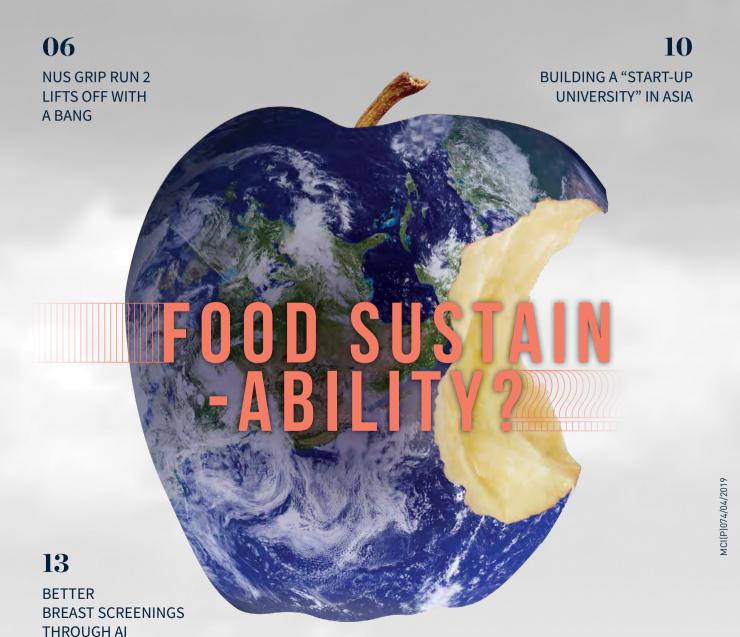
SPARISE SPARKS

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Editor's note

In this edition of SPARKS, we are pleased to introduce you to NUS Enterprise's new leadership who joined us in April 2019: Prof Freddy Boey, NUS' Deputy President (Innovation & Enterprise) and Prof Chee Yeow Meng, Associate Vice President (Innovation & Enterprise). Both shared with SPARKS their vision for NUS' I&E strategy in its next phase of growth, including plans to launch new flagship programmes that both extend NUS Enterprise's entrepreneurial education offerings and increase the commercialisation of NUS technologies.

We also take an in-depth look at food sustainability, an issue of wide-reaching environmental, economic and societal relevance. NUS is approaching this issue in various ways, with the recently held Alternative Protein Marketplace Industry Day and NUS FoodTech Challenge events bringing together innovators from across Singapore to showcase their sustainable protein solutions. We also introduce you to five start-ups within our ecosystem who are working to reduce food waste and/or increase food security, be it through apps that connect consumers to surplus foods, or agritech start-ups that promote urban farming.

As Q3 wraps up, we also reflect back on the various events that have taken place over this busy and exciting period, including the NUS Enterprise Summer Programme, the GRIP Run 2 Lift-Off, and NOCfest. We also feature interviews with students from our NOC Southeast Asia programme, and shine the spotlight on FathomX, a start-up founded by an NOC alumnus that partook in the GRIP programme.

As we forge ahead with new aspirations to spark greater opportunities for our budding entrepreneurs beyond the shores of Singapore and into the region, keep a look out for Enterprise SPARKS to bring you the latest from our thriving entrepreneurial ecosystem.

Enjoy the read!



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The Japanese delegation from Aichi Prefecture were hosted by NUS Enterprise representatives on 10 September 2019.

s NUS spreads its wings into Asia to create greater collaboration for members of our entrepreneurial ecosystem, we signed two Memorandums of Understanding (MOU) on 10 September 2019, deepening our ties to Japan.

In the first, Mr Hideaki Ohmura, Governor, Aichi Prefecture, Japan, and Professor Freddy Boey, Deputy President (Innovation & Enterprise), NUS, inked an agreement that the Aichi Prefectural Government will encourage related organisations (universities, research institutes, and enterprises) to engage in research cooperation with NUS.



(Left) Mr Hideaki Ohmura, Governor, Aichi Prefecture, with Professor Freddy Boey, Deputy President (Innovation & Enterprise), NUS at the MOU signing event.

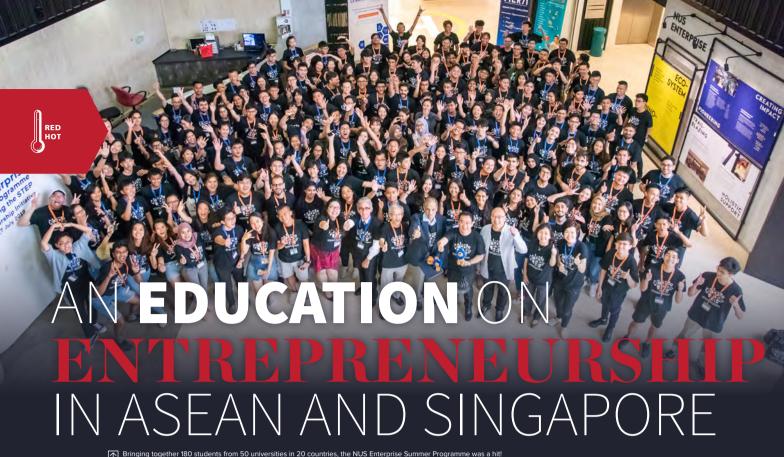
The second MOU was signed between NUS and Nagoya University, represented by Prof Chee Yeow Meng, Associate Vice President (Innovation & Enterprise), NUS and Prof Akihiro Sasoh, Vice President (Academic Research and Industry-Academia-Government Collaboration), Nagoya University, respectively. The MOUs aim to foster collaboration and cooperative activities in the areas of entrepreneurship education and start-up support.



(Extreme right) Ng Zhen Ning, Co-founder of NuSpace, a start-up from NUS Graduate Innovation Programme shared about the nanosatellites optimisation for IoT applications.

The Japanese delegation toured the on-campus incubator, The Hangar by NUS Enterprise, and had the opportunity to meet up with four NUS start-up companies:

- Aruvvi, which is working on Al for predictive maintenance;
- Vox Dei, which is focusing on natural language processing related technology;
- ONUSpace, which is innovating aerospace related technology;
- Subnero, which is providing innovative products and solutions to facilitate underwater wireless networked communications and in –water sensing.



Bringing together 180 students from 50 universities in 20 countries, the NUS Enterprise Summer Programme was a hit

US Enterprise held its 14th run of the NUS Enterprise Summer Programme on Entrepreneurship from 15 to 26 July 2019. This year, we had 180 students from 50 universities and more than 20 countries join us on this two-week programme - the largest cohort by far, and almost double the number of participants from last year. The programme aims to create an opportunity for participants to gain new ideas and perspectives, and to enable them to network with experts and build bonds with their peers from the region.

Students were exposed to a wide range of learning activities, such as hearing from a diverse group of entrepreneurs, who shared engaging narratives of their start-up journeys at specially curated panel discussions and sharing sessions. They visited incubation spaces such as The Hangar by NUS Enterprise, BLOCK71 Singapore and NUS Enterprise@Singapore Science Park to learn how start-ups take off from an initial idea. Through social enterprises such as Mangrove Learning, Society Staples, Ground-Up Initiatives and Kampung Kampus, they learnt more about the social issues that these start-ups are trying to address. Tech companies such as Google, GOJEK, Singtel, Changi Airport Group, Carousell and ShopBack gave insights into incorporating innovation and intrapreneurship into their organisation.





Students visited NUS Enterprise @ Singapore Science Park, an incubator for start-ups in the deep tech space

One of the highlights this year was a focus on entrepreneurial opportunities in Southeast Asia – one of the fastest growing markets in the world poised for further growth. Students were exposed to various ASEAN languages and cultures, and had the chance to attend a panel discussion on Start-up Innovation Ecosystem and Opportunities in ASEAN, of which panel speakers included ASEAN Ambassadors to Singapore from Cambodia, Philippines and Thailand, as well as a representative from the Embassy of Indonesia in Singapore. Participants experienced immersive hands-on activities, from learning Balinese dance, playing and harmonising the Angklung, trying out Tinikling (or "Bamboo Dance"), to Batik making, all of which are representative of the colourful and vibrant ASEAN cultures.

During the first week, participants formed teams and were told to come up with innovative start-up ideas to be pitched to investors by the end of the programme. Armed with what they had learnt during lectures and pitching workshops, the teams presented their solutions to a panel of industry experts and investors at a private pitching session on the last day of the programme. The winning team for each track was announced at the closing dinner held at Jurong Bird Park. In addition, participants performed and certificates and prizes were presented to the winners during the dinner.

We interviewed some of the participants at the end of the programme, and the feedback was positive:

"Before attending this Summer Programme, my goal was to complete my degree and get a job at an MNC. But the Summer Programme has changed my mind. Now my goal is to be a part of a start-up ecosystem. I realised that this isn't a normal shift in mindset, but the programme has taught me that higher risks come with better rewards." - Musa, Lahore School of Economics, Pakistan

"My mindset has definitely changed, and I am able to think more critically. One major takeaway from the various lectures we had was that it is always about the customer. I've probably become more selfless in my decisions in entrepreneurship, because at the end of the day, it is not about me but the customer. We are creating a future for them, not us." - Vincent Lukito, Institut Teknologi Bandung, Indonesia

Follow NUS Enterprise Summer Programme on Facebook, Instagram or visit our website (https://enterprise.nus.edu.sg/educate/summerprogramme) to stay informed about the programme next year.



On their second day of the programme, students were challenged to an 'amazing race' around Singapore getting clues from major landmarks like Kampong Glam and Chinatown!



Prof Tan Eng Chye, NUS
President (front centre)
with some of the ASEAN
ambassadors and students at
the 14th NUS Enterprise Summer



Organised by Society Staples, students got to learn more about dragon-boating for Persons with Disabilities and experienced it for themselves.

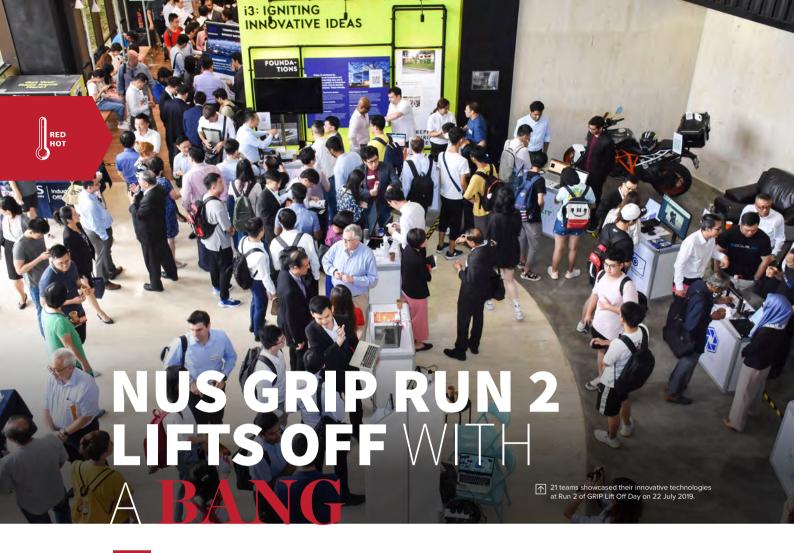


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At the ASEAN cultural immersion session, students got to try their hands at playing Angklung as a group



Prof Wong Poh Kam from NUS Business School addressing the students at the launch of the Summer Programme.



aving undergone three months of intensive training through the Venture Hothouse, 21 deep technology start-ups from the NUS Graduate Research Innovation Programme (NUS GRIP) took off on 22 July in a showcase of technology and market-readiness to over 300 potential investors, partners and key players of the Singapore innovation ecosystem. Attended by NUS President Professor Tan Eng Chye, Provost Professor Ho Teck Hua, and Deputy President (Innovation & Enterprise) Professor Freddy Boey, the teams shared about their businesses which are based on a wide variety of NUS technologies in AI, food and medical tech, engineering, ICT and Agritech. These are all research based innovations designed to address existing market needs while breaking new grounds.

Singrow



Singrow showcased their white strawberry innovation.

Singrow uses cutting-edge agro technology to grow premium fruits and crops. Their key innovations include the first white strawberry variety developed in a tropical country, a faster indoor hydroponic strawberry cultivation method, and a strawberry-specific hydroponic system. This enables the growth of the premium strawberries using less energy and within a shorter time. Singrow has secured SGD50,000 from NUS to further the innovation and bring it to the market. Other partners such as Agricultural Total Solutions will build on integrated vertical hydroponic systems; GWS Living Art will provide the pilot scale vertical farm site and build the urban farming communities; and City Sprouts will organise urban farming events and workshops.

Microtube



Demo showcasing the most comfortable glove controller for an immersive experience in a mixed reality world.

Microtube offers the thinnest and most stretchable fibre sensor to capture motion and force. This platform sensor has multiple applications, one being a comfortable gaming glove controller for a truly immersive experience in a mixed reality world. As part of the Venture Hothouse, they were able to replace bulky, heavy and expensive gloves with their initial prototype and will be working with partners to scale this for the gaming industry.

"It has been a fruitful time for us at Lift-Off Day. We met many established players, some of whom we are exploring potential partnerships with, and we received great feedback on our product and business," commented Yu Long Teng, co-founder of GRIP start-up Microtube.

SGD100,000 seed funding from the National University of Singapore. This will enable these start-ups to fine-tune their products and to scale their businesses. All start-ups will be further incubated by the University to solidify their footing in the market in the next nine months. To learn more about NUS GRIP, visit nus.edu.sg/grip.

To date, 14 teams have been selected to receive



Team FitSight presenting a preventive for the early onset of myopia.



(L to R) Mr. Chen Jun, Chairman and CEO, Shenzhen Goldport Capital Management, NUS President Prof Tan Eng Chye, NUS Provost Prof Ho Teck Hua and Prof Freddy Boey, NUS Deputy President (Innovation & Enterprise) graced the opening of GRIP Lift Off Day.



"Beyond venture creation in Singapore, we have been talking to key partners from substantial markets around the world to create new opportunities for funding and rapid market access for our GRIP startups. We have established strategic partnerships for China, and are now looking to make inroads into the rapidly growing ASEAN market. We plan to start about 50 of these deep tech companies from NUS a year, so we definitely welcome more members of the innovation ecosystem to come and work with us to make them a success."

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Professor Freddy Boey, Deputy President (Innovation & Enterprise), NUS

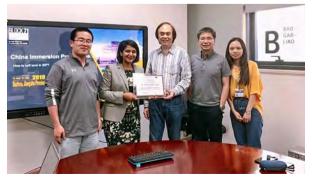


he inaugural China Immersion Programme, run by NUS (Suzhou) Research Institute (NUSRI) and BLOCK71 Suzhou, officially ended on 31 May 2019.

Designed to enable Singapore companies to think more holistically about their strategies for entering and competing in the China market, the programme includes both in-depth theory lessons about the Chinese economy and business culture, as well as company visits, mentoring sessions, and market validation exercises.

FireVisor Systems, an AI start-up which provides a predictive analysis platform for smart manufacturing, participated in the programme, receiving a customised itinerary focused on developing market understanding, learning how to navigate through China's complex business environment and cultivating important relationships and business networks. It was also one of the participants of the Tsinghua Exchange Programme earlier this year, where the company met the team from BLOCK71 Suzhou

FireVisor, a graduate of The Hangar by NUS Enterprise, has leveraged on the synergistic ecosystem that we have built to help start-ups venture into the China.



(2nd from left) Surbhi Krishna Singh, CEO & founder of FireVisor - an Al start-up from The Hangar by NUS Enterprise with (3r from right) Dr Laurence Lau, NUSRI mentor at Block/T Suzhou.

On the first day of the programme, Surbhi Krishna Singh, CEO and founder of FireVisor, worked closely with NUSRI mentor Dr Laurence Lau to design a general business canvas map for the company. On the second and third day, Surbhi tested out FireVisor's business models under the guidance of Dr Lau and Hui Kwok Leong, Deputy Director, BLOCK71 Suzhou.

The programme also provided FireVisor an opportunity to immerse itself in China's business environment through on-site visits to general manufacturing companies and solar companies, such as Sinnotech, Canadian Solar, GCL and J-Dragon. Surbhi had dialogue sessions with directors from each company and visited their manufacturing plants. She also learned from Singapore entrepreneurs in China, established working relationships with business leaders, and formed potential partnerships with local companies.

As a result of these visits and various sessions with business veterans and mentors, Ms Singh gained a clearer picture on how to invest and enter the China market.

Surbhi commended the programme, stating, "Definitely, the programme is well-organised and everything is super-efficient. The China Immersion Programme gave me the inspiration and confidence to do business in China. More importantly, I gained deeper insights into the Chinese market and polished my business plan into China."

For more enquiry about the programme, please visit our website at http://www.nusri.cn/etp/blksz/project/crp/

INSIGHTS INTO THE CHINA MARKET



Young Technopreneur Award and Sunshine Award recipients with Mr Foo Jixun (1st row: 2nd from right), Managing Partner of GGV Capital.



Mr Foo shared his thoughts on the challenges of entrepreneurship.

arlier this month, alumni from the NUS Overseas Colleges (NOC) China programme had the opportunity to meet with Mr Foo Jixun, Managing Partner of GGV Capital, a global venture capital firm that invests in seed-to-growth stage start-ups in various sectors. Mr Foo is the generous donor behind the Young Technopreneur Award, who is very supportive of students venturing overseas to experience and learn about the market. He has consistently been recognised by Forbes China as one of the "Best Venture Capitalists" every year since 2006. He has also invested in several iconic companies that we are familiar with today: Baidu, Grab, Didi-Chuxing, Youku-Tudou, etc.

Here are three key takeaways from the sharing session:

On Entrepreneurship:

Mr Foo emphasised that failures are a big part of life; they are rewarding because they provide learning opportunities on business operations that strengthen business acumen and experiences to carry one further in the future. He also shared the importance of idea testing on a wider market (outside Singapore) to gain market context and relevance, and to avoid groupthink.

"Find the fine line between being tenacious about the idea versus being honest with yourself that certain ideas just don't work. There is no perfect formula but only trial-and-error. Let the market be your judge."

On Future Trends:

Having accumulated years of venture capital investing, Mr Foo highlighted the importance of having foresight of rising trends for entrepreneurs to identify market opportunities. Mr Foo also shared his views and predictions on rising trends in China and Southeast Asia, such as the rise of artificial intelligence, robot

automation and cloud services for many industries including logistics, public transportation and education, as well as further replication in Southeast Asia of what's been done in China.

"Trends are so much more important than what things are today. It is more valuable to observe a trend of change in a particular city or behaviour. VC and entrepreneurship are about identifying and understanding these changes."

On Personal Life:

Being a 过来人 (someone who has been through a varied personal experience), Mr Foo provided many nuggets of wisdom and practical advice for the younger generation to be nimble in this fast-paced world. Mr Foo strongly encourages the younger generation to explore and travel the world to gain unique personal experiences and different perspectives. One mantra imparted by Mr Foo is to be "insecure" and envisage how things can still be improved. This "insecure" mentality was what enabled Mr Foo to learn continuously and stay at the top of the game. Our NOC alumni were reminded to pick and invest time in the right trajectory to reap the rewards. To know whether one is on the right trajectory, Mr Foo concluded with his answer:

"Join a start-up or a tech company because they will create and provide a unique experience. They will give you a different lens as to what the world can look like. Being in a company that opens up your vision is very important. Start-ups are the ones, day in, day out, thinking about what's next. Join a forward-looking company."

Apart from generous funding that helps defray our students' overseas expenses, NOC Award recipients also benefit from the unique opportunities to meet and learn from industry experts such as Mr Foo Jixun. Look out for the next round of applications opening in October 2019.

More details at www.bit.ly/NOCAwards



Prof Freddy Boey at the GRIP Run 2 Lift-Off Day in July.



Crafting a strategy is Prof Freddy Boey, NUS Deputy President (Innovation & Enterprise) and the new leader of NUS Enterprise. In his own words,



Universities no longer just produce people with degrees. Maybe even more important in the world today is the university as a reservoir of innovative people and innovative ideas."



Prof Boey's vision for NUS Enterprise includes a renewed focus on NUS' differentiators: its research strengths and talent. With the aim to better leverage NUS' Intellectual Property (IP), Prof Boey hopes to not only realise the investment that has been made in research, but to translate resulting technologies into new ventures with societal and economic impact. At the same time, he plans to increase outreach to the university's researchers and graduate students, helping to imbue an innovative culture across campus.

The Graduate Research Innovation Programme (GRIP), helmed by Prof Boey under the Industry Liaison Office (ILO), is one example of what he has in mind. In less than a year, more than 40 start-ups based on university IP have emerged from the deep-tech venture creation programme, with innovations ranging from 3D-printed personalised medicine to autonomous maritime vehicles. Several GRIP companies have already received external investment or purchase orders, testament to the commercial applicability of NUS' technologies and the potential for graduate students to be trained as technopreneurs.

To further bolster NUS' I&E efforts, Prof Boey plans to launch new initiatives next year that align with the university's primary educational mission and produce "a continuous flow of innovators." This includes 1) extending the existing undergraduate NUS Overseas Colleges (NOC) programme to PhD students; 2) introducing an experiential-based MSc in Entrepreneurship degree; and 3) developing a Residential Accelerator Programme (RAP) to provide focused training to professionals interested in accessing NUS technologies and forming high-tech start-ups. Together with GRIP, these four programmes will form the core pillars of NUS' I&E strategy in its next phase.

Underpinning this approach is a view of the university as a "universe-city," one that is deeply rooted locally but intensely engaged with the world. To this end, Prof Boey intends to capitalise on new opportunities within Southeast Asia and China, helping to both expose NUS students, technology and start-ups to key markets, while also positioning the university as a magnet for Asian and global talent.

Ultimately, Prof Boey hopes that students will choose to come to NUS because it is a "start-up university." Summarising his vision for success, he states, "If five years from now, a student says 'I want to join NUS...because I want to do a start-up,' I think we [will] have achieved significantly."

ENHANCING ENTREPRENEURIAL EDUCATION AT NUS



ssisting Prof Boey in the execution of his strategy is Prof Chee Yeow Meng, Associate Vice President (Innovation & Enterprise) at NUS. Serving concurrently as the Director of both the NUS Overseas Colleges (NOC) programme and the NUS Entrepreneurship Centre (NEC), Prof Chee has been tasked with overseeing the scale-up of NUS' entrepreneurial education programmes, extending their influence to new locations and audiences, and launching the new flagship NOC PhD and MSc in Entrepreneurship programmes.

"It's been generally acknowledged that [NOC] has been one of the key forces behind the development of Singapore's tech ecosystem," Prof Chee states. "That is a result of 17 years of investment that NUS has put in."

To build on this success, Prof Chee intends to double NOC's programme's annual intake to 600 students per year by

2025. To ensure that quality is not compromised in the pursuit of quantity, he has implemented psychometric testing to the application process, complementing candidate interviews and helping to expediently identify promising students with entrepreneurial potential. He is also actively reviewing NOC's locations to ensure the programme can remain relevant and responsive to shifting technology trends and the emergence of new entrepreneurial hubs.

"Going forward, the good thing is that NOC has a very strong brand name to leverage. And we want to expand the programme to benefit others," Prof Chee states. Accordingly, a key tactic is to broaden NOC's target market beyond the undergraduate level. Plans include early outreach to secondary school students, with the intention to reinforce NUS' association as an entrepreneurial university of choice and capture a key pipeline of future talent. At the graduate level, the extension of NOC to PhD candidates will better bring students experienced in technology into the programme's fold. This will not only result in graduates more likely to form technology-based ventures, but provide needed entrepreneurial exposure to those students who choose to pursue industry over academia post-graduation.

A formal degree will also be made available to students through the new MSc in Entrepreneurship programme, set to launch in July 2020. Building on NUS' experience in providing entrepreneurial education, the one-year MSc programme will combine academic coursework with experiential learning, inclusive of an internship in Singapore, exposure to NUS' IP library, and the requirement to develop a business model for a start-up. The course will bring NUS' educational offerings to the next level, while offering a deliberate start-up creation programme for entrepreneurially-inclined students around the region.



TechASEAN:

A RESOURCE FOR THE REGION

n 2016, NUS Enterprise launched TechSG, an innovative directory detailing Singapore's start-ups, incubators, and investors. Three years later, the initiative has taken on a larger mission and geographic scope: rebranded as TechASEAN, the portal now maps over 20,000 technology-based start-ups in Southeast Asia, making it the most comprehensive resource for accessing data and information on the technology ecosystems of the region.

Developed by NUS Enterprise's research team in collaboration with local start-up Wonderlabs, the portal currently covers Singapore and Indonesia, with plans to extend coverage to Vietnam, Thailand, the Philippines, Myanmar and Malaysia over the next few years.

By providing comprehensive information on start-ups, their founders, investors, incubators, technology sources and other facilitating intermediaries, TechASEAN will serve as an important tool for understanding the connectivity and dynamics of the region's start-up scene. The platform will also provide analytics about the ecosystems, including comparative analysis of their trends and structures. A ranking of key influential ecosystem players in Singapore, based on linkage data collated and quantified by TechASEAN, will also be launched in September.



Prof Wong Poh Kam showcased the capabilities of TechASEAN, a comprehensive resource portal mapping the technology ecosystems of Southeast Asia.



Professor Wong Poh Kam, who led the project in his previous capacity as Senior Director of the NUS Entrepreneurship Centre, shared the aims of the initiative: $\frac{1}{2} \sum_{i=1}^{n} \frac{1}{2} \sum_{i=1}^{n} \frac{1}{$



We hope that TechASEAN, by providing a unified platform that brings together information on the fragmented start-up ecosystems, will be useful to venture investors seeking to invest regionally, start-ups looking for partners and talents to scale across the region, and various start-up ecosystem service providers seeking to build pan-ASEAN presence."

A soft launch for the platform was held on 18 July at the "Start-up & Innovation Ecosystem and Opportunities in ASEAN" event, which was held as part of the NUS Enterprise Summer Programme.



Meet the team behind FathomX! (left to right): Mayank Gurnani, NUS ILO Venture Manager; Zhang Ao, Intern; Dr Feng Meng Ling, Co-Founder, Technical Advisor; Du Hao, Co-Founder, Engineering & Technology; Jeff Weisel, Commercial Champion; Dr Mikael Hartman, Co-Founder, Clinical Lead; Amos Heng, Co-Founder, Business Development; Ler Ser Yeng, Technology Manager.

he Graduate Research
Innovation Program (GRIP) is an
initiative by the NUS Industry
Liaison Office that helps postgraduate
students and researchers transform their
research into deep technology startups. Participants receive mentorship,
market and product validation, and
even an opportunity to pitch for up to
SGD100,000 in seed funding.

FathomX, a graduate from GRIP Run 2, is a spin-off from NUHS that offers medical imaging AI to improve breast cancer screening inadequacies. Their solution aims to reduce the false positive rates of mammogram screenings by 67%, shorten mammogram screenings to just one minute, and eliminate the need for multiple radiologists to cross-analyse scans.

We managed to chat with co-founder Amos Heng, who is also an alumnus of the NOC Shanghai programme. Read on to find out more about his entrepreneurial journey, and how he and his team have benefitted through their GRIP experience.

How did your journey with Fathom X begin?

I've always been interested in med-tech innovation and products. It stems from my days in National Service, where I served as an army medic and realised how much potential there is for innovation to actually save lives.

I did two internships at a medical device company and the Ministry of Health, as well as enrolled in the Innovation & Design Centric Programme under the Engineering in Medicine Track. I also got involved in the Grand Challenge Scholar's Program for Advanced Health Informatics, and embarked on four separate medical device and healthcarerelated projects.

Right before graduation, I met Dr Feng Meng Ling, who is an incredibly well-respected researcher in the field of Medical Al. He shared his ongoing project and how it could revolutionise the industry, which I decided to be a part of after realising that the market, technology, and product market fit added up.

What are some of your challenges?

Med-tech start-ups operate differently from those in other fields. The gestation period can be long due to compliance and regulatory issues. This is especially so for us as we focus on diagnostics and medical devices. Time is required for pre-audits, audits, receiving approval for clinical trials, as well as user tests. Thus, our biggest challenge is navigating the bureaucracy while still moving to grow quickly as a start-up.

Were there any key moments and milestones in your start-up journey?

A key moment was when an audience member at one of our pitches told us that she hopes we succeed, as breast cancer is a significant problem the country is facing. She was not an investor, nor a customer, but that moment made us realise that FathomX exists not because we want to become CEOs or CTOs, but because we want to solve a problem bigger than our immediate concerns.

Our company is humbled to have achieved several milestones, including being Top 5 in the World and Top in Asia for the Digital Mammography Dream Challenge, being one of 12 grand finalists in Hubei Innovate, and also being shortlisted for Slingshot SG.

How has GRIP provided support for your company?

The GRIP programme is an amazing initiative. Deploying and scaling our technology required a company to be involved, and that was where GRIP came in with its accelerator programme, mentorship, connections and funding. The programme has been helpful and structured in a way for us to translate our research into a viable business.

What are your plans moving forward?

We hope to set up the ISO certifications and compliance and conduct clinical trials across the various healthcare clusters soon. We also wish to expand our technology not only within the Breast Screening Singapore Programme, but also to mammogram clinics around the world via our research collaboration partners.



LEARNING (TO MAKE TO **DELICIOUS** AGAIN

ce-cream can be a quick fix to anyone's bad day. However, conventional ice cream is often unhealthy, so binging on that cold tub of creamy goodness may only add on to your stress! Fret not, because Hoow Foods, a start-up based in NUS Enterprise @ Singapore Science Park, is here with a solution for you. With their revolutionary Callery's Ice Cream, you can now enjoy this delightful treat, minus the auilt!

The story of Hoow Foods began with its four co-founders, Yau Png, Zhong Hao, Wang Qun Xiong and Dr Sherman Ho (who are all coincidentally NUS alumni). After seeing the increasingly

> unhealthy diets and rise of chronic metabolic diseases among the local and regional populace, they felt the need to use their expertise to help solve this problem.

left to right): Dr herman Ho (Chie Technology Officer), Yau Png (Chief Executive Officer), Wang Qun Xiong (Director of Strategy and nance), Zhong Hao (Director

Realising how ice cream is a beloved treat in tropical Singapore, coupled with the fact that healthy ice cream remains an untapped venture here, the team wanted to leverage this opportunity and fill this gap. With that, Callery's Ice Cream was born. Callery's is a significant milestone for Hoow Foods as it only took six months to be commercialised upon conception, and is Singapore and Asia's first premium lowcalorie ice cream to be offered in a pint.

However, the company's scope is not limited to creating healthy ice cream. As a food technology start-up, Hoow Foods focuses on reformulation technology, where traditional recipes are transformed into healthier versions without any compromise in taste and texture. Using their own smart platform, which incorporates machine learning and Al to reformulate food, they have been able to make their product development fast and efficient. Their target market is food manufacturing and retail companies who are interested in modifying their products' nutritional

profile into something healthier.

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Some of Hoow Foods reformulated foods include (clockwise from bottom left): Guilt-Free Chocolate Chip

Currently, Hoow Foods is the only company specialising in reformulation. Achieving this feat was not easy, and they met with several challenges in their pursuit of success, such as proving that their technology even worked. However, the launch of Callery's Ice Cream helped them to overcome this as its success convinced interested parties of the company's reformulation abilities. A challenge they are now facing is developing their market for reformulation. According to co-founder Yau Png, many smaller companies are still unaware of the global move towards healthy and sustainable food. Therefore, they still see a need to educate these companies on the consumer's willingness to pay a premium for healthier food, as long as it tastes good.

Despite these obstacles, Hoow Foods is not letting anything slow them down. They have recently formed a partnership

with Singaporean food conglomerate, Killiney Group, which gave the company the credibility it needed to establish themselves as a foodtech start-up. The company is also working on refining their technology, such that they are able to reformulate a wider variety of foods. Through reformulation, they hope to solve global issues such as the obesity and diabetes epidemic, as well as enable the shift towards sustainable foods by ensuring they taste just as good as the

foods we are used to.

Since joining the NUS Enterprise ecosystem slightly more than a month ago, the company has already received many opportunities. From being part of the **Alternative Protein** Marketplace Industry Day (read on more in our article NUS FoodTech Day

2019, pages 16 to 17) to networking with global industry leaders such as Nestle, Givaudan, and Ingredion, the prospects seem to be endless. They are also very excited and grateful for the opportunities provided by NUS Enterprise, and as Yau Png himself said, "Being NUS Alumni ourselves, we're proud to fly the NUS flag high!" In addition, the company is already working towards more game-changing research, which they hope to announce by the end of the year.

We are proud to see our very own students powering through the start-up world, and bringing brilliant innovations into the market.



ast year, DSTA@71 organised their inaugural run of HackerFest, as part of DSTA's (Defence Science and Technology Agency) efforts to pursue open innovation and partnerships with the local start-up community, enterprises, academia and students. Co-organised with NUS Enterprise, the event took place over an exciting weekend of intense effort and pitching.

Prior to HackerFest, the teams were exposed to training workshops, data clinics and a site visit to the Armour Simulation Centre. These visits aimed to offer deeper insights into the challenge statements, also serving as opportunities for the organisers to engage potential participants and equip them with the related technical knowledge.

On their Pitch Day, 10 shortlisted teams presented their ideas and were evaluated based on originality and innovation, quality of prototype, feasibility and adaptability, among others. Open category winners walked away with collaboration opportunities with DSTA and NUS Enterprise, access to mentorship and industry network and cash benefits.

FXMedia is one of the winners of the HackerFest Challenge 2018,

for the category on 'Zero Footprint Operations Centre'. FXMedia looked into the adoption of novel mixed reality technologies to reduce large physical footprint as well as set-up effort and time for future operations centre. FXMedia has since been collaborating with DSTA, having embarked on a joint development project to further enhance the MVP capability. Through this development journey, the two parties have established a close, trusting partnership, sharing scenarios and concepts, and exchanging ideas on technical implementations and solutions.

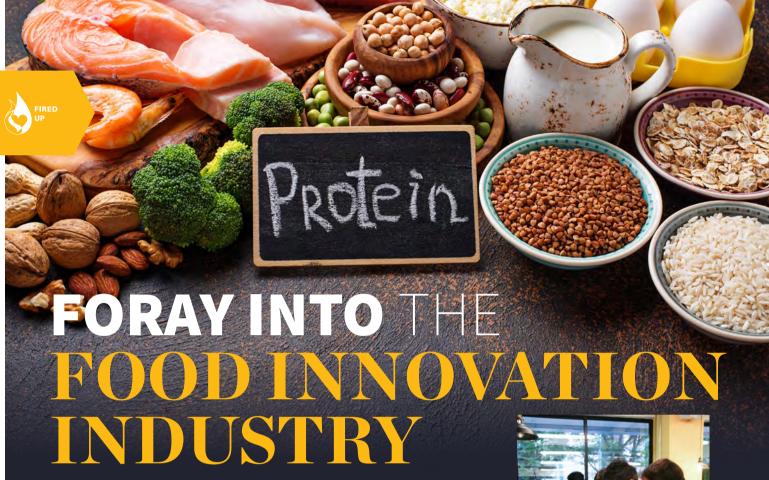
"We are truly happy that HackerFest opened doors of opportunity with DSTA for us. Being an SME, we feel really honored to be of service to DSTA and for the Nation," said Joeie Oon, Director, FXMedia.

Recently in March 2019, FXMedia presented their Minimum Viable Product (MVP) demo with their solution for a zero footprint operations centre. The MVP, using Microsoft Hololens as the key technology, allowed commanders and operators in ops centres to collaborate on a virtual sandtable with gestures and voice commands. Representative

systems including video feeds and maps, were also constructed virtually without the need for physical system setup.

Located in Block 71 at the JTC LaunchPad, DSTA@71 was set up in 2018 as a springboard for local start-ups to gather and accelerate, working with them towards the rapid development of technologies. A collaborative initiative by DSTA and NUS Enterprise, it offers a dedicated platform for co-innovation, collaboration and conceptualisation of breakthrough innovations to strengthen the defence and security of Singapore.

"DSTA's presence in Block 71 has given the start-up community new opportunities to meet and share with the innovation leaders of DSTA as well the top brains from other countries in the area of defence and security. Such interactions will enrich the quality of potential solutions and improve application of leading technologies, which will benefit the related industry," said Mr Kelvin Tan, Director (Corporate Partnerships), NUS Enterprise.



t was an exciting day over at NUS Enterprise @ Singapore Science Park as we hosted both the Alternative Protein Marketplace Industry Day and NUS FoodTech Challenge on 17th July 2019. Distinguished guests began streaming in as early as an hour before the event started, eager to get the best seats at the venue. By the time the event began, the crowd had spilled to outside the seminar room – what an overwhelming response it was!

We kicked off our first event, the Alternative Protein Marketplace Industry Day, with an opening address by Dr Brian Koh, Director of NUS Enterprise. His address was followed by Allan Lim, Group Manager of Nestle R&D Centre, who shared his vision for the food industry. Keynote speaker Christian Cadeo, Managing Partner of Big Idea Ventures, addressed the central theme of the event: alternative protein. He talked about the changing trends in consumption of alternative meats, the different aspects driving the increasing popularity of plant-based foods, and the positive impact of plant-based proteins.

This was followed by presentation pitches of brilliant ideas by different companies, namely Lesaffre, Thai Wah Public Company, Growth Well, Hoow Foods, and Sophie's Kitchen. The event concluded with a delightful networking lunch sponsored by gomama, a vegan food start-up who delivers their own plant-based spin on classic recipes, serving delicious plant-based alternatives to common dishes such as pasta, gyoza, and fried rice. Concurrently, booths were also set up by different foodtech companies to showcase their latest innovations, and guests were definitely treated to a fulfilling experience.



Ingredion's booth featured a live demonstration of the use of their ingredients for culinary creations.



A hearty, nutritious, plant-based spread of food by our friends at gomama.

The afternoon was just as bustling with the Final Demo Day of the week-long NUS FoodTech Challenge 2019, where ten teams from tertiary institutions around Singapore came together to battle for the exciting top prizes! The teams pitched their ideas to our panel of judges, comprised of different industry experts from companies such as Nestlé, Ingredion, and JR Group, as well as representatives from NUS Enterprise. As teams worked hard to find solutions to sustainable protein, beyond soy, for Southeast Asian consumers, many brilliant ideas emerged and we got to witness the hard work of the bright minds of young Singaporeans.



A prototype by one of the teams for their innovation,
Noods-to-Go – a healthier and customisable version of

The outcome of the event was a success! We would also like to extend our congratulations to the top 5 teams:

- 1st Prize + Special Award Winner: Seedling, who created a flour blend that incorporates food processing by-products generated daily by consumers
- 2nd Prize + Special Award Winner: The Ideators, a team who wants to make the traditional kueh salat healthier by replacing the top kaya layer with a chickpea layer
- 3rd Prize + Special Award Winner: Soylent Green, a team who wishes to promote the consumption of edible insects as protein
- Special Award Winner: Cornivores, who formulated vegan pulled pork from jackfruit
- Special Award Winner: Alternative Amino, who aims to revolutionise instant noodles by incorporating duckweed to improve the noodles' nutrition

All five teams will receive an express ticket to the Innovation Practicum Grant and three months of free incubation support to further develop their ideas in the food industry by NUS Enterprise.



A big congratulations to all our winners of NUS FoodTech Challenge 2019!

What is plant-based protein?

Plant-based protein refers to food that provides a considerable amount of protein akin to conventional protein sources such as poultry and fish, but are derived from plants. Such proteins often require lesser natural resources for production compared to their conventional counterparts. It comes in many forms, with a popular one being plant-based meat (eg. Impossible Burger). However, it's not all about burgers. Plant-based products can be in the form of:

- Dairy-free ice cream
- Egg replacement
- Functional beverages
- Vegan Ingredients

What has changed?

The Plant Takeover

With some supermarket sections now devoted entirely to plant-based products, it is likely we will see more dairy and meat having a plant-based equivalent in the years to come.

Environmental Impacts

People are beginning to realise the environmental cost of eating conventional protein and are thus seeking alternative protein to save the environment.

Changing Consumer Habits

As consumers become more conscious, more of them seek healthier and more sustainable food.

Urbanisation

More people are moving into urban areas which are characterised by higher meat consumption. However, due to reasons above, many of them are now looking to replace meat with alternative protein.

Why the hype?

Manufacturers Go Big on Optimal Taste

Manufacturers such as JUST work on making plant-based versions of food taste similar, if not even better, than the original. This has encouraged consumption significantly as more people are willing to try it and even switch to it permanently. This trend can also be observed in the case of plant-based milk.

Products Made More Visible

When Beyond Meat launched their patties, they demanded it be placed within the meat aisle. This skyrocketed sales as their product received regular traffic from shoppers, rather than being cast aside as a niche product. Visibility is key to appeal to the everyday consumer.

Cultural Icons as Vegan Advocates

There is no longer a stigma against being vegan. Notable athletes such as Boston Celtics' Kyrie Irving (Basketball) and Serena Williams (Tennis) are going vegan. This inspires the everyday consumer to believe that if these remarkable individuals are able to sustain on plant-based diets, then they should be able to as well.

What will it change?

Positive impact of plant-based proteins:

- Climate change
- Health
- Animal welfare
- Economic growth

The market for alternative protein is huge, valuing at approximately USD5 billion and it is estimated to grow dramatically into a USD140 billion market by 2024. The demand for alternative protein in Asia is growing at an even faster rate than other regions, and 7 in 10 consumers are already reducing meat consumption and looking to alternative protein.

Many entrepreneurs are now venturing into the plant-based industry, with a successful example being Beyond Meat, who have already sold over 25 million patties. Other companies with revolutionary plant-based innovations include Shiok, the first company in the Asia Pacific to create vegan cell-based shrimp dumplings, and Karana, a company consisting of two entrepreneurs who use jackfruit to replace meat in a variety of delicious cuisines.



TAKING A BITE

OUT OF THE

SUSTAINABI MARKET



eet the NUS Enterprise companies whose innovations are creating a more sustainable food ecosystem

Reducing Food Waste



Treatsure CEO and co-founder Preston Wong.

Despite the rise in global hunger, it is estimated by the United Nations that approximately 1/3 of all food is lost or wasted —representing a humanitarian, environmental and economic crisis.

Doing its part to combat food waste is **Treatsure**, an incubatee at The Hangar, whose app connects everyday consumers to businesses with surplus food. By encouraging customers to "treat food as treasure," the start-up is simultaneously preventing good food from being thrown away.

Meanwhile, BLOCK71 Singapore incubatee **Good for Food** is using data analytics and machine learning to provide actionable insights to hotels and other mass-producers of food. Through identification of the dishes most likely to be leftover or thrown away, Good for Food can help buffets better match their supply to demand. According to the start-up, its customers have been able to reduce their food wastage between 30-50% in the first few months of implementation.

Converting Waste into New Products



Magalarva turns organic waste into fertiliser.

BLOCK71 Jakarta incubatee

Magalarva is tackling food
sustainability in a different way,
bioconverting organic waste into
plant fertiliser through breeding and
use of black soldier fly larvae. The
larvae are also highly nutritious and
can be used in animal feed and pet
food. The company's environmental
impact is thus two-fold: not only do
they produce a sustainable protein
but they help eliminate organic waste
buildup.

Increasing Food Security



Archisen uses sensors and IoT technology to help urban farmers increase crop yields and improve management processes.

Another key push in the effort to create a more sustainable food ecosystem is urban agriculture. As Singapore is heavily dependent on food imports, increasing production of homegrown sources can help to both increase self-sufficiency as well as alleviate the environmental costs associated with transport and packaging.

NOC alumni start-up **Citiponics** has turned an underutilised carpark in Ang Moh Kio into an urban farm, producing up to four tonnes of Georgina lettuce every month—without the use of any soil.

At the same time, fellow NOC alumni start-up **Archisen** aims to establish the largest network of urban farms in Asia, serving megacities delicious, safe and fresh produce. The company helps build profitable farms by combining crop intelligence, engineering innovation and market insights.

NOCfest

A PEEK INTO

ENTREPRENEURIAL JOURNEYS



Students had the opportunity to speak to ambassadors for each of the NOC locations, from New York, to Israel, even Singapore



Raimie Tang, founder of Dateldeas and NOC alumnus sharing about his start-up, delivering top quality date ideas through a telegram channel.

very year students, NOC alumni start-ups and alumni ambassadors gather together at the NOCfest held at The Hangar by NUS Enterprise, fueled by a common interest - the NUS Overseas Colleges programme.

At this year's NOCfest, we welcomed more than 350 NUS students, together with 50 alumni ambassadors and 20 start-ups founded by NOC alumni. Some of these alumni start-ups include Carousell, Dateldeas, Versafleet and Jaga-me! The event offered plenty of opportunities for students to meet with NOC alumni and learn more about the transformative NOC experience, and find internships from 20 alumni start-ups.



NOCfest was a success with over 300 students in attendance!

66 It was

It was super heartening to see all the amazing bright minds interested in entrepreneurship! The path to starting up is not easy, but with passion and grit, anything is possible!"

Cordillia Ann Tan Mei Yu, NOC Class Ambassador and NOC Shanghai alumna Our ambassadors and start-ups were eager to share their knowledge and experiences with NOC applicants and NUS students looking for an opportunity to fit themselves into a world-class entrepreneurial programme.

"Glad to be part of the alumni start-ups showcase at NOCfest. We saw over 300 students turn up at the event, which was an open house in its own right. Experience life in a start-up – apply for NUS Overseas Colleges" – Ryan Chong, co-founder of Pitchspot and NOC Singapore alumnus.



IGNITING ASEAN'S ENTREPRENEURIAL

FLAME

In this issue, we catch up with two students who embarked on NOC Southeast Asia (Indonesia and Vietnam). Read on to find out more about their experiences!

TESO in Ho Chi Minh



ESO, based in Ho Chi Minh City, is a start-up that provides software outsourcing services as well as technology solutions for businesses to helps companies reach more customers. We hear from Tan Wei Ming, Bertrand, a first-year computing student, about his exciting experience with the company.

Tell us about your NOC experience

I was thrown into an incredibly intense and fast paced full-stack web developer role in the company. On top of working on upcoming core products, I also assisted in the development of Content Management Systems (CMS), website/web page revisions and maintenance of databases for our clients.

How different is the entrepreneurial environment in Vietnam compared to Singapore?



(Left) Bertrand with the CEO of TESO, An Nguyen, whom he learnt many

My company experienced a surge of both incoming and outgoing employees within my three-month tenure, and many of these talented individuals were way younger than me (the youngest being 18). I also recall my lead developer telling me how leniently I've been treated when it comes to work mistakes and errors because of my "foreign" status. This showed me that as Singaporeans, we are way more privileged in terms of career growth and opportunities. It humbled me to know that there are equally talented individuals out there, who simply do not have similar opportunities or as ample a space to grow and learn from their mistakes.

What are some of your key takeaways from your NOC journey?

I can confidently say that the three rigorous months of programming has left me with significant marketable computing skills. These technical website-building skills have enabled me to build an entire website from scratch, and enabled me to fully implement and understand the technical processes of an entire web application infrastructure.

The programme did not only teach me technical skills. As a Year 1 student who is still figuring my way around academics and career prospects, this experience has given me a better understanding of what it takes to be successful. One of the company's investors told me that it was crucial for me to define my competitive advantage, as the global market will not be willing to splurge on a Singaporean developer when a Vietnamese developer can do the same job for less.

I was also exposed to the hustle and grit of the young Vietnamese entrepreneurs, who were willing to give up just about anything for success in their business. My CEO started with an IT background, and transitioned to business and sales after meeting certain success. He personally subscribes to the notion that there is no work-life balance. He strongly believes that one should bear the burden of sacrifice to truly taste the fruits of success. This mindset has definitely rubbed off on his employees as many of them possess a similar drive and verve towards their work and projects.

Many of my co-workers rarely had a chance to be mentored by my CEO, and it was both an honour and privilege to be taught by him. On my last day, we even made future plans for me to help out in his business when I'm back in Singapore, telling me that "my internship has not yet ended". The most valuable lesson I've taken from him was to be aware and fully harness on just one core competency.



Qwords in Yogyakarta



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One of the stops in NOC Southeast Asia was Indmira Farm (Yogyakarta), a tech company focusing on research and development on agrocomplex and environmental rehabilitation.

N

ext up, we hear from Soh Kai Xin, one of our NOC participants who worked with Qwords, one of Indonesia's top 10 web hosting companies, serving domain name registration & web hosting services around

the world.

Share about your NOC experience.

There's a saying that goes, "Walking a thousand steps is better than reading a thousand books." Truly, embarking on NOC Southeast Asia has been the best learning journey I have ever undertaken in my life, and I have learned so much beyond an ordinary classroom.

I was a marketing intern at PT Qwords International, an Indonesian IT company in Yogyakarta. Not only did I do social media marketing and graphic design, but I also did many exciting and new things that I have never done before, including organising workshops to even modelling in a shoot for an ad!

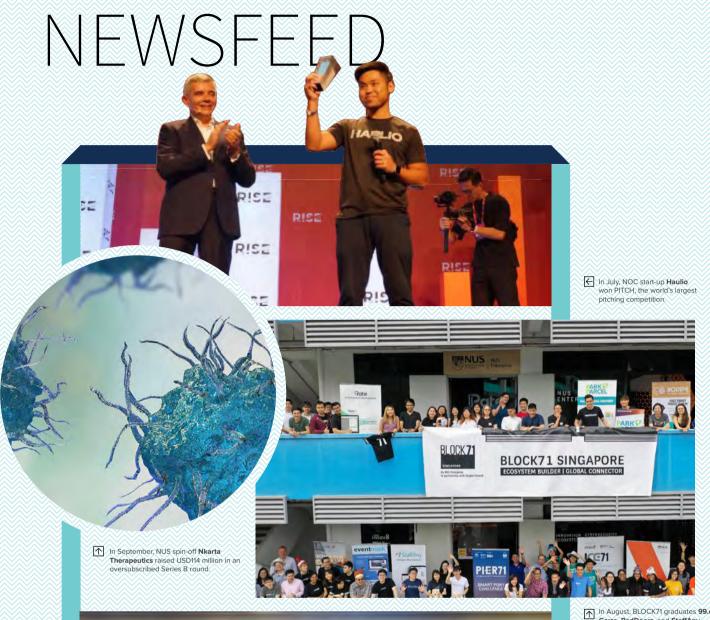
What are some of your key takeaways from your NOC journey?

The biggest takeaway I have learned is to venture out of my comfort zone. I have learned to be brave and step out of my country, my office, and my job-scope. It felt uncomfortable at first, and even scary, but this helped me learn so many new things, make so many new friends and have so many new experiences — which is really the essence of entrepreneurship.

I am so inspired by the hustling spirit of locals I've met, from the likes of my boss Rendy, who started his business in university and today owns multiple start-ups and three companies, or my colleague Nisa who works as a graphic designer by day and runs an eatery by night. Though only a few years older than me, she was bold enough to use her savings to pursue her dream of starting an F&B business. It is never too early to start. In fact, while in Yogyakarta, I co-founded Kreature Kolektif, an apparel brand that supports creative Asian artists, with my fellow NOC friend Raymond, and we've already garnered over

Back in Singapore, we plan to continue this venture. I also want to start my own socially-driven business, something I have been intending to do for a long time. NOC has taught me this: a journey of a thousand miles begins with a single step. So, take a leap of faith, and one small step towards starting up!

SGD1000 in sales revenue.





To CE71 Accelerate welcomed a new batch of ten start-ups to its programme in August, with participants joining from Australia, Bulgaria, France, and more!

In August, BLOCK71 graduates 99.co, Carro, RedDoorz, and StaffAny announced funding rounds amounting to a collective USD115 million.

FLASH BACK



NUS ENTERPRISE EVENTS & ACTIVITIES: JUL - SEP 2019

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

JUL

- **14-27** NUS Enterprise Summer Programme
- 17 FoodTech Challenge 2019
- 17 Alternative Protein
 Marketplace Industry Day
- 22 Commercialising Cyber Security Research: Shooting in the Dark?
- 22 GRIP Lift Off Day
- 24 SIA AppChallenge 2019 Roadshow (BLOCK71 Bandung)
- 25 SIA AppChallenge 2019 Roadshow (BLOCK71 Jakarta)
- 31 SIA AppChallenge 2019 Roadshow (BLOCK71 Singapore)

AUG

- WeChat Developer Challenge
- Lean LaunchpadEducators' Workshop
- SIA AppChallenge 2019 Meet & Eat Session at NUS
- L'Oréal Innovation
 Runway Challenge 2019 –
 Singapore Roadshow
- 21 NOCfest
- 21 L'Oréal Innovation Runway Challenge 2019 – Jakarta Roadshow
- NOC Talkshop at E-Cube
- NOC Talkshop at The Hangar
- 26 Journey of the Innovator: From the Horses' Mouth
- 28 Kopi Chat Da Bao with SpeQtral's CTO, Dr. Robert Bedington
- 30 From Lab to Patients: How Al-driven Technologies Drive Value
- 31 Kopi Chat –
 Entrepreneurship: Nature
 or Nurture?

SEP

- Journey of the Innovator

 Start-up Pitching 1-2-3!
- 05 Taiwan Cyber Start-up Showcase
- Explore with PIER71:Global Freight ExchangeNew Approach toContainer Freight
- Journey of the Innovator– Money Talks
- 09 PIER71 Explore with GFX
- 18 ICE71 X Le French Tech Cyber panel event
- 18 PIER71 x Sunbo Angel Partners
- 21 GRIP Run 3 Venture Hothouse Workshop 2 - Costing & Business Model
- 23 Cyber N'US 2019
- Alternative Business
 Hacking: How do we
 blend marketing &
 accounting to achieve
 growth hacking?
- 25-27 Innovfest Suzhou



🔁 Co-hosting the Kopi Chat Da Bao session were BLOCK71 Bandung's Community Manager, Riszki Ramadan (left) and BLOCK71 Singapore's Community Manager, Alvina Fu (right)

eyond being consumed, food has found other interesting ways into our lives. Ever heard of mushroom leather? Well, one of our BLOCK71 start-ups, Mycotech, has found a way to create leather from mushrooms! Using their biomaterial product, Mycelium, that was created from mushrooms, Mycotech manufactures products such as MyLea, mycelium leather, and BioBo, a mycelium board composite that is environmentally-friendly and can be used in construction. These innovations prove that food has the potential to pave the way for a more sustainable planet.

In our second instalment of Kopi Chat Da Bao, we caught up with Adi Reza, CEO and co-founder of Mycotech, who shared more about the company's journey. Read on for the top three takeaways about scaling up in the foodtech space!

Sustenance is key

Despite kicking off their research in Mycelium, the company's business did not entirely shift from a food business to a tech start-up. The company continues to sell mushrooms as food till today, but channel their profits to fund their research into Mycelium. The cashflow allows them to better sustain themselves, especially since they are still a growing start-up. Therefore, budding start-ups should always seek ways to sustain themselves, as this creates room for growth in the long-run.

Do not be afraid to start small

Everyone has to start somewhere - the Mycotech team even started their research in their own mother's pantry! It was not always smooth-sailing, and there were many failures at first, but it was through this process that they learnt more about their product and ways to improve its production. This helped them to maintain high quality standards in their products, allowing them scale-up to where they are today. Taking more time to perfect your product rather than rushing for expansion can benefit more than it costs in the long run!

Jump on opportunities

Opportunities are everywhere and it is up to one to seize them. When Mycotech saw the opportunity to run a kickstarter campaign in Indonesia, they agreed to it as they believed it was a chance to have their products tested by customers. The feedback received from their campaign was helpful and taught them more about the needs of the market. Therefore, one should never shy away from opportunities as there is always a chance of learning.