

# Going Beyond Comparative Advantage: How Singapore Made It 30 April 2014

Presented by

Philip Yeo, **SINGAPORE**

Chairman, **Standards, Productivity and Innovation for Growth**  
SPRING, [www.spring.gov.sg](http://www.spring.gov.sg), 2007-to-date

Chairman, **Agency for Science, Technology and Research**  
A\*STAR, [www.a-star.edu.sg](http://www.a-star.edu.sg), 2001-2007

Chairman, **Economic Development Board**  
EDB, [www.edb.gov.sg](http://www.edb.gov.sg), 1986-2006

# Singapore's Urban Development



Then



Now

# Singapore's Housing Development



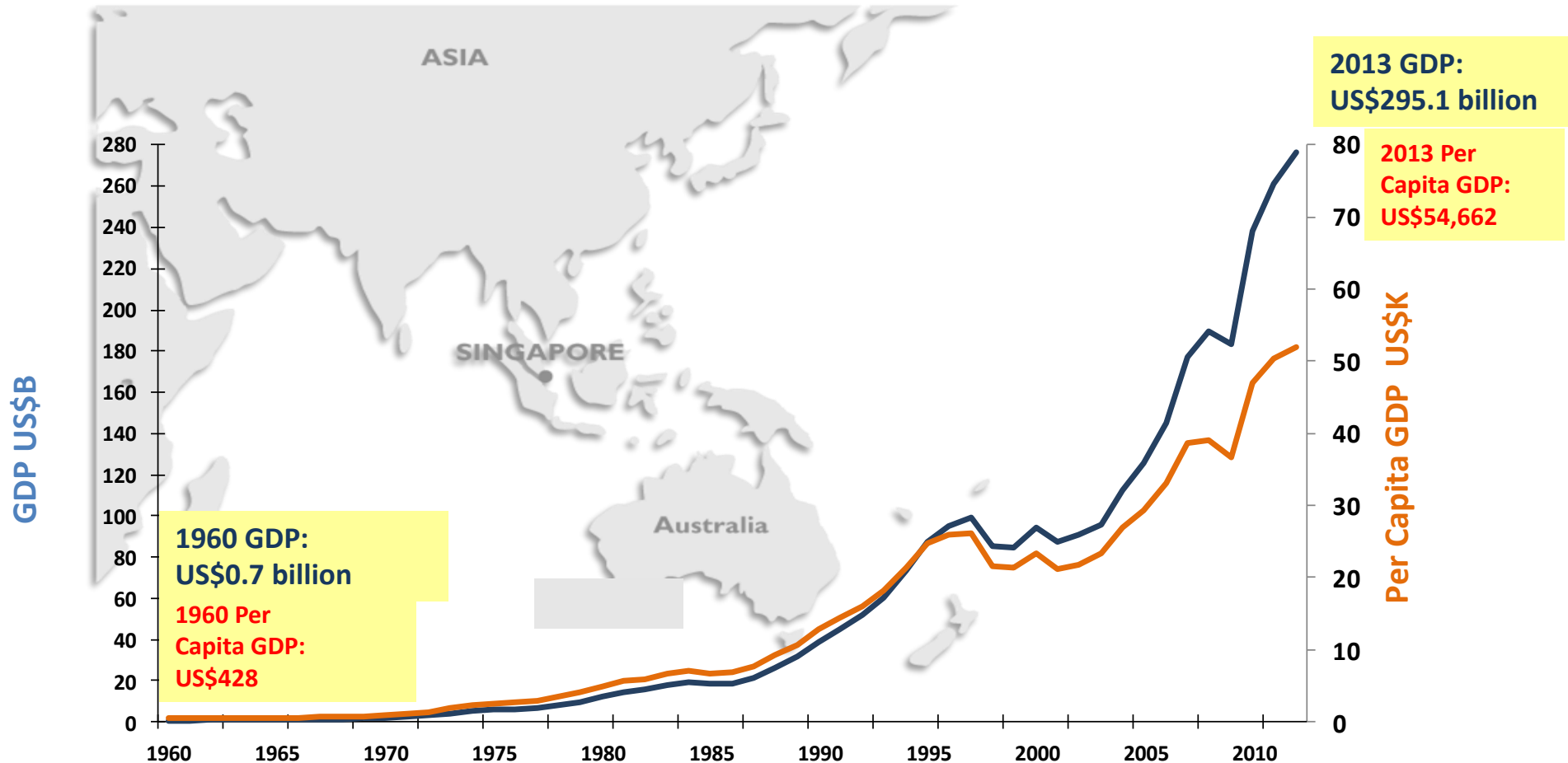
Then



Now



# Growth of Singapore's Economy



1960s  
Labour  
intensive

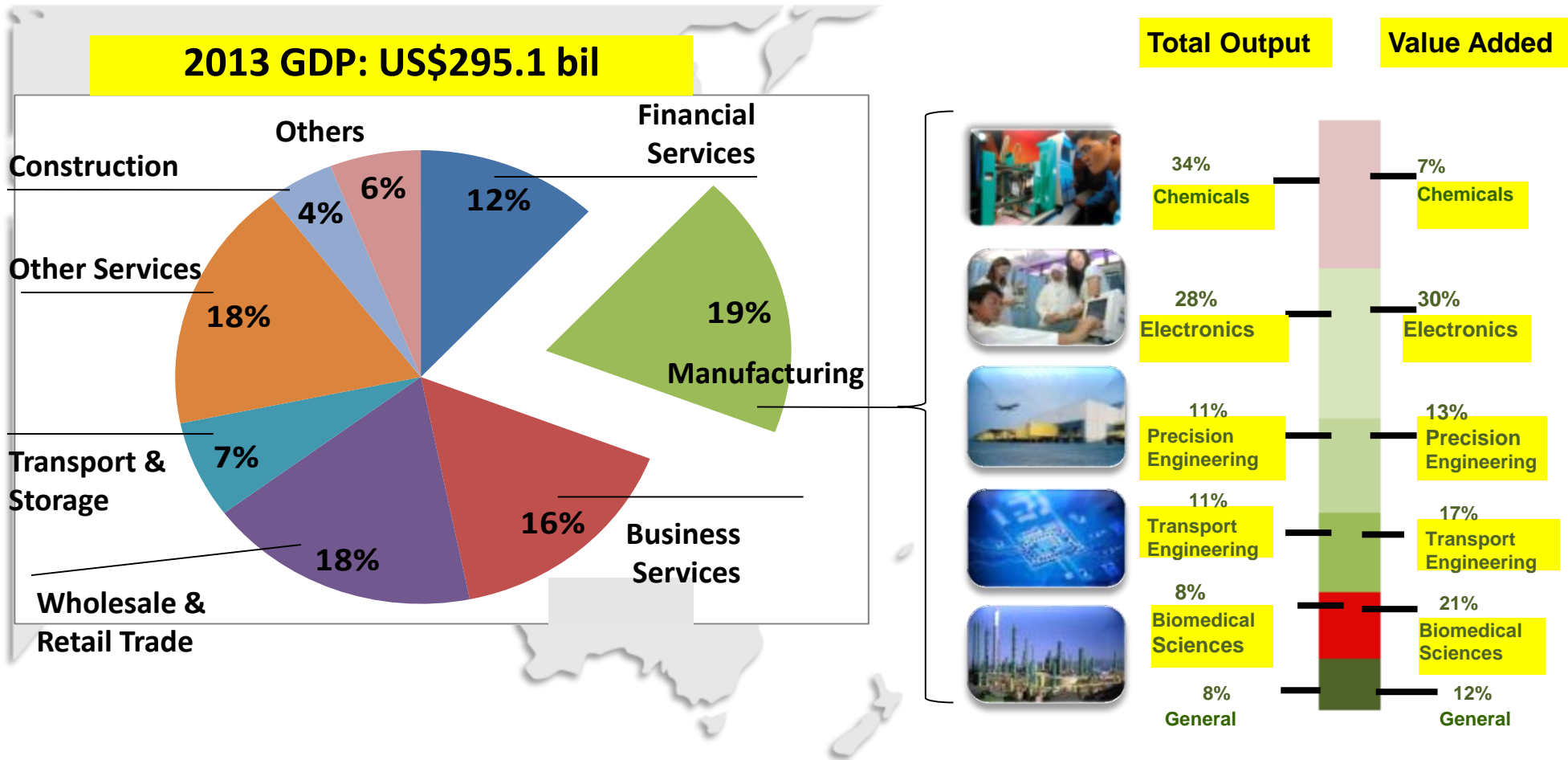
1970s  
Skill  
intensive

1980s  
Capital  
intensive

1990s  
Technology Intensive

2000...  
Knowledge &  
Innovation Based Economy

# Singapore's Economy Today



# Phases of Singapore's Economic Development

Jobs & GDP Growth

Knowledge Intensive

Technology Intensive

Capital Intensive

2000s

Knowledge-based Economy

1990s

Cluster Developments: Key Game Changer

One-North Development  
200 hectares  
2000-20 Master Plan

Skill Intensive

1980s

Creating Business Parks: Twin Engine of Manufacturing and Services

Jurong Island Petrochemical Complex

1970s

Industrial estates with amenities at the fringe of residential towns

Singapore Science Parks

Labour Intensive

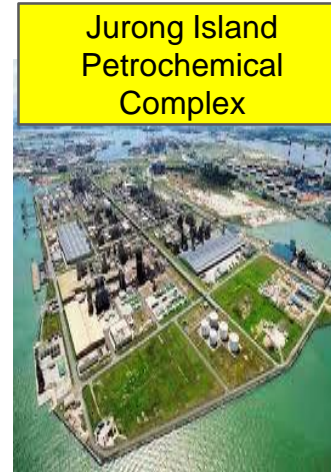
1960s

The First Industrial Township

Jurong Industrial Estate



Flatted Factories



# Our Approach: Industry Development

***We have no markets, no raw materials.  
All the industry we've created is illogical. But what choice do we have?***

## ELECTRONICS



- 40% of world's hard disk media production
- 14 silicon wafer fabrication plants
- 20 semiconductor assembly & test operations
- 40 IC design centres

## CHEMICALS



- One of world's top 3 export refining centres
- > 95 leading petroleum, petrochemicals and specialty chemicals on Jurong Island, Singapore's centrepiece for the energy & chemicals industry

## PRECISION ENGINEERING



- Largest & most comprehensive aerospace maintenance, repair & overhaul centre in Asia
- 70% of world's production of jack-up oil rigs and FPSO conversion; 20% of world's ship repair market

## BIOMEDICAL SCIENCES



- > 50 commercial scale manufacturing plants, including 7 world leading biopharmaceutical companies & 25 medical technology companies
- 7,000 researchers in > 50 companies, universities and public sector research centres



# Our Approach: Investment Promotion

**7,000** Multi-national Corporations

**60%** with regional responsibilities

**37,400** International Companies, including 3,200 from China,

4,400 from India,

7,900 from ASEA (excluding Singapore)

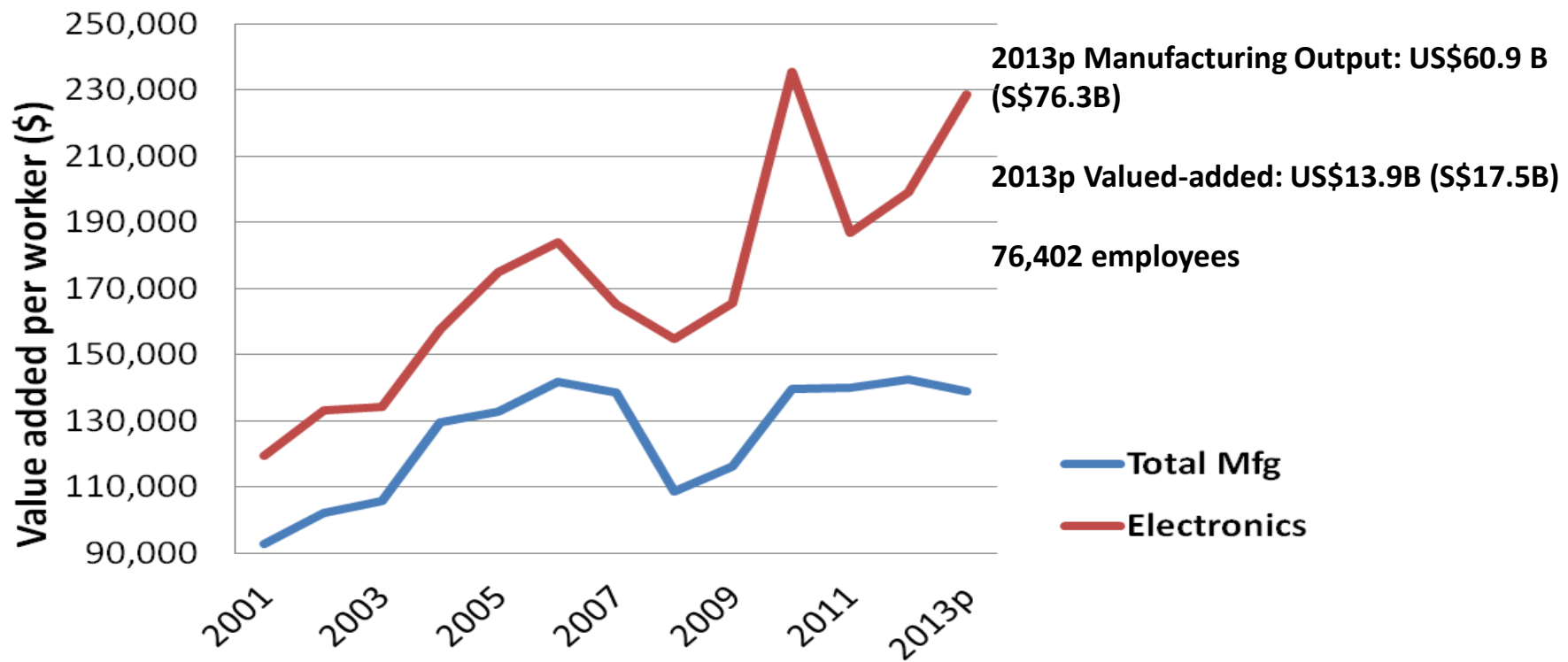




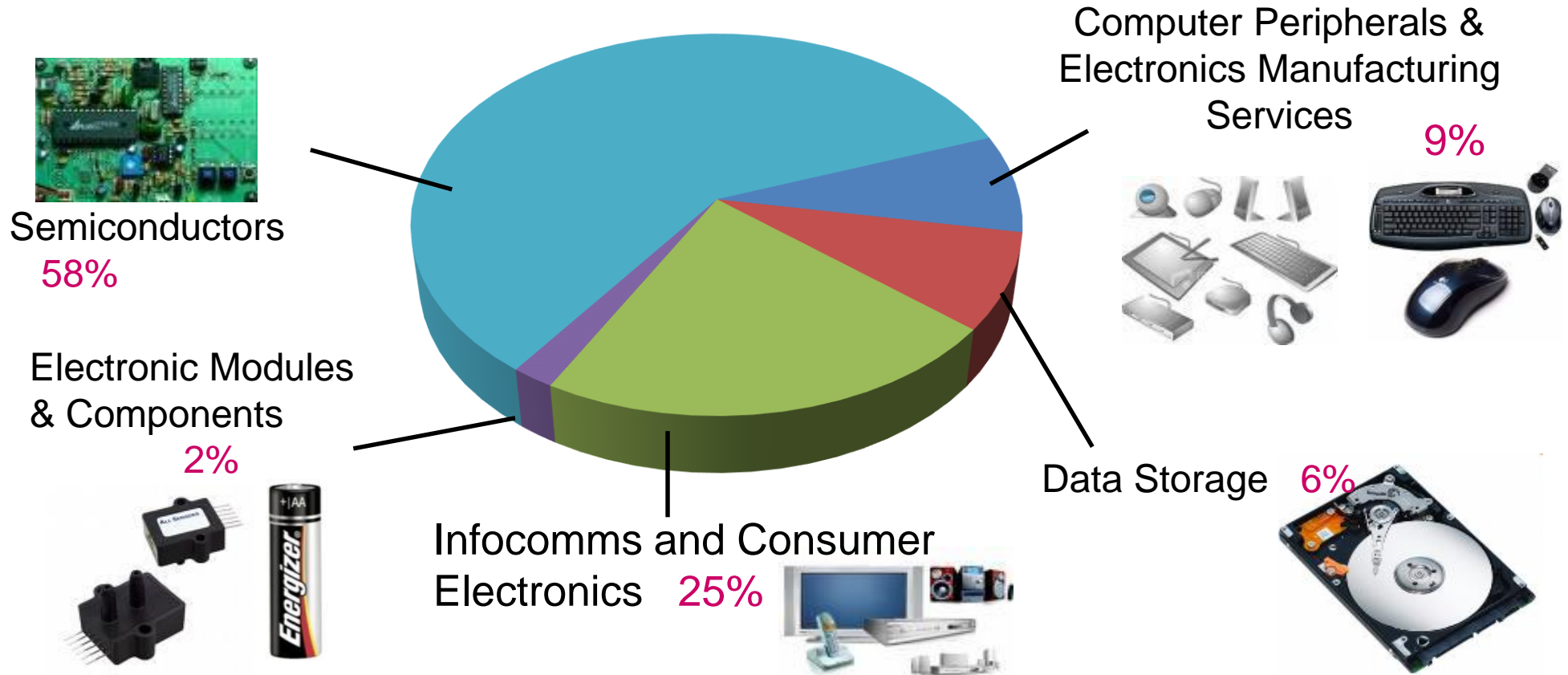
# Industrial Development - Electronics

Backbone of Singapore's economy, contributing 30% of the total manufacturing value-add

Value-Added (VA) per worker for electronics industry consistently exceeds manufacturing average

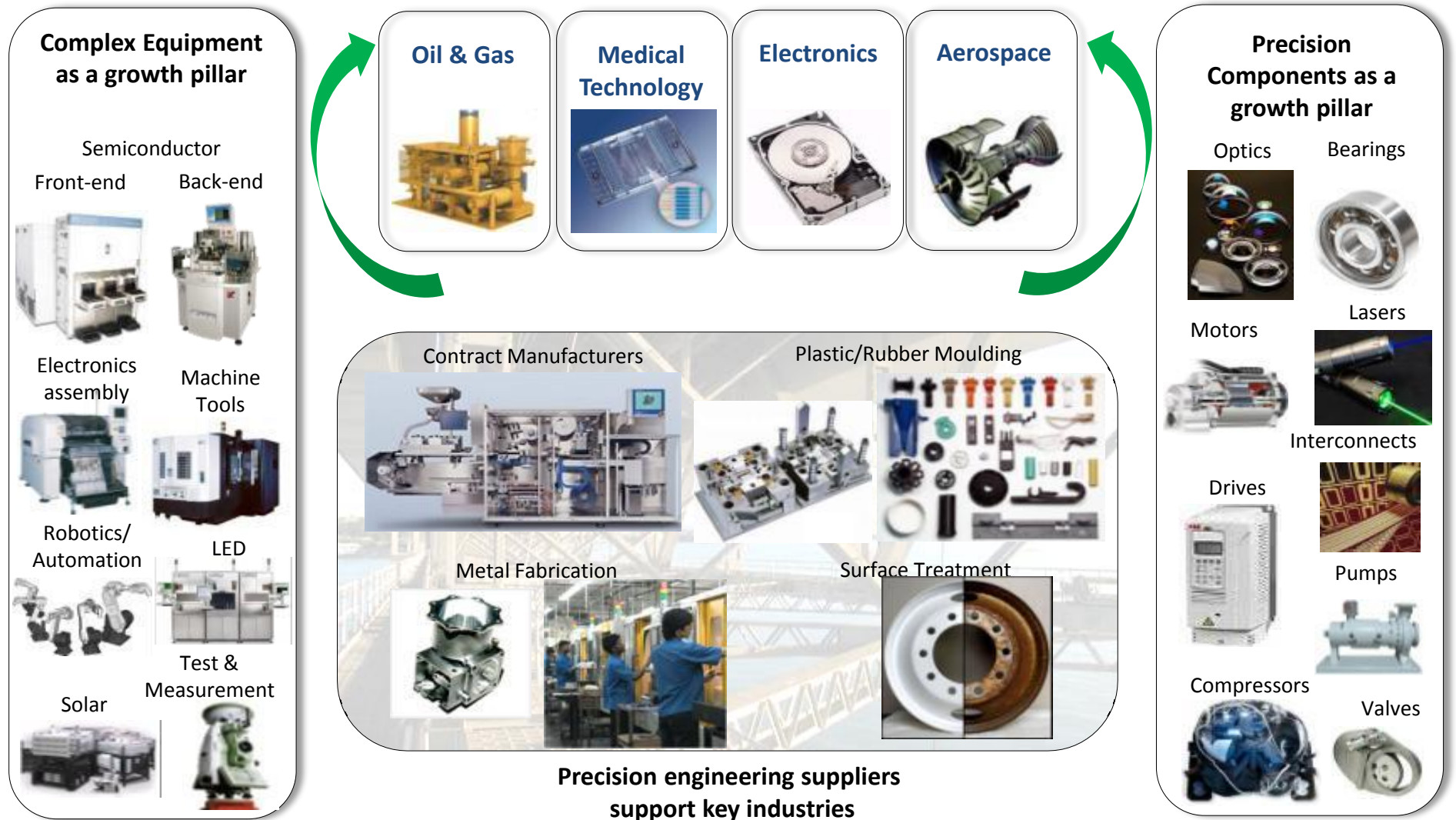


# Industrial Development - Electronics



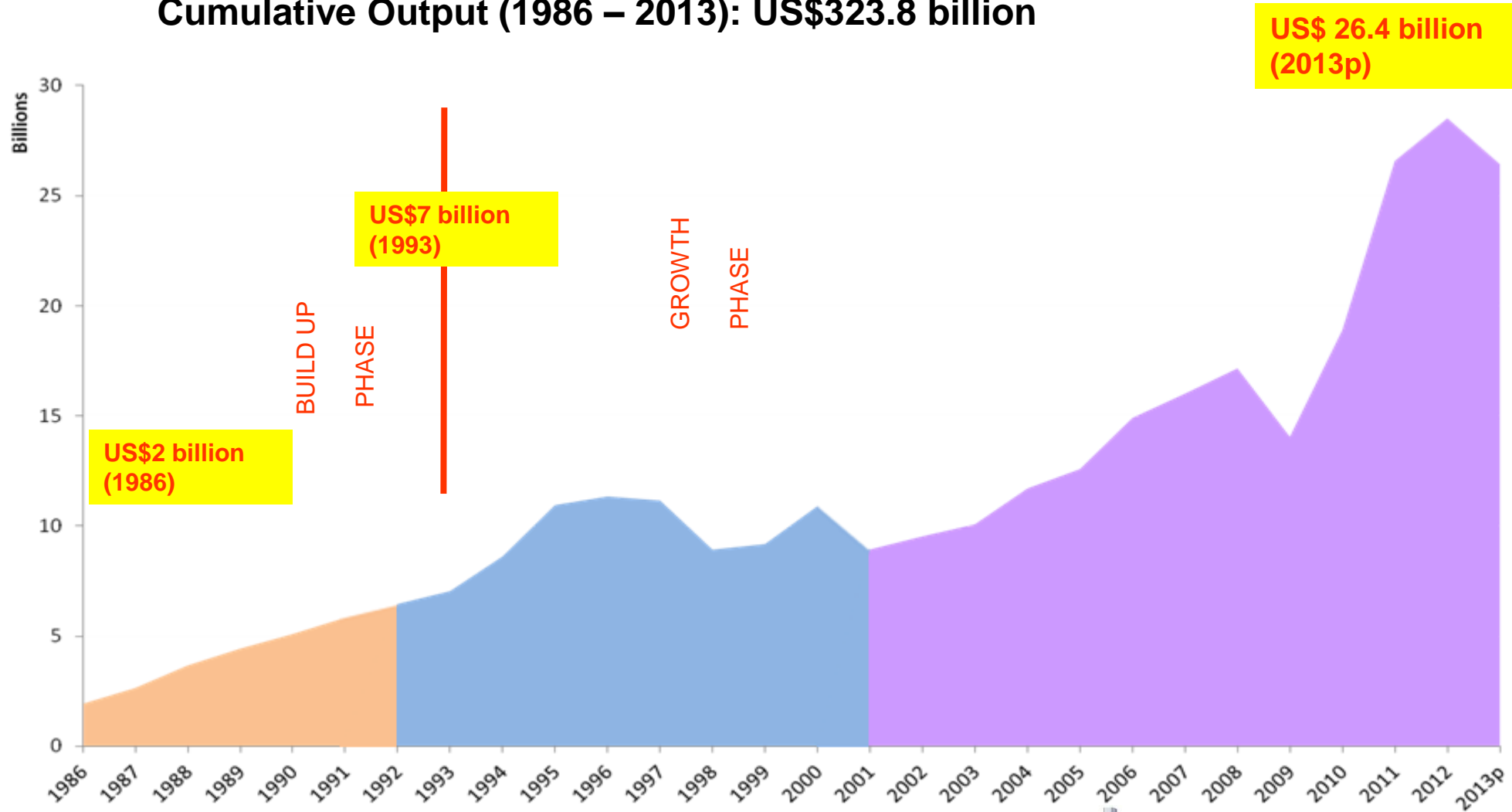
**Manufacturing Output 2013p: S\$76.3b**

# Industrial Development - Precision Engineering



# Industrial Development - Precision Engineering

Cumulative Output (1986 – 2013): US\$323.8 billion

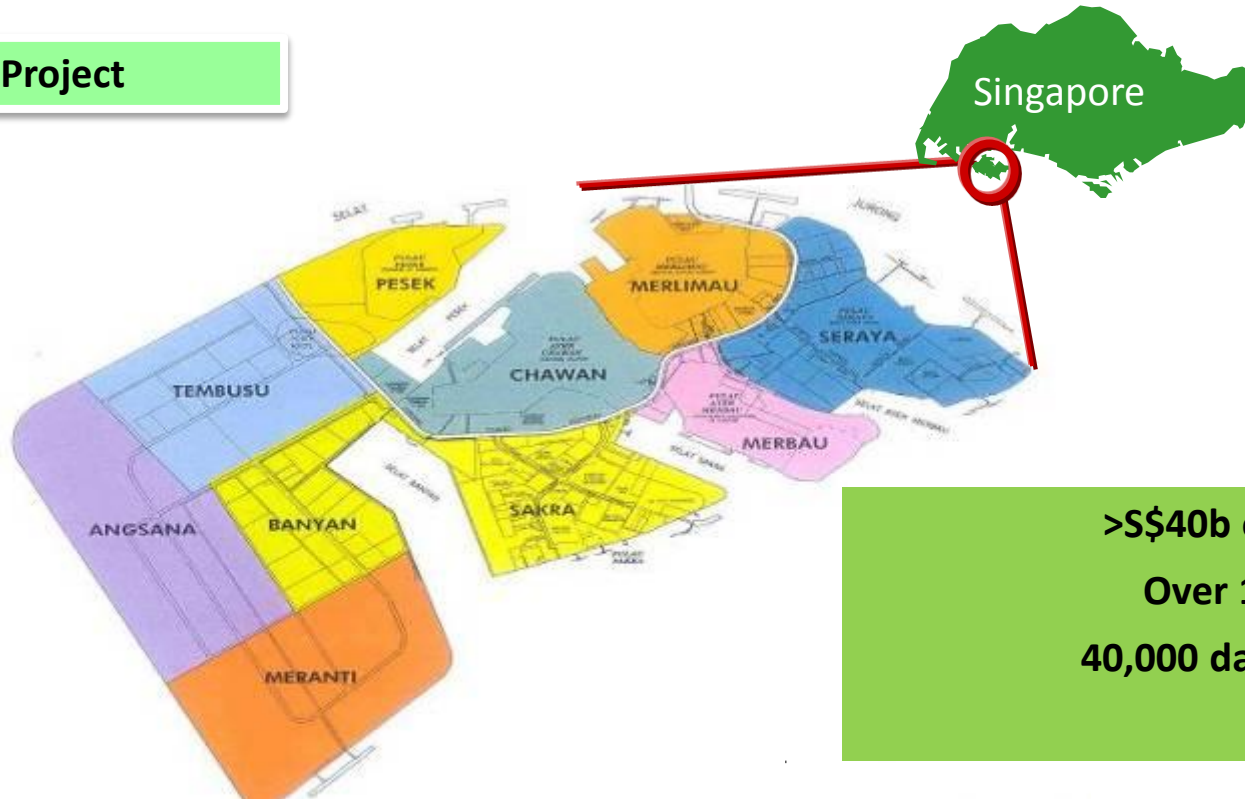




# Industrial Development - Chemicals

## Jurong Island: Heart of Singapore's Chemicals Hub

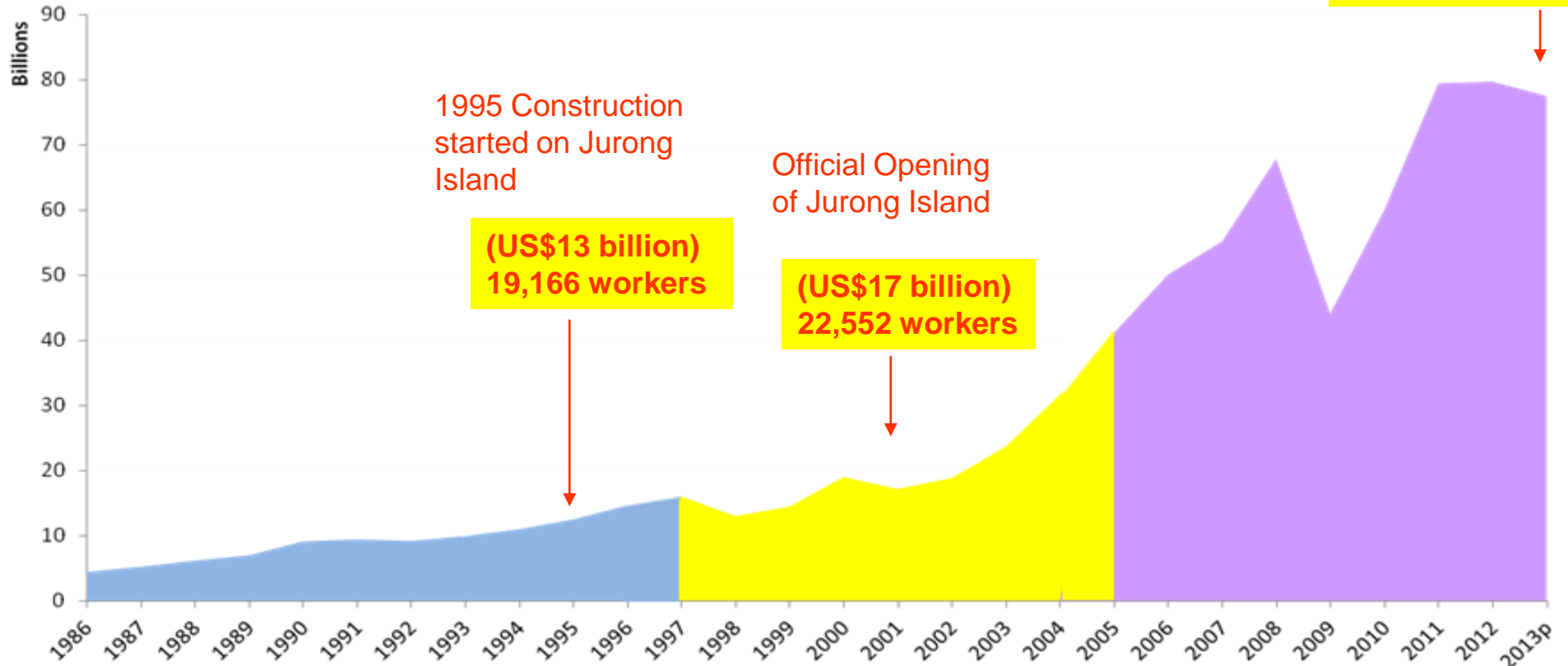
**S\$ 7 billion Reclamation Project**



**>S\$40b of investments**  
**Over 100 companies**  
**40,000 daily commuters**  
**3,000 Ha**

# Industrial Development – Chemicals

Cumulative Output (1986 – 2013) : US\$807.2 billion



Source: EDB



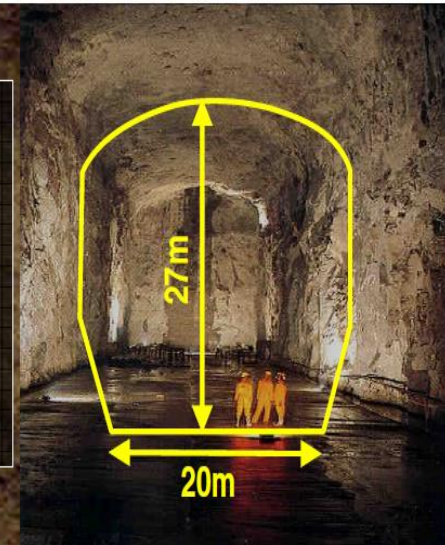
# Jurong Rock Cavern

- \$950 million project
- Save 60 ha of land
- Increased fuel storage security



Cross section of the cavern

- 9 storeys high
- Length = 340 m
- Excavation using Drill and Blast Method with Grouting (if required)
- Volume per storage cavern = 165,000m<sup>3</sup>  
(equivalent to 64 Olympic-sized swimming pools)



Mid 2013

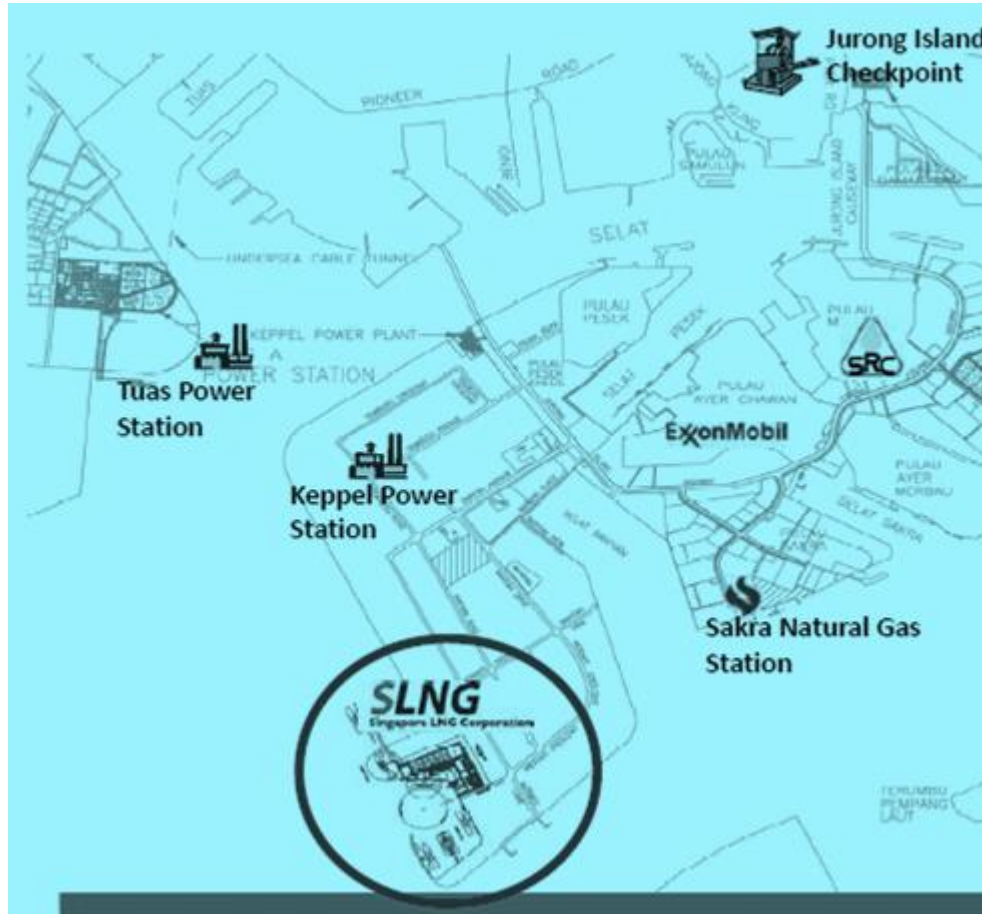
**First 2 caverns ready**

End 2014

**Next 3 caverns ready**



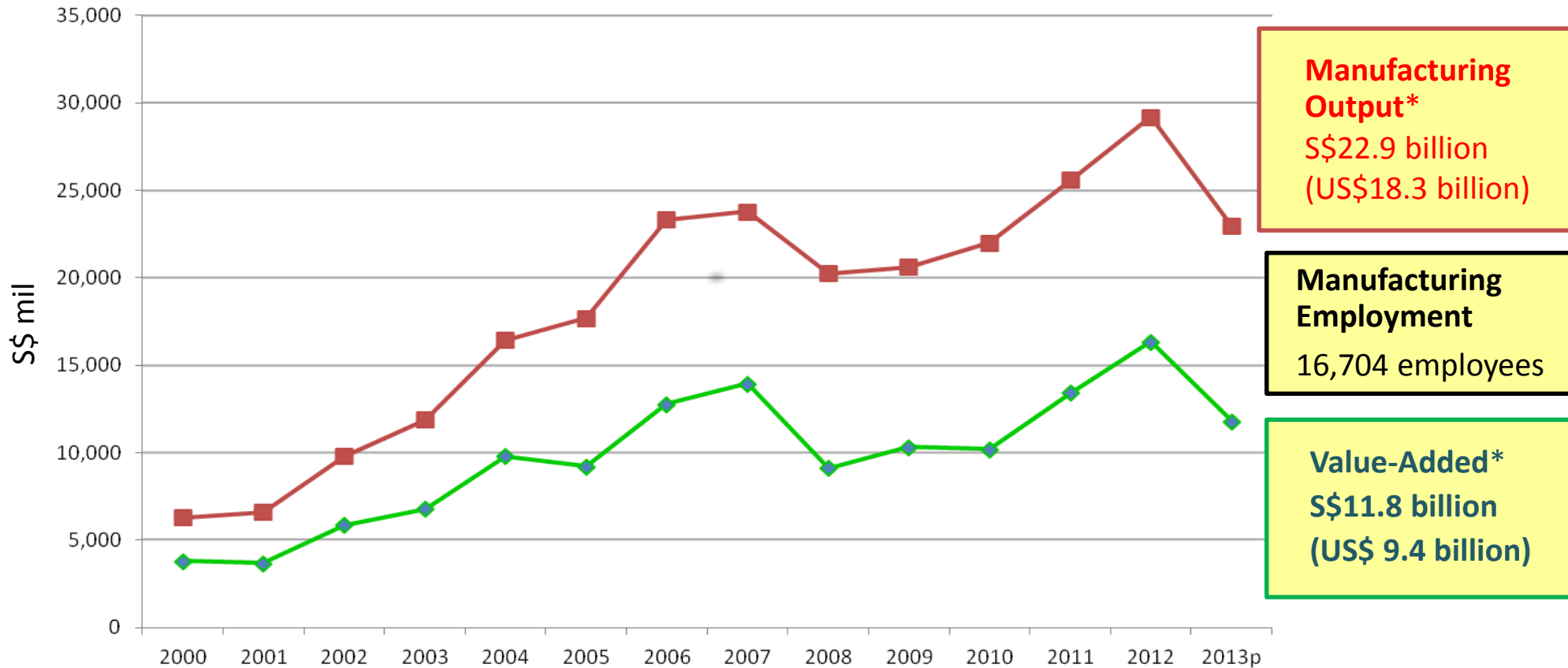
# LNG Terminal



- **Regasification capacity of 3.5 mtpa of LNG**
- **Terminal officially opened in Feb 2014**
- **SLNG Terminal facilities:**
  - **Berthing of LNG vessels**
  - **Unloading and reloading of LNG**
  - **Pumping and vapourisation of LNG**
  - **Metering and send-out of regasified LNG**



# BioMedical Sciences (BMS) in Singapore



**Manufacturing Output\***  
 S\$22.9 billion  
 (US\$18.3 billion)

**Manufacturing Employment**  
 16,704 employees

**Value-Added\***  
 S\$11.8 billion  
 (US\$ 9.4 billion)

**Launch of BMS Initiative**

**Opening of Biopolis**

**GDP Share (2013): 3.81%**  
**Total Employment: >20,000**  
**CAGR (2013): 10%**

*Compounded Annual Growth Rates (CAGR) computed over 5 years*  
*\*Value-Add = Labour Cost + Depreciation + Interest Cost + Profit before Tax + Land Cost*

# Pharma Manufacturing Growth in Singapore

OUTPUT  
(S\$'000)

Biologics, new modalities, process development centres

Nutritionals facilities

Bulk biologics facilities

Bioprocess, process development lab

Multi-purpose API, drug product facilities

**29 Manufacturing facilities**  
**S\$23.9B (US\$) output in 2012**  
**~6,000 employees in 2012**

2001                      2003                      2005                      2007                      2009                      2011                      2012

YEAR



# Pharma HQs in Singapore

## Pharmaceutical companies with Regional HQs in Singapore



## Highlights of Headquarters in Singapore



### GSK's Emerging Markets & Asia-Pacific Hub

Regional headquarters and control tower for all of GSK's operations in Asia-Pacific, Latin America, and African regions



### Quintiles's Asia-Pac Regional Headquarters

Quintiles Singapore functions as Asia-Pac headquarters providing a full range of clinical development and commercialization services



### Novartis's Regional Headquarters for Asia Cluster

Regional headquarters for pharmaceutical operations across Asia cluster

# MedTech Cluster in Singapore

**30** Manufacturing Plants  
**9,900 employees**

**26** R&D Centers  
**500 Researchers & Engineers**

**29** Regional HQs  
**1,500 employees**





# Recent MedTech Investments

## Manufacturing

### Medtronic Pacemaker Manufacturing Facility



Medtronic opens manufacturing facility for cardiac rhythm disease management (CRDM), which will produce pacemakers and leads.

### Agilent Instrument Manufacturing



Agilent Technologies opens its new life sciences manufacturing facility to produce Liquid Chromatography/Mass Spectrometry instruments for global markets.

## R&D and Innovation

### Menicon R&D Centre and Manufacturing Facility



Menicon established its first R&D and manufacturing facility for its new line of daily disposable "Flat Pack" contact lenses in Singapore.

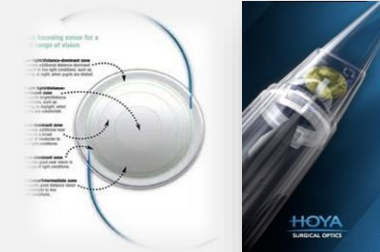
### Life Technologies Global Instrument Centre of Excellence



Life Technologies established its Global Instrument Centre of Excellence in Singapore.

## Headquarters

### Hoya Surgical Optics Global Headquarters



Hoya Surgical Optics relocates its global headquarters from California, US to Singapore.

### Siemens Medical Instruments Global Headquarters



Siemens Healthcare relocates its Audiology Group global headquarters in Singapore under Siemens Medical Instruments

# MedTech Company Headquarters (HQs)

The **Top 10 Medical Device Companies** have Regional HQs in Singapore



## Highlights of Headquarters in Singapore



### Becton Dickinson's Shared Services Centre

Shared services hub supports all BD's operations in Asia-Pacific region.



### Siemens Medical Instruments Global Headquarters

Global HQ for hearing aids business. Singapore R&D and Manufacturing facility supplies 30% of the world's hearing aids

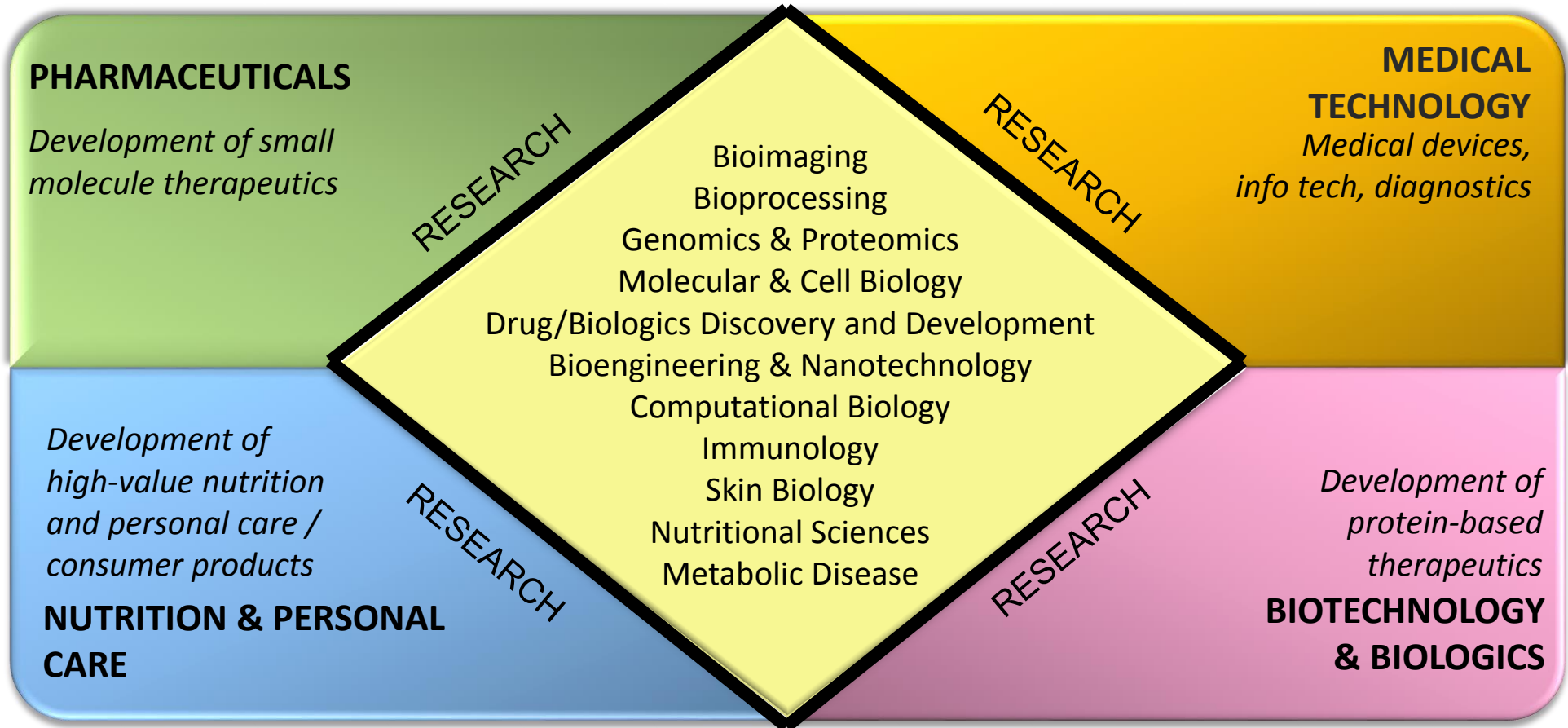


### Essilor's Asia-Pacific Headquarters and R&D Hub

Asia-Pacific R&D centre and coordination hub developing lenses for Asian consumers.

# BioMedical Sciences (BMS) Initiative

INDUSTRY



# BMS Phase 1: Developing Basic Research Capabilities

## World Class Expertise

Core technologies and expertise in areas including genomics analysis, animal disease models, stem cells, drug screening, construction and mass production of monoclonal antibodies, bioimaging

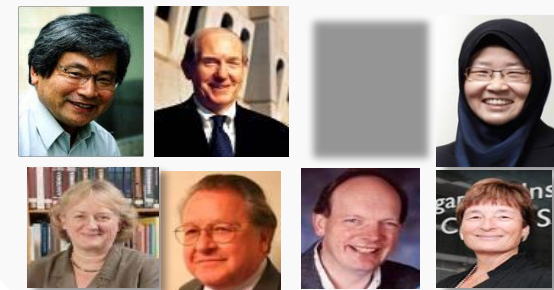
## World Class Infrastructure

Biopolis: 4M sq ft integrated research campus



## World Class Talent

Pioneers and thought leaders from around the globe



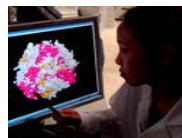
Institute of Molecular & Cell Biology



Bioprocessing Technology Institute



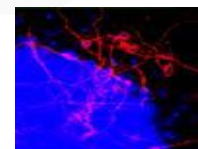
Genome Institute of Singapore



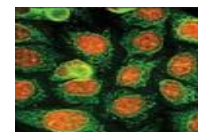
Bioinformatics Institute



Institute of Bioengineering & Nanotechnology



Singapore Stem Cell Consortium



Singapore Bioimaging Consortium



Experimental Therapeutics Centre



Singapore Institute for Clinical Sciences



Institute of Medical Biology

Pre-2000

2000

2001

2002

2003

2004

2005

2006

2007 onwards



# BMS Phase 2: Translational & Clinical Research (TCR) Efforts

Basic Research

Translational and Clinical Research (TCR)

Phase I, II & III Clinical Trials

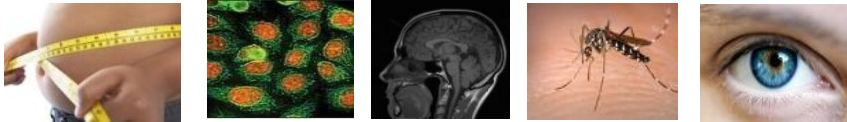
Medical Applications

## Initiatives to promote TCR

### 1 (TCR) Flagship Programme

- 5 strategic disease-orientated areas
- Each awarded S\$25mil over 5 years

Cancer      Metabolic Disease      Eye Disease  
Neuroscience      Infectious Diseases



### 2 Bedside & Bench Grant Call

- Foster collaboration between basic scientists and clinical investigators
  - Funded for up to 3 years

## Supporting Infrastructure

- Investigational Medicine Units
- Singapore Clinical Research Institute
- Clinical Imaging Research Centre



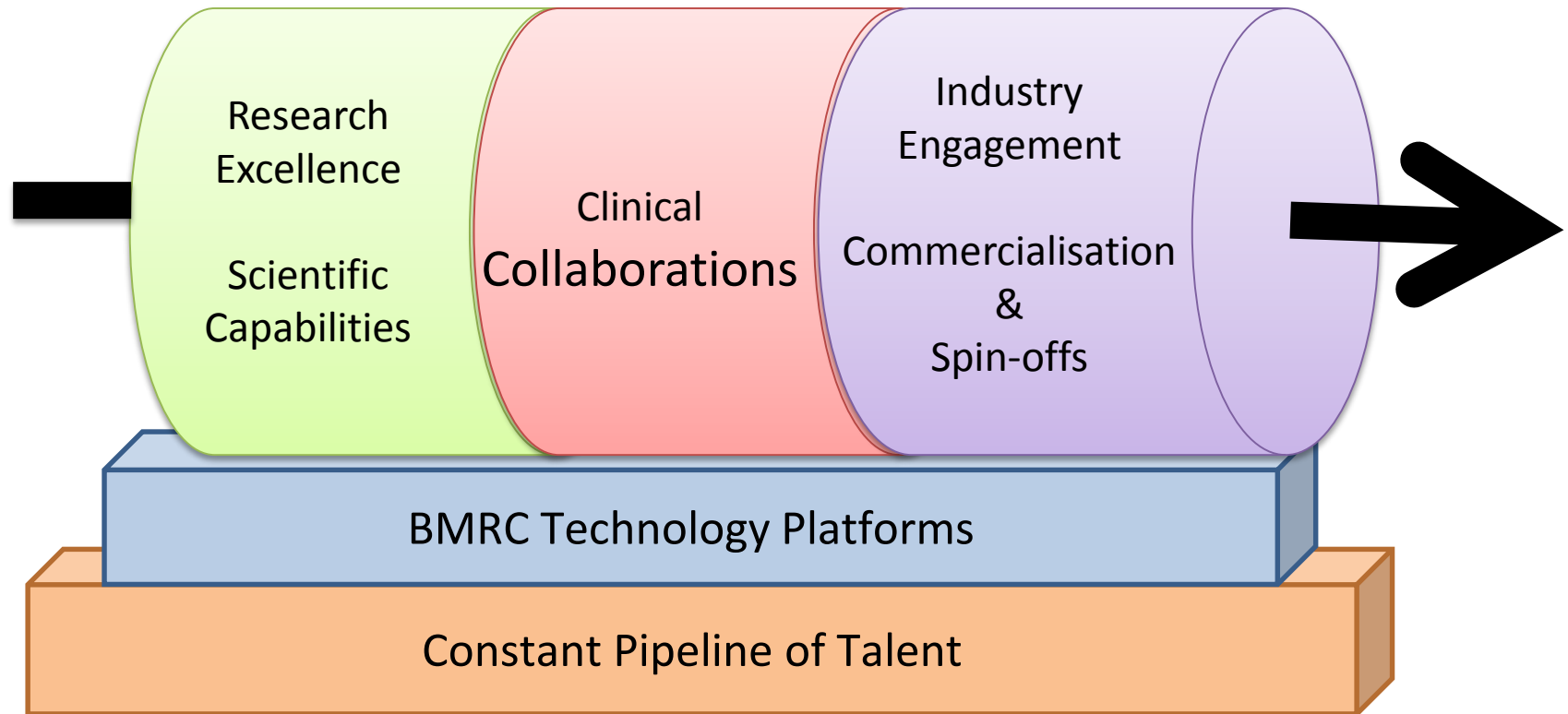
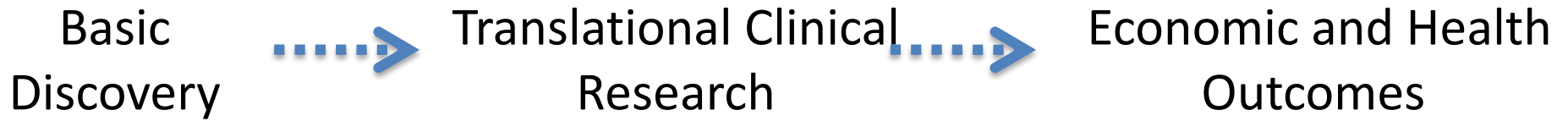
## Talent Attraction / Development

### Developing a pipeline of Clinician Scientists

- S'pore Translational Research Investigator Award (STaR)
- Clinician Scientist Award (CSA)



# BMS Phase 3: Integrating for Impact



# Entrepreneurship

## Support



### YES! Schools

Provides schools with grants to put in place a entrepreneurship learning programme for their students.

### Incubator Development Programme (IDP)

Grant support for incubators & venture accelerators that assist innovative startups.



## Grant

### Action Community for Entrepreneurship (ACE) Start-ups

Provides grant support to entrepreneurial Singaporeans to set up their business on a \$7 : \$3 matching basis



### Technology Enterprise Commercialisation Scheme (TECS)

Support early-stage Proof-of-Concept (POC) and Proof-of-Value (POV) projects

## Equity



Equity-based co-financing for Singapore-based start-ups with innovative products and /or processes.

### Sector Specific Accelerator (SSA) Programme

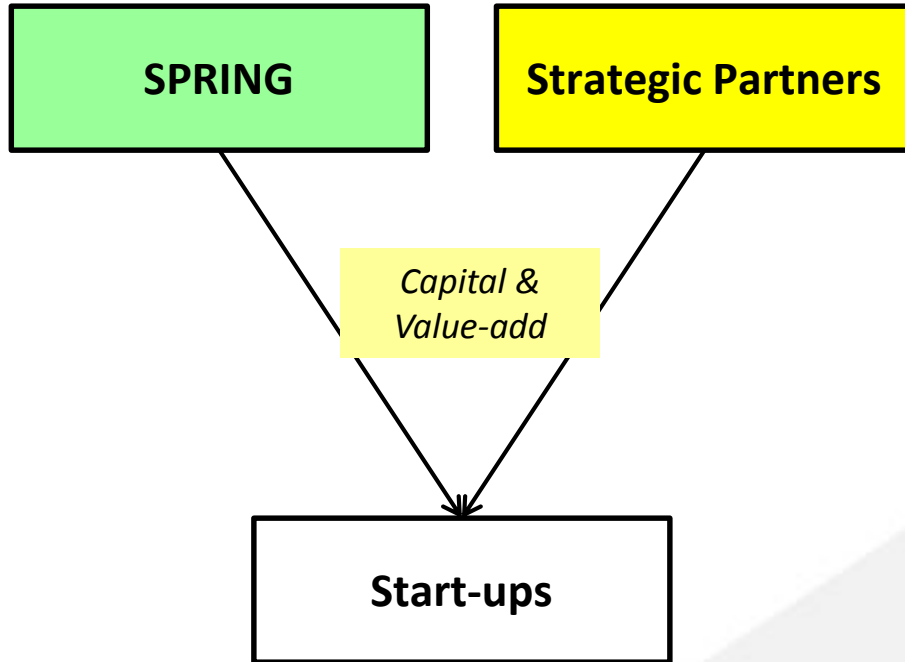
Equity-based co-financing with accelerator partners for Singapore-based high-tech startups in nascent sectors such as medical technology.

\*at least 30% equity owned by Singapore citizens / permanent residents

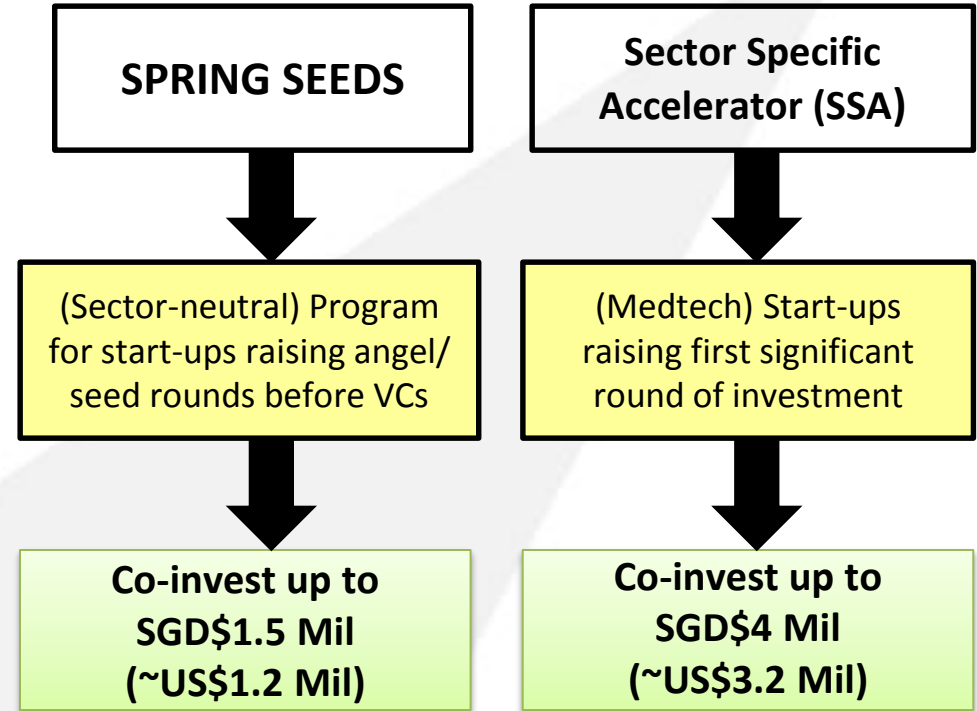
YES : Young Entrepreneurs Scheme

# Financing & Support for Start-ups

## Co-Investment Approach



## Programs



*Our partners include...*



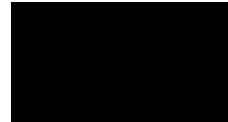


# MedTech Start-ups Support

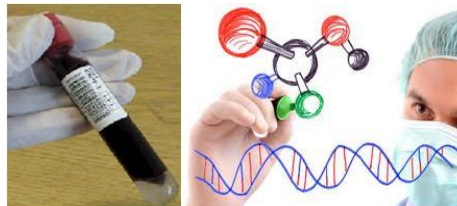
- Supported through Commercialisation Grants (Proof-of-Concept / Proof-of-Value) and /or Equity Co-investments (SEEDS/SSA)
- > 40 local Med Tech Start-ups currently being helped




- Spin-off from National University of Singapore (NUS); advisors include founder of Biosensors Int'l.
- Developed non-invasive “liquid biopsy” platform using a microfiltration biochip to isolate rare CTCs from whole patient blood.
- Raised institutional round in 2013 from Temasek-linked fund
- Partnered National Cancer Centre Singapore (NCCS) and Singapore General Hospital (SGH) to set-up region’s first Circulating Tumour Cell Centre of Research Excellence



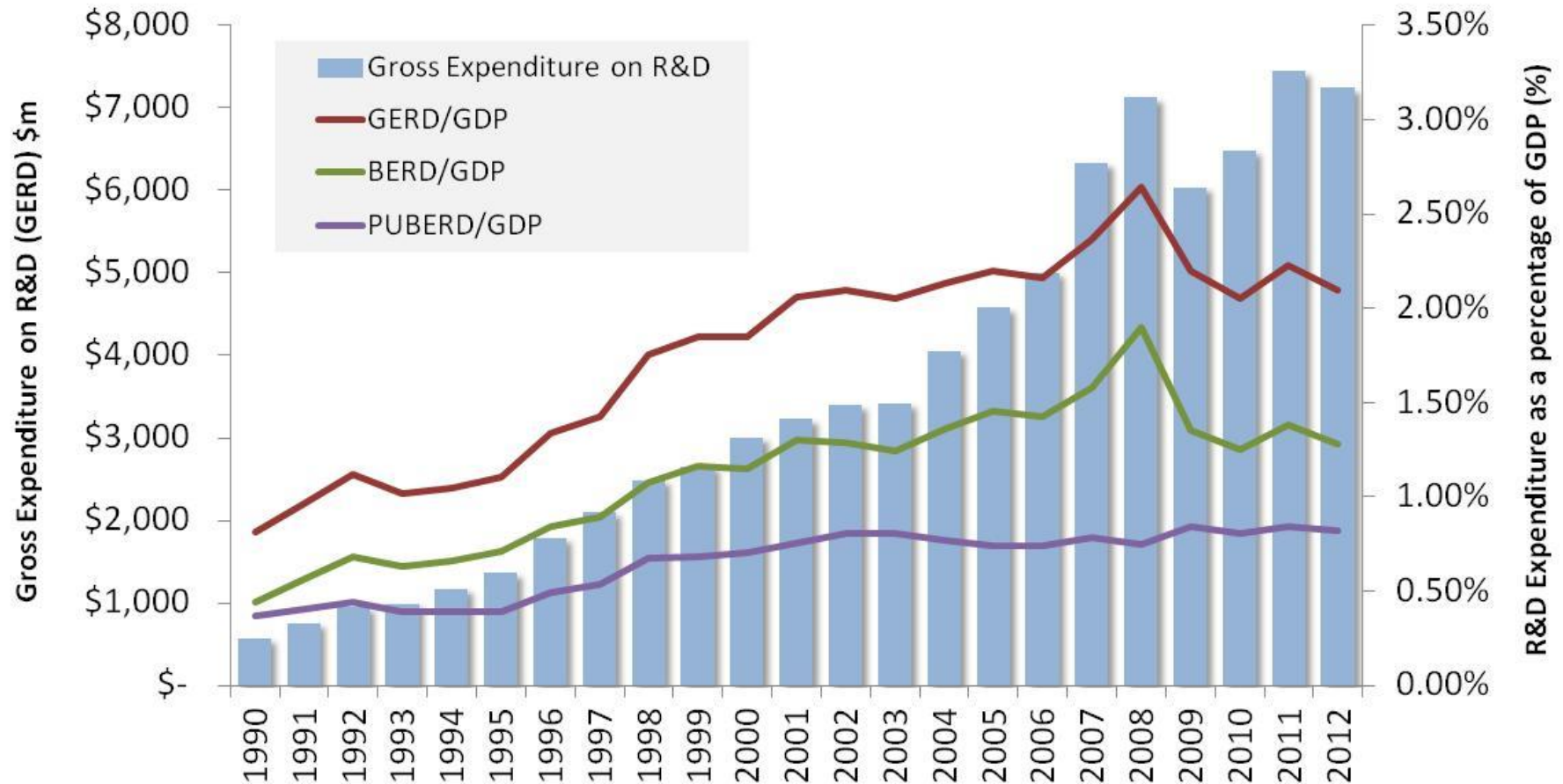
- Spin-off from research programmes between NUS and UK/Australian universities.
- Developing a rapid point-of-care diagnostic tool that accurately discriminates between benign and malignant ovarian cysts; also offers proprietary tests for prenatal screening & diagnosis.
- Received partnership interests from various world renowned institutes, as well as investment from prominent local investors.



- Spin-off from Nanyang Technological University
  - Developed an innovative surgical implant for use in hernia repair.
  - Received clearance to market its Class IIB hernia mesh product from FDA in Jan 2013; public launch unveiled at MEDICA 2013.
- 
- Biomedical instrumentation company commercialising an unique digital PCR system.
  - Applicable for detections of rare mutations and copy number variations, in areas such as drug discovery and clinical diagnostics.
  - Currently mentored and supported via at a local high-tech incubator.

# Commitment to All R&D

GERD – Gross Expenditure on R&D, BERD – Business Expenditure on R&D, PUBERD – Public Expenditure on R&D



5-year  
S&T Plans

National  
Technology  
Plan  
(1991-1995)  
US\$1.5 bn

National  
Science &  
Technology Plan  
(1996-2000)  
US\$3 bn

Science &  
Technology  
Plan 2005  
(2001-2005)  
US\$4.8 bn

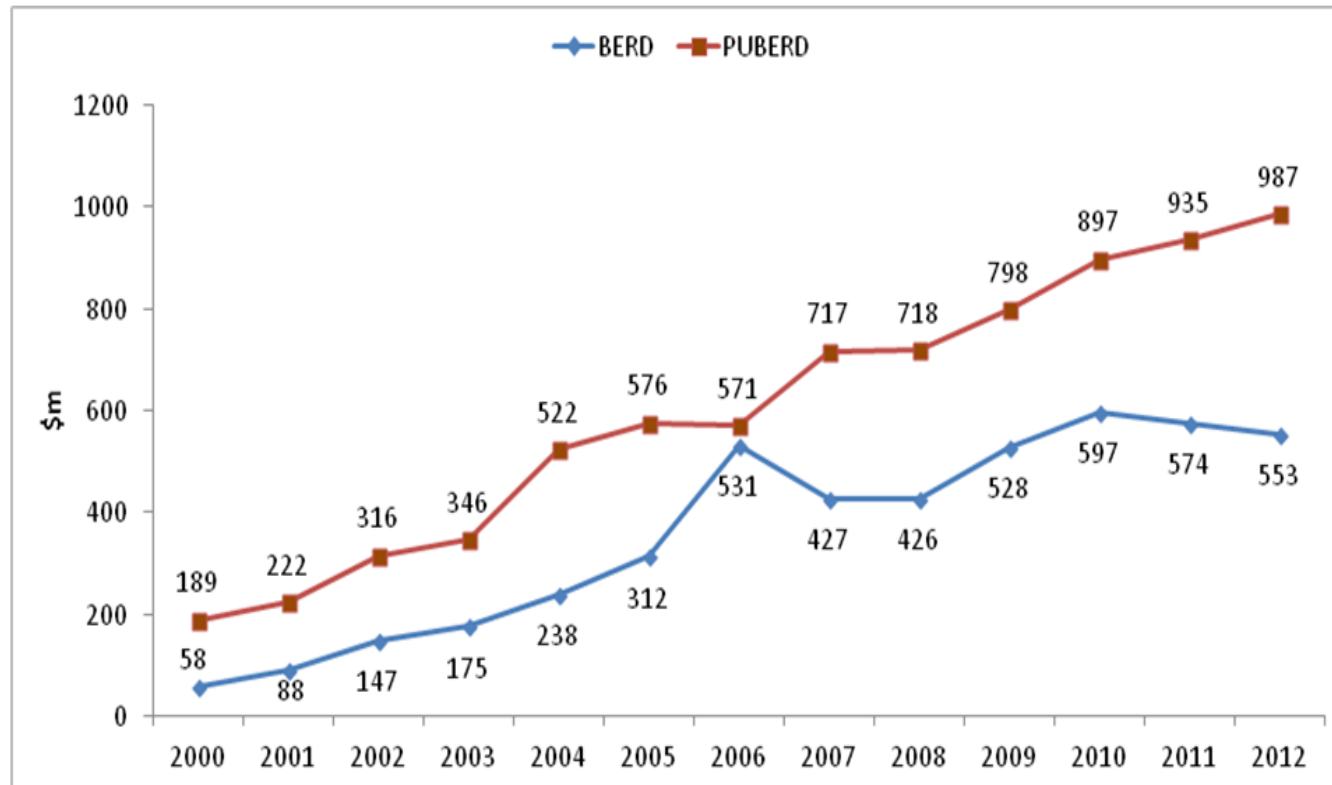
Science &  
Technology  
Plan 2010  
(2006-2010)  
US\$10.7 bn

Research,  
Innovation &  
Enterprise Plan  
(2011-2015)  
US\$12.3 bn

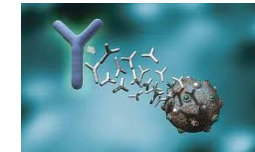
# Gross Expenditure on BMS R&D

Moving up the value chain from manufacturing to innovation

**BERD for BMS (2012): \$553 mil**  
**BERD CAGR (2000-2012): 20.7%**



Source: National R&D survey 2012, Singapore



**Chugai Pharmbody Research**  
 Established in July 2012  
**S\$200M (US\$160.3M), 60 jobs**



**P&G Innovation Centre**  
 TOP in Nov 2013  
**S\$250M (US\$200.4M), 500 jobs**



**First Asian research center outside Japan**  
**S\$9.1M (US\$7.3M) over 5 years**

# Knowledge Capital

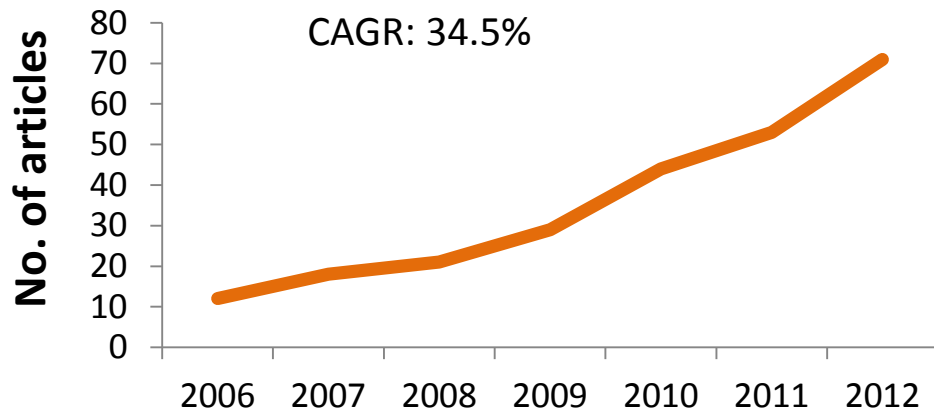


## Country Rankings 2012

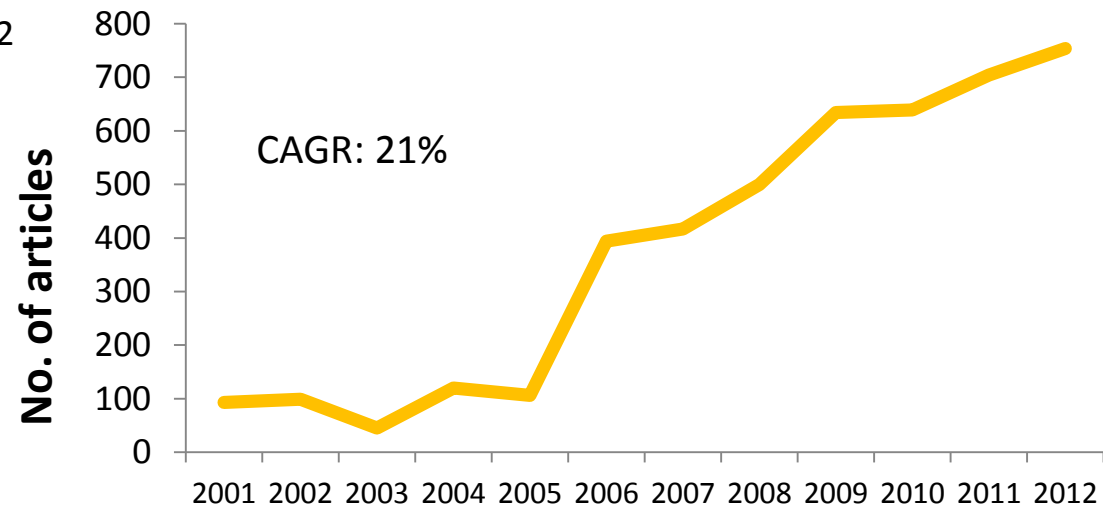
Overall: 5<sup>th</sup>

Most productive among top 5 countries

### NATURE PUBLICATIONS SINGAPORE

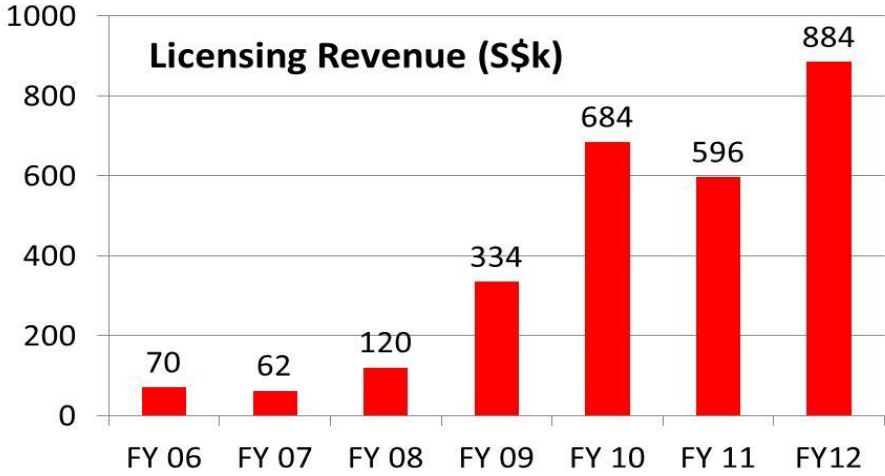
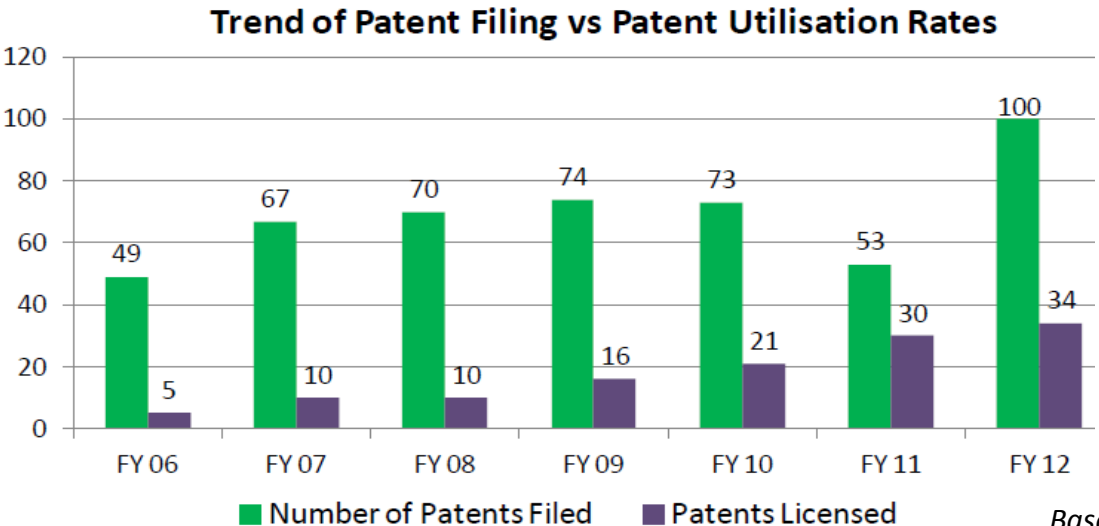
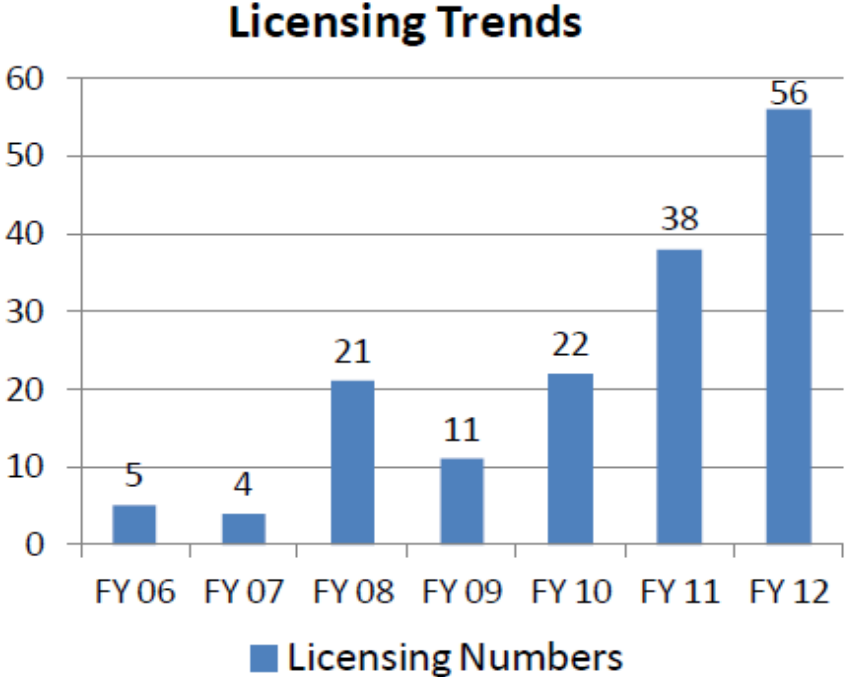
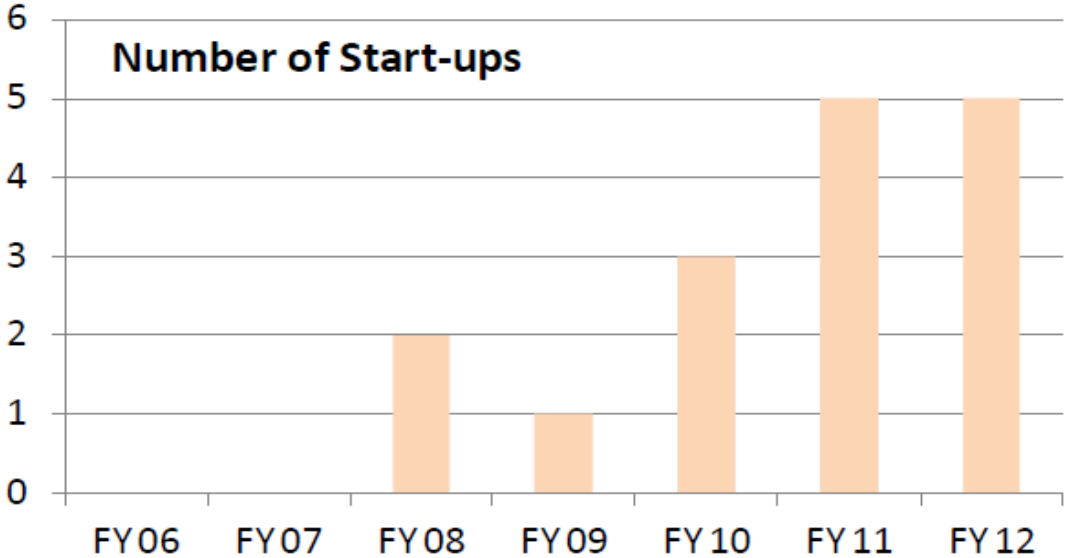


### A\*STAR Biomedical Publications



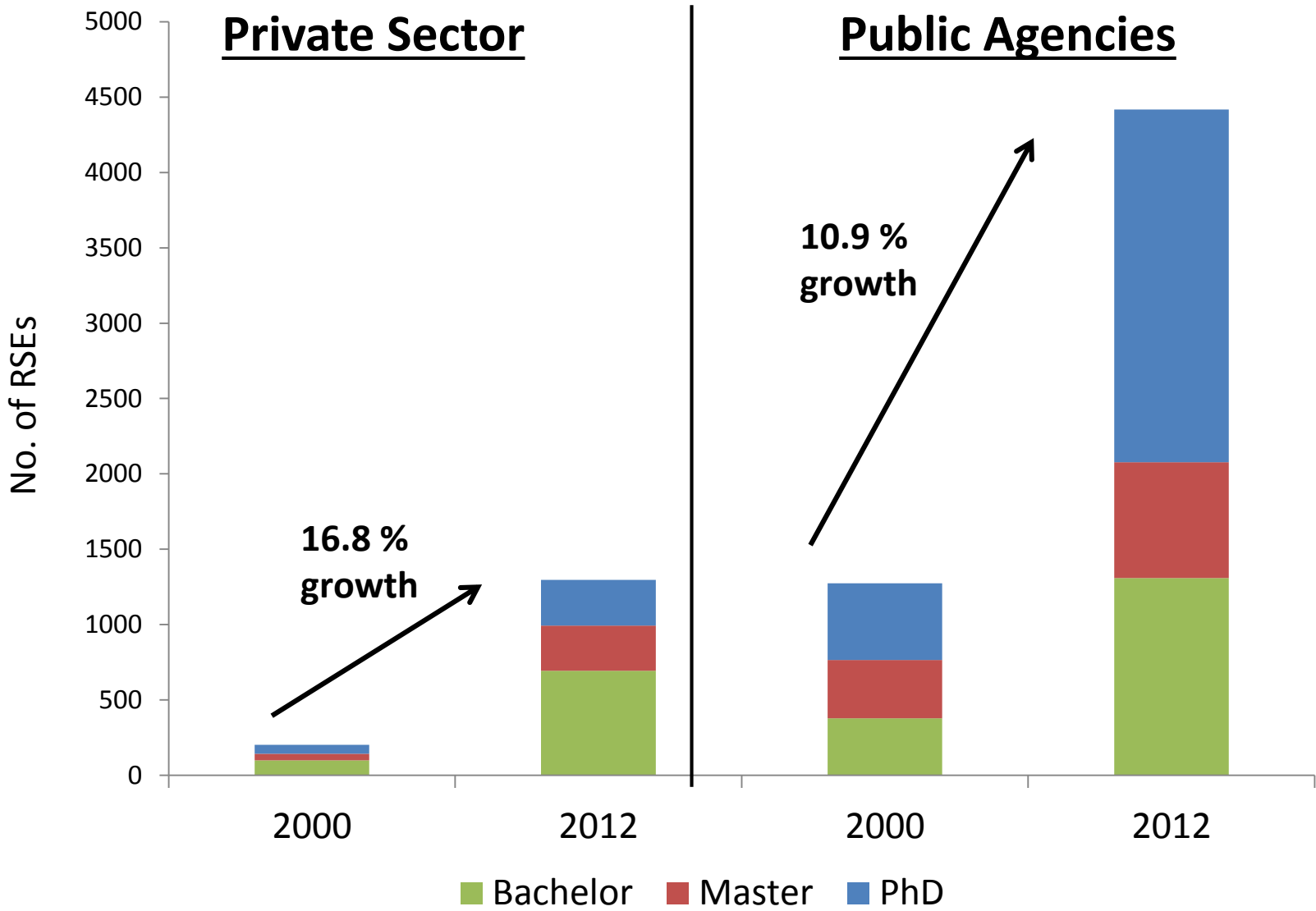


# Innovation Capital



Based on A\*STAR & extramural projects managed by A\*STAR ETPL

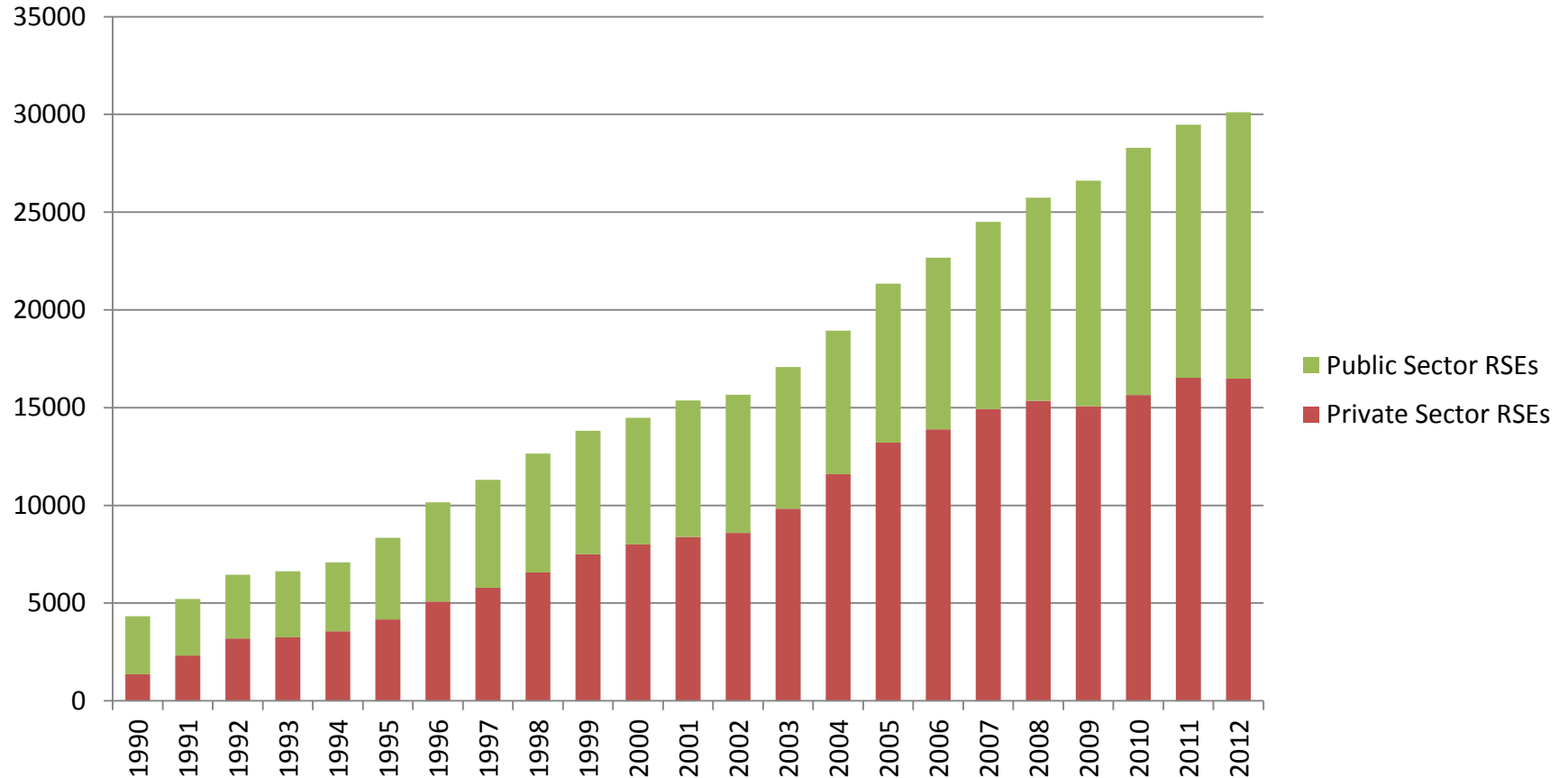
# Human Capital



Source: National R&D survey 2012

# Building Up R&D Human Capital

**Research Scientists & Engineers (RSEs) grew from 4,300 to 30,100 (between 1990-2012)**  
**RSEs in the private sector grew more than tenfold from 1,360 to 16,500**



Manpower Growth	Public	Private	Total
CAGR 1990-2012(PhD)	9.6%	15.8%	<b>10.3%</b>
CAGR 1990-2012 (Overall)	7.2%	12.0%	<b>9.2%</b>

**55%** of total RSEs work in the private sector

# Building up Human Capital: Catch a few **Whales** Senior Scientific Leaders to help develop local talent



**Dr Philippe Kourilsky**  
Chairman, SigN



**Dr Alan Colman**  
Exec Dir, SSCC



**Dr Sydney Brenner**  
Scientific Adviser, A\*STAR



**Dr David Srolovitz**  
Exec Dir, IHPC



**Prof Charles Zukoski**  
Chmn, SERC



**Sir George Radda** Chmn, BMRC



**Dr Edward Holmes**  
Exe Dy Chmn (TCSG),  
BMRC &  
Chmn, NMRC



**Dr Judith Swain**  
Exec Dir, SICS



**Prof Paola Castagnoli**  
Scientific Dir,  
SigN



**Dr Dale Purves**  
Exec Dir, NRP



**Prof Dim-Lee Kwong**  
Exec Dir, IME



**Dr Keith Carpenter**  
Exec Dir, ICES



**Dr Pantelis Alexopoulos**  
Exec Dir, DSI



**Dr Phil Ingham**  
Dy Dir, IMCB



**Sir David Lane**  
Chief Scientist



**Dr Birgitte Lane**  
Exec Dir, IMB



**Dr Frank Eisenhaber**  
Director, BII



**Dr Alex Matter**  
Director, ETC



**Dr Edison Liu**  
Exec Dir, GIS



**Dr Jackie Ying**  
Exec Dir, IBN



**Prof Stephen Quake**  
Consultant



**Dr Jean Paul Thiery**  
Dy Dir, IMCB



**Prof Peter Gluckman**  
PI, SICS



**Dr Davor Solter**  
PI, IMB



**Prof David Townsend**  
Head of PET and SPECT Group, SIA  
Acting Exec Dir, IMCB



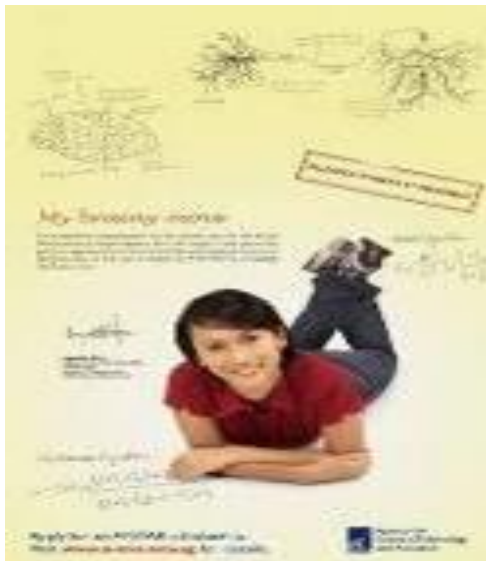
**Dr Stephen Cohen**



# Local Human Capital – Grow PhD Guppies



Guppy – 0.03 meters

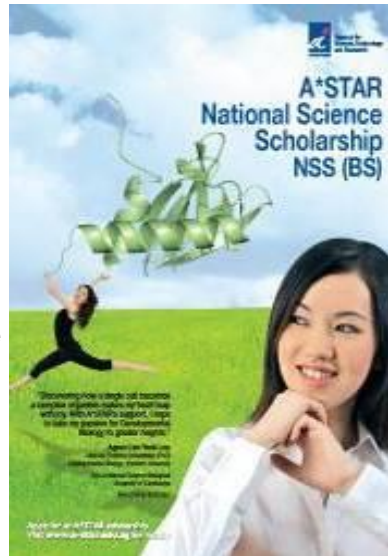


# 1,200 new Singaporean PhDs@ One-North



**Cambridge  
Chemistry  
PhD**

**Imperial College  
Chemistry  
BSc**



**Stanford  
Developmental  
Biology  
PhD**

**Cambridge  
Natural Science  
Biology  
BSc**



**Cambridge  
Medicine/PhD**

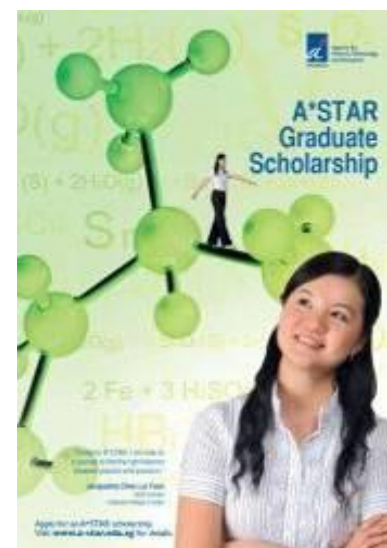


**NUS  
Biomedical  
Sciences  
PhD**

**NTU  
Biological  
Sciences  
BSc**



**Stanford  
Genetics  
PhD**



**Imperial College  
London  
Cancer Biology**

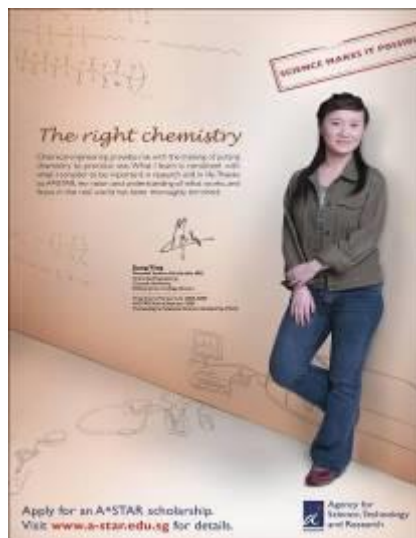


**Harvard  
Stem cells  
Post-Doc**

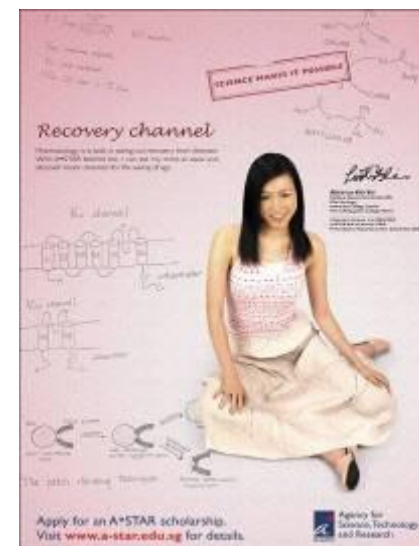
# Human Capital: International Guppies



MIT  
Materials Science  
& Engineering  
(Malaysia)



Stanford  
Chemical Engineering  
(Shanghai)



MIT  
Bio Engineering  
(Hong Kong)



Stanford  
Electrical Engineering  
(India)



MIT  
Chemical Engineering  
(Vietnam)



# Long Term Human Capital Pipeline

**Evelyn Thangaraj**  
 2005 A\*STAR YRAP Scholar  
 from India  
 (currently A\*STAR Scholar,  
 Medicine,  
 Imperial College, London)



**Le Ngoc Phuong Lan**  
 2005 A\*STAR YRAP Scholar  
 from Vietnam  
 (currently A\*STAR Scholar,  
 Pharmacy, University of  
 London)



Guppies

Senior Guppies

Young Whales



10-14 yrs

15-18 yrs

19-23 yrs

24-30 yrs

< 35 yrs



- YRAP - Young Researchers Attachment Programme
- A\*STAR - Agency for Science & Technology Research
- NSS - National Science Scholarship
- PGS - Pre-Graduate Scholarship

- AGS - A\*STAR Graduate Scholarship
- SINGA - Singapore International Graduate Award
- AIF - A\*STAR International Fellowship

# Nurturing a Talent Pipeline of 1,200 Singaporean PhDs

Awarded **more than 1,200 PhD Scholarships**  
to develop Singaporean R&D talent since 2001  
**More than 350 scholars** have completed their PhDs and are contributing to Singapore's  
Research, Innovation and Enterprise (RIE) environment

Dr Karen Crasta  
Lee Kong Chian School of Medicine,  
Nanyang Technological University (NTU)  
A\*STAR International Fellow  
NRF Fellow 2013



Dr Cheek Chit Fang  
Principal Investigator, IFOM-p53 Lab  
National Science Scholar (PhD)



Dr Melissa Fullwood  
Yale-NUS College  
Principal Investigator, Cancer Science  
Institute  
National Science Scholar (BS-PhD)  
NRF Fellow 2013

Dr Jonathan Loh Yui Han  
Principal Investigator, Institute of  
Molecular & Cell Biology (IMCB)  
A\*STAR Graduate Scholar



Dr Seah Kwang Hwee  
Associate Patent Examiner, Intellectual  
Property Office of Singapore (IPOS)  
A\*STAR Graduate Scholar



# Scientific Career Development

## Scholars Contributing to Public R&D

### Young Scientific Leaders Heading Research Labs



**Cheok Chit Fang**  
NSS (PhD) 2001

**Snr Research Fellow,**  
IFOM-p53lab

- Heading IFOM-p53 lab jointly funded by A\*STAR and IFOM, Italy



**Andrew Wan**  
NSS (PhD) 2001

**Team Leader &**  
**Principal Research Scientist,**  
IBN



**Ho Swan Ying**  
NSS (PhD) 2002

**Research Scientist, BTI**

- Set up & leads  
Metabolomics Group in BTI



**Jonathan Loh**  
AGS (NUS) 2003

**Principal**  
**Investigator, IMCB**

- 2010 A\*STAR Investigatorship
- 2010 S'pore Youth Award for S&T
- 2009 Young Scientist Award
- 2012 TR35 @ Singapore



**Joel Yang**  
NSS (PhD) 2004

**Scientist, IMRE**

- 2009 A\*STAR Investigatorship
- 2012 TR35 @ Singapore
- 2010 R&D 100 Awards
- 2012 Young Scientist Award (PSTA)

### Exploring Academic Positions in Local Universities



**Ho Han Kiat**  
NSS (PhD) 2000

**Assistant Professor,**  
**Dept of Pharmacy,**  
**Faculty of Science, NUS**



**Melissa Fullwood**  
NSS (BS) 2002  
NSS (PhD) 2006

**Assistant Professor, Yale-NUS College**

- 2009 L'Oreal Singapore for Women in Science National Fellowships
- 2010 Lee Kuan Yew Postdoctoral Fellowship, Duke-NUS GMS
- 2010 GE & Science Regional Prize for Young Life Scientists
- 2013 NRF Fellowship



**Quek Su Ying**  
NSS (PhD) 2002

**Scientist, IHPC**  
**Adjunct Asst Prof, Div of Physics**  
**& Applied Physics, NTU**

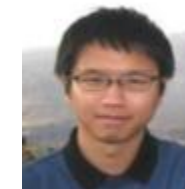
- 2013 NRF Fellowship



**Juliana Chan**  
NSS (BS) 2002  
NSS (PhD) 2006

**Adjunct Asst Prof, Div of Bioeng, Sch of**  
**Chem. & Biomolec. Eng., NTU**

- 2010 S'pore Women's Weekly Great Women of Our Time Award (S&T)
- 2011 L'Oréal For Women in Science National Fellowships



**Vincent Tan**  
NSS (PhD) 2006

**Scientist, I2R**  
**Adjunct Asst Prof, Dept**  
**of Electrical & Computer**  
**Eng., NUS**

# Scientific Career Development

## Scholars Contributing to Industry

### Young Entrepreneurs



**Gideon Ho**  
IF 2003

Chief Commercial  
Officer, HistoIndex

- Co-founded HistoIndex, spun off from A\*STAR – which provides stain-free, 3D, quantitative imaging solutions to visualise & stage fibrosis



**Lee Yong Yeow**  
AGS (L) 2006

Postdoctoral  
Fellow, IBN

- Team developed DropArray ,
- a unique miniaturisation platform - led to spin-off Curiox Biosystems in 2008
- Winner (Open Category), 8th Start-Up @ S'pore Business Plan Competition '07

### Building up SME Capabilities via T-Up



**Chow Keat Theng**  
AGS (NUS) 2001

T-Up: SPN Intern'l Pte Ltd

- Completed secondment to SPN International, scaled up coating production



**Ryan Chaw**  
AGS (NUS) 2003

T-Up: HVS Eng Pte Ltd

- Completed secondment to HVS Eng., maintenance solutions for fluid-cooled tube & shell heat exchanger systems
- Currently at IPI



**Eu Zhi Ang**  
AGS (NUS) 2006

T-Up: Hoiiio

- Prog. Mgr (Telecomms) & Scientist, Hoiiio
- Working on Voice Over IP technologies

### Scientists Contributing Expertise to Industry



**Tanu Kustandi**  
AGS (L) 2003

- Joined Procter & Gamble after working in IMRE
- Being trained in Japan



**Natalia Tansil**  
AGS (L) 2004



**Yar Kar Peo**  
NSS (PhD)  
2001

Principal  
Engineer, ST  
Electronics

- Worked in I2R
- Heads digital comms section in ST Electronics
- Current work: digital comm. aspect of Satellite systems



**Lim Yiping**  
AGS (O)  
2006

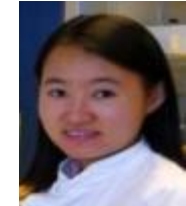
Process  
Dev't  
Engineer,  
Lonza

- Contributed to process development at Lonza Biologics



**Harmeet Singh**  
AGS (NUS)  
Research Scientist,  
L'Oreal Research &  
Innovation

- Worked in IMB
- Now involved in validation of technologies / techniques for skin & cosmetic applications



**Low Yen Ling**  
NSS (PhD)  
2002

Abbott  
Nutrition

- Opportunity to work with industry while in SICS
- Seconded, transferred to Abbott,
- Health products & diet



# Biomedical Research Infrastructure



Centros



Matrix



Genome



Helios



Chromos



Proteos

Research Community



# BIOPOLIS



Nanos



Neuros & Immunos



Biopolis - The Biomedical Hub of Asia



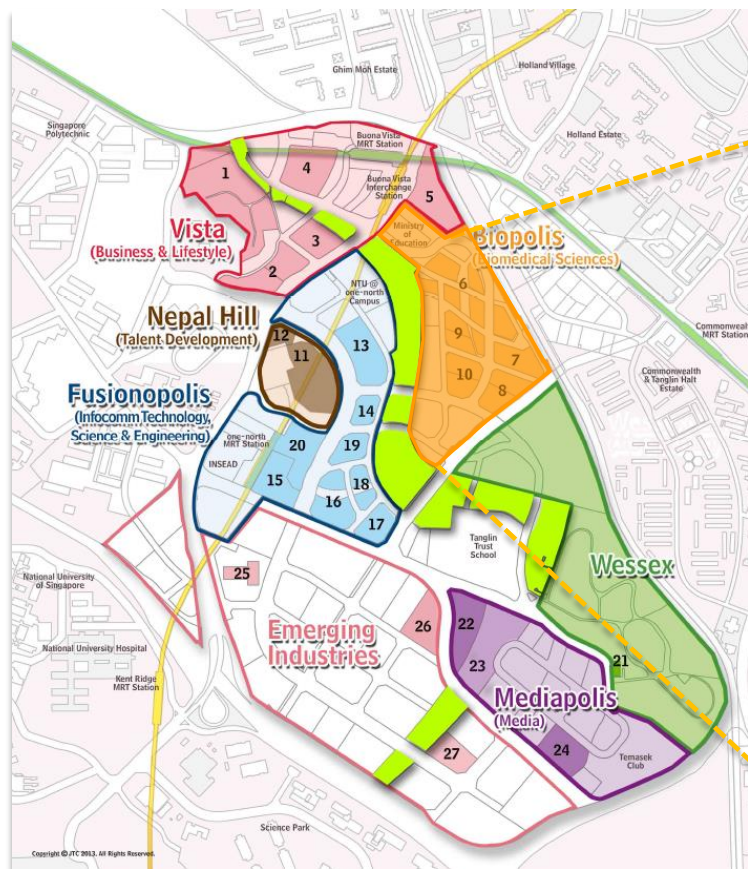
# Breaking Ground in Dec 2001: Biopolis Phase 1





# one-north: Biopolis

Home for Biomedical Sciences Research



**Biopolis Phase 1: Cluster of 7 Linked Buildings Completed in 2004**



**Biopolis Phase 4 (P&G) Completed in 2013**



**Biopolis Phase 2 Completed in 2006**



**Biopolis Phase 5 To Complete in 2014**



**Biopolis Phase 3 Completed in 2011**

**Land Area: 7.5 ha  
GFA: 350,000 sqm**





# Biopolis – Phase 1

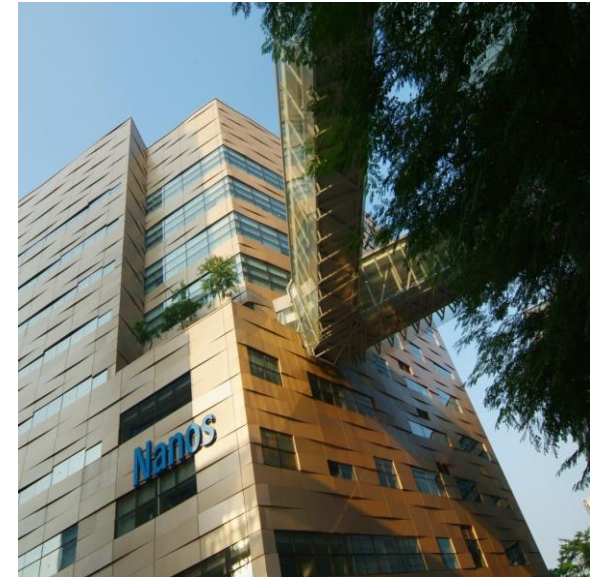
**Helios**



**Matrix**



**Nanos**



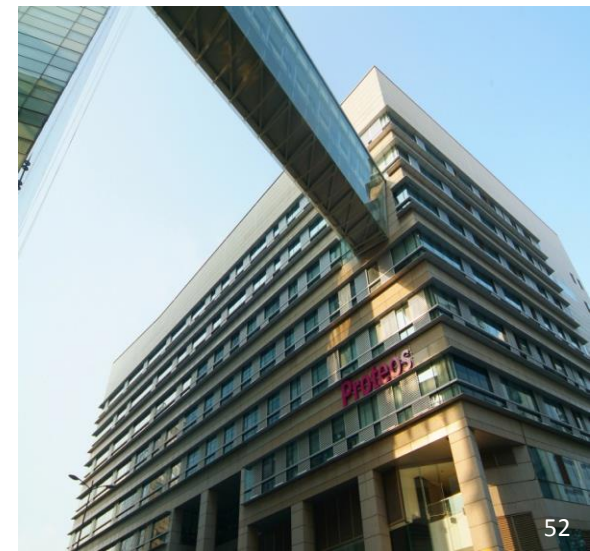
**Centros**



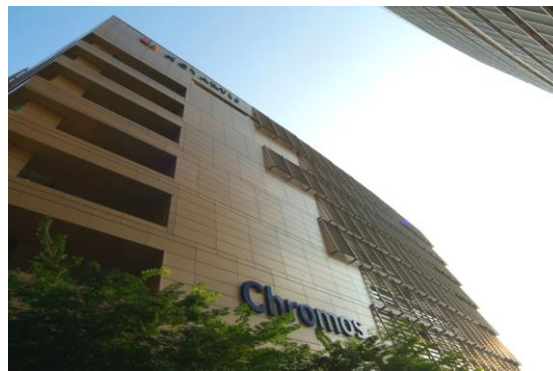
**Genome**



**Proteos**



**Chromos**





# one-north: Fusionopolis

Home for Science, Engineering, Infocomm & Media



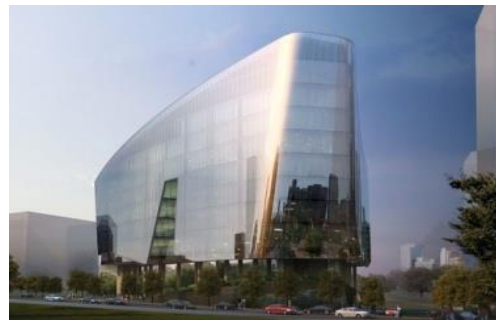
**Fusionopolis Phase 1**  
Completed in 2008



**Fusionopolis Phase 3**  
Completed in 2013



**Fusionopolis Phase 2A**  
To Complete in 2015



**Fusionopolis Phase 4 (LucasFilm)**  
Completed in 2013

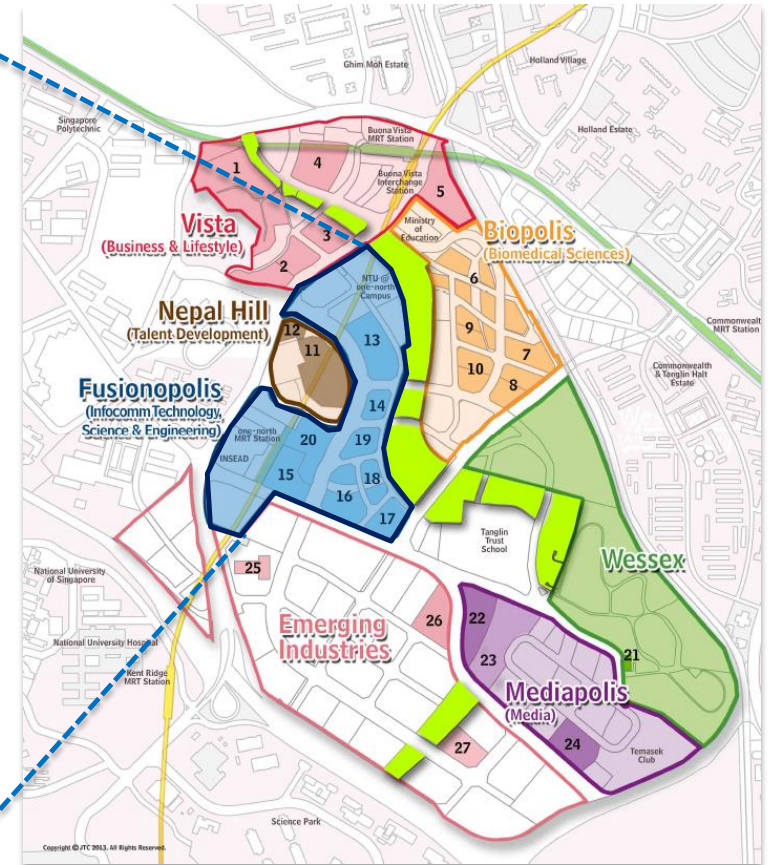


**Fusionopolis Phase 2B**  
Completed in 2010



**Fusionopolis Phase 5**  
To Complete in 2014

**Land Area: 6.5 ha**  
**GFA: 400,000 sqm**





# Fusionopolis Phase 1

Infrastructure and scientific platform to fuse and to synergize the knowledge for different domains, bringing together public and private R&D activities



Fitness Gym & Pool



Shared Conference Rooms



Retail and F&B Podium



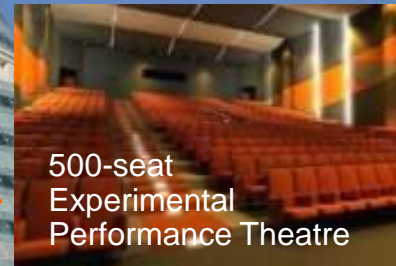
one-north MRT Station



Serviced Work-Live Apartments

Skybridges and Sky Gardens

Business and Research Space



500-seat Experimental Performance Theatre



# One-North Residences





# Projects In Other Countries

- Singapore started to share its town-planning and industry development expertise with other cities from the 1990s
- The early projects included Batam Industrial Park in Indonesia and Wuxi-Singapore Industrial Park in China
- Over 900,000 jobs have been created in parks developed outside Singapore



**Batam Industrial Park in Indonesia**



**Wuxi-Singapore Industrial Park in China**



# China- Suzhou Industrial Park



**Over 500,000 Jobs Created (Source:  
China Economic Review)**

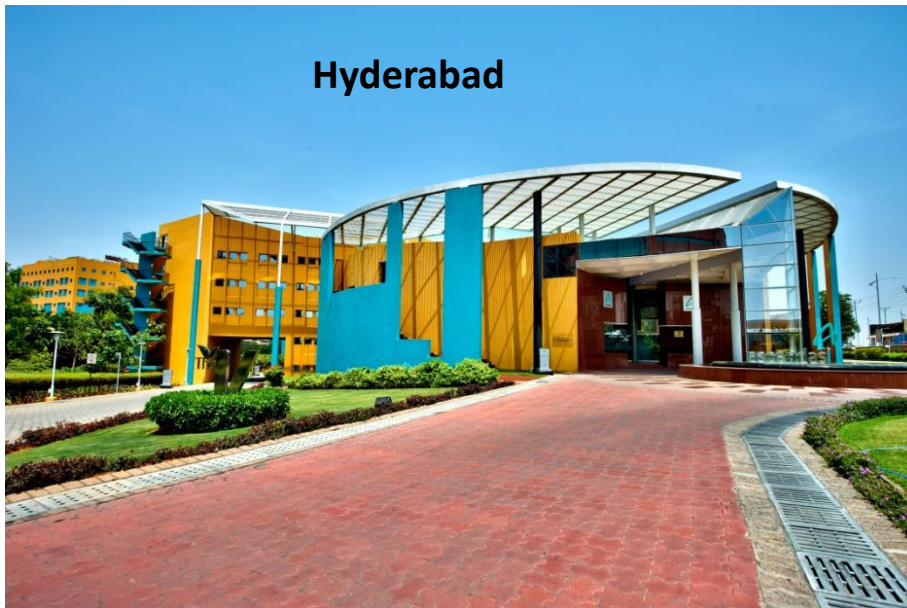


# Industrial Parks in India



**Bangalore**

**77,000 IT Jobs Created**



**Hyderabad**



**Chennai**



# Vietnam Singapore Industrial Park



**140,000 Jobs Created Over 4 Parks**

**Over US\$6 billion of investments**

**Groundbreaking of 5<sup>th</sup> Park in Sep 2013**

**Located in Quang Ngai province, central Vietnam**

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