

Nurturing impact at scale

NTU President Ho Teck Hua on balancing basic science and entrepreneurship, and why translating ideas into real-world solutions requires patience, persistence, and the right ecosystem.

Stanford University is well known as a hub of innovation, in part because many students and alumni have gone on to become some of the best-known entrepreneurs in the world. Over a 50-year period, the university has held approximately 13,500 inventions and disclosures. Of those, only one in five has generated any licensing revenue, and only one in a hundred has had a chance at earning US\$1 million or more. Just three spin-offs have crossed the US\$100 million mark — one of them being Google.

Professor Ho Teck Hua, President of Nanyang Technological University, Singapore (NTU Singapore), cites that data to make a point. “Successful commercialisation of research breakthroughs is difficult,” he says.

Five ways research can fail to bear fruit

Prof Ho identifies five challenges to research commercialisation. The first is weak market validation. Many researchers pursue scientific questions that interest them without engaging the market to see which problems need solving. “Even if a breakthrough is found, the product-market fit is unclear and investors may be

uninterested,” he adds. His antidote to this is to build customer discovery, market testing, and iterative prototyping into the translational pathway right from the start.

The second challenge is one of market size. A scientific advance may not address a market problem large enough to justify the investment needed to commercialise it. Solving this requires researchers to think about economic headroom early in the research process. “Focus on addressing pain points in big markets, for example,” says Prof Ho.

The third challenge is the talent gap in venture building. Technical competence and entrepreneurial competence are different skills, and researchers who are strong in one area may not be strong in the other. “Without venture-building talent, even a good invention will not get off the ground,” Prof Ho says. To fill this gap, NTU committed S\$5 million to a S\$75 million pilot programme supported by partners such as Xora Innovation, the early-stage deep-tech investing platform of Singapore investment company Temasek, to accelerate the commercialisation of deep-tech ventures from university research.

Through the programme, deep-tech founders at Xora work directly with NTU’s intellectual property (IP) and technical teams to develop and refine go-to-market strategies, bridging the gap between scientific expertise and commercial execution.

translational research. Basic research will always be important. This is because the value of its outcomes cannot easily be predicted and many of the most commercially significant discoveries in history began as exercises in pure scientific curiosity.

Prof Ho is aware of this. “It can be hard to predict which research ideas are going to have an impact,” he says. He adds that universities must strike a balance between basic and translational research by building an open, creative, and encouraging research environment. NTU does this by ensuring that the University’s infrastructure, resources, and faculty support “empower our scientists to tackle big, difficult, and intellectually challenging problems”. At the same time, the University collaborates closely with industry so that researchers understand where market gaps

exist and can work alongside industry partners to produce outcomes with commercial potential.

“It is the existence of a collaborative and connected ecosystem that has helped our researchers produce work with high intellectual value and high translational value, as well as research with high intellectual value and uncertain translational value,” he says.

The case in numbers

The results, in aggregate, are tangible. In 2024 and 2025, NTU received the Startup Ecosystem Stars Award presented by the International Chamber of Commerce and global innovation platform Mind the Bridge, with backing from the Organisation for Economic Co-operation and Development, and the European Commission. In a 2023 Clarivate ranking of research organisations most cited by the world’s top innovators, NTU placed seventh globally and was the only Singapore institution in the top ten. The University’s portfolio of spin-offs and startups have a cumulative valuation of approximately S\$1.6 billion.



An initial Memorandum of Understanding on a programme to accelerate the creation of successful deep tech startups was signed by (from left) NTU President Professor Ho Teck Hua, National University of Singapore President Professor Tan Eng Chye, and Mr Russell Tham, Head, Emerging Technologies of Temasek Global Investments.

The fourth challenge is a lack of crucial early-stage funding. After a breakthrough, scientists typically need capital to develop a working prototype, which is needed to attract further investment. Some ideas stall at precisely this juncture — a problem the pilot programme is structured to address.

The fifth challenge is scalability. An invention that works in the laboratory may prove impractical or uneconomical at an industrial scale. Prof Ho’s view is that this should be considered early in the research process, ideally in partnership with industry, so that the business case for supporting the research can be strengthened.

Basic research and the limits of prediction

The need to engage the market reveals a major difference in the motivations behind basic and

Two recent examples illustrate the successes. Eureka Robotics, an NTU spin-off, develops AI-powered systems that give factory robotic arms greater sensitivity and precision. It raised US\$10.5 million in Series A funding led by B Capital, whose co-CEO is Facebook co-founder Eduardo Saverin, with participation from Airbus Ventures. Amperesand, another deep-tech spin-off focused on power infrastructure for AI data centres, raised US\$80 million in Series A funding co-led by Walden Catalyst Ventures, founded by Intel CEO Tan Lip-Bu and former Samsung Electronics president Young Sohn, and Temasek.



Eureka Robotics was founded in 2018 with the mission of helping factories worldwide automate dull, dirty, and dangerous work, so that human workers can focus on their creative endeavours.



Founded in 2023, Amperesand is a next-generation power infrastructure provider for artificial intelligence data centres and critical power applications.

Forbes has described Mr Tan, an NTU alumnus, as a pioneer of Asian venture capital; his involvement is a reasonable proxy for how the University's innovation pipeline is perceived beyond Singapore.

Beyond the scoreboard

Revenue figures and startup counts are the standard metrics for university commercialisation. While these numbers are important, Prof Ho argues that “we should also consider other outcomes and indicators.”

The first indicator is researcher development. Commercialisation exposes scientists to industry thinking and helps them learn about market needs, which makes them better at identifying industry gaps and collaborating effectively with industry.

The second indicator is network expansion. Industry relationships built during one commercialisation effort often become assets in the next. Professional contacts could become important partners for future business opportunities, as well as provide insights that help scientists in their entrepreneurial journey. Graduates in the hiring market also benefit when their institution has strong ties to industry.

A third indicator is customer feedback. If a product exceeds customer expectations, that could be a win for a startup even if revenue numbers are not initially strong. This is because good word of mouth from customers can go a long way to bolster a firm's success in the longer term.

“Such impact cannot be easily captured by revenue and startup numbers alone,” Prof Ho says.

Building across disciplines

One structural asset NTU has invested in is interdisciplinary infrastructure. The University's Interdisciplinary Collaborative Core curriculum requires all undergraduates to work in cross-disciplinary groups — a deliberate attempt to build the habit of integrating insights across fields before students encounter the boundaries of professional specialisation. At the graduate level, the Interdisciplinary Graduate Programme has students concentrating across two or more disciplines rather than one.

“We want to train our students to be interdisciplinary problem solvers who can

break down the walls between disciplines to find solutions,” says Prof Ho.

The University now has numerous institutes and centres conducting multidisciplinary research, and over one hundred faculty members hold joint appointments across schools or colleges. Times Higher Education recently ranked NTU fifth globally in its Interdisciplinary Science Rankings — the only university in Asia in the top five.

Physical infrastructure matters too. The NTU Innovation Port provides spaces specifically designed for cross-disciplinary collaboration, intended to lower the friction involved in getting people from different fields to work on shared problems.

What comes next

With NTU's research footprint, Prof Ho has a vision for the University's role in Singapore's innovation landscape over the next decade.

Noting that innovation and research translation are important activities for small countries like Singapore, he says that NTU plays its part by helping to spur innovation and research translation in a systematic and purposeful way.

He points to the University working closely with world-class industry partners on research, including major companies like Alibaba and Mastercard. “By doing this, our research serves as the economic engine to help businesses solve their pain points and build better products and solutions faster,” explains Prof Ho.

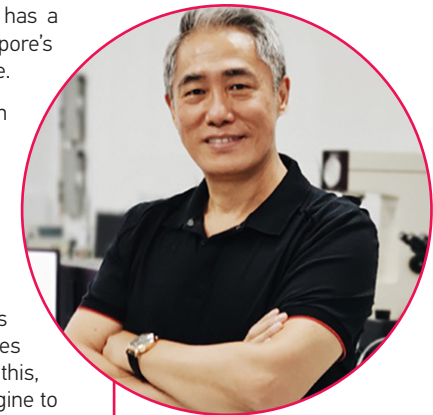
NTU will also have to work with more organisations to accelerate science entrepreneurship and develop a pipeline of deep-tech ventures. For example, the University recently teamed up with US-based non-profit Activate to launch a programme to this effect.

IP licensing presents another opportunity. NTU must conduct research relevant to the world, and which can be licensed to businesses to strengthen their offerings and address their challenges in a timelier way. To this end, NTU is

making it easier for its IP to be licensed, such as by deferring IP licensing fees.

The University needs to build its contingent research capabilities too, so it can leverage them to find solutions during crises like the COVID-19 pandemic. This means supporting researchers in honing their expertise through challenging research problems.


The longer-term ambition centres on the startup ecosystem. NTU currently has one deep-tech unicorn — Nanofilm Technologies International, a nanotechnology solutions firm valued at over US\$1 billion at its peak. Prof Ho wants to improve the odds of producing more unicorns, through careful curation and support. It entails supporting the creation of enterprises that tap on NTU's IP to develop products and services for a global market.



Dr Shi Xu, Founder of Nanofilm Technologies International, which specialises in ultra-thin protective coatings used in many products, from consumer gadgets to automotive parts and optical devices. These innovations are built on proprietary technologies and processes that Dr Shi invented and patented during his time at NTU.

“My hope is that NTU will stand as the best technological university in Asia that is at the forefront of translating research to create societal impact for Singapore and beyond,” says Prof Ho.





Good science isn't enough: the case for designing translation from day one

Professor Lim Kah Leong points to IP discipline, repeatable processes and partnerships built before the science is ready, and not after.

Fewer than one in ten drugs that show potential in preclinical testing ever make it to approved therapy — a rate that has barely moved in decades. The bottleneck is rarely the discovery itself. What compounds the problem is how seldom research teams are equipped, or incentivised, to contemplate translation until it is too late.

Professor Lim Kah Leong has spent much of his career asking why promising discoveries so rarely survive the journey from bench to bedside. As Associate Vice President of Research (Biomedical and Life Sciences) at NTU and President's Chair Professor in Translational Neuroscience, and Director of Neuroscience and Mental Health Programme at NTU's Lee Kong Chian School of Medicine (LKCMedicine), he has come to see the problem as less scientific than institutional — a gap in planning, IP discipline and partnership-building as much as anything in the lab.

Investable science starts before the first paper

Prof Lim observes that most biomedical research-

ers do have an end goal — to improve patient care. Yet academic incentives pull elsewhere. The drive to claim novelty, through conference presentations or early publication, can compromise IP before researchers realise what they have given away.

He encountered this firsthand during a collaboration with a local biotech company. When a patent lawyer ran a prior-art search, the scope of what counted as prior disclosure was broader than expected: presenting at “symposia for the learned” qualifies. The case was resolved, but the lesson stayed. His framework since then has been a deliberate sequence — design, protect, publish — three processes he treats as complementary rather than competing.

Beyond IP, Prof Lim applies a three-pronged test: can the science be reproduced across multiple labs? Can it be manufactured at scale? And is there real demand — clinicians with unmet needs, along with industry prepared to fund development?

When science gets lost in translation

When asked where university life-science

projects most often stall, Prof Lim points upstream — well before validation debates or reimbursement questions.

The first issue is structural. Scientific reputation remains indexed to metrics — h-index, citations, journal impact factor — that favour novelty over utility. Promotion and tenure committees evaluate on these terms. Universities serious about commercialisation, he contends, need to revisit how they recognise translational work.

The second is experiential. Strong academics are often well outside their element when it comes to venture-building. There is a paradox here that Prof Lim finds telling: academics are trained to treat failed experiments as progress, yet the prospect of a failed startup — with its demand for time, money and public accountability — stops many of them cold.

Building proximity into the process

These upstream barriers fuelled Prof Lim's motivation for establishing LKCMedicine's Office of Innovation and Enterprise (OIE) in 2022 — designed to engage research teams early, and close enough to their work to tease out translational potential that might otherwise go unrecognised.

The primary touchpoint is OIE's Innovation and Entrepreneurship clinics with faculty — regular engagements that give the office direct visibility into live research. When researchers see a credible route forward and have institutional backing behind them, Prof Lim finds they are far more willing to step into uncertain territory. Support includes grant pathways through the National Healthcare Innovation Centre, introductions to external mentors and connections into the broader ecosystem.

For investors, Prof Lim draws a deliberate distinction: the signal worth looking for is not just “demonstrable outcomes” but also “demonstrated outcomes” — a track record of turning strong projects into credible translational trajectories, repeatedly. LambdaGen

Therapeutics, a spinout that OIE shepherded from early-stage collaboration through grant funding to investor introductions, is one illustration of what that looks like in practice. He also flags that getting science into society requires more than technical validation. Cost feasibility and social dimensions are part of the equation, and NTU's breadth across colleges and schools means neither has to be outsourced.

Opportunities abound

He sees particular strength ahead in AI and health data analytics, a natural convergence of NTU's capabilities across engineering, computing and medicine. Medical devices and precision therapeutics, supported by NTU's sciences base and healthcare partnerships, represent another sustained area of opportunity for industry and investors.

“Academia–industry partnership is bilateral in nature. An effective entry point would be the provision of real-world problem statements for our research performers to solve. The potential solution would be best co-created together with the potential industry partner, for example via a hackathon. This will help align priorities and promote matching expectations,” adds Prof Lim.



NTU faculty and students embedded with clinical partners through the Engineers in Scrubs programme initiated by Prof Lim — working at ground zero from day one to understand real-world problems and develop practical solutions for healthcare.

Built to scale: From lab breakthrough to global power player



Amperesand, a deep-tech spin-off from NTU, is rewriting what power infrastructure can do for the world's AI data centres.

Electricity demand is surging as digitalisation and AI adoption accelerate. The International Energy Agency projects that data centres could more than double their global electricity use to around 945 terawatt-hours by 2030 — roughly Japan's current consumption — with AI-optimised facilities driving the fastest growth. Against this backdrop, lead times for traditional transformers have quadrupled since 2019, grid bottlenecks are stalling new deployments and power reliability has become a strategic concern for governments and hyperscalers alike.

Long before today's power crunch, a small team at NTU was working on an unconventional idea — a solid-state transformer (SST) that could one day replace bulky hardware with compact, semiconductor-enabled systems offering speed, control and efficiency that legacy infrastructure simply could not hold a candle to. What started as a light-bulb moment would, over a decade of dedicated work, flourish into Amperesand, a deep-tech spin-off now backed by global investors and preparing to deliver 30 megawatts of commercial systems by 2026.

Unlike a traditional transformer made of heavy coils and magnetic cores, an SST uses fast-switching power electronics and software controls to convert and manage electricity in one integrated unit. This results in higher efficiency, a far smaller footprint and the precise power management indispensable to AI data centres.

A decade of research, a clear path to market

Amperesand's story begins at the Energy Research Institute @ NTU (ERI@N), where researchers launched a programme in 2016 to reimagine medium-voltage power conversion. Supported by two NRF-funded projects, the team built a series of increasingly powerful prototypes — first a 150 kW proof-of-concept SST, and later a full 1 MVA containerised demonstrator capable of handling real-world grid conditions.

These years of iterative testing, validation and systems engineering created more than a dozen deep-tech IPs, laying a technical foundation strong enough for commercial interest. But turning an academic success into a globally deployable product required more than engineering. It

required a coordinated pathway through NTU's innovation ecosystem.

NTU I&E's processes helped the team navigate early investor discussions, licensing structures and commercial readiness. In 2023, the technology was spun out as Amperesand, incubated by Xora Innovation and backed by seed funding from four venture capital firms. The Temasek x NTU x NUS pilot programme further supported the spin-off's initial growth, recognising its potential to address a critical infrastructure problem with significant economic and strategic implications.

As the company took shape, much of ERI@N's core SST team transitioned to Amperesand in 2024, ensuring continuity between research and product development. A research collaboration agreement allowed the company to continue accessing NTU's facilities while refining industrial design and preparing the system for certification.

To accelerate technology maturation, NTU and Amperesand jointly secured the NRF Central Gap Fund — a national scheme that supports high-impact technologies nearing market deployment. The funding enabled the team to incorporate manufacturing considerations, safety requirements and modular architecture refinements into what would become the company's commercial Medium Voltage Solid-State Transformer (MV SST) platform.



Amperesand's Medium Voltage Solid-State Transformer (MV SST) platform delivers a fundamental leap in power density, efficiency and scalability for AI data centres, defence and megawatt charging solutions.

By 2024, Amperesand had completed full-power, overload and bidirectional testing on its Generation 2 system. A pilot with the Port of Singapore followed soon after, demonstrating how the technology could support mission-critical megawatt-scale charging under real operating conditions.

Turbocharging the future of AI

The leap from validated prototypes to global commercialisation came into full view in 2025, when Amperesand raised an oversubscribed US\$80 million Series A co-led by Walden Catalyst Ventures and Temasek. The investment will enable the deployment of 30 MW of commercial systems in 2026, with a strong emphasis on meeting the urgent needs of hyperscale AI data centres.

Amperesand's MV SST platform consolidates multiple electrical components into a compact, factory-built product that cuts installation labour by half and accelerates time-to-power by up to tenfold. Its power density results in an 80% reduction in equipment footprint, freeing valuable space in high-power facilities. Crucially, the system's intelligent controls allow variable, energy-intensive loads to interact seamlessly with the grid — an essential capability as nations confront the growing strain of AI-driven electricity demand.

The company is now expanding engineering and manufacturing operations across San Francisco and Reno, while maintaining strong R&D ties with Singapore. Amperesand expects to exceed 100 employees worldwide in 2026, positioning itself to deliver critical power infrastructure at scale.

"Amperesand has uniquely benefited from Singapore's support in long-horizon deep-tech research and commercialisation of breakthrough power conversion technologies," shares CEO Brian Dow. "Our journey to bring a new generation of medium-voltage electrical equipment to AI Factory and industrial customers would not be possible without the coordinated pipeline of early R&D, translational funding, talent, and university partnerships in Singapore."