Background

Modelled after the established Biodesign Programme at Stanford University

A joint partnership launched in 2010

A capability development initiative that aims to train and nurture the next generations of medical technology innovators for Singapore and Asia:

Singapore-Stanford Biodesign (SSB)
Stanford University launched Stanford Biodesign in 2000 as a multidisciplinary educational programme dedicated to the training of aspiring medical technology innovators. Its curriculum (“The Biodesign innovation process”) provides a systematic approach to the identification of important unmet healthcare needs, the development of novel technologies to address them, and the subsequent development of business and commercialization plans to bring them into patient care.

To date, this robust methodology has proven to be especially useful in creating a sustainable pipeline of talent, companies and impact to the US medtech ecosystem.

Outcomes of the US Programme: (as of 2018)
- 160+ Fellows
- 1900+ Students
- 50+ Faculty trained in Biodesign
- 50+ Medtech companies created of which >85% are still active
- 1.5M+ Patients impacted worldwide


Overview of SSB Initiatives

In its mission to nurture the next generation of Asian medical device innovators, SSB implemented and executed three anchor initiatives, kickstarted a successful project pipeline and generated a healthy innovation output.

Anchor Talent & Knowledge Initiatives
- Fellowship Programme: Intensive 1-year hands-on team-based training scholarship on medical technology innovation
- Innovation Class: First joint post-graduate multidisciplinary training module
- Industry Events: Knowledge creation platforms for local medtech community

Innovations
Over time, SSB expanded its footprint beyond its core training programmes with talent alumni starting to seed new projects through the application of the Biodesign framework

Corporate Membership
Biodesign training and mentorship for R&D and Marketing teams from MNCs/industry partners

Regional Outreach
Immersion in regional countries to better understand Asian markets i.e. Indonesia, Korea and China and their unmet needs

Fellowship Extension
Entrepreneurial runway for Fellows to seek funding and further their projects

Launch of Singapore Biodesign
In a bid to being more Asia-centric and implementation focussed, SSB evolves to become Singapore Biodesign
SSB Outcomes 2011-2018

<table>
<thead>
<tr>
<th>TALENT</th>
<th>INNOVATIONS</th>
<th>ECOSYSTEM &amp; INDUSTRY</th>
<th>REGIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 FELLOWS</td>
<td>31 TECH DISCLOSURES FILED</td>
<td>9 UNIVERSITIES</td>
<td>6 INTL’ THOUGHT LEADERS</td>
</tr>
<tr>
<td>240 UNIVERSITY STUDENTS</td>
<td>20 PROJECTS FUNDED (&gt;$1M)</td>
<td>59 INTL’ MENTORS &amp; SPEAKERS</td>
<td>2 IMMERSION PARTNERS</td>
</tr>
<tr>
<td>146 INDUSTRY PROFESSIONALS</td>
<td>7 SPIN-OFFS</td>
<td>59 INTL’ NETWORK</td>
<td></td>
</tr>
<tr>
<td>185 WORKSHOP PARTICIPANTS</td>
<td>2 TECHNOLOGY REACHING PATIENTS</td>
<td>7 CORPORATE MEMBERS</td>
<td>15 HOSPITALS</td>
</tr>
</tbody>
</table>

- **ACADEMIC PARTNERS**: 9
- **INTERNATIONAL KOLs**: 6
- **INTERNATIONAL THOUGHT LEADERS**: 6
- **ALLIANCES**: 59
- **INTERNATIONAL NETWORK**: 59
- **INTERNATIONAL SPOKESPEOPLE**: 59
- **MENTORS & SPEAKERS**: 59
- **IMMERSION PARTNERS**: 2
- **HOSPITAL PARTNERS**: 2
- **CLINICAL PARTNERS**: 1
- **REGIONAL PARTNERS**: 6
- **INTERNATIONAL NETWORK PARTNERS**: 59

High-touch mentoring of multi-disciplinary teams in the medtech innovation process.
The SSB Fellowship is an intensive 1 year training for a multidisciplinary team of four Fellows, comprising of engineers, clinicians and business/industry professionals. Our Fellows spent 6 months in Stanford to learn the Biodesign knowhow before returning to Singapore to work on their own projects and to teach Biodesign locally.

Over the past 8 years, a total of 32 Fellows were trained in the Biodesign process encompassing identification and verification of clinical needs, brainstorming, invention, prototyping and business development.
Outcomes of Fellowship Programme

SSB fellows continue to pursue a career in healthcare post-fellowship in four key paths: CEOs/Co-Founders, Project Managers, Business Development Managers, and Clinician Innovators. A significant proportion of SSB Fellows play enabling roles to plug translation and commercialization gaps in the local ecosystem. Those that remain in clinical institutions and academia continue to support training and project origination in their workplace.

Source: All statistics from the 2018 Fellow Alumni Survey and/or our internal programme office’s tracking initiative (as of Dec 2018).

*Specialists include those who focus on clinical trials and/or regulatory domains.
Co-Founder and CEO, Privi Medical
• Forbes 30 under 30 Asia List 2017

Drug-free solution for haemorrhoids
> $1.1M RAISED

• Winner of NTUC Income’s Future Starter Challenge
• Instarelief obtained FDA 510(k) Clearance Jan 2018

Featured in The Straits Times, 2014

Privi Medical- Helping you Manage Haemorrhoids at Home

Featured in Biotechin.Asia, 2015

Fellows Testimonials

“My inspiration to join SSB was from my journey with Mona Lisa (Biobot Surgicals Pte Ltd), which was one that brings a research idea to a commercial product. The SSB Fellowship equipped me with the skillset and mindset to better travel for this tumultuous journey for more idea and innovation generation.”

A/PROF HENRY HO
SSB FELLOW, 2011

“Biodesign is the ultimate experiential learning in medical device commercialisation. It’s like getting an MBA in medical technology.”

DR LUKE TAY
SSB FELLOW, 2012

“It changed the way I approach problems, to try to verify facts without making assumptions and seek greater resolution to solving problems beyond the superficial.”

A/PROF HENRY HO
SSB FELLOW, 2011

“It is inspired by the commitment of those in the Biodesign community in trying to improve healthcare for all.”

MS KA MUNG CHEE
SSB FELLOW, 2015
Innovation Class

This is the first and only joint post-graduate module in Singapore offered to up to 8 local universities and students from the science and engineering, medical and business fields. The class is a compact didactic 14 week training programme, providing students with an understanding of the medical technology innovation process and opportunity to work on real-world unmet clinical needs via team-based projects. The class is taught by SSB Fellows, esteemed industry speakers and faculty from our university partners.

Outcomes of Innovation Class

Our class alumni and faculty from the various academic institutes continue to contribute back to talent training, seeding of innovation projects and industry development activities.

- 45 projects enabled
- 75 talents trained
- $32M activated for ecosystem
- >50 teaching hours contributed by lecturers at NUS, NTU, SIT
- $62.5M funding raised for projects

Industry Training & Workshops

1. Riding on the popularity of the innovation class, the class was further extended to industry professionals through our corporate membership programme to meet the increasing demands for region-specific innovations.

2. SSB also expanded its training offerings outside of Singapore on request by regional academic and clinical partners.

3. Finally, SSB also conducted customized workshops tailored to varying stakeholders needs such as upstream marketing, and promoting cross-disciplinary and multi-institutional collaborations using the Biodesign framework.

Through such workshops, SSB is able to reach out to a larger audience and create awareness about Biodesign and promote medtech innovation and implementation.

Workshop Testimonials

"Systematic approach in solving real clinical needs, the workshop provides an excellent opportunity for clinicians and engineers to exchange ideas and in-depth discussions."
— Neurosurgeon, Cleveland Clinic, 2018

"The Biodesign needs screening framework is useful and applicable for my current work. I really appreciate the sharing of real life experiences by the external speakers."
— Marketing Executive, Johnson & Johnson, 2016
Creation of customer-centric innovations arising from our foundational talent training initiatives is the strongest validation of the SSB programme.
SSB Fellow Alumni Spin-offs

**advent access**
Preserving AV fistula access to reduce dialysis cost and restore quality of life for kidney failure patients.
— Founder & CEO: Mr Ruey Feng Peh, US Biodesign Innovation Fellow 2008, SSB Programme Director, 2012 - 2017

Inventors:
Ms Fiona Loke, SSB Fellow, 2011
Dr Luke Tay, SSB Fellow, 2012
Mr Jing Ming Chew, SSB Fellow, 2013

In-House Regulatory Specialist:
Ms Iris Tan, SSB Fellow, 2011

**privi**
Drug-free solution for haemorrhoid sufferers to regain control of their lives in a safe and comfortable way.
— Founded by Mr Prusothman Sina Raja, Dr Benjamin Tee CK, Dr Rena Dharmawan and Dr Cecilia Wang, SSB Fellows, 2014

**Jaga**
Professional home nursing platform solution that transforms the way patients and their families experience healthcare.
— Co-founder, Dr Rena Dharmawan, SSB Fellow, 2014

SSB Class Alumni Spin-offs

**NephTech**
Non-invasive assessment and monitoring of the arteriovenous fistula / graft in dialysis patients to achieve better quality outcomes.
— Co-Founder, Dr James Lim, Innovation Class, 2011

**SiNOPSE THERAPEUTICS**
A bio-pharmaceutical company focused on the discovery, design and development of small molecular weight compounds for the treatment of chronic diseases.
— Co-Founder & CEO, Dr Sakthivel Sekar, Innovation Class, 2015

COMMUNITY

SSB has played a significant role in building the local medtech ecosystem and forging new regional relationships to maintain a globally relevant multidisciplinary network.
SSB 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 SSB and its partners to reach out for collaborations. In addition, SSB has jointly organized the BME-IDEA 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 quality of care. Since 2014, SSB has actively reached out to China, Indonesia and South Korea and has formed partnerships that allows for:

i) Needs identification

ii) Validation of market relevance

iii) Forging pathways for commercialization, e.g. clinical trials

Over the years, SSB has witnessed the growth of the then nascent medtech ecosystem. Through Biodesign training and knowledge creation, SSB has built an extensive partnership network with the various stakeholders of the local ecosystem such as educational institutions, clinical and industry partners.
COMMUNITY

Thought Leaders Series

SSB has built up an alumni and industry network of >1000 people that are specific to the local and international medtech ecosystem. To keep this community engaged, SSB organizes events focussed on content that features a customer-centric approach to catalysing startup creation and enterprise activities.

THOUGHT LEADERS SERIES

The Thought Leaders Series (TLS) is a biennial signature event hosted by SSB. Since its inauguration, SSB has had the great honour of inviting international key opinion leaders to educate the Singapore community on the latest industry insights and market trends in medical technology development. Through an ‘in-conversation’ styled forum, the distinguished speakers illuminate international perspectives on the challenges and future of the medical technology industry. Moving forward, the TLS will become an annual affair with a shift towards discussing the opportunities and challenges for Asian-centric health technology innovation.

Diabetes technologies showcase featuring a selection of the latest diabetes technologies innovations spanning multi-disciplinary care in the hospital and at home at SSB TLS 2018.

2018
DIABETES SANDBOX: INTERFACE BETWEEN MEDICAL TECHNOLOGY AND DIGITAL HEALTH

<table>
<thead>
<tr>
<th>KEYNOTE SPEAKER</th>
<th>PANELISTS</th>
<th>MODERATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr Michael Kloss, CEO, Ascensia Diabetes Care</td>
<td>Dr David Klonoff, Head, Diabetes Center, UCSC</td>
<td>Mr Linus Tham, GCIO, Parkway Pantai</td>
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2015
MEDTECH INNOVATION ECOSYSTEM: WHAT CAN ASIA LEARN AND ADAPT FROM SILICON VALLEY?

<table>
<thead>
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<th>KEYNOTE SPEAKER</th>
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</thead>
<tbody>
<tr>
<td>Prof Paul Yock, Executive Director, Stanford Biodesign</td>
<td>A/Prof Tan Sze Wee, Deputy Executive Director, BMRC, A*STAR</td>
<td>Dr Christopher Shen, Executive Director (US), Singapore-Stanford Biodesign; Managing Director, Vertex Ventures Healthcare</td>
</tr>
<tr>
<td></td>
<td>Mr Yah-Chie Lu, Chairman, Biosensors International</td>
<td></td>
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<tr>
<td>Prof Sun Kyung, Chair, Osong Medical Innovation Foundation; Professor, Korea University College of Medicine</td>
<td>Dr John Collins, COO, Center for Integration of Medicine and Innovation Technology</td>
<td>Dr Fumiaki Ikeno, Programme Director (US), Japan Biodesign, Stanford University</td>
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2013
INNOVATION IN SURGICAL ROBOTICS

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<tr>
<th>KEYNOTE SPEAKER</th>
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<tr>
<td>Dr Frederic Moll, CEO, Auris Robotic Surgery; Founder, Intuitive Surgical Inc.</td>
<td>Prof Christopher Cheng, Senior Consultant, Urology, Singapore General Hospital; Pro-term CEO, Sengkang General Hospital</td>
<td>A/Prof Louis Phee, Head, School of Mechanical &amp; Aerospace Engineering, NTU; Co-founder, Endomaster Pte Ltd</td>
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2011
MEDICAL TECHNOLOGY INNOVATION: EAST MEETS WEST

<table>
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<tr>
<th>KEYNOTE SPEAKER</th>
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</thead>
<tbody>
<tr>
<td>Dr Thomas Fogarty, Managing Director, Fogarty Institute for Innovation</td>
<td>Mr Yah-Chie Lu, Chairman, Biosensors International</td>
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</table>
COMMUNITY

Special Lectures

SSB also provides a platform for subject matter experts in the medtech innovation process e.g. regulatory, design thinking; as well as in various domain clinical specialties and geographies to share their experiences and insights with the local community.

2015
LEADING WITH CREATIVE CONFIDENCE

INNOVATIONS IN CARDIAC SURGERY

Mr Tom Kelley
Partner, IDEO

Mr Manny Villofana
Founder, St. Jude Medical Inc.

2014
INTERNATIONAL TRENDS IN MEDICAL TECHNOLOGY INNOVATION & REGULATION

Mr Michael Gropp
Former VP, Global Regulatory Strategy

Mr William Hawkins
Ex-CEO, Medtronic

2012
PERSONALISED MEDICINE

Mrs Karen Long
DVP Clinical, Medical & Regulatory Affairs, Abbott Molecular

Mrs Carolyn Albertson
Senior Director, Global Strategic Regulatory Affairs and Advocacy, Abbott Laboratories

MEDTECH VENTURES IN CHINA

Dr Christopher Shen
Executive Director (US), Singapore-Stanford Biodesign; Principal, Essex Woodlands

2011
HEALTHCARE INNOVATORS FORUM KEYNOTE

Mr Ruey Feng Peh
Programme Director,
Singapore-Stanford Biodesign

Mr Abinash Nayak
VP, R&D, Hill-Rom

Mr Lekshmy Parameswaran
Director, Research, Fuel for Healthcare Innovation

2013
CHANGING THE PARADIGM FROM TREATING DISEASE TO DISEASE MANAGEMENT

2012
PERSONALISED MEDICINE

Mrs Karen Long
DVP Clinical, Medical & Regulatory Affairs, Abbott Molecular

Mrs Carolyn Albertson
Senior Director, Global Strategic Regulatory Affairs and Advocacy, Abbott Laboratories

MEDTECH VENTURES IN CHINA

Dr Christopher Shen
Executive Director (US), Singapore-Stanford Biodesign; Principal, Essex Woodlands

COMMUNITY

Networking Events

With the highly curated thought leadership content and outstanding profiles of medtech luminaries, SSB events continue to attract the enthusiastic participation of a wide-ranging spectrum of stakeholders from the local medtech ecosystem who look forward to being enriched by the sharing of experiences and introduction to like-minded peers.

Overall, SSB events continue to serve as an excellent networking platform to meet luminaries, stakeholders and participants from the ecosystem. SSB will continue to serve our community with appropriate networking events to promote collaborations.
Empowering Asia’s Healthtech Innovators of Tomorrow

A vibrant ecosystem is vital in order to continue nurturing talent, both during and post-training. With this view in mind, SSB has been playing a role of an enabler to bring together various players of the Medtech ecosystem in Singapore and Asia. In addition, initiatives like the regional clinical immersion has allowed SSB to spread its wings outside Singapore. Taking all of the above into account, SSB has successfully established partnerships with 8 hospitals, 9 educational institutions and 7 medtech companies locally, as well as 7 international hospitals and 1 international university regionally. Moving forward, SB will strive to maintain and build on its existing network to contribute to the vibrant and growing healthtech ecosystem in Singapore and Asia.