Gravitate

May | 2025

The Deep Tech Founder Magazine

A HEALTHCARE REVOLUTION
TAKING THE GUESSWORK OUT OF DIAGNOSTICS

GROWING MEAT IN SPACE
THE FUTURE OF GLOBAL FOOD SYSTEMS

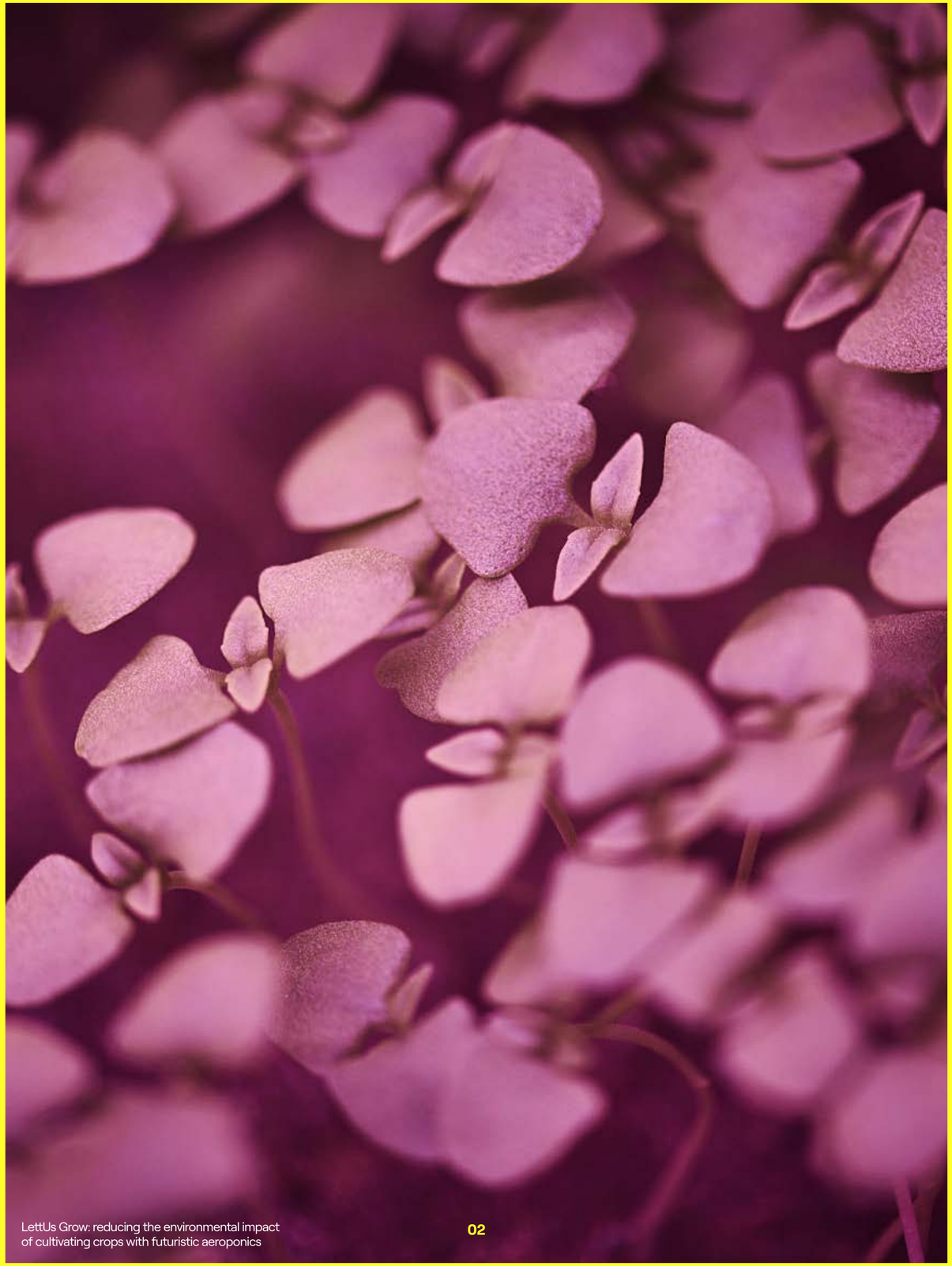
DEEP MINDS

How Deep Tech startups are disrupting food, energy and healthcare

Why **Deep Tech?** and Why **Now?**

Harry Destecroix MBE
Founder, Science Creates

To ensure the prosperity of our society and our planet, we must make significant advancements in health and sustainability. Deep Tech startups are our most powerful economic engines to drive these innovations; they have the power to transform pioneering scientific and engineering breakthroughs into groundbreaking products that will impact billions, worldwide.



LettUs Grow: reducing the environmental impact of cultivating crops with futuristic aeroponics

Deep Tech startups are our most powerful economic engines

Founded back in 2015 by Deep Tech entrepreneurs seeking essential resources for growth, I'm proud to say Science Creates' evolution has been nothing short of remarkable. But our mission hasn't changed. We are committed to building a nationwide Deep Tech ecosystem that will translate more of the UK's world-leading research from the lab into real-world impact.

Over the last decade, we have built two Deep Tech incubators, launched national accelerator programmes, created an award-winning VC fund and established our charitable arm. We have supported hundreds of Deep Tech startups, engaged thousands of schoolchildren and invested millions into founders. As we approach our tenth anniversary and look forward to opening our third incubator, the evolution doesn't end there.

Continuing on our mission to empower world-class Deep Tech startups, we've leveraged our combined experiences to redefine our activities into four key pillars: Incubators (infrastructure), VC (venture capital), Platform (community, programmes and partnerships) and Outreach (STEM outreach and public engagement).

Historically, there's been no shortage of investment in traditional tech companies, but Deep Tech doesn't fit the conventional mould. By scaling our four pillars, we will establish a national, founder-led ecosystem that generates, nurtures and supports thousands of Deep Tech spinouts, which is where we believe the real opportunity lies. We will foster a culture of entrepreneurship within UK academia, unlocking the full potential of science and innovation. Leveraging advanced technology, these startups will accelerate the Fourth Industrial Revolution, transforming the UK economy, accelerating global sustainability and enhancing the health of millions globally.

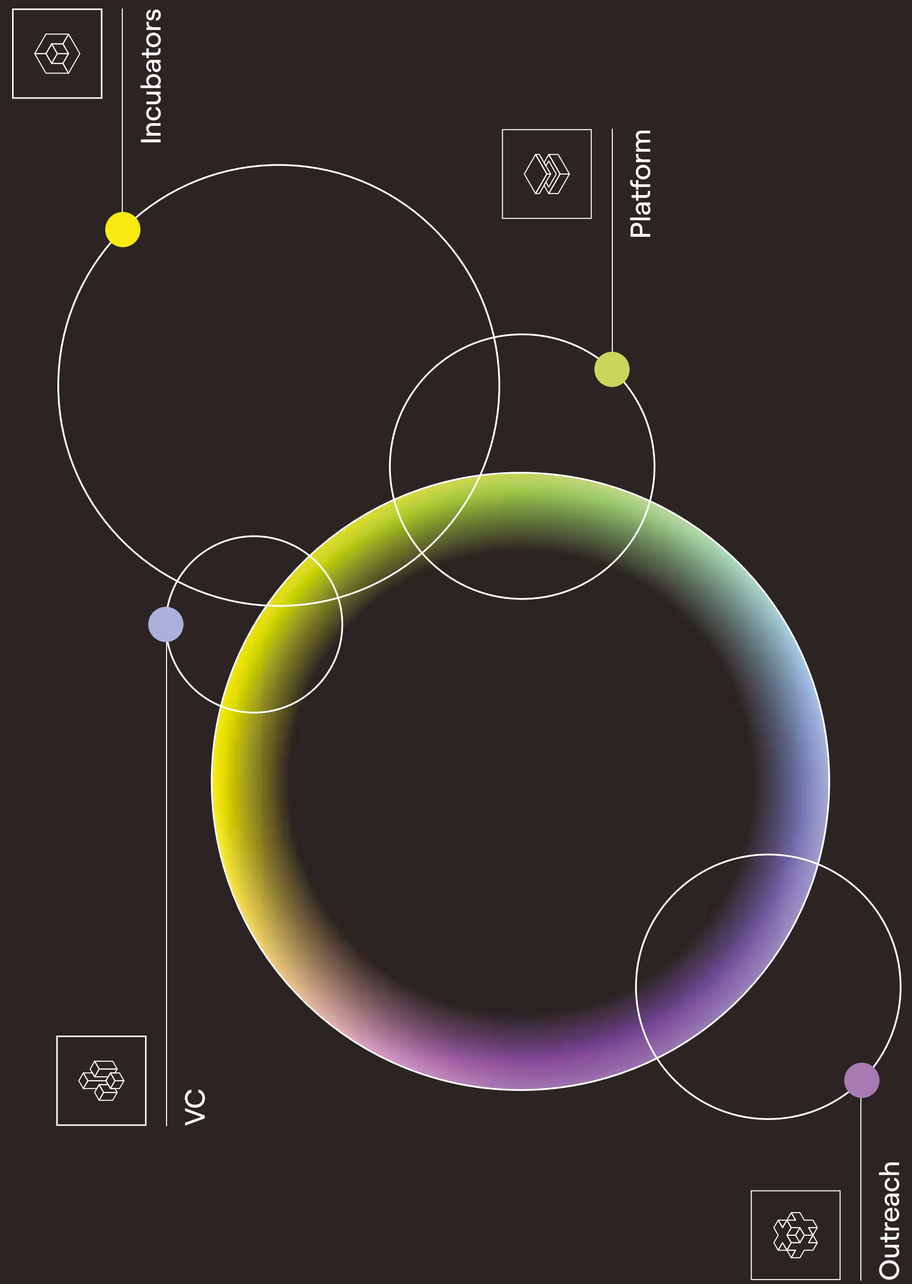
'But why Deep Tech, and why now?' you might ask. For those not deeply immersed in the history of technological innovation, it's easy to overlook how dramatically the world can change within a lifetime. Two centuries ago, the average human lifespan was about three decades. Today, many in the western world aspire to live for a century. Technology not only extends our time on this planet but also amplifies our potential achievements within a given lifetime.

And the pace of change is only accelerating. Three decades ago, Nvidia had just been founded. Two decades ago, there were no iPhones, and sequencing the first genome cost $3 billion. In the last decade, we've seen the rise of AI transformers and gene-editing technologies like CRISPR, bringing groundbreaking advancements. Today, sequencing a genome costs near $100, surpassing Moore's Law.

Science Creates Founder, Harry Destecroix MBE

To ensure the prosperity of our society and our planet, we must make significant advancements in healthcare and sustainability

Science Creates member company Anaphite is working to optimise lithium-ion batteries for EVs and reduce our need for fossil fuels



At Science Creates, we are dedicated to bridging this gap

Since the 2000s, the cost of launching tech startups has drastically decreased due to cloud computing and open source platforms like GitHub. Standardised hardware, a trend now emerging in Deep Tech startups, is further bringing down the cost of developing and achieving proof of concept. Advanced technologies are becoming more accessible, fundamentally transforming scientific innovation and enabling startups to develop new product categories that were previously unimaginable.

These startups, driven by technical founders from leading research institutions, will be the ones unlocking unprecedented markets in healthcare and sustainability; it's undeniable that these advancements are what's needed for the prosperity of our society and our planet.

But while the UK's Deep Tech potential is immense, it largely remains just that — potential. Despite being powered by top-tier STEM (Science, Technology, Engineering and Maths) graduates and world-renowned research institutions producing high-quality publications, it's a resource that has been historically underutilised. The UK's research commercialisation rate, relative to the size of its economy, lags behind the US.

At Science Creates, we are dedicated to bridging this gap. With the four pillars of our ecosystem, along with all the brilliant, contrarian and impact-driven minds amongst us, we look to support and foster the progress of scientists and engineers — the rock stars of our time. In doing so, they will accelerate global sustainability and improve the health of millions.

In this edition of Gravitate, you will find in-depth articles on the future of health, energy and food — three sectors in need of radical transformation that some of our member companies are at the forefront of. You will also read opinion pieces from thought leaders within our organisation, each offering unique insights into the opportunities and challenges that lie ahead.

WHAT DO WE DO WHEN THE STATUS QUO JUST ISN'T CUTTING IT? WE NEED TO THINK OUTSIDE THE BOX — AND GO INSIDE THE LAB

Nicky Jenner, Science Editor

When Food Systems Fail

In 2017, 165 Holstein dairy cows were packed onto a Qatar Airways cargo plane and flew from Germany to Doha, bringing an all-too-literal meaning to the term 'cattle class'.

The cows landed and headed off to their new Qatari home: a purpose-built dairy farm where they were shortly joined by a few thousand more airlifted bovine compatriots. The cows were unwitting participants in Qatar's efforts to circumvent embargoes placed on the country by Saudi Arabia and its other Gulf neighbours, from which Qatar imported around 80% of its dairy needs. With the embargoes firmly in place, Qatar didn't have enough milk for its population, so it swiftly flew in an emergency cohort of milk producers.

Today, Qatar produces all the milk it needs in-country, and then some. The cows did the job! However, the situation only served to highlight Qatar's heavy reliance on a fragile and unstable food system — one that could quickly fail if anything were to change.

"Our global food system emerged from the 1970s and '80s and is very, very linear", agrees Jack Farmer, Co-Founder and Chief Scientific Officer of LettUs Grow, an aeroponic farming company based in Bristol. Jack is quick to emphasise the simplistic, and hugely wasteful, 'grow it, ship it, waste it' nature of our global food chain — one that applies far more widely than just in Qatar.

"You grow everything where it grows well, ship it to the consumer, they eat it and they waste loads of it. The inherent assumption is that nothing major will ever go wrong. It's not at all resilient, and global instability such as a conflict, climate crisis or political shift can cause it all to fall over."

BUILDING VERTICAL FARMS

A plant biologist by trade, Jack is passionate about creating a more sustainable, circular system that puts power back into the hands of producers. We need to produce food in a more localised, transparent, controllable way, he says. "The food system of the future must be more local to where people are actually consuming the food, and for this to work we need to develop technology and practices that work in environments that are limited by things like water or temperature. Controlled-environment agriculture works really well here."

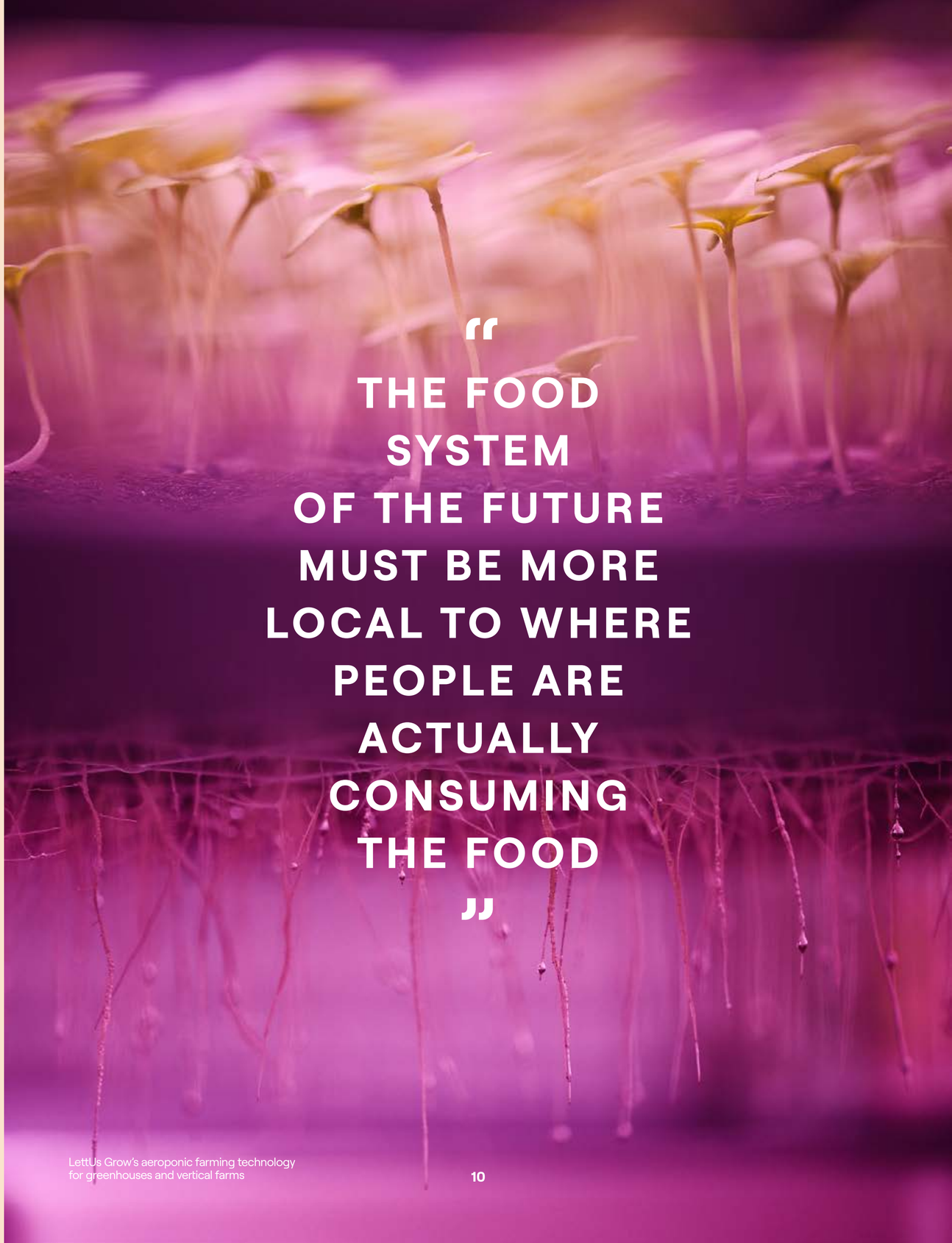
The global aeroponics market is booming, and expected to grow in value by around 20% annually in the next few years as we increasingly favour fertiliser- and pesticide-free food.

LettUs Grow is one of a growing number of companies worldwide focusing on aeroponics, a futuristic system that suspends plant roots in air and bathes them in a nutrient-dense mist of water. This mist is produced by firing sound waves at water, causing ripples that throw droplets up into the air like a wave breaking at sea. LettUs Grow's greenhouses are filled with tray upon tray of delicate leafy greens bathed in sunlight. Viewed from beneath, the perforated trays reveal gnarly, finger-like root systems, all naked of soil and cloaked in mist.

Aeroponics delivers win upon win: it can use less water, reducing the environmental impact of cultivating crops; and plant roots can be fed precisely controlled amounts of water and nutrients while not being waterlogged, improving yield. The reduction in water is especially important, says Jack, and may even be the difference between parts of our planet remaining populated or not. Many regions are becoming starved of water, causing them to either import large quantities of food — via long, complex and unstable supply chains — or to make inefficient use of the limited water they have — a strategy that has a short shelf life.

"Most equatorial regions are growing produce using groundwater. It's just not sustainable or feasible for the next 50 years, as they'll deplete their reserves and run out", says Jack. "As rain patterns change with our climate, people are going to have to start making serious choices about whether they adopt agricultural practices that use less water, or migrate out of those areas completely. There'll be a laser focus on which food products use the most water... and it's no surprise that the one where you just spray loads of water on the ground is the most water-intensive. A system where you use and recycle water more efficiently is really the only way forward."

While controlled-environment agriculture uses more electricity to cultivate a crop than traditional farming methods, it also requires far less fertiliser and no diesel —something that will prove more favourable to the environment in most cases, says Jack, as our energy grid shifts away from fossil fuels and towards renewable sources.



LettUs Grow's aeroponic farming technology for greenhouses and vertical farms

FROM FARM TO FORK

THE ELEPHANT IN THE ROOM HERE IS ANIMAL AGRICULTURE: AN INDUSTRY WITH A COLOSSAL WATER FOOTPRINT

Will Milligan,
Founder and CEO of Extracellular

Around one-quarter of the freshwater we use globally each year goes straight to producing meat and dairy via factory farming. The industry is notorious for both using water unsustainably and being a leading polluter of our water systems, and is at high risk from water-related issues like flooding and drought. Water is used at every step of the animal-rearing process — from growing and producing feed to actually feeding and hydrating animals, cleaning their facilities and, eventually, their slaughter. A single slaughterhouse can use millions of gallons of water every single day.

While aeroponics systems can minimise the water needed to take a plant from farm to fork, a less water-intensive future for factory farming looks like an even greater paradigm shift: it looks like not rearing animals at all.

"Ultimately, we have 2 billion more people to feed in the next 30 years, and as a global population we're consuming more meat, not less", says Will Milligan. Will is Founder and CEO of Extracellular, a Bristol-based research, development and manufacturing company of cell-based products — including cultivated meat.

"We'd need to rear twice as many animals as we do today to feed that growing population given the amount of meat we consume, but we simply don't have the land or resources. As meat is societally and culturally embedded in our food system, alternatives just aren't cutting it — we need to come up with better alternatives for the real thing. To meet demand, we need better, more efficient, novel ways of producing real meat."

Cultivated meat is a hugely promising way to do just this. Instead of leading animals to an abattoir, meat could be grown cleanly and without cruelty in a kind of meat microbrewery. A single small cell sample is taken from a living animal, given everything it needs to grow in a big tank, and can go on to produce the equivalent of hundreds of meat products — all thanks to a single animal. Rather than being a pipe dream, cultivated meat is already on sale in the US and Singapore, and was served to global leaders at 2022's COP27 conference in Egypt.

Creating meat products in this way drastically cuts carbon emissions; reduces land, water and energy use; and could enable countries across the world to be more self-sufficient in their food production (without the need for emergency cows). "Countries that don't have the traditional basis for raising animals — maybe they don't have the rolling green hills of the UK, for instance — may be able to feed their populations more effectively and securely with this technology", adds Will. "That's a really exciting prospect for me.

"In short, when we look at the future of our food system, it's all about feeding the planet more sustainably: feeding more with less. Cultivated meat is really the key solution to eating meat in a sustainable way. Who knows — in 20 or 30 years' time, it might be seen as crazy that we used to kill animals for food, in the same way that the idea of smoking in a pub right now is a foreign concept. Just 20 years ago, you'd walk into a smoky haze."

THE EUROPEAN SPACE AGENCY IS LOOKING AT GROWING MEAT IN SPACE, POSSIBLY IN EARTH ORBIT OR ON LONG-HAUL TRIPS TO MARS. YOU CAN'T TAKE AN ANIMAL WITH YOU, BUT YOU COULD TAKE THEIR CELLS.

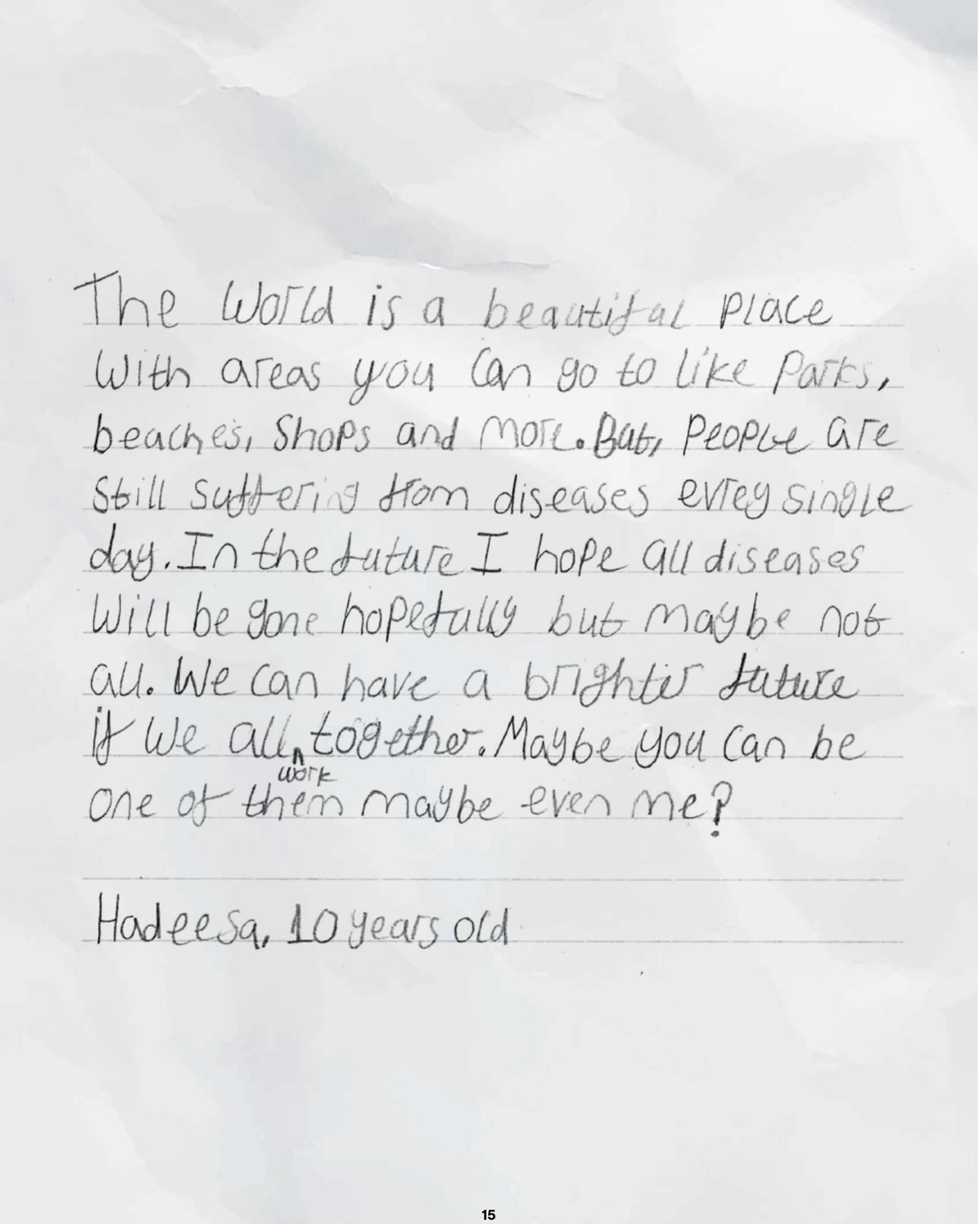
Deep Tech Pioneers of Tomorrow

Charlie Proctor
Head of Outreach, Science Creates

Charlie Proctor, Head of Outreach, and Founder and CEO of independent charity Science Creates Outreach, discusses the importance of education and outreach in diversifying and empowering the future of science entrepreneurship, and shares the long-term commitment of the charity to tackle career aspirations in STEM.

Bringing the local community along on our journey of scientific discovery and wonder has run through Science Creates' veins since the company's first incubator opened in 2017, when we started inviting local schools to visit our labs and participate in workshops with our members. In 2022, these efforts continued to be cemented through the inception of Science Creates Outreach — the company's own registered charity — dedicated to shaping the scientists and innovators of tomorrow.

Future pioneers.
Children from St Barnabas Primary School in The Learning Lab


The World is a beautiful place
With areas you can go to like parks,
beaches, shops and more. But, people are
still suffering from diseases every single
day. In the future I hope all diseases
will be gone hopefully but maybe not
all. We can have a brighter future
if we all, together. Maybe you can be
work
one of them maybe even me?

Hadeesa, 10 years old

These manifestos are from the minds of 10-year-olds. Children know, just as we do, the challenges that await us; they share many of the same worries.

In 2025, we've taken this even further with our Outreach pillar: an extended offer with yet more fundraising events and STEM workshops to make sure that everyone can learn and engage with the world of science startups, Deep Tech and entrepreneurship. Why? Because changing the world is a group effort that needs diverse ideas and colourful approaches.

In a world grappling with climate change, pandemics, resource scarcity and healthcare disparities, the need for innovative solutions has never been more urgent. To tackle the scale of these global issues effectively, we need more scientists and Deep Tech entrepreneurs, and we need to train them now.

Education and outreach play a vital role in shaping the scientists and innovators of tomorrow, who will be at the forefront of finding solutions to our complex, upcoming problems. Children possess a remarkable ability to envision a better future, untainted by the limitations of the present. This inclination, plus their natural curiosity, needs to be harnessed and kept alive. We believe encouraging and nurturing this mindset will lead to a pipeline of young scientists, engineers and entrepreneurs with a passion for creating a better, cleaner world for all of us.

However, career aspirations are not where we need them to be. In fact, just 16% of 10- to 18-year-olds aspire to a career in STEM*. From the science programmes of the 1960s, the introduction of the GCSE double science award at the end of the 80s and the more recent increase in science in the current curriculum, there have been continued attempts to improve the way we teach science. Yet, science still remains unapproachable and unappealing for some. The point here is that just introducing more science into the curriculum without thinking about how or why it is being taught is not increasing the likelihood of more people wanting to take it as a degree or aspiring to it as a career.

Our charity, Science Creates Outreach, has a unique approach. Nestled amongst world-changing science and engineering companies at our Old Market incubator is The Learning Lab — a dedicated space for welcoming in the Bristol community and a hub for STEM entrepreneurship education for young people. Within the heart of working science laboratories, surrounded by founders of groundbreaking startups, we immerse young minds in the how and the why of Deep Tech. School classes, community groups and education networks can book tours of the incubator, participate in hands-on workshops in the lab and meet the people behind today's scientific advancements. By providing real-world experiences alongside pioneering entrepreneurs, the charity instils a passion for problem-solving and innovation. These interactions with a diverse range of role models help to demystify scientific careers, making them more tangible and achievable for aspiring young students.

It cannot be overlooked that the future of innovation lies in embracing diverse perspectives. Right now, the STEM workforce lacks representation across dimensions like gender, ethnicity, age and socio-economic background. Diverse perspectives have been proven to yield more creative and effective solutions to complex challenges, yet women make up just 28% of the workforce in STEM and only 12% of this workforce are from ethnic minorities**. Addressing these disparities is crucial if we are to encourage a more inclusive and innovative scientific community. That's why we target specific schools, work with community groups and encourage young people from all backgrounds to pursue careers in STEM fields, in order to build a workforce that reflects the diversity of our global society.

We're fully committed. This is a long-term and large-scale project, in which we want young people to visit repeatedly to increase their awareness, skills and connections with today's scientists and entrepreneurs. We are targeting all stages of the 15- to 20-year education and innovation lifecycle, designing our programmes to make real impact in the UK — in line with government objectives in STEM and the economy.

By empowering the next generation with the skills, knowledge and confidence to tackle global challenges, the charity is unlocking a brighter future for science innovation and the wellbeing of our planet. The young minds inspired and educated through this initiative will become the catalysts for meaningful change in society. Not only will they lead scientific advancements in the future, but also inspire adults to take greater actions to protect our planet today. There's a difference between liking science and aspiring to be a scientific founder, and Science Creates Outreach aims to bridge that gap.

Soon we will not be holding their hands — our future will be in their hands.

*Archer, L., DeWitt, J., & Osborne, J. (2020). ASPIRES 2: Young people's science and career aspirations, age 10–19. UCL Institute of Education.
** UK Government All-Party Parliamentary Group (APPG) on Diversity & Inclusion in STEM. (2020). Diversity and inclusion in STEM: A report for UK Government.

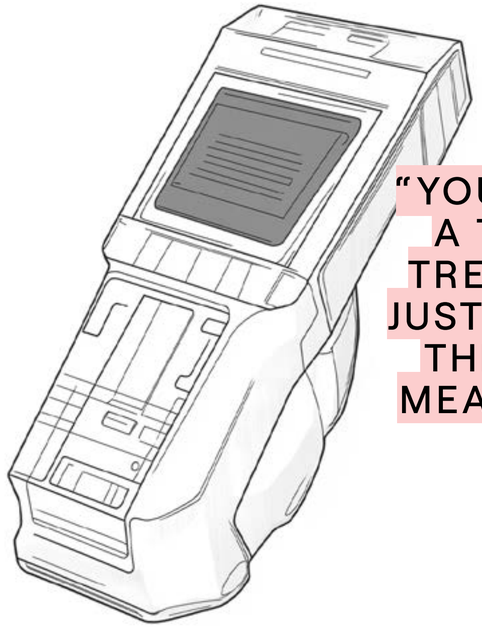
Have you seen our beautiful greenery and clear lakes? They are a stunning sight to see and in order for them to keep on attracting animals and insects, we need to look after them. But right now we are not doing so good. We keep on littering and it is killing animals one way or another. If we keep on doing these things, sooner or later we won't have these places to enjoy. In the future, I'd like to live in a world with no problems like littering. One of the ways we can achieve this is by not using plastic bags, stop throwing our litter on the floor or using recyclable bags. I know we can do something to stop this together.

Aayah, 11 years old

We need a healthcare revolution — and we need it now

Our methods of diagnosing disease are fundamentally flawed, and ever-smarter bacteria are triggering a crisis of global warming proportions. What can we do to keep our healthcare system healthy?

Nicky Jenner, Science Editor



"YOU WANT SOMETHING LIKE A TRICORDER FROM STAR TREK: SOMETHING YOU CAN JUST TAKE OUT AND MEASURE THE THINGS YOU WANT TO MEASURE, RIGHT THERE AND THEN."

It's never a welcome scene: you wake up feverish, with a throat like cut glass. Exhausted and thoroughly under the weather, you drag yourself to your doctor's surgery, where the GP diagnoses you with strep throat and prescribes you some antibiotics. It's a miserable morning, you tell yourself, but at least you'll soon be feeling better — right?

Actually, maybe not. While once a reliable method of treating bacterial infection, antibiotics are becoming less and less likely to work.

In the UK, there's a 20% chance that the first-choice antibiotic the doctor gives you won't work, and this figure is even more worrying elsewhere. In China, it sits at around 50%, with Shanghai standing out as a resistance hotspot at 80%. In a modern healthcare system like ours, this seems unbelievable: that if you head to the doctor in Beijing with strep throat, there's only a 50:50 chance you'll be given effective medicine. How did we get here?

"The first antibiotic, penicillin, was discovered in 1929, after which we discovered loads more that all worked well and let us treat bacterial infections pretty effectively", explains Michael Roberts, Founder and CEO of GenomeKey, a transformative diagnostics company based in Bristol. "But then we started to realise that bacteria were evolving and finding ways to get round our antibiotics. This resistance is the 'other' global warming: another sort of existential threat facing humankind."

"Antimicrobial resistance is the 'other' global warming: an existential threat facing humankind"

While it may 'only' be a 20% problem today in the UK, it's worsening. "I can't say how long it's going to take us to get to 40%, 60%, maybe even a Shanghai-like 80%, but I can tell you that it's happening", says Michael. "So we're building tools today in preparation for that future — tools that doctors desperately need to match the right treatments to the right patients."

Throw everything, see what sticks

To make a diagnosis today for an infection such as sepsis or meningitis, doctors take a blood sample and send it off to the lab, where the sample is put into an incubator to see what bacteria grow (a process called blood culturing). Then, it's a waiting game. Doctors can't do anything without knowing what the problem is, so the patient is left twiddling their thumbs and feeling rotten. It's an expensive, days-long process that isn't just inconvenient — it can be deadly. For fast-acting and life-threatening diseases, a patient could die before their results arrive.

"Culturing is the problem. It's a slow and fundamentally flawed approach to diagnosing disease", says Michael. "So what we're saying is: let's try and go about it a different way."

To Michael and GenomeKey, "a different way" takes the form of a tool that can skip the blood culturing step by instead hunting for and profiling any bacterial DNA present within your blood. Think back to the hypothetical morning when you head to the doctor for treatment. Instead of sending a vial of your blood to the lab for a few days, this time your doctor whips out a futuristic handheld device. They take your sample, insert it into the machine, and let the high-tech scanner work its magic. After mere hours, not days, the machine pings — the results are in, and the doctor can now choose the most appropriate treatment for you.

> "If you put someone on the right antibiotic much earlier, you could just be saving their life"

Crucially, analysing a bacterium's DNA not only tells you its type but also what it's resistant to — the key information clinicians need to quickly select the right antibiotic.

"If you put someone on the right antibiotic much earlier, you could just be saving their life", adds Michael. "You also have a good chance of reducing the cost of infection and preventing the overuse of antibiotics, because you can use a much smaller amount much earlier on — very precise and targeted antibiotics, rather than throwing the whole spectrum at people to see what works."

Scanning your body's blueprint

Handheld health scanners may sound like something from science fiction, but it's where our healthcare system is headed: towards tools that can rapidly read the complicated biochemistry of your body and print out useful information at the point of care (while you're actually sat with your doctor, not several days later).

"You don't want a multi-million-dollar device in a lab run by just a few specialised scientists", says Andy Heron. "You want something like a tricorder from Star Trek: something you can just take out and measure the things you want to measure, right there and then."

> A recent example of the value of rapid point-of-care testing is at-home COVID-19 testing, which provided governments with the vital information needed to manage the coronavirus pandemic

Andy is the Founder and CEO of Portal Biotech, a company developing a new device to monitor, measure and detect the proteins and small molecules associated with disease. "Everything from standard day-to-day health and wellbeing to every single disease: it's all captured in the proteins and molecules", says Andy.

Past decades have brought about a revolution in our ability to measure and map our genetic code. We can now sequence a complete human genome in a single day for around £500, something that's been a complete game-changer for the healthcare industry. However, advances in our understanding of proteins (proteomics) are comparatively lacking, and growing more and more important given that the vast majority of drugs target proteins.

According to many healthcare innovators, what we need now is a similar revolution for the next layer down: the proteins created by your DNA, rather than your DNA itself.

"You can understand a lot of disease by understanding the genetic code, but there's a lot that's much more difficult to understand without knowing what's happening to proteins", says Andy. "The classic example of where DNA falls down is that of identical twins — they share identical DNA, but they have entirely different lives and health outcomes, because what makes you 'you' on a day-to-day basis isn't your genetic code but how your environment interacts with that over time.

"Another classic example is a caterpillar and a butterfly: it's the same underlying genetics, but the functional biochemistry is obviously entirely different."

Portal Biotech aren't the only ones focusing on a 'protein revolution' for detecting disease. Another company, Rosa Biotech*, has a different approach to picking apart complicated biological mixtures, instead employing novel lab-built proteins as disease detectors. The team loads up lots of barrel-shaped proteins with special dyes, and then expose them to something — a patient sample — they want to analyse. Different molecules dislodge the dyes in different ways, creating distinctive coloured patterns that reveal what's lurking inside the mix.

Caterpillar vs. butterfly

The aforementioned revolution in genetic scanning and sequencing has made the idea of personalised or precision medicine — medicine designed to suit your specific genetics, biochemistry and life experience, rather than being applied generically — a real possibility.

While humans share the same broad biochemistry and so many drugs work universally across populations, many health problems relate to highly specific mechanisms of disease, and so would be most effectively treated with highly specific treatments that are tailored to the patient.

"We're effectively in the era of personalised medicine already, and it's certainly where medicine needs to go", concludes Andy. "You want to measure people as individuals, so we can confidently say: 'Yes, this is the right medicine for you'. It's about measuring the detail and complexity of your genes, your proteins, to really unlock the differences between individuals — the differences between a caterpillar and a butterfly."

*Rosa Biotech ceased operations in 2024

> In the UK, some new parents may soon be offered the ultimate tool in personalised medicine: optional genomic sequencing for their babies at birth, so that scientists can spot early signs that intervention could help improve the baby's future health.

Zeroing in on the potential of our blood for targeted healing; Science Creates member company Scarlet Therapeutics

Bloodborne bio-machines

Tricorder-like devices are an exciting example of science fiction leaping off the small screen and into the lab — but what if we could go a step further and redesign the body to heal itself, an enviable talent showcased by Schwarzenegger's cyborg Terminator?

Cell therapy company Scarlet Therapeutics has zeroed in on the potential of our blood for targeted healing, and is generating therapeutic red blood cells in the lab. "The main function of red blood cells is to carry oxygen around the body", says Alistair Irvine, CEO of Scarlet Therapeutics. "But if you can make them do something of therapeutic benefit as well, you essentially create little bio-machines working away to deliver drugs or perform a treatment within your body. For example, if you've got a patient with a genetic condition that causes toxins to build up in their system, they've got no way of getting rid of those toxins — but we can create and infuse red blood cells that break them down."

Non-modified universal red blood cells can also be created in the lab, a possibly life-saving prospect for patients with rare blood types needing transfusions.

Scarlet Therapeutics creates synthetic cells by taking a blood sample from a donor, and genetically modifying special constituent cells so that they grow into red blood cells containing a protein, or proteins, of choice. These special constituent cells are known as stem cells, and have the unique ability to grow into many of the different cell types found in the human body. Stem cells play a crucial role in cell therapy, a huge and rapidly growing area of healthcare. Therapies are being developed for a wide range of conditions including autoimmune disease, cancers, dementia and paralysis.

"The really exciting part of what we're doing is generating a cell line: a population of cells that can be kept alive in the lab for a long period of time. You basically take the initial cells and make them immortal", adds Alistair. "You can create a continual supply of therapeutic blood, so you don't have to go back to the donor every time. If you build the line from someone whose blood is compatible with the majority of people, you can treat most patients with blood from a single cell line — the end goal is to get red blood cells that can go into anybody. Overall, lab-grown cells will play an important role in the healthcare system of the future."

THE DEEP TECH DILEMMA

How relevant is product-market fit in the new era of Deep Tech startups?

John Williams, SCVC Partner

The inventor of Product-Market Fit (PMF) defines it as a unique product offering that people desperately want. Or, in another way of looking at it — will the dogs eat the dog food?

Unfortunately, beyond this definition, details are very much left to the imaginations of VCs and founders. Some companies even attain PMF but can't be confident that's what they've achieved. To complicate matters further, PMF is typically seen as a process: it can be lost just as quickly as it is attained as the market moves.

So why is this term used so frequently within the startup community? Academic research into entrepreneurship and business doesn't even recognise the term due to its vague definition. Yet it is widely believed that achieving PMF is the holy grail for startups and thus investors.

The origin of the concept comes from Sequoia Capital; the term PMF was coined by Benchmark and popularised by Andreessen Horowitz. It's difficult to think of three heavier hitting venture firms to argue with, especially since the concept has stood the test of time. But does this wisdom apply to the relatively new world of Deep Tech startups?

Deep Tech describes technologies that require significant R&D and capital expenditure prior to any commercialisation attempt.

Deep Tech startups are typically attempting to commercialise advanced research for the first time. This contrasts with general tech startups, which are utilising existing engineering techniques and technologies to address existing market needs. We're talking about the difference between the invention of the MRI machine and the invention of Deliveroo.

To VCs, the risk profile of Deep Tech startups is drastically different. Deep Tech companies, unsurprisingly, have larger technical risk, whereas general tech companies tend to be all about market risk. It's no wonder Marc Andreessen said market size is more important than the product and the team when he popularised PMF.

A quirk of venture capital funds is they tend to be subject to the power law, which observes that a single company in a portfolio is likely to drive most of the fund's returns. When considering the size of the larger funds, that can only be achieved with eye-watering exit valuations for a single company, now in the tens of billions of dollars. And with general tech, the inherent value of the company is intrinsically linked to its revenue. So that market better be big.

But what about Deep Tech companies? How will they be valued? How do you size a market that doesn't necessarily exist yet?

The inventor of Product-Market Fit (PMF) defines it as a unique product offering that people desperately want. Or, in another way of looking at it — will the dogs eat the dog food?

STL, a Science Creates member company, builds viable and sustainable IP-led businesses such as SCVC portfolio company Delta.g

A Deep Tech company should come from a position of strong technical IP, often derived from years of research.

In the UK, we usually see this manifest as university spinouts, where the IP has already benefited from significant time and financial resources prior to the company's inception. A driver of early mergers and acquisitions (M&A) is often larger corporations securing what they think is valuable strategic IP. So, if the tech works, Deep Tech startups are already in an advantageous position compared to general tech in that they don't necessarily have to achieve PMF at all to see a happy outcome.

But how do Deep Tech startups go about maximising their chances of finding PMF and driving value even further?

General tech companies work backwards. Pick a suitably large market, determine a product that can fill a gap in the market, and then figure out how to build it technologically. Since PMF is a process, the tech, the product and even the market are all variables that can be altered along the way.

This doesn't work in Deep Tech. If the technology is the result of years of research and millions in funding, it's not trivial to change the technology because of the PMF feedback loop. And if the technology is less flexible, then careful consideration is needed when designing the product that will ultimately select the market.

Deep Tech companies need a technology-first approach to product design — because if the product isn't good enough, there's a limited number of options to adapt. At SCVC, the venture capital arm of Science Creates, we have created a framework used for de-risking Deep Tech companies called Technology-Product Fit (TPF).

Where PMF asks the question "will the market embrace your product?", TPF asks "does this product exemplify your technology?" Or, to embrace the initial analogy, where PMF asks "will dogs eat the dog food?", TPF asks "does your technology make dog food that will make dogs live 10 years longer?" If the answer is yes, and your technology allows you to build a product that only you can build, then the competitive landscape looks a lot simpler.

This process even applies to tech giants. Consider the rise of Nvidia, now a company worth $2 trillion that many think has monopolised AI compute. It started life as a graphics card company for gaming. In the pursuit of better-looking graphics, Nvidia released programmable shaders. If these shaders can be programmed to do complex rendering calculations, then they can also be programmed to do general-purpose computations. Nvidia developed and released a general-purpose GPU framework called CUDA to enable this — which would go on to be one of the key catalysts in the growth of deep learning. Nvidia continued this shift to focus on AI in a way that is fully flexible – its USP – and makes the company immune to becoming obsolete as machine learning architectures rapidly evolve. Nvidia's TPF is its flexibility to deliver high-performance computing in rapidly changing ecosystems. The market takes care of itself.

And what happens when a Deep Tech company doesn't consider TPF in its early stages? TPF, like PMF, is a process. A startup should spend its formative years developing a series of prototypes to gauge the most appropriate industry option, or vertical, for the technology. This happens in parallel to further development of the core technology, which significantly de-risks the company, as Deep Tech companies have high technology risk. If a company commits to a vertical too quickly, there is little evidence of the compatibility between the technology and the product vertical, and if a company is created around the vertical, it can become a one-way door with little ability to alter its trajectory if the product turns out to be the wrong one.

Imagine you have developed a particularly lightweight composite material and, while seeking market validation, Boeing tells you that your technology would be ideal to use in the tip of aeroplane wings. So, you develop a whole aerospace company with a team of aerospace experts ready to spend years developing this aerospace product. And then, when you finally take it to Boeing or Airbus, they don't want it. Your technology could have been the perfect smartphone housing, but you can't pivot it now because you have committed to the wrong vertical and the wrong product.

Unfortunately, this happens too frequently in Deep Tech startups, as there is significant pressure from early-stage VCs, and even university tech-transfer offices, to identify a market and potential customers at the very beginning. Without a process and serious evaluation, it becomes a dice roll whether the selected vertical is correct or not – otherwise, by the time that is apparent, it will be too late.

At SCVC, we use the TPF-first approach in all of our decision making processes, because we don't want to roll that dice.

We're talking about the difference between the invention of the MRI machine and the invention of Deliveroo.

Science Creates member and materials innovation company, Kelpi - turning the tide on plastic packaging

SHAKING UP

Why we're building better batteries, planet-friendly packaging and a greener grid

The Science Creates ecosystem is home to disruptors, experts and innovators: scientists and engineers working to bring about truly radical change by taking scientific discovery out of the lab and into the world.

Nicky Jenner, Science Editor

THE STATUS QUO

“We must act now to limit the risks of an increasingly inhospitable climate in this and the coming centuries.”

Petteri Taalas
Former Secretary-General of the
World Meteorological Organization

A core area of focus for our members is energy, a sector in which change is not a nice-to-have — it’s essential, say global experts. The energy sector pushes out three-quarters of our global greenhouse gas emissions, and our warming world is struggling to cope. In 2023, former Secretary-General of the World Meteorological Organization Petteri Taalas vocalised the urgency of the situation: “We must act now to limit the risks of an increasingly inhospitable climate in this and the coming centuries.”

Science Creates innovators are working on just this. They’re developing advanced materials and technology for a cleaner, sustainable future — and rendering the old way of doing things obsolete.

MEET THE INNOVATORS REWRITING THE RULES OF ENERGY

Electrifying transport with better batteries

Anaphite

Batteries are indispensable to the energy transition, and underpin efforts to electrify global transport systems. The older lead-acid technology used in a car's 12V battery cannot store as much energy as new lithium-ion batteries, which are being used to power the electric vehicles (EVs) on our roads. Improving these batteries is crucial to creating EVs that charge quicker, drive further before needing to recharge and are cheaper to manufacture and buy — all common hurdles facing EV uptake.

One company working to optimise lithium-ion batteries for EVs and reduce our need for fossil fuels is Anaphite. Anaphite has developed a process that enables batteries to be produced in a lower energy and lower cost method called dry coating, without compromising on battery performance. Dry coating removes the need for the bulky, expensive, energy-hungry equipment currently used in battery production, making the entire process quicker, cheaper and more efficient.

Better batteries could also stabilise our energy grid by storing excess energy created by renewables like solar, wind and wave, and then releasing this to meet surges in demand.

Producing plastic-free packaging from seaweed

Kelpi

The overwhelming majority of the plastic we use is derived from oil and gas. Despite growing initiatives to shift from single-use plastics to cleaner, greener alternatives, demand for plastics has doubled in the last 20 years, and is still growing rapidly. Only 9% of plastic waste is recycled globally, about 12% is incinerated and 40% ends up in landfill*. Every year, more than 20 million tonnes of plastic waste leak into fragile ecosystems** — especially aquatic.

Pulling oil from the ground to make single-use plastics is unsustainable, says Kelpi, a materials innovation company turning to the environment for inspiration and developing bio-plastics from renewable, natural materials.

Kelpi uses seaweed and natural plant-based oils to create a unique coating material that provides the sort of barrier to moisture only previously achieved by fossil fuel plastics. The company has already received £7.35 million across two seed funding rounds for its work creating thin coatings for paper, card and fibre, which allows recyclable packaging made from these materials to replace single-use fossil fuel plastics. Rather than fossil fuels, Kelpi starts with seaweed, which grows in vast amounts without the need for fertiliser, land or freshwater; sequestering carbon and deacidifying the ocean as it grows.

Kelpi's innovative coatings are already being tested by global clients in the food and drink, and cosmetics and toiletries sectors — to create paper and card packaging that works like plastic but enjoys the much higher recycling rates of paper and card after use. And, even if it ends up at sea, Kelpi-coated paper and card packaging will break down naturally in a matter of weeks or months, leaving no toxins or microplastics behind.

Harnessing the potential of waste

WASE

A whopping 2.5 million Olympic swimming pools' worth of wastewater is discharged, untreated, into our environment every single day. Wastewater innovators WASE have developed a modular system to treat waste at the point of production and convert wastewater (and other residues) into renewable biogas, clean water and nutrient-rich fertiliser. This biogas can be used to generate energy and fuel business processes, reducing our reliance on fossil fuels and driving down greenhouse gas emissions from agriculture and industry, while the recovered clean water can be cycled back into agriculture or discharged safely to reduce and conserve the sector's water use.

In 2024, WASE secured an investment of £8.5 million — a round that earmarked funds to scale operations and execute multi-million pounds of signed contracts and projects with customers while building out its product offering.

* World Economic Forum, Ellen MacArthur Foundation, & McKinsey & Company. (2016). The new plastics economy: Rethinking the future of plastics.

** United Nations Environment Programme (UNEP). (n.d.). Plastic pollution.

The Building Blocks of a Community

As Science Creates looks forward to the opening of its next physical space, 'OMX', in late 2025, architect-in-residence Patrick Fallon discusses why cultivating community takes more than bricks and mortar.

Patrick Fallon
Head of Developments, Science Creates

As I walk across the double-height space at our Old Market incubator, the morning light pours in along the split-level bar, and I arrive at a sleek, arching chrome device that stands proud. There is a swarm of morning chatter — laughs and familiar, friendly faces hovering, looking at who is next to remedy their morning need.

While the tap bellows steam and the crunch and grind of the bean is silenced below, the conversations are eye-opening; they remind me, every day, just how visionary our community is here. Today, it's quantum gravity and how measuring an atom dropping in a vacuum means you can see the unseen, hundreds of metres underground. Tomorrow, it's about opening Europe's largest contract pilot facility for cultivated meat. Another day, it's how the future of medicine lies in lab-grown red blood cells which, once injected into humans, aim to flush out rare chronic diseases. Another day, another world-first. Pretty invested chats for first thing in the morning, but it's these great minds, solving huge world problems, that get me out of bed every day.

It's these minds that have risked a lot to develop such game-changing technologies. After all, commercialising IP is not easy. They've chosen a treacherous path, odds stacked against them. Whether it's down to technology issues, cash flow setbacks or simply bad luck, many of these companies won't make it past the seven year mark*. It takes a certain type of character to be a Deep Tech entrepreneur and work for a company for which the future is never certain. These are brave individuals ready to take their chances and they all share a common trait: an unrelenting will to improve the world.

So how do we design a space for people where the stakes are so high?

We think the spatial experience of our incubators should reflect the level of thought and ambition of the science taking place within. In this case, that's a lot. The PhDs per square foot here can sometimes be intimidating, even for someone who completed 12 years of architecture school. Our approach is to tailor our spaces for a vibrant, ambitious and passionate entrepreneurial community. We've done so by committing to placemaking — designing spaces that inspire, encouraging conversation through intimacy and human scale, while at the same time overdelivering on the R&D spec.

But it goes beyond design — it's a mentality. At Science Creates, we exist to enable our members to solve some of the hardest scientific challenges, in any way we can. What you get as a result is a place where some of the world's leading startups, investors and academics gravitate. It feels like everyone has a shared purpose and a lot of work still to do.

This is square footage that's in demand, with all spaces taken. As the coffee queue grows each morning, so does the realisation that it is a great problem to have — it means we're providing a place where people really want to be. The community events are packed and demonstrate strong social bonds — whether it's a Mexican Day of the Dead bake-off, an LQBTQIA+ Drag catwalk or a 'SCimbledon' ping-pong championship, people are happy to stay here after work, late into the evening, which is a great thing. The intersection of all walks

Giving scientists the physical infrastructure they need to become entrepreneurs and achieve impact in the real world

of life is amazing to see, too, and it's cross-generational — often with the atrium full of young faces from a local school or home-ed class walking into The Learning Lab to discover what a scientist actually does in practice, inspiring them into exciting career pathways.

But as the timetable gets booked up, growth can be a double-edged sword. I am often asked by our members when the next facility is going to open. They are under many pressures — growing teams, investment milestones and limited lab space. It's a difficult juggling act that can have a massive impact on a company's chance of success.

This cultivation of the field and the building of our incubators has taken the best part of a decade.

It has been a slow process, and along the way we have been bruised by the commercial property market, the economic climate and anything, by Sod's Law, that will try to scupper our plans. It does soften the mood. But we're a resilient bunch, with many 'code reds' under our belts. The clock is ticking and the time is coming closer for us to help remove the uncertainty and help again with lab space availability in Bristol.

***Our partnership** with the University of Bristol and Research England marks the first step in realising our vision for the future. Together, we're creating a biotech and quantum innovation hub: 'OMX' — an extension to our Old Market site that will double our footprint and offer lab and office space for both spinouts and scaleups. Set to open in 2025, OMX will provide much-needed facilities for our growing community.*

This project is also a first for us as we venture into multi-story lab spaces, making us the largest provider of CL2 lab space in the South West, with 77,000 sq ft under management. OMX will be another platform for even greater growth and opportunity in Deep Tech.

While it can sometimes feel like an uphill battle, being part of a growing team, a thriving ecosystem and an expanding cohort of Deep Tech companies in the West of England is incredibly rewarding. The region is now attracting some of the UK's largest investments in spinouts; an exciting shift that underscores the region's growing importance in the Deep Tech sector. But there's still work to be done and for too long the 'Golden Triangle' has been the focus of innovation funding in the UK. A levelling of the playing field is how we see it, with a need for stronger connections between the community's needs and the strategic need for investment. A greater appetite for risk is required.

We founded our Old Market incubator, along with our first site at St Philips, as part of our mission to give scientists the physical infrastructure they need to become entrepreneurs and achieve impact in the real world. Navigating a period of profound scientific and societal events spanning almost a decade, we have seen this Deep Tech ecosystem and community grow and pull together beyond anything we expected. It is a difficult undertaking, building a Deep Tech business. But being a collective, and one that is mutually supportive with a shared purpose, will smoothen the ride — and make the early mornings worth it.

*Royal Academy of Engineering, Beauhurst. (2024). Spotlight on spinouts 2024 (p. 29). Royal Academy of Engineering.

Concept— to Company

Following the successful completion of a second Engineering Biology Accelerator Programme, Lucy McGowan reflects upon the enormous opportunity of innovation in this space, and the growing pressure for the UK to become a global leader in it.

Lucy McGowan
Innovation Manager, Science Creates

So you're a synthetic biologist. You've spent countless hours in the lab. The orbital incubator swills your bacterial cultures in the background with a familiar rumble and squeak. Clone, rinse, repeat. But this feels like it's going somewhere. The metaphorical light bulb illuminates in your head as you think "I just might actually have something here. This could be more than a paper". You're at a crossroads. What now?

A breakthrough in engineering biology (EngBio) is just the beginning. According to Failory*, nine out of ten startups fail. Scientific founders must learn to navigate the known knowns, the known unknowns and even the unknown unknowns of their company — they need support to thrive. Fortunately, the UK government's Department for Science, Innovation and Technology recently named EngBio as one of five critical technologies to be made a national priority. A subsequent surge in public funding has led to a groundswell in EngBio opportunities, meaning there's never been a better time to commercialise research in this space.

At Science Creates, we believe that scientists make great entrepreneurs; we exist to support founders who strive to solve the world's biggest issues through Deep Tech. That's why in 2023, we partnered with UKRI to successfully deliver a unique Engineering Biology Accelerator Programme. Our accelerator is the first of its kind and currently the only UK-wide programme tailored to EngBio.

*Failory. (n.d.). Startup failure rate: Ultimate report + statistics.

Acceleration with purpose

We know there isn't a step-by-step recipe to start a Deep Tech company; the journey is unique for every founder. There is a wealth of different accelerators out there and, with time precious and funding scarce, it's hard to select which ones are right for you. We keep ours simple: our accelerator is fully funded, EngBio focussed, tailored to your needs and, crucially, takes no equity from the companies who join. We put founders in the driving seat.

We believe great people are at the heart of any successful business and Deep Tech is no exception. Therefore, a core principle of Science Creates is that we always work with partners who have a wealth of experience in their respective fields, preparing founders with the best possible expertise. Candidates on the programme are supported by a dedicated team working alongside eight delivery partners and are connected to a wider network of over 40 active member companies and 12 strategic partners, including a UK-first partnership with Thermo Fisher Scientific. Our flagship accelerator is also supported through unique partnerships with a network of globally-leading VCs, helping founders to explore the best investor fit for their early-stage companies, without giving VCs rights of first refusal to invest.

Through the framework of our nine-week accelerator, founders refine their IP strategy, technology roadmap, fundraising plan, pitching skills and company brand. Our accelerator also invests heavily in personal development via psychometric assessment, workshops, one-to-ones and follow-ups with qualified leadership psychologists.

Accelerators vs Incubators

While used interchangeably in the startup world, at Science Creates we define accelerators as short-term, intensive programmes to quickly advance the stage of a business by providing expert training, mentoring and support, with potential options to receive follow-on funding.

Our Incubators are facilities designed to give longer-term support to early-stage Deep Tech startups, meaning access to lab, office and event spaces that exist within Science Creates' wider ecosystem of support.

Over a century ago, the term synthetic biology emerged for the first time. Flash through to the present — we have seen the discovery of the DNA helix, genetic engineering, CRISPR and mRNA technologies. These discoveries radically redefined the term, now encompassing a pioneering field which has exploded over the past two decades. Synthetic biology considers the living world in its component parts; through clever design these parts can be reorganised and rearranged synthetically to create novel inventions.

The subdiscipline of engineering biology (EngBio) has evolved to distil the ever expanding streams of synthetic biology research into scalable and innovative technologies — EngBio is where synthetic biology meets the real world. Through its industrial scale, EngBio has the potential to solve many of our greatest challenges in climate, health and food security. If you can think it, EngBio can probably achieve it. The UK is a hotbed for emerging technologies in this field, with new solutions being discovered continuously. The problem is that many of these technologies, and the people capable of scaling them into real-world solutions, are trapped in the lab.

Nurturing global leaders in EngBio

A UK-wide spread of EngBio founders means taking a UK-wide approach to recruitment. Science Creates has hosted roadshows in five of the UK's leading regions for EngBio, giving prospective applicants an insight into what it takes to be a successful entrepreneur in the field. As well as uniting communities of future EngBio founders with their local innovation support services, the roadshows host inspiring panel discussions and provide authentic insights from the perspective of successful EngBio founders and VCs.

Our roadshows set out to find the most ambitious and innovative early-stage EngBio founders across the UK — and we found them. Cohort 1.0 comprised a highly diverse group of 23 founders, with a further 20 making up Cohort 2.0. Candidates range from entrepreneurial master's graduates to experienced principal investigators and everything in between. Collectively, they are attempting to tackle a huge range of global issues, with their innovative technology spanning across the four pillars of EngBio: biomedicine, clean growth, food systems and environmental solutions.

Accelerator graduates who found an EngBio company unlock the exclusive opportunity to apply for up to £50k of equity-free, follow-on feasibility funding from UKRI, to support the ongoing development of their business. The flexible nature of the programme encourages candidates to seek and apply for funding relevant to their company throughout, to maximise their runway post-programme. Graduate companies also return for the Science Creates Showcase event, with selected founders winning the opportunity to pitch to a room of investors.

Since September 2023, the accelerator has supported 42 entrepreneurial scientists and a total of 35 EngBio companies across two cohorts, with half of those companies being formed during or shortly after the programme. Within just 18 months, graduates have raised at least £3.8 million in equity investment, as well as more than £2.1 milion in grant and competition funding. These figures continue to climb as companies grow their headcount, develop their technologies and gain increased exposure over time.

The outlook for EngBio entrepreneurs

The appetite for EngBio is growing exponentially. In December 2023, the Conservative Government announced its National Vision for Engineering Biology, pledging £2 billion in funding over the next decade. Whilst the new Labour Government is yet to commit to this figure, it has indicated that EngBio will continue to be a major priority for the UK. The recent publication of the House of Lords' inquiry into EngBio places pressure on leaders to provide a full pipeline of support that can not just catalyse the formation of early-stage spinouts or startups, but also enable and retain high-growth scaleups. This will require long-term investment, a commitment to train skilled workers, industrial-scale infrastructure and regulation that's fit for the future.

EngBio has the potential to become a multi-trillion dollar global market, as well as positively reimagine our outlook on society's biggest challenges in health, food security and the environment. The UK is primed to become an international leader in EngBio. As the field grows, so will the next generation of EngBio founders. These founders will require continuous and dynamic support at all stages — from inception to scaling and exiting — for their companies to succeed.

Our accelerator demonstrates that a relatively small amount of public funding at a critical early stage can go a long way towards helping companies gain momentum, attract larger-scale investment and grow quickly.

Over the next decade, many more scientists will take the leap, defining the new era of EngBio. Science Creates' thriving ecosystem is ready to accelerate the upcoming surge of ambitious EngBio founders to translate their discoveries into living, breathing businesses. Will you be one of them?

The Science Creates Engineering Biology Accelerator was fully funded by UKRI. The first programme ran from September 2023 - November 2023. The second programme ran from June 2024 - August 2024.

From discoveries to inventions

ScienceCreates