

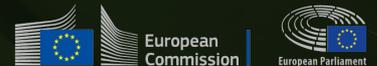
2021: the year of Deep Tech.

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PEAN
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8 January 2021

BY  dealroom.co +  sifted/  FT

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About European Startups.

Created by Dealroom and Sifted, and supported by the European Commission and European Parliament, European Startups is a two-year project aimed at facilitating informed conversation and collaboration among European tech ecosystem stakeholders, to take Europe's startup economy to the next level.

At the centre of the initiative is the European Startups database, a definitive platform providing macro-level trends and trusted insights for data-driven policy making, complemented with investment-grade research and inclusive events.



Previous reports

Download them all on europeanstartups.co/reports



22 April



16 June



3 July



29 October

Why this Deep Tech report.

The term Deep Tech invokes great excitement for some, scepticism for others, and sometimes both simultaneously.

Excitement, because of things like quantum computing, autonomous vehicles, and protein folding solutions. Artificial Intelligence alone could add another \$13 trillion to the global economy over the next decade, according to McKinsey. The potential value of nuclear fusion or curing cancer is hard to overstate.

Meanwhile, there's also scepticism, not about these innovations, but about the term "Deep Tech". Firstly, it's rather vague. Secondly, it implies a too narrow focus on cool technologies for their own sake, while losing sight of commercialisation and competitiveness.

The EU is heavily investing in strengthening Europe's Deep Tech and Blockchain ecosystem. But there is a worry that this effort is insufficiently supported by efforts to make Europe more competitive and entrepreneurial.

This report aims to better establish what Deep Tech actually is, how Europe's ecosystem works, what it's lacking, how it can compete and what desirable policy goals might be.

A big thanks to

This report heavily leans on insights from conversations with:



Stephen Nundy
Technology & VC Investor
Lakestar



Dr. Inga Deakin
Principal
Draper Esprit



Nathan Benach
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Air Street Capital



Rodolfo Rosini
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Julia Hawkins
Partner
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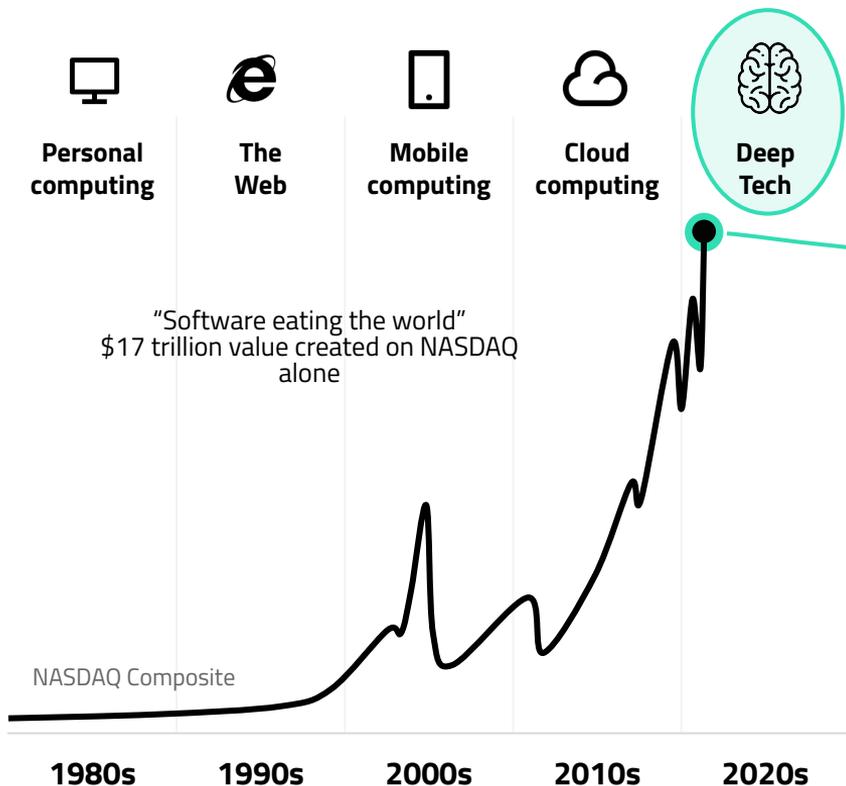


Nicolas Colin
Co-founder & Director
The Family



Gil Dibner
General Partner
Angular Ventures

Tech is entering a new era.



2021: a pivotal year for Deep Tech.

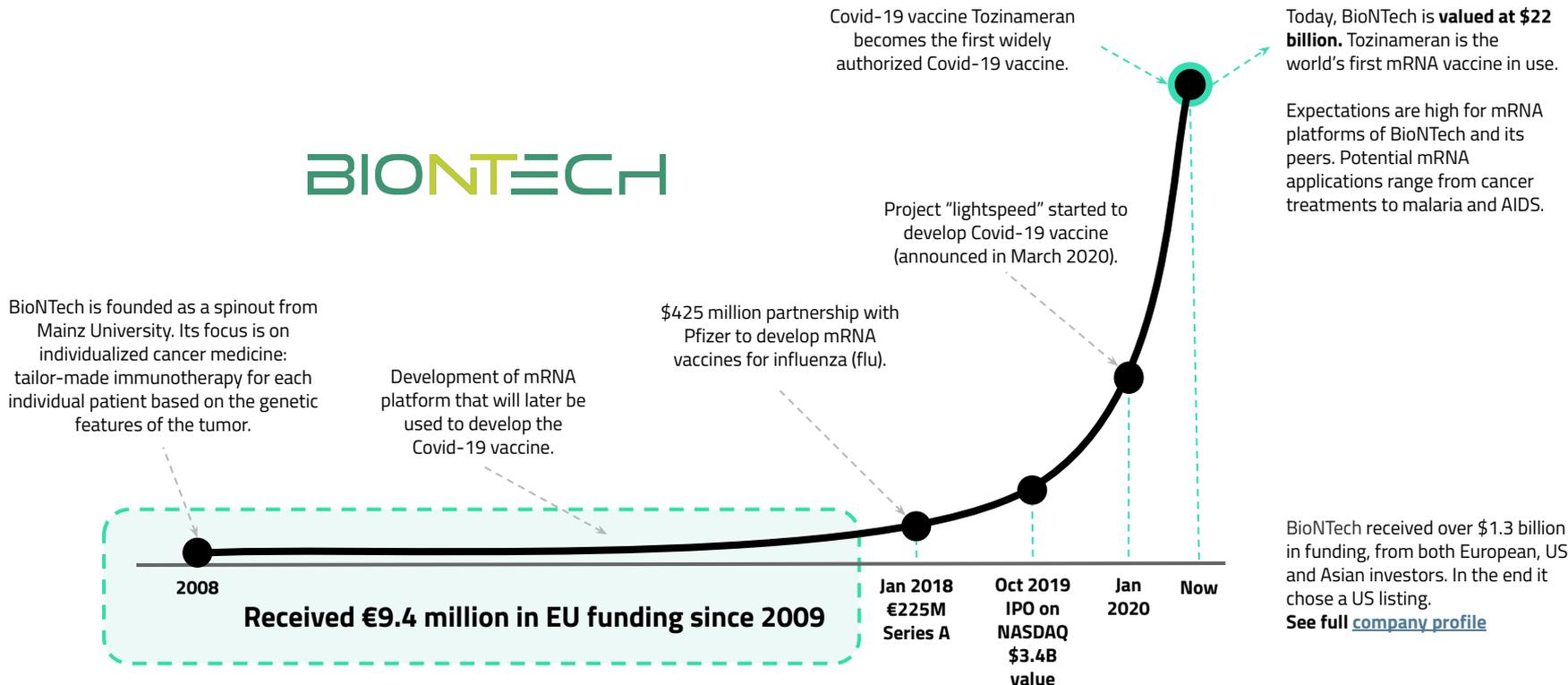
The last decade has created \$17 trillion of value on the NASDAQ alone, mainly driven by enterprise cloud and consumer internet. In the decade we're now entering, tech's impact on our lives might become much more profound. Major technological breakthroughs have been accumulating at an accelerated pace.

Just to name a few milestones: In 2019 Google (with NASA) achieved "quantum supremacy", only to be topped by China by a factor 10 billion in 2020. The CRISPR-Cas9 genome editing technique was awarded the Nobel prize in 2020 while Crispr Therapeutics' market capitalisation tripled to \$11 billion. DeepMind solved a major protein folding challenge (AlphaFold) while it's MuZero program marked another milestone in self-learning AI (MuZero can teach itself to play Go, chess, and Atari games). OpenAI released GPT-3, a language model that uses deep learning to produce human-like text. And the list goes on.

So far, this might have seemed abstract to outsiders. However, we are now witnessing the first ever mRNA-based vaccine in use to combat Covid-19. SpaceX's spectacular rocket launches/landings speak to the imagination. Deep Tech is starting to become much more visible and impactful to a wider audience. We can expect more breakthroughs in 2021, dominating several headlines, becoming much more tangible, and directly solving global social and business challenges.

The success of BioNTech demonstrates the importance of long-term R&D, but also the role of government and the need for stronger European capital markets.

BIONTECH



Notable Deep Tech companies founded since 2000

BIONTECH

€20B valuation
Biotech

UiPath

€9.3B valuation
Robotic process automation

CRISPR

€9.5B valuation
DNA sequencing

ARRIVAL

€3.0B valuation
Automotive

GRAPHCORE

€1.8B valuation
Semiconductors

NANOPORE

€2.0B valuation
Semiconductors

mindmaze

€1B valuation
Neuroscience and digital therapeutics

babylon

€1.8B valuation
Health platform

Benevolent

€1B valuation
Biotech

IMPROBABLE

€1.8B valuation
Game development platform

DARKTRACE

€1.5B valuation
Enterprise cybersecurity

blueprism

€1.8B valuation
Robotic process automation

LILTIUM

€1B valuation
Flying vehicles

CMR SURGICAL

€1B valuation
Minimally invasive surgery robots

celonis

€2.3B valuation
Robotic process automation

Notable Deep Tech companies founded before 2000

ASML

€162B valuation
Semiconductors

NXP

€45B valuation *
Semiconductors

arm

€44B valuation **
Semiconductors

SIEMENS Healthineers

€46B valuation
Medical devices

PHILIPS Healthcare

€44B valuation
Medical devices

ERICSSON

€34B valuation
Telecommunications

NOKIA

€18B valuation
Telecom

ST

life.augmented
€28B valuation
Semiconductors

HEXAGON

€28B valuation
Geospatial apps

infineon

€42.3B valuation
Semiconductors

HEPTAGON™

€1.8B valuation
Semiconductors

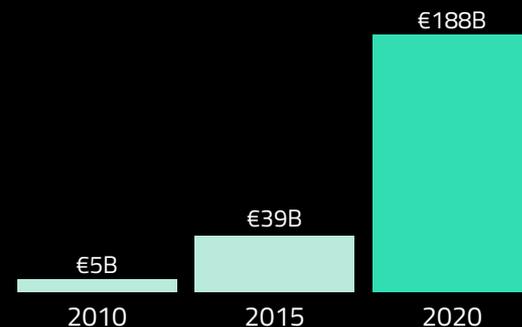
soitec

€5.0B valuation
Semiconductors

abcam

€3.4B valuation
Biotechnology

Combined value of European-founded Deep Tech companies is nearly €700 billion and growing

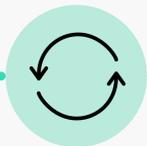




There's unlocked potential in Europe's leading academic institutions.

Europe's Deep Tech companies are worth a combined €700 billion today. Many have their roots in academia and drew early support from government grants.

Yet there's a lot more potential to be unlocked. Europe's universities and research really are world-class. The commercial gap with China and the US can be closed by fostering an entrepreneurial culture on campuses, training first-time academic entrepreneurs and tech transfer officers, and offering spinouts simpler and faster deals.



Closer collaboration needed to support Europe's most promising Deep Tech startups.

Some of the most successful startups will manage to break through silos, by combining disciplines, while attracting different talent and investors across stages of development.

Universities, governments, specialised deep tech investors and agnostic venture capital investors should move closer towards each other to help such companies succeed and scale.



The next decade requires bottom-up streamlining and top-down strategic thinking.

Successes like BioNTech demonstrate the importance of early support from governments and universities. Such programs need to be streamlined to really attract Europe's top talent (bottom-up).

Meanwhile, Europe could benefit from replicating some of the large scale long-term strategic R&D approaches of the US (DARPA) and China, to ensure tech leadership (outside academia) in areas which are going to become important in 2035+. As Marc Andreessen [wrote](#), "It's time to build."

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What is Deep Tech?

2

Europe's Deep Tech investment landscape

3

Competing globally in the age of Deep Tech

4

From Deep Tech to Deep Purpose

1 What is Deep Tech?

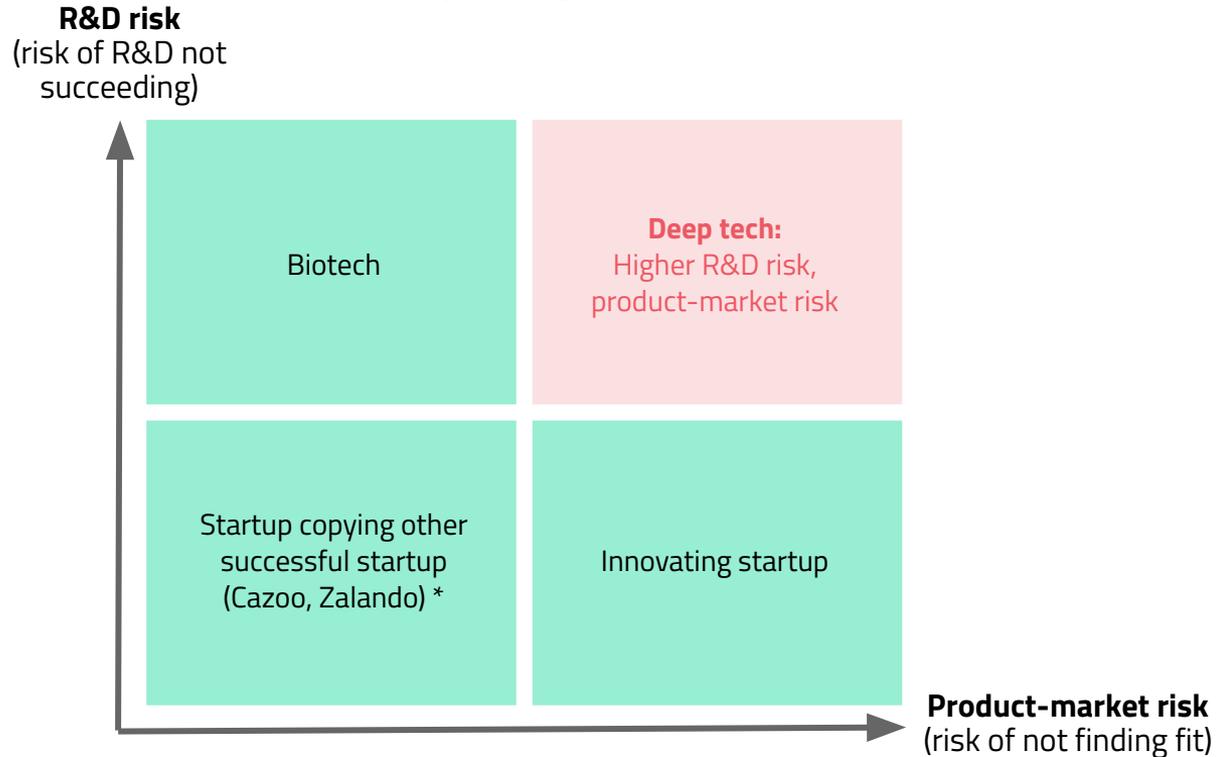
What is Deep Tech?

"For a startup to earn the "deep tech" label, there must be science or engineering risk in getting the idea to actually work and, assuming it does, risk in proving market demand for that product. If there is only one of these risks, but not both, then we're not talking about a "deep tech" startup."



Nathan Benaich
Founder & General Partner
Air Street Capital

Deep Tech combines multiple risks at once (inspired by Nicolas Colin).

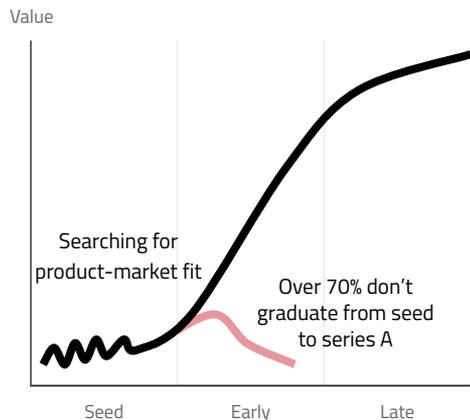


*Cazoo is a perfect example of a startup with all major risks mitigated: serial founder, proven business model and technology (of course many risks remain).

Deep Tech (and Biotech) startups have a longer cashburn. But advancements in AI, and more experienced talent pools could bring them more in line with regular startups.

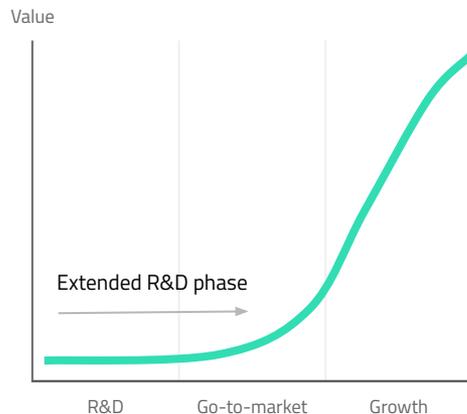
Regular startup

Exploit new but proven technologies
Validate product-market fit as early as possible
R&D and patent ownership is rare



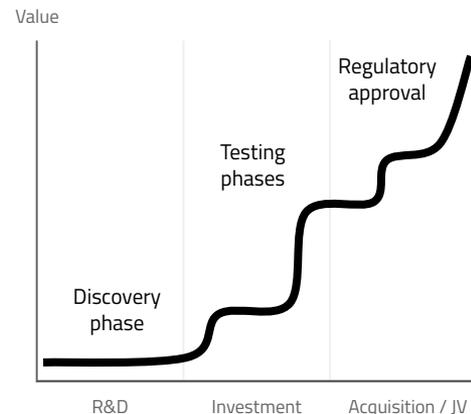
Deep tech startup

Starts with extended R&D phase
Higher share of technical staff
Often involves hardware and/or IP



Biotech startup

Long and costly testing phases
Discovery phase becoming shorter *
Less market risk **



Greater risk, but also greater support from multiple directions.



Breeding ground Academia

Many deep tech companies arise from universities. Some as spinouts: startups where universities have equity and/or royalty/licensing deals. Others as independent startups

Rationale

- ✓ Make an impact
- ✓ Potential to create a spinout
- ✓ Universities: attract funding



~€12B / year Government

Horizon Europe: €100B / 7 years
National innovation programs = hundreds of millions per country
(Bpifrance is >€1B/year, Innovate UK ~ £1B/year)

Rationale

- ✓ Technological sovereignty/autonomy
- ✓ Tackling global challenges (climate, curing disease, access to healthcare, food)



€150B / year Corporates

Amount is the annual European corporate R&D spend (nearly half by pharma and automotive)

Rationale

- ✓ Enable growth (e.g. Facebook and Google investing in rural internet) and secure future (e.g. investing in quantum computing) *



€10B / year Venture capital

Roughly a quarter of VC invested in Europe goes to Deep Tech startups

Rationale

- ✓ Capture new market opportunities
- ✓ Backing early-stage tech to find breakthroughs to progress ecosystem

Many of Europe's top Deep Tech companies have their roots in academia and drew early support from government grants.

"The private markets are efficient at identifying and funding companies that have commercially viable technology. The best use of public money is to fund scientific and academic research in the absence of a commercially viable business case. That is where there is a market failure that governments can correct. **Over the long run, that sort of research tends to have tremendously positive knock-on effects for society and the economy – often for decades.**"

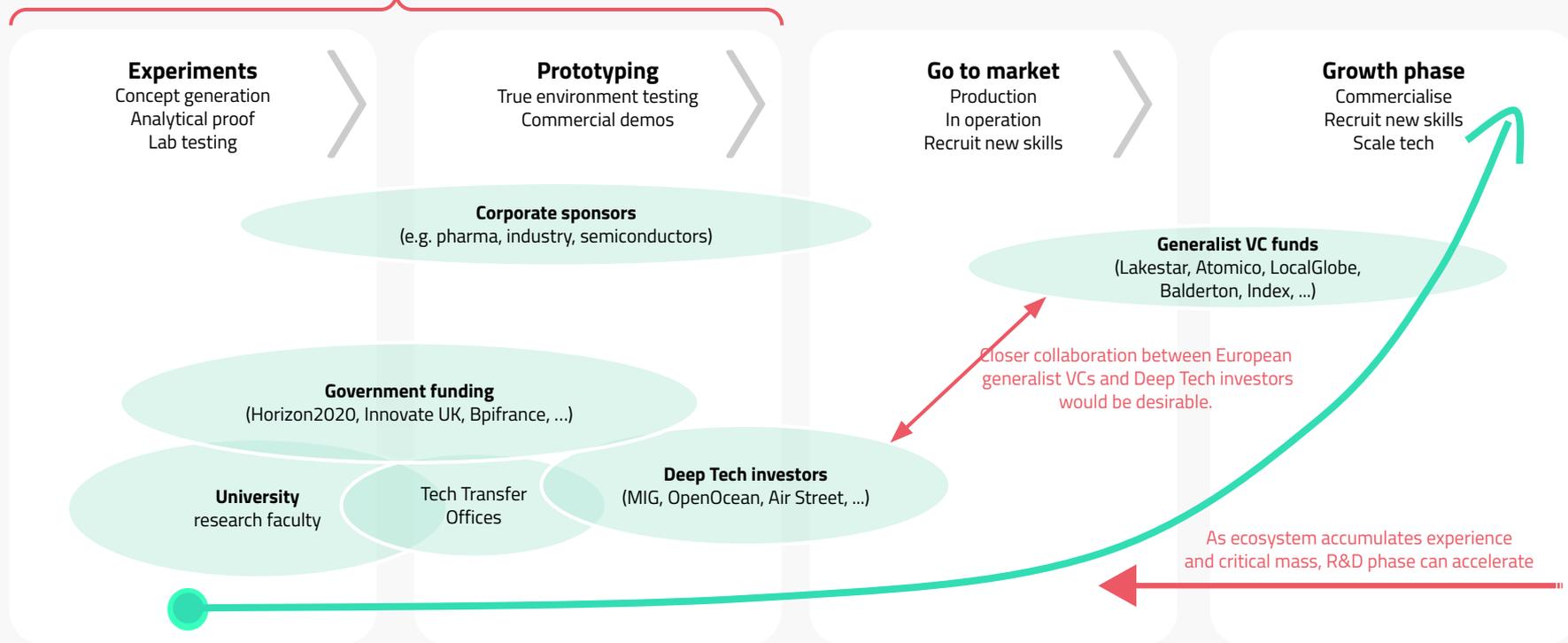


Gil Dibner
Founder, Angular Ventures

Company	Category	University	Grants	VC funding
BIONTECH	Biotech	Mainz	European H2020 programs	€1.3b
onfido	Identity verification	Oxford	Eurostars SME Programme, Tech Nation	€192m
Aledia <small>Innovative displays</small>	Light-emitting diodes	CEA	European Innovation Council (EIC)	€171m
ICEYE	Satellites	Aalto	European Commission, Eurostars SME Programme	€123m
climeworks	Carbon sequestration	ETH Zurich	Eurostars SME Programme	€114m
XMOS	Edge AI chips	Bristol	EIC	€102m
Exscientia	AI-based drug discovery	Dundee	Bill & Melinda Gates Foundation	€96m
IQM	Quantum computing	Aalto	EIC	€68m
MAGAZINO	Intralogistics robots	TUM	EXIST	€41m
KALRAY	Intelligent microprocessors	CEA	Eurostars SME Programme	€34m
oxbotica	Autonomous vehicle software	Oxford	Innovate UK	€70m
wingtra	Professional drones	ETH Zurich	EIC	€27mp
ULTROMICS	AI-based diagnostics	Oxford	Government of the UK, NIHR	€24m
Paragraf	Graphene-based electronics	Cambridge	ERDF	€23m
Recycling Technologies	Plastic recycling	Warwick	EIC, UKRI	€20m
river lane	Quantum computing	Cambridge	Government of the UK	€4m
vaccitech	Biotech (Oxford's Covid vaccine)	Oxford	UKRI	€43m
ONI	Super resolution microscopes	Oxford	n/a	€27m

... and each stakeholder plays a role in taking different types of risks throughout the lifecycle of a Deep Tech company.

Early support from universities and governments is effectively de-risking later stage investors in Deep Tech.



“At the moment, deep tech VCs and sector-agnostic VCs are working in silos. These two investing groups need to move towards each other to help companies succeed and scale.

“We need to ensure that when deep tech companies go global, their home geography and ethical values are represented both on the cap table and in the boardroom. Meanwhile, the private-public financing relationship is one that needs to continue to be nurtured. There’s been some great progress with EU government grants like Horizon 2020. Governments can invest alongside private investing “know-how” to ensure they are leveraging VC expertise and partnership whilst managing risk against the public purse.”

Stephen Nundy

Partner, Lakestar
Deep Tech Investor



Deep Tech is really about what companies *do*, rather than what they *are*.

Improbable, in its early days, had to solve hard technical problems around distributed computing. It has since matured into a games software infrastructure company and studio.

Darktrace developed foundational unsupervised learning methods for network security in their early days. Once they proved success and ROI with early customers, they earned trust, built their brand equity and could scale from then on.

UiPath is a global market leader in Robotic Process Automation (RPA*) and a European flagship example of successfully commercialized enterprise automation. Today, the ROI appears so significant that enterprise chase RPA.

* RPA (Robotic Process Automation), as defined by UiPath: technology that allows anyone today to configure computer software, or a "robot" to emulate and integrate the actions of a human interacting within digital systems to execute a business process.

Started as consumer internet, now doing Deep Tech



Started as Deep Tech, now doing Enterprise SaaS



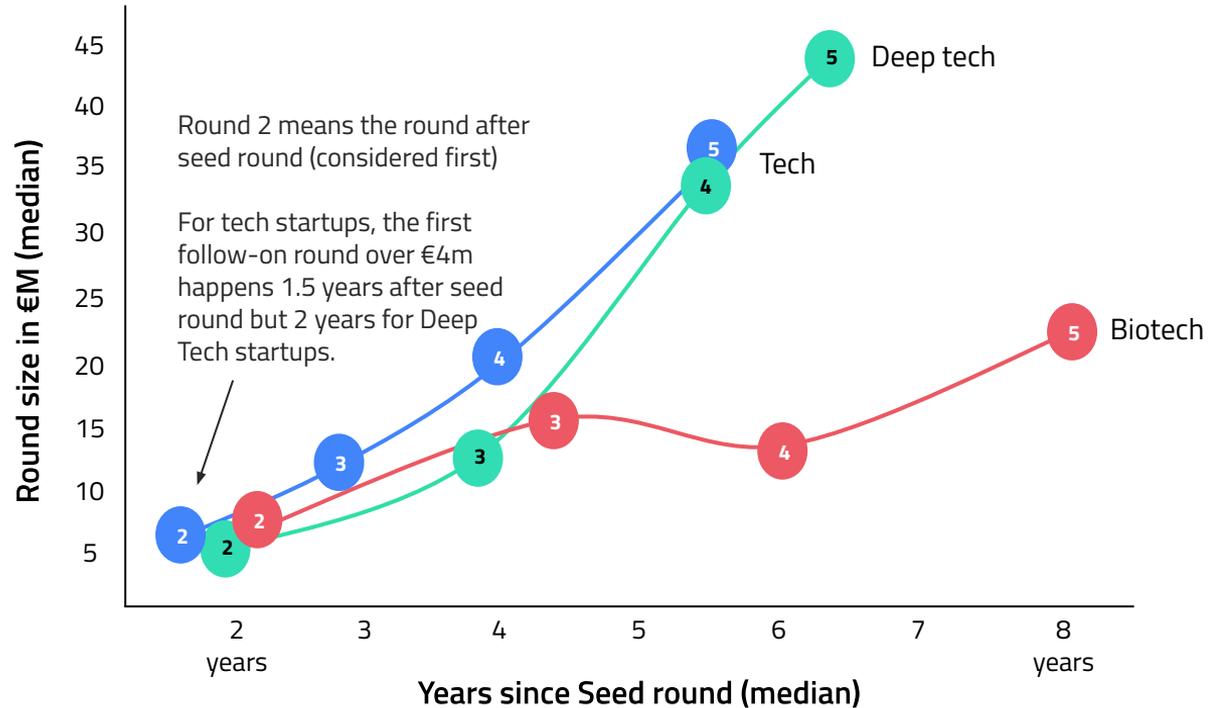
It takes (a bit) more time and capital to build a Deep Tech startup.

We looked at 1,700 qualified European startups that raised a seed round >€200K between 2010 and 2015 and closed a 2nd round of at least €4 million. The approach taken is based on the methodology from the [Journey to Series A](#) research.

This methodology is very restrictive (many startups are excluded as their 2nd round didn't reach €4 million) but results in a high-quality, clean data set. The results on a less restrictive data set are available upon request.

Time between rounds and amounts raised

■ Deep tech ■ Tech startups ■ Biotech



Graduation rates of Deep Tech startups are higher initially, but then fall in line with the broader market.

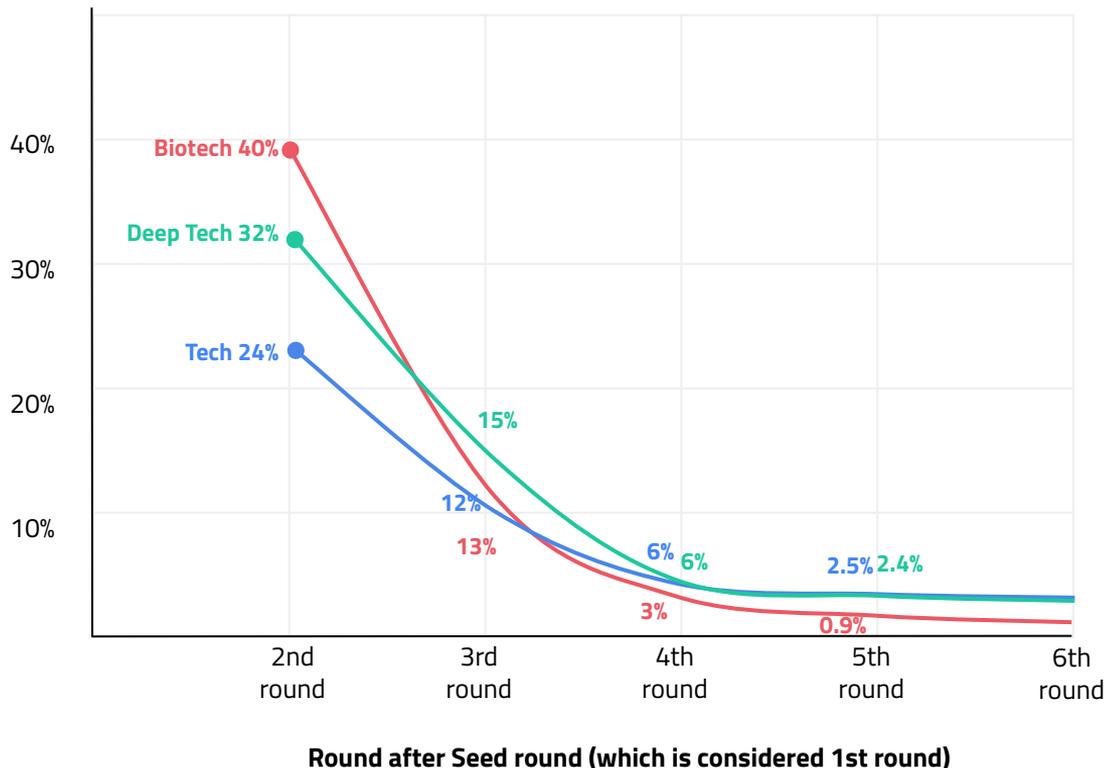
The same 1,700 qualified European startups were analysed to compare graduation rates - what percentage of startups with a seed round successfully raise a next round. Again here, the first round after seed is at least €4 million.

Across Europe, 24% of startups with a seed round, make it to the next round. For deep tech this is nearly 32%.

The pattern could be explained by the fact that Deep Tech startups need more rounds before they can be validated.

Graduation rates between rounds

■ Deep tech ■ Tech startups ■ Biotech



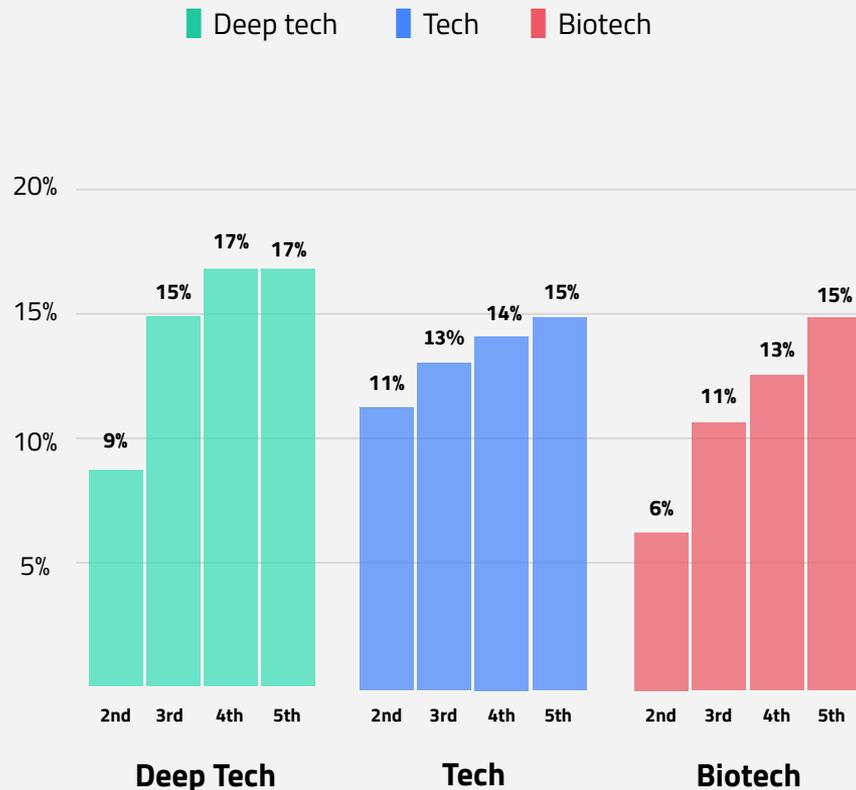
Deep tech startups have a similar probability to exit.

Deep Tech companies have the same or even higher probability to exit. New technology is an attractive bolt-on acquisition for companies with existing large datasets or virtually unlimited capital to incur losses. There have been several notable exits. *

Some of these exits may have been painful to watch. And yet, the temptation to block them is probably best resisted. It would discourage entrepreneurs (and VCs). Europe should be the continent to attract the next Elon Musk or Özlem Türeci. Better to address the root causes of “premature exits” such as lack of late stage growth capital.

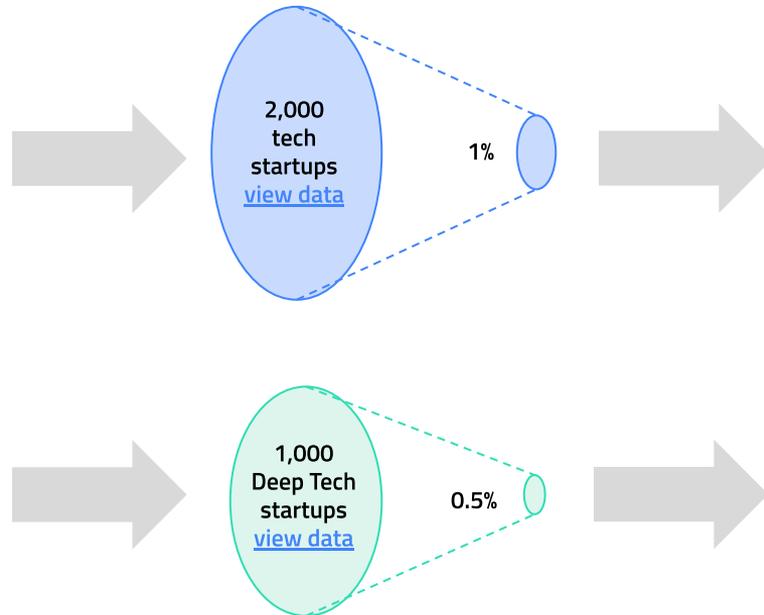
			
<p>Oxford spinout Detection of cancer at an early stage</p>	<p>Oxford spinout Novel AI for game development</p>	<p>World-renowned AI research laboratory</p>	<p>Machine Learning-based visual processing</p>
<p>Acquired by Exact Sciences for \$410m in Oct 2020</p>	<p>Acquired by Zynga for \$527m in Jan 2014</p>	<p>Acquired by Google for £400m in Jan 2014</p>	<p>Acquired by Twitter for \$150m in Jun 2016</p>

Cumulative % of startups that exit (by round)



So far, a smaller proportion of Deep Tech startups have reached \$1 billion+ valuations. But it's also a younger ecosystem.

Cohort of seed rounds
from 2010–2015



Companies from cohort that
surpassed \$1B+ valuation

21 companies reached \$1B+ valuation ([view all](#))



5 companies reached \$1B+ valuation



(note: there are more Deep Tech unicorns but from different cohorts)

“I think there is a misconception that Deep Tech and Biotech must have dramatically different risk profiles from tech startups.

“Yes, they are different disciplines requiring specialisation, but it makes sense to start collaborating much more across them. The differences that are there will only become smaller (e.g. AI accelerating drug development, and digital therapeutics). Some of the most successful startups will manage to break through these silos both in terms of their ability to attract world class talent from bio as well as tech backgrounds; in addition to attracting life science as well as tech investors. Especially as these startups will have different needs across different stages.”

Julia Hawkins

Partner, LocalGlobe
Health Tech investor



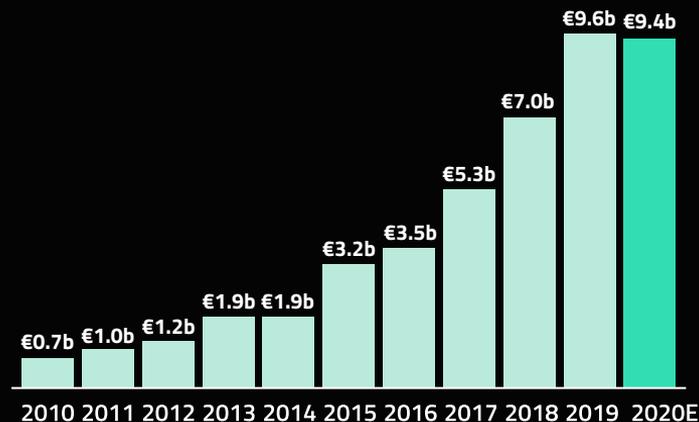
2 European Deep Tech investment landscape.

With €10B annual investment, Deep Tech is a quarter of European venture capital.

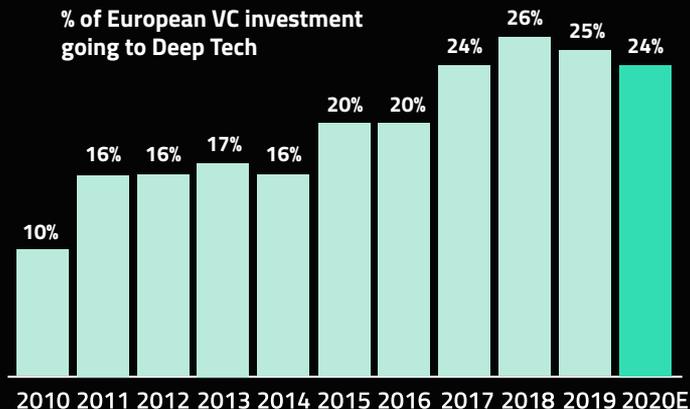
Notable Deep Tech investors by capital deployed in Europe (random order).

<p>atomico[®]</p> <p>PsiQuantum (US), Liliium, Graphcore, Varjo, Arculus</p>	<p>LAKE STAR</p> <p>Isar Aerospace, FiveAI, Aution, Eigen Technologies, Soul Machines (US), Terra Quantum</p>	<p>Droper Esprit</p> <p>UiPath, Graphcore, Movidius, ICEYE, Ledger, Endomag</p>	<p>Balderton capital</p> <p>Darktrace, Sophia Genetics, Infarm, Healx, Tessian, ComplyAdvantage, Cleo, Rahko, The Curious AI Company, Furhat Robotics</p>
<p>TEMASEK</p> <p>BioNTech, BenevolentAI, Improbable, SenseTime (China), Magic Leap (US)</p>	<p>IQT VENTURES</p> <p>Varjo, Cleo, Cytora, Wandelbots, Einide, Riskmethods</p>	<p>LocalGlobe</p> <p>Improbable, Tessian, Cleo, Streetbees, Signal AI, Faculty</p>	<p>Index Ventures</p> <p>Collibra, Comply Advantage, Aurora (US), Scale (US), Behavox (US), Kayrros</p>
<p>bpi france</p> <p>Kineis, Carmat, Aledia, Bioserenity, Owkin, Balyo</p>	<p>Amadeus Capital Partners</p> <p>Improbable, Graphcore, Healx, Five AI, XMOS, Paragraf</p>	<p>idinvest PARTNERS</p> <p>Sophia Genetics, Onfido, Bioserenity, Kaia Health, WeRide.ai (China)</p>	<p>SoftBank</p> <p>Improbable, Energy Vault, Roivant Sciences (US), Cruise (US), Nuro (US), View (US)</p>
<p>octopus ventures</p> <p>Quantum Motion, Altitude Angel, WaveOptics, Ori Biotech, Phoelex, AudioTelligence, Swiftkey, Rangespan, Evi, Magic Pony, UltraSoC, Zynstra</p>	<p>BAILLIE GIFFORD</p> <p>Northvolt, Graphcore, Liliium, Aurora (US)</p>	<p>PRIMEVENTURES</p> <p>Almotive, CybelAngel, Intrinsic ID, Ipdia</p>	<p>HV CAPITAL</p> <p>Isar Aerospace, Vaha, Verbit (US)</p>

Venture capital investment in European Deep Tech companies



% of European VC investment going to Deep Tech



“Most investors find it hard to back businesses with product-market fit risk, yet that is what deep tech entails.”

“My own experience, first in raising capital as founder of a deep-tech startup, and now as an investor who speaks to other founders and investors, is that, unfortunately, contrarian money is relatively rare. Most investors find it hard to back businesses with product-market fit risk, yet that is what deep tech entails. This failure of imagination is costly: by not empowering bold entrepreneurs we're not productionizing the innovation needed to solve the critical, planet-scale problems facing all of us.”

Siraj Khaliq

Partner, Atomico

Member of the Board at arculus, PsiQuantum,
Graphcore, Scandit, and CloudNC



Examples of VC-backed deep tech categories & companies.

Robotics

Semiconductors

Energy

Advanced materials

AI-first enterprise software

AI-first life sciences

Space tech

Quantum tech

Blockchain

EXOTEC

Industrial

CVR

Medical

nqi

Agricultural

Karakuri

Restaurant & kitchen

robo wunderkind

Gaming, educational & companion robots

E/NRIDE

Autonomous ground vehicles

VOLOCOPTER

Autonomous flying cars

MANNA

Drones

Auterion

Drone software

FIVE

Autonomous vehicle software

GRAPHCORE

Processing units for machine intelligence

PROPHESÉE

Neuromorphic vision systems

NOVELDA

Sensors for AI-based applications

SCINTIL

Photonics integrated circuits

TOPOSENS

3D ultrasound sensors

tokamak energy

Fusion energy

McPhy

Hydrogen

SEABORS

Nuclear fission

climeworks

Carbon capture

SKELE+ON

Ultracapacitors

Highview Power

Liquid-air energy storage

northvolt

Green battery cells & systems

Paragraf

Graphene

nanoker

Ceramics

EQONIC

Renewable polymers

Xampla

Plant-based plastic alternatives

ONS

Coatings

parx materials

Antimicrobial plastics

Basilisk

Self-healing concrete

UiPath

Robotic process automation

DARKTRACE

Cybersecurity

NAVVis

Simulation & digital twins

KONUX

Predictive maintenance

EigenTechnologies

NLP-based decisions for complex documents

IMPROBABLE

Cloud-based game development platform

SCANDIT

Computer vision & cognitive video automation

TRACTABLE

AI for accident & disaster recovery

healx

Drug discovery & development

OWKIN

Datasets analysis & molecular modelling

IRIS.AI

Analysis on research databases

inato

Clinical trials

LabGenius

Protein engineering

KHEIRON

Medical imaging & diagnostics

babylon

Symptom checker for triage & pre-diagnosis

HUMA

Remote monitoring

kaia health

Digital therapeutics

ICEYE

Satellites

orbital aerospace

Orbital launch vehicles

exotrail

Space propulsion

CISLWAR

Space debris removal

LEAPSPACE

Ground stations

AMPHINEY

Space software

OXFORD SPACE SYSTEMS

Antennas for space use

SATLANTIS

Satellite payloads

MISSION SPACE

Space telescopes

IQM

Computers

CC

Cambridge Quantum Computing

Software

MM

QUANTUM

Security

nomi

Sensing

Hafnium Labs

Chemistry

HQS

Simulations

QUANDELA

Photonics

kiutra

Cryogenic refrigeration

Quantum

Various quantum applications

Ledger

Security & infrastructure

bitpanda

Web-based platforms for crypto transactions

SIRIN LABS

Cold storage wallets

ELLIPTIC

Crypto compliance

flipsidecrypto

Business intelligence

SÖGUR

Cryptocurrencies

VRADIX

Decentralized finance protocols



“In addition to specific areas of Deep Tech that Europe particularly excels at (Machine Learning, Quantum, Robotics for example), **the continent’s breadth of scientific research makes it an ideal place to build companies that straddle disciplines — Machine Learning applied to Life Sciences, or Quantum applied to Material Sciences, for example.** As a result, Europe is home to many of the most interesting Deep Tech companies in the world, and we expect the opportunities for investment to continue to increase.”

Suranga Chandratillake
General Partner
Balderton Capital

New applications of Deep Tech are rapidly spreading across different markets.

Combined valuation* ■ <€3B+ ■ €3–8B+ ■ >€8B+

	Deep learning	NLP & interfacing	Prediction & detection	Process automation	Robotics & autonomous hardware	Sensors & vision	Engineering & lab work	Advanced materials	Blockchain	Semiconductors & quantum tech
Generalist / horizontal	DeepMind		Avora	Uipath, Celonis		Scandit, Varjo, Ultrahaptics	Kiutra			Graphcore, IQM, Beil
Providing healthcare	Dental Monitoring, Aiforia	Babylon	Babylon Aidence	Lumeon	CMR Robocath	MindMaze, Varjo, Visiopharm	Oxford Nanopore	Parx Materials	FarmaTrust	NVision Imaging Technologies
Discovering medicine	BenevolentAI	Causaly	Sophia Genetics	Synthace, LabGenius			Crispr BioNTech		Molecule	Pharmacelera, Rahko
Food & Agriculture			Connecterra	QualySense	Naio, Tibot	Infarm, Gamaya		Nicefiller, Lactips, Calyxia		
Energy	Greyparrot	Kayros	Earth Science Analytics		Flyability	Greyparrot	Tokamak	HT Materials Science	Efforce	
Fintech & legal	Tractable, Omnisus	Eigen Technologies	Cytora	ComplyAdvantage, Nivaura					Nexo, Ledger, Elliptic, LTO	
Mobility	Navya, FiveAI			Ravin.ai	Lilium, Einride	WayRay, Bickfeld	Arrival, Zeleros	Canatu		
Manufacturing					Universal Robots, Arculus			Paragraf		
Cybersecurity	AU10TIX		Darktrace			onfido				Crypto Quantique, Nu Quantum
Entertainment					Robo wunderkind					
Space exploration							Isar Aerospace			

Source: Dealroom.co. * Indicative.

Finland, Norway and Belgium have the highest relative concentration of Deep Tech in the EU-27. Germany (Munich & Berlin) and France (Paris) lead by absolute size.



“When it comes to early stage government funding, Finland and Sweden are probably best-in-class. Speed and minimal bureaucracy, and some of the best outcomes as a result. EU countries should take a close look at what works there, learn from it, and replicate it.”

Rodolfo Rosini
CEO
Undead

	Deep Tech VC investment 2015–2020	Deep tech as % of VC invested (2015–2020)	Important Deep Tech clusters
UK	€12.6B	23%	Oxford-Culham-Harwell-Abingdon, Cambridge, Bristol, Dundee, Warwick, Southampton, Edinburgh, London*
Germany	€5.4B	21%	Berlin, TU Munich, Fraunhofer, KIT, RWTH Aachen University, Uni Mainz, Darmstadt University of Technology, Ulm, German Aerospace Center
France	€5.0B	23%	Paris, CEA (Atomic Energy Commission), Vision Institute, LNE-SYRTE, LP2N, Grenoble Institute of Technology, Inria, Sorbonne (incl. ISIR)
Sweden	€2.5B	24%	Lund, KTH Royal Institute of Technology, Luleå University of Technology, Uppsala, Karolinska Institute, Chalmers,
Switzerland	€2.5B	33%	ETH Zurich, Swiss Federal Institute of Technology Lausanne, EPFL, IDSIA, UZH
Netherlands	€1.2B	19%	Eindhoven/Brainport-ASML-NXP-Philips, Delft, Wageningen, TNO, University of Amsterdam, Twente
Finland	€1.2B	37%	VTT, Aalto, Oulu, University of Helsinki
Belgium	€0.9B	32%	Ghent, Leuven-Imec, Hasselt, Antwerp, UCLouvain, Vrije Universiteit Brussel
Ireland	€0.8B	18%	Limerick, Dublin
Spain	€0.7B	15%	Starlab, Polytechnic University of Catalonia (incl. ICFO)
Denmark	€0.6B	25%	Odense, University of Copenhagen, SDU
Norway	€0.6B	38%	NTNU
Italy	€0.5B	19%	University of Milan, Politecnico Milano
Austria	€0.3B	29%	Tu Wien, University of Applied Sciences Technikum Wien
Poland	€0.2B	26%	Warsaw University of Technology, Wrocław University of Science and Technology, Polish Center for Technology Development
Estonia	€0.1B	16%	University of Tartu

3 Competing globally in the age of Deep Tech.

AI has so far favoured Big Tech incumbents with data, rather than disrupt them.

amazon

\$23B

Including AWS, Alexa, Amazon Go (Cashierless store), Prime Air (drone delivery)

Google

\$16B

DeepMind, Project Baseline, Verily Life Sciences, quantum computing, Waymo, Stratospheric balloons for rural internet



\$12B

Autonomous vehicle system, Mobile Augmented Reality, Biometric sensing

facebook.

\$8B

Including Blockchain, React.js, AI, Reality Labs (Oculus AR/VR), Rural Access

SPACEX

€5.1B



€0.8B



TESLA

€210M



€140M

HYPERLOOP

n/a

THE BORING COMPANY

€210M

OpenAI

€1.8B

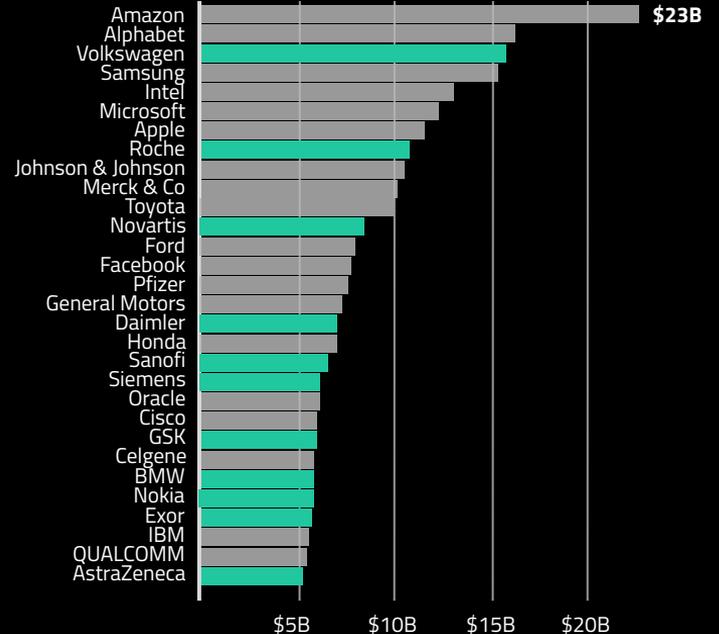
SolarCity

€350M

Big Tech dominates R&D spending, investing to accelerate growth and in new products. Volkswagen has a huge R&D budget but still mostly spends on combustion engine research. Meanwhile, Elon Musk shows that total budget is not everything and disruption is possible.

Global R&D spend 2018

Europe (incl. UK)



Europe's big corporate R&D budgets are concentrated around pharma, automotive and telecom. The USA dominates internet, software and electronic hardware.

Corporate R&D spend in 2018 (\$ billions)	United States	EU-27	Japan	China	South Korea	United Kingdom	
Internet, software, hardware (Google, Apple, FB, Amazon, Samsung)	114	9	9	15	17	1	Dominated by USA big tech. These are domains where money is spent on futuristic moonshots.
Semiconductors (Intel, NXP)	39	5	3	1	2	0	
Biotech (Celgene, Abbvie, Gilead, Amgen)	35	4	0	0	0	0	
Pharma (Roche, J&J, Merck)	40	42	13	1	0	12	Europe has strong position in Pharma and Automotive.
Automotive (Volkswagen, Toyota, Ford)	19	46	39	6	4	4	
Telecom (NTT, Nokia, Eriksson)	13	16	2	3	0	1	
Oil & Gas (PetroChina, Exxon, Shell)	1	3	0	3	0	0	Very low R&D spending. And 90% of that low spending goes to fossil fuels. Opportunity to grow?



“Deep Tech in combination with platforms that can accumulate large new datasets is driving innovation.

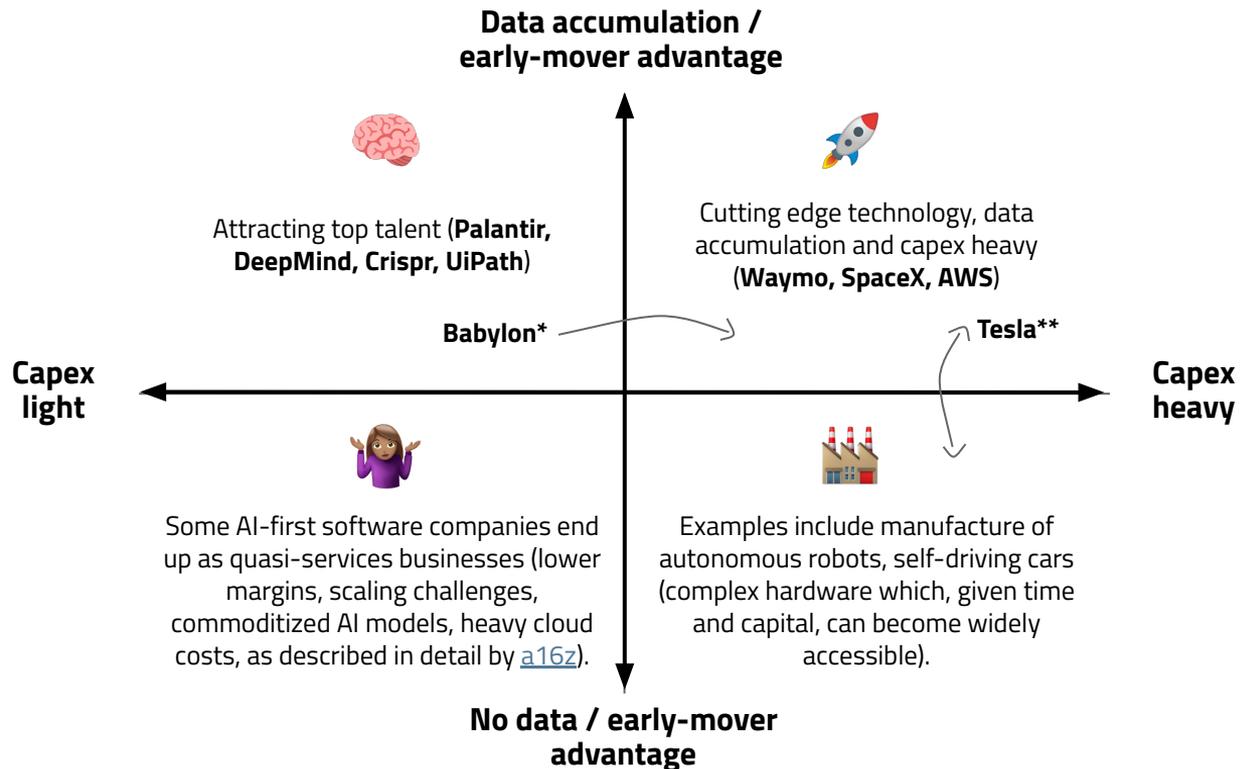
“For instance, telemedicine platforms collecting written data through providing their service can create products based on NLP; or startups using AI for drug discovery are collaborating with pharma companies, and can gain insights and data to refine their algorithms and develop their own products.

“You can expect to see M&A and partnerships along the way as these business models evolve.”

Dr. Inga Deakin

Principal, Draper Esprit
Health Tech investor

Most tech eventually becomes widely accessible. Therefore, companies need much more than just IP to succeed.



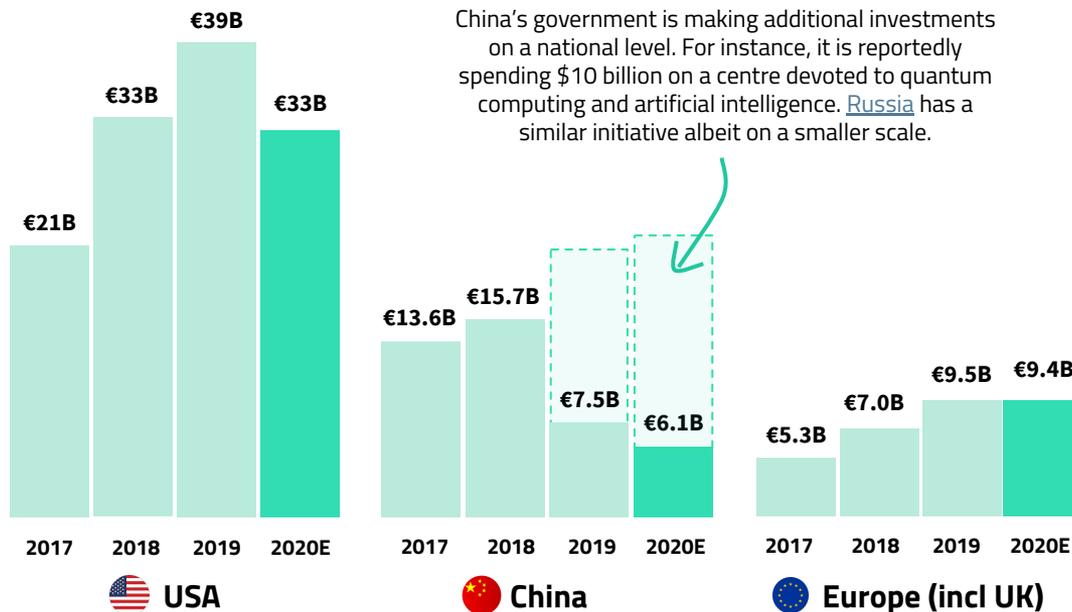
Source: Dealroom.co

* Babylon = also adding own doctors.

** Tesla quadrant depends on how fast car industry can catch up.

While VC investment in European Deep Tech has overtaken China, the full picture is different.

Venture capital investment in Deep Tech by destination



“Even after streamlining R&D funding in Europe, we still need a [DARPA-type entity](#) that can fund long-term strategic technology with limited bureaucracy and a clear mandate to take risks, in fields where the private sector has not started investing yet. There will certainly be money wasted in the beginning (which is exactly what happened with DARPA in the first decade) so this doesn't need to be huge, but it needs to be staffed with top talent.

“Today there are technologies that are going to become important in 2035+ where Europe is currently not playing a sufficient role outside academia, similar to quantum computing 5-10 years ago.”

Rodolfo Rosini
CEO
Undead



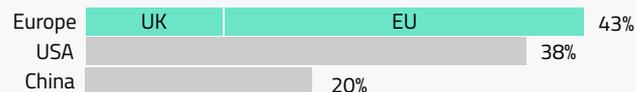
“Europe is world-class in research. European universities and ecosystems can help close the gap by fostering an entrepreneurial culture.

“In both the US and UK, experienced entrepreneurial academics, who want to spin out a second company with university IP, have a lot of leverage with their university tech transfer offices for a fast and favourable transaction. First time academic entrepreneurs often don’t know what to expect, don’t know what is most commercially important, and would benefit from discussions with peers and others outside the university to help with negotiations within their university. European universities and ecosystems can help close the gap by fostering an entrepreneurial culture and training this larger group of researchers.”

Dr. Inga Deakin

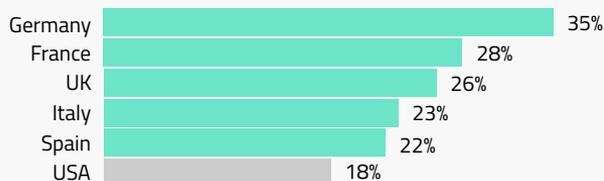
Principal & Health Tech investor
Draper Esprit

High share of highly-cited research publications



European students are more into Science

(portion of graduates in Science, Technology, Engineering, and Mathematics)



Europe does well in Computer Science ranking (THE 2020)

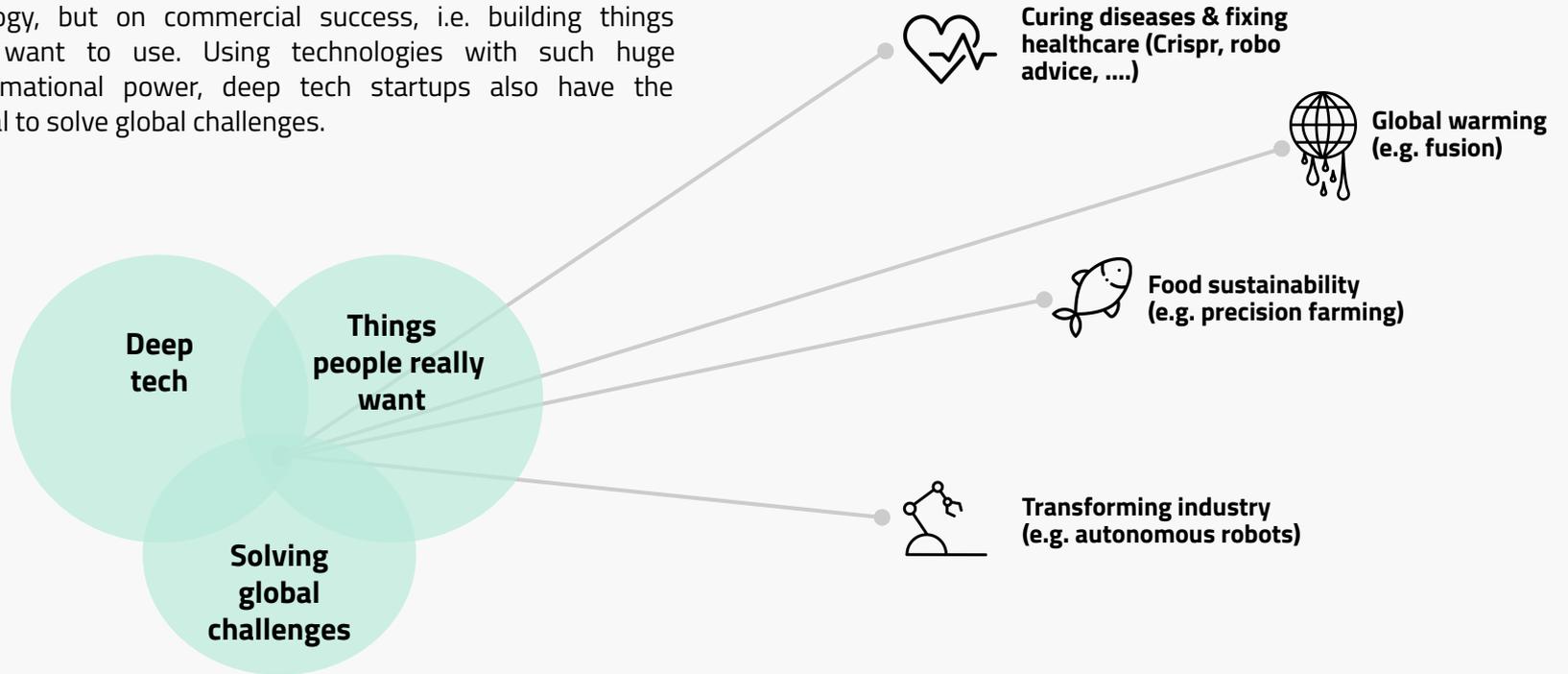
1. Oxford	11. Singapore National
2. Stanford	12. UCLA
3. ETH Zurich	13. Singapore Nanyang
4. MIT	14. Cornell
5. Cambridge	15. Tsinghua (Beijing)
6. CMU	16. Georgia Tech
7. Imperial College London	17. HKUST
8. Harvard	18. TU Munich
9. Princeton	19. University College London
10. Caltech	20. École polytechnique fédérale de Lausanne

Taken from [Benedict Evans / Mosaic Ventures Dec 2020](#).
Data originally from BEIS/SCOPUS/UNESCO/THE 2020.

4 From Deep Tech to Deep Purpose.

It's time to build..., but what to focus on?

An effective Deep Tech strategy needs to focus not only on the technology, but on commercial success, i.e. building things people want to use. Using technologies with such huge transformational power, deep tech startups also have the potential to solve global challenges.





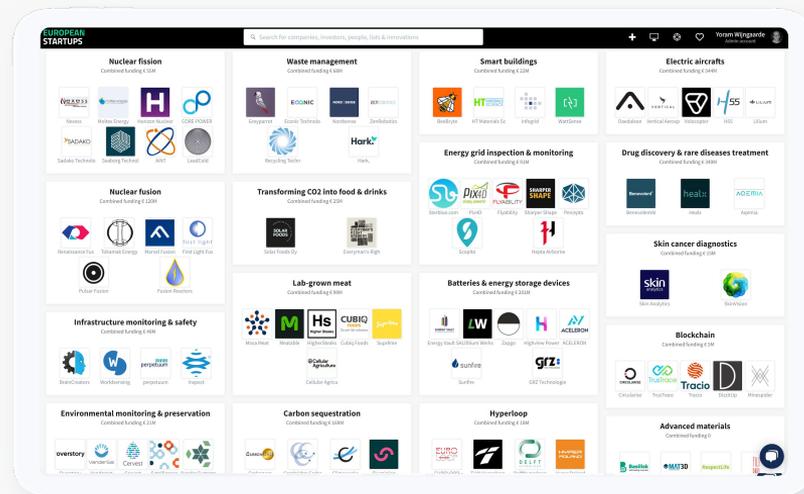
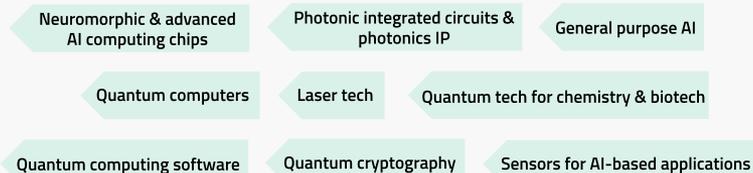
Founded: **2018**
 Location: **Espoo, Finland**
 Valuation: **€156—234M**
 Latest round: **€39M Series A in Nov 2020**

Developer of superconducting quantum computers to solve real-world problems that no classical computer can solve. Quantum computing speeds up discoveries from finance to energy, medicine to material science, logistics to advanced industries.

IQM together with Finland's Aalto University unveiled an ultra-fast nano-scale bolometer that can detect very faint microwave radiation. This can be used to measure the energy state of a superconducting qubit (the essential building block of quantum computers).

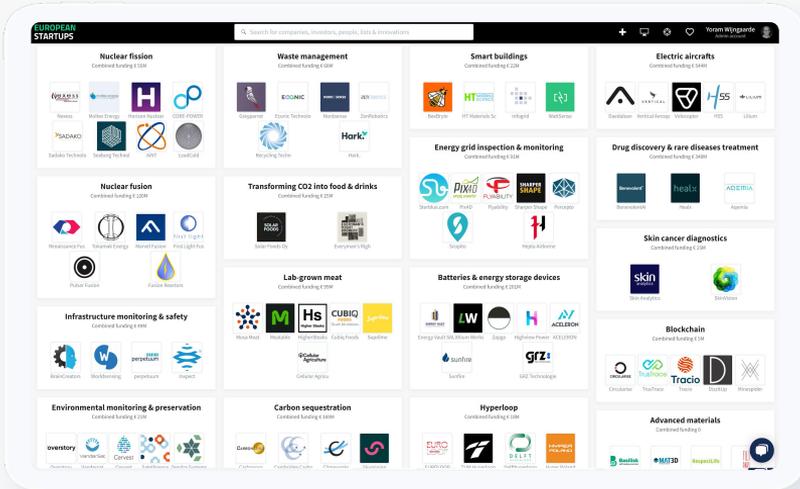
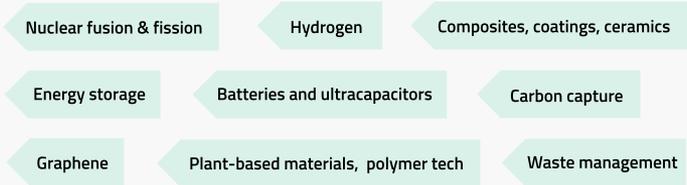


Enabling Deep Tech: quantum technologies and semiconductors.



60+ startups enabling deep tech

Deep Tech working on climate



100+ Deep Tech impact startups >>

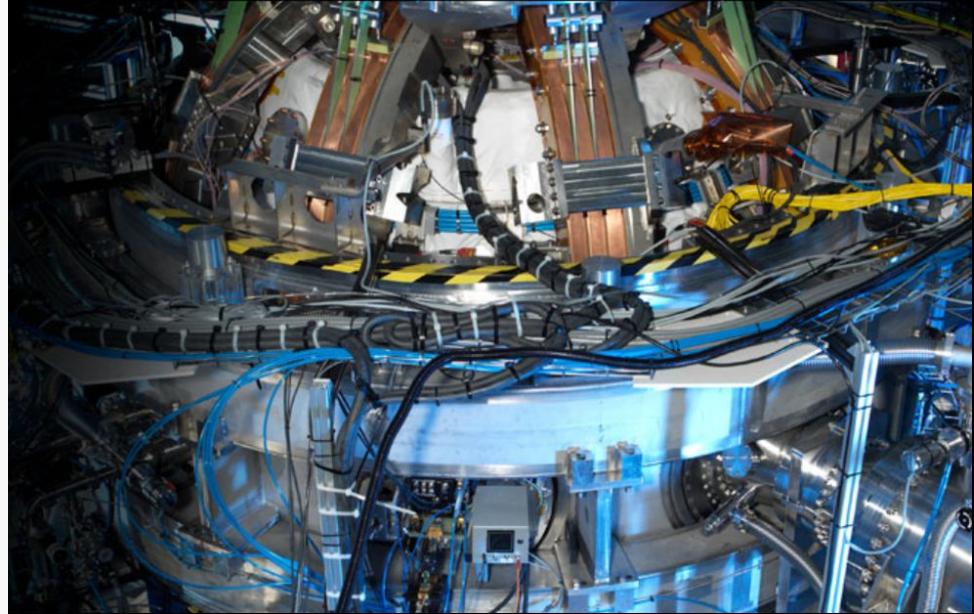


Founded: **2009**
 Location: **Abingdon, UK**
 Valuation: **€316—475M**
 Latest round: **\$87M Late VC in Jan 2020**

Designs cost-effective and compact devices to demonstrate and accelerate the commercial potential of fusion power, the energy source that powers the sun.

Aim to provide clean fusion power by 2030, with no emission of carbon from combustion, no risk of meltdown and no long-lived radioactive waste.

Tokamak Energy is based just 5 km from the EU-funded Joint European Torus (JET) fusion project in Culham (near Oxford) which pioneered fusion ignition technology.

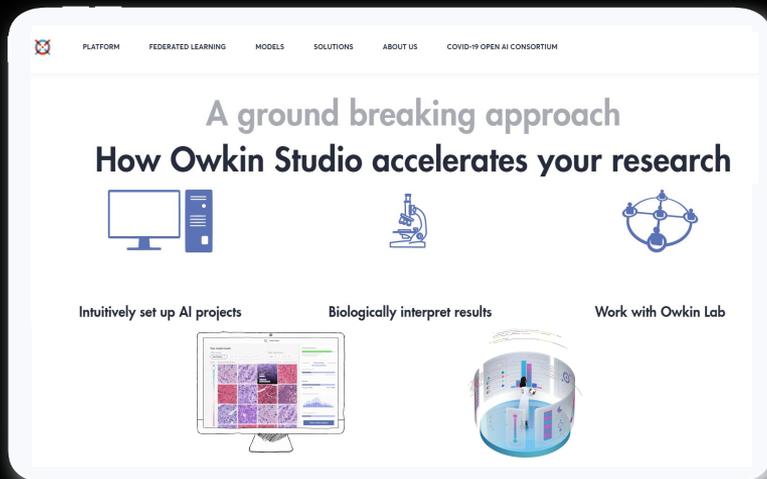




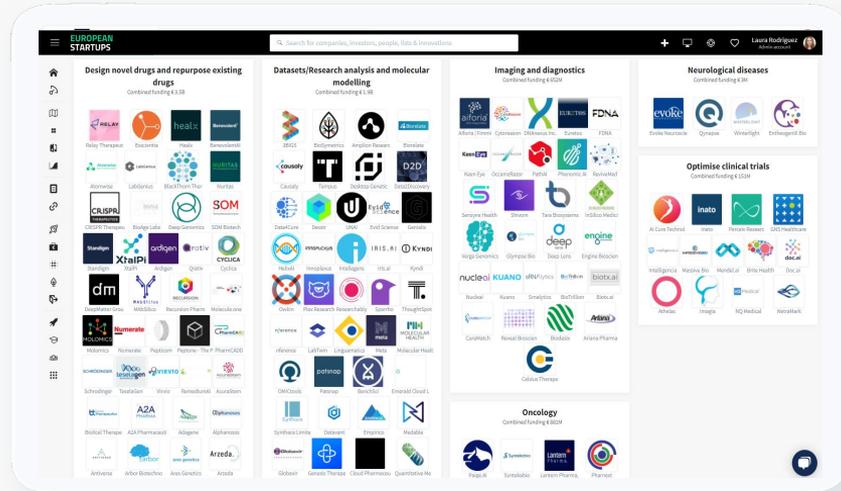
Founded: **2016**
 Location: **Paris, France**
 Valuation: **€125M**
 Latest round: **\$43M Series A in July 2020**

Runs a virtual lab (research platform, and a portfolio of AI models and solutions) where clinicians, pharma companies and academics can access anonymized data sets and models.

Owkin counts a worldwide network of leading academic medical centres and curated research-grade patient data. This helps researchers to understand why drug efficacy varies from patient to patient, enhances the drug development process, and to identify the best drug for the right patient to improve treatment outcomes.



Deep Tech for drug discovery & development.



Visit 170+ startups

Robotics to transform industry, medical, and agricultural processes.

Drones

Construction robots

Air taxi / personal flying vehicles

Cooking & bartending robots

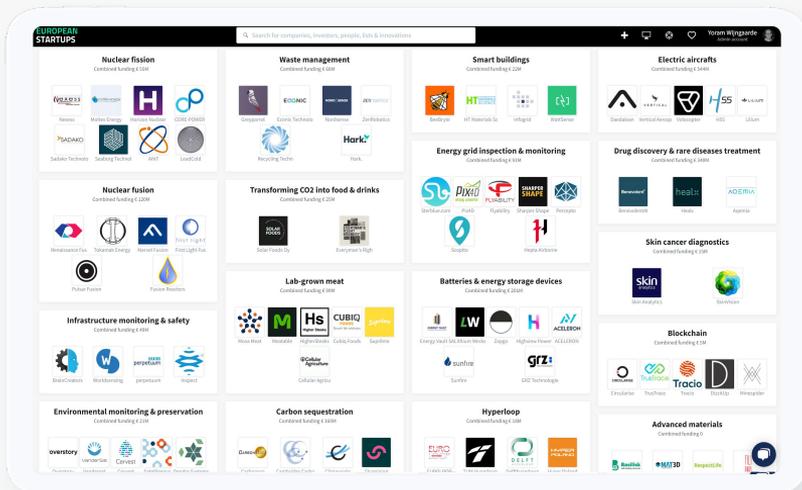
Surgical robots

Exoskeletons

Robot fleet mgmt software

Agricultural robots

Intralogistics / warehouse automation



150+ robotics startups

EXOTEC

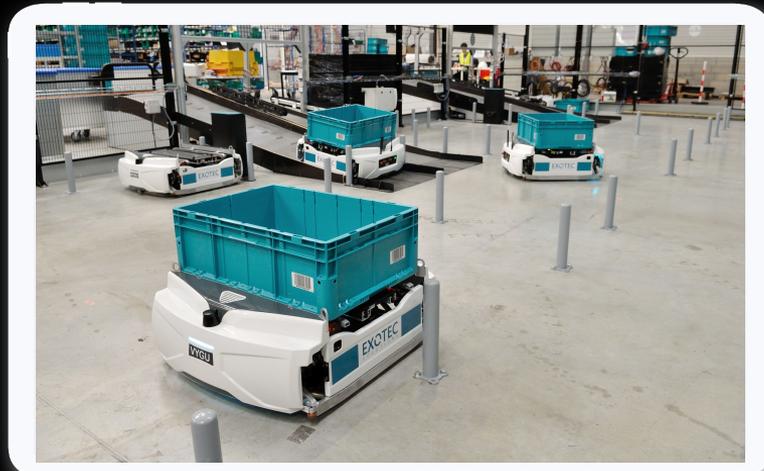
Founded: 2015

Location: Croix, France

Valuation: €327—491M

Latest round: \$90M Series C in Sept 2020

Intelligent intralogistics systems based on fleets of robots operating in three dimensions. Clients include Cdiscount, L.Eclerc, Carrefour, XPO Logistics, showroomprive.com. The robots cuts order preparation time, lower energy consumption & environmental footprint, improve employee productivity & safety, operate 24 hrs per day.





EUROPEAN
STARTUPS