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ASIA EDITION

Empowering Asia's HealthTech innovators

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Stanford University launched Stanford Biodesign in 2000 as a multidisciplinary educational programme dedicated to the training of aspiring medical technology innovators. It was the brainchild of Dr. Paul Yock, a cardiologist, and bioengineer who runs Stanford's Byers Center for Biodesign.



To date, Stanford Byers Center for Biodesign has launched more than 50 companies, and impacted over 2.7 million patients worldwide[1]. Impressed with what this program has done for the US MedTech ecosystem, Agency for Science, Technology and Research (A*STAR), the Economic Development Board (EDB) and Stanford University jointly launched The Singapore-Stanford Biodesign (SSB) now renamed as Singapore Biodesign (SB) Programme in 2010. Nearly a decade since its conception, we look at how this program has impacted Asia's health tech.

A Launchpad for health tech innovation

Modeled after the established Biodesign Programme at Stanford University, this capability development initiative was aimed at training and nurturing the next generation of medical technology innovators for Singapore and Asia for the then-nascent ecosystem.

Biodesign originates from the design thinking process. It is essentially a play of 3 I's Identification of important unmet healthcare needs, Innovation of novel technologies to address them, and the Implementation phase - the subsequent development of business and commercialization plans to bring them into patient care. Biodesign helps with understanding the nuances of commercializing a medical device innovation from a user perspective, including overcoming potential regulatory and reimbursement hurdles.

'As Singapore was just starting on its journey with a nascent ecosystem in 2010. Biodesign was seen as a way to boost a future innovation economy riding on the rich biomedical research and manufacturing foundations,' said Dr Mary Kan, Deputy Programme Director, SB.

In the first phase of the programme, the programme focused on talent development, inculcating the design thinking methodology into our flagship fellowship programme which consists of 4 multi-disciplinary (engineers, clinicians and business/industry professionals) fellows each year. These fellows were trained in Stanford, and then returned to Singapore to teach the first joint-post graduate programme to multi-disciplinary students from universities across Singapore, achieving a multiplier talent training effect. The SB Fellowship is an intensive 1-year training.

In addition, SSB ran Biodesign workshops for academia, healthcare institutes and industry from all over the Asia region.

'The field of medicine has been one of the slowest to be disrupted by technology and digitalization. And for good reason - many industries can afford to "move fast and break things", which is contrary to what traditional medicine teaches of an evidence-based, more cautious approach. However, we know that we have to embrace and lead this disruption, rather than be forced to adopt it later on. The Biodesign fellowship program has been instrumental in helping this disruption by training clinicians like me, who are interested in this intersection of healthcare and technology, to identify technological solutions to patient-centric needs,' said Dr Ian Matthews, Assistant Group Chief Technology Officer, National University Health System; Chief Medical Officer to AEvice health; Co-founder, Aardvark labs; SB Fellow 2017.

He further added, 'The opportunities that I have had post-program, in helping MedTech start-ups, working with the hospital technology office, and helping to build the medical technology ecosystem have been incredible and exciting. This would not have been possible for me without the learning, experience, and networks established during the fellowship.'

SB is able to leverage on the global Biodesign community that has been forged through the various official international programmes originating out of Stanford, and the satellite nodes through the Global Faculty Training Programme. Collectively, these centres form the larger Biodesign community that allows SB and its partners to reach out for collaborations. In addition, SB has jointly organized the Biomedical Engineering – Innovation, Design and Entrepreneurship Alliance (BME-IDEA) Asia-Pacific (APAC) annual forum with Stanford Biodesign from 2016 - 2018 to promote best practices in bioengineering training and innovation for Asia.

Increasingly, there has been a greater demand for Asian-centric health technology solutions to increase patient access and improve the quality of care. Since 2014, SB has actively reached out to China, Indonesia, and South Korea and has formed partnerships that allow for: i) Needs identification ii) Validation of market relevance iii) Forging pathways for commercialization. e.g. clinical trials.

In particular, SB has received recognition from the industry and the region with 7 corporate members and 10 established regional clinical parties in 3 regional countries.

'Locally, SB has witnessed and participated in the growth of the Medtech ecosystem. Through Biodesign training and knowledge creation, SB has built an extensive partnership network with the various stakeholders of the local ecosystem such as educational institutions, clinical and industry partners,' said Dr Kan.

A decade of fostering innovation

For 8 years from 2011 to 2018, SSB has trained more than 500 students and professionals via the Fellowship Programme, Innovation Classes and Biodesign Workshops. SB fellows have continued to assume key leadership positions for in organizations like innovation centric Singhealth, and the National University Health System (NUHS), National Health Innovation Centre Singapore (NHIC) etc. Its fellows have continued to assume key leadership positions for innovation centric programmes in the healthcare clusters in Singapore such as Singhealth, and the National University Health System (NUHS), assisting to build the ecosystem, whilst contributing to the training of talent locally. In particular, our alumni have made an impact on health tech innovation with clinicians continuing to innovate through active projects, supported by alumni who have joined health tech innovation outfits such as the National Health Innovation Centre Singapore (NHIC), A*STAR's A*ccelerate, the National University Health System (NUHS),Medical Engineering Research &Commercialisation Initiative (MERCI) and SingHealth's Medical Technology Office (MTO).

Many of them have started their own company. One such firm is Privi, founded by fellows from the 4th SB and is currently led by Mr.PrusothmanSina Raja, Dr.Benjamin Tee CK, Dr. Rena Dharmawan and Ms. Cecilia Wang. The Firm has identified the unmet need for a treatment to manage haemorrhoids safely and effectively at home and developed Instalief™, safe and drug-free solution to relieve the symptoms of this condition. The FDA-approved product is expected to reach the market by the end of this year or early next year. Privi has achieved US FDA clearance and recently completed a major clinical study.

There has been a total of 7 spin-offs form the programme with a combined start-up valuation of over S$35 million. A*STAR's commercialization arm, A*ccelerate Technologies, owns the IP created by the fellows during their fellowship year. Separately, tech disclosures and IP originating from the joint post-graduate innovation class programme are owned by the universities

participating in the module. Collectively, the technology transfer offices from A*STAR and the various universities have filed 31 tech disclosures with a selection going through to provisional and eventually National Phase Entry patent status.

‘Collectively, with the whole strength of our fellows and students, we have mobilized over S$30 million in public and private sector funding for the local MedTech ecosystem, filed over 30 patents from their training projects since Year 2011, with at least 20 of these projects having received funding,’ said Dr Kan.

She further added, ‘SB fellows and class alumni have also impacted over 100 projects since Year 2011 through mentorship and other engagements, resulting in an additional S$30 million raised in health tech project funding.’

Building on the talent initiatives, SB recognized its unique geographical position in Asia/ASEAN and launched more initiatives to create awareness for the region. For example, since 2015, SB initiated a regional immersion in Indonesia, Korea or China, to better understand unmet Asian healthcare needs. Subsequently, it also launched the corporate membership programme to introduce Biodesign training into local and regional R&D/upstream marketing teams from the industry.

‘SB also played an instrumental role as an enabler of an evolving local Medtech ecosystem. The programme invited thought leaders from established domain areas related to the Medtech innovation process to Singapore to share their experience with the local community and encourage open interaction and collaboration through our networking events,’ said Dr Kan.

Road ahead

Moving forward, SB aims to be a high-touch HealthTech talent development platform centered on a needs-based approach and quality industry mentoring to accelerate health technology innovation and adoption for Asia's (Singapore, China, and ASEAN) unmet healthcare needs.

‘Our talent development initiatives will feature more hands-on and experiential training to benefit translational project teams. In particular, the programme will emphasize the need to contextualize innovations by understanding global market needs, supplemented by real-world industry mentors for successful startup creation and healthcare adoption. Finally, SB will continue to increase interactions with the Singapore community & regional networks through talent placement and collaborations to advance innovations,’ said Dr Kan.