Spinning out Success

Entrepreneurial Impact Ranking 2020

Tracking UK universities' record at turning research into world-changing companies.

octopus ventures

A brighter way

Simon King (PhD),
Partner at Octopus Ventures

Foreword

As an investor in early stage businesses, many with a deeply technical nature, we see universities as foundational to the companies we invest in. So it gives me great pleasure to introduce this report as a follow on from last year's Research to Riches report, revealing universities' success at turning their academic achievements into thriving companies.

Here at Octopus Ventures, we have worked with Ideas2Impact to update 2019's Entrepreneurial Impact Ranking and we've extended the study to a new depth of insight. In the UK we are lucky to have a high density of world class universities that spin out world-class businesses. These institutions are melting pots for smart people, technologies and ideas; the precursor to creating new companies. From our perspective as an investor in these types of companies, we know first-hand the positive economic and societal impact they can have. We believe there remains further opportunity to create world-leading spinout companies in the UK. Our goal with this report is to identify which institutions create investor-ready spinouts and to share the reasons why they are successful for the benefit of all.

The world to which we deliver this report is a markedly different one than that of twelve months ago. The global economy has suffered its largest exogenous shock since World War II, the human toll of the Covid-19 tragedy is horrendous and still unfolding and many industries and institutions face existential hardship. Universities, as organisations where people come together from all over the world, are among the hardest hit. How research and resulting spinouts will be affected in the long term has yet to be seen, but we remain fiercely optimistic.

The drive to teach and learn is stronger than ever in a world with such a fast-changing job market. Innovation driven by research is at worst uncorrelated with the market environment and at best thrives in market downturns. Research at universities will contribute to our way out of the current pandemic: Imperial College is modelling the spread of the disease and the impact of interventions, while teams at Oxford are developing a vaccine. The societal benefits of these and other UK universities' research capabilities has never been more prominent.

Growth and improvement throughout the ecosystem resulted in 2018/2019 being a record year for spinout exits from universities with sales of spinout company shares totalling more than £61 million - an increase of 37% from 2017/2018. This has led to some interesting movement in the rankings.

There have also been some significant spinout companies sold over the past year, including many in the pharmaceutical space, a particularly strong area for the UK. We ourselves were invested in a semiconductor spinout from the University of Kent and University of Essex, UltraSoC Technologies, that was acquired by Siemens Mentor Graphics earlier this year.

For this year's report we have spent time with some of the top ranked institutions to understand in more detail their approach to creating and helping spinouts at the earliest stages. From this we've produced a list of six recommendations that we believe lead to the creation of companies that can attract investment and become successful. By focusing on early customer discovery, aligning incentives and being creative with initial fundraising, spinouts can be formed that are best placed to overcome the many risks early stage companies face. Despite the distinct challenges posed by the pandemic in 2020, we remain optimistic about the UK's universities and their ability to create pioneering companies that will change the world.

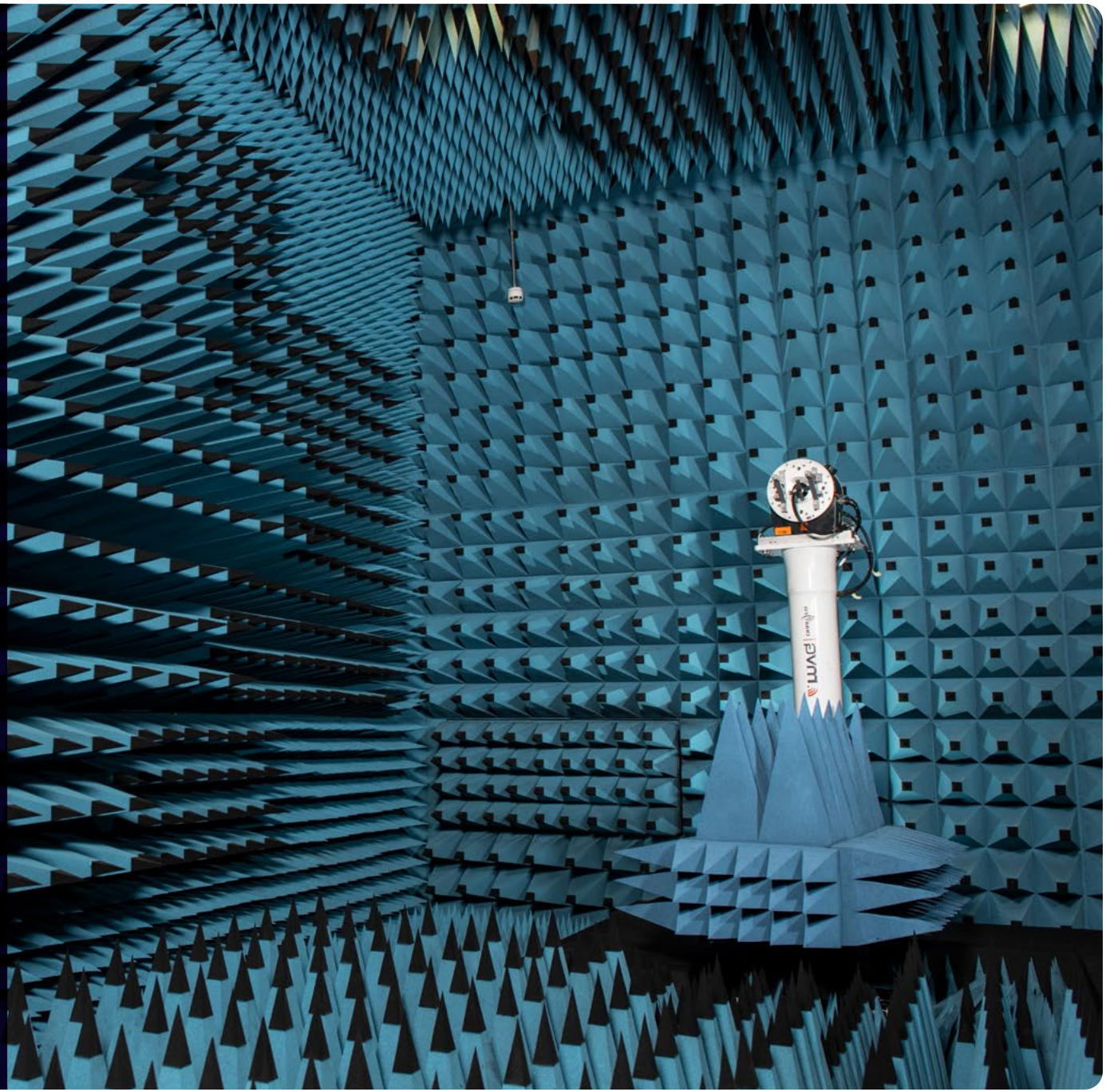
The next generation of tech companies spinning out from the UK's universities will drive the economy forward. This Entrepreneurial Impact Ranking highlights the value of continued investment in research and innovation to help them do this.

Find it fast

Why do spinouts matter?

The UK's universities punch far above their weight when it comes to research output. So how important is it for them to build spinout businesses too? According to industry leaders, investors and knowledge exchange professionals, there are a number of reasons to look beyond the core business of teaching and research.

"We are entering a very different economic phase driven by the 4th industrial revolution," says Mike Rees, author of the respected 'Independent advice on university-investor links'. "It is about how you adapt the value of the research for broader economic and social well-being."



Sean Fielding, Chairman of PraxisAuril, shares this view. He highlights the significant return on investment for the UK economy. "The data shows that for every £1 invested in research the government gets around £3.60 back in terms of economic benefit. The closer that investment is to market, the greater that economic benefit becomes."

Fielding also considers the awareness and profile that spinouts attract to be of great value to the UK's broader ecosystem of entrepreneurs, venture capital firms and universities. "Spinouts are very visible; they form one of the peaks of collaboration and partnership built up over many years."

But what does a 'successful' spinout look like?

Historically, opinion has been split on whether financial return or societal impact should be the priority. The academic community tends to be motivated more by societal impact, while the investment community is driven by financial returns. The most successful spinout companies offer both.

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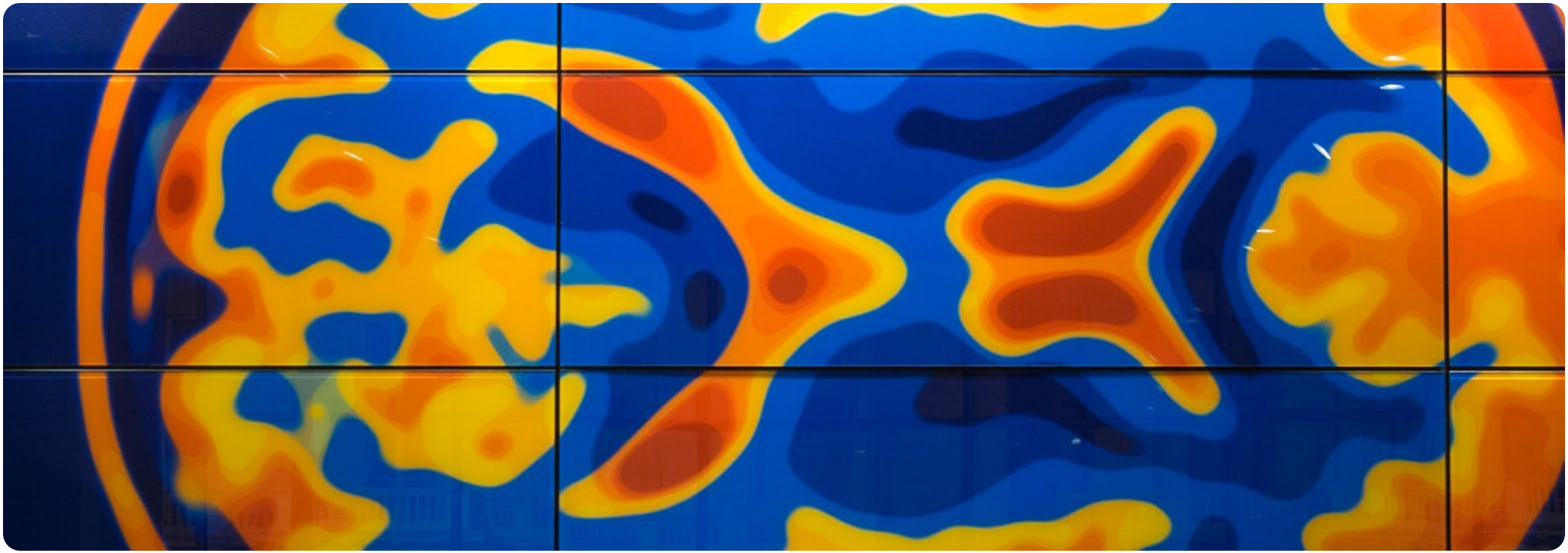
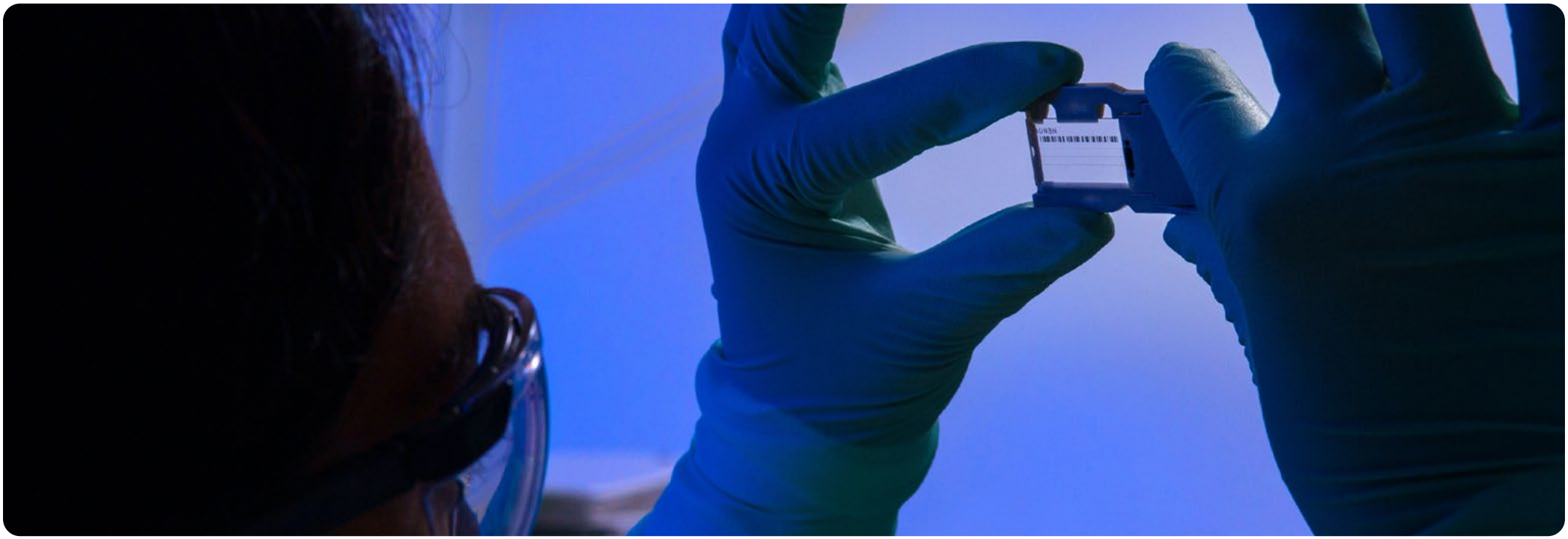
Brian McCaul, CEO of QUBIS and the Director of Innovation at Queen's University Belfast summarises how perspectives have evolved. "When I first showed up at QUBIS there were two camps with almost opposing views, one being we are here to make money, the other being we are here for good. There is a sweet spot in that we do both. We create good by creating quality jobs and companies that address some of the deficits in our economy. Along the line, we are also getting technology out to society and having an impact."





Spinouts vs Startups – what's the difference?

Both university spinouts and startups begin their journeys as early-stage technology companies. One of the key differences between them relates to who owns the Intellectual Property. Spinouts often have multiple 'inventors' because they draw on the technology, know-how or people that are owned or employed by universities. Since the technology has been created using university money, spinouts often have a hybrid ownership structure shared between the inventors and their universities. The technology is often extremely complex, and so spinout companies usually require intellectual property protection through patents.

That technical complexity can be a blocker for spinouts when it comes to finding investors. For one thing, building products from new technologies is capital-intensive. Furthermore, development cycles in the highly-regulated industries these spinouts service (like medical devices and pharmaceutical) are lengthy. That can put the timeline to exit in the decades, and make spinouts a risky proposition for all but the most specialised investors.

It can also be difficult to staff spinout teams. The skills required to harness and develop niche technologies are rare and highly coveted – especially by large corporations. Persuading the limited number of specialists to leave lucrative corporate contracts and join high-risk spinouts instead is a major challenge.

For these reasons, spinout companies are much harder to develop and scale than most startups. The lean start-up model of a few laptops, some Amazon Web Server space and a team of coders to build a product rarely applies to spinout companies. Startups will typically find it much easier to source staff and investment than spinouts, too.

The ranking

Methodology

The Entrepreneurial Impact Ranking (EIR) is calculated according to the most crucial indicators that influence spinout activity at universities. Disclosures, patents, spinouts created, and subsequent financial transactions associated with exits are those key metrics. Given the investor's perspective, exits of spinout companies are fundamental to how well universities perform in the ranking. The wide variation in resources available to each of the universities is taken into account and weighted according to the funding inputs received by each institution.

Building successful spinout companies to exit is a matter of patience as much as anything else. In recognition of this, The EIR employs the latest available data from a decade long-period (2009 to 2019), sourced exclusively from the Higher Education Statistics Agency. This approach emphasises long-term performance, meaning large movement up and down the ranking each year is much less likely.

Entrepreneurial Impact Ranking

*Movement in the ranking vs. last year

Rank	University name	EIR score
1 (~0)*	Queen's University Belfast	101.34
2 (~0)	University of Cambridge	95.53
3 (~0)	Cardiff University	82.39
4 (~0)	Queen Mary University of London	78.87
5 (+1)	University of Dundee	77.34
6 (-1)	University of Leeds	76.08
7 (+2)	University of Oxford	74.75
8 (-1)	University of Nottingham	73.03
9 (+2)	University of York	67.78
10 (-2)	King's College London	67.62
11 (-1)	Imperial College London	66.98
12 (+14)	University of Bristol	63.91
13 (-1)	University of Aberdeen	61.39
14 (+4)	University College London	60.15
15 (-2)	Royal Holloway, University of London	59.60
16 (-2)	Ulster University	58.98
17 (-2)	University of South Wales	58.56
18 (-2)	The University of Manchester	58.11
19 (-2)	Durham University	57.37
20 (+12)	University of Sunderland	57.05
21 (-1)	University of Glasgow	56.97
22 (-1)	University of Bradford	56.71
23 (-4)	University of Strathclyde	56.17
24 (-2)	University of Salford	55.47
25 (~0)	University of East Anglia	54.91
26 (-3)	University of Warwick	54.57
27 (+1)	University of Leicester	53.40
28 (+2)	Loughborough University	53.23
29 (-5)	University of Bath	53.21
30 (-3)	Glasgow Caledonian University	53.10
31 (+34)	University of Liverpool	52.11
32 (+22)	Nottingham Trent University	51.56
33 (-4)	University of Exeter	51.22
34 (-3)	University of Southampton	49.64
35 (-2)	University of Birmingham	46.19
36 (-1)	The Institute of Cancer Research	35.50
37 (-3)	Coventry University	35.49
38 (+31)	University of Surrey	33.92
39 (-1)	University of Plymouth	29.47
40 (-3)	Royal College of Art	29.20
41 (-2)	Oxford Brookes University	28.88
42 (-2)	Edinburgh Napier University	28.69
43 (-2)	St George's, University of London	28.46
44 (+14)	Bangor University	28.33
45 (-2)	University of Wolverhampton	28.33
46 (-4)	Staffordshire University	28.14
47 (+3)	Robert Gordon University	28.13
48 (-3)	Middlesex University London	27.98
49 (-5)	Royal Veterinary College, of London	27.96
50 (+2)	University of Hull	27.77

Entrepreneurial Impact Ranking

Rank	University name	EIR score
51 (-5)	Manchester Metropolitan University	27.75
52 (-3)	City, University of London	27.68
53 (+6)	University of the West of England, Bristol	27.61
54 (-6)	Aston University	27.53
55 (+6)	University of Central Lancashire	27.49
56 (-5)	Cranfield University	27.45
57 (-2)	De Montfort University, Leicester	27.38
58 (-5)	Brunel University, London	27.21
59 (+15)	University of the West of Scotland	27.17
60 (-4)	University of Kent	26.85
61 (-14)	University of the Arts, London	26.52
62 (-2)	The University of Edinburgh	26.38
63 (-6)	Falmouth University	26.21
64 (+11)	University of Huddersfield	25.92
65 (-3)	Heriot-Watt University	25.43
66 (-30)	The University of Sheffield	25.39
67 (+22)	Newcastle University	24.97
68 (-5)	Bournemouth University	24.87
69 (-2)	University of Hertfordshire	24.86
70 (-6)	Keele University	24.52
71 (-5)	Swansea University	24.05
72 (~0)	University of Sussex	23.14
73 (-2)	Aberystwyth University	22.95
74 (-6)	Lancaster University	22.48
75 (-2)	Liverpool John Moores University	21.95
76 (+10)	Northumbria University, Newcastle	21.76
77 (-7)	University of Reading	21.67
78 (+2)	Birmingham City University	19.72
79 (-2)	Sheffield Hallam University	19.12
80 (-4)	University of Portsmouth	18.99
81 (~0)	University of Greenwich	18.73
82 (+1)	The Open University	18.19
83 (+9)	University of Roehampton, London	18.00
84 (-2)	University of Westminster	17.93
85 (-1)	Birkbeck, University of London	17.89
86 (-8)	University of Essex	17.87
87 (~0)	London South Bank University	17.43
88 (-3)	Abertay University, Dundee	17.00
89 (-1)	University of Lincoln	16.30
90 (~0)	London Metropolitan University	14.48
91 (~0)	Anglia Ruskin University	13.75
92 (+1)	University of Brighton	12.89
93 (+1)	University of Northampton	11.63
94 (+2)	Newman University, Birmingham	9.95
95 (~0)	University of Bolton	9.94
96 (+3)	Goldsmiths, University of London	9.56
97 (+2)	University of Wales Trinity Saint David	9.18
98 N/A	Wrexham Glyndwy	8.05
99 (-2)	University of Bedfordshire	5.62
100 N/A	University of Stirling	4.79

Movement since last year

Queen's University Belfast (QUB) retained its top spot in the ranking, despite very competitive performances from several top 20 institutions. QUB's success emphasises the importance of quality of spinout – it consistently yields a high proportion of successful exits. QUB's most recent exit saw cyber security and data analytics spinout, Titan IC, acquired in April 2020 by Mellanox, an Israeli-American supplier of networking technologies.

The gap between 1st and 2nd place narrowed significantly this year – a testament to the growth of the spinout ecosystem. The University of Cambridge held firm in 2nd place, but both the Universities of Oxford and Cambridge had outstanding years. Sales of shares in spinout companies totalled £23.8 million and £18.8 million, respectively. As a result, the University of Oxford moved up 2 positions to 7th place.

According to Matt Perkins, CEO at Oxford University Innovation (OUI), the growth in availability of early stage internal funds has been critical to Oxford's success. "The key influencing factor which has spurred us on is the introduction of Oxford Sciences Innovation (OSI) and the £600 million that has been provided to support Oxford spinouts. That also encourages other investors to come in and support those spinouts. In the last 12 months, Oxford spinouts have received around £750 million of investment."

Recent success stories from the University of Oxford include Nightstar Therapeutics and Latent Logic. Nightstar Therapeutics, an ophthalmology spinout, was acquired for $800 million in June 2019. The buyer was American multinational Biogen; its goal is to develop a pipeline of gene therapies that could cure inherited conditions that lead to blindness. Latent Logic was

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acquired by Google subsidiary Waymo in December 2019. Latent Logic's expertise in imitation learning has potentially brought Google one step closer to self-driving cars, by helping machines learn directly from the actions of humans.

Beyond Oxbridge, there were also significant moves upwards from University College London (UCL) and the University of Bristol. Sales of stakes in their spinout companies amounted to £6.7 and £4.4 million, respectively.

UCL's high ranking is largely thanks to its world-leading expertise in genetics, and its spinout companies' propensity for listing on the NASDAQ. Autolus Therapeutics, Orchard Therapeutics and MeiraGTx all listed on the NASDAQ in 2018, raising $150 million, $200 million and $75 million, respectively. Freeline Therapeutics listed a little later with a NASDAQ IPO in 2020, raising $75 million.

A key win for the University of Bristol was the 2018 acquisition of KWS Bio Test. It was bought by US pharmaceutical firm Charles River Laboratories in a deal worth $20 million. Charles River was interested in KWS Bio Test's expertise in immunology, oncology, autoimmune and infectious disease-related diagnostics – areas where the laboratory is looking to grow its range of tools.

The University of Dundee pushed into the top 5 this year. Its core research strengths are in medical and computer sciences, and its most successful spinout combines both. Founded in 2012, Exscientia is a leader in the emerging field of AI-powered drug discovery. It raised $60 million in a series C round earlier this year, and ranked in the Sunday Times' Tech Track 100.

Deep dive – Queen's University Belfast

QUBIS is a wholly-owned subsidiary of Queen's University Belfast and the commercialisation arm of the university. Since being established in 1984, the company has been involved with the development of 90 plus spinout companies, with some high-profile exits and stock exchange listings such as Kainos, Andor Technology and Fusion Antibodies.

Understanding levels of interest from the market through customer discovery is at the heart of what QUBIS does and has been key to its success. "The majority of the seed deals that we consider have already been through a heavy-duty customer discovery process," says Brian McCaul, CEO of QUBIS and Director of Innovation at Queen's University Belfast. "We have answered questions along the lines of does anybody care? and is there some evidence that there is a problem out there that needs this type of solution or tech?".

This approach follows the general rule of speaking to at least 100 potential customers to validate thinking around product/market fit before moving forward. QUBIS has found that, given the demands on leading academics' time, it generally works far better to engage an early-career researcher such as a Postdoc or PhD to work on customer discovery.

McCaul also believes that a rigorous customer discovery process can play a huge role in reducing the perceived risk of joining a spinout. "If you haven't established some product/market fit, or you haven't got any evidence that people are going to buy this or it is an interesting solution, then why would anyone care about what

sort of equity they are going to get? Product/market fit is just as critical as terms on equity and salary for the calibre of people we want to develop our spinout companies commercially." This is clear evidence that commercial opportunity can play a huge part in helping to attract top talent even at the early stages of a spinout, which is a common challenge.

McCaul also explains that QUBIS tends to avoid directly advising on commercial strategy and prefers instead to focus on helping to understand product/market fit. "We never want to dictate what that go-to-market strategy is, because what do we know? We think it is much more about getting as many outside eyes on the technology and getting as many proxy yesses as possible as far as product/market fit. Once you have achieved that, it is about putting the right board of directors around the right entrepreneur to then develop the ideal go-to market and commercial strategies themselves."

Funding is another hurdle that QUB has been able to overcome, despite its distance from the UK's hubs of early stage funding in London and the South East. Invest Northern Ireland's early stage proof of concept funds have proven a valued source of investment. QUBIS also raises early stage funding from well-known sources such as HEIF and Innovate UK. An interesting differentiator is that QUBIS looks to more unconventional funding sources such as Equity crowdfunding. Spinout companies such as Re-Vana have successfully been able to raise finance through this channel.

From an investor's perspective, ownership structures of spinout companies can prove challenging, with many different parties present on the 'cap table', who should ideally all be aligned in building the company's value through the commercial exploitation of a technology. McCaul's team has tried to solve this problem by aligning ownership and incentive structures with direct contributions made to commercial development. "Our incentive scheme as far as equity ownership goes is dependent upon the contributions made towards the commercial development and growth of the spinout company. We have a nominal starting position whose terms progressively improve for the academic team depending upon how much of a contribution they have made towards the commercial development of the company."

In summary, QUB's focus on rigorous customer discovery at the earliest stages has helped the university build a track record of quality over quantity in terms of its spinout companies. The confidence that commercial leadership derives from this approach has also helped bridge the gap between risk and reward, which so many early stage spinouts find a challenge when going to market for commercial hires. That, combined with a creative approach to early stage funding, is yielding continued success with exciting opportunities such as Re-Vana, Cibus Analytical and Sonrai Analytics all securing initial seed funding deals this year.

An emerging blueprint for spinout success

Drawing on a series of interviews with investors and knowledge exchange professionals, this report has identified some of the common practices that successful institutions share. Customer discovery, product/market fit, funding, teams, and approaches to aligning incentives are recurring themes. When these critical factors combine in the right way, spinouts can be considered investor-ready.

Customer discovery

One of the most important proof points for investors is market validation. "The technology has to be de-risked to a certain degree, and one of the key indicators we look for as a guide to this is market traction" explains Zoe Chambers, Principal at Octopus Ventures. "It is unlikely to be something that we will look at closely until there has been some element of it being tested in the market."

Customer discovery can take many forms. Successful spinouts usually conduct discovery across a number of touchpoints. Those can include speaking directly to potential customers; working with alumni networks and advisory panels; housing incubators and innovation labs and hiring professional consultants. Spinouts might also engage with pioneering programmes such as ICURe, which is specifically designed to complete the customer discovery phase. For customer discovery to be effective, it has to be thorough. At minimum, spinouts should be looking to speak to 100 potential customers. Discovery processes should be delegated to those that can make the required time commitment, and understand the technology well enough to ask the right questions.

Building on programmes such as ICURe, an exciting wave of incubators and innovation labs are emerging to meet the challenge of developing new technologies commercially at their earliest stages. Unit DX and Engine Shed, both incubators for startups and spinouts in Bristol, are great examples of this. Funded and founded by Harry Destecroix off the back of his success at Ziylo (a University of Bristol spinout sold to Novo Nordisk for a reported $800 million), Unit DX is one of the great news stories in recent years, and an excellent example of self-sustaining ecosystems starting to take hold in the UK.

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Funding

"I worry about the availability of seed capital" says Mike Rees, author of 'Independent advice on university-investor links'. Seed funding is available thanks to government-led initiatives like HEIF, Innovate UK and the Research Councils. But additional sources of funding are often vital to help capital-intensive spinout companies on their journey from proof of concept through to growth, scale up and exit. The consistent theme among universities that successfully bridge the gap is creativity.

The emergence of large internal funds such as Oxford Sciences Innovation, which has been able to raise £600 million to support early stage spinouts coming out of the University of Oxford, are another significant step forward. The University of Cambridge has been similarly successful with Cambridge Innovation Capital, with many Russell Group universities such as UCL, Cardiff University and the University of Bristol now following suit with internal seed funding, albeit to a more modest extent.

Partnerships with investment funds can be another effective route to additional financing. UCL recently closed its Technology Fund 2 in partnership with Albion Capital and British Patient Capital, while the Royal College of Art has collaborated with Venrex Investment Management.

Increasingly, universities are turning to equity crowdfunding. This approach helps raise the coverage of fundraising amongst investors that would otherwise be challenging to reach out to.

The Royal College of Art has shown particular creativity and determination in its efforts to open new funding channels. It has built an angel investor network connected exclusively to the university. Nadia Danhash, Director of Innovation at the Royal College of Art, says "It was a hard slog to begin with, knocking on doors. Initially that's how it started, I think I got 40 people in the room and organised a company presentation event and since then it has grown. People now bring their friends along, who also want to join."

That network effect can also be utilised among alumni. The University of Manchester's Innovation Factory (Tech Transfer Office) recently launched the 'Ideas with Impact Partner Programme' for its alumni base. It helps fund scientific research as it transitions from the lab into the real world. This unique philanthropic setup offers alumni the opportunity to fast-track the application of scientific discovery aligned to one of three themes; healthy futures, an interconnected world and climate energy solutions. Under each theme, ten projects are handpicked by the Innovation Factory team, and donations spread across them. In return, donors are kept abreast of scientific developments as they happen. They're also given right of first refusal on future investment opportunities if those projects become companies. A trust structure ensures that a portion of any future returns generated off the back of the programme is fed back into the innovation machine.

A number of universities are now building their own networks and alliances through accelerators such as SETsquared, MICRA and the Northern Triangle. They allow universities to work together to grow the scale of opportunity required to justify an investment fund.

Spinouts can also increase their chances by rethinking the way they request funding. "A lot of people will come and request millions of pounds off the bat," says Nicola Broughton of Oskare Capital. "It is usually a little bit better to take £500k to prove the technology a little bit more and build your team incrementally. Some thought into what the journey looks like enables you to make the right risk-adjusted decisions accordingly."

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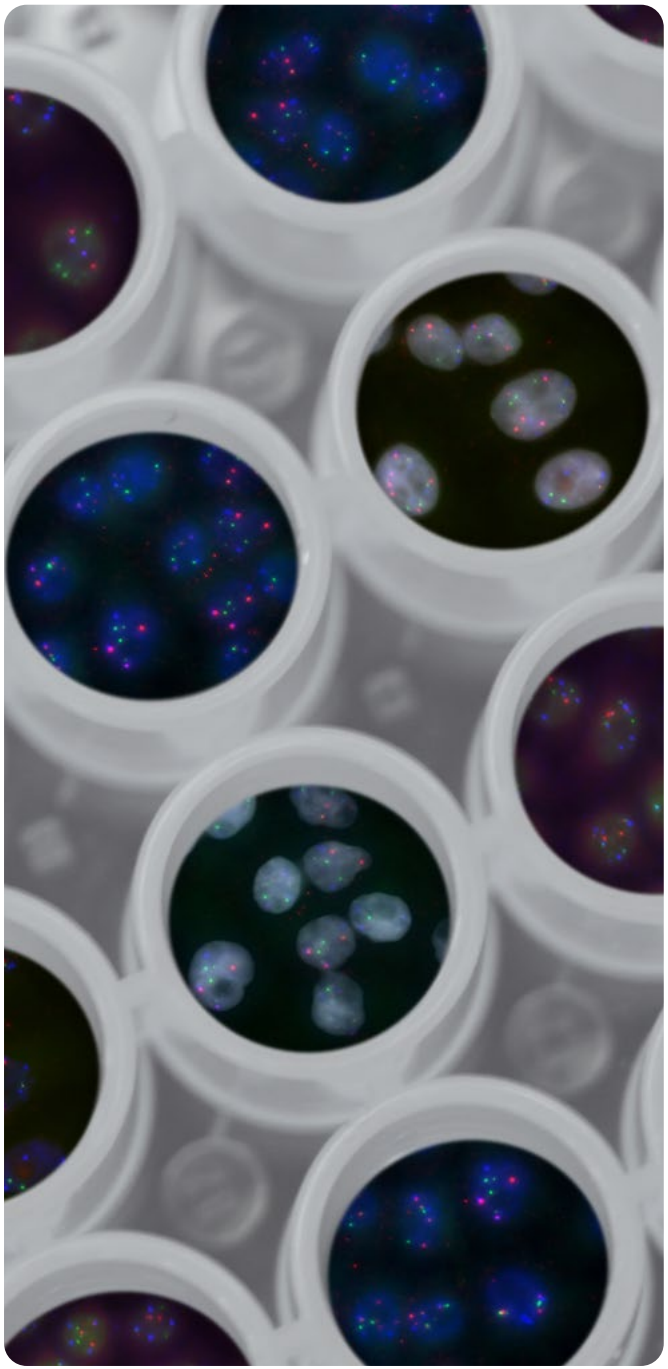

Talent, teams and alignment

Human capital is at least as important as financial backing, and there has been much debate about how to improve the availability of the technical entrepreneurs and experienced commercial leaders needed to build spinout companies.

Working with early-career researchers (like PhD and Postdoctoral students) is one way to address the shortfall. They can be drafted in during the early stages to support customer discovery – an approach that's had resounding success for programmes such as ICURe and is gaining traction at a number of universities.

Cancer Research UK is working with external incubators and accelerators to augment the tech talent pool for spinouts. The initiative is led by Chief Business Officer Tony Hickson. "Cancer Research UK has embarked upon a programme to get more people involved in entrepreneurship, and that is the intention of our partnerships with a number of accelerators such as with Panacea and Deep Science Ventures"

But growing the talent pool only solves one part of the problem. The other challenge spinouts face is in building the quality teams critical to their success. "Fundamentally, a team is the best thing to de-risk your opportunity's future chances of success" says Zoe Chambers of Octopus Ventures. "If you accept that there is a big enough market and this novel technology has a use somewhere, then it is all about who is in place to take the steps to make it successful."

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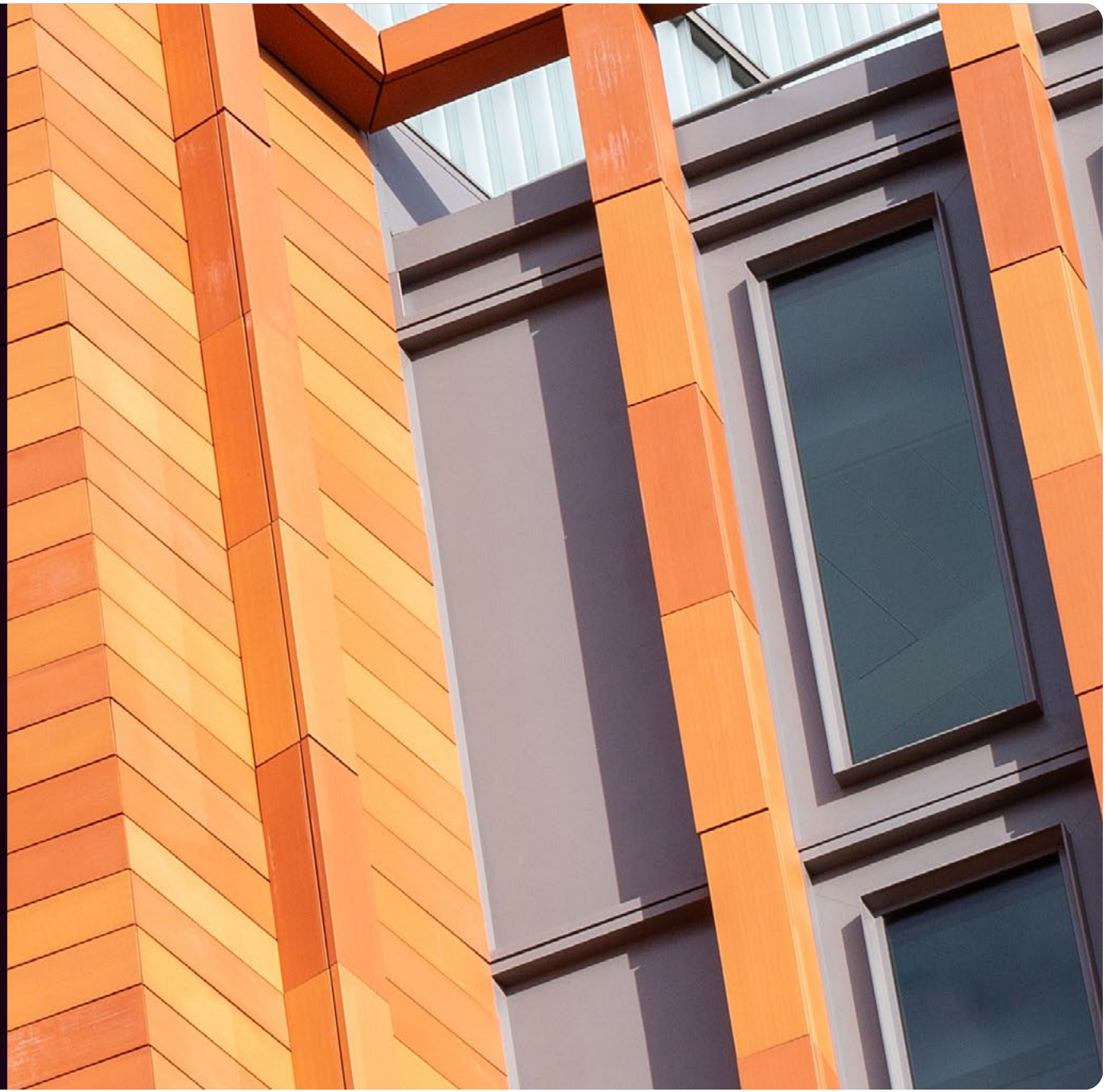
Spinouts can encourage commercial leadership to commit to early stage spinout opportunities by ensuring the right incentives and opportunities for ownership are in place. The profile of skills required in a spinout company evolves as it progresses. Very early stage teams are heavily weighted towards technical expertise, whereas more commercially-focused teams are required later on. For that evolution to be seamless, it's important to align incentives through the ownership structure. Some of the best performing universities in the EIR take a significant stake in their spinout opportunities at an early stage. They then reduce that level of ownership according to contributions made at each stage of development. This is often achieved by giving ownership in the company (through equity or options) to employees, based on their achieving specific milestones. These might include showing a proof of concept product, raising early stage funding, or engaging with foundational clients.

Conclusion

The economic and societal benefits of building spinout companies are clear. Spinout companies create jobs and are an excellent channel for ground-breaking technologies to have a positive impact on our lives. Investor interest in deep tech companies continues to grow as exciting new technologies such as machine learning mature, and their range of applications continues to extend. These prevailing trends are expected to continue, and in turn increase interest in spinout companies.

The Entrepreneurial Impact Ranking shows the impressive progress that university spinouts are making. 2018-19 was a record year for universities in terms of their exits. A diverse range of successful companies was produced, with specialisms spanning from genetics to robotics.



Recommendations

This report has identified similarities in best practice that most effectively support the generation and growth of successful spinout companies. These have been distilled into six core recommendations.

Customer discovery: Make this a foundational part of the process at the earliest stages. Delegate the process to those with the technical knowledge and time to do it properly. The minimum criteria for success should be at least 100 detailed conversations with potential customers.

De-risk technology and teams: Think not only about de-risking a proposition via the proof of concept and prototyping stages, but also by virtue of the people and skills you are able to attract to be a part of the spinout company. Where possible, bring in individuals to help academics understand what great looks like when it comes to hiring. Similarly, leverage alumni networks to find relevant skills and experience.

Align incentives for different skill sets and development phases: Different skill sets will be required at different stages in the life of a spinout company. Typically, technical expertise is important in the early stages, and commercial knowledge later. Ownership structure and incentives should be aligned so that the spinout is as attractive as possible to the right people at the right time.

Milestone-based valuations and fundraising: Think about the value of a spinout in terms of its current stage and future risks. Value will increase incrementally as milestones are met and risks mitigated. Spinouts should raise funds according to how much money is needed to reach the next milestone – not how much is needed to see them through the whole lifecycle.

Get creative on fundraising: Try to leverage all sources of funding available, whether that be philanthropic donations from alumni or other interested parties, crowdfunding, angel networks, charitable foundations and trusts or family offices and corporate venture funds. There are examples of all the above sources of funding playing a role in the early stage funding of spinout companies.

Build scale through alliances: These could be through inter-university alliances such as SETsquared, MICRA and the Northern Triangle, but also through collaborations with incubators such as Unit DX, as well as angel networks, venture capital funds and corporate partnerships. Each of these alliances can add significant value to spinout companies in different circumstances.

Deep tech trends – An investor's perspective

Zoe Chambers,
Principal at Octopus Ventures

AI-related technologies currently dominate deep tech investments. There were 451 AI-related deals in Europe through 2019, attracting $4.9 billion in investment. The UK is a global leader in the field, with universities like UCL, Imperial and Cambridge producing thousands of highly-skilled PhD students each year.

But AI isn't just one thing. It's a diverse and extensive field of technologies with applications across a range of sub-sectors. It's an investor's job to figure out which of those are most interesting. "Natural language processing (NLP) is starting to come into its own as a sub-area of deep learning" explains Zoe Chambers, Principal at Octopus Ventures. "Taking deep learning to the next level, you have areas such as robotics that are integrating across disciplines. The outcome of that is companies are working on training robots to quickly recognise and manipulate objects in a very general way, without having to retrain for every single object and every single task. Developments like this are a high priority."

Simon King (PhD),
Partner at Octopus Ventures

The UK's universities are also at the forefront of Quantum Computing. Centres of excellence exist at UCL, Bristol University, Edinburgh University, Oxford University and Cambridge University, with a plethora of others poised to follow suit. The technology is still in its relative infancy, however. "Despite claims by the tech giants of quantum supremacy (building a machine that outperforms its classical counterpart), right now, there is no clear front-runner and we are still years away from the 'quantum revolution'" says Simon King, Partner at Octopus Ventures. "Because of the complexity of Quantum Computing and cutting-edge nature of the technology, the bulk of early stage companies in the space are spinouts from Universities." Several university spinouts are now racing to create the first general-purpose quantum computer, and that's exciting for investors. "The cutting edge of quantum development remains very thin and it's a close-knit community", explains King. "As investors, we're keen to be as supportive as possible to the individuals and teams who will bring about the next technological revolution."

Uzma Choudry (PhD),
Octopus Ventures'
Future of Health team

Life and medical sciences are another strength. The UK ranks 3rd globally in life sciences research, just behind the USA and China. Uzma Choudry, an investor with Octopus Ventures' Future of Health team, has a clear idea of what a promising life sciences spinout looks like. "From a platform and tech perspective, we are looking at gene editing technologies, so things like CRISPR-Cas. We are also interested by microbiome editing, as there are a lot of companies right now that are finding their initial applications of gene editing in the microbiome space. There is a lot of exciting activity around the synthetic biology space with applications spanning from health and environment through to industrial biotech."

Outside the relatively linear world of pharmaceutical-related therapeutics, the general trend is for the most innovative deep technology companies to combine a variety of technologies in new and almost counter-intuitive ways. As the availability of data and robotics continues to grow, machine learning and artificial intelligence are increasingly moving away from being standalone technologies, and are now being incorporated into everything from diagnosing cancers through to speech recognition and harvesting crops. The direction of travel for smart investment capital is following a similar trajectory.

Interdisciplinary innovation is the way forward, and many funds are already there.

Authors

Octopus Ventures

Octopus Ventures, part of Octopus Group, is one of the largest and most active VCs in Europe, with £1.3 billion under management. Our investment team is focused on investing in the areas we believe have the potential to change the world.

One such area is deep tech, and we know that in this space, really significant advances are happening, slowly and quietly, in university laboratories and research centres. We believe that celebrating and investing in these world-class institutions will play a vital role in shaping the fourth industrial revolution.

octopusventures.com

Ideas 2 Impact

Octopus Ventures worked with Ideas 2 Impact (i2i) on this research. An innovation and fundraising consultancy, i2i helps organisations raise funds for research and commercialisation, as well as putting together pathfinder teams for the development of new spinout companies.

i2i's founder Alisdair Jones has worked with universities for over a decade, both investing in early stage research-based companies and producing research on the UK's early stage ecosystem. This is alongside promoting the research portfolios of over 500 universities across 40 countries.

i2impact.org

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