SGInnovate Unveils 'Deep Tech Nexus' Strategy to Further Strengthen Deep Tech Startup Ecosystem in Singapore
A result of one year's worth of insights and evolving market needs

29 November 2017, Singapore: **SGInnovate** today announced its '**Deep Tech Nexus'** Strategy as a direct result of experiences and insights gained in its first year of operation. The Deep Tech Nexus represents SGInnovate's commitment to add tangible value to the Singapore deep tech startup ecosystem in two key areas – **Human Capital** and **Investment Capital**.

As part of this strategy, SGInnovate has partnered with like-minded industry players and global brands including General Assembly, GIC, IBM, National Supercomputing Centre (NSCC) Singapore, Nurture.ai, NVIDIA, Red Dragon AI and SingularityNET – all of whom will play instrumental roles in strengthening the deep tech startup ecosystem in Singapore. **(Refer to APPENDIX A and B for partners' details and quotes)**

"SGInnovate was formed in 2016 because we believe Singapore can create globally-relevant deep tech products and companies. Singapore has great strengths in academia and scientific research, but we saw a gap in the critical 'business-building' capabilities needed to create a viable deep tech company.

"Over the past year, we have met and worked with hundreds of researchers, founders, corporates and investors. Being so immersed in the deep tech founder community has given us a rich understanding of the specific challenges facing these entrepreneurs. Tackling these challenges gives our second year of operation great clarity and focus – and this has led to our Deep Tech Nexus Strategy," said Steve Leonard, Founding CEO, SGInnovate."

SGInnovate's focus areas are in transformational technologies that have horizontal applications to many industries, as well as MedTech which will impact the healthcare industry. Two such transformational technologies that now – or soon will – affect most industries include Artificial Intelligence (AI) and Blockchain. For 2018, SGInnovate will be intensifying its efforts around AI, aligning with **AI Singapore (AISG)'s** mission to bring together Singapore-based research institutions, AI startups and corporates to enhance and expand Singapore's AI capabilities. SGInnovate will focus its efforts on the AI startups.

SGInnovate's work in the area of **Human Capital** will be pursued in three ways **(Refer to APPENDIX C for more details)**:

- **Strengthening Individual Talent Capabilities** through a range of deep tech related learning opportunities, delivered by SGInnovate partners.
- **Expanding Deep Tech Talent Network** through active engagements locally and internationally to build an ever-increasing network of ambitious and capable people who want to build startups.
- **Strengthening Deep Tech Communities** through a range of deep tech related networking events, bringing together researchers, entrepreneurs and investors to share experiences on a wide range of topics.

SGInnovate's work in the area of **Investment Capital** will be pursued in three ways **(Refer to APPENDIX C for more details)**:

- **Investing Equity in Early-Stage Deep Tech Startups.** The goal is to make direct investments into at least 20 deep tech startups founded in Singapore in 2018, including investments made at pre-seed, seed and Series A stages.
- **Business Building Support** where SGInnovate will work closely with startups in which it has invested, in areas such as customer sales and talent recruiting.
- **Collaborative Spaces** where deep tech startups, education events and community events can co-exist for mutual benefit. All activities will continue to take place at SGInnovate's locations at 32 Carpenter Street (more than 16,000 square feet) and BASH (more than 25,000 square feet).

By the end of 2017, SGInnovate will have completed equity investments in 15 deep tech startups, played a part in generating 400 potential-customer leads for early-stage companies and built a network of more than 1,000 technical individuals interested in joining early-stage tech companies. In addition, as part of its deep tech community building efforts, SGInnovate has created and hosted more than 100 events at its premises attracting a total of 9,000 participants.

Leonard added, "SGInnovate is itself a startup and, to echo DPM Tharman's point when he launched us last year, we will keep prototyping and pivoting in the coming years. Building deep tech companies takes time. We feel good about the impact we have already made, and are looking forward with confidence to the year ahead.

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About SGInnovate

At SGInnovate, we believe that Singapore has all the resources and capabilities needed to tackle 'hard problems' that matter to people around the world. As a part of the robust startup ecosystem here, our mission is to enable ambitious and capable individuals and teams to imagine, start, build, and scale globally-relevant technologies. With the support of our partners, SGinnovate's priority is to work with deeply-technical founders that have research-originated IP at the core of their company. We back these entrepreneurs through equity-based investments, access to talent, and support in building customer traction. We are prioritising our efforts around Artificial Intelligence, Robotics and Blockchain. These technologies represent impactful and scalable answers to global challenges. SGInnovate is a private-limited company wholly owned by the Singapore Government. For more information, please visit www.sginnovate.com

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APPENDIX A – Deep Tech Nexus Partners

Partners	Collaboration Model
  General Assembly (GA) is advancing the future of work by equipping individuals and corporations alike with the most in-demand 21st-century skills. Offering training and assessments in web development, data science, digital marketing, and more, GA is building transparent career pathways for people, and sustainable, diverse talent pipelines for employers. Founded in 2011 in New York City, General Assembly is now in 20 cities worldwide, has a community of professionals nearly 1 million strong, and was voted the world's most innovative company in education by Fast Company.	<u>Strengthening Individual Talent Capabilities</u> SGInnovate will work with General Assembly to organise workshops and courses in Python, Machine Learning and Data Science, to equip an estimated 250 trainees with fundamental programming skills and principles before moving on to more advanced Deep Learning concepts.
  GIC is among the world's largest fund management companies. It was established in 1981 to manage Singapore's foreign reserves. GIC strives to achieve good long-term returns on assets under its management, so as to preserve and enhance Singapore's reserves. GIC's key strengths include the ability to take a long-term investment perspective, having a global presence, capabilities to invest in cross asset opportunities, and a skilled, experienced team.	<u>Strengthening Deep Tech Communities</u> SGInnovate will work with GIC to co-curate and/or co-brand industry events, targeting areas related to AI, machine learning, data analytics and deep tech ecosystem. These events will focus on promoting thought leadership and community building by bringing in subject matter experts to talk about key industry trends, and real-world applications of AI and deep technologies.

Its investments span across 40 countries and in assets such as equities, fixed income, real estate, private equity and infrastructure. GIC employs over 1,400 staff in its headquarters in Singapore and offices in Beijing, London, Mumbai, New York, San Francisco, Sao Paulo, Seoul, Shanghai, and Tokyo.	
IBM is a leading cognitive solutions and cloud platform company headquartered in Armonk, NY that leverages the power of innovation, data and expertise to improve business and society. Established in 1911, it is the largest technology and consulting employer in the world, with more than 380,000 employees serving clients in 170 countries. With 24 consecutive years of patent leadership, IBM Research is the world's largest corporate research organization with more than 3,000 researchers in 12 labs located across six continents. With Watson, the AI platform for business, IBM is building industry-based solutions to real-world problems guided by its "Principles for Transparency and Trust in the Cognitive Era."	<u>Strengthening Individual Talent Capabilities</u> SGInnovate will work with IBM to organise AI training courses for undergraduate students from IT related academic programmes such as computer science and software engineering. The AI career path aims to prepare an estimated 50 students in applying AI in real life. <u>Strengthening Deep Tech Communities</u> SGInnovate and IBM would engage with the AI and deep tech ecosystem through co-curated and/or co-branded industry events. These events would focus on industry trends, case studies, real-world applications, etc. of AI and deep technologies, including (but not limited to) blockchain, robotics, machine learning, and medtech. These events will take place regularly, with a target of 10-12 events in 2018.
National Supercomputing Centre (NSCC) Singapore was established in 2015 and manages Singapore's first national petascale facility with high performance computing (HPC) resources to support science and engineering computing needs for academic, research and industry communities. Funded by its stakeholders, including Agency for Science	<u>Strengthening Individual Talent Capabilities</u> SGInnovate will work with NSCC to organise training in AI and High Performance Computing. <u>Collaborative Spaces</u> SGInnovate-supported startups and trainees will have access to HPC/AI computing resources, which will include those provisioned under the NSCC-NVIDIA AI.Platform collaboration (comprising DGX-1 Volta V100 and access to Saturn V), as well as NSCC's existing 1 PetaFLOPS supercomputing called ASPIRE1 (Advanced Supercomputer for Petascale Innovation, Research and

Technology and Research (A*STAR), Nanyang Technological University (NTU), National University of Singapore (NUS), and Singapore University of Technology and Design (SUTD), with substantial funding from the Singapore Ministry of Trade and Industry (MTI), NSCC aims to democratise access to supercomputing. NSCC works with local and international organisations to catalyse collaborative HPC projects and programmes which support national research and development initiatives, attract industrial research collaborations and enhance Singapore's research capabilities. For more information, please visit https://nscc.sg.	Enterprise) that comes with 13 petabytes of high performance storage with global connectivity at up to 100Gbps.
  Nurture.ai is a web platform for the AI community to intelligently discover, discuss and implement AI research, thus accelerating the AI research process and increasing ease of adopting new methods.	Strengthening Deep Tech Communities SGInnovate will be working with Nurture.ai to build a strong community of enthusiasts and experts who would be trained in AI. Nurture.ai enables this through organising free study groups using Stanford University's course material on deep neural networks, where participants get to discuss the most cutting-edge AI models covered in the lectures, read the relevant research papers with peers and implement these models as open-source code. SGInnovate is also a partner to the Global NIPS Paper Implementation Challenge organised by Nurture.ai, which has seen more than 600 applications globally so far and 30+ expert mentors including researchers from the Baidu Silicon Valley AI Lab, Amazon Core Machine Learning Research team, NVIDIA, SAP, Stanford University and several authors of papers accepted at the Conference for Neural Information Processing Systems – the most prestigious AI research conference in the world.
  NVIDIA is a computer technology company that has pioneered GPU-accelerated computing. The GPU has proven to be unbelievably effective at solving some of the most complex problems in computer science. It started out as an engine for simulating human imagination, conjuring up the	Strengthening Individual Talent Capabilities Partnering with NVIDIA Deep Learning Institute (DLI), SGInnovate will be conducting DLI workshops and offering hands-on training for developers, data scientists, and researchers looking to solve the world's most challenging problems with deep learning. The goal is to train 1,000 developers over the next two years.

amazing virtual worlds of video games and Hollywood films. Today, NVIDIA's GPU simulates human intelligence, running deep learning algorithms and acting as the brain of computers, robots, and self-driving cars that can perceive and understand the world. This is NVIDIA's life's work — to amplify human imagination and intelligence.	
Red Dragon AI is started by two serial entrepreneurs Sam Witteveen and Dr Martin Andrews, who are committed to increasing the AI talent pool in Singapore. They started the "TensorFlow and Deep Learning" meet-up group, which, in under a year has become Singapore's biggest active data science community. And while Red Dragon's products are still in stealth mode, you might want to keep an eye out for them as Google has selected both Martin and Sam as only two of fifteen Google Developer Experts for Machine Learning in the world.	Strengthening Individual Talent Capabilities SGInnovate will be working with Red Dragon AI to organise various advanced AI training sessions. Using industry standard frameworks such as TensorFlow, Keras & PyTorch, students will learn Deep Learning as applied to a variety of different practical applications including computer vision, natural language and time series information. They will then be applying those skills to make real world AI products and services. At least 100 students will participate in the advanced training sessions over the next year. Strengthening Deep Tech Communities With a member count of close to 2,000, Red Dragon AI would be looking to organise multiple TensorFlow, PyTorch & Deep Learning meetups with SGInnovate in the next year. The target is to reach out to more than 1,000 participants.
SingularityNET – the brainchild of renowned Artificial Intelligence expert, Dr. Ben Goertzel, and famed robotics pioneer, Dr. David Hanson, is a revolutionary new, decentralized, open marketplace for exchanging AI services. With SingularityNET, companies, organisations and individuals will be able to create, combine and monetise AI technologies at scale.	Strengthening Deep Tech Communities Together with SGInnovate, SingularityNET will co-host meetups and provide speakers and technical experts in the areas of blockchain, smart contracts, AI & robotics to drive discussions and inspire new ideas. In 2018, the target is to reach out to a community of over 2,000 people. Business Building Support Through the partnership, startups within the SGInnovate community will get early access to SingularityNET, with SingularityNET providing technical guidance to enable them to integrate, monetise and scale their AI technologies.

One of the first use cases for SingularityNET will be provided by Sophia, the world's most expressive humanoid robot. Created by founding partners Hanson Robotics, Sophia will become a core node for SingularityNET, bootstrapping the network with dozens of cognitive processes such as procedure repository, associative episodic memory, spacetime servers, world simulation, and more.	

APPENDIX B – Partners' Quotes

- "Skill sets in data analytics and machine learning are sought after by both startups and large organisations alike," shared **General Assembly's Regional Director, Aziza Sheerin**. "It is critical that Singapore builds talent capabilities in these areas to remain competitive. SGInnovate is launching an exciting initiative focusing on deep learning, and General Assembly looks forward to collaborating with them on workshops and courses to train 250 individuals in Python, Machine Learning, and Data Science in 2018."

- "With SGInnovate's wide networks in the deep tech space and their portfolio of promising AI startups, the partnership would be a great boost to Nurture.ai's efforts in empowering the AI community in Singapore to implement the most state-of-the-art AI research into well-documented, easily useable code," said **Yap Jia Qing, Founder, Nurture.ai**.

- "NVIDIA congratulates SGInnovate on its first anniversary. Deep learning is growing at an accelerated pace and we are delighted to partner SGInnovate in driving AI in Singapore. We hope to help build the talent pool by training 1,000 developers within the next two years," said **Raymond Teh, vice president of APAC sales and marketing, NVIDIA.**

- "It's good to see SGInnovate taking a lead in nurturing AI and the deep tech community in Singapore. Their unique position of being independent from the government and educational institutions has allowed them to see what startups really need and respond quickly. Teaching the Deep Learning Developer Course, has allowed us to see that there is a wealth of talent in Singapore that just needs real world training to unlock the ability to make AI products and services," said **Sam Witteveen, Founder, Red Dragon AI**.

- "This partnership will create new opportunities for Singapore startups to leverage and cooperate with SingularityNET – and in this way for Singapore to play a leading role in the currently unfolding transition of AI technology to its next stage of development. In the next few years we will see a transition from narrow AI to Artificial General Intelligence, and from disparate AI tools to a coordinated network of AI functionality. This partnership will help catalyse the involvement of Singapore researchers, developers and companies in this critical transition in AI capability and application," said **Dr Ben Goertzel, Co-Founder & CEO of SingularityNET, and Chief Scientist of Hanson Robotics**.

APPENDIX C – Specifics under Human Capital & Investment Capital

Human Capital

- **Strengthening Individual Talent Capabilities** through a range of deep tech related learning opportunities. A series of programmes delivered by industry leaders will be undertaken to help people gain knowledge in working with tools at various competency levels in areas such as Machine Learning, Deep Learning and Data Analytics. The goal is to have 1,500 people participate in these programmes over the next two years. **(Refer to APPENDIX D for the training roadmap)**

- **Expanding Deep Tech Talent Network** through active engagements locally and internationally to build an ever-increasing network of ambitious and capable people who want to build startups. The goal is to bring 2,000 high-potential talent into contact with high-potential deep tech startups based in Singapore by 2018. One of the initiatives being driven by SGInnovate in expanding the deep tech talent network is its Apprenticeship Programme, where a curated pool of students in STEM disciplines from local and overseas Institutes of Higher Learning (IHLs) are placed within a select number of Singapore's promising deep technology startups.

- **Strengthening Deep Tech Communities** through a host of deep tech related networking events by bringing together researchers, entrepreneurs and investors to share experiences on a wide range of topics. These events serve as a way to raise the intellectual debate, as well as pursue opportunities to get more people to know more about important future topics. The goal is to have 15,000 participants taking part in over 150 events throughout 2018 across various community meet-ups.

Investment Capital

- **Investing Equity in Early-Stage Deep Tech Startups.** The goal is to make direct investments into at least 20 deep tech startups founded in Singapore in 2018 ranging from pre-seed, seed to Series A stages. SGInnovate will also be managing a portion of the SG Equity fund, and will be co-investing into deep tech startups alongside private-sector VCs including Jungle Ventures, NSI Ventures and Vickers Partners.

- **Business Building Support** where SGInnovate will journey with startups in which it invests, supporting them in growing and scaling their businesses – via connection to business use cases, customer sales, talent acquisition, technical advisory and more.

- **Collaborative Spaces** where deep tech startups, education events and community events can co-exist for mutual benefit. All activities will continue to take place at SGInnovate's locations at 32 Carpenter Street (more than 16,000 square feet) and BASH (more than 25,000 square feet). To better serve the demands under the Deep Tech Nexus Strategy, BASH will be undergoing renovation works and will be operational again in Q1 2018. Some key features of the revitalised BASH will include more enclosed rooms to allow early-stage companies to have privacy, expanded training areas to house more education programmes in areas relating to AI, and access to AI-tuned computing resources. In addition, there will be a new area dedicated to the companies formed under the Entrepreneur First (EF) Singapore programme.

APPENDIX D – Training Roadmap

BEGINNER	INTERMEDIATE	ADVANCED
Aware of AI concepts, know how to utilise AI tools	Trained in Data Science, familiar with AI use cases	Able to lead an AI project from start to end

BEGINNER:
- Deep Learning Fundamentals Workshop — Entry
- Python and Machine Learning workshops — Entry
- Tool-based: Talks/workshops by corporate partners — Entry

INTERMEDIATE:
- Intermediate training in Data Science → Data Science courses — Entry
- Explore verticals, specific use cases → Deep Learning Verticals Workshop — Entry
- Advanced training

ADVANCED:
- Advanced training → Advanced Machine Learning or Deep Learning Courses — Entry
- Formal AI education in an IHL → Specialist Diploma or Degree in AI (tbc) — Entry

Training Partners:
NVIDIA, NSCC, General Assembly, IBM,

Training Partners:
NVIDIA, General Assembly

Training Partners:
General Assembly, Red Dragon AI