SINGAPORE BIODESIGN
Outcomes 2011-2018
Modelled after the established Biodesign Programme at Stanford University

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.


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

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
SSB Outcomes 2011-2018

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<th>TALENT</th>
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<th>ECOSYSTEM &amp; INDUSTRY</th>
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<tr>
<td>32 FELLOWS</td>
<td>31 TECH DISCLOSURES FILED</td>
<td>ACADEMIC PARTNERS</td>
<td>6 IMMERSION PARTNERS</td>
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<tr>
<td>240 UNIVERSITY STUDENTS</td>
<td>20 PROJECTS FUNDED (&gt;$11M)</td>
<td>9 UNIVERSITIES</td>
<td>6 INTL’ KOLS</td>
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<tr>
<td>146 INDUSTRY PROFESSIONALS</td>
<td>7 SPIN-OFFS</td>
<td>59 INTL’ NETWORK</td>
<td>2 INTL’ NETWORK</td>
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<tr>
<td>185 WORKSHOP PARTICIPANTS</td>
<td>2 TECHNOLOGY REACHING PATIENTS</td>
<td>7 CORPORATE MEMBERS</td>
<td>2 CLINICAL IMMERSION HOSPITAL PARTNERS</td>
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</table>

High-touch mentoring of multi-disciplinary teams in the medtech innovation process.
TALENT Fellowship Programme: 2011 - 2018

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

Dr. Prusothman Sina Raja
SSB FELLOW, 2014

- Forbes 30 under 30 Asia List 2017
- Instarelief obtained FDA 510(k) Clearance Jan 2018

Drug-free solution for haemorrhoids

>$1.1M RAISED

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

Mr. Jing Ming Chew
SSB FELLOW, 2013

BD Manager,
IPTEC Pte Ltd

- BD, sales & marketing
- Develop QMS framework

Commercial Manager,
Zicom

- Evaluate deal-flow
- Manage portfolio startups

A/Prof Henry Ho
SSB FELLOW, 2011

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

Testimonials

"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."

DR BENJAMIN TEE
SSB FELLOW, 2012

"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 commercialization. It’s like getting an MBA in medical technology."

DR LUKE TAY
SSB FELLOW, 2012

"I am inspired by the commitment of those in the Biodesign community in trying to improve healthcare for all."

MS KA MUNG CHEE
SSB FELLOW, 2015
TALENT

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.

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.

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
Innovations

Innovation Projects & Startups

Arising from our talent development initiatives and as a natural evolution of the programme, SSB’s Fellow and class alumni have witnessed increasing success in its spin-off output, with 2 technologies reaching >1k patients. A respectable innovation pipeline of 31 technical disclosures filed, 20+ funded projects (>S$5M funding) and 7 spin-offs has established SSB not only as a training programme but also as a high fidelity spin-off platform and a source of deal-flow for investors/incubators.

SSB innovation pipeline has also seen an increasing shift towards digital and connected health products and services. The strong foundations in Biodesign methodology serves to increase the chance of project success upon spinoff. The seeding of innovation projects and formation of startups is seen as the strongest validation of the SSB training programme.

Creation of customer-centric innovations arising from our foundational talent training initiatives is the strongest validation of the SSB programme.
INNOVATIONS

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

SiNOSPEE 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 allow 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, SB organizes events focused on content that features a customer-centric approach to catalysing startup creation and enterprise activities.

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.

Dr Andrew Chou, a physician-engineer and 2018 SSB Fellow, sharing findings on diabetes from their immersive research in China, Indonesia and Singapore.

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

KEYNOTE SPEAKER
Mr Michael Kloss
CEO, Ascensia Diabetes Care

PANELISTS
Dr David Klonoff
Head, Diabetes Center, UCSF
Dr Bee Yang Mang
Head, Singapore Health Duke-NUS Diabetes Centre

MODERATORS
Mr Linus Tham
GCIO, Parkway Pantai
Mr Fredrik Nyberg
CEO, APACMed

2015 MEDTECH INNOVATION ECOSYSTEM: WHAT CAN ASIA LEARN AND ADAPT FROM SILICON VALLEY?

KEYNOTE SPEAKER
Prof Paul Yock
Executive Director, Stanford Biodesign

PANELISTS
A/Prof Tan Sze Wee
Deputy Executive Director, BMRC, A*STAR
Dr John Collins
COO, Center for Integration of Medicine and Innovation Technology
Prof Sun Kyung
Chair, Osong Medical Innovation Foundation, Professor, Korea University College of Medicine

MODERATORS
Dr Christopher Shen
Executive Director (US), Singapore-Stanford Biodesign, Managing Director, Vertex Ventures Healthcare
Mr Ruey Feng Peh
Programme Director, Singapore-Stanford Biodesign; CEO and Founder, Advent Access Pte Ltd

2013 INNOVATION IN SURGICAL ROBOTICS

KEYNOTE SPEAKERS
Dr Frederic Moll
CEO, Auris Robotic Surgery; Founder, Intuitive Surgical Inc.
Prof Christopher Cheng
Senior Consultant, Urology, Singapore General Hospital; Pro-term CEO, Sengkang General Hospital
A/Prof Louis Phee
Head, School of Mechanical & Aerospace Engineering, NTU; Co-founder, Endomaster Pte Ltd

2011 MEDICAL TECHNOLOGY INNOVATION: EAST MEETS WEST

KEYNOTE SPEAKERS
Dr Thomas Fogarty
Managing Director, Fogarty Institute for Innovation
Mr Yah-Chie Lu
Chairman, Biosensors International

Mr Yoh-Chie Lu
Chairman, Biosensors International
Dr Fumiaki Ikeno
Programme Director (US), Japan Biodesign, Stanford University
Dr Christopher Shen
Executive Director (US), Singapore-Stanford Biodesign; Managing Director, Vertex Ventures Healthcare
Mr Ruey Feng Peh
Programme Director, Singapore-Stanford Biodesign; CEO and Founder, Advent Access Pte Ltd
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.

**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.

**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**

**INTERNATIONAL TRENDS IN MEDICAL TECHNOLOGY INNOVATION & REGULATION**

Mr Michael Gropp
Former VP, Global Regulatory Strategy

Mr William Hawkins
Ex-CEO, Medtronic

**2014**

**INTERNATIONAL TRENDS IN MEDICAL TECHNOLOGY INNOVATION & REGULATION**

Mr Michael Gropp
Former VP, Global Regulatory Strategy

Mr William Hawkins
Ex-CEO, Medtronic

**2015**

**LEADING WITH CREATIVE CONFIDENCE**

Mr Tom Kelley
Partner, IDEO

Mr Manny Villafana
Founder, St. Jude Medical Inc.

**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.
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.