

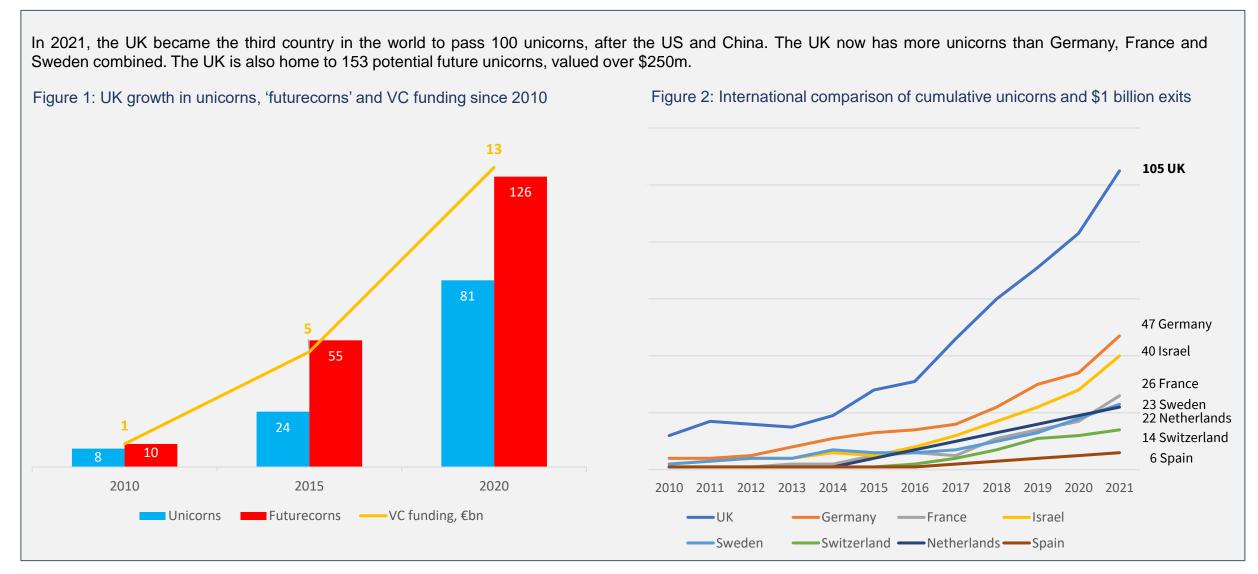
# PRIME MINISTER'S COUNCIL FOR SCIENCE AND TECHNOLOGY

INCREASING THE AVAILABILITY OF SCALE-UP INVESTMENT FOR DOMESTIC INNOVATIVE SCIENCE AND TECHNOLOGY COMPANIES

Evidence pack

Data correct as of 06/10/2022

## UK start-ups & investments grew 10x in the last decade

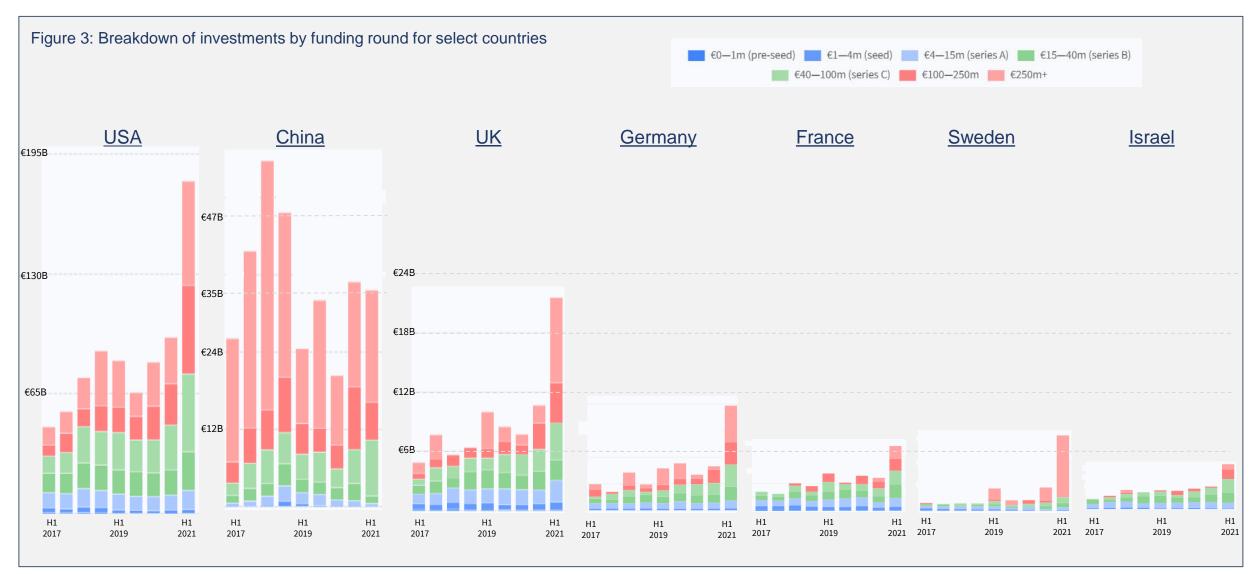


## The UK is 'top 3' for unicorns in almost every sector

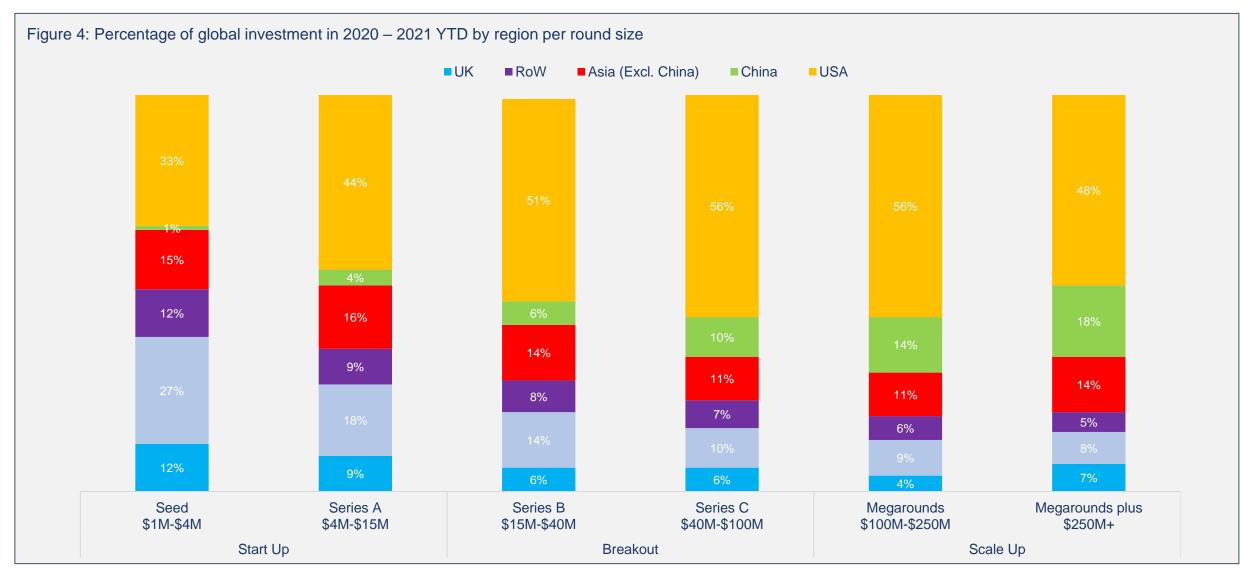
	USA	China	UK	India	Germany	Israel	France
Unicorns and \$1B+ exits	1,000	281	105	49	46	40	26
Fintech	183	36	37	14	7	4	6
ecommerce	177	85	31	30	26	4	11
Deep tech	294	69	21	5	5	19	4
Enterprise Software	316	28	17	5	8	11	3
Health	173	30	13	2	4	5	3
Food	42	26	7	5	5	0	0
Transportation	70	63	7	6	7	6	1
Energy	37	15	4	0	0	1	1
Travel	11	5	3	1	5	0	1
Marketing	88	12	1	4	4	5	3

Source: Dealroom

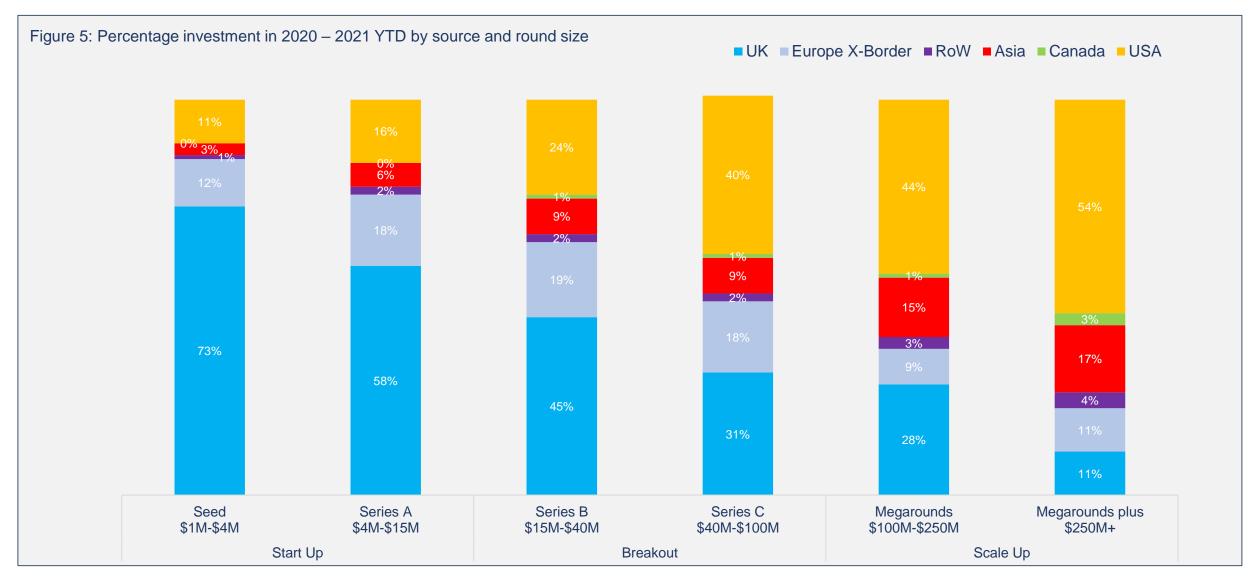
# Despite being third in the world for VC investment, the UK is proportionately weak at scale up (over €100m), particularly in comparison to the USA and China



# Comparing the fraction of global investments by stage, US investments are 3.6x larger than UK at early stage, increasing to 9.45x at scale up



# Due to the lack of domestic growth capital most of the investment for UK R&D intensive companies above \$100m is from international sources



# Issues to address (1): experience from asset owners

The issues below were raised during an asset owner roundtable hosted by CST, comprising of senior delegates from pension funds, insurers, and endowments. This is a summary of themes intended to inform policy discussion and does not represent formal consultation.

#### **Culture and human capital**

- a. The approach to S&T investment is focussed on the long-term benefits and is countercultural to existing investment culture. Once the environment is created and starts to become successful, it needs supporting and protecting.
- b. Investment culture comes from the top diversity at board level could support cultural change. Further government engagement with regulators and other partners on diversity standards for investor and asset owner boards could help to ensure institutions have diverse representation and skills to maintain a focus on long term performance for beneficiaries.
- c. Specialist investing skills If you want to attract the best talent, you need to pay them. The focus should not just be about keeping admin costs down. There is a lack of incentives for investment in S&T businesses to scale-up. Pension funds do not have sufficient flexibility on fees to enable them to attract the specialist skills they need for impact investing.
- d. The level of commercial acumen in deep tech companies is much lower than in other areas. Do we lack commercially minded academics in the UK?

#### **Funds**

- a. Government should focus on incentivising scale. There are not many late-stage growth funds in the UK (compared to USA). Nobody is doing 'venture growth'. UK needs a scale up equivalent of the British Business Bank, run by people who understand how to do investing for growth and impact.
- b. Government needs to be ready to support 'leap of faith' investments that align with national goals.

#### **Engage and convene investors**

- a. There is a need for a sustained programme of engagement with clear messages from government on opportunities around national goals.
- b. The UK's S&T strengths need to be better promoted to investors with specific emphasis placed upon emerging UK S&T companies and sectors. Put the spotlight on role models in the tech space who have commercialised their research and publicise where investment has been fruitful.
- c. S&T companies solve problems and deliver social outcomes: sustainability, energy security, health, addressing inequality. This is a powerful way of framing S&T proposition to investors, which aligns with increasing interest in ESG investment opportunities.

# Issues to address (2): experience from business

CST members and secretariat reviewed the experience of more than 30 UK and US businesses as a pilot study to explore the comparatively low rates of scale up investment for innovative UK S&T companies and understand what factors influence the culture and behaviour of funders. Interviews centred on what challenges S&T companies had faced in accessing scale up investment in the UK compared to international competitors, and experiences of scaling their company in the UK.

The following issues and suggestions were raised during interviews with companies:

- a. There remain barriers to early-stage investment in innovative S&T companies, including university spin-outs. Universities and public sector funders have not adequately explored how to strengthen the business management expertise of UK S&T company founders to improve the potential for spin-outs to scale-up.
- b. Government should explore tax as a lever to encourage domestic and international investment in S&T scale ups and the establishment of growth funds in the UK. In addition, R&D tax credits should be targeted to drive the S&T priorities identified by government and better promote UK-based R&D.
- c. There is a lack of specialised innovation infrastructure for testing, experimentation and large-scale manufacturing. This creates a challenge for some companies when engaging investors on the long-term plans for the commercialisation of their technologies, and leads to a greater proportion of companies needing to test and manufacture abroad. There is an opportunity for government to engage investors and support the prioritisation of investment in infrastructure to support UK companies commercialising technologies of national importance.
- d. There are vast differences in the expertise and experience of UK and US investors (S&T expertise and experience scaling successful businesses). Human capital development for UK investors, as well as ensuring talent on UK company boards, is critical.

We provide case studies of UK/US comparisons in specific technology areas in the following slides. We gratefully acknowledge the support of Margaret McLeod at MIT for her support on interviews and analysis.

## UK/US Twins Funding Experiences – Pilot Study

## Differences in the funding experiences of UK/US twins

On average, US twins received more than 2.5x more capital\* than their UK counterparts, with a greater number of funding rounds.

- The median funding received by US twins was £162m and £45m for UK twins.
- The mean number of funding rounds for US twins was 5 compared to 4.2 for UK twins.
- Science-based twins attracted more capital and more funding rounds than those in high technology sectors.

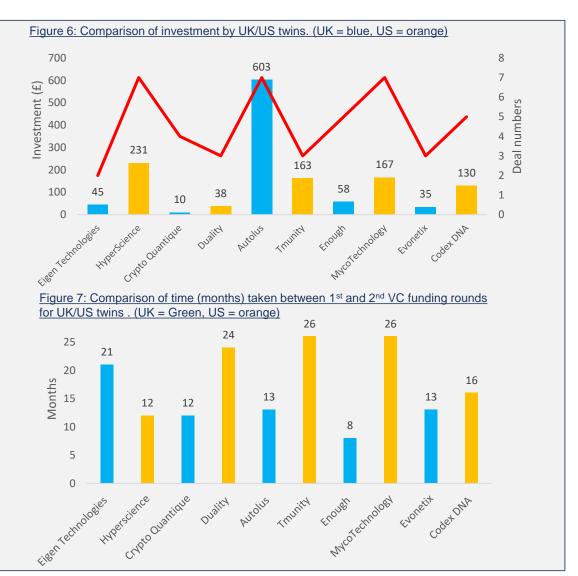
It took US and UK twins a similar amount of time between receiving their first and second VC investment rounds, but US second round VC funding was a third bigger by value.

- On average, it took UK twins 16 months between their first and second funding rounds. US twins had a similar experience, taking 18 months between first and second rounds.
- The median deal size for second round funding for US companies was £14m. UK twins received a third less funding, with a median deal of £10.5m.

On average, UK twins had to wait 5 months longer between their second and third funding rounds.

- Of the 5 UK twins presented in this analysis, only 3 received a 3<sup>rd</sup> VC funding round, while 4 of 5 US companies received a 3<sup>rd</sup> round.
- UK twins had to wait longer than US twins on average (18.5 months vs. 13.5months) between their 2<sup>nd</sup> and 3<sup>rd</sup> funding rounds.

Further work could dive deeper to look into US and UK funding comparisons of all the earlystage companies in the tech sectors, to gain greater confidence in comparing the UK and the US.



## 'Twins' case study: Oxbotica vs Aurora

Founded in 2014 Headquartered in Oxford, United Kingdom



Oxbotica is an autonomous vehicle software company formed as a spin-out from Oxford University's Mobile Robotics Group by Professor Paul Newman (BP Professor of Information Engineering at University of Oxford) and Professor Ingmar Posner (Professor of Engineering Science, Applied Artificial Intelligence, at the University of Oxford).

To date, Oxbotica has raised a total of \$114.5m over 5 funding rounds.

Their latest funding was raised in April 2021 from a Series B round led by Ocado Group, as part of a partnership on hardware and software interfaces for autonomous vehicles. Those that have invested in Oxbotica typically invest in IP-rich, R&D intensive sectors; three of these investors have headquarters outside the UK (Tencent, Hostplus and Venture-Science).

Date	Funding round	No. of investors	Money raised	Lead investor
Apr 2021	Series B	1	£10m	Ocado Group
Dec 2020	Series B	8	£38.3m	BP Ventures
Jun 2019	Series A	3	£12.5m	IP Group Plc
Sep 2018	Series A	3	£7.7m	IP Group Plc
Apr 2017	Grant	1	£13.5m	Innovate UK
Nov 2014	Seed	1	£100k	Oxford University Innovation

Founded in 2016 Headquartered in California, United States



Aurora is an autonomous vehicle software company founded by Chris Urmson (former CTO of Google's self-driving car team and technology director for Carnegie Mellon), Sterling Anderson (former Director of Tesla Autopilot), and Drew Bagnell (former autonomy architect at Uber Advance Technology centre).

To date, Aurora has raised a total of \$1.1bn in funding over 5 rounds. Their latest funding was raised in December 2020 from a Corporate Round. Aurora is funded by 15 investors, Uber and Millennium Technology Value Partners are the most recent investors.

Aurora has acquired 3 organisations: Blackmore Sensors and Analytics in May 2019; Uber Advanced Technologies Group in December 2019; and OURS Technology in February 2021. In July 2021, Aurora announced plans to go public and merge with special acquisitions company Reinvent Technology Partners. The deal represents an equity value of \$11bn for Aurora, and the combined company will be valued at \$13bn.

Date	Funding round	No. of investors	Money raised	Lead investor
Dec 2020	Corporate	1	\$400m	Uber
Aug 2019	Series B	1	-	-
July 2019	Series B	1	\$70m**	Hyundai Motor Group
Feb 2019	Series B	13	\$530m	Sequoia
Feb 2018	Series A	2	\$90m	Greylock, Index Ventures
Mar 2017	Seed	-	\$3m	-

Figure 8: Comparison of investment in Aurora and Oxbotica at different funding rounds



- Analysing the investment received by both Oxbotica and Aurora in the first five years of being founded highlights significant differences in the scale of investment between the UK and US.
- Oxbotica has received substantially smaller rounds of funding compared to Aurora, with a greater length of time between investment rounds. Oxbotica has raised a total of \$94.7m through series A and B funding rounds, compared to Aurora which has raised over \$1bn through series A and B funding rounds.

<sup>\*</sup> Oxbotica funding has been converted from GBP to USD for comparison (09/09/2021) \*\* Due to limited data the \$70m attributed to July 2019 may include funding from Aug 2019

## 'Twins' case study: Eigen Technologies vs Hyperscience

#### Founded in 2015 Headquartered in London, United Kingdom

**Eigen**Technologies

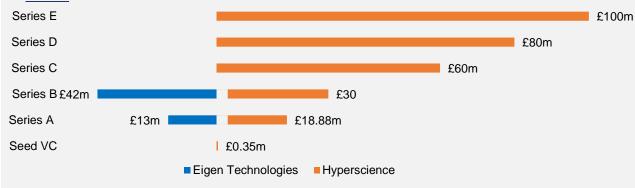
Eigen Technologies is a research driven AI company which specialises in nonperforming loans (NPL) for businesses in finance, law and professional services. The company was founded by Lewis Lui (Physicist and former McKinsey business analyst) and Jonathan Feuer (former managing partner at CBC Capital).

To date, Eigen Technologies has raised a total of £45m over 2 funding rounds.

Their latest funding was raised in March 2020 from a Series B funding round which was led by Lakestar and Dawn Capital.

Date	Funding round	No. of investors	Money raised	Leadinvestor
Mar 2020	Series B	1	\$5m	ING Ventures
Nov 2020	Series B	4	\$37m	Dawn Capital, Lakestars
Jun 2018	Series A	2	\$13m	GS Growth, Temasek Holdings

## Figure 9: Comparison of investment in Eigen Technologies & Hyperscience at different funding rounds



#### Founded in 2014 Headquartered in New York, United States

(h[s])<sup>®</sup>

Hyperscience develops AI-based enterprise software designed to automate office work processes through using machine learning to streamline complex processes automatically and increase productivity. The company was founded Peter Brodsky (former Director at SoundCloud), Vladimir Tzankov (R&D lead at Instinctiv) and Krasimir Marinov (former Backend Software Engineer)

To date, Hyperscience has raised a total of £289m over 14 funding rounds.

Their latest funding was raised in January 2022 from a Series E II funding round which was lead by Gaingel.

Date	Funding round	No. of investors	Money raised	Lead investor
Jan 2022	Series E II	1	-	Gaingel
Dec 2021	Series E	1	£100m	Bessener Venture Partners
Dec 2020	Incubator V	1	-	Plug and Play Accelerator
Oct 2020	Series D	1	£80m	Tiger Global Management
Sep 2020	Incubator IV	1	-	Plug and Play Accelerator
Jun 2020	Series C	4	£60m	Bessener Venture Partners
Mar 2020	Incubator III	1	-	Plug and Play Accelerator
Feb 2020	Incubator II	1	-	Decode Accelerate
Jan 2019	Incubator	1	-	FinTech Innovation Lab
Jan 2019	Series B	8	£30m	Stripes
Dec 2016	Series A – III	2	£8m	Felicis Ventures
Jul 2015	Series A – II	9	£880k	-
Jul 2015	Series A	7	£10m	First Mark
Dec 2014	Seed VC	1	£350k	Slow Ventures

 Eigen Technologies and Hyperscience raised similar amounts over series A and series B funding rounds. Hyperscience was able to secure a further £240m through Series C – E funding rounds.

## 'Twins' case study: Crypto Quantique vs Duality Technologies

#### Founded in 2015 Headquartered in London, United Kingdom



Crypto Quantique focuses on combining quantum technologies with modern cryptography to develop next-generation hardware and software products to future proof cyber security solutions. It was co-founded by Dr Shahram Mossayebi (PhD in Post-Quantum Cryptography from Royal Holloway University) who has published several scientific papers on the security of modern cryptosystems against quantum adversaries and Dr Patrick Camilleri (PhD in microelectronics engineering and complex systems from Otto-bon-Guericke University) who was formally a Phillips semi-conductor IC designer.

To date, Crypto Quantique has raised £19m from UK grants/seed funding and a €2.2m grant from the European Commission.

Their latest funding was raised in September 2019 from a seed funding round led by Entrepreneur First.

Date	Funding round	No. of investors	Money raised	Lead investor
Jul 2020	Grant	1	£300k	Innovate UK
2019	Grant	1	€2.2m	EU Innovation Council
Sep 2019	Seed Round	2	£8m	Kim Ventures
Sep 2018	Seed Round	-	£1m	-
Sep 2016	Grant	1	£10m	Entrepreneur First

#### Founded in 2016 Headquartered in New York, United States



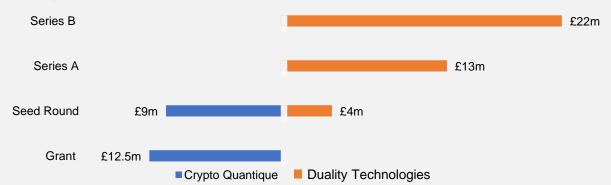
Duality Technologies enables organisations to securely collaborate on sensitive data via operationalising Privacy Enhancing Technologies and enables secure analysis and AI on encrypted data. Dr Alon Kaufman (formally RSA's global director of Data Science and Innovation founded Duality Technologies) founded the company alongside three individuals with technical science backgrounds (and one former VC general partner who specialises in hi-tech companies).

To date, Duality Technologies has raised a total of £39m in 3 declared funding rounds.

Their latest funding was raised in July 2021 from a Series B funding round led by LG Technology Ventures. All of the investors were based in North America apart from one which was based in Israel.

Date	Funding round	No. of investors	Money raised	Lead investor
Sep 2021	Incubator	1	-	Plug and Play Accelerator
Jul 2021	Series B	7	£22m	LG Technology Ventures
Oct 2019	Series A	5	£13m	Heast Ventures
Oct 2017	Seed	1	£4m	Team8

## Figure 10: Comparison of investment in Crypto Quantique and Duality Technologies at different funding rounds



 Crypto Quantique obtained a higher seed funding round compared to Duality Technologies, £9m and £4m respectively. Duality Technologies went on to raise a total of £25m through Series A and Series B funding rounds, whereas Crypto Quantique have not secured any further funding.

Source: Pitchbook

## 'Twins' case study: Autolus vs Tmunity

#### Founded in 2014

Headquartered in London, United Kingdom



Autolus are developing the next generation of CAR-T cell therapies targeting both haematological cancers and solid tumours. Autolus was founded upon the work of Dr Martin Pule (senior haematology lecturer at UCL) and was spun-out of University College London in 2014.

To date, Autolus has raised a total of £632m over 7 funding rounds.

Their latest funding was raised in November 2021, the lead investor was Blackstone Life Sciences. Autolus listed on NASDAQ in June 2018.

Date	Funding round	No. of investors	Money raised	Lead investor
Nov 21	PIPE	1	£183m	Blackstone Life
Jan 2020	IPO (2 <sup>nd)</sup>		£61m	-
Apr 2019	IPO (2 <sup>nd)</sup>	-	£77m	-
Jun 2018	IPO		£77m	-
Sep 2017	Series C	6	£80m	Syncona Partners
Mar 2016	Series B	5	£60m	Arix Bioscience
Jan 2015	Series A	1	£30m	Syncona Partners

#### Founded in 2015 Headquartered in Philadelphia, United States



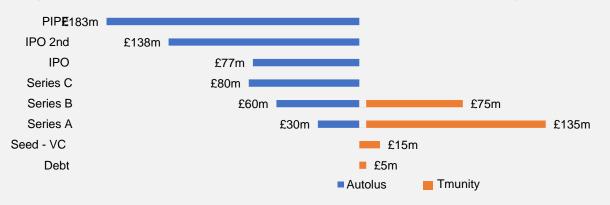
Tmunity Therapeutics are developing novel products which will utilise the immunological potential of T-cells to treat a wide range of diseases. The company was founded by Carl June (Professor in Immunotherapy in the Department of Pathology and Laboratory Medicine) and four other individuals who are all professors in biomedical sciences at the University of Pennsylvania.

To date, Tmunity has raised a total of £230m over 6 funding rounds.

Their latest funding was raised in October 20219 from a Series B funding round.

Date	Funding round	No. of investors	Money raised	Lead investor
Oct 2019	Series B	10	£75m	-
Apr 2018	Series A – II	4	£35m	-
Mar 2018	Series A	6	£100m	-
May 2016	Seed VC - II	-	£5m	-
Dec 2016	Seed VC	2	£10m	-
Dec 2015	Debt	-	£5m	-

#### Figure 11: Comparison of investment in Autolus and Tmunity at different funding rounds



 Analysing the investment received by Tmunity and Autolus over the last 7 years highlights how Autolus raised significantly more overall compared to Tmunity. The life sciences sector was the only sector within our research sample in which the UK company raised more in total than the US equivalent. Autolus went on to obtain a further £80m through a Series C funding round before listing on NASDAQ in June 2018.

## 'Twins' case study: ENOUGH vs MycoTechnology

#### Founded in 2015 Headquartered in Glasgow, United Kingdom



ENOUGH uses the natural process of fermentation to produce mycoproteins for a range of food products such as burgers and noodles. ENOUGH formed as a spinout of Strathclyde University and was founded by three chemical engineers with over 25-years experience in the food industry: Jim Laird (formally Managing Director of Value Creation Partners), David Ritchie (ICI Chemical Engineer), and Craig Johnson (former industry director of CMAC Future Manufacturing Research Hub).

To date ENOUGH have raised £78m over 3 funding rounds.

Their latest funding was raised in June 2021 from a Series B funding round led by Nutreco and Olympic Investments.

Date	Funding round	No. of investors	Money raised	Lead investor
Jun 2021	Series B	4	£36m	Nutreco and Olympic Investments
Jul 2019	Grant	1	£16m	Horizon 2020 SME Instrument
Apr 2018	Series A	3	£6m	Scottish Enterprise
Nov 2017	Grant	1	£70k	Innovate Uk
Jul 2017	Seed	2	£160k	Scottish Enterprise

#### Founded in 2013 Headquartered in Great Denver Area, United States



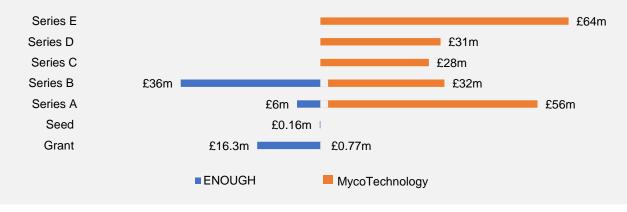
MycoTechnology is a food ingredient company that uses fungi-based food processing platforms to create novel ingredients such as meat analogue substitutes and fermented protein. Out of the four original founders, Jim Langan and Brooks Kelly (fugus scientist from Pennsylvania State University) have a scientific background and Alan Hahn and Peter Lubar have a background in business working in Silicon Valley.

To date, MycoTechnology have raised £208m over 6 founding rounds.

Their latest funding was raised in March 2022 from a Series E round led Oman Investment Authority.

Date	Funding round	No. of investors	Money raised	Lead investor
Mar 2022	Series E	14	£64m	Oman Investment Authority
Jan 2021	Series D	13	£31m	Evolution VC
Nov 2020	Grant	1	£770k	Syngenta
Jan 2019	Series C	7	£23m	Cibus Fund
Dec 2018	Series C1	-	£5m	-
Oct 2017	Series B	10	£32m	Bunge Ventures
Jul 2015	Series A	9	£56m	S2G ventures

#### Figure 12: Comparison of investment in ENOUGH & MycoTechnology at different funding rounds



• ENOUGH received a substantially smaller Series A funding round compared to MycoTechnology who were unsuccessful in securing funding. ENOUGH has raised a total of £42m through Series A and B funding rounds, compared to MycoTechnology which has raised £88m through Series A and B funding rounds. MycoTechnology also went on to secure a further £123m through Series C – E funding rounds.

Source: Pitchbook

## 'Twins' case study: Evonetix vs Codex DNA

#### Founded in 2015 Headquartered in Cambridge, United Kingdom

Jan 2018

evonetix Founded in 2013

DCVC & Molten

**CODEX DNA** 

Evonetix are developing a desktop DNA synthesis platform which provides the ability to quickly synthesise DNA accurately and at scale. The company was primarily founded by Matthew Hayes (former CTO of the global MedTech division at Cambridge Consultants). The other five members of the founding team also worked at Cambridge Consultants and possess a diverse range of experiences in finance, marketing, comms and business development.

To date, Evonetix has raised a total of £43m over 3 funding rounds.

Series A

Their latest funding was raised in March 2020 from a Series B round led by Foresite Capital, all 3 of the Series A investors also invested at Series B.

Date	Funding round	No. of investors	Money raised	Lead investor
Mar 2020	Series B	9	£30m	Foresite Capital
Jul 2018	Grant	1	£1m	Innovate UK

£12m

Headquartered in San Diego, United States

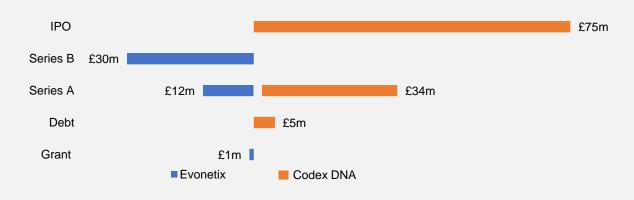
Codex DNA provides the tools needed for the designing, coding and creation of synthetic DNA. The company was founded by Todd Nelson (former CEO of Discover X and MP Biomedicals) and Daniel Gibson (Principle Scientist at Synthetic Genomics Inc.)

To date, Codex DNA has raised a total of £114m over 4 funding rounds.

Their latest VC funding was raised in December 2019 from a Series A funding round, led by the Participation Fund and Northpond Ventures. In June 2021, Codex DNA listed on the NASDAQ stock exchange.

Date	Funding round	No. of investors	Money raised	Lead investor
Jun 2021	IPO	-	£75m	NASDAQ stock exchange
Mar 2021	Debt	-	£5m	-
Dec 2019	Series A - I	2	£14m	Participation Fund &
				NorthPond Ventures
Aug 2019	Series A	3	£20m	NorthPond Ventures

Figure 13: Comparison of investment in Evonetix & Codex DNA at different funding rounds



 Codex DNA raised £34m at series A compared to £12m by Evonetix. Codex also went on to list on the NASDAQ stock exchange in June 2021.

Source: Pitchbook

## Annex: Quantitative Analysis Methodology

Company investment data for the analysis of twins funding round was drawn from PitchBook in May 2022.

For each twin, data covers funding rounds from their launch up until early 2022 (to note there is a time lag for investment deals to appear on PitchBook).

Only investment deals that are confirmed as being completed, verified, and have a disclosed amount and are included in the analysis. It may be the case that further undisclosed investments were made into the twins.

\*Investment activity covers all deal types listed on the PitchBook platform. Click this image > to open a .pdf detailing deal types.

