subsequently secured Innovate UK grant funding to accelerate product accreditation and launch into the marketplace. A further matched funding round is anticipated in early 2019 followed by a substantial series A round in late 2019.

Dr Minshad Ali Ansari, Bionema’s CEO, said “We are really pleased with the continuous support from Swansea University. Their funding will enable us to further develop our bio-pesticide products and take advantage of the growing organic market.”

**Hexigone Inhibitors Ltd**

Hexigone Inhibitors ([www.hexigone.com](http://www.hexigone.com)) has developed a new smart release anti-corrosion product that has been independently proven to be ten times more effective than the current market leader. Hexigone’s patented coating involves a stored reservoir of corrosion inhibitor, and works by channelling electrolyte anions, triggering the release of the inhibitor on demand, thus forming a self-healing coating. As hexavalent chromate, the most commonly used corrosion inhibitor, faces an EU ban in 2019, there are many opportunities for the company to address, and so the technology is of significant interest to many corporate partners.

SUIF invested £25k in Hexigone in 2017/18 alongside the Company of Armourers and Brasiers, which allowed the business to secure a number of innovation awards and non-dilutive grant funds. Recently the company secured a £550k loan from Innovate UK and is expecting to close another investment round of £550k in the near future.

Hexigone’s CEO Dr Paddy Dodds commented that “The seed funding really got us going and the support of the Swansea Innovations team in our early days has been invaluable. We are now securing a second, more substantial round of funding and are delighted that the Swansea University Innovation Fund are actively engaged in this investment round.”

For further information contact Dr Gerry Ronan, g.a.ronan@swansea.ac.uk, 01792 606578, 07866 550 609

[www.spinoutsuk.co.uk](http://www.spinoutsuk.co.uk)
The Midlands Innovation group of universities launches MICRA

The Midlands Innovation Commercialisation of Research Accelerator (MICRA) is the largest collaboration between university technology transfer offices in the UK.

MICRA will share best practice and share resources across technology transfer offices in Midlands universities to attract investment and management talent to the region. The partnership will support the development of spinout companies, helping them to obtain finance and expertise, and accelerating the rate at which innovations are able to be commercialised.

Dr James Wilkie, CEO of University of Birmingham Enterprise, observed “The UK has eighteen of the 100 most innovative universities in Europe – and four of these are in the Midlands Innovation partnership. We also have an enviable translational landscape that is attracting increasing attention from overseas, and a rich history of collaboration with companies of all sizes.”

Within easy reach of London, the Midlands is essential to national economic success. The region is responsible for over a fifth of the UK’s total manufacturing capability. The services sector in the Midlands accounts for over four million jobs and is worth around £158 billion a year.

Midlands Innovation unites the power of university research with the unique strengths of Midlands industry to drive pioneering research, innovation, skills development and economic growth. Collectively partners are incubating more than 600 businesses and supporting over 1,600 jobs.

MI partners include the universities of Aston, Birmingham, Cranfield, Keele, Leicester, Loughborough, Nottingham and Warwick. Academics in these universities generate more new inventions and patents per unit of research income than any other UK universities group.

Professor Sir David Eastwood, Vice-Chancellor at the University of Birmingham, who welcomed guests to the launch event in October, said “The benefits of MICRA to the region will be significant. Strengthening the innovation ecosystem to encourage closer links between the technology transfer offices and high-quality incubation spaces most suitable to individual business needs, will stimulate the growth of innovation-led businesses in the Midlands.”

Helen Turner, Director of Midlands Innovation, added “Midlands Innovation provides a collaborative structure which enables technology transfer offices to strengthen their capacity and share best practice. By working together MICRA aims to attract large ‘patient capital’ investors who are willing to back new ideas. People with vision and management talent who understand the potential for success in our region.”

To find out more about MICRA visit www.midlandsinnovation.org.uk

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

Earlier this year Beauhurst acquired Spinouts UK in order to become a one-stop-shop for information on all of the UK companies that are spinouts from academic institutions.

As part of our acquisition of Spinouts UK, spinning out from an academic institution became one of our tracking triggers. This means that any company spun out from a UK higher education institution after 2011 will be tracked – with our highly detailed profiles – on the Beauhurst platform, and Beauhurst subscribers will be able to search across these companies using hundreds of variables with our advanced search tool.

In profiling these spinout companies – and the other 25,000 ambitious UK companies on our platform – Beauhurst creates and compiles a wealth of data on each and every one of them. This includes their investment history, grants they've received, who their key staff are, and much more. By completing our dataset with the acquisition of the Spinouts UK dataset, for the first time we - and our subscribers - can quickly answer questions like: Which spinouts have received the most private investment? Which spinout has received more grants than any other? What percentage of spinouts have a female founder?

It is also very easy for us to see who the most frequent investors into spinouts are. In 2017 they were: the Scottish Investment Bank, Parkwalk, Mercia, IP Group and SyndicateRoom.

Grants

Private investment is not, however, the only mechanism by which spinouts can fund their development. 525 (49%) of the 1,070 spinouts currently tracked by Beauhurst have received funding from Innovate UK. 83 academic spinouts have received five or more grants from Innovate UK.

AIMES Grid Services, which spun out in 2008 from the University of Liverpool, has received 22 grants from Innovate UK. The largest single grant to an academic spinout was the £5.69m given to Nexeo as part of £6.99m project starting in March of this year and running until 2021 to develop improved anodes for lithium ion batteries.

Private Investment

Academic spinouts are capital intensive but risky businesses. For this reason they are often heavily reliant on equity finance to support their growth. The 1,070 spinouts we’re tracking have received £6.57 billion since 2002. 2018 is already a record year for the amount invested into startups. Below is a table showing the spinout companies that have raised the most equity investment from private investors.

<table>
<thead>
<tr>
<th>company</th>
<th>university</th>
<th>amount raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxford Nanopore</td>
<td>Oxford</td>
<td>£493m</td>
</tr>
<tr>
<td>FlexEnable</td>
<td>Cambridge</td>
<td>£287m</td>
</tr>
<tr>
<td>Orchard Therapeutics</td>
<td>UCL</td>
<td>£221m</td>
</tr>
<tr>
<td>Darktrace</td>
<td>Cambridge</td>
<td>£173m</td>
</tr>
<tr>
<td>Circassia</td>
<td>Imperial</td>
<td>£140m</td>
</tr>
<tr>
<td>Freeline Therapeutics</td>
<td>UCL</td>
<td>£137m</td>
</tr>
<tr>
<td>Cell Medica</td>
<td>Imperial</td>
<td>£137m</td>
</tr>
<tr>
<td>Autolus</td>
<td>UCL</td>
<td>£130m</td>
</tr>
<tr>
<td>CMR Surgical</td>
<td>Cambridge</td>
<td>£115m</td>
</tr>
<tr>
<td>Metalysis</td>
<td>Cambridge</td>
<td>£92m</td>
</tr>
</tbody>
</table>

Diversity

The lack of diversity in knowledge-intensive subjects and industries is well-known and often commented on. Our data on spinouts reveals a similar picture at the technology transfer end of the spectrum. 125 (12%) of our 1,070 spinouts have at least one female founder. 83 (8%) have a founder who is over 65. 65 (6%) have a founder who is under 30. 75 (7%) have a founder called David. 332 (31%) have at least one director called David.

The above is just the beginning of the analysis we can now carry out on our dataset. If you have any ideas for interesting lines of inquiry, we’d love to hear from you.
University of Edinburgh ready to drive data innovation

The Edinburgh and South East Scotland City Region Deal, signed at the University of Edinburgh in August 2018 by Prime Minister Theresa May and First Minister Nicola Sturgeon, is a £1.3 billion deal between the UK and Scottish governments, the six south-east Scotland local authorities, and two universities – Edinburgh and Heriot-Watt.

The Deal covers a range of strategic themes, including transport infrastructure, housing, skills and employability, but Data Driven Innovation (DDI) is core to the programme. The DDI element aims to boost data and digital skills in the workforce and use the two universities’ expertise in research and data science to improve commercial products and services, all to drive inclusive economic growth.

DDI’s bold ambition: to turn the region into the data capital of Europe. Targets include enabling 400 data-centric startup companies over the deal’s 15-year span.

Dr George Baxter, Chief Executive Officer of Edinburgh Innovations, the University’s commercialisation service, is enthusiastic: “This is unique in the history of City Deals – no university has led an initiative like this before.”

“The University’s role in the DDI programme is one of the reasons I came to Edinburgh,” adds Baxter, who moved to Edinburgh Innovations from Nottingham University two years ago. “I’d been involved in City Deals in my previous role, but I could immediately see the difference in approach with this one – with the entrepreneurial spirit of universities at its core.”

For Edinburgh Innovations, this means accelerating the creation of data-centric startups and spinouts, as well as expanding the University’s partnerships with commercial and public sector organisations, and delivering executive education programmes.

Baxter has been building Edinburgh Innovations’ capacity and realigning its services since he took the helm in October 2016. A recent development is the creation of a new Enterprise Services team, combining the tech transfer and enterprise development functions and led by the newly appointed Dr John Lonsdale, previously at the University of Central Lancashire.

“It’s exciting to join a University ranked among the best in the world and with such a successful history of commercialisation,” says Lonsdale. “The team at Edinburgh Innovations has exceptional experience and credibility in the enterprise ecosystem, and their spinouts have an enviable record of success and longevity.”

The many high-profile spinouts from the University of Edinburgh have included Wolfson Microelectronics, which became a FTSE 250 PLC and a main audio chip supplier to both Apple and Samsung; PureLiFi, which has pioneered a whole field of wireless communication; and, more recently, Speech Graphics, whose facial animation software is used by leading video game studios.

Recent fundraising success by award-winning medtech spinout Invizius, whose technology promises to improve the lives of millions of dialysis patients, illustrates the wrap-around nature of Edinburgh Innovations’ support for University entrepreneurs. Researchers were not only helped to turn their discoveries into a company, but through Edinburgh Innovations’ support received investment in May of £500,000 from Mercia Technologies. Mercia has had staff hosted on the University campus for the past year, through a partnership agreement that itself was brokered by Edinburgh Innovations.

“Our aim is to make things easy,” says Baxter. “The Invizius story typifies our work – helping innovators on their journey, whether as entrepreneurial staff and students or partner organisations or investors. We seek out opportunities and help people take those opportunities, ultimately for societal and economic benefit.”
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](http://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](http://www.ipgroupplc.com)

**UMIP**, a division of The University of Manchester I Ltd, is the University’s agent for IP commercialisation. UMIP brings the University’s ground-breaking 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](http://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](http://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](http://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.

**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](http://innovation.ox.ac.uk)

**Praxis Auril** 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](http://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](http://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](http://www.uclb.com)

**University of Birmingham Enterprise** supports academics 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](http://www.birmingham.ac.uk/enterprise)