ENTERPRISE
SPARKS
A QUARTERLY PUBLICATION OF NUS ENTERPRISE
JUL - SEP 2021
ISSUE 031

Seeding Agritech Innovation

MCI(P)096/03/2021

FEATURES

RED HOT — SPARKS interest with the latest in the start-up and entrepreneur scene within our community

TRAIL BLAZERS — SPARKS action with fireside chats and tips from experienced entrepreneurs

BRIGHT IDEAS — SPARKS ideas with different thoughts and perspectives

FIRED UP — SPARKS partnerships with industry and market leaders

FIRE STARTER — SPARKS passion with exciting entrepreneurial internships

FLASH BACK — SPARKS interest in past events and activities

USEFUL TINDER — SPARKS food-for-thought

Editor's note

As a small city-state with limited agricultural land, Singapore has primarily relied on using its economic power to ensure sufficient food imports. But with a growing population and concerns over climate change, not to mention an ongoing global pandemic that has highlighted the vulnerability of supply chains, the country has made significant efforts of late to bolster its food production in a bid to increase its food security and self-reliance.

This issue of SPARKS focuses on NUS' contributions to this strategy, notably through the establishment of the new NUS Agritech Centre (p. 8). The Centre, operational since July, represents the university's first dedicated incubator for agritech innovation, with specialised high-tech equipment and resources providing pivotal support to budding agritech start-ups. Importantly, the Agritech Centre draws upon the research strengths and entrepreneurial talent of the university to demonstrate how technologies such as artificial intelligence, robotics and autonomous drones can play a role in urban farming.

Supplementing this feature are synopses of three existing NUS agritech start-ups, who collectively produce around 24 tonnes of vegetables per month (p. 11); a summarised Technology Scan report conducted by the Industry Liaison Office on Vertical Farming (p.12); and event coverage of the "NUS Giving Experience: Taking Farming into the Future" panel that was conducted last June (p. 24). Beyond agriculture, NUS is also contributing to the future of food and food security through foodtech innovation, as highlighted at the recent NUS FoodTech Challenge (p. 16).

We also bring you highlights on recent events, including our flagship InnovFest conference (p. 3) and the recent Tech Showcase Day (p. 14), as well as coverage of the NUS Enterprise Academy (p. 6) and some of its related entrepreneurial education programmes (p. 18; p. 20).

All photos used are either file photos, were taken pre-COVID, or were taken in accordance with the prevailing COVID regulations at the time.

NUS National University of Singapore
Enterprise

ENTERPRISE SPARKS
NUS Enterprise
21 Heng Mui Keng Terrace,
Level 5 Singapore 119613
enterprise@nus.edu.sg
www.enterprise.nus.edu.sg
Company Registration No:
200604346E

Editorial Team: Katherine Chinn
Contributors: Safreen Banu D/O Wahid Ali; Chee Hui Ming; Chin Chee Kean; Eunice Tan; Kathleen Tan

We are happy for you to share or reproduce the content of this publication but do let us know before you do as it is proprietary to NUS Enterprise. Thank you!

RED HOT

INNOVFEST 2021: IMPACTING THE REGION'S INNOVATION AND ENTERPRISE LANDSCAPE

ECOSYSTEM BUILDER | GLOBAL CONNECTOR

Blk 71 has been cited by *The Economist* for its entrepreneurial ecosystem.

Exciting new technologies and ideas from across Asia and the globe intersected with society at InnovFest. Organised by NUS Enterprise, the conference is the official start-up event of Asia Tech x Singapore (ATxSG).

Held virtually from 14 to 16 July, InnovFest showcased 100 start-ups, spin-offs and technologies from the NUS ecosystem. Some 50 thought leaders also shared their experience and expertise over 17 curated sessions. Welcoming participants including innovators, venture capitalists, entrepreneurs and industry experts, Professor Freddy Boey, NUS Deputy President (Innovation & Enterprise), emphasised the importance of speedily bringing innovation from lab to market -- especially in this day and age.

NUS Deputy President (Innovation & Enterprise) Prof Freddy Boey speaking at InnovFest

Ms Rahayu Mahzam, Parliamentary Secretary in the Ministry of Communications and Information as well as the Ministry of Health, said in her opening remarks that Singapore has long recognised that innovation is instrumental in strengthening the growth and resilience of its economy and society.

"In adopting an ecosystem approach, we are able to take a multi-faceted lens, to spur innovation, in support of economic and social goals. Start-ups are a key source of innovation in any economy, as they experiment with new ideas and solve problems with new technologies," she said.

Collaboration is key

Two MOUs were signed by NUS at InnovFest to promote greater collaboration among start-ups, industry, government, academia and regional players.

The first MOU was with Singapore University of Technology and Design (SUTD), where the parties agreed to jointly groom the next generation of entrepreneurial talents and build momentum in innovation and enterprise activities.

> **More than ever, companies need to innovate rapidly. Speed in adopting and exploiting new technologies is critical for success and survival. The ability to take new technologies out of the lab and launch them at start-up speed will set apart the winners."**
>
> **Professor Freddy Boey**
> **NUS Deputy President (Innovation & Enterprise)**

The second MOU was between NUS and two of Indonesia's top universities, Universitas Gadjah Madah and Universitas Indonesia, fostering greater innovation between Singapore and Indonesia. Scholarships and support will be offered to Indonesian students to attend NUS' Master of Science in Venture Creation. The universities will also jointly establish a venture creation programme in Indonesia.

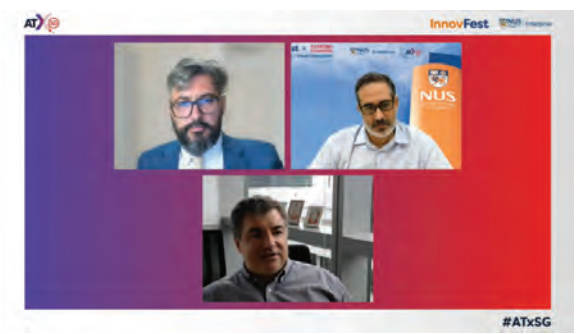
NUS President Prof Tan Eng Chye (left) and SUTD President Prof Chong Tow Chong at the NUS-SUTD MOU signing ceremony.

Challenges of commercialisation

At a panel discussion, three leading NUS scientists discussed issues faced when commercialising their research on 2D materials.

"Singapore has grown not only as a leading research centre for graphene, but more importantly as a strong innovation centre. We see scientists working alongside engineers to develop their research into applications. Exciting research and ideas can be generated at universities, but to develop these ideas, you need the entrepreneurial talents. So these must be nurtured too," said Professor Konstantin Novoselov, Tan Chin Tuan Centennial Professor at NUS.

Researcher and entrepreneur Professor Oezyilmaz Barbaros, who heads the Department of Materials Science & Engineering at NUS, added that an entire ecosystem is required to bring innovation to market. The founder of GrapheneScale Pte Ltd, an NUS spin-off company commercialising graphene for various applications, also pointed out that a whole range of people is needed to translate scientific discoveries into something of value for the economy.



Prof Oezyilmaz Barbaros (top left), moderator Dr Ricardo Oliveira (top right) and Prof Konstantin Novoselov (bottom).

ATxSG and InnovFest Information

> 13,000 registrations for ATxSG

> 8,000 live attendees on ATxSG's virtual platform over 3 days

17 curated sessions at InnovFest, with 50 thought leaders sharing their experience and expertise

InnovFest exhibition showcase of ~100 start-ups/ spin-offs/ technologies from NUS ecosystem

"This is currently lacking in Singapore. Other countries have a broader base to draw upon, in terms of manufacturing industry, start-up companies that are already fairly successful, and SMEs in advanced materials or who are component makers. Building this up in Singapore will require consistent support over the next decade," said Prof Barbaros.

The panel also discussed the conservative risk appetite of Singapore investors in deep tech areas where it is difficult to get support for early-stage spin-offs. Typically, investors here want to see a demo or product, while this is not necessarily the case in the United States.

The panel's moderator, Dr Ricardo Oliveira, is also an NUS researcher and entrepreneur, having spun off his unique graphene production technology into 2D Materials Pte Ltd. He agreed that there were difficulties when starting their deep tech journey.

"When we were still within NUS, there was funding for our work. However, once we transitioned to the start-up, the support received got less. While we did receive significant help from NUS Enterprise and Enterprise SG to spin-off the company and grow, the funding to get to the next level and become an industrial deep tech player came from abroad – investors from Japan and Brazil," he recounted.

"Deep tech innovators should talk to industry early, build a network, create good relationships with key players and socialise with entrepreneurs. There are huge opportunities if researchers interact closer with industry. It leads to designing better research programmes, as well as writing stronger patents and proposals," said Prof Barbaros.

Making Impact

Prof Boey shared that NUS contributes one of the largest numbers of deep tech start-ups in Singapore via programmes such as the NUS Graduate Research Innovation Programme (GRIP).

"We have a proven model for commercialising technologies developed within our research laboratories. Our programmes are designed to transform mindsets and accelerate ideas into solutions, targeting aspiring entrepreneurs wanting to launch new ventures successfully. They provide mentorship, business development, networking opportunities and access to NUS' library of IP and technologies," said Prof Boey.

Such initiatives are already seeing impact. One of NUS Enterprise's earlier 'experiments' is Blk 71, which will soon celebrate its 10-year anniversary -- and was hailed by *The Economist* in 2014 as the "world's most tightly packed entrepreneurial ecosystem."

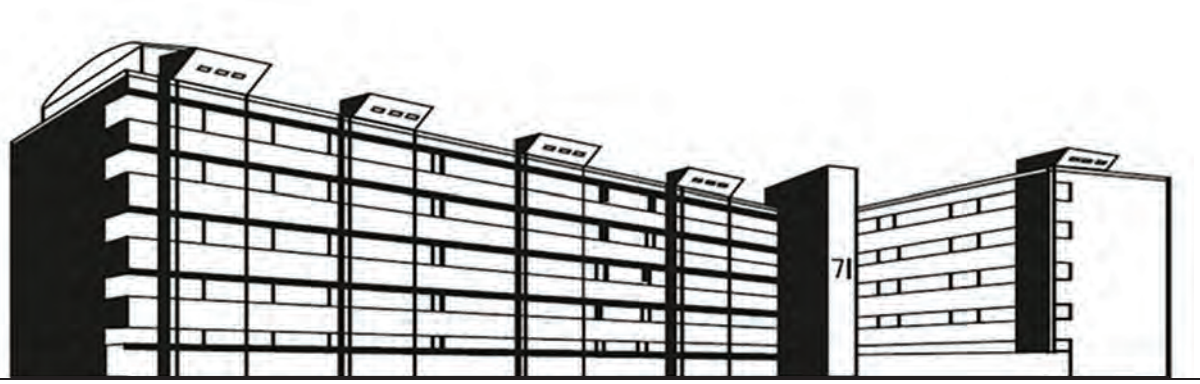
In 2011, NUS Enterprise, together with Media Development Authority and Singtel Innov8 proposed to redevelop Blk 71 (previously slated for demolition) into a start-up hub. The 'experiment' took off and Blk 71 filled quickly. Start-ups also took up space nearby in five more blocks. With the success of Blk 71 in Singapore, NUS Enterprise spearheaded an initiative known as BLOCK71 to launch more hubs overseas, which take on the name from its birthplace here.

> **"For entrepreneurs to realise their full potential, it is essential for universities to provide support for a dynamic ecosystem, and help these budding entrepreneurs to catalyse ideas and bring them to fruition."**
>
> **Professor Tan Eng Chye**
> **NUS President**

Professor Chee Yeow Meng, NUS Associate Vice President (Innovation & Enterprise), shared highlights on the companies incubated by NUS in BLOCK71 Singapore over the past 10 years:

- They have raised a total of S$3 billion (11% of all equity funding raised by Singapore-based start-ups since 2011)
- The total valuation of these companies exceeds S$7 billion (25% share of the total start-up valuation in Singapore)
- Their generated annual revenue exceeds S$1 billion (4.7% of Singapore's info service sector)
- Incubatees with the highest valuations: PatSnap (> S$1.35 billion), Carousell (S$1.18 billion) and ShopBack (S$487 million)

As InnovFest 2021 drew to a close, the hope – and indeed, the expectation – was that there will be further success stories in the years to come.



RED HOT

NUS ENTERPRISE ACADEMY: EXPANDING ENTREPRENEURIAL EDUCATION

The NUS Overseas Colleges programme is one offering of the new NUS Enterprise Academy. Photo taken pre-COVID.

Two divisions within NUS Enterprise, the NUS Entrepreneurship Centre (NEC) and NUS Overseas Colleges (NOC), have come together to form the **NUS Enterprise Academy (NEA):** a dedicated unit focused on expanding the university's educational initiatives in entrepreneurship and innovation.

The new Academy will broaden the university's role in training future entrepreneurial talent, building upon NUS' more than 20-year experience in pioneering groundbreaking initiatives such as the NOC programme, the NUS MSc in Venture Creation, and the NUS Graduate Research Innovation Programme (GRIP).

With new formal degree and executive programmes set to launch in the near future, the Academy also positions the University as a magnet for entrepreneurial talent from across the world to access quality education and training in new venture creation and deep tech commercialisation. Professor Freddy Boey, NUS Deputy President (Innovation & Enterprise), noted the significance of the new initiative. "Entrepreneurship plays an influential role in powering the economic development of a country or a region. It helps to create new high-value jobs, attract investments, drive innovation and support community development. The establishment of the NUS Enterprise Academy is timely as it consolidates our expertise in nurturing start-up founders and enables NUS to significantly expand its efforts in promoting innovation and entrepreneurship."

Speaking to his ambitions for the Academy, Professor Boey commented that the new unit "will educate students from Singapore, the region and eventually the world, to become confident entrepreneurs who have a high chance of succeeding in their ventures on the first try. In this context, the students we train will be from different backgrounds with different aspirations, but united by a common thread that focuses on deep tech. In this regard, they will be trained to start sustainable and well-protected businesses in the knowledge economy, whether in Singapore or beyond."

New and enhanced initiatives

The NUS Enterprise Academy will encompass and expand upon existing educational programmes such as NOC, the NUS MSc in Venture Creation, and the NUS Enterprise Summer Programme.

In addition, the Academy will target new audiences, inclusive of PhD students and working professionals and entrepreneurs, through new experiential learning-based programmes.

"Following up on the successful launch of a Master's programme in Venture Creation, we are pushing to offer a PhD by Innovation track that will aim to produce more deep tech start-ups generated by the students' own research work. By selecting students who are keen to work on applied research solutions to technological needs, we will ensure that their ventures address real problems in the real world," said Professor Boey.

"In addition, we will be offering a Technology Access Programme (TAP) to more seasoned individuals who might be interested in starting ventures within their own companies (i.e. intrepreneurs) or those with business experience to branch out into deep tech companies based on NUS intellectual property."

Reflecting the university's expansive approach to innovation and entrepreneurship education, the NUS Enterprise Academy is therefore poised to offer a suite of experiential opportunities for aspiring entrepreneurs at all stages of career development.

"Through internships in entrepreneurial hubs world-wide, immersion opportunities in diverse cultures and start-up ecosystems, as well as new credit-bearing and degree programmes, the Academy provides the best possible entrepreneurship learning experience for our students," stated Professor Boey.

"Importantly, the Academy works synergistically with ecosystem builders, such as BLOCK71, and venture creation programmes, such as GRIP, by producing pipelines of entrepreneurial talent that can feed into these efforts. Taken together, these NUS initiatives will form a comprehensive ecosystem that brings the best talent and technologies together, while providing support for resulting ventures from ideation through exit."

The MSc in Venture Creation and NUS Enterprise Summer Programme will now be part of the NUS Enterprise Academy. Bottom photo taken pre-COVID.

Name	Description	Target Audience
NOC: NUS Overseas Colleges	A unique twist on the study abroad experience, NOC combines internships at innovative start-ups with entrepreneurial coursework at partner universities. Offered in more than 15 cities	Undergraduates and MSc students; will be expanding to PhD students soon
MSc in Venture Creation	A first-of-its-kind immersive graduate degree programme providing aspiring entrepreneurs access to NUS technologies, an immersive start-up internship, a hands-on venture creation module, mentorship in business development, and market access opportunities	MSc students
NUS Enterprise Summer Programme in Entrepreneurship	Immersive introduction to the Singapore and Southeast Asia start-up ecosystems, complete with company visits, peer learning, and pitching opportunities	International students
PhD in Innovation (Coming Soon)	A PhD programme which will culminate in an innovation thesis, involving research on an original IP solution, a market survey, prototype design and collection, as well as the development of a financial/ business model for investment consideration	PhD students
TAP: Technology Access Programme (Coming Soon)	Executive programme providing access to NUS IP as well as education on high-tech venture formation and deep tech commercialisation	Executives and entrepreneurs

RED HOT

NUS AGRITECH CENTRE: SEEDING INNOVATION IN URBAN FARMING

The NUS Agritech Centre utilises state-of-the-art tools and controls to accelerate agritech innovation.

Operational since July 2021, the NUS Agritech Centre brings together art and science to address one of the largest and most pressing challenges of our time: how to feed a growing global population when available land to farm is shrinking due to urbanisation, climate change and other factors.

The issue is of vital importance to Singapore. With only 1% of land deemed agricultural and few natural resources, over 90% of the country's food is imported- making it extremely vulnerable to fluctuations in global supply chains.

To increase Singapore's food security, the government laid out its "30 by 30" goal in 2019, aiming to locally produce 30% of the population's nutritional needs by 2030.

Contributing toward this ambition, the NUS Agritech Centre holds potential implications for urban environments around the world that increasingly rely on vertical farming and advanced technologies to ensure their food supplies. Run by NUS Enterprise, the entrepreneurial arm of NUS, the Centre will function as an innovative sandpit for researchers, entrepreneurs and visionaries to experiment and explore market-based solutions in agriculture.

In remarks made before the formal opening, Professor Freddy Boey, NUS Deputy President (Innovation and Enterprise), commented that the Centre was NUS' first major effort in the field of agritech innovation.

"About two years ago, we had a discussion at the senior management-level that urban farming would be the next big thing. While this is a bit of a moonshot for the university, we have the opportunity to make a significant difference in Singapore," states Prof Boey.

"I would not be surprised in the decade to come if, in major cities around the world, urban farming is no longer a novelty but the norm."

NUS Enterprise Director Brian Koh (Right) showcases the features of the facility to NUS Deputy President (Innovation and Enterprise) Prof Freddy Boey (Left) and NUS President Tan Eng Chye (Centre).

Objectives of the NUS Agritech Centre:

- Develop and commercialise frontier technologies for indoor urban agriculture
- Translate cutting-edge technologies developed by NUS researchers and scientists to improve farm yield, growth efficiency and profitability
- Multi-disciplinary approach to harnessing and translating deep technology to solve market needs
- Sandpit for scientists, entrepreneurs and visionaries to present challenges, experiment, and explore market-based solutions
- Establish a strong network of communities and partners

"We're lucky to be here," says Kit from REAPED. The start-up is making urban shrimp farming easier, cheaper, and more energy efficient through the use of aquaponics and automated water quality monitoring.

Spanning 800 square metres in the Cavendish building, the Centre is situated in the heart of Singapore Science Park, making it strategically proximate to both industry partners as well as the research and entrepreneurial talent found at NUS' nearby Kent Ridge campus and the NUS Enterprise@Singapore Science Park incubator. The latter, which is located a stone's throw away at Curie building, also houses the Minimum Viable Product Studio.

"We wanted this to be an all-encompassing space, providing for everything from research to commercialisation," notes Brian Koh, Director of Ecosystem Development at NUS Enterprise.

Importantly, by bringing relevant stakeholders together, the Centre is designed to inspire a new generation of high-tech urban farmers.

"What we are doing is to provide facilities that enable our young and promising agritech start-ups to scale up. And that will hasten their companies' capabilities, which by themselves would be very hard to do," explains Prof Boey. "Increasingly, we are finding more spin-offs from the NUS Graduate Research Innovation Programme (GRIP) engaged in this area. And we will very deliberately pursue agritech and urban farming as a theme across our venture creation programmes."

GRIP graduates comprise a large portion of the Centre's first tenants. In a 60 square metre room, Singrow will be using its proprietary platform to grow high-value mushrooms and premium strawberries- a feat previously unheard of in Singapore's tropical climate.

Next door, in one of the Grow Zones, Polybee will be validating its drone phenotyping and pollination technology on tomato plants, having already done so on strawberries.

Down the hallway, REAPED, a sister company to GRIP alumnus RAPID, is in the midst of erecting its freshwater shrimp-growing set-up.

Large glass windows lined along an L-shaped hallway provide the visitor with a glimpse into the innovative work these start-ups are doing. A variety of plants dot the co-working space, while the walls and floors of the Centre's common areas are dark, with strand lighting falling from the ceiling in an emulation of stars in the night sky.

"We wanted to create a sense of exploration, and at the same time we focused a lot on the beauty of the details. What we did not want was for this to look like a typical lab," explains Brian. "After all," he quips, "the greatest scientists are artists as well," a reference to Einstein's famous proclamation.

The careful design choices are matched by the scientific. The Centre is one of the most unique and technologically advanced of its kind in Singapore, complete with five Grow Zones, two Precision Climate Zones, a Multipurpose Zone that can be converted in-situ to recycling waste water or as a cultivation area, a Technical Zone with germination chambers and specialised lab equipment for high-accuracy analysis, as well as Wet and Dry Washing Zones to cater to the diverse needs of researchers and entrepreneurs in the Centre.

Nearly everything in the Grow Zones and Precision Climate Zones can be controlled at the touch of a button and monitored remotely—from temperature, humidity, carbon dioxide, oxygen, pH, and exact plant nutrients to the lighting. Automation, Internet-of-Things (IoT), and data collection for machine learning and analytics are also incorporated throughout the Centre's facilities, and can be applied at all stages from seed germination to post-harvesting.

"The idea here is that we can create any type of climate and grow almost anything in the world," states HJ Chen, Agritech Venture Manager, while showcasing the Precision Climate Zones.

"We can drop the temperature to as low as 10 degrees Celsius or raise it to arid desert-levels. And by being able to control every input factor- be it temperature or lighting- these chambers will help accelerate the process of finding the optimal conditions for a plant species to grow. We can then replicate these conditions in larger spaces like the Grow Zones."

"The NUS Agritech Centre provides us with a state-of-the-art facility for our product development. Thanks to this venue, we can now iterate fast, and export our technology to our overseas partners in time," adds Siddharth from Polybee.

Another unique feature of the Centre is a 3D plant scanner that can perform high-resolution multispectral imaging, providing researchers with a real-time quantitative description of the plant's physiological, anatomical, biochemical and ontogenetic properties.

"In essence, what we are doing is to remove the guess work," HJ adds. "With our imaging technology, we don't have to wait days to see something happen."

NuSoil is using the Precision Climate Zone to run multiple experiments with next-generation hydrogel materials for the purpose of optimising plant growth under varying conditions.

"For me, the most exciting part is that, farming, until recently, has been quite incremental in the use of technology," states Prof Boey. "Bringing in food from rural areas into cities creates its own problems. With urban farming, we can cut out logistics and storage issues, while the precision and control afforded by indoor farming and automation can reduce perishability, shorten the growth cycle of crops and increase yield and even nutritional content."

Ultimately, the hope is that the technologies and knowledge generated from the NUS Agritech Centre can be applied at scale to improve efficiencies and lower the cost of future food production.

"In Singapore, one can envisage a plot of land the size of Toa Payoh filled with 24-storey HDB flats that are dedicated to urban farming, inclusive of vegetables and proteins," says Prof Boey. "Apart from wheat and rice, it's feasible that this would meet all of Singapore's needs."

Although a Toa Payoh-sized farm is a long way off, NUS does have its sights set on a larger facility in the future: NUS President Tan Eng Chye has given approval for the establishment of an 18,000 square metre integrated agritech and aquatech facility to be opened next to Temasek Life Labs in an estimated three years. The NUS Agritech Centre in Singapore Science Park is an interim step to this larger operation, albeit a significant one.

"We couldn't wait for that to happen and do nothing in the meantime," states Prof Boey. "It's definitely worthwhile for Singapore to showcase how urban farming can be done, and we want to position NUS as a prime contributor to this."

Meet the Incubatees

- **AirGae:** sustainable air purification and carbon capture technology using microalgae
- **NuSoil:** soil enhancement with bio-based upcycling hydrogel technology
- **NUS Department of Biological Sciences, Faculty of Science:** crop phenotyping, screening and targeted selection for optimal growth and nutrient content
- **Polybee:** autonomous plant pollination and crop measurement with micro-drones
- **REAPED:** sustainable urban aquaculture and aquaponics solution with automated shrimp hatchery and plant growth systems
- **Scent Analytics:** VOC sensor based on artificial intelligence for plant stress detection in controlled environment agriculture
- **Singrow:** innovators for proprietary varieties, novel growing protocol and new gen growing system for high value crops such as strawberries and mushrooms
- **Urban Sweet Potatoes:** research and commercialisation of indoor cultivation for high yield sweet potatoes

The Department of Biological Sciences aims to use a genome-wide association study to breed new vegetable varieties suitable for indoor farming. To do so, the team is gathering a large collection of germplasm and varieties from around the world (including some that are not even being planted commercially), extensively phenotyping these varieties and variants, mapping their genomes, identifying desirable genes and markers for exceptional qualities and performing cross-pollination.

Meet three NUS Enterprise-related start-ups who are helping to meet Singapore's "30 by 30" goals.

Citiponics

Decades ago, Singapore's agricultural land was dramatically reduced in order to provide more space for the development of housing and industry. Fast forward to today, where entrepreneurs are finding innovative ways to leverage urban spaces and bring food production closer to the communities they serve.

For instance, **Citiponics**, co-founded by NUS Overseas Colleges (NOC) alumna Danielle Chan, has turned an underutilised carpark in Ang Mo Kio into an 1,800 square metre rooftop farm, producing up to four tonnes of leafy vegetables and herbs per month through the use of their farming technology, the Aqua Organic System.™ Their closed-loop farming innovation was designed with productivity, safety and sustainability in mind.

As such, Citiponics is able to grow their pesticide-free produce via a zero-waste farming process, achieving 3.5x the production of traditional farming with a 99% reduction in water usage and minimal energy expenditure. Every component in the system, including the fired-clay farming medium, is reusable and recyclable.

Helping to connect the local community to its food sources, Citiponics is also working with local schools to provide education on agritech and sustainable farming and set up school-based urban farms. In addition, the company makes a concerted effort to engage the community through the organisation of community markets and farm tours. Due to the pandemic, they have set up an online shop (www.citiponics.com/shop) to cater to consumer needs for direct farm-to-table deliveries. Produce sold from Citiponics' farm includes Georgina lettuce, amaranth spinach and cai xin.

Archisen

Co-founded by NOC alumnus Vincent Wei and Nanyang Technological University grad Sven Yeo, **Archisen** operates one of the highest-yielding indoor farms in Singapore, producing up to 100 tonnes of vegetables per year through the use of Controlled-Environment Agriculture (CEA). Applying IoT, sensors, artificial intelligence, and machine learning, the start-up is bringing automation and precision to hydroponics farming, helping to identify the most conducive environments for crop growth and ensuring the freshest and most nutritious produce.

At the same time, the start-up is building one of the largest network of urban farms in Asia through its turn-key urban farm solution, Cropdom, which helps partner farms to track, analyse and improve their management processes. Powered by Archisen's propriety operating system, Croptron, Cropdom provides real-time monitoring on a variety of parameters, collectively harnessing data and intelligence across farms for the benefit of all.

A miniature version of Archisen's farming system, Just Harvest, has also been developed for retailers and restaurants to grow and harvest their own plants, while the start-up's flagship Just Produce brand provides consumers with direct access to Archisen-grown lettuce, mustard greens, specialty herbs, and more. Just Produce is available through a variety of offline/ online stores, including Redmart, FairPrice, Amazon Fresh, as well as NUS Enterprise-incubated Urban Origins and Treatsure.

Agritisan

One of the newest agritech companies to emerge from NUS is **Agritisan**.

Founded by Furlyn Chow (Materials Science & Engineering, Class of 2022); Clement Clayrant Chen (Mechanical Engineering, Class of 2022); Darren Erdyan Khalif (Mechanical Engineering, Class of 2022) and Ho Cheng Wei (Mechanical Engineering, Class of 2019), the start-up has developed an off-grid vertical farming system suitable for rooftop farms. Agritisan utilises natural resources such as sunlight and rainwater to operate its farming towers and grow its vegetables, ensuring consistency of quality without the need to draw water or electricity from the building- thus making Agritisan a truly self-sustainable farm. Agritisan's systems are also designed to ease harvesting processes, limiting the number of manpower required and additionally allowing inclusivity for differently abled workers to work easily.

The company currently runs a 1,300 square foot rooftop hydroponics farm in Singapore located at the BESCO Building at Ubi, achieving a yield of 12 tonnes of produce per month.

The team credits their achievements to their synergy and passion: they have been working full-time and are committed to pushing Singapore towards the country's goal of food security while achieving sustainability and inclusivity. Agritisan aims to put its farming system on every rooftop in Singapore by 2025 and is currently looking to raise seed funding of S$600,000 to achieve the goal.

Agritisan is a recipient of NUS Enterprise's Practicum funding, and was recently named a winner of the NUS Resilience & Growth Innovation Challenge.

BRIGHT IDEAS

VERTICAL FARMING
A ROAD TO FOOD SUSTAINABILITY

The United Nations (UN) has projected the global population to increase by 2 billion persons in the next 30 years, from the current 7.7 billion to 9.7 billion in 2050. Based on statistics, global food production has to increase by 70% just to keep pace with population growth. Agricultural land currently occupies about 40% of the earth's surface, but the agriculture industry is facing major global challenges with regard to shortage of available agricultural land.

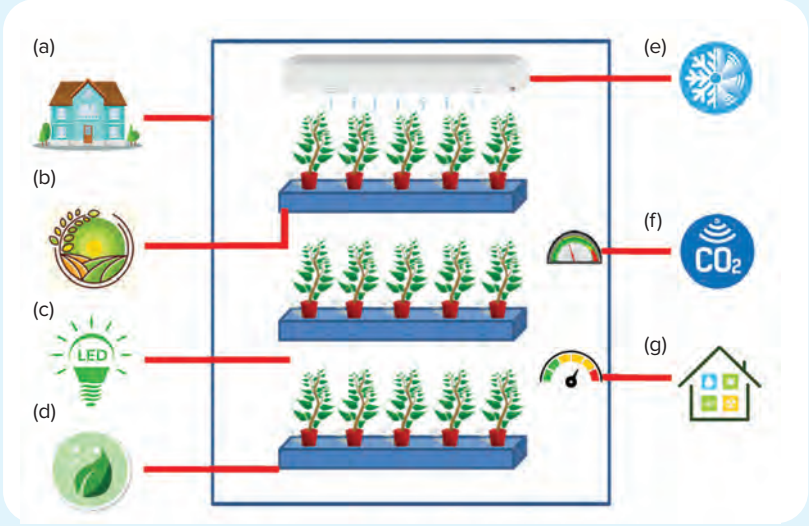
Clearly, these factors are driving the world towards finding more efficient and sustainable innovations for food production and security. To achieve this, one innovative concept is Vertical Farming (VF). While VF development is still in its nascent stage, data shows that VF-related activities and investment funding have grown more rapidly in the past five years. The global and Asia Pacific VF markets (@ US$3.16 billion in 2018 and @US$0.78 billion in 2020 respectively) are also expecting a compound annual growth rate (CAGR) of 28% between 2019 and 2025/26.

Nearer to home, the need to strengthen Singapore's food security through agri-technology is paramount as only 8% of the vegetables we consume are produced in local farms today, making us highly dependent on food imports.

In 2019, the Government announced the ambitious "30 by 30" goal to produce 30% of Singapore's nutritional needs locally by 2030. This includes vegetables cultivated in climate-controlled greenhouses under special LED lighting to maximise yields, and fish farmed at sea in contained systems to shield them against toxic algae blooms and oil spills.

Components of VF

VF builds upon the concept of greenhouses and is an emerging farming technique capitalising high quality and nutritional food production in high-rise buildings through efficient utilisation of resources, advanced greenhouse methods, and technologies. The most common farming techniques are hydroponics, aeroponics, and aquaponics.
The structural design and use of technologies can be very diverse for VFs. Most VFs rely mainly on artificial LED lighting for crop growth, while some utilise a mixture of natural and artificial light. For optimal results, VFs employ different farming techniques and technologies to suit the chosen crops' growth.



(a) VF Structure (b) Growing Systems and Platform (c) Lighting (d) Nutrient Supply
(e) Air-Conditioning System (f) $C0_2$ Supply Unit (g) Environmental Control Unit

Agriculture 4.0 is the new agricultural revolution with a focus on leveraging technology to innovate, improve and address the real needs between demand (consumers) and value chain/ supply.

From a long-term sustainability perspective, it is crucial for VF to leverage advanced technologies (such as Artificial Intelligence and Information and Communications Technology) and integrate with intelligent data management systems to drive greater operational efficiencies and boost production. The digital transformation of VF and the food industry will enhance business outcomes and improve sustainability.

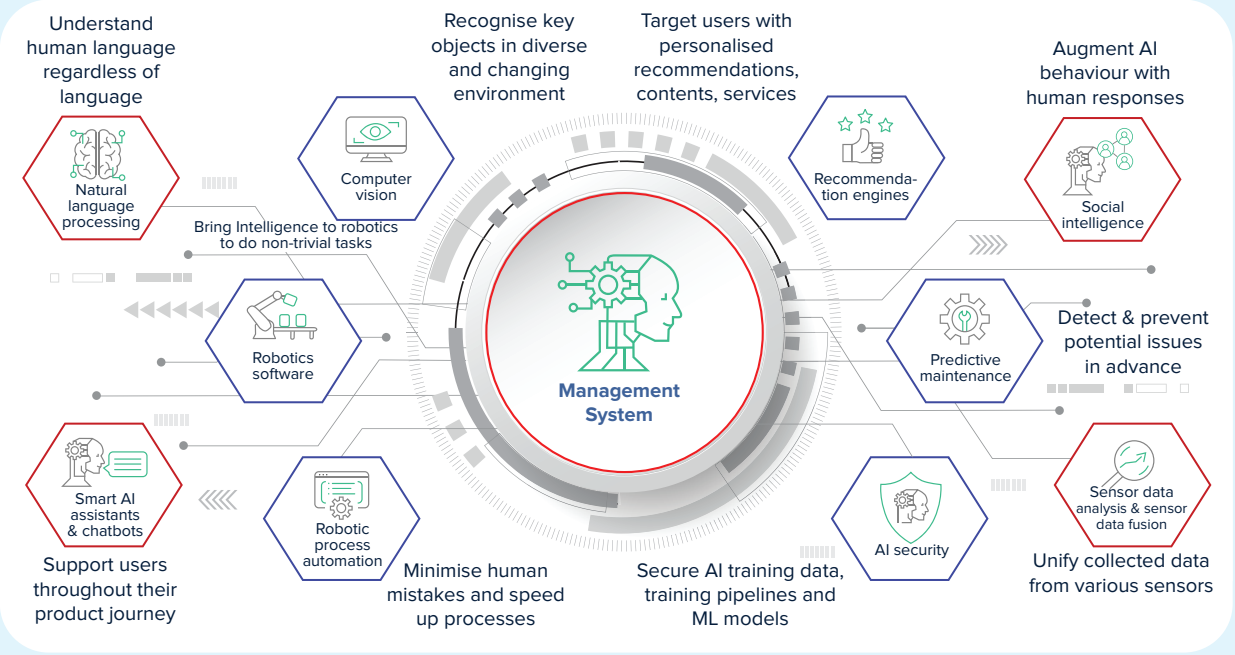
Benefits

- Enhance food security
- Controlled crop quality; avoid crop losses
- Create local jobs
- Reduce water usage for crop production
- Recycle organic waste (especially for aquaponics)
- Reduce use of fertilisers, herbicides and pesticides
- Improve urban climate; air quality and health

Challenges

- High capital setup and operating costs
- Low-cost produce from conventional farming
- Long-term sustainability and ROI of VF untested
- Consumers resistant to change in food purchasing habits
- Lack of skilled master growers / plant scientists / engineers

Leveraging Advanced Technology



Roles of Stakeholders

According to data from Lux Research, VF has garnered US$2.44 billion of venture investment between 2017 and July 2021 worldwide. For Singapore, the number of VFs has also grown from one (in 2012) to more than ten currently, producing a range of produce from strawberries, vegetables to aquaculture.

These farms use technology and high-yield methods to overcome the limitations of conventional farming and transform their work into lucrative businesses. It is highly recommended for small countries like Singapore to adopt VFs and scale up local food production capabilities for food security and survivability as we march towards the near future (2030) and 2050. Key stakeholders such as governments can play a critical role in fostering collaborations between technology companies, universities, research centres, and innovative start-ups. This is essential for achieving scale, efficiency, and agility across the food chain supply, especially where the domestic market is small and industry consists of relatively small businesses.

On the other hand, universities usually have multiple sources of income through research, industry involvement, investment, and government grants. This puts universities in a favourable position to research, raise competencies and develop skillsets through educational programmes, and support start-ups to test-bed and develop VFs.

*** Sources of information for this article include the Food and Agriculture Organisation of the UN, the MDPI Journal on Sustainability and Internet sources, NUS online library, Lux Research, World Government Summit, Enterprise Singapore, Global Markets Insights, Market Data Forecast, Intellias, and IDTechEx.*

FIRED UP

SOLUTIONS FOR BUILDING ASIA'S SMART CITIES

A collaborative approach, coupled with accessible technology solutions, are critical for the future of sustainable cities in urban Asia.

Cities are currently home to over half of the world's population. According to the United Nations (UN), by 2050 this number is expected to increase to nearly 70%. This means that urban areas are set to receive another 2.5 billion residents, with the majority of this urban concentration occurring in Asia.

In July, Tech Showcase Day was organised by BLOCK71 for 15 tech start-ups with market ready solutions to connect with 21 corporates from across Singapore, Indonesia, Vietnam and Japan. The goal? To spotlight curated solutions for Smart Cities and Sustainable Urban Development in Asia.

Organised in partnership with NUS Enterprise, Salim Group's Innovation Factory, Becamex IDC and Aichi Prefecture, **Tech Showcase Day** connects curated Southeast Asia-based technology companies to trusted corporate partners in key Asian markets for networking and industry-focused business meetings.

Each edition of Tech Showcase Day fosters interactions between companies through a closed-door sharing of use cases and accessible innovative solutions - catered to each company's indicated needs and challenges. Each tech company is selected based on its ability to provide solutions to automate and optimise operations in today's business environment for wider impact in social, environmental and economic developments.

In BLOCK71's endeavour towards building Smart Cities and Sustainable Urban Development across Asia, this edition focused on solutions for:

(i) Waste and Resource Management

Waste can have a devastating effect on public health, the environment, and the climate, but cutting-edge innovation and technology can provide improved, cheaper solutions to the challenge, and help cities and communities to see waste as a business opportunity.

(ii) Clean Energy

Speeding up the transition to clean, renewable energy is one of the best ways to curb the dangerous carbon pollution that causes climate change.

(iii) Sustainable Manufacturing

Sustainable manufacturing is the creation of manufactured products through economically-sound processes that minimise negative environmental impacts while conserving energy and natural resources. Sustainable manufacturing also enhances employee, community and product safety.

Sazali Johari, Programme Director of BLOCK71 Southeast Asia at NUS Enterprise, shares about BLOCK71's commitment to support high impact tech start-ups with market access across the region

(iv) Safety and Security

Access to safe, affordable, accessible and sustainable transport systems and shared community spaces is important for all in the physical and digital world. This is done with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

The participating start-ups comprised deep technology spin-offs from the NUS Industry Liaison Office's NUS Graduate Research Innovation Programme (NUS GRIP) and BLOCK71's incubated members across Southeast Asia.

This includes KleenSoil (NUS GRIP graduate) and Hydroleap (NUS alumni), who have gone on to further conversations and potential collaborations with the corporate representatives they met.

Dr Mohammed Sherafatmand, Founder and CEO of Hydroleap, presenting their water and wastewater treatment for manufacturing and construction applications

To gain exclusive access to future business matching initiatives like Tech Showcase Day, apply to be part of the BLOCK71 Global Startup Runway Track at block71.co

The next Asia runs feature opportunities to scout for tech solutions and connect with corporates in:

- **October:** Japan
- **November:** Vietnam
- **November:** Indonesia

Tech Start-ups included:

- **1Cool:** Sustainable, Efficient Cooling Solutions
- **Ailytics:** Construction Safety and Productivity
- **Auk Industries:** Manufacturing and Industrial IoT
- **Enverse:** Industrial Analytics for Energy Management and Optimisation
- **GroundUp.AI:** Manufacturing AI and Sensors
- **Hydroleap:** Water and Wastewater Treatment for Manufacturing and Construction sectors
- **Invigilo:** Workplace Safety and Monitoring AI and IoT
- **KleenSoil:** Sustainable, Customised Solid Waste Remediation
- **LengKeng:** Out-of-Home Media Purchasing and Monitoring
- **Nano Technologies (Vuiapp):** Earned Wage Access Platform
- **NEU Battery Materials:** Electrochemical Battery Recycling Solution
- **Otrafy:** Food Supply Chain Security & Management
- **RoPlus Robotics:** Gripping Solutions for Diverse Industries
- **RYTLE:** Last Mile Delivery and Logistics Fulfillments
- **Waveboost:** Wireless Power and Data Transfer for IoT Devices

Corporates represented across Asia included:

- BA Partners (JP)
- Dexa Group (ID)
- ESRI (ID)
- Fukuoka Jisho (JP)
- HP Enterprise (ID)
- HOYA (VN, JP)
- Indmira (ID)
- JAG Kokusai (SG, JP)
- Keppel Land (SG)
- Lovian (ID)
- Mizuho (JP)
- Paragon Technologies (ID)
- Salim Group (ID)
- Sunwah Innovations (VN)
- Toyota (ID, JP)
- VNTT Solutions (VN)
- XL Axiata (ID)

FIRED UP

FOOD WASTE: RIPE FOR INNOVATION

Representatives from the four winning teams; L to R: Teams SOY OK, More.Bites, MOTTAI, and Prokabar.

South and Southeast Asia together generate 25% of the planet's food waste, much of which is lost in the food supply chain before reaching consumers. At the same time, increasing demand for food production is putting pressure on the world's agriculture, energy and natural resources.

One way to encourage a more sustainable food ecosystem? Increase the circularity of the food value chain through valorisation of underutilised biomass and food waste side-streams. Tertiary students from across Singapore recently came together to tackle this issue during the NUS FoodTech Challenge 2021, organised by the NUS Food Science Technology Society and NUS Enterprise. First held in 2019, the NUS FoodTech Challenge calls upon students to brainstorm and develop innovative foodtech ideas in response to pressing issues facing the food and beverage industry.

This year's Challenge was sponsored by Nestlé, which tasked participants to propose new food concepts that would excite Southeast Asian consumers with affordable, healthy and sustainable products while innovatively upcycling food waste side-streams. Examples of the latter could include Brewer's spent grains, soy okara, and coffee grounds, amongst others.

More than 43 teams, comprising 143 total participants, entered the competition from the National University of Singapore (NUS), Nanyang Technological University (NTU), Singapore Institute of Technology (SIT), and Singapore Management University (SMU). Following a month of workshops and mentoring sessions with partner sponsors, start-up founders and senior representatives of the foodtech industry, a preliminary judging round resulted in 10 finalists who would move on to the Finale.

In the week leading up to the big event, the finalists carried out prototyping for their final product. During this period, they had access to commercially unavailable side streams, flavours and ingredients, as well as the labs at the NUS Department of Food Science & Technology.

After a competitive round of pitching, the Challenge concluded on a high note on 9 July with four teams who managed to satisfy the judges' taste buds while scoring high marks on innovation and feasibility:

MOTTAI Oh Snap!

1st Place, $3000

Andrea Koo; Delia Lee; Sean Ou; Aileen Pua; Joanne Toy
NUS

MOTTAI's Oh Snap! snack sticks offer a flavourful and fuss-free snack choice that provides as much fibre as ¾ cup of broccoli and as much protein as a ½ cup of milk. Made from okara and using MOTTAI's proprietary drying technology, Oh Snap! comes in a variety of trendy flavours (Silly Seaweed; Snuggly Sour Cream & Onion; Punchy Pepper-Lime), as well as locally-inspired seasonal varieties (Rebellious Rendang, Lovely Laab Salmon, Geeky Green Curry, and Cheeky Chili Crab).

MOTTAI's proposal also includes an innovative business model: the company would provide its okara preservation technology to soy producers on a pay-for-use basis, buying the okara generated to produce its snacks, as well as future okara flour blends that could be sold to other food manufacturers. The result? A new side revenue stream for soy producers, more nutritious snack options for consumers, and decreased waste in the food industry.

> "We are very happy with what we have achieved through this challenge. Apart from winning the prize, the journey itself has been very rewarding. As food scientists, this business case pushed us beyond our comfort zones, forcing us to navigate through many unfamiliar challenges. There were many times when our ideas kept changing and we felt very jaded as our ideas couldn't work out and we just kept deleting whatever we had previously worked on. We also often felt like we were going in circles, and meeting the same roadblock over and over again. The moment everything snapped into place was really the highlight of our journey. Our advice for future participants is to not give up, it's okay even if you have zero idea of where you're going when the deadline is four hours away."
>
> -Team MOTTAI

ProkaBar

2nd Place, $2000

Ethan Ryan Neo Ren Wei; Ho Teck En; Loo Si Min; Nicholas Hartantio; Wang Rui Feng
NUS

Designed for the working adult seeking a convenient and affordable snack option, ProkaBar is a protein bar made from okara and barley spent grains. The bar comes in three different flavours (Vanilla Yoghurt, Assorted Nuts, and Dried Berries), as well as a convenient three-in-one bite-sized package. Perfected by the team over 32 iterations, the bars provide 75% of an individual's daily fibre needs and 20% of their daily protein needs.

More.Bites

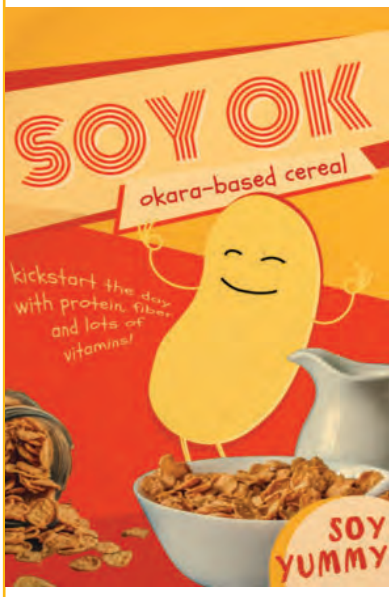
3rd Place, $1000

Chia Wan Ni Geraldine; Norazean Zaiden; Goh Yu Fen; Wong Lan Li; Lim Wenxiong Elton
Singapore Centre for Environmental Life Sciences Engineering, NTU

Inspired by Yong Tau Foo, a dish containing a varied selection of food in bite-sized pieces and paired with a staple such as rice or noodles, More.Bites has developed a nutritious twist on a traditional comfort food.

Their More.Bites cup noodles are paired with plant-based otah balls, upcycling Brewer's spent grains, soy okara and ugly vegetables. With higher fibre and protein as compared to existing cup noodles, More.Bites enables consumers to indulge without the guilt.

Soy OK



Undergraduate Innovation Prize, $500

Pang Yu Fei; Chong Li Xuan; Goh Yun Xuan; Chua Chong Yi; Manfred Goh
NUS

Team Soy OK was awarded the Undergraduate Innovation Prize, a special category for undergraduate teams. Their product, an okara-based cereal, is designed to address the issue of malnutrition in Southeast Asia through the provision of a healthy and affordable breakfast option. The okara used is fermented, rather than dried, helping to improve the texture and flavor, while extending its shelf life and enhancing its nutritional properties.

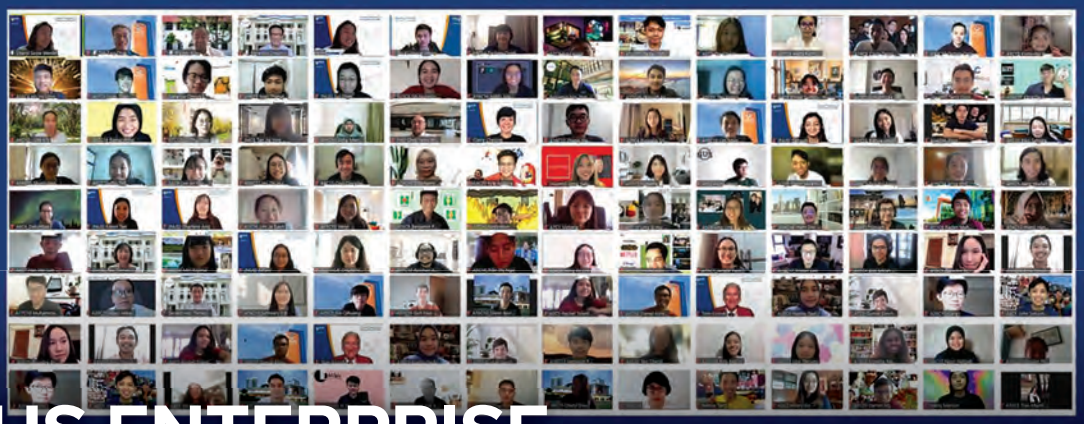
Nestlé and NUS Enterprise will be reviewing the teams' ideas and handpicking those most suitable for an accelerator programme or incubation.

Chosen teams can look forward to accessing Nestlé and/or THE HANGAR's resources in further developing their product.

Judges:
- Guglielmo Bonora, R&D Singapore Centre Head, Nestlé
- Irma Silva Zolezzi, Head, Nestlé Research Singapore Hub
- John Cheng, Director, Innovate360
- Brian Koh, Director (Ecosystem Development), NUS Enterprise
- David Sher, Senior Manager, NUS Industry Liaison Office

Sponsor:
- Nestlé

Partner Sponsors:
- CP Kelco
- IFF
- Tate & Lyle
- Manus Bio



NUS ENTERPRISE SUMMER PROGRAMME

Run 2 was held from 5 – 16 July 2021.

Despite the COVID-19 pandemic and worldwide travel restrictions, the 15th and 16th runs of the NUS Enterprise Summer Programme in Entrepreneurship were successfully held over the periods of 7-18 June 2021 and 5-16 July 2021, collectively hosting 285 participants from 15 countries. The two-week intensive programme was entirely virtual, with lectures, workshops, learning journeys, sharing sessions and panel discussions giving participants a complete overview of start-up development at various stages.

Learning through Games

This year's programme gave participants a whole new experience through Minecraft. Participants were given unique avatars that enabled them to work together to meet the entrepreneurial objectives of game challenges such as King of the Hill, Escape Room and Spleef. Following that, participants went on a virtual tour of NUS incubators The HANGAR and BLOCK71, as well as iconic places in Singapore such as the Merlion, Gardens by the Bay and Marina Bay Sands. The team behind the Minecraft game indeed brought Singapore into the homes of participants all over the world!

Participants were brought on a guided tour around The HANGAR and played the Escape Room game, which encouraged them to stay curious, explore, and solve problems using new perspectives.

> The Minecraft NUS Arena was crazy beautiful, as well as all the players in different teams who are competitive in winning each game! I was inspired by the uniqueness of how we were welcomed in the programme, and doing it through Minecraft was definitely the best idea. Kudos to the NUSSP Minecraft Team!"
>
> **Zairon Raymond S. Reyes,**
> *University of the Philippines Los Baños, Philippines*

Understanding the Global Start-Up Ecosystem

Professor Tom Kosnik gave a lecture on the Singapore, ASEAN and global start-up ecosystems, as well as metrics that define the economic performance of a country or industry. The participants learnt that understanding the different markets is essential to ensuring both the right product/market fit as well as the cultural sensitivity of a product or service to its target market. The participants also attended language and culture lessons conducted by the NUS Centre for Language Studies to supplement their learning about the ASEAN region, picking up basic conversation skills in Thai, Vietnamese, Bahasa Indonesian and Singaporean Mandarin!

Developing the Entrepreneurial Mindset

An understanding of one's self, entrepreneurial attitudes and motivations forms the foundation for the type of entrepreneur and leader one will become. This also heavily influences the company culture your start-up will embody and contributes to finding the right team, says Ms Annie Luu, Global VP of Strategic Partnership at Fingerprint for Success. Participants learnt about complementary communication behaviours within groups and conflict management for attributes that might clash within a team. In another workshop with Ms Aileen Sim from Simplified Coaching & Consulting, participants gained skills on how to manage their physical and mental well-being throughout the entrepreneurship journey, as well as how to handle their expectations and emotions.

There were many opportunities for participants to mingle and make new connections. Each group had a mix of different nationalities and strengths, making the working experience thrilling and meaningful. Many of the participants shared positive sentiments about the group work being pleasant and enriching.

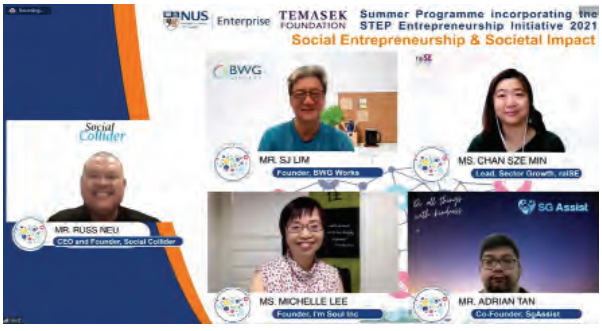
> I have learned a lot from experts from various sectors in the Singapore ecosystem. Other than that, I am able to make new friends with international participants who are energetic and friendly!"
>
> **KRY Lita,**
> *Royal University of Law and Economics, Cambodia*

Understanding Investors

The programme equipped participants with numerous soft skills, as well as technical knowledge about running a start-up - including legal, economic and environmental factors. Dr Cheng Yu-Chao Jack, Principal Assistant Director, Head of Greater China, Faculty Member at Intellectual Property Office of Singapore International (IPOS-I), taught participants about protecting their ideas and products and the legal matters that they should consider. They also got a thorough overview on investors and insights about the venture capital space from Mr Wilson Wang, Deputy Director, Investments and Business Development at the NUS Industry Liaison Office.

Picking the Right Enterprise Track

Participants were also exposed to various facets of entrepreneurship, from social enterprises to corporate intrapreneurs. Grameem Shakthi's social entrepreneurship model showed that businesses could be both charitable and profit-making. Likewise, Ms Laina Green shared business model ideas for social enterprises and introduced the social business model canvas that participants could utilise during their ideation process. To further delve into the subject matter, a panel on "Social Entrepreneurship & Societal Impact" shed light on industry challenges.



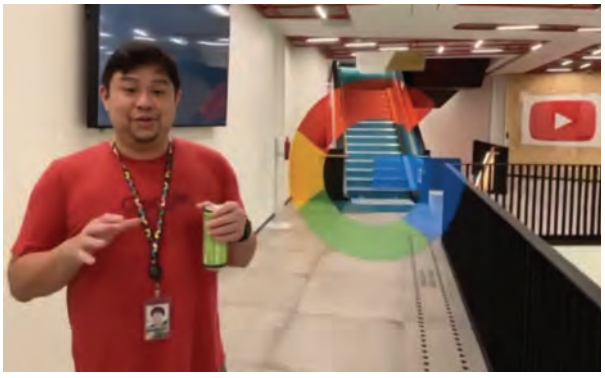
Panel sharing with various social organisations moderated by Russ Neu, CEO and Founder at Social Collider.

> I learnt so much just in the span of two weeks, especially on seeking the right people for your start-up, the importance of social entrepreneurship, and how ventures can bring significant changes to society."
>
> **Netanya Chendra,**
> *University of Indonesia, Indonesia*

Learning through Start-up Experiences

The participants also learnt about issues that might arise during the entrepreneurial journey directly from start-ups. For example, Mr Alex Teo from ShopBack shared his attempts at making the app more convenient and attractive to users, including the features that worked and those that did not. The numerous learning journeys and sharings by other companies like Carousell, Grab and Mai (Markable AI) gave participants a better understanding of the setbacks faced by different start-ups and how to select the business model best suited to their services. This taught the participants about the companies' growth journeys, how they captured larger markets, and how they balanced opportunities and risks.

Even in a physical camp, it would have been impossible to bring the massive number of participants on a tour around any facility at the same time. However, the team made the impossible possible through a virtual tour of Google and Project Dignity Kitchen. Mr Thye Yeow Bok, Head of the Start-up Ecosystem at Google Southeast Asia, brought the participants on a guided tour around the Google Campus in Singapore for over an hour, showing them the facilities and stressing the importance of innovation to staying relevant as the world accelerates with technology. With various topics presented each day of the two-week programme, the participants understood that the company culture of a large corporation promoting intrapreneurship is vastly different from that of a social enterprise or a profit-oriented start-up.



Mr Thye Yeow Bok, Head of the Start-up Ecosystem at Google Southeast Asia, showcased the Google Campus in Singapore.

A Fulfilling Experience

The programme's success has been growing exponentially over the years, attributed to the rich network of speakers who share invaluable information with the next generation of entrepreneurs, as well as the NUS Enterprise team that put a programme together that cultivates and promotes interest in entrepreneurship amongst youth.

> The programme served as a stellar opportunity for to-be entrepreneurs from all over the world to interact and exchange information, and to understand the market & opportunities available to them in ASEAN and Singapore that can help to expedite their start-up journey.
>
> **Dakshitaa Babu,**
> *National University of Singapore, Singapore*

FIRE STARTER

PAYING IT FORWARD:
ADVICE FROM MSC VC STUDENTS

Six months into their programme, four students from the inaugural MSc Venture Creation cohort gathered to discuss their experiences with incoming students during the latter's e-Orientation on 1st July.

Clockwise from upper left: Lin Xiuyan Alice (China); Nadim Zaro (Jordan); Zaid Khan (Pakistan); and Wang Jieyu (China).

01 What has it been like living in Singapore for the past six months?

Zaid: In contrast to where I come from [Lahore, Pakistan], everything in Singapore is orderly and on time. It's easy to get around via MRT and bus, and everything you can think of is here: parks, tech spaces, etc. The ethnic diversity was definitely a change, but with people from every corner of the world here, I don't feel like a foreigner anymore. It feels like my home.

Nadim: I'm from Jordan and before coming to Singapore I was in Dubai. Everyone told me Singapore was Dubai 2.0, but actually Singapore is more unique and different, in a cultural sense. It's also a great bridge to all of ASEAN and Asia for an international student.

Alice: I'm from China, and even though Singlish mixes English with Cantonese and Hokkien words, I was at first unfamiliar with the dialect and embarrassed at not being able to understand it. For the first few months, I would record my internship boss to ensure that I understood him correctly.

02 What has been your experience with MSc Venture Creation programme? What advice would you give your juniors?

Nadim: In terms of the workload, it's definitely a job to manage the internship and the evening modules. My advice would be to communicate openly with your internship supervisor and ask for help where you need it. Also go into the programme with an open mind—even if you have an idea of what you want to do, your ideas might change, grow, and become better.

Jieyu: Juniors should make an effort to talk to and learn from their classmates and team members, even if they are from different countries and backgrounds. They should also try to speak English as much as possible, even if many people in Singapore can speak Chinese.

Zaid: Work/life balance can be tricky, but it also depends on how you view the situation. You can have fun at work and learning new skills can also be fun.

03 Tell us about your internship experience.

Alice: I interned for five months within Singapore Airline's Digital Innovation Lab, KrisLab. Employees would share their creative ideas with us and we would help them to prototype and come up with material business plans. It wasn't easy, but it gave me the opportunity to learn a lot of new skills, including AR gamification and video editing.

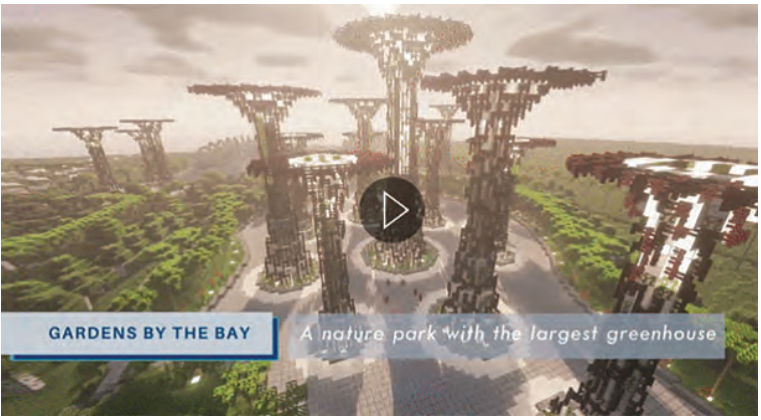
Nadim: I interned at a drone services start-up, where I was part of the sales team for their enterprise software. It was definitely a fulfilling, applicable and practical experience: I didn't spend too much time behind a desk on my computer. Instead, I was on my feet, spending a lot of time in field watching the drone pilots do surveillance, and also visiting client companies with my supervisors.

Zaid: I interned at tech transformation consulting company, which required me to talk to clients and learn new skills. The programme as well as the internship are intense and come with a lot of expectations, so you need to be prepared, reach out if you have trouble, and know how to manage your time.

04 What did you enjoy about the Summer Programme?

Nadim: The team has built the entire UTown campus on Minecraft and we got to play games on that. In addition, we had the opportunity to speak first-hand with companies such as Grab, Google, ShopBack, and TikTok.

Alice: The Summer Programme also gave us the chance to mingle and learn from each other, in the process helping to generate different ideas that may be useful for our second semester when we are developing and validating our own business plans.



MSc VC students explored a virtual version of Singapore during the NUS Enterprise Summer Programme

05 Was there a particular module that you would recommend?

Nadim: I really enjoyed the People Strategy module; it was very interesting and demonstrated how a people-centric approach can make money throughout a company.

Zaid: I would say it also depends on what skills you want to acquire and use in the future, whether that be specific technical skills or a better understanding of intellectual property.

06 What are your career plans after graduation?

Nadim: I don't have a fixed career plan. But the advantage of the programme is that I have a better view of what opportunities there are. We've been working on different projects and mini-hacks throughout the semester and generating various business ideas. Post-graduation, you may want to pursue some of these, or even find a career within the innovation and entrepreneurship ecosystem. It's really up to you and where you want to go.

07 Finally, Singapore is known as a food paradise. Do you have any new favourites?

Alice: I'm from Fujian province, so the food is similar to what I ate before. My favourite is the Hainan chicken rice.

Zaid: The food is something I was concerned about because I'm a picky eater. But everything is available here, whatever you want to eat. You can get all varieties from every country.

The NUS Master of Science (MSc) in Venture Creation, administered by NUS School of Continuing and Lifelong Education (SCALE) and supported by NUS Enterprise, is an immersive graduate degree programme that combines experiential learning with the academic rigour of Asia's top university. Designed to transform mindsets and accelerate translation of ideas into solutions, the programme targets aspiring entrepreneurs wanting to launch new ventures with success by providing mentorship in business development and access to NUS technologies, as well as opportunities to network for market access.

Key components of the programme include:

- Summer Programme in Entrepreneurship: a two-week immersive overview of the innovation and entrepreneurship environments of Singapore and Southeast Asia, delivered through lectures, company visits, conversations with start-ups, and ideation and pitching sessions

- Experiential Entrepreneurship Internship: a semester-long full-time start-up internship, enabling students to work alongside co-founders and gain direct entrepreneurial experience

- New Venture Creation: a module that helps students understand the process, challenges, risk and rewards of starting a new business, and equips students with the tools to improve their chances of successfully doing so

- Lean Startup Practicum: a step-by-step, hands-on approach enabling students to bring their start-ups from ideation to fruition

For more information, please visit:

NEWSFEED

NUS spin-off Allozymes was named the co-winner of Future Food Asia 2021 in July, receiving US$100,000 in prize money. The company's proprietary platform can analyse and map millions of enzyme variants per day, with the potential to become the largest enzyme data library.

In July, the BiovitalsHF® solution from former HANGAR incubatee Biofourmis became the first-ever heart failure digital therapeutic to receive a Breakthrough Device designation from the US' Food & Drug Administration (FDA). Founded in 2015, the company has raised approximately US$145 million in funding and now has over 350 employees.

Congrats to NUS spin-off SEPPURE and NUS Graduate Research Innovation Programme (GRIP) graduate NEU Battery Materials for their recent prize wins at The Liveability Challenge!

SEPPURE received a S$100,000 investment from Planet Rise, and a S$50,000 investment from Amasia; while NEU Battery Materials took home a S$50,000 investment from Silverstrand Capital.

In August, former NUS Enterprise@Singapore Science Park incubatee Hoow Foods launched a new subsidiary, Hegg Foods, focused on developing healthier plant-based food alternatives that are sustainable and environmentally-friendly. Hegg's first product is the eponymous HEGG, a locally-produced 100% plant-based egg substitute.

Recently reported funding for NUS Enterprise and NUS Industry Liaison Office-affiliated companies:

- **2D Materials** - Investment Agreement; Undisclosed
- **Alami** - Series A+; US$17.5 million
- **Allozymes** - Seed funding; US$5 million
- **Aruna** - Series A; US$35 million
- **Augmentus** - Seed funding; undisclosed
- **Carro** - Series C; US$360 million
- **Drive Lah** - Pre-Series A; US$3.2 million
- **Hoow Foods** - Pre-Series A; US$2.2 million
- **MindFi** - Pre-seed funding; US$750,000
- **Nium** - Series D; US$200 million
- **Parcel Perform** - Series A; US$20 million
- **SCI Ecommerce** - Unspecified; US$28 million
- **Tinvio** - Series A; US$12 million
- **Unit21** - Series B; US$34 million

All info based on public news sources.

FLASH BACK

NUS ENTERPRISE EVENTS & ACTIVITIES: JUL - SEP 2021

Stay updated on our upcoming events at: enterprise.nus.edu.sg/events

JUL

1	PIER71 Smart Port Challenge Roadshow: Remote Connectivity and Automated Periodic Gas Monitoring
1	LIFES Webinar Series- Bin Diving into Commercial Kitchens: Innovative Solutions in Food Waste Prevention
5-16	NUS Enterprise Summer Programme in Entrepreneurship
6	PIER71 Smart Port Challenge Roadshow: Greener Alternatives & Automated Steel Cargo Identification
6	The Hangar Booster Programme Showcase Day
7	GRIP Run 6 CC Masterclass
7	LLP Educators' Workshop
8	PIER71 Smart Port Challenge Roadshow: Harbour Tugs Monitoring & Centralisation of Port Regulations
9	NUS Foodtech Challenge 2021 Finale
9	LIFES Webinar Series- Edible Garden City: Bringing You Closer to Your Food Choice
13	PIER71 Smart Port Challenge Roadshow: Crew Safety & Health
14-16	Innovfest x Elevating Founders @ Asia Tech x Singapore
15	LIFES Webinar Series- Perfectly Imperfect: Seeing Surplus Food in a New Light with Just Dabao
16	PIER71 Smart Port Challenge Roadshow: Cleaning of Underwater Curved Surfaces & Cargo Holds
17	NUS Sharing Session by OAM: Beyond Academics, Be Future-Ready: Global Explorations and Career Preparations
19	PIER71 Smart Port Challenge Roadshow: Consolidating and Automating Shipping Data
21	ICE71 at Smart Cybersecurity Summit
22	Tech Showcase Day: Smart Cities and Urban Development in Asia
22	PIER71 Smart Port Challenge Roadshow: Streamlining the Procurement Process for Better Visibility and Efficiency
22	LLP- SMU Final Presentation Day
26	NOC Talk for SOC O-Week 2021 Freshmen
27	NOC Talk for Engineering O-Week 2021 Freshmen
27	PIER71 Smart Port Challenge Roadshow: Boarding Officers' Role & Seafastening
29	SIA AppChallenge (Student Track) - Virtual Roadshow: Digital Innovation and Singapore Airlines
29	PIER71 Smart Port Challenge Roadshow: Common Incident Data Collection Across P&I Clubs

AUG

5	VB Run 3 Demo Day
12	SIA AppChallenge - Student Track Virtual Roadshow #2, Challenge Statement Deep Dive
12	e-ASK NOC
13	NOC Recruitment: e-TalkShop @ faculties [SoC+FOE (e-scholars)]
13	Meet the VC with Ascend Vietnam Ventures' Le Nguyen
16	NOC Recruitment: e-TalkShop @ faculties [Biz, FASS, FoS, SDE and others]
16-18, 23-27	IMDA-NUS Enterprise-BLOCK71 Chongqing Immersion Programme
17	Philip Yeo Innovation Fellows Programme 2021 Info Session
18	SIA AppChallenge (Student Track) - Virtual Roadshow: Past Winner Insights
18	NOC Recruitment: Spotlight on Asia co-organised with The Young SEAkers (TYS) - NOC alumni
19	NUS Industry Roundtable Series: Ensuring Food Security in Singapore
19	ICE71-RSAC 365 Innovation Showcase: Frontier Technologies of Adaptive Security
19	BLOCK71 Founders' Circle- How to Scale During a Crisis
21	Growth Hacking for Beginners
24	Phillip Yeo Innovation Fellows Programme 2021 Info Session
26	LLP- NTU Final Presentation Day
26	Essential Growth Hacking Strategies for Startups
30	LIFES Webinar Series: Social Innovation in the Food Sustainability Space with Urban Origins
31	Launch of CSA Cybersecurity Call for Innovation 2021
31	NUS GRIP Run 7 Info Session #1

SEP

1-2	NUS Enterprise Virtual Office Hours
6	SIA AppChallenge, Student Track Grand Finale
15	GRIP Run 7 Info Session #2
17	SIA AppChallenge, Startup Track - Grand Finale
23	GRIP Run 7 Info Session #3
29	AI & Big Data in FinTech Forum

USEFUL TINDER

TAKING FARMING INTO THE FUTURE

Pictured: Polybee's pollination drone technology.

Technology is transforming one of the world's oldest industries. With a growing global population and rising environmental pressures, our traditional image of a farmer—someone toiling outdoors under a hot sun—is yielding to something much more modern as the field turns to cutting-edge innovations in order to improve production, operations and crop quality.

On 24 June 2021, the NUS Development Office, together with the NUS Industry Liaison Office, brought together three of NUS' entrepreneurs to discuss how they are "Taking Farming into the Future," as part of the NUS Giving Experience Webinar Series.

Participants, Clockwise, from upper left:

- Xu Tao, Co-Founder, Singrow
- Siddarth Jadhav, Founder & CEO, Polybee
- David Sher, Venture Development Manager, NUS GRIP, NUS Industry Liaison Office (Moderator)
- Daryl Lim, Co-Founder, Augmentus

1 Know Your Environment

Within Singapore's urban context, agritech innovation is likely to target perishables and alternative proteins, as opposed to staple crops like rice and wheat which require a larger land area. By bringing production of these perishables closer to the populations they serve, it is also possible to simplify the logistics and supply chains involved, while reducing the energy and carbon footprint associated with production and transport.

As an example, NUS spin-off Singrow runs one of the largest vertical farms in Singapore, focusing on the breeding of new plant varieties, as well as a novel hydroponics system to grow quality crops year-round in a tropical climate while utilising less energy and fewer resources.

2 Find the Silver Lining

Polybee's autonomous drones for pollination and plant measurements are critical to helping countries like Singapore grow and breed a broader pool of pollination-dependent crops that are both climate resilient and address consumer's nutritional needs. COVID-19 disrupted the company's business, however, by putting a pause on the overseas trials Polybee was engaging in with vertical farms and greenhouse operators.

Rather than seeing this as a set-back, the start-up viewed the opportunity as a means to improve its technology and make it highly scalable. The goal? Develop something robust and easy-to-use, such that customers only need to receive the equipment and follow the standard operating procedures in order to implement it.

3 Leverage the Ecosystem

Singrow's high-tech farm has served as a platform for fellow NUS start-ups, including Polybee and Augmentus, to test and develop their own technologies.

For instance, Augmentus, which provides a no-code AI robotics platform, collaborated with Singrow on the development of a dynamic harvesting solution for the latter's strawberries. Polybee likewise worked with the company on a flowering pollination system. These technologies can be integrated into the solutions Singrow offers other vertical farms, providing a distribution channel for budding agritech start-ups to reach other clients.

At the same time, all three start-ups benefitted from NUS' entrepreneurial offerings, which helped "de-risk" the venture building process: Augmentus founder Daryl Lim attended the NUS Overseas Colleges (NOC) programme; Polybee is a graduate of both Lean Launchpad Singapore (LLP) and the NUS Graduate Innovation Research Programme (GRIP); and Singrow is also a GRIP alumnus. Being part of NUS Enterprise's co-working community also helped the start-ups connect and identify areas of collaboration for mutual benefit.