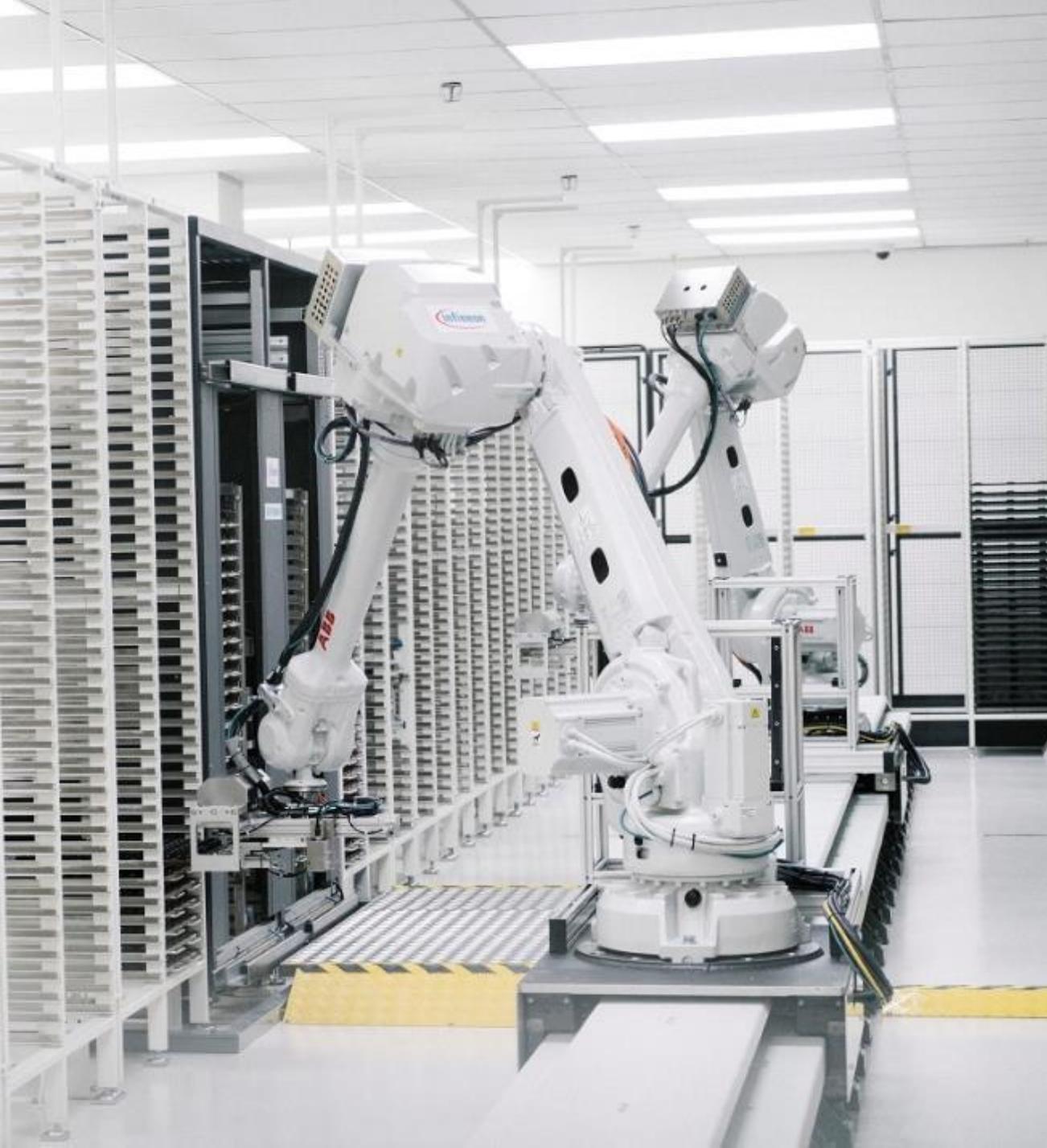


# Healthcare and Agri-food Ecosystems in Singapore



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**Regional Director (Europe)**

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# Agenda

- Introduction to Singapore and the EDB
- Healthcare  
Biotech  
Healthtech
- Agri-food

# The Singapore Economic Development Board (EDB)



**Lead Agency that Plans and Executes  
Economic and Industrial Development Strategies for Singapore**

## **OUR VISION**

A Global Leader

A Great City

A Home in Asia

For Business, Innovation, and Talent

## **OUR MISSION**

We create for Singapore, sustainable economic growth  
with vibrant business and good job opportunities

**ATTRACT  
FOREIGN  
INVESTMENTS**

**GROW  
INDUSTRY  
VERTICALS**

**ENHANCE  
BUSINESS  
ENVIRONMENT**

# Singapore: A Global City

## Global City with Quality of Life

5.5 million population

1.25 million foreigners

**Most livable city in Asia [Mercer 2018]**



## Multicultural

English speaking

4 official languages



## Pro-business

**Home to over 7,000 MNCs and 37,000 international companies (~10,000 EU)**



**76** Double Taxation Avoidance (DTA)

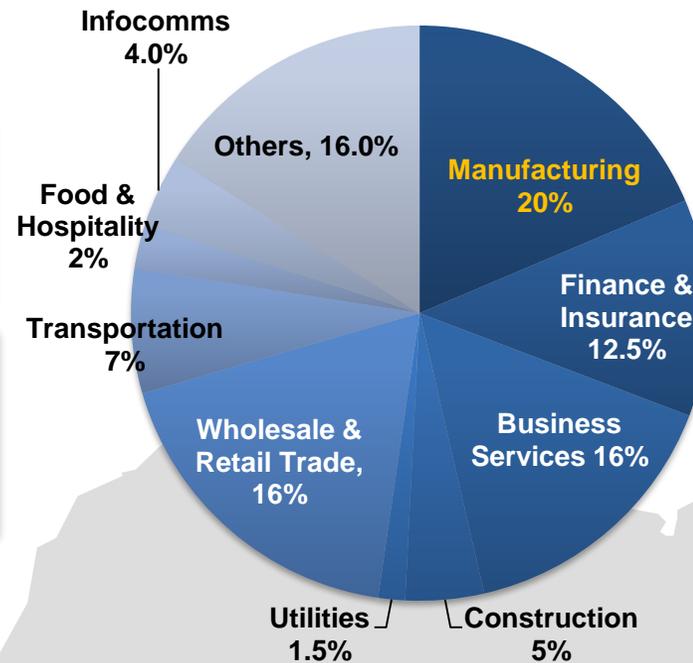
**42** Investment Guarantee Agreements (IGA)

**60%** of World GDP covered by FTAs

Source: Inland Revenue Authority of Singapore

## 2018 GDP:

**S\$487 billion (~EUR 316 billion)**



**3.2% GDP growth in 2018**  
**Manufacturing remains a key pillar of SG's economy**

Source: Ministry of Trade and Industry

**#2 most competitive economy in the world**

*IMD World Competitive rankings*

**#2 for ease of doing business**

*World Bank's doing business survey*

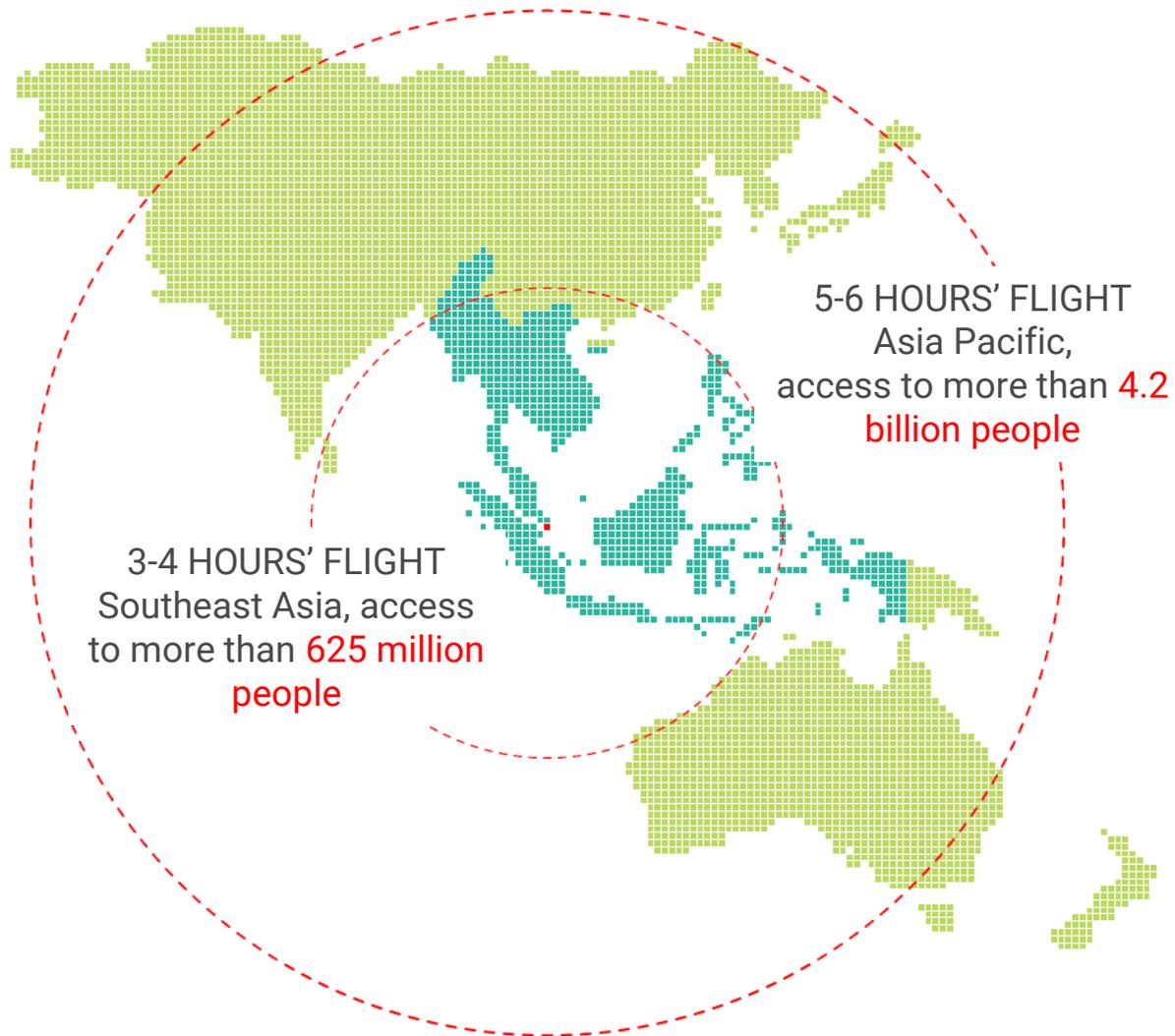
**#1 in Asia for sustainability**

*Arcadis's Sustainable Cities Index*

**#1 in Asia for IP Protection**

*WEF's Global Competitiveness report*

# Singapore, a platform to Asia



Average annual healthcare spending is growing, but still lower than the OECD average



Currently having a young population, but **persons aged 65 and older will make up 15% of its population by 2050**, fuelling demand for healthcare in South East Asia



**More than 90% of users (350M) in ASEAN use the internet via mobile**

source: Google-Temasek SEA economy report 2018



Healthcare

# A VIBRANT, WORLD-CLASS BIOMEDICAL HUB IN ASIA



**60 Manufacturing Plants**

>\$28B output  
>20,800 employees

**30 R&D Centers**

>\$720M research expenditure  
>2,000 Private Sector Researchers

**80 Leading RHQs**

>7,600 employees

# BIOPHARMACEUTICALS SECTOR IN SINGAPORE: THE VISION

Singapore as Asia's own globally leading hub for the **discovery and development of novel precision treatments for Asian-prevalent diseases targeting global markets**

## Singapore's strategic advantages

### Technology

World-class research hub with deep R&D capabilities. S\$4B allocated to the Health and Biomedical Sciences from 2016-2020

### Ecosystem

Globally competitive ecosystem of enterprises

### Market Access

Close proximity and linkage to Asian region

## Therapeutic areas of focus



Oncology



Cardiovascular



Sensory & Neurological



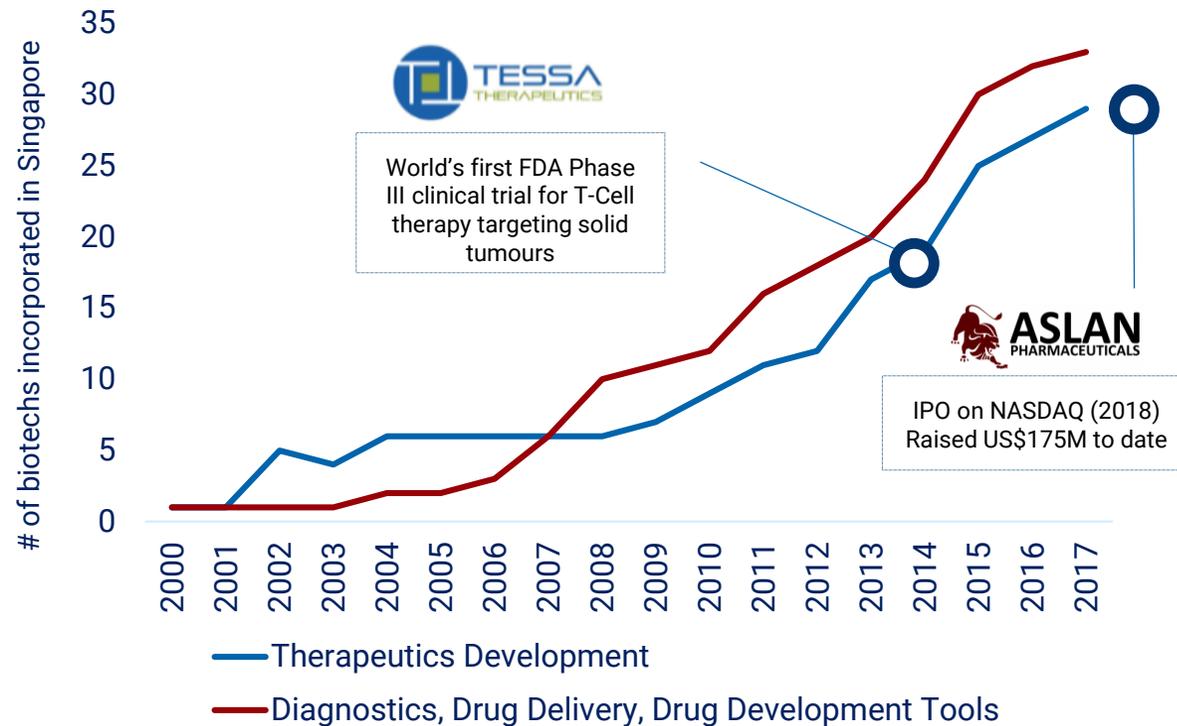
Diabetes



Infectious

# A FAST-GROWING BIOTECH SCENE...

Growth of biotechs in Singapore & Key Milestones  
(2000 – 2017)



>60

Number of Biotechs in Singapore

US\$350M

Value of deals and investments for Singapore biotechs in 2018\*

# BIOTECH ACTIVITY ACROSS A RANGE OF TECHNOLOGIES

## Oncology



T-Cell Receptor therapy against viral-related cancers



Viral-Specific T-Cell therapies against nasopharyngeal cancer



Small molecule inhibitors targeting Asian-prevalent cancers



Small molecule inhibitors that target critical genomic drivers of cancer

## Drug Discovery Platforms



*Integrated Rapid Response Platform* accelerates drug development process



Drug discovery platform augmented by artificial intelligence and genetic data



High-dimensional immune profiling platform for biomarker and target identification



Precision medicine enabled antibodies that target solid tumours

## Stem Cell Therapies

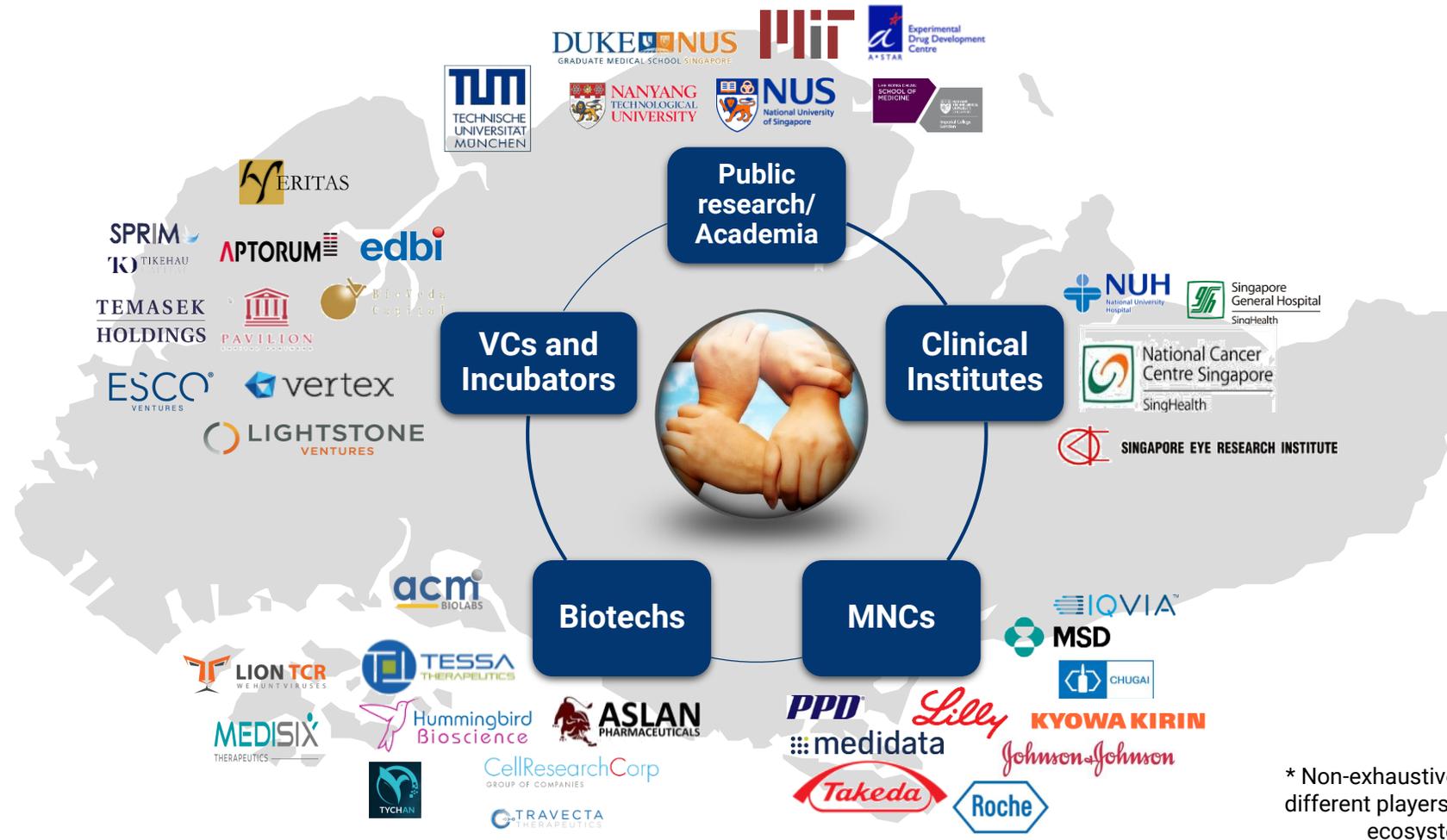


Proprietary cord lining stem cell storage & processing technology to enable stem cell-based therapies



Harnessing stem cell exosomes against multiple disease indications

# RICH LANDSCAPE OF POTENTIAL PARTNERS



\* Non-exhaustive list of the different players in the R&D ecosystem

# ...AS WELL AS A ROBUST HEALTHTECH ECOSYSTEM

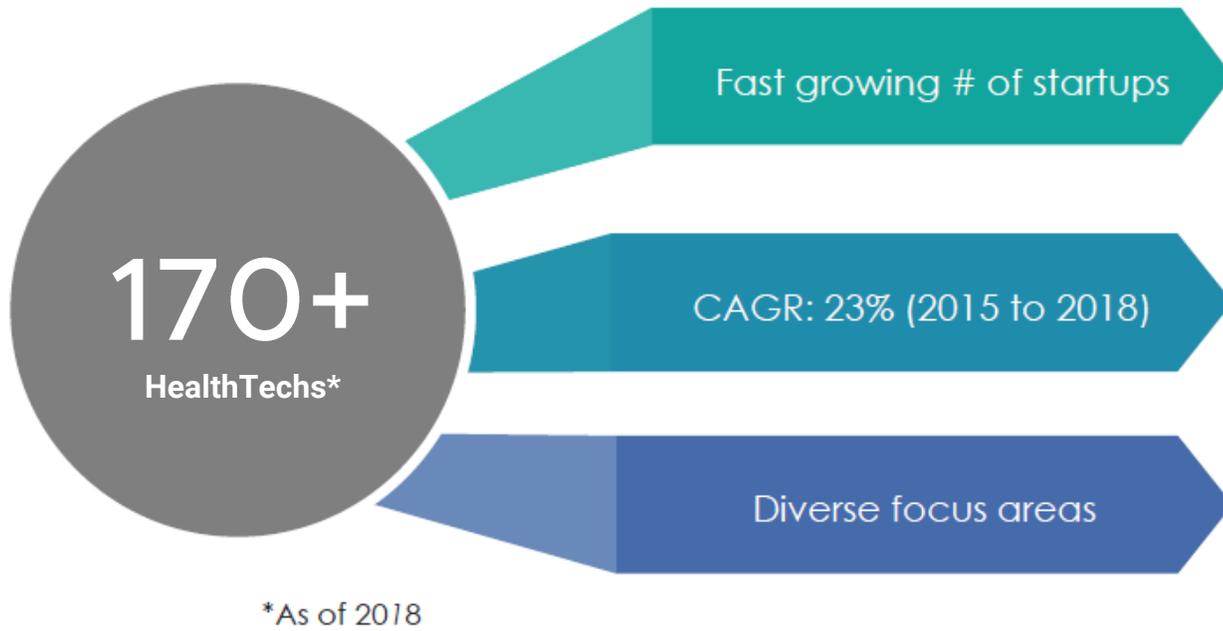
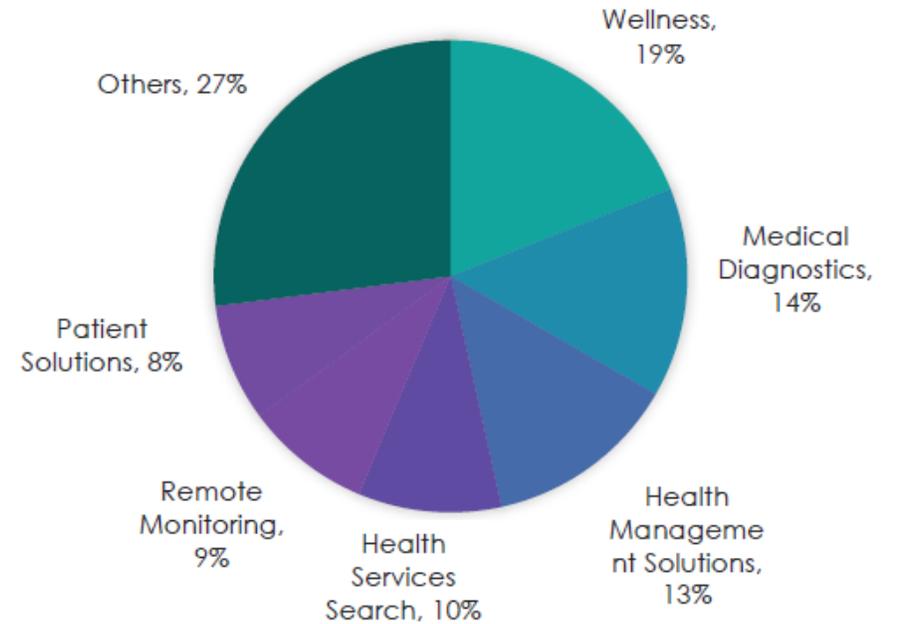


Figure 2: Singapore HealthTech Ecosystem by category share



# INNOVATIONS REFLECT MACRO TRENDS IN SEA

## DIGITALISATION OF HEALTHCARE SYSTEMS



## CONSUMERISATION OF HEALTHCARE



biofourmis

holmusk

Vault Dragon

AUREUS  
ANALYTICS

mClinica

ATTUNE

hello HEALTH

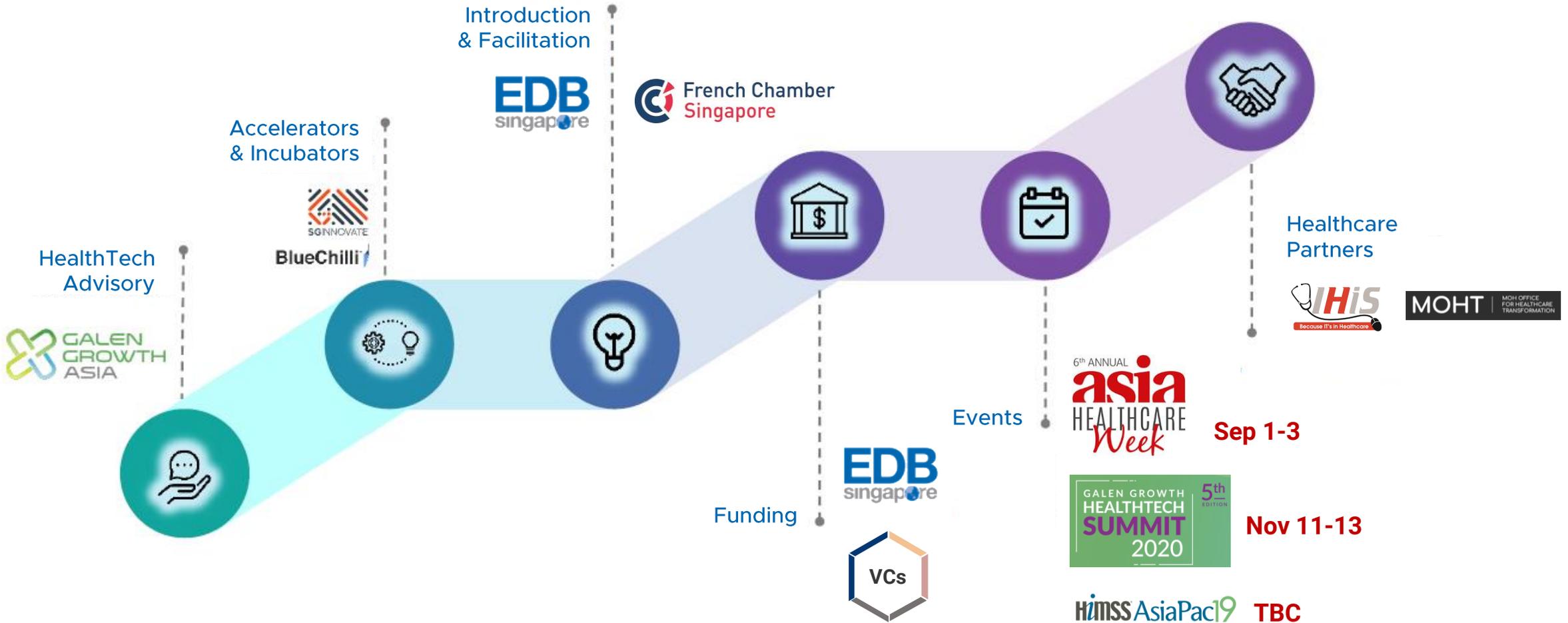
Homage

mydoc

# FINANCING FROM POOL OF VENTURE CAPITAL



# MULTIPLE ENTRY POINTS TO ACCESS SINGAPORE

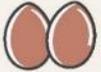


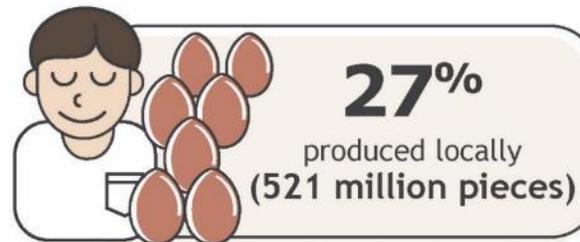
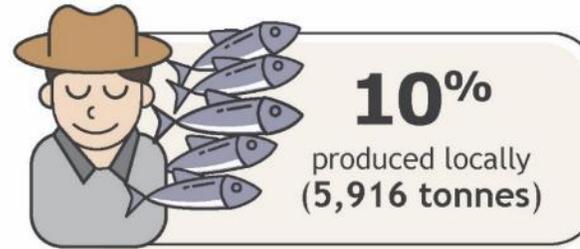


Agri-food

# 30% OF SINGAPORE'S NUTRITIONAL NEEDS BY 2030

2018

Food farms		
	Coastal food-fish	<b>117</b>
	Land based food-fish	<b>9</b>
	Vegetables	<b>78</b>
	Poultry (hen & quail eggs)	<b>5</b>
	Bean Sprout	<b>6</b>
	Dairy cattle	<b>3</b>
	Shrimp	<b>2</b>
	Frog	<b>2</b>
	Crab	<b>1</b>
	Goat	<b>1</b>



4 sectors of interest

Indoor vertical agriculture

Aquaculture

Insect farming

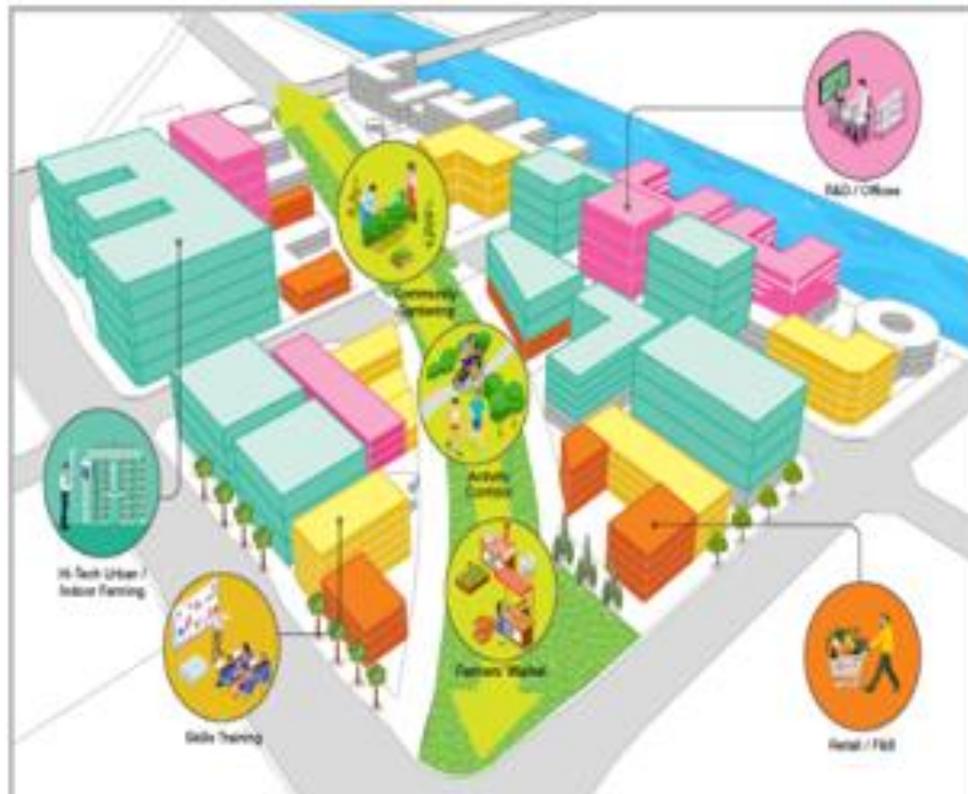
Alternative Proteins

Discover the right business models

Commercialise & export the solutions

# AGRI-FOOD INNOVATION PARK

**A reference site for high-tech farming operations to test and iterate technologies, and develop production standards and best practices**



**Insect Farming / Novel Feed**



**Hatchery / Broodstock**



**Indoor Controlled Environment Farming**



**Aquaculture Health**

# INDOOR FARMING

>30

registered Vertical Farming entities in Singapore



**Sustenir** uses a Controlled Environment Agriculture (CEA) model to grow specialty leafy greens. Previously an office space, the farm produces 54 tonnes of vegetables a year within 344m<sup>2</sup> of space.



**Sky Greens** is the world's first low-carbon hydraulic-driven outdoor vertical farm that uses a conveyor belt to vertically rotate crops.



**Panasonic's** indoor farm in Singapore grows 81 tonnes of vegetables a year.

The farm handles more than 40 varieties of crops, such as mizuna, romaine lettuce, mini red radishes and Swiss chard.



VertiVegies

**SANANBIO**<sup>TM</sup>

**VertiVegies** is collaborating with **SananBio** to build a 20,000m<sup>2</sup> plant factory that will require 90% less water and 75X more productive than conventional soil-based farms.



# AQUACULTURE

## AVA Marine Aquaculture Centre

- Indoor close-looped RAS systems
- Ready infrastructure for plug-and-play (lab spaces, storage tanks)
- Seawater, Freshwater and Mainland Power Grid Access
- Trained technical staff
- Broodstock centre for seabass
- Research expertise in seabass, pompano, cobia, snappers and trevallys
- Ease of import and export of raw materials, feed ingredients, finished products and specimens (including diseased specimens)



**Collaboration opportunities for conducting feed trial, novel feed production/formulation and analysis.**

## Feed Trial Facility (ready by 2020)

### Controlled Feed Trial Facility

- Test feed formulations and delivery methods across a wide range of local and foreign species both finfish and shrimp.
- **2 x 36 one tonne tank systems**
- Potential to conduct Disease Challenge Trials in surrounding BSL 2 Labs
- Physical Properties Testing Lab
- Quarantine Centre

### Experimental Feed Mill

- Perform small batch extrusion/pelletization, with cold chain storage
- 50kg/hour Extruder and Experimental Feedmill setup

### Partnership with JCU experts to design and implement feed trials:

- Leading academics based in Singapore with expertise in nutrition, selective breeding, hatchery technologies, health and system design.
- Expertise in barramundi (Asian sea bass) and shrimp.



# \$144MIL R&D PROGRAMME TO ADVANCE AGRIFOOD TECH

## Theme 1: Sustainable Urban Food Production



**Genetics:** Superior indoor crop varieties & tropical aquaculture species



**Disease and Health Management**

Smart Sensors for Urban Production



**Nutrition:** Animal health and optimised feed for tropical aquaculture



Nutrient quality preservation for farm produce

## Theme 2: Future Foods



Cell-based **Cultured Meat**



**Microbial Protein**



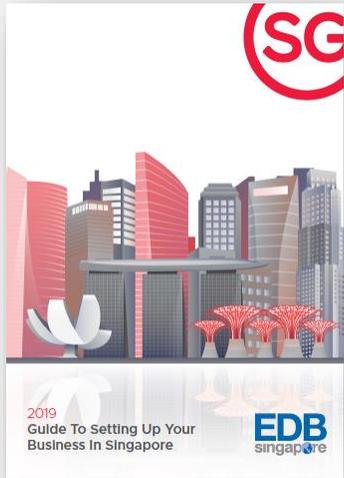
**Plant Protein Discovery and Processing**



Scale-up **Pilot Facility**

Opportunities to partner industry to shape program & form research collaborations

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