Global University Venturing

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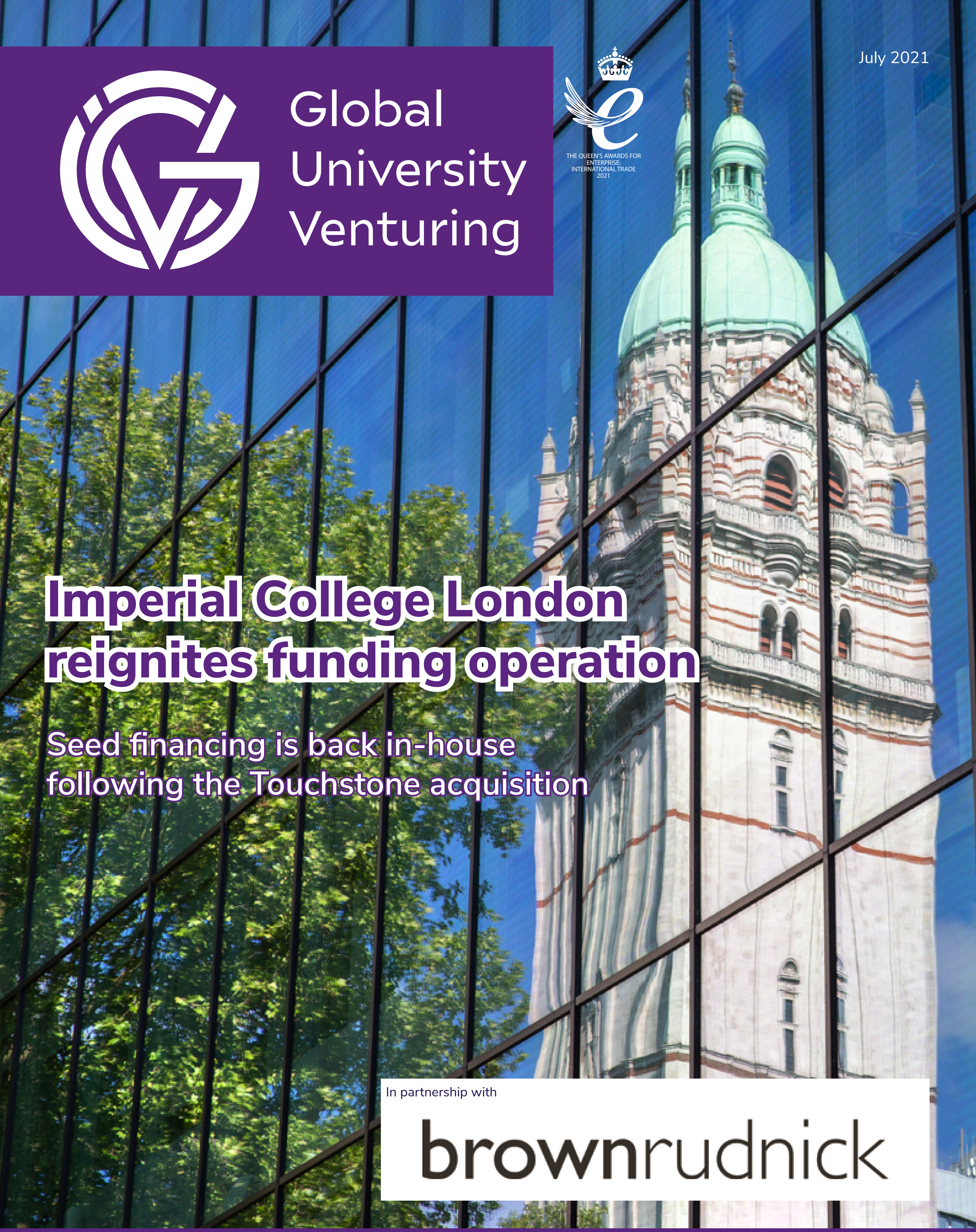

THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2021

Imperial College London reignites funding operation

Seed financing is back in-house following the Touchstone acquisition

In partnership with

brownrudnick

H1 review: an unprecented period

Albotherm seeds a green future

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Global University Venturing

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Solving the quantum problem

By Thierry Heles
Editor

Quantum computing will change everything – or so the hype would have you believe. In fiction, they are often portrayed as machines with esoteric capabilities such as showing real-life videos of Jesus (streaming platform Hulu's limited series Devs) or communicating with dark matter (broadcaster BBC's adaptation of Philip Pullman's His Dark Materials novels).

These scenarios are obviously fantastical – if highly enjoyable – concepts and they are what science fiction often does best: take almost incomprehensibly complex technologies that remain out of reach for now and have them make sense in imaginary universes to great effect.

And while no sane person would expect to actually see a video of Jesus' last words on the cross, it all speaks to this idea that quantum computing could theoretically achieve anything we set our minds to.

But quantum computing is not a magical machine. Its core advantage is to solve complex calculations at scale that would take a traditional computer an essentially infinite amount of time.

An example of this is Shor's algorithm, discovered in 1994 by Peter Shor, the Morss professor of applied mathematics at Massachusetts Institute of Technology, and occasional poet with a penchant for limericks and musings about quantum mechanics. In essence, the algorithm proves that a quantum computer is exponentially faster at factoring large numbers – a fact that means quantum computers could break modern-day encryption such as that employed by banks or online transactions.

Breaking cryptographic keys in the same way is not technically impossible with binary computing. It would just take much, much longer – potentially thousands of years even with supercomputers – as far as we currently know.

Emphasis on "currently" because therein lies the rub: much of quantum research is actually concerned with proving that a classical computer cannot solve the same problem in a comparable amount of time and that a quantum computer would not be overkill. If this sounds ludicrous – your assumption might be that, surely, a quantum computer would always be faster – it really is not.

Ewin Tang, now a PhD student with the University of Washington's theoretical computer science group, shocked many when he published a paper in 2018 – aged just 18 – that proved that the recommendation problem could be solved at roughly the same speed on a classical computer.

The recommendation problem is exactly what it sounds like: if you watch a movie on a streaming platform or make an online purchase, an algorithm will try and find other content or products that you may also want. This sounds simple enough but can involve thousands of data points that take a long time to process. Quantum computing had largely been seen as an obvious way to exponentially speed up this process and, in fact, just two years earlier a pair of researchers had claimed as much in their paper.

With one stroke of genius, a teenager had made that real-world application for quantum computing obsolete.

This is all before we even get to building quantum hardware. Qubits – the quantum version of a bit – are incredibly error-prone and that has meant quantum supremacy has stubbornly remained out of reach. The feeblest noise, such as a stray magnetic field, wipes out the qubit's two-ways-at-once state – the quality that makes qubits so powerful in the first place, because traditional bits can only be in one state at a time. It is also really difficult to maintain qubits in their

IBM has also been working on a quantum computer and pictured above is its IBM Q at CES in 2020. Photo courtesy of IBM.

quantum state and when they lose their state, the errors start creeping in.

So, simply putting more qubits into the machine is not enough and if a company talks about a 5,000-qubit processor, this does not automatically mean it is a phenomenally powerful machine. Compare this to a traditional computer where a 64-bit architecture does equal higher efficiency compared to 32-bit.

Google, the internet technology subsidiary of conglomerate Alphabet, demonstrated two weeks ago that quantum error correction works, subject to certain conditions, on its Sycamore quantum processor, and showed that the method could be scaled. Those conditions? Google's approach can only handle one of two error types at a time, rather than simultaneously, and the method could not fix errors that it detected in real time. It was a breakthrough, but not the holy grail.

Then, one week ago, Honeywell Quantum Solutions, a subsidiary of industrial conglomerate Honeywell, and Cambridge Quantum Computing – which are set to merge and form an independent business once regulatory hurdles are cleared – released their own study that showed their method could correct errors in real time. It was a bigger breakthrough, and brings us much closer to the holy grail.

None of this is to say that quantum computing is a pipe dream. It will become a reality and it will revolutionise many industries. For example, earlier this year, pharmaceutical firm Roche signed a deal with Cambridge Quantum Computing to speed up its drug discovery.

And countless spinouts are trying to make advances in the field too, such as Riverlane, based on University of Cambridge research, which is developing an operating system for quantum computers.

C12 Quantum Electronics, a France-based spinout of Ecole Normale Supérieure and CNRS, is working on a quantum computing processor that relies on high-purity quantum nanotubes to minimise errors and significantly improve performance.

Another one is PsiQuantum, a US-based spinout of University of Bristol, that is working on a commercial quantum computer that will offer a million qubits – the point at which the technology would become general-purpose and useful to businesses.

And in April this year, University of Chicago's Polsky Center launched the Duality accelerator, the first programme in the US that will focus exclusively on quantum technologies. It unveiled its inaugural cohort earlier this month, with six companies focused on challenges as varied as developing simulation software for modelling noise and current in quantum devices such as high-resolution quantum sensors (QuantCAD) or developing a quantum random number generator (Axion Technologies). For more on this, subscribe to our podcast, Talking Tech Transfer, which will feature an in-depth discussion of Duality with the Polsky Center's Jay Schrankler next month.

Similar programmes already exist elsewhere. In the UK, commercialisation firm IP Group and state funding agency UK Research and Innovation (UKRI) teamed up in August 2020 to form a $15.7m accelerator aimed at nurturing early-stage quantum technologies. That accelerator is being funded through UKRI's Commercialising Quantum Technologies Challenge, a $193m initiative set up through its Industrial Strategy Challenge Fund.

That is the other reality of quantum computing: it will become increasingly geopolitically relevant. No state will want its adversaries to have bigger computing power, and no government will want its industries seen left behind because progress is made elsewhere. It is not a reality many spinouts will be concerned with while they are trying to figure out how to get the technology to work in the first place, but it is a challenge that will materialise sooner rather than later. And it seems likely that something as unprecedently powerful as quantum technologies will eventually become subject to export controls in most geographies.

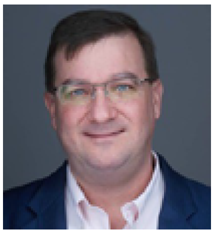
But this, like every challenge thrown at the innovation ecosystem, will also be resolved. After all, tackling the big problems is what university researchers do best. And although quantum computing will not magically make all of our troubles go away, for all of the hurdles that remain its potential heralds a very promising future indeed.

There is no doubt in my mind that tech transfer offices and spinouts will be key in getting us there.

News roundup

People

Ian McClure has been promoted from his position as executive director of University of Kentucky's Office of Technology Commercialisation to associate vice-president for research, innovation and economic impact.



Marc Sedam, vice-provost for innovation and new ventures at University of New Hampshire, has been appointed vice-president for technology opportunity ventures at New York University-affiliated medical centre NYU Langone Health.

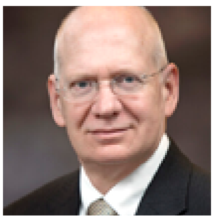
Cambridge Enterprise, the tech transfer arm of University of Cambridge, has appointed Diarmuid O'Brien as its new chief executive, effective September 2021. O'Brien is currently the chief innovation and enterprise officer at Trinity College Dublin, a position he has held since 2016.


Duke University has unveiled personnel changes as part of a restructuring of its technology transfer operation, appointing Jeff Welch as director of new ventures and promoting Robin Rasor to associate vice-president for translation and commercialisation.

Michael Moore, director of licensing and life sciences at Northwestern University, has been appointed director of technology transfer at Augusta University. He will lead its Office of Innovation Commercialization. He replaces Carl Clark, who recently retired after 12 years as director of innovation commercialisation.


University of Chicago's Polsky Center for Entrepreneurship and Innovation has hired Chuck Vallurupalli and Preeti Chalsani to serve as the inaugural senior director and deputy director, respectively, of its Duality accelerator. The accelerator is the first in the US to focus exclusively on quantum technology developers.

Institute of Science and Technology Austria has appointed one of its researchers, Prof Bernd Bickel, as vice-president for technology transfer effective September 1, 2021. Bickel's appointment is expected to strengthen the institute's technology transfer programmes. It is a newly created position.



Jon Soderstrom, managing director of Yale University's Office of Cooperative Research, has stepped down after 25 years. He will become strategic adviser for technology transfer and commercialisation in Yale's Office of the Provost.

William Tucker, executive director of University of California (UC), Davis' tech transfer office InnovationAccess and interim associate vice chancellor for innovation and technology commercialisation, has retired. Tucker had been executive director since 2017 and interim associate vice chancellor since 2019.

Adam Stoten has stepped down from his position as chief operating officer of Oxford University Innovation (OUI), the tech transfer subsidiary of University of Oxford. He has joined Evotec to focus on expanding its Bridge programmes internationally.

Andrew Goff, head of consulting services, has also left OUI after 17 years with the office. He had previously been business liaison manager for the university itself and was one of the longest-serving employees at OUI.

OUI has additionally promoted Emilie Syed, previously working in the New Ventures and Investments team, as the new head of its incubator.

Syed takes over from Cath Spence, who has herself been promoted to deputy head of physical sciences.

Funds

Flagship Pioneering, a US-based biotechnology venture studio, has raised another $2.23bn for its Fund VII from new and existing limited partners, bringing the vehicle to $3.37bn. It reopened the fund to additional capital in April this year. The fund marks the first time that Flagship's origination and growth strategies will live under a single investment vehicle.

University of Tokyo Edge Capital Partners (UTEC), the deep tech-focused venture capital firm affiliated with University of Tokyo (UTokyo), raised an undisclosed amount for the first close of its fifth fund. The firm expected to reach a ¥30bn ($275m) target for UTEC 5 by mid-year to create what it claims is the largest Japan-based venture capital fund focused on science and technology to date.

The Engine, the venture firm and tough tech incubator formed by Massachusetts Institute of Technology (MIT), added $20m in capital to its Fund II today thanks to the International Finance Corporation, the private sector arm of the World Bank. The fund secured an initial $230m from limited partners including MIT and Harvard University in October 2020.

IP Group, the UK-based commercialisation firm, unveiled a joint venture called IPG-CEL China Ventures with asset manager China Everbright that will raise a fund sized up to RMB1.5bn ($235m). The fund is expected to achieve a first close of $77m this year, before growing to its target size within the next three years. The fund will exclusively invest in joint ventures and subsidiaries of overseas companies incorporated in China.

Corporates Daikin, Hakuhodo, Mitsubishi Estate and Fuyo General Lease have helped University of Tokyo's Innovation Platform subsidiary expand its carveout vehicle, Open Innovation Promotion Fund I, to ¥24bn ($222m). University of Tokyo had committed to its $26.1m first close in May 2020, investing alongside Mitsubishi UFJ Bank and Sumitomo Mitsui Banking Corporation. SBI Group took part in the latest close, as did air conditioning equipment manufacturer Daikin, marketing group Hakuhodo, property developer Mitsubishi Estate, leasing service Fuyo General Lease and the government-backed Development Bank of Japan.

Pureos Bioventures, a Switzerland-based venture capital firm backed by undisclosed strategic investors in life sciences, has extended the size of its first fund to $205m. The final closing of BB Pureos Bioventures will target a portfolio of 17 to 20 pre-clinical and clinical-stage companies in Europe developing biological drugs and emerging modalities such as nucleic acid, cell and gene therapies.

Main Sequence Ventures, the Australia-based venture capital firm founded by Commonwealth Scientific Research Organisation, secured A$250m ($194m) for its second fund. Limited partners include aerospace and defence manufacturer Lockheed Martin, Singaporean state-owned investment firm Temasek, superannuation fund Hostplus, venture capital firm Horizons Ventures and unspecified family offices and individual investors represented by Morgan Stanley Wealth Management and Mutual Trust.

Safar Partners, a US-based venture fund focused on technology companies emerging out of Massachusetts Institute of Technology, Harvard University and University of Rochester, has raised more than $191m, according to a regulatory filing. The fund has a target of $325m. It is unclear who the limited partners are.

US-based venture capital firm Congruent Ventures has raised $175m for an early-stage climate technology fund, from limited partners including University of California. Software producer Microsoft's Climate Innovation Fund, affiliates of Prelude Ventures, Three Cairns Group, clients of Cambridge Associates that include the Jeremy and Hannelore Grantham Environmental Trust and the Surdna Foundation, are also among the LPs. Unnamed institutions, foundations and family offices have also backed the fund, which had a $125m target. The university participated through UC Investments.

Amadeus Capital Partners, a UK-based venture capital firm, has closed its latest fund at £110m ($153m) from limited partners including cornerstone investor British Patient Capital.

Apollo Therapeutics, a UK-based biopharmaceutical joint venture involving University of Cambridge, Imperial College London and University College London (UCL), closed a $145m round backed by the latter's UCL Technology Fund. Patient Square Capital led the transaction, which also attracted Rock Springs Capital and Reimagined Ventures.

Ulu Ventures, a US-based venture capital firm, has raised $138m for its third fund from investors including University of Rochester and Grinnell College. Social media firm Twitter and Motley Fool Ventures, the corporate venturing arm of financial advisory service Motley Fool, also chipped in, as did financial services firms Bank of America and Goldman Sachs. The limited partners were filled out by seven foundations – of which only John D and Catherine T MacArthur and Harry and Jeanette Weinberg Foundations were named – as well as pension fund Los Angeles Fire and Police Pension, funds of funds including Fairview, Plexo and Illumen Capital, VC firm Norwest Venture Partners and family offices One World Investments and the Kwanza Jones & José E Feliciano Supercharged Initiative.

Baylor College of Medicine has become the latest institution to partner healthcare-focused investment management firm Deerfield Management for a therapeutic research partnership. Called Blue Square Discoveries, Deerfield has earmarked up to $130m for the next decade and will provide drug development, management and operational know-how to help Baylor with its biomedical discovery pipeline.

Big Idea Ventures, a US-based venture capital fund focused on food and agricultural technologies, has added nine additional university collaborators for its Generation Food Rural Partners (GFPR) fund. Louisiana State University, Oregon State University, Penn State University, Purdue University, Tufts University, University of Hawai'i, University of Illinois at Urbana Champaign, University of Massachusetts Amherst and Worcester Polytechnic Institute have signed up to GFPR. It has a $125m target. NC State University was the first collaborator announced in February this year.

US-based venture capital firm MaC Venture Capital has secured $103m for its first seed-stage vehicle from limited partners including Howard University and University of Michigan. Shoe retailer Foot Locker is also a limited partner, as are Goldman Sachs, Greenspring Associates, Bank of America, State of Michigan Retirement System, Mitch and Freada Kapor and a range of unnamed backers.

Atlantic Bridge, the Ireland-based growth equity technology firm, launched its second University Bridge Fund with €80m ($96.7m) from limited partners including Trinity College Dublin, University College Dublin and University College Cork. The EU-owned European Investment Fund, Irish state economic development agency Enterprise Ireland and financial services firm Allied Irish Banks also committed capital.

University of Michigan is investing $95m into funds raised by US-based venture capital firm Eclipse Ventures and China-based peer Chengwei Ventures. Chengwei Ventures Evergreen Fund LP has secured a $40m commitment from the institution, while Eclipse Ventures has received a total of up to $55m for two of its funds.

Deerfield Management, the US-based healthcare investment firm, has signed up Empire Discovery Institute (EDI) to its therapeutics commercialisation initiative and expects to invest up to $65m over the next five years. EDI is a non-profit drug discovery and development accelerator focused on bringing academic discoveries into the market. It collaborates with University of Rochester, University at Buffalo and Roswell Park Comprehensive Cancer Center.

Imec.xpand, the venture capital arm of nano-electronics research institute Imec, has secured €30m ($36.7m) from the Flemish government. The money represents the first publicly disclosed commitment to Imec.xpand's second fund, which is expected to begin investing next year.

Sleeping Giant Capital, a US-based venture firm allied to Western Michigan University (WMU)'s Haworth College of Business, has raised $21m for the first close of its fund. The fund was launched in August last year and has a $50m target. It will look to conduct buyouts of small businesses throughout west Michigan, targeting companies with $3m to $30m in revenue, and install new leadership.

The universities of Birmingham, Dundee, Edinburgh and Nottingham have joined forces with drug discovery firm Evotec and pharmaceutical firm Bristol-Myers Squibb to launch BeLab1407. Equipped with $20m, BeLab1407 is the latest addition to Evotec's international network of early-stage academic collaborations called Bridge – an acronym for Biomedical Research, Innovation and Development Generation Efficiency. It will focus on drug discovery.

Evotec, the Germany-based drug discovery company, has added academic institutions from Germany's Rhine-Main-Neckar region to its therapeutics commercialisation initiative. Bristol-Myers Squibb is serving as the pharmaceutical partner to the initiative. BeLab2122 also forms part of Bridge.

Rev1 Ventures, a US-based startup studio, has launched the $20m Fund II with the backing of Ohio State University and University of Dayton. Limited partners also include diversified metals manufacturing company Worthington Industries, healthcare services provider Cardinal Health, media company Dispatch Printing, insurer Nationwide and electrical grid operator AEP Ohio. Huntington Bank, US Bank, Crane Group and Drive Capital have also invested in the fund.

A consortium of 12 UK universities led by Oxford University Innovation (OUI), the tech transfer subsidiary of University of Oxford, has launched Impact 12, an impact investment fund with an £8m ($9.6m) target that is tasked with supporting university social ventures. The vehicle has been developed by impact investor and responsible finance provider Social Investment Scotland (SIS) in partnership with University of Oxford, together with the universities of Cambridge, Northampton, Coventry, Aston, Birmingham, Cranfield, Keele, Leicester, Loughborough, Nottingham and Warwick.

Houghton Street Ventures, a UK-based venture capital firm, has been launched in partnership with London School of Economics (LSE) to invest in startups founded by the institution's staff, students and alumni.

Advanced materials producer Saint-Gobain has committed an undisclosed amount to China-based investment firm Richland Capital's third venture capital fund. The firm is targeting up to RMB800m ($123m) for the close of Richland Capital Fund III. The vehicle's first close, in August 2020, was backed by Redbud, a fund-of-funds formed by Tsinghua Asset Management, part of Tsinghua University, as well as Solvay Ventures, the investment arm of chemicals producer Solvay, and Nipsea, which invests on behalf of paint producer Nippon Paint. Asahi Kasei Ventures, the corporate venturing subsidiary of chemicals and advanced materials manufacturer Asahi Kasei, made a commitment of undisclosed size to Richland Capital Fund III three months later.

A six-month period without precedent

> **Investors have ploughed almost as much money into spinouts in the first half of the year as they did for all of 2020.**

By Thierry Heles
Editor

Let us start with some historical context: the first half of 2020 accounted for $11.3bn invested in spinouts. This was a welcome, upward trajectory from the $8.4bn in H1 2019, despite the disruptions caused by the pandemic. The total invested in spinouts globally for all of 2020 was just shy of $21.7bn. It had been $17.4bn in 2019.

The total for the first half of this year is nearly $18.4bn.

It is an almost 120% increase year-on-year and makes it the most active period since GUV began tracking the sector.

Partially, this can be ascribed to June 2021 – itself a record-breaking month with more than $4.5bn invested – but also to the fact that the lowest total for a month was still close to $2.3bn, more than was raised during 10 months in 2020.

Every year thus far has had months where less than $1bn was invested in spinouts and although we are only half-way through 2021, the fact that so far the total has not even dropped below $2bn is extraordinary.

Intriguingly, the number of spinouts that raised capital was 564. This too was an increase on the 501 in the first half of last year, but nowhere near as many transactions as the dollar value would suggest.

An analysis by deals database Crunchbase found that a record $288bn of overall venture capital was ploughed into companies, an almost unbelievable increase of just shy of $110bn on the previous record – the second half of 2020. It also found that the number of deals increased across all categories apart from angel rounds.

It is a reality that also applies for corporate venture capital, as our sister publication Global Corporate Venturing found in its own H1 review. Here, corporates invested close to $132bn across 2,288 deals, up from $53.8bn and 1,702 deals in the first half of last year.

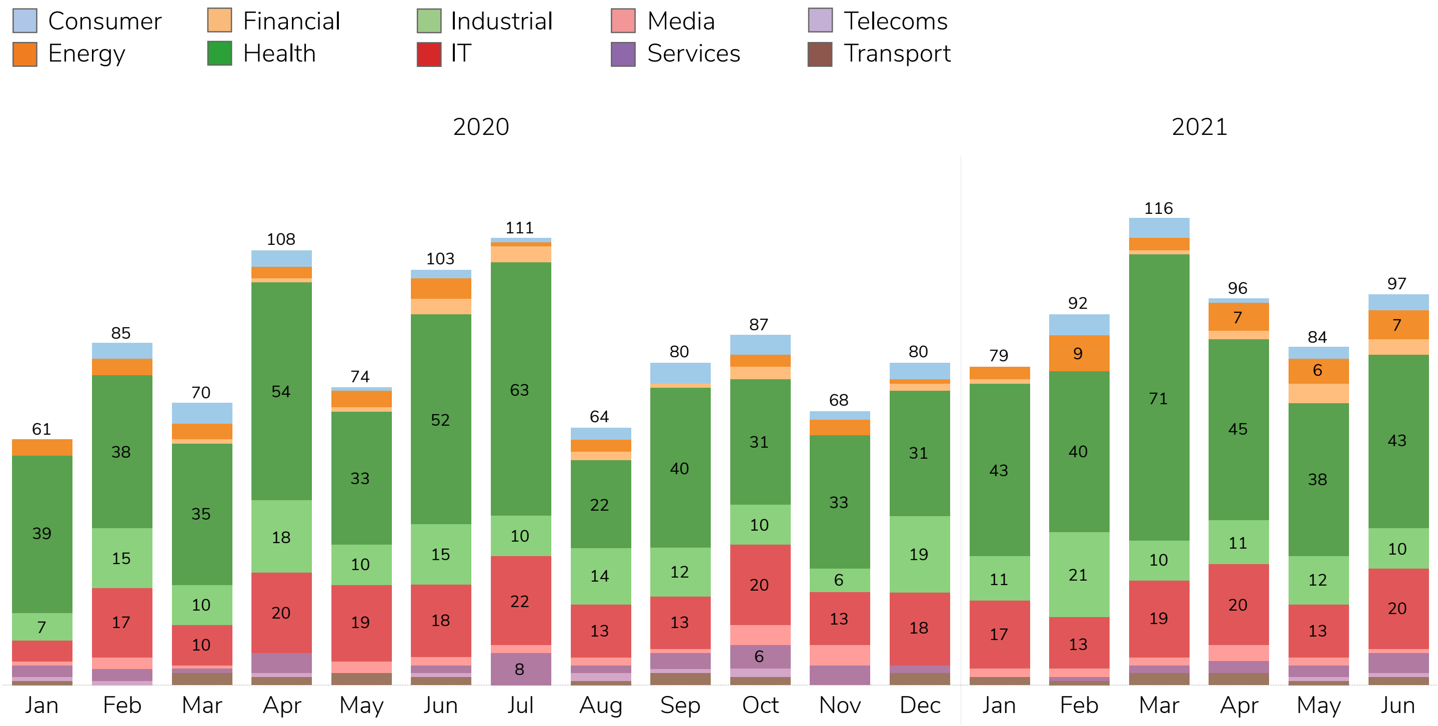
So, what is going on with spinouts? Where did all of that money go, if not into more companies? Crunchbase counted 17 companies that secured more than $1bn in the first half of this year. Our own analysis shows that two of those were spinouts – Celonis and Databricks – as can be seen in the top 10 table.

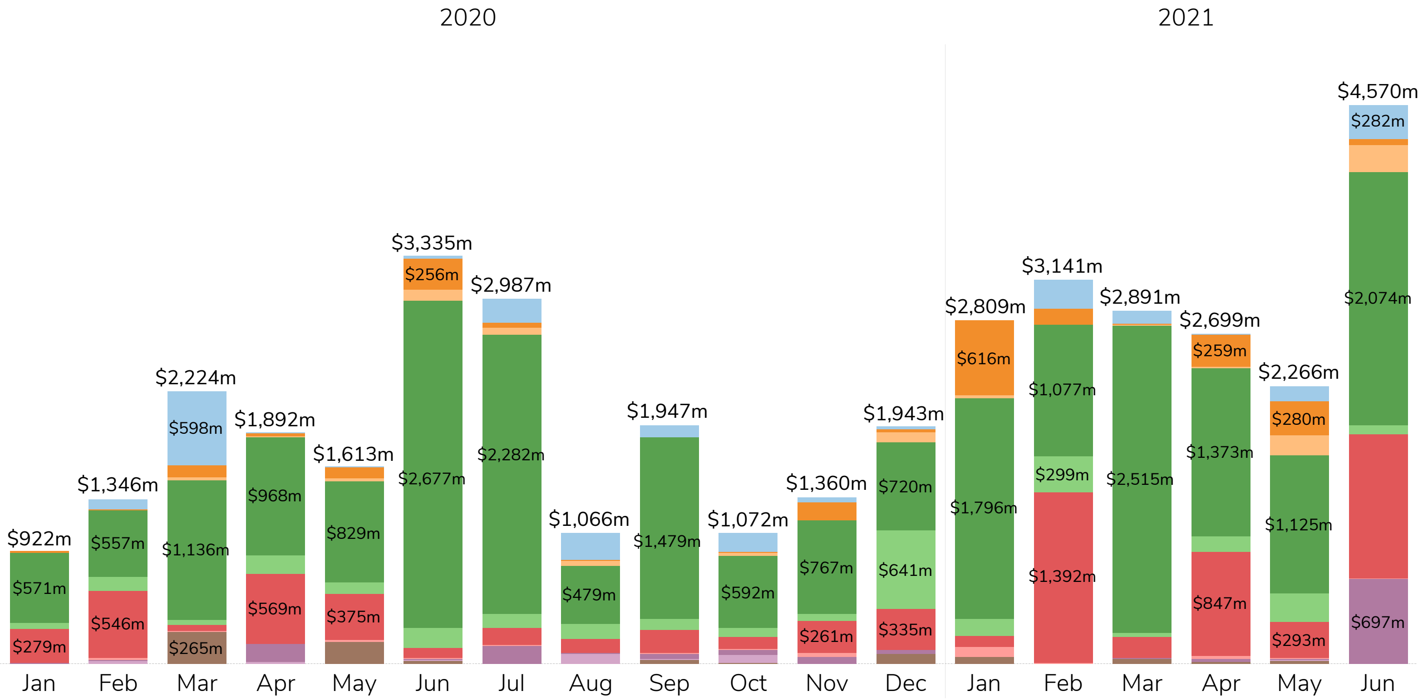
The top 10 largest investments did, in fact, account for around 30% of the total funding received by companies – more than $5.5bn. That still leaves a lot of money for everyone else, of course, but late-stage funding was clearly a popular choice for investors.

Top 10 deals by size in Q2 2021

Company	Institution	Sector	Round	Size
Celonis	TU Munich	IT	D	$1bn
Databricks	University of California, Berkeley	IT	Undisclosed	$1bn
SambaNova Systems	Stanford University	IT	D	$676m
FlixMobility	TU Munich	Transport	Undisclosed	$650m
CMR Surgical		Health	D	$600m
Sila Nanotechnologies	Georgia Institute of Technology	Energy	F	$590m
Hinge Health		Health	D	$300m
Oxford Nanopore Technologies	University of Oxford	Health	Undisclosed	$270m
Centessa Pharmaceuticals	University of Cambridge, University of Toronto Mississauga, University of Cologne, TU Dortmund	Health	A	$250m
Motif FoodWorks	Massachusetts Institute of Technology	Consumer	B	$226m

Deals from January 2020 to June 2021





And who could blame them? If we look at exits, there were 40 in the first half of 2021 compared to 30 during the same period last year. The 40 exits generated at least nearly $6bn in returns – as always, many acquisitions did not disclose financial terms so the real amount is higher – compared to the significantly lower sum of $2.1bn for the same period last year.

Here, too, the top 10 largest transactions accounted for a large portion of the overall returns. In fact, they made up the majority, with more than $4.1bn generated.

Notably, several exits followed the overall pattern in the market of reverse mergers, including the largest: Lilium, a Germany-headquartered aircraft developer spun out of Technical University of Munich, agreed to take over special purpose acquisition company Qell Acquisition Corp in a transaction ascribing the merged business a $3.3bn pro forma valuation.

With initial public offerings dominating the list of top 10 exits – even if just – it meant only one acquisition made it into the league table. That it was worth a respectable $295m – before potential milestone payments of up to $92m and undisclosed revenue-based payments – is good news too. Interestingly, the acquisition of Farapulse, a US-based medical device developer spun out of University of Iowa, was by a long-time, existing shareholder that had secured such an option: Boston Scientific.

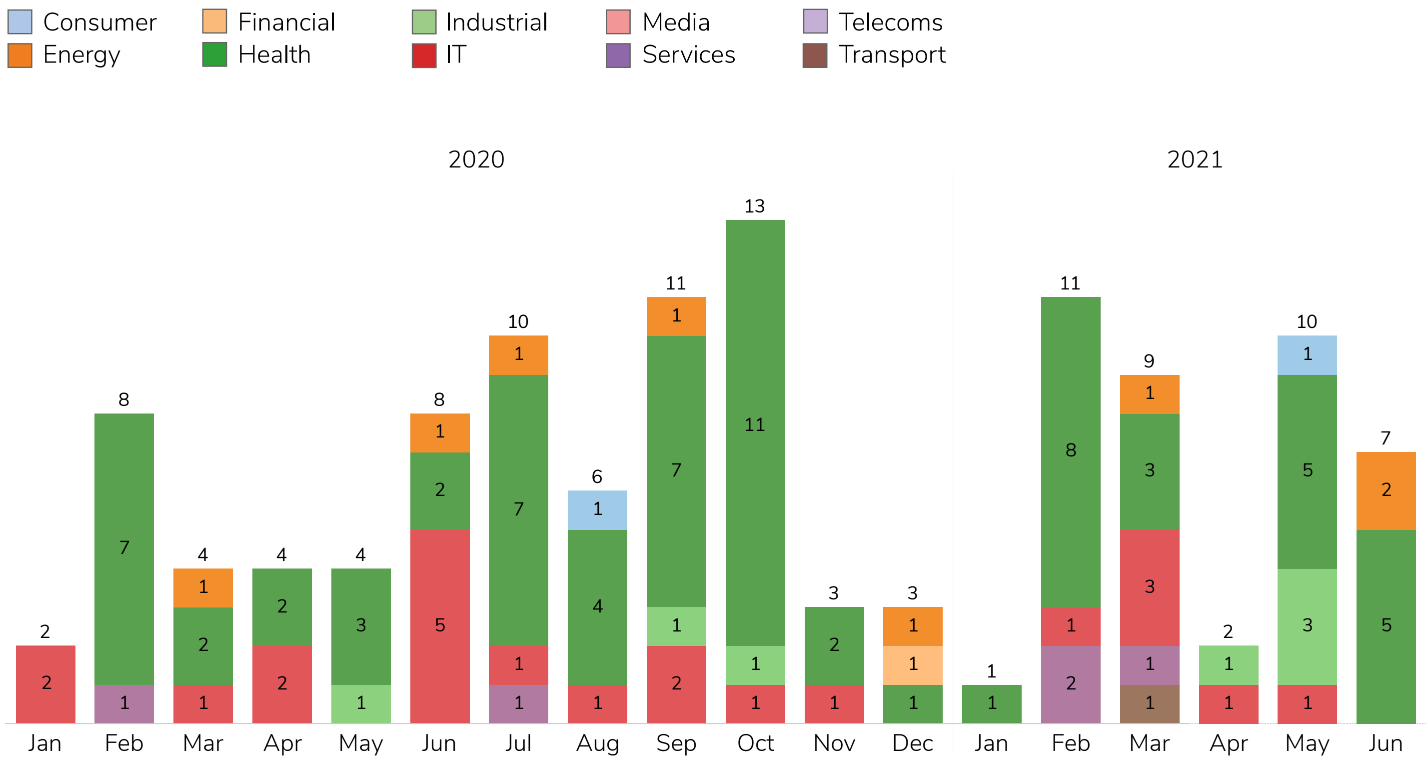
And here is some more good news: more than $11bn were raised for university-focused funds in the first half of 2021. That should give investors firing power for a while yet, even at the rate that spinouts are collecting money at the moment.

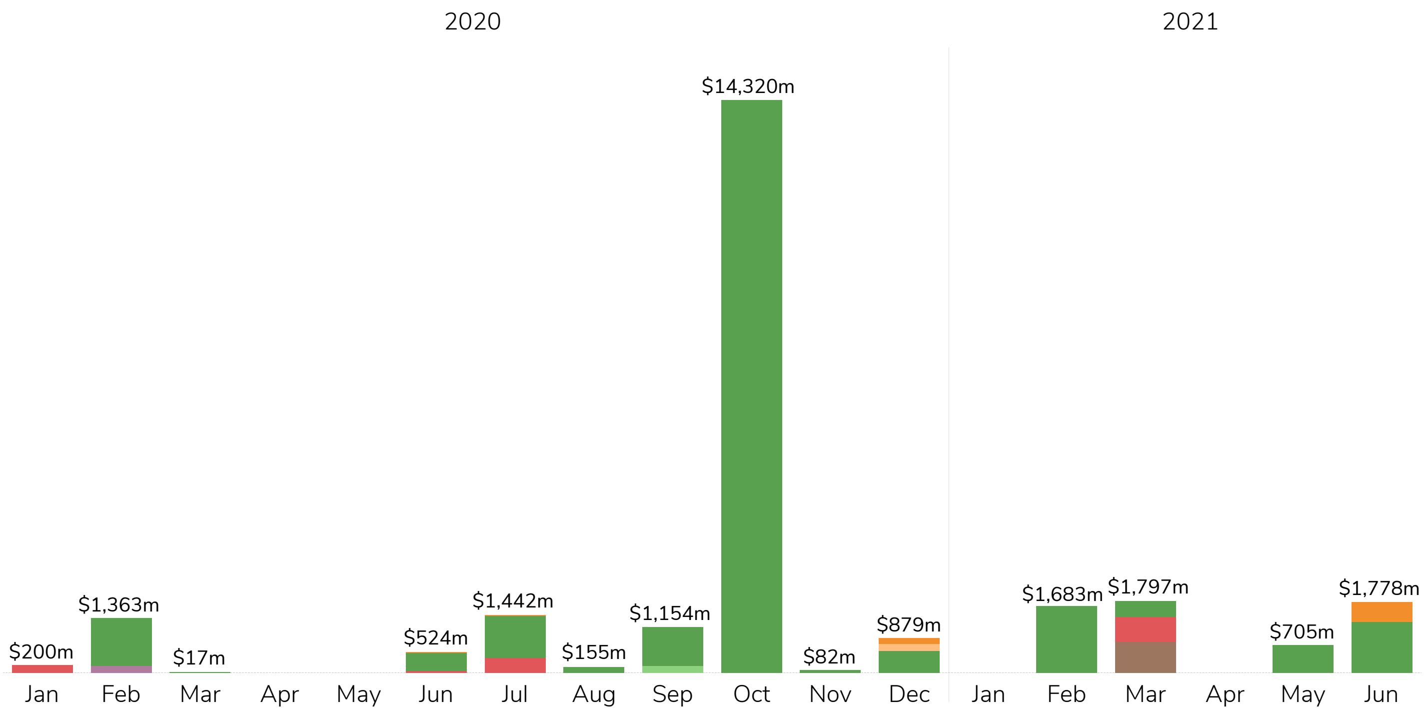
How much higher can all the numbers go? If H1 is anything to go by, all bets are off.

Top 10 exits by size in Q2 2021

Company	Institution	Sector	Type	Size
Lilium Aviation	TU Munich	Transport	Reverse merger	$780m
IonQ	University of Maryland	IT	Reverse merger	$625m
Sana Biotechnology	Harvard University	Health	IPO	$588m
Solid Power	University of Colorado, Boulder	Energy	Reverse merger	$515m
Centessa Pharmaceuticals	University of Cambridge, University of Toronto Mississauga, University of Cologne, TU Dortmund	Health	IPO	$330m
Farapulse	University of Iowa	Health	Acquisition	$295m
Verve Therapeutics	Harvard University	Health	IPO	$267m
Immunocore	University of Oxford	Health	IPO	$258m
Graphite Bio	Stanford University	Health	IPO	$238m
Effector Therapeutics	University of California, San Francisco	Health	Reverse merger	$235m

Exits from January 2020 to June 2021





Imperial reignites funding operation

> **The institution is starting afresh with its investment activities, having brought the management of its spinouts back in-house after Touchstone.**

By Thierry Heles
Editor

Imperial College London's history of tech transfer and investments is a well-known, if chequered, one. The university set up an internal office in 1986 but that was soon turned into a wholly-owned subsidiary that subsequently became an independent organisation and, in 2006, listed on Aim. Imperial Innovations (later rebranded to Touchstone Innovations) ploughed some £300m ($417m at current exchange rates) into early-stage companies before it became subject to a hostile takeover by commercialisation firm IP Group in 2017.

This left Imperial College without a team dedicated to spinouts. Rather than outsource these capabilities again, a decision was made to bring it all back in-house. The structure of the college's operation can be intimidating to untangle, but it is actually fairly straightforward.

Brijesh Roy, seed investment manager at Imperial College, explained: "We have the university's enterprise division – headed by Simon Hepworth – which looks over all commercial aspects.

"Our enterprise labs is where we have entrepreneurial training that was originally focused on students but now has pre-accelerators that are not dissimilar to others across the country, from programmes targeting students with an idea to academics looking to spin out their research who need wet labs.

"We also have a growing innovation hub in White City. There is a lot of development and scale space – it is the commercial, entrepreneurial backbone with a lot of real estate, labs and innovation areas.

"Then there is the traditional tech transfer office, which is structured in two ways. There are the people who look after intellectual property, partnerships and commercialisation. They handle the patent filing and work with academics who want to create spinouts.

"If we want to create spinouts, that is the other part of the tech transfer office, which is where I sit: the startups team. That is headed by Govind Pindoria, who looks after the spinout portfolio. Until a couple of years ago, that was still managed by IP Group. The 10 to 15 companies we spin out in a year – my colleague Neil Simrick does most of that work – is our growing portfolio. Simrick oversees the Founder's Choice programme, tries to shepherd companies out and helps the academics."

The Founder's Choice programme allows founders more control over their spinouts in the early days of the company. Instead of the simple 50-50 equity split between founders and their employer, Imperial takes as little at 5% founding equity with anti-dilution protection until series A. The anti-dilution effectively dilutes Imperial College's voting rights as a shareholder in favour of the founders, a structure that investors appear to prefer.

Roy was brought in to work out how the university should be investing in its spinouts, leading to the creation of the Imperial College Innovation EIS Fund I. The money is the legal responsibility of Parkwalk Advisors, the fund management subsidiary of IP Group, but the structure enables Imperial College to make recommendations on which companies should receive investment.

Starting from scratch meant the team had "a great opportunity" to build what they thought would be most useful, Roy recalled. One important aspect of the fund is that it "does not have any have any structural rights," he explained, "there is only a confidentiality agreement that means we can see all the information to be able to make recommendations."

It was all going smoothly until the day after Imperial announced it was going to start raising the fund with Parkwalk, when "Boris Johnson took to the airwaves and told everyone to go home," Roy remembered.

To everyone's credit, they still managed to raise £2m within three months and then spent the summer months figuring out the next steps of finding, vetting and investing in companies solely through video chat. By September, they had their first investment advisory committee and by December, the first portfolio company: Charco Neurotech, which has developed a small device to help improve the movement of Parkinson's patients.

The committee is split between Imperial College staff – hailing

Brijesh Roy

from enterprise commercialisation, central administration, departments and also including senior academics who offer their research expertise – and external experts, such as Alice Bentinck, co-founder of Entrepreneur First, and Brent Hoberman, who founded Founders Factory.

Since that first deal was struck with Charco, "the process has gone like clockwork," Roy declared, "such as we are aiming to, at the end of July, have our final investment committee. There is a company being considered that hopefully would mean we get the entire fund committed within six months – eight companies with cheques of about £250,000 as part of £1m rounds."

Lucy Jung, co-founder and chief executive of Charco Neurotech, contributed: "Throughout our involvement with Imperial, whether it be Enterprise Lab, MedTech SuperConnector, Imperial Venture Mentoring Service or the Innovators' Programme, Charco has been able to find the support that we need at every stage of our journey.

"When we met with Roy, he supported us throughout the investment process, aiding us in building a strong narrative and preparing for the investment committee. It was an intense few weeks, but a great opportunity for us to learn. We thoroughly enjoyed the whole process. It means a lot that we were able to receive the support from the initial concept, all the way to pre-seed investment, from Imperial"

Anyone with a link to Imperial College has been eligible for funding – be it staff, students or alumni – and the fund has been sector agnostic. It meant the university could secure stakes in companies it originally may have missed out on, the latter being a reality that became a source of bafflement when the committee was looking at Charco and wondered where Imperial's founding shareholding was.

Lucy Jung

The process has gone like clockwork, such as we are aiming to, at the end of July, have our final investment committee.

Brijesh Roy

The reason for a lack of Imperial's founding shareholding was simple: it grew out of her master's project. "She has come up with something that academia had not," Roy observed. Indeed, ever since Prof Jean-Martin Charcot – widely considered the father of neurology – realised in the 19th century that Parkinson's patients arriving by carriage had better symptoms than those arriving on foot, not much innovation has occurred. "Even today," Roy noted, "the state-of-the-art research is putting people in chairs that vibrate the whole body."

Charco brings smiles back for people with Parkinson's

Jung described the technology: "We are developing hardware and software to improve the movement of Parkinson's patients via focused vibrotactile stimulation, combined with the cueing phenomena. The device also delivers reminders to ensure that people do not miss their medication.

"The software tracks the symptoms so that clinicians have a better understanding of how people are progressing and can best optimise care."

The technology improves the condition throughout all stages of the disease and it has applications in other neurological conditions as well, Jung pointed out. Charco plans to explore these areas in future.

Jung's interest in Parkinson's began in 2013, when she and a group of fellow students collaborated on a project designing tech for people with long-term conditions. One story in particular stayed with Jung, she revealed: "I remember meeting this gentleman who had Parkinson's and he was saying: 'I look angry, but I am actually happy right now. Parkinson's caused my face to look like this and now everyone always thinks I am angry.'

"That hit me," she said, "Parkinson's means everyone thinks he is angry which affects his social life."

The encounter led to Charco's motto, "bring smiles back for people with Parkinson's," Jung said.

At this point, you could be forgiven for thinking Jung graduated from her master's degree in 2013 and, having become interested in Parkinson's, went on to found Charco. But that is not what happened at all.

"I was working well on that project," Jung recalled, "but I was diagnosed with a brain tumour. I was 25 and it was a shock. The tumour was benign, and they tried all the different medications to control growth, because it would have affected my vision if it did not stop growing."

Jung underwent brain surgery, thankfully recovered and went back to Imperial to finish her degree, newly driven by her experiences. "If there is any potential, even if it is just a 1% or 2% improvement, when you are the patient that is such a difference," she emphasised. "When I was the patient, I was so desperate for any kind of hope and that was a big lesson."

It guided the development of Charco's device, the Cue1, as Jung and her co-founder Dr Floyd Pierres sought the advice and experiences of patients and clinicians. When they surveyed patients if they would want the device if they built it, 97.5% of respondents said yes.

"That was encouraging," Jung stated. "Then the next challenge hit us."

Pindoria became her first mentor and, within weeks of Charco's incorporation in mid-2019, a company director. During the first meeting Jung had with Pindoria, she wondered whether she was ready to lead the business. "He countered by asking what I thought was important to become a CEO. I answered that I believe a good CEO should have a strong vision, persistence and responsibility," Jung revealed.

"I still remember him saying: that is exactly the three things needed to become a great CEO. And I thought, okay, if it is those three, then we can do this. We need to do this.

If there is any potential, even if it is just a 1% or 2% improvement, when you are the patient that is such a difference.

Lucy Jung

"From there, we learnt everything. We joined MedTech SuperConnector, Innovation RCA and Cambridge Judge Business School. We received a lot of university support. We are very lucky to have a lot of great advisers, mentors and investors who believe in the vision of improving quality of life for people with Parkinson's.

The immediate focus for Charco now is the product launch, and the company is raising another round also with a view to expanding its team. "We were beta testing the device and those people said they wanted to keep it," Jung said, "so we found a way to make that happen.

"We have more than 4,100 people on our waiting list at the moment."

GripAble makes rehabilitation therapy accessible

Another medical device company that emerged out of Imperial College is GripAble, which is developing a platform to make rehabilitation easier, more accessible and cheaper to more people around the world.

Paul Rinne, co-founder and chief executive, is a neuroscientist within the Department of Bioengineering and Department of Medicine at Imperial College, while co-founder and chief technology officer Mike Mace was, at the time, a research associate looking at rehabilitation technology.

The problem that GripAble solves is a surprisingly simple, but very stubborn one. "I was working, for many years, with patients with neuro disabilities and looking for biomarkers of recovery and for things that we could stimulate to improve recovery," Rinne elaborated.

"We had a lot of fancy tech at Imperial – robots, motion capture systems, imaging systems – but when I started to work with our therapy teams at Imperial NHS, I got a reality check. It was a baptism of fire right into the realities of the one-on-one nature of therapy and also into the lack of any innovation in the space supporting therapists.

Paul Rinne

"You could approach the therapists and say: 'we have this new fancy robot; do you want to use it?' And, of course, they reply: 'when do you think I have the time to use this equipment? How do you turn it on? Are you going to leave an engineer with me to maintain it? And what does the patient do when their 20 minutes is up?'"

Rehabilitation therapy is, like most healthcare, limited primarily by time: therapists have to sit down with patients, make notes, set goals. When it comes to the actual therapy, Rinne discovered that therapists were relying on things like putties, cones, wooden blocks – whatever they could get their hands on.

"That is the technology that is used today," Rinne lamented. "That is when I turned to the engineers at Imperial and told them we needed to stop over-engineering. What can we do that delivers better service but that, most importantly, is accessible to the therapist and the patient?

"We started looking into mobile technology, building accessible sensors and then through a mobile platform therapists could create programmes and collect data on the patient's progress. The handle was the first sensor we developed, and we targeted that at patients wanting to recover their hand and arm function, to be able to eat, drink and dress themselves."

Rinne met Mace "down the corridor," he joked. "When I was figuring out how to create a product, I looked internally at Imperial for engineers developing technologies in that space. Together with my old PhD supervisor Paul Bentley, we approached Prof Etienne Burdet, the chair of the human robotics group in the Department of Bioengineering.

"He took some convincing that robotics was not the only way forward and this was the scalable future. In those meetings, he had a postdoc – Mace – and we were paired together as the two junior members –him from the engineering side and me from the clinical side."

Rinne and Mace "have not looked back since" and the pair went on to take part in business competitions and OneStart, a programme run by pharmaceutical firm GlaxoSmithKline's corporate venture capital arm SR One, and then an accelerator in Dubai. "We moved to Dubai for six months and that is really where the foundation of the company came through outside of the technology aspect and the clinical aspect," Rinne said.

Rinne is a born entrepreneur, even though he used not to think of himself that way. "If you had sat me down a number of years ago, I probably would not have used the word entrepreneur. I would now say that," he divulged.

"I did not go into the PhD in neuroscience to found a company but looking back at what I was doing whilst undertaking that research, it was all very geared, in my head, towards how we would develop this technology and sell it.

"There were things I did do on the side that my supervisor found out about afterwards: I set up a consultancy company for app development and even worked on a finance app at one point. It was all about how to find a need, solve the problem and work out a business angle. Back then, I did not appreciate that as entrepreneurship."

When I started to work with our therapy teams at Imperial NHS, I got a reality check. It was a baptism of fire right into the realities of the one-on-one nature of therapy and also into the lack of any innovation in the space supporting therapists.

Paul Rinne

At the heart of GripAble's technology are the sensors, which gather data on key points relevant to therapists – such as an individual's strength and their range of motion – which, through the software platform, can then be used to infer other information, such as a patient's pain level and mood.

"Ultimately the sensors ¬– whether they are used for neuro rehab, musculoskeletal or paediatric care – are our area of expertise," Rinne explained. "They could be used in other areas of healthcare. Strength is becoming a significant biomarker of general wellness, frailty or recovery from respiratory disease. It is also used as a marker of oncology and in drug studies. We have the opportunity with GripAble not just to look at rehab but also at general health conditions, such as healthy aging."

The major hurdle that GripAble has been trying to overcome is the deployment of its device. It has achieved an even split between private healthcare providers and the NHS but getting it into NHS clinics "is exceptionally challenging," Rinne remarked.

"Never mind covid being on top of everything, it is challenging in terms of getting understanding of value that the product delivers, transitioning from certain ways of work and how exceptionally fragmented the payment side is.

"Ultimately this is why, to date, no one has actually scaled a technology in the rehabilitation space through the NHS. I think we have done an incredible job; we are breaking down those doors by doing the hard graft, going bottom up to the top clinics and building the evidence base to be able to approach the NHS top down and convince them to put it in every single hospital."

Imperial's investment in the company's £1.6m pre-series A round earlier this year has been "obviously fantastic," Rinne stated. "It is a great marker of confidence in the company. Of course, the affiliation with the university is invaluable – whether it is the clinical validation side or the engineering support. With the Imperial College Innovation Fund backing us, we know we also have the business support and the financial support."

Rinne pondered: "It is a young fund at Imperial, it was not yet set up when we were founded in

2017, but I am hoping that this new focus of theirs accelerates the development of companies such as ours coming out of the ecosystem."

The spinout earlier raised "a modest amount" in its first funding round three years ago led by Oxford Technology, which "were fantastically supportive in that phase and continue to be". Triple Point came in subsequently "to help deliver scale and support us on the corporate governance side, to make sure we are moving forward in a way that allows for growth," Rinne said. The company has also attracted money from a group of angel investors.

GripAble is now in the process of raising its series A round and has set its sights on three major goals: one, the ability to scale through distribution partners and make sure the platform is getting into every clinic, outpatient centre or care home in the UK and other territories.

This would then support the second goal: scaling the data-driven software and build an artificial intelligence platform that would allow GripAble to make recommendations to help accelerate a patient's recovery and ensure adherence. "This is going to take many years of data collection, but it is the opportunity beyond just the sensor," Rinne envisioned.

"The final part is to transition into the US market and replicate what we have achieved in the UK," he announced. "We have a small office in Austin and just hired our first US employee. We are working with the Association of British HealthTech Industries and their US accelerator."

Already, the company has deployed its device across 16 countries internationally, with 1,000 units across the UK. "We now have over 5,000 patients who have used the system, we have recorded over 65,000 activity sessions and we are approaching 15 million movements recorded. This is data and the potential to deliver information and insight that this market just has not had," Rinne declared.

Petit Pli tackles sustainability holistically

A completely different market that is just as ripe for disruption is the fashion industry. Petit Pli aims to tackle this challenge in a holistic way. The company is a material technology developer that has patented "a fabric that expands bidirectionally," chief executive Ryan Yasin explained.

"We initially applied that fabric to a specific solution, which is children's wear to reduce over-consumption rhythms and to have positive gains along the entire value chain."

Yasin, like Jung, gained a joint master's degree from Imperial College London and Royal College of Art in Global Innovation Design – "a course that appears to be product design on steroids as far as I can see," Roy mused.

But unlike Jung, Yasin's focus for his dissertation was not on the company he ended up building. "I have a background in aeronautical engineering and in my thesis, I focused on deployable structures for nanosatellites, which involved a lot of research into origami and how to fold structures into small gaps and then have them deploy out in space," Yasin said.

His fascination revolved around materiality, he explained, and a love for manipulating the mechanical properties of fabrics through structures embedded within them.

Yasin spent a semester in his first year at Keio University, working with Harajuku fashionistas to try and solve specific problems for them. "I did not like the outcome of that being a portfolio piece and something that remained as a theoretical albeit interesting project," Yasin bemoaned. "I felt dissatisfied, actually, because the inspiration for that project was to solve a problem about which these fashionistas had really opened up about to me. I had learned so much about the struggles that they went through in terms of something which was not obvious and did not meet the eye.

"The speculative outcome did not add value to their lives. I really did not like that. So, when I came back to London, I knew that I wanted to design something that could have a real and positive impact for someone and society as a whole."

He set about creating a business that could self-sustain and looked for a commercially viable problem. The light bulb moment came when he bought a piece of clothing for his nephew living in Denmark: by the time it arrived, he had already outgrown it.

Petit Pli's solution is a stroke of genius: the garments grow with the children and thus one item lasts for years.

"It is important to understand why this solution exists," Ryan declared, "and that is to approach sustainability with a holistic viewpoint. We are not focusing on one person in the value chain and trying to solve the problem for them, because what often happens is that you design a solution perfect for one person but it has a negative knock-on effect either up or downstream on the value chain."

He elaborated: "Petit Pli takes waste material from plastic bottles, which is turned into fibres and manufactured into a single-size,

growing garment. So, rather than making several separate sizes, the factory only has to make one – which means their process is more efficient and they can save on logistics and energy.

“The retailer has a lot less stock to manage and needs less storage space, because they do not have to deal with minimum orders for several sizes, which also saves them on labour costs and energy.”

It does not stop there, he added. A big problem in the fashion industry currently is returns, with an industry average ranging from 40% to as high as 60% because consumers shop online, order several sizes of garments and return the ones that do not fit. Petit Pli’s return rate is 2%.

Sustainability does not end once an item is in a consumer’s wardrobe, of course, and Petit Pli has already thought ahead to the eventual end-of-life of its products, Yasin revealed. “Our core range is all made from 100% monofibre construction, which means that it is much easier to recycle. Next, we are also looking at how we can take these garments back and repurpose them.

“Our packaging is made out of cardboard and it is a box designed to fit in 90% of UK letterboxes so that you do not miss a delivery and have to make an unnecessary trip to the local post office or schedule a redelivery. You can fold the box into a jetpack for the child to wear and upcycle as a toy.

“On top of that, our factory in Portugal derives 100% of its energy from renewable sources,” he stressed.

But Petit Pli goes much further still in its quest to be sustainable,

Ryan Yasin

Yasin said. “We are also looking to subscription models so the consumer can spread the cost of a garment over its lifespan, which makes it sustainable from an accessibility viewpoint. Often, what we see today is many sustainable products are expensive and it is not feasible for many people to adopt, however, a garment that grows will save cost over its lifespan – so this business model makes sense.”

This last aspect is one that Yasin finds laudable in fast fashion today: it has made clothing accessible. It just did not do it in a way that was good for workers or the planet.

While the company started out with a range of children’s clothes, the pandemic led to a second product: facemasks. “We identified challenges with existing facemasks on the market, such as poor fit and poor aesthetics, which meant people did not want to wear them and the stigma created risks for society,” Yasin said.

Earlier this month, the company also launched its range of women’s wear. It is a single size for multiple shaped bodies, but in particular maternity wear that fits before, during and after pregnancy, Yasin explained. Petit Pli spent a long time researching the problem, he explained, and came to the conclusion that “maternity wear design is always an afterthought.”

“It often looks like pyjamas,” he said. “It is a transitionary period for women, and the fact that they then also have to change their entire wardrobe is another point of anxiety and stress that is actually unnecessary. We think we have a strong solution there.”

On top of Petit Pli’s direct-to-consumer operation, the company is also exploring business-to-business opportunities such as uniforms for the construction industry. The two branches of the business are interlinked in Yasin’s mind and he hopes to use feedback from consumers essentially as research to develop business products.

Petit Pli’s team is multidisciplinary – its staff has backgrounds in mechanical, design and aeronautical engineering, fashion design, graphic design and marketing – in order to be as dextrous and agile as possible, Yasin stated.

While those backgrounds all make sense, there is another that jumps out: chief operating officer Arabella Turek is a neuroscientist and sociologist.

These two areas of expertise "has placed her in a sweet spot for understanding human behaviour and helping the company with its goal of nudging consumption behaviour of society as a whole," Yasin said. "If we can do that, we achieve our main goal, which is to encourage people to consume less while capturing the value they would have invested in multiple poor-quality items."

The importance of building a multidisciplinary team was instilled in Yasin by his experience at Royal College of Art, where he was part of a cohort of 12 people from all over the world with varying backgrounds all approaching the same problems slightly differently.

Petit Pli, like many UK startups, secured its first cash injection in the form of a grant awarded by Innovate UK, an investment that Yasin called very important but that depended too much on timing and the ability to allocate resources before money was available.

"There is enough funding, both from a government perspective and from commercial entities," he explained. "It is often luck of the draw whether your solution and innovation fits within the scope of a grant proposal or competition, and that scope is always changing so one year there might be enough cash deployed and the next year there might not be.

"What could be improved upon is that there is typically a lot of paperwork involved. For bootstrapped companies that is often a huge cost because that time dedicated to paperwork is not time the company can afford while it still has to commercialise, prove traction and build supply chains."

He added: "At the same time, you cannot complain. It is fantastic that these mechanisms exist, and we are very fortunate to have them to be able to start these high-risk proposals."

Petit Pli's institutional shareholders are Royal College of Art, Sky Ocean Ventures (a corporate venturing arm of broadcasting group Sky focused on reducing the need for plastic) and Sustainable Ventures, the latter having been the first equity investor that allowed Yasin, then still a sole founder, to run beta trials, gather customer feedback and build a waiting list. Sustainable Ventures is also an investor in Albotherm, featured in this issue starting on page 26.

This reliance on individual consumers early on in his journey led him to the decision to raise the next round as a combination of institutional capital – allocated to a push into the business-to-business segment – and crowdfunding.

"Someone once told me that it is important to hire people who are your customers," Yasin recalled. "By the same logic, it is important to have shareholders who are also your customers."

Long-term, "Petit Pli wants to clothe the future of humanity," Yasin stated. "We are just starting with the next generation. We consider garments to be wearable technology that just has not caught up with the rest of technology yet and we want to be the driving change behind that."

One vision for the future Yasin pondered was clothing that is breathable when it is hot but becomes waterproof when it rains. Another vision is to have t-shirts that can display whatever art the consumer wants to at any given moment.

"There is a lot of work that still needs to be done and if we are at the forefront of that then we can create solutions that elevate human potential," he pondered.

"If we can elevate human potential in a responsible way that is not harming anyone now or in future, that is our overarching goal."

And while the fashion industry is rife with copycats and fakes, this is one aspect that Yasin is not worried about when it comes to Petit Pli. "Many people perceive us as a brand, but we are not just a brand," he explained, "we are also building a community, we have trademarks, intellectual property and patents, and we have collaborations with large global companies in the pipeline.

"Taking that approach in addition to trade secrets allows us to build something that is protectable. We are not really a children's wear brand. We are a material technology company who have intellectual property and have identified one application and commercialised it in a direct-to-consumer manner."

It is an interesting approach in a sector where other startups are either building a sustainable consumer brand or a material technology that they can sell to businesses, undoubtedly making Petit Pli a company that warrants keeping a close eye on.

Riding the wave

With Imperial's first fund set to be fully committed by the end of this month, there is obviously the question as to whether Roy and his team want to do it again. The answer is yes, although, he joked, he needed a vacation first.

"The target for the first fund was to get it deployed by December, so we have gone faster than planned," he mused. "You push on doors and they open, and maybe you can push on more doors when you are operating remotely in half hour Teams slots. Parkwalk are keen, but obviously I cannot speak for them."

He concluded: "It has worked. The reception from the startups has been great. I must have met 125 to 150 founders over the last year. It has been amazing; I have not been lonely. I met all sorts of people and practically married to eight of them."

For more on Imperial's work, subscribe to our Talking Tech Transfer podcast and listen to the full interview with Brijesh Roy out on July 30.

Photo: Thomas Angus / Imperial College London

Albotherm seeds a green future

> Based on research at University of Bristol, Albotherm's technology could revolutionise how greenhouses and buildings are cooled.

By Thierry Heles
Editor

Did you know that glass panels on greenhouses are covered in shading agents and diffuse coatings when farmers need to prevent too much heat building up inside and destroying the crops? If you did, you probably have not given it another thought because it clearly makes sense. But there is a problem with this approach: what do farmers do on a colder or cloudy day when it would be beneficial to let more sunlight through?

Molly Allington and Sian Fussell, chief executive and chief technology officer, respectively, of University of Bristol spinout Albotherm, have the solution. Based on research by Fussell, who has just completed a PhD at the Bristol Centre for Functional Nanomaterials, Albotherm is developing temperature-responsive coatings that reversibly turn white when they hit a trigger temperature.

"You can tune the trigger temperature of the material," Fussell explained. "In the lab, we can get it between 18 and 45 degrees, and we have fine control within that temperature range."

While Fussell has been focusing on the research into the material – work that began around five years ago – Allington, who gained a BSc in Chemistry at Bristol, first joined the project to conduct market research, looking for opportunities and an initial target sector.

Agriculture turned out to be a winner. "It is a large market, even if it is not as large as others that we would hope to aim for later," Allington suggested. The main reason why Albotherm is focusing on agriculture first is those shading agents and diffuse coatings: they are an analogous, and more cumbersome, product.

Some farms, Allington noted, "have big robots that roll along the greenhouses to spray the shade paints, or they have people who have to climb up and do it by hand. It is a lot of unnecessary labour. We felt that our technology was a clear improvement on this, and it would be easy to prove and sell it to the greenhouse growers."

While greenhouses are the focus for now, Albotherm is already thinking further ahead. Another application of the technology, Allington explained, could be coatings for concrete.

"We would love to be able to use our technology, for example, on the roofs of buildings, particularly high-rise tower blocks," Allington pondered. "A lot of people are painting their buildings' roofs white to keep them cool, which is good in summer, but if you are somewhere like the UK with a temperate climate – that is cold winters, hot summers – you do not necessarily want to be reflecting the heat all year round.

"We would also want to incorporate these into other buildings, for example large atriums and constructions with glass facades, which have problems with excess solar gains. There is also the potential of developing our product for polytunnels, which are a type of greenhouse used widely across Africa and Asia, but less so in Europe," she elaborated.

The need for the technology is acute: by 2050, the resources required to cool agricultural, domestic and commercial buildings is expected to account for 13% of global energy.

The challenge remains significant, but Albotherm is not looking to do it all alone. "Our main focus is going to be on conducting cutting-edge research and on continually developing new, exciting products," Allington said.

"It does not make sense for us to go into large-scale production, especially being in chemicals where there are a lot of regulations. We would ultimately like to partner with a big corporation for manufacturing and distribution."

Molly Allington (left) and Sian Fussell (right)

And Allington and Fussell are no strangers to tackling challenges: Albotherm was born during the pandemic. It was officially incorporated in September 2020, after the pair had started to formalise the project a few months earlier.

"I would say that the fundraising and the last year has been one huge challenge. It was full of really unexpected things going wrong and it took us so much longer than we thought," Allington recollected.

Innovate UK, the country's innovation agency, awarded Albotherm a grant in June 2020, but the pair then had to secure match funding. It was an arduous process, Allington recalled. "It took us nine months or so. We were turned away by a lot of people and it was quite demoralising."

The tenaciousness paid off: Albotherm found Sustainable Ventures to lead its £370,000 ($515,000) seed round, completing the deal in April this year.

Sustainable Ventures was a good fit, Allington revealed, because "they support a lot of similar companies. including tech companies, businesses in construction, materials and so on.

"When we started out, we wanted to create a business that was going to do good and help the environment. Finding an investor that was tied to that view as well and that was not going to just push us to make maximum profit at the detriment of the environment was important to us."

Fussell added: "They also run a 12-month accelerator programme as part of the investment. This is the first time running a company for both of us and the accelerator helps with all the early-stage problems that you run into. It also helps generate ideas and meet people."

And that Innovate UK grant turned out to be "essential", Allington said. "It is the moment that we felt like a real company. We had been thinking about starting Albotherm for a while, we had the name and a rough business plan, but we did not really have anything concrete until that point.

"Without the grant, we would not have been able to raise the funding that we did. Even the amount that we did raise is nowhere near enough, without the additional grant support, to do all of the research. The sheer amount of materials and lab space means the costs are very high for a small company."

While Albotherm managed to secure the grant, Allington lamented that there was not enough support for companies who do not necessarily know how to go about applying for these awards. "We were lucky in that one of our advisers at the university had worked before as an Innovate UK assessor, who gave us a lot of support on what things they would be looking for," she explained.

"Also, because we took part in SETsquared's ICURe programme, we were in a closed round which meant fewer people applying. Overall, there is a lot of grant funding about, but it is really competitive and hard to get."

Apart from helping them secure funding, the ICURe programme also taught Allington how to sell a product to prospective clients, she revealed. "The technology might be of a real use to someone, but if you do not frame it in the right way, they are not even going to open the email. Being able to learn those networking skills was really important. We are still in touch with some of the companies that we spoke to on that course, and they may be our first customers."

While raising capital during a pandemic turned out to be challenging, there was however no other support missing that the pair wished they had had.

Allington explained: "We were lucky and we signed on quite early, in August 2020, to Spin Up Science's ventures programme. It was a new programme for them

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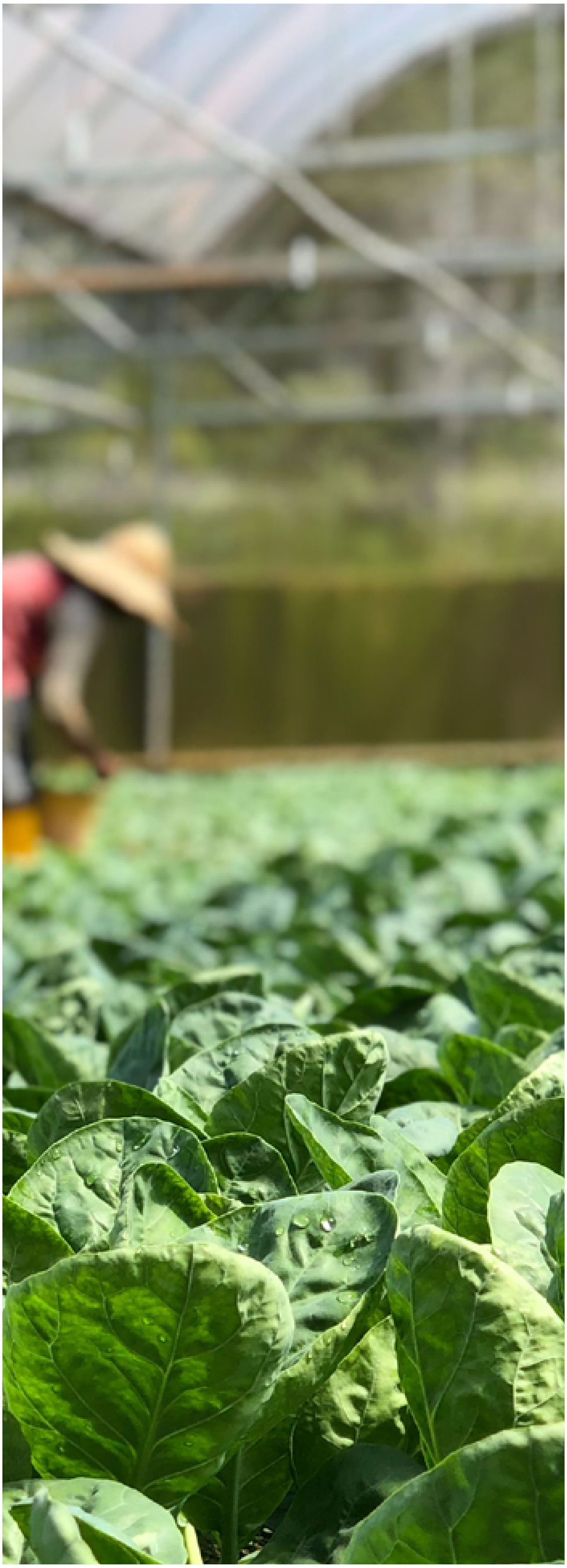
>
> Molly Allington



but Spin Up Science was built to support spinouts and they have been the single most helpful support we had in the last year.

"Every question we had, they were there to answer and explain to us how the business part works and help us with financial models – the whole package."

One aspect that stuck out to the pair while pitching to investors was the lack of women sitting across the table. "We did not meet any women who were angel investors at all," Allington noted. "When we did get funded by Sustainable Ventures, their investment director is a woman, and they have a lot of women on their team. They told us that since they hired more women, they have tended to fund more women. It is interesting that they can already see that impacting their portfolio."

Considering the passion with which both now speak about their company, it is surprising that neither set out to be an entrepreneur. "I do not think that was always the goal," Fussell stated. "It became apparent that we had something that people were interested in and it came about that spinning out a company would be a really good way forward."

Allington echoed those thoughts: "I was never really interested in business. I did chemistry at university because I really loved doing chemistry, but I realised I did not want to go into a lab job and do the same thing every day. That seemed a little boring to me. When the opportunity came to get involved in a project with real-world applications, that seemed way more interesting than any other job I could have imagined at the time."

So, what advice would the pair give to someone looking to launch their own spinout? Fussell declared: "Have a network of people to help you. That is probably what made us get to where we are today. People like those at Spin Up Science and at the university who can help, and people who have already started companies and can give you advice on the little things that, if you do not notice them early enough, can become massive challenges.

"We have been fortunate that we met a lot of people even considering we were working from home for most of the year."

Allington added: "Even if you do not already have the contacts, you can always make them. There are so many networking and support groups, if you are honest about wanting advice then people are quite willing to give their time. I have been surprised by how many important people are willing to talk to us."

It certainly helps that the pair is located in Bristol, a city that has made huge strides in recent years to support startups. Fussell observed: "There is access to really good facilities for science-based companies. We are based at Future Space; they have shared labs, so we do not have to invest time and money into setting up a lab ourselves. It lowers the barrier to entry so much and it creates an environment where people are very supportive and there is actually space where you can work as a company."

It also means that those students who are not interested in launching their own ventures are much more open to working for them, rather than going into an established corporation. Fussell noted: "A lot of graduates are interested. Students are much more aware of startup culture than they would have been even a few years ago."

That does not always make it easy to find the right candidate, of course, as Allington stressed: "We recently hired a research assistant, and it took us a long time to find the right candidate but we needed someone a bit more niche than some other companies."

Yet, when they did find the ideal candidate, they were based in Bristol. That is a promising sign for the city and for Albotherm as it continues to grow. And with the potentially catastrophic impact of the climate crisis on food security, that growth arguably cannot come soon enough.

It is a good thing then that Allington and Fussell come across in every way as a pair that will not give up no matter how big the challenge. We should all be excited about the things they will undoubtedly achieve.

Isolere Bio breaks the biomanufacturing bottleneck

> **Co-founder and CEO Kelli Luginbuhl discusses how the Duke spinout re-imagines the manufacturing of complex biologics.**

By Thierry Heles
Editor

It has been less than a decade since Jennifer Doudna, of University of California, Berkeley, and Emmanuelle Charpentier, of Umeå University, published their seminal paper on Crispr-Cas9 gene editing in the journal Science, showing that while there had been other genome editing techniques, they had discovered a much simpler approach.

The progress made over the years since that paper was published has been phenomenal. Countless cell and gene therapy developers have sprung up, including Doudna and Charpentier's own Crispr Therapeutics, but also University of Pennsylvania-linked Passage Bio or Broad Institute-affiliated Editas Medicine. Doudna co-founded the former, but left over a complex, drawn-out legal dispute between her university and Broad Institute, which both laid claim to aspects of the technology.

Doudna also went on to co-found Caribou Biosciences and Intellia Therapeutics.

So far, so promising. But there is a looming issue: the industry is still relying on decades' old chromatography methods that were invented for much simpler, smaller molecules, which is why we have found ourselves with a bottleneck and imbalance in supply

Kelli Luginbuhl (far right) with some of her team, including CSO Michael Dzuricky (second from left)

and demand for manufacturing cell and gene therapies.

Step in Isolere Bio, a spinout of Duke University that is looking to solve this exact problem. Kelli Luginbuhl, chief executive and co-founder, said: "Isolere Bio was founded with a vision of re-imagining how we can manufacture complex biologics and next-generation medicines of today and of the future.

"There has been very little innovation in manufacturing over the last several decades. We are looking to make an impact with our technology, making the manufacturing of these lifesaving medicines more efficient and more affordable."

The company is based on research by Ashutosh Chilkoti, the Alan L Kaganov professor of biomedical engineering and chair of the Department of Biomedical Engineering at Duke University, who "always has felt that it could make an impact in how biologics could be purified and, even more broadly, manufactured," Luginbuhl recounted.

Joseph McMahon, president and chief executive of Bioventure Partners, is also a co-founder.

Chilkoti and McMahon met at a function many years ago and both believed in the idea, but at the time McMahon was still president and chief executive of biopharmaceutical contract services organisation KBI Biopharma.

"When McMahon eventually decided to leave KBI and found his own early-stage investment and growth advisory firm, the timing was finally right for him and Chilkoti to spin the technology out of Duke," Luginbuhl stated.

Around the same time, Luginbuhl was finishing up her PhD – which looked at developing a controlled release drug delivery system for type 2 diabetes – and planning to move to San Francisco. "But then Chilkoti asked if I wanted to stick around Durham and start a company, and that was an opportunity I could not turn down," she recalled.

Through her PhD research, Luginbuhl was already intimately familiar with the stimulus-responsive proteins that form the basis of Isolere's technology. "I spent my whole PhD working with the same materials that we are developing now. I have had a lot of experience designing, developing, characterising and understanding these unique biomaterials. Purifying proteins was an everyday part of my PhD," she noted. "I feel very grateful: how many people get to translate what they worked on during their PhD into a company that they are building to develop useful tools?"

Despite her keenness to co-found the spinout, she had never thought about launching her own company before then. But she was very interested in startups, she revealed, and had applied for positions with several in San Francisco because "they are a perfect balance between the innovation and the creativity you get from academia, but with the direct impact you see in industry."

The decision to keep the company in Durham, a burgeoning area for cell and gene therapies, was an easy one. "The technology is closely related to the R&D that has been going on in the Chilkoti lab for many years," Luginbuhl explained. "KBI Biopharma was here. It just made sense to keep Isolere Bio here as well.

"The cost of getting things done in Durham is much lower than somewhere like San Francisco. We have a great pool of universities from which to attract talented scientists and engineers. We have a backyard of innovative gene therapy companies to collaborate and hopefully partner with."

Isolere Bio, founded in 2017, focuses on purification technology for adeno-associated virus (AAV) vectors, but it did not start out that way. Initially, the company had set its sights on monoclonal antibodies and spent about a year developing that technology.

But, Luginbuhl said, “it just was not the right fit. Protein A chromatography works well. It is a hugely competitive field and antibodies manufacturers are resistant to change.”

The shift to AAV ended up being serendipitous. “We started talking to people in the field and realised that AAV had even bigger pain points in terms of manufacturing, as do most viral vectors.

“AAV was the logical next step from an antibody in terms of size and complexity. There are a few chromatography resins available for specifically purifying AAV, but there is little competition and we are confident that we can improve the manufacturing efficiency.”

The detour at the beginning of the company’s life has not deterred Luginbuhl, who added: “We are already looking at other applications beyond AAV, including adenovirus, lentivirus, nucleic acids and maybe, eventually, even cells. I truly believe in the platform potential of the technology Isolere is developing.”

Challenges remain, of course. “The biggest challenge for us will be getting the early adopters. Once there are a few people who have used it to purify AAV gene therapies that are going into clinical trials, there will be a lot of momentum. Finding the right fit for a partner that is willing to be first is probably our most difficult hurdle,” she pondered.

“Luckily, there is a good fit and a greater need, creating significant interest by AAV companies in evaluating the technology. We are working hard to make that adoption as simple as possible by developing the technology to drop straight into existing downstream manufacturing suites: we are using tangential flow filtration equipment that is already in place and validated off-the-shelf filters to minimise concern from a regulatory perspective.

“But it is a very different unit operation – most manufacturers have never worked with phase separating biomaterials.”

Isolere Bio is hoping to get the technology deployed to early adopters within 12 to 16 months, having worked on the AAV offering for a little over a year. Already, the spinout has joined forces with a number of collaborators to externally validate the technology. “Hopefully,” Luginbuhl reflected, “some of those will turn into partnerships to demonstrate that the technology works equally well as we scale up from the bench to much larger batch volumes.”

The company’s team is currently nine people strong, having nearly doubled over the past three months. By early next year, Isolere will be moving into its own R&D facility to accommodate additional growth – being currently based out of the Duke Bridge incubator, although all of its research is now done internally and no longer at Chilkoti’s lab.

Ashutosh Chilkoti

Being in a Duke facility meant Isolere was forced to halt its lab work for two months but, Luginbuhl stressed, “we are really fortunate to have still made tremendous progress, despite being shut down and despite the supply chain issues that cropped up during the pandemic.”

She added: “I am not grateful for covid, but I think it put a spotlight on the need for scalable, rapidly deployable manufacturing technologies. It certainly worked to our advantage in going out and raising money early this year.”

For all the city’s advantages, venture capital remains difficult to find in Durham – particularly for a cutting-edge business like Isolere Bio.

I feel very grateful: how many people get to translate what they worked on during their PhD into a company that they are building to develop useful tools?

Kelli Luginbuhl

"Some of the investors in this area are much more conservative," Luginbuhl observed. "I had to alter my pitch when I was talking to investors locally, telling them I had de-risked everything. When you go to the coast, especially San Francisco, they want to know: 'If everything goes well, what could you achieve?'"

Everything being virtual played into Luginbuhl's hand and she "did not really feel like I was at a disadvantage being in Durham. Being able to interact with VCs virtually rather than flying back and forth was a big benefit."

Interestingly, Northpond Ventures, the lead investor in Isolere Bio's $7m round – closed in March this year – found the spinout rather than the other way around.

"We showed up on their radar after we were selected by Nature's Spinoff Prize as one to watch, and they reached out in the fall of 2020. At the time, we were not looking to raise money, so they ended up coming back in early 2021 when we were," Luginbuhl remembered. "They have been incredible to work with. They are a great team of smart individuals with a very closely aligned vision for the kinds of science-driven technologies they want to invest in."

She continued: "A lot of people have said it must be really difficult to raise money for a manufacturing technology rather than a therapeutic. But between the pandemic and the explosive growth in cell and gene therapy, there is starting to be a lot more attention on manufacturing.

"It is no longer enough to be first-to-market, it is becoming more competitive: you need to get to market with a commercially viable product that you can manufacture and price affordably."

Part of the money that Isolere Bio raised will allow it to bring its AAV technology to market, but, Luginbuhl underlined, "it is also allowing us to look at lentivirus and mRNA among other types of applications."

Luginbuhl is ostensibly relieved not to have to pitch for at least another year. "Now that we have closed the round, I am looking to dig in get to work bringing this technology to market," she stated.

Leading the company for the past three years, Luginbuhl thankfully had never felt disadvantaged for being a woman, she stated. "It is interesting coming from the biomedical engineering field, which has reached a pretty steady 50-50 male-female ratio. But when you go into the higher levels of organisations, the number of women, and diversity more broadly, is very much lacking.

"Of course, it would be great when I meet with other CEOs or pitch to VCs to see faces that look like mine. But I am a realist and it is what it is. Change does not happen overnight – I am fuelled by that and also really glad to be a part of the change."

She was keen to pay it forward too, she said: "I have never turned down any opportunities to be a guest lecturer or participate in career panels. I am not sure I have the experience yet, but I am hoping as I reach that point to serve as a mentor to other women looking to move into this role. Nothing ever suffers from having diverse viewpoints, backgrounds and opinions.

"The best thing I can do is build a company I am proud of and give back, continuing to be a part of the entrepreneurial community and be a mentor to other PhD students looking to spin out companies.

"I have never felt excluded, I have a lot of relationships with other C-suite peers that also come from Duke Biomedical Engineering, as well as other CEOs I have met in my role at Isolere."

There was one type of support she wished she had had from day one, however, having spent the early days as the sole full-time member of staff: chief scientific officer Michael Dzuricky. "He joined in October 2019 when he finished his PhD," she recalled. "We balance each other really well and it was a big shift emotionally to have someone by my side who was equally invested.

A lot of people have said it must be really difficult to raise money for a manufacturing technology rather than a therapeutic. But between the pandemic and the explosive growth in cell and gene therapy, there is starting to be a lot more attention on manufacturing.

Kelli Luginbuhl

"You always envision startups as two friends working out of their garage. It felt like I went from being alone to having a partner in crime that I trust wholeheartedly and who knows the technology as well as I do."

Those early days would have been even harder without the awards from the National Institutes of Health (NIH) and National Science Foundation (NSF), she disclosed. "I do not think we would have lasted more than a year without bringing in that grant support. Chilkoti and McMahon both put in some early seed money to get us going, but the NIH and the NSF SBIR grants were what really allowed us to take off with these ideas.

"They also provided a rigorous scientific review. It feels good to have top-tier scientists reviewing your research plan and deciding to fund it. That also gave us the support we needed when going out and starting to have early conversations with biotech companies."

Looking ahead, Luginbuhl remained unsure of Isolere's long-term route. "Right now, there are a lot of paths open to Isolere. We are in uncharted territory," she contemplated. "There is certainly the acquisition route, but there is also a path growing revenue through business-to-business sales as well as licensing strategies to consider.

"Regardless of which path we end up going down – and that path might be different for AAV versus other applications – the next key milestones remain the same: show that the technology works as we scale up, develop a scalable reagent manufacturing method with a contract manufacturing organisation (CMO) partner and make sure we are delivering a high-quality and very safe product.

"We started working with regulatory consultants early and have kicked off work to develop a residual assay, which will be important to end users for demonstrating that there is no quantifiable amounts of our reagent left in the final therapeutic product."

With confidential disclosure agreements in place, Luginbuhl kept plans for potential partnerships under wraps but confirmed that Isolere had entered discussions with a number of pharmaceutical and biotech companies, as well as CMOs and life sciences end-to-end solutions providers.

"We are keeping a lot of options open and looking for the right fit in a partner moving forward that will

Duke's Bridge incubator

allow us to demonstrate the technology at scale," she announced. "What is most important to us is that this technology make an impact in the cell and gene therapy world."

Whichever path Isolere Bio decides to take, it seems clear that Luginbuhl will take it to great successes. That is good news not only for Luginbuhl and her company, but also for the biotech industry and humanity as a whole.

Luginbuhl concluded: "We truly believe in the platform nature of this technology and AAV is really just a start. "I am eager to see our AAV technology make it to market, but also look forward to showing proof of concept out over the next six months for some of these other application areas. AAV is not alone in being a very challenging biologic to manufacture.

"We are looking to strike the right balance now between making sure we stay focused on AAV, but also exploring these other areas where we believe we have the potential to make a big impact."

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The documentation of inventions during spinout

> **Careful documentation of inventive activity during the early stages of a spinout are important to avoid legal complications.**

By Mark Lubbock and Zachary Hyde
Partners, Brown Rudnick

Patents can form an essential part of the commercial success of a spinout. Patents can give the company an exclusive right to its point of differentiation, creating barriers to entry that may block later competitors from selling the same goods or services. Those barriers to entry may free the spinout from price competition and increase market share, potentially increasing its value by multiples far in excess of values driven by other assets.

However, in order for them to be effective it is critical to ensure that the spinout can demonstrate the right to own or use the rights. It is common for title to the patents for the initial inventions made to be retained by the parent university so they have to be licensed to the spinout, but it is also common for later patents to be filed by the spinout, in the name of the spinout, for inventions originating wholly from company resources.

Regardless of whether a patent originated in the name of the university and is licensed to the spinout, or originated within the spinout, that patent may contribute to the commercial success of the spinout. In either case, in-licensed or company-owned patents play a role in protecting the university's investment and driving future returns, although in the former case, the licences need to be robust enough to satisfy later investors and in the latter case it is important for the spinout to ensure that the patents are employee-made or are the subject of clear assignments.

It is common for a spinout to have a mix of both in-licensed and company-sourced patents. Not surprisingly, when an academic researcher becomes a spinout founder, those patents may – broadly speaking – have overlapping subject matter. In fact, a researcher will often continue their principal research in the academic lab while also serving part-time as a consultant to the spinout. It may also occur that other personnel from the same academic lab may work with the spinout at early stages. It may also be the case that personnel from a number of different institutions are involved in the research work which leads to the invention especially when consortia are created for the purpose, often funded by government grants.

In whatever way a new invention with potential commercial value is made, the best use of that invention can be made by avoiding uncertainty as to ownership and putting any resultant patents into the hands of the spinout through the correct legal mechanisms.

For university employees, invention ownership is often governed by an employment agreement or handbook. Depending on local laws, those documents either supplement laws pursuant to which inventions made by employee-researchers belong to the employer-university or create obligations to assign any inventions made within the scope of employment or using university resources to the university. It is recommended for all spinouts to use employment agreements containing obligations and clauses that assign inventions made in the course of employment or using the employer's resources to the spinout. It is also important that consortium agreements which govern the roles and responsibilities of the participants are clear about who owns what and what the owners are entitled to do with the rights they end up with.

For any new invention made during periods when personnel may be working both with the university and with the spinout, the spinout can avoid having a cloud of uncertainty over commercially-important legal rights by carefully adopting best practices for documenting and assigning inventorship and by communicating candidly with the university's technology licensing office.

Scientists at the spinout may discuss the benefits of an invention within the walls of a newly-rented business space. But they should be mindful of whether the legal definition of invention was met at the university or in the new business. For a patent in the United States, invention is defined as "the formation in the mind of the inventor, of a

definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice." (see: Burroughs Wellcome Co. v. Bar Labs., Inc., 40 F.3d 1223, 1227-1228 (Fed. Cir. 1994)).

The way in which an invention is made, and where it is made, may also affect entitlement to it under English law and that of other European countries. In consequence, the spinout, like the university, should make it the practice for inventors to document inventive activities with records that show where and in what capacity the invention is made.

A familiar form of such record-keeping is the laboratory notebook of the research lab, made and witnessed contemporaneously with scientific inquiry. Such practices for documentation of invention have been discussed. See, for example, Crowell, 2007, Documentation of Inventions, In Intellectual Property Management in Health and Agricultural Innovation: A Handbook of Best Practices, Krattiger, al. Eds., Oxford, UK (the abstract of that book is available at: http://www.iphandbook.org/handbook/ch08/p03/).

By the careful documentation of inventive activity to such standards, both in the university lab and in the spinout's facilities, and by the careful application of the invention assignment provisions of employment agreements and consortium agreements and a good understanding of the legal process, the stakeholders can ensure that patents are filed in the name of the entity that has legal and equitable rights in the invention.

Those practices will avoid disputes about patent ownership. Both the university and the spinout benefit from having the patent name the correct applicant. Each party should avoid future disputes about invention ownership or patent entitlement by carefully documenting the inventorship and the application of assignment and licensing obligations. Such best practices will create a clear chain-of-title for both spinout-owned and in-licensed patents, ensuring that the patents can be used to the commercial benefit of the spinout. Because correct documentation of inventorship and patent ownership will give security to future investors, assist in the enforcement of the patent rights against competitors and promote the commercial success of the spinout, those practices are good for the returns of university ventures.

CVCs poised to benefit from positive momentum

> **The effective equality between public and private capital markets is almost complete.**

By James Mawson
Editor-in-chief

In filing his GCV data analytics report, Kaloyan Andonov described it as showing "a lot of positive momentum.

"It even feels a bit frothy."

That is some understatement. The first half of the year had a total of 2,288 deals with an estimated total capital of $131.78bn, according to GCV Analytics.

That value, involving at least one corporate venturer, is more than the whole of last year and almost at the all-time record of $134bn in 3,232 deals posted in 2019.

Global venture capital funding in the first half of 2021 shattered records as more than $288bn was invested worldwide, according to data provider Crunchbase.

The effective equality between public and private capital markets, therefore, is almost complete. Allied to widespread understanding and acceptance of open innovation and it is little surprise corporates, along with hedge and mutual funds, institutional and family investors and traditional or specialised VC funds, can provide as much capital as public markets while the rotation on and off stock exchanges has been made much easier through the use of special purpose acquisition companies and direct listings and back into private hands through leveraged buyouts.

US initial public offerings have already totalled $171bn, passing the 2020 record of $168bn, according to data from Dealogic, published by Reuters, while global mergers and acquisitions was a record $2.4 trillion in H1, up 158% from the same period last year, according to Refinitiv Deals Intelligence.

Once capital markets have caught up with a more efficient allocation of resources to the entrepreneurs and managers who can best use it, what comes next? Looking at first principles can help. Low interest rates and monetary stimulus pushes more people into a risk-on position to find returns. This is adding the froth to venture investing, but the drivers of innovation remain in place, as advances in sectors feed off each other and impact other sectors around the world.

This is not a linear process but more exponential and now the capital is increasingly abundant to fund the innovations.

While corporate venture capitalists (CVCs) are increasingly professional – shown by the leaders' support for the GCV Institute this year – there remains a slight sense too many are yet to weaponise their advantages to take their rightful share of rounds and drive company building. Having spent so long trying to improve their reputation with entrepreneurs and syndicate partners, it is natural many experienced corporate venturers are cautious about coming over as too hard-edged in negotiations.

This form of competition and collaboration is refined and hence fragile if communication fails.

Global Corporate Venturing's sector councils covering health, finance, energy and artificial intelligence and deep tech, with others to come around mobility and industry 4.0, are designed to support this communication and hence efficient allocation of capital. They are also intended to build off a common language and best practices shared by CVCs for CVCs, through GCV's training institute, reports and events.

This work is thanks to the community's support and leadership in the innovation capital ecosystem. Increasingly, it means working with and is welcomed by independent VCs looking for corporate limited partners and the added-value CVCs can bring.

We have recognised these leaders in the GCV Powerlist published on July 21 as part of our Digital Forum that ran to July 28. We will return to live and hybrid events from September, starting at the GCVI Summit in California before moving to Brazil, the UK, Florida and Asia.

There will be plenty to talk about.

TenU Hosts Regional Opportunities: four key messages

> **George Baxter of Edinburgh Innovations chaired TenU's fourth event, leading a discussion on growing regional innovation hubs.**

By Ananay Aguilar
Policy adviser to TenU

On our fourth event, TenU Hosts Regional Opportunities, a panel of experts debated emerging trends in regional entrepreneurial ecosystem development. In the light of growing interest by US and UK governments in investing in and growing regional innovation hubs, TenU convened this event to find out about the wealth of opportunities in the regions, the initiatives underway to develop regional ecosystems further and the incentives needed to increase their potential.

The event was chaired by TenU member George Baxter, CEO of Edinburgh Innovations. He was joined by two technology transfer leaders, Andrew Wilkinson, also TenU member and CEO of University of Manchester Innovation Factory, and Nichole Mercier, assistant vice-chancellor and managing director of the Office of Technology Management and Tech Transfer at Washington University in St Louis (WashU); two venture capital investors, Kirsten Leute, partner at Osage University Partners, and Liz Roper, partner at Epidarex Capital; and entrepreneur and investor Vikas Shah.

A broad range of insights were offered by the speakers which are summarised in the following four points.

1. Collaboration is at the heart of ongoing successful regional initiatives and has been accelerated through the pandemic.

Vikas Shah observed that it was often the case that less developed ecosystems were asked to become more like the most successful ones. Instead, he proposed, ecosystems should play to their strengths and collaborate in order to learn from each other and avoid replications. This would lead to richer regions overall.

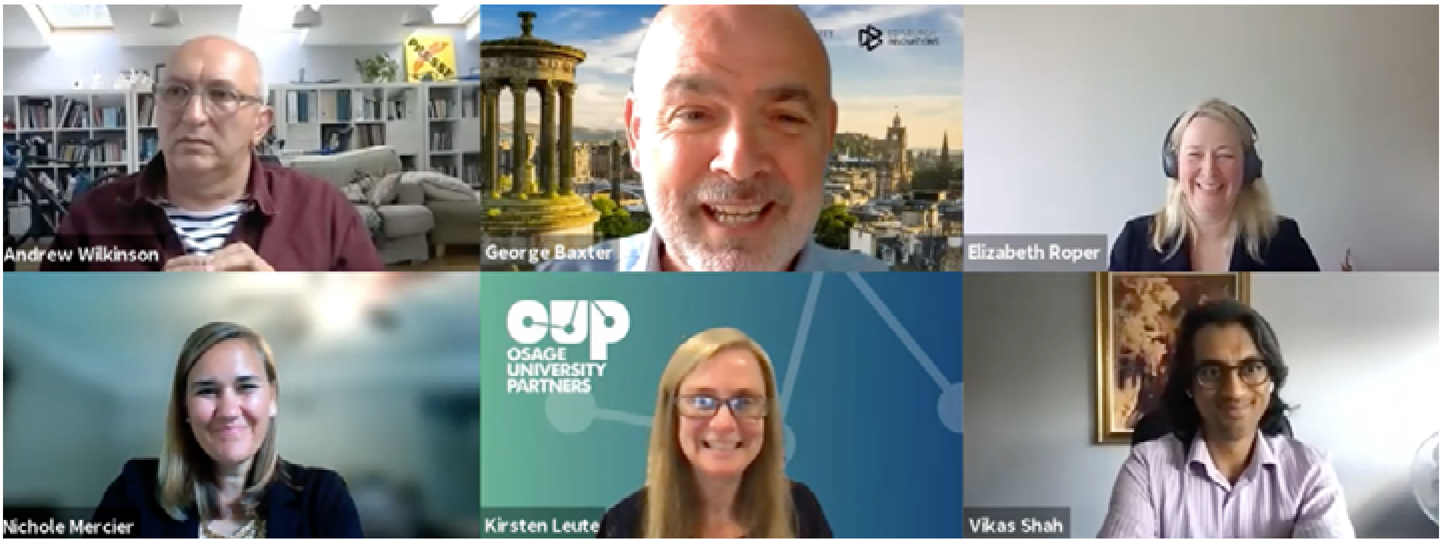
In this spirit, Andrew Wilkinson offered a successful example of collaboration in introducing Northern Gritstone, a recently launched investment company raising £500m that was founded by the universities of Leeds, Manchester and Sheffield to invest in the wealth of excellent very early-stage technologies produced by these universities and attract further funding into the region.

Nichole Mercier added another example of collaboration in which WashU is involved, the Midwest Regional University Network, that aggregates midwestern universities and their networks to attract funding from outside the region. Mercier also highlighted the role of the pandemic in accelerating conversations with regions that were previously perceived as remote: “the pandemic has shown us that much can be done effectively with a virtual format”.

2. Building capacity is as much about building and strengthening networks as it is about acquiring skills.

Liz Roper, through Epidarex, works closely as a partner to the academic inventors of very early-stage technologies, helping them to demonstrate proof of concept, to shape the business plan, to put a team together and take their start-ups to a point where they can attract major investors. Whilst building capacity is key, Roper noted, introductions made all the difference. As Kirsten Leute pointed out, much of the process of attracting investment depends on who you know, and so a warm introduction from another investor can be really useful to ensure growth. It was thus not uncommon for Osage to make over 200 introductions per year.

As Roper explained, larger investors, often from outside the region, want a local investor that they know has looked at the market potential in detail, has done the due diligence and can provide the confidence to invest. And so Epidarex specialises in providing the first investment and then getting the companies to a stage where they can introduce the entrepreneurs to top investors. As nodes within a network, Epidarex and Osage provide value to both regional entrepreneurs and investors by matching their interests, expertise and specialty areas with those from outside of the immediate ecosystem.



3. Creating place is part and parcel of building and retaining an entrepreneurial community.

On the audience's question of how to retain talent within regions, George Baxter remembered from previous work in Manchester that he looked at arguably unrelated factors such as the school provision of International Baccalaureate exams to attract and retain potential entrepreneurs with families coming from Europe or elsewhere in the UK. Efforts to make cities more attractive, Leute observed, became increasingly important as the larger ecosystems became too expensive for budding entrepreneurs looking to grow their businesses. Indeed, encouraging collaboration between regions was key to Shah, who highlighted that one of the things that made Manchester attractive to him was that he could jump on a train and be in London in two hours.

Mercier added that it was equally important to support key individuals with the potential to build deep connections in a region and to attract students and postdocs to involve them in projects around a specific technology or skill. Shah agreed with this, arguing that often cities tried hard to cater for a number of disparate populations, when in fact they could focus on supporting those few flourishing businesses and on looking after their needs. In this way, these businesses were motivated to stay and, in turn, create jobs and attract further people and investment.

Wilkinson pointed out that both efforts needed to be made in conjunction and ideally at scale in order to reach critical mass: "you need to have lots of businesses to create supply chains and to have people moving between organisations, so that suddenly it becomes really hard to move".

All agreed that these efforts needed to be supported by joint local and national investments.

4. There is no one-size-fits-all in technology transfer, but there is one goal: taking the best science to the next stage to create societal impact.

The university technology transfer sector is held together by the common desire to commercialise innovative research to create societal impact. Yet, within that, the discussion suggested that the university tech transfer sector is a rich and varied one. It teased out differences between private and public universities, between those based in large ecosystem and those in more remote areas, between smaller specialist institutions and larger generalist ones, and many more, that ultimately influence the wide range of university policies and the particularities of the process leading from invention to commercialisation.

The process, in turn, is further shaped by the type and stage of the technology, the maturity and investment culture of the entrepreneurial ecosystem, the academic inventors' experience and preferences, and the requirements of funders, to name a few of the key variables. Yet despite these differences, the panel of university tech transfer office representatives and investors agreed that they all pursued a common goal when negotiating terms: taking the best science to the next stage.

For TenU's quick start guide on some of the many complexities that universities tech transfer offices have to negotiate on a daily basis, follow this link.

The TenU Hosts event series offers opportunities for US and UK policymakers, thought leaders and leading practitioners in research commercialisation to hold conversations on topical issues. The next TenU Hosts event will be held in the autumn; if you wish to be informed of the date, contact us to join our mailing list.

TenU is a transatlantic collaboration formed to capture effective practices in research commercialisation and share these with UK and US governments and higher education communities, in order to increase the societal impact of research. TenU's members are the technology transfer offices of the University of Cambridge, Columbia University, University of Edinburgh, Imperial College London, KU Leuven, University of Manchester, Massachusetts Institute of Technology, University of Oxford, Stanford University and University College London.

– This article first appeared on TenU's website, where a full recording of the event can also be viewed. It has been edited for style and republished with permission.