

SINGAPORE BIODESIGN
Outcomes 2011-2018



HISTORY

HISTORY

Background

LAUNCHED IN 2010

A*STAR
SINGAPORE

•
STANFORD
BIODESIGN

•
EDB
SINGAPORE



JOINT PARTNERSHIP

Modelled after the established
Biodesign Programme at
Stanford University

STANFORD BYERS CENTER FOR
BIODESIGN

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)

The Biodesign Process

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

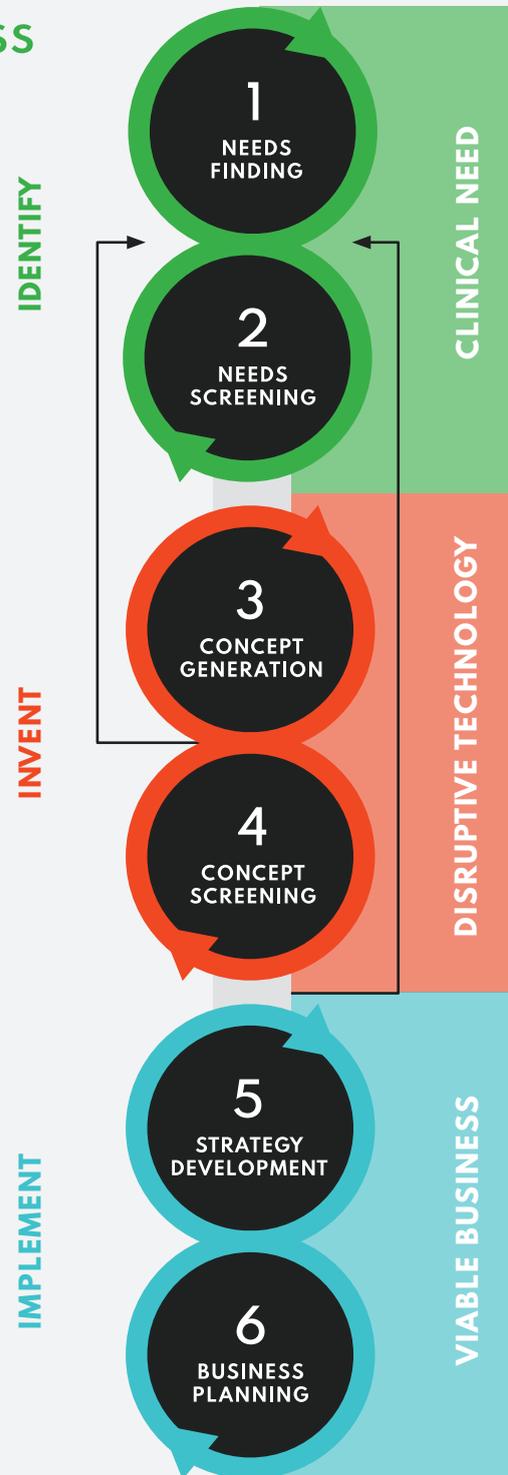
50+
FACULTY
trained in
Biodesign

50+
MEDTECH
COMPANIES
created of which
>85% are still active

1.5M+ PATIENTS
impacted worldwide

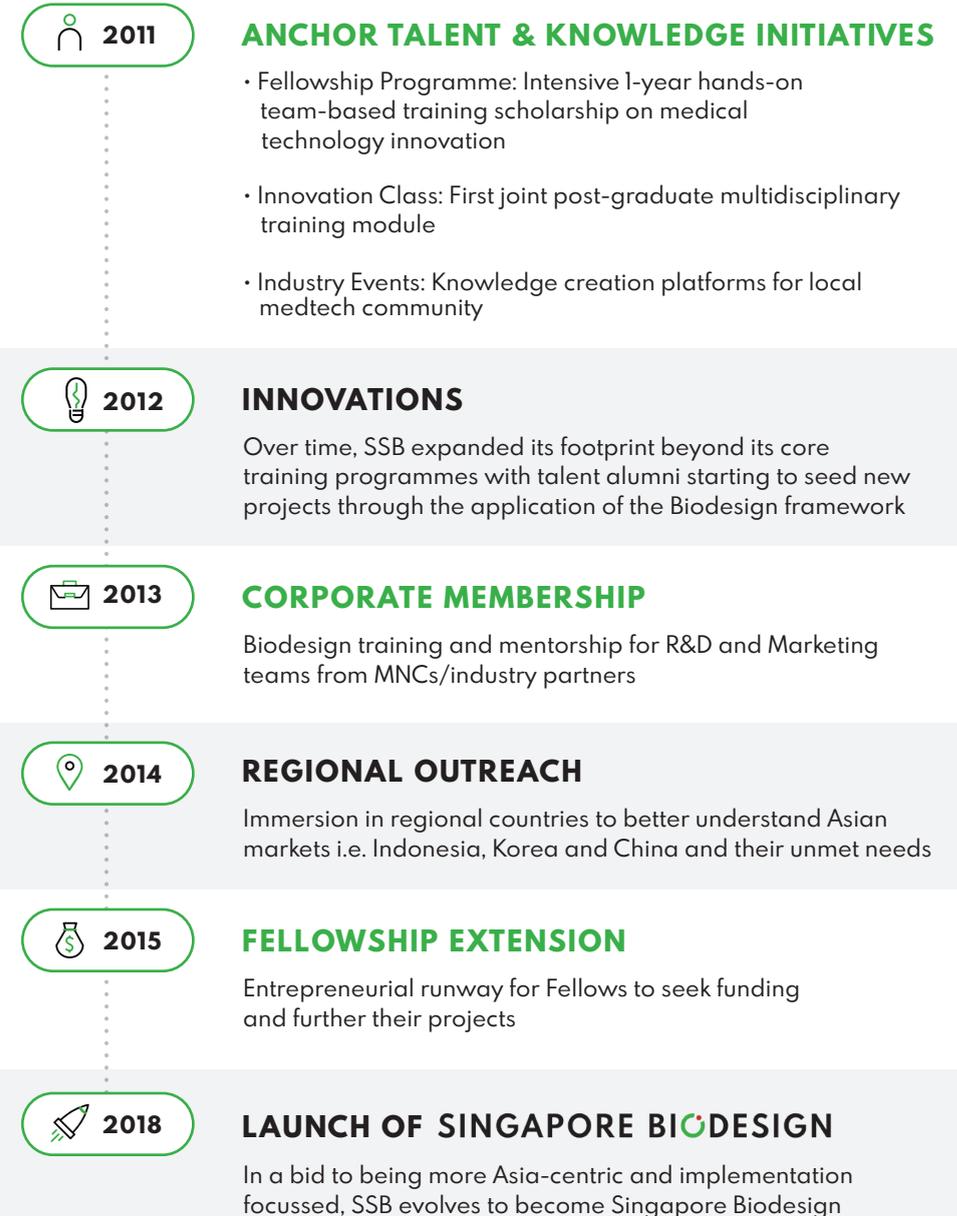
Adapted from Biodesign: The Process of Innovating Medical Technologies, Yock P. et al., ISBN13: 9781107087354

Stanford Biodesign Outcomes:
<http://biodesign.stanford.edu/our-impact.html>



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.



SSB Outcomes 2011-2018

TALENT	INNOVATIONS	ECOSYSTEM & INDUSTRY		REGIONAL
32 FELLOWS	31 TECH DISCLOSURES FILED	ACADEMIC PARTNERS 9 UNIVERSITIES	INTL' KOLS 6 INTL' THOUGHT LEADERS	 6 IMMERSION PARTNERS
240 UNIVERSITY STUDENTS	20 PROJECTS FUNDED (>\$11M)	ALLIANCES 59 INTL' NETWORK	INDUSTRY NETWORK 59 MENTORS & SPEAKERS	 2 IMMERSION PARTNERS
146 INDUSTRY PROFESSIONALS	7 SPIN-OFFS		1 PARTNER	
185 WORKSHOP PARTICIPANTS	2 TECHNOLOGY REACHING PATIENTS	7 CORPORATE MEMBERS	CLINICAL PARTNERS 15 HOSPITALS 1 HOSPITAL CLUSTER	 2 CLINICAL IMMERSION HOSPITAL PARTNERS

TALENT



High-touch mentoring of multi-disciplinary teams in the medtech innovation process.

Fellowship Programme: 2011 - 2018

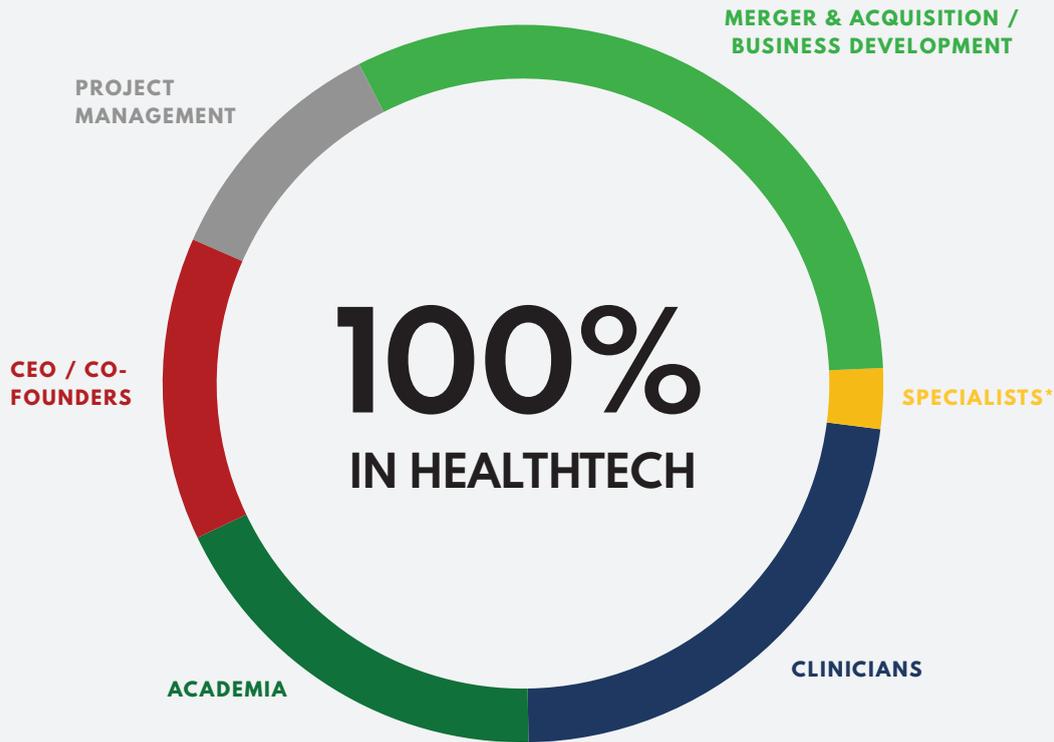
The SSB Fellowship is an intensive 1 year training for a multidisciplinary team of four Fellows, comprising of engineers, clinicians and business/industry professionals. Our Fellows spent 6 months in Stanford to learn the Biodesign knowhow before returning to Singapore to work on their own projects and 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.

COMPANIES THAT SSB FELLOWS HAVE ENTERED POST-FELLOWSHIP

MERGER & ACQUISITION / BUSINESS DEVELOPMENT	
PROJECT MANAGEMENT	
CEO / CO-FOUNDERS	SPECIALISTS
ACADEMIA	CLINICIANS

NOTABLE TALENTS

Clinician Innovator



A/PROF HENRY HO
SSB FELLOW,
2011

Head and Senior Consultant,
Urology, SGH

Director, Medical Technology Office,
Singhealth

Adjunct Associate Professor,
Duke-NUS Medical School

Adjunct Associate Professor,
Yong Loo Lin School of Medicine, NUS

Inventor; Clinician KOL, Biobot,
Zicom Medtacc



Cheaper way to treat cataracts

Scientists here patent new device that can be marketed overseas

By FENG ZHENGLIN

HALF of the world's blind people suffer from the condition, and treatment for it remains too costly for many patients in developing countries.

But scientists here may have come up with a way to treat cataracts, an age-related eye disease, at a fraction of the cost of current operations.

They have patented a low-cost medical device and plan to market it in countries such as China, where treatment for the disease is not subsidised by govern-



The researchers working on the low-cost medical device are (standing, from left) Dr Anthony Tang, Dr Henry Ho and Ms Panna Loh, along with his wife Tan (seated). PHOTO: A*STAR

Featured in The Straits Times, 2012

CEO



MR PRUSOTHMAN SINA RAJA
SSB FELLOW,
2014

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



Featured in Biotechn.Asia, 2015

Enabler



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



Senior Manager,
ETPL, A*STAR



• OIC for ETPL's Medtech Projects
• Organized 1st Open Innovation Challenge in Healthcare



Assistant Vice President,
ZIG Medtech Asia Pte Ltd

General Manager,
Endofotonics (Shanghai)



• China POC for commercialization activities

Chief Operating Officer,
Endofotonics

• Investment Due-diligence
• Managed portfolio companies

Fellows Testimonials



"My inspiration to join SSB was from my journey with Mona Lisa (Biobot Surgical 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 commercialiation. 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."

DR BENJAMIN TEE
SSB FELLOW, 2014

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

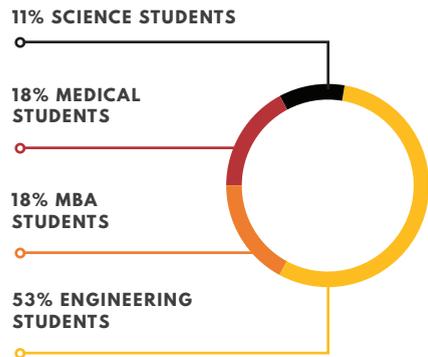
MS KA MUNG CHEE
SSB FELLOW, 2015



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.

BREAKDOWN OF DISCIPLINES

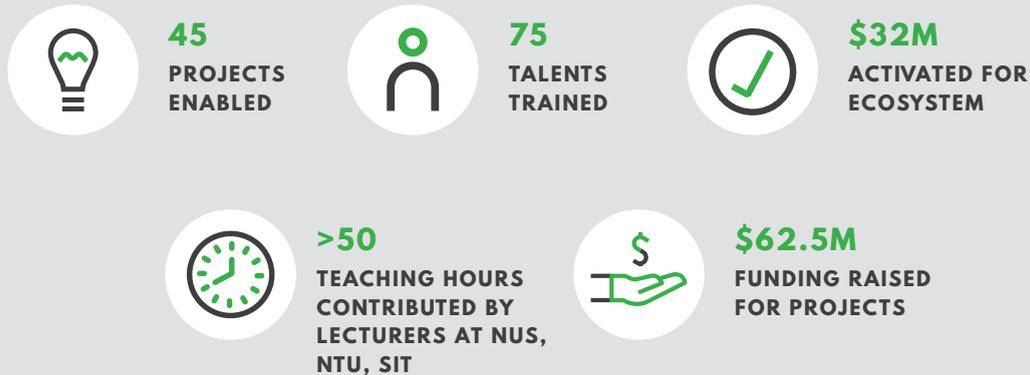


UNIVERSITIES



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.



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

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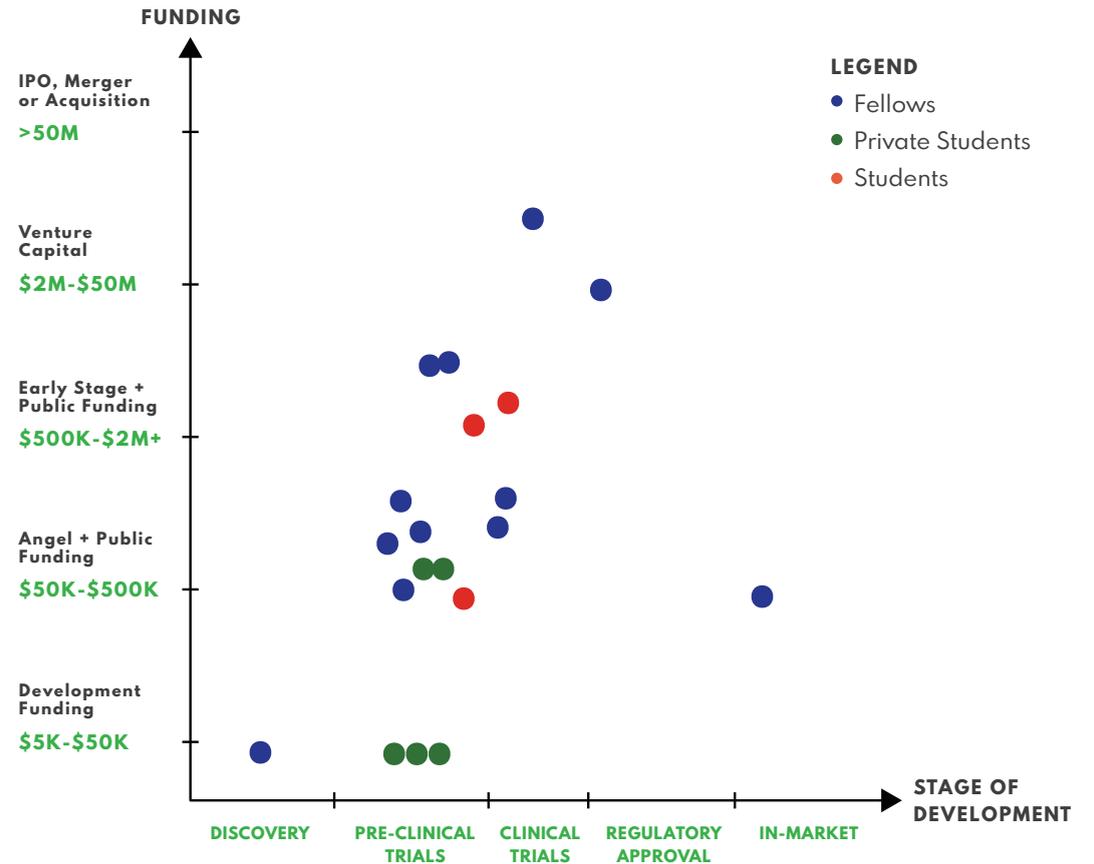
Creation of customer-centric innovations arising from our foundational talent training initiatives is the strongest validation of the SSB programme.

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 (>\$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 start-ups is seen as the strongest validation of the SSB training programme.



SSB Fellow Alumni Spin-offs



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



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



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



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



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



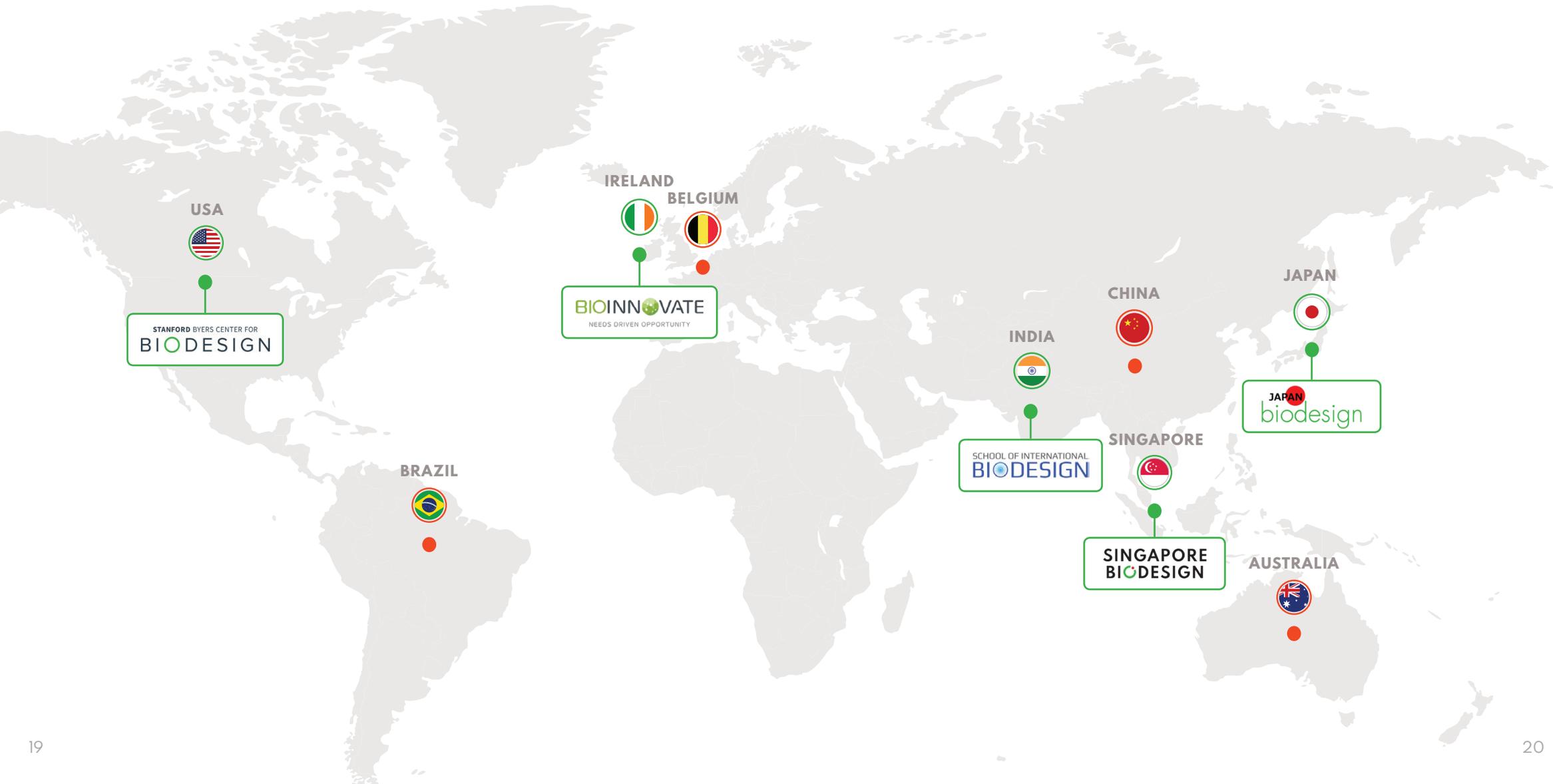
SSB has played a significant role in building the local medtech ecosystem and forging new regional relationships to maintain a globally relevant multidisciplinary network.

Biodesign 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.

LEGEND

- Biodesign Programmes
- Global Faculty Training Programme



Regional: China, Indonesia, South Korea

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



Local: Singapore

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.

EDUCATIONAL INSTITUTIONS



CLINICAL & INNOVATION PARTNERS



INDUSTRY PARTNERS



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 focussed on content that features a customer-centric approach to catalysing startup creation and enterprise activities.

THOUGHT LEADERS SERIES



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

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

KEYNOTE SPEAKER

Mr Michael Kloss
CEO, Ascensia Diabetes Care

MODERATORS

Mr Fredrik Nyberg
CEO, APACMed

PANELISTS

Dr David Klonoff
Head, Diabetes Center, UCSF

Mr Linus Tham
GCIO, Parkway Pantai

Dr Bee Yong Mong
Head, SingHealth Duke-NUS Diabetes Centre

2015

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

KEYNOTE SPEAKER

Prof Paul Yock
Executive Director, Stanford Biodesign

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

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

Mr Yoh-Chie Lu
Chairman, Biosensors International

Dr Fumiaki Ikono
Programme Director (US), Japan Biodesign, Stanford University

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 Yoh-Chie Lu
Chairman, Biosensors International

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



Mr Tom Kelley
Partner, IDEO

INNOVATIONS IN CARDIAC SURGERY



Mr Manny Villafana
Founder, St. Jude Medical Inc.

2014

INTERNATIONAL TRENDS IN MEDICAL TECHNOLOGY INNOVATION & REGULATION



Mr Michael Gropp
Former VP, Global Regulatory Strategy

2013

CHANGING THE PARADIGM FROM TREATING DISEASE TO DISEASE MANAGEMENT



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

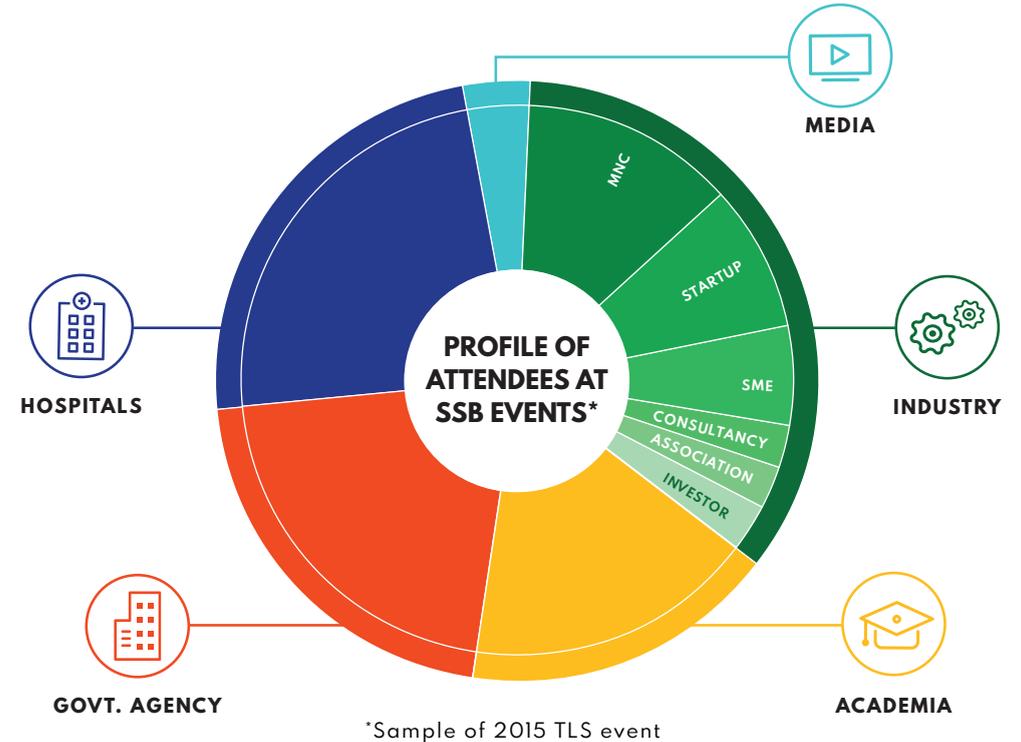
Mr Abinash Nayak
VP, R&D, Hill-Rom

Mr Lekshmy Parameswaran
Director, Research, Fuel for Healthcare Innovation

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.



Building the MedTech Ecosystem

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.

INDUSTRY NETWORK

59

MENTORS/
SPEAKERS

7

CORPORATE
MEMBERS

CLINICAL PARTNERS

15

HOSPITALS &
MEDICAL CENTRES

1

HOSPITAL
CLUSTER

ACADEMIC PARTNERS

9

UNIVERSITIES



Empowering Asia's Healthtech Innovators of Tomorrow

SINGAPORE
BIODESIGN

CONTACT US

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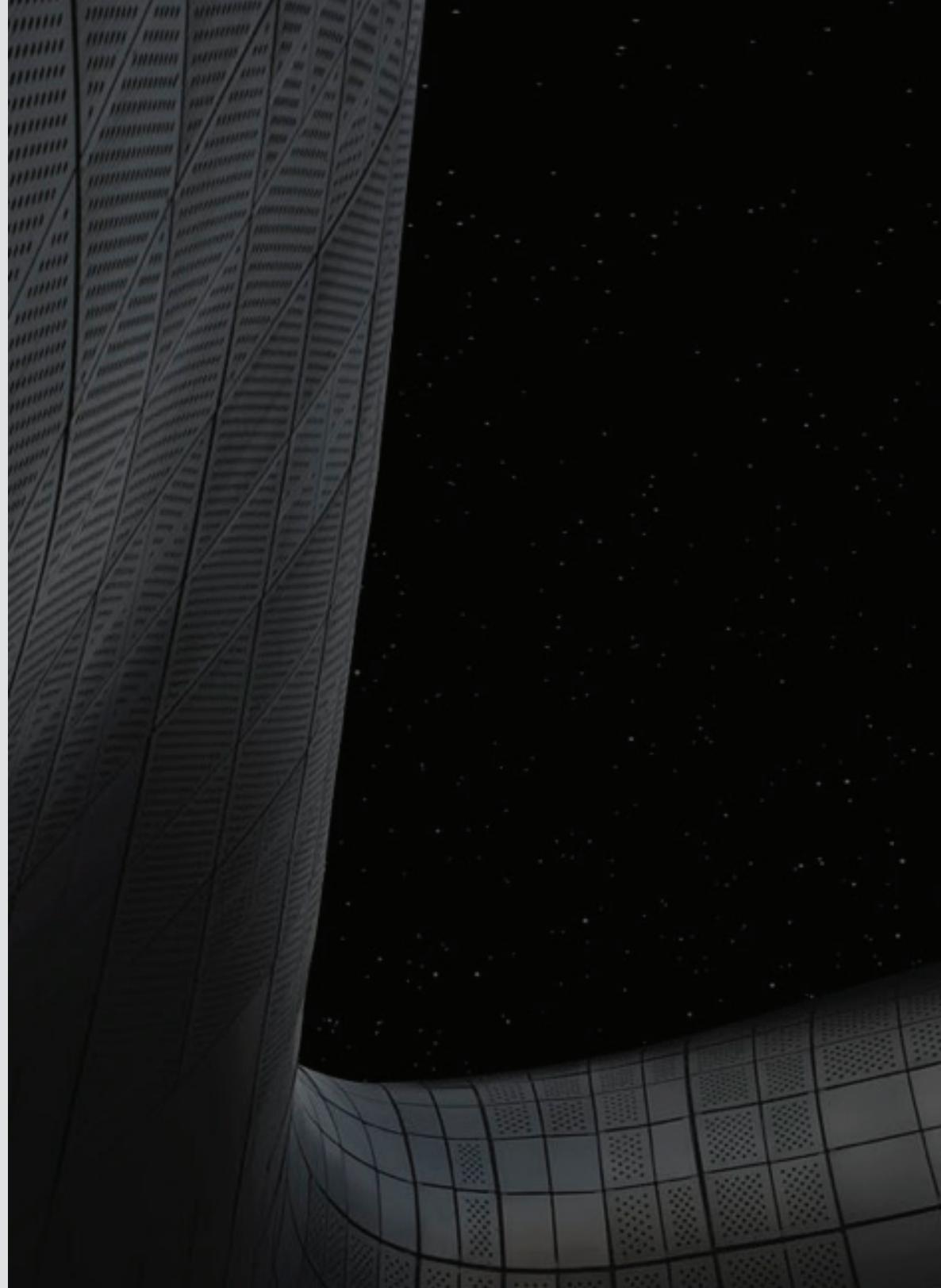
TEL: +65 8793 6406

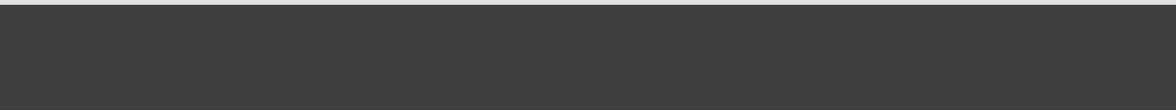
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HOST INSTITUTION:



JOINT PROGRAM PARTNER:

