

# **Translational strategies in an integrated economy:- perspectives from Singapore**

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**Dy Chairman, Agency for Science Technology & Research**



# National university of Singapore

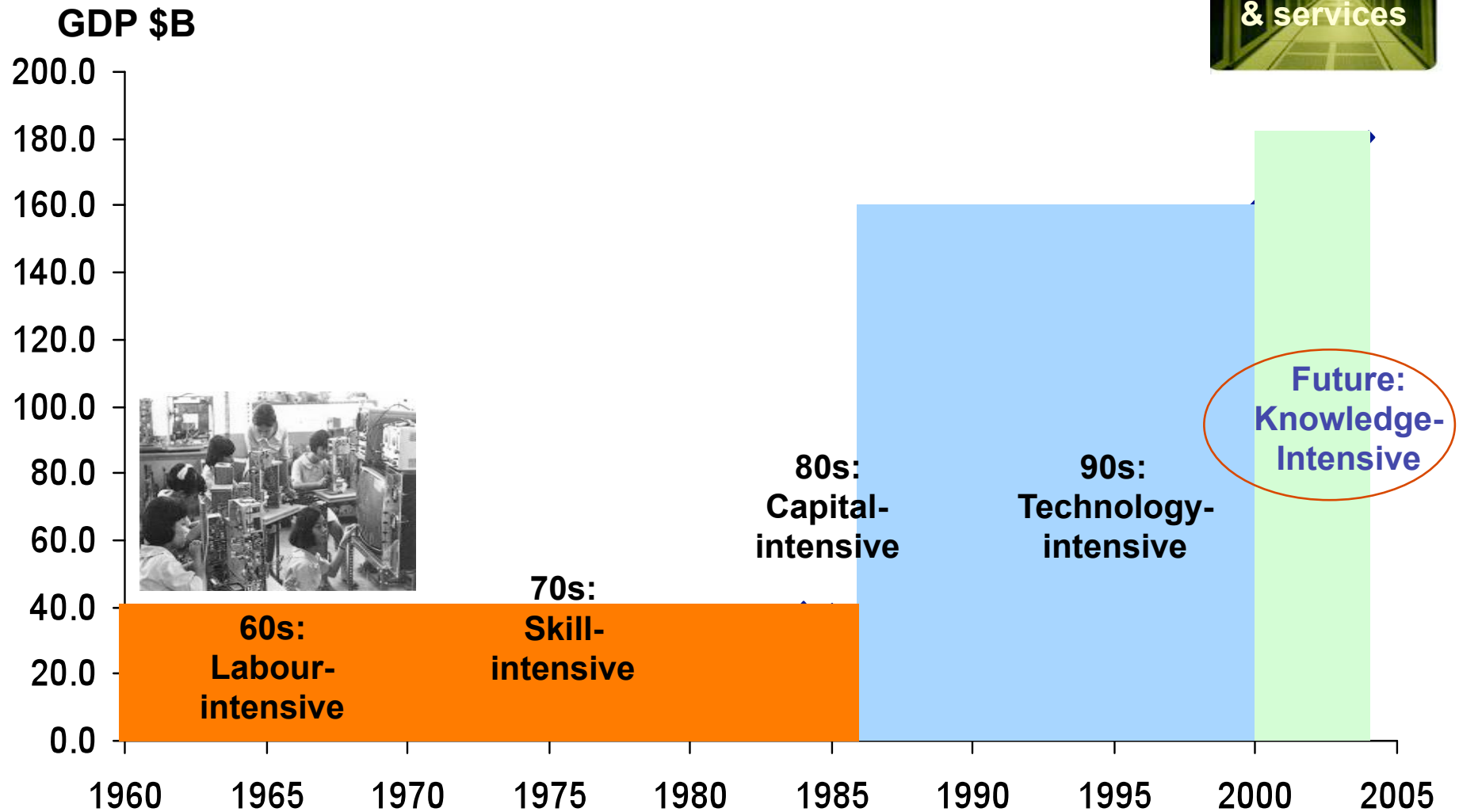
- **Comprehensive, research-intensive global university**
- **3 campuses – Kent Ridge, Bukit Timah, Duke-NUS Graduate Medical School**

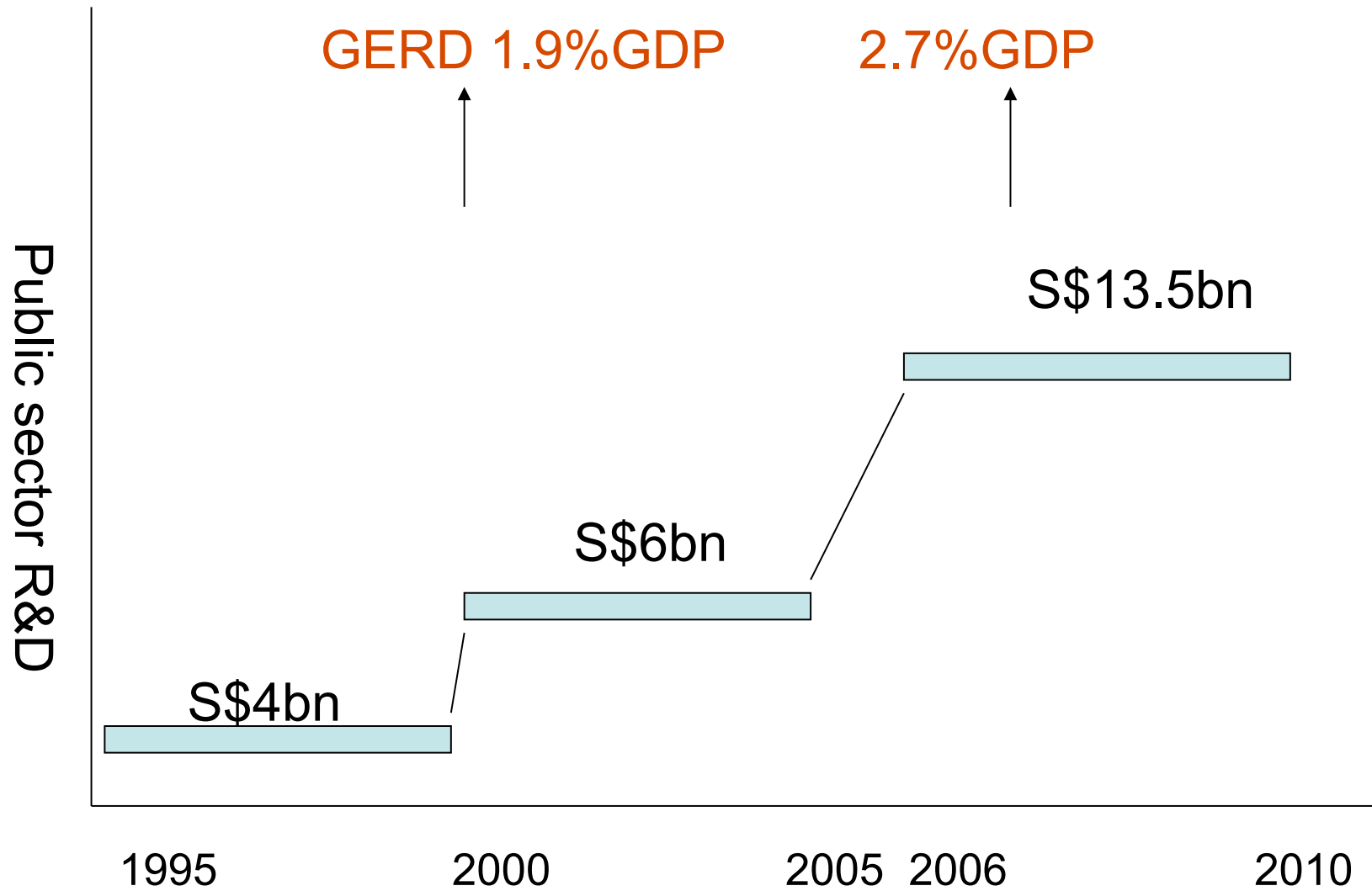


# Translational Strategies in an integrated economy

- Why Biomedical Sciences sector was selected as a focus
- Translational research - Key approaches & challenges

# The Singapore Growth Story.....





## Why BMS?

- Global importance of human health & disease
- Talent mobility + advances in research technologies mean newcomers can be competitive

## Does Singapore have a chance?

- Small talent base + Competition intense with several established hubs already

## Does Singapore have a chance?

BMS needs 2 things, which Singapore happens to be good at:

- long-term vision & view  
= substantial & long-term support
- close coordination between different agencies

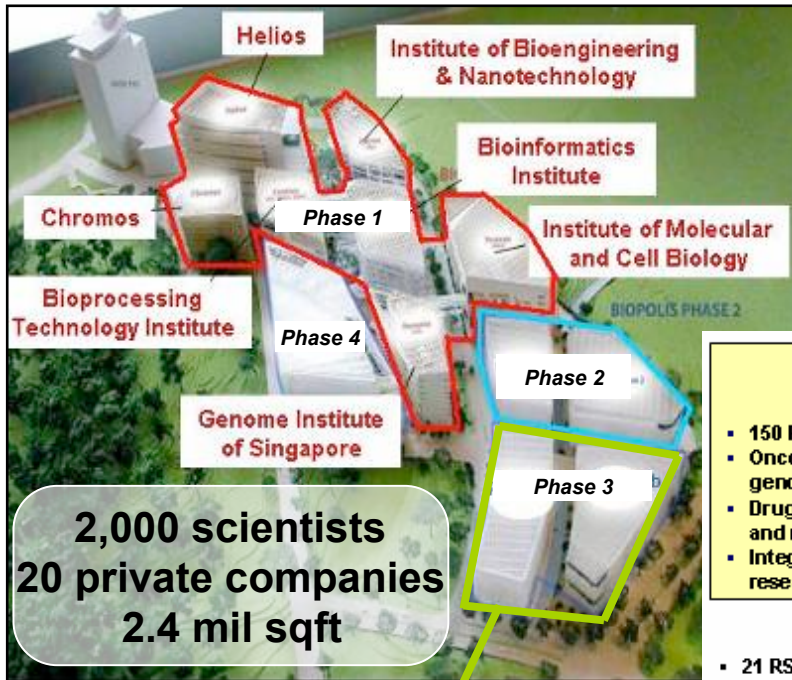
## Phase 1 of BMS Initiative: 2000 - 2005

### Emphasis on basic science

- Critical mass of high quality research talent in Research Institutes & programmes
- ~500 top local students in research training
- State-of-art infrastructure in Biopolis, universities
- Growing base of industry R&D labs
- Substantially expanded BMS sector's economic contribution



# Biopolis: A Vibrant BMS R&D Community




2,000 scientists  
20 private companies  
2.4 mil sqft

## Phase 3


- Currently under development
- Expected to be ready by 1Q10

## Shared Facilities

- Scientific Services
- Core Services
- General Amenities
- Animal Facility

- 150 RSEs
- Oncology biomarker research & genomic data analysis
- Drug Hunting Teams for cancer and metabolic diseases
- Integrated computational science research




- 21 RSEs
- Use *in vivo* functional genomics to predict clinical utility of novel drug targets
- Focused on CNS and metabolic diseases



- 21 RSEs
- Focus on cancer
- Chugai-Biostar (Mitsui/CIEA) JV



- 13 RSEs
- Neuroscience R&D




- 85 RSEs
- Drug discovery for TB, Dengue and Malaria




- 62 RSEs
- Natural products research for drug discovery




- 15 RSEs
- R&D in stem cell expansion



- 80 RSEs (projected)
- R&D in biocatalysis



- 20 RSEs
- Chemistry process development R&D



- 60 RSEs
- Drug discovery for neuro-degenerative diseases
- Medicinal chemistry



- 15 RSEs by 2008
- Drug development for infectious diseases

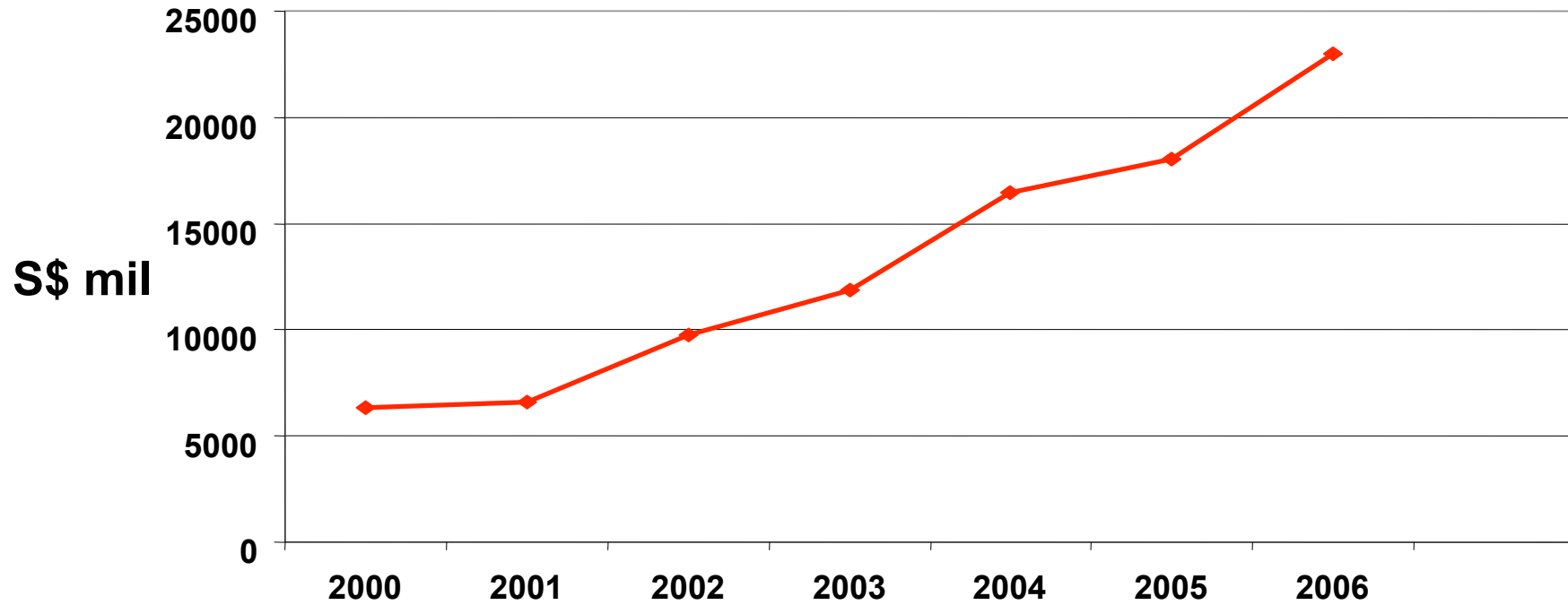


- 55 RSEs
- Genomics & small molecule technologies-based drug discovery



- 60 RSEs by 2008
- Development of vaccines for infectious diseases prevalent in Asia

# Strong Growth in BMS Manufacturing Sector



- Manufacturing output increased by 4-fold from **S\$6 billion to S\$24 billion**
- Employment opportunities doubled from **5,000 to 10,000 jobs**

# Translational Strategies in an integrated economy

- Why Biomedical Sciences sector was selected as a focus
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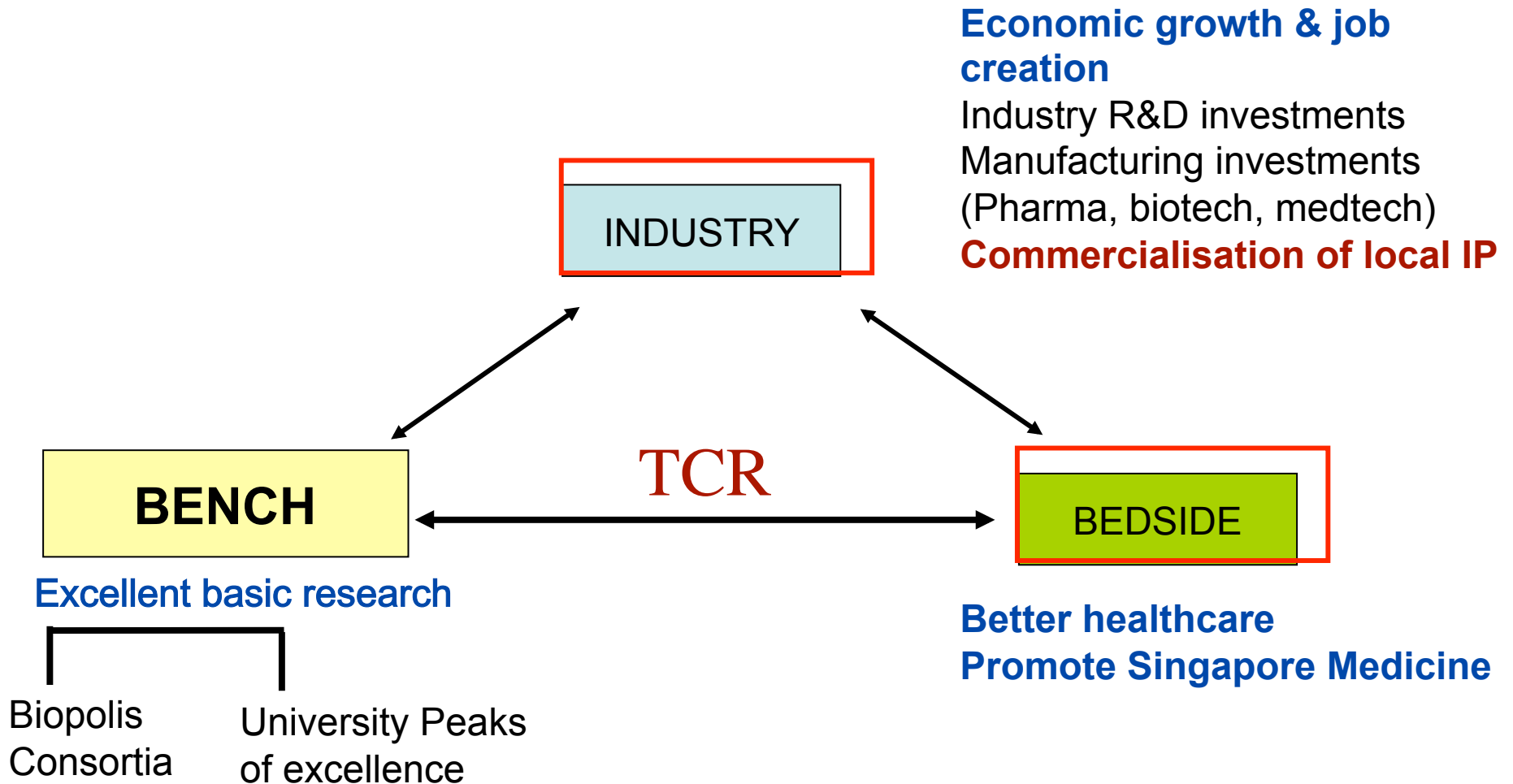
## Key recommendation for Phase 2

"It is no longer good enough to  
cure cancer in the mouse" Ed Holmes. UCSD

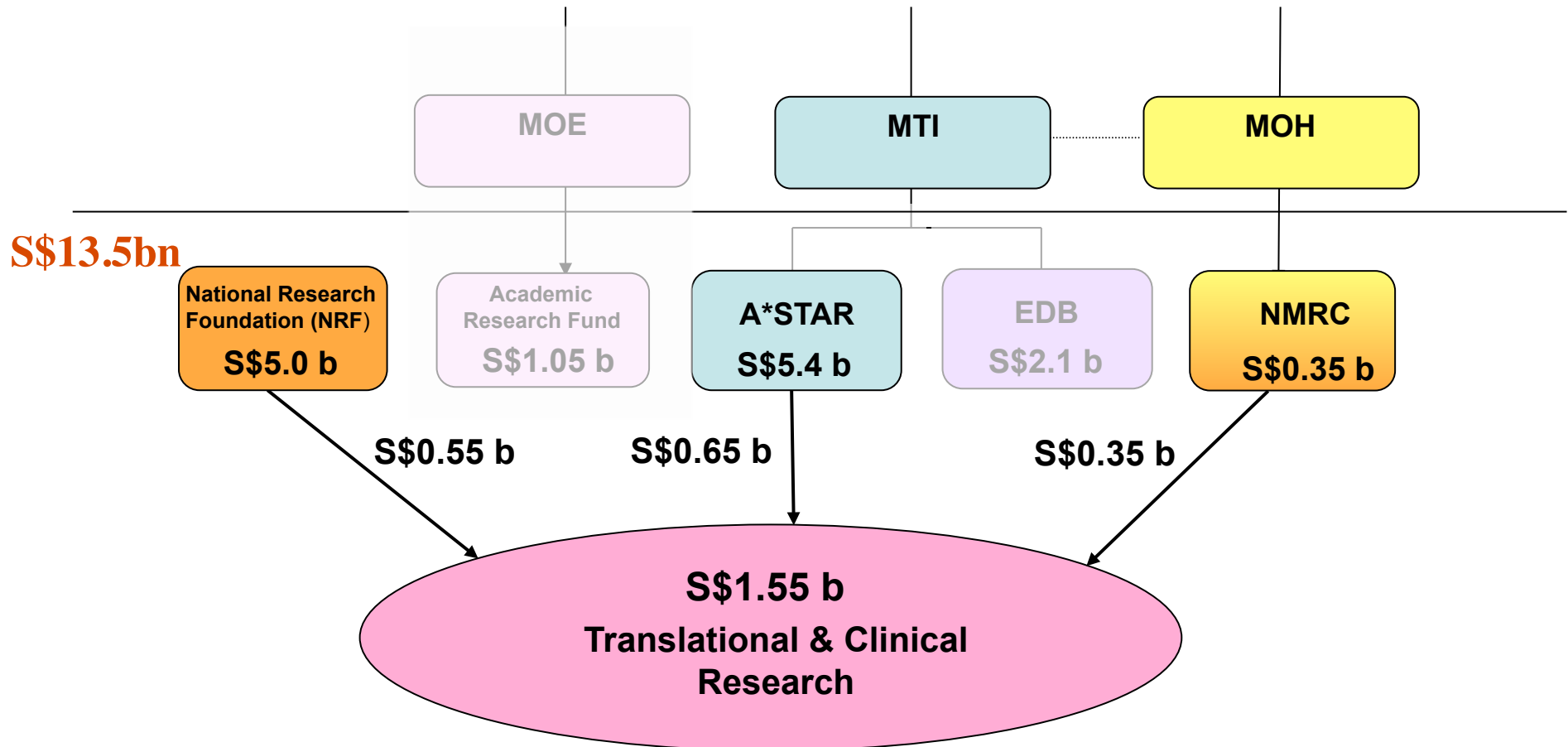
"The most important 'model' is man  
S Brenner



# Build Translational and Clinical Research Capabilities



# #1: Ringfenced Funding for TCR: 2006 to 2010



## #2: Very close coordination



### Steering Committee for Life Sciences (SCLS)

Dy Chmn RIEC / Chmn NRF, Ministers of Trade & Industry, Health and Education

#### Biomedical Sciences Executive Committee

Chaired by A\*STAR Chairman & Permanent Secretary of Health

BMS International  
Advisory Council

#### TCR Coord Comm

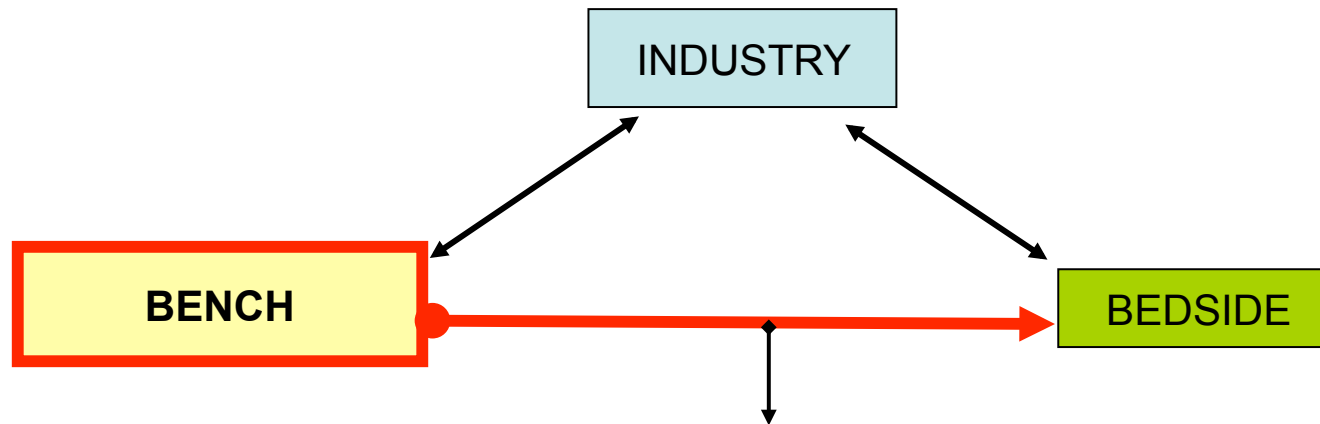
Tan CC/Ed Holmes

Biomedical Research  
Council (BMRC)

National Medical  
Research Council

*S\$1.55B for  
translational  
and clinical  
research*

# #3: Building TCR – 6 goals



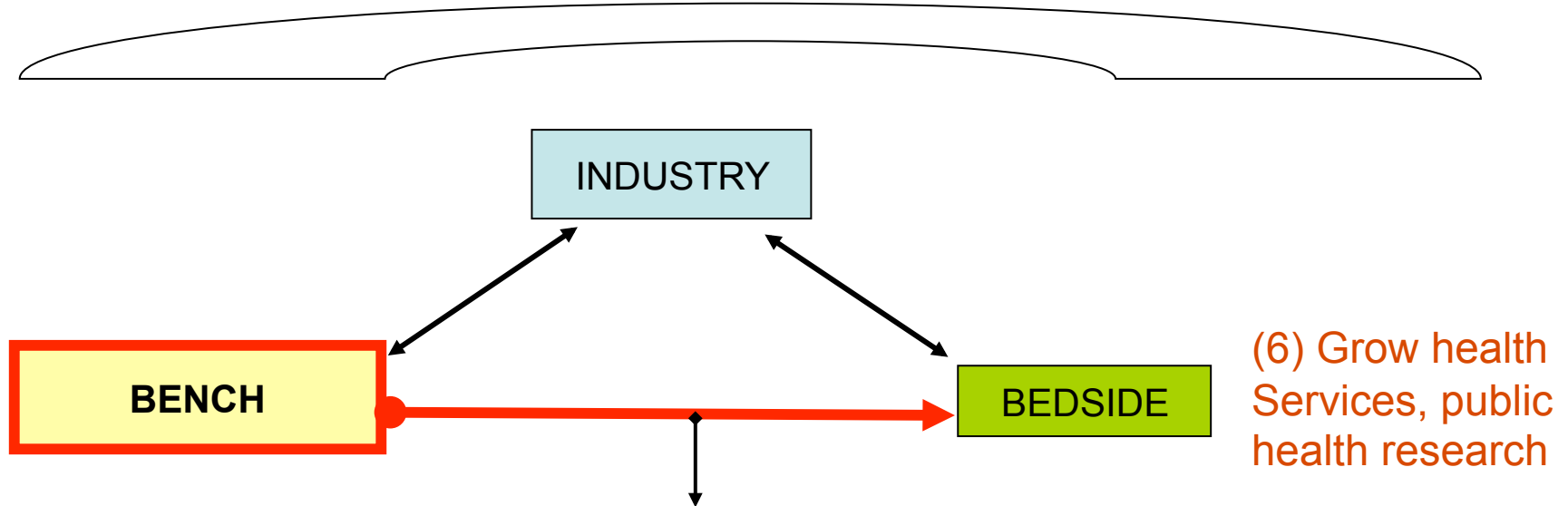
(3) Develop strong investigational med capability & be preferred site in Asia

(2) Establish 5 flagship programmes, each spanning bench-to-bedside

(1) Build critical mass of clinician-scientists, supernumerary to clinical service needs



- (4) Develop best enabling resources in Asia for translational research  
(5) Strengthen regulatory framework for TCR.



- (3) Develop strong investigational med capability & be preferred site in Asia
- (2) Establish 5 flagship programmes, each spanning bench-to-bedside
- (1) Build critical mass of clinician-scientists, supernumerary to clinical service needs**

# Build critical mass of clinician-scientists



## Singapore Translational Research Investigator Awards (STaR)



Prof Daniel Tenen  
(NUS YLL School of Medicine)



Prof David Virshup  
(Duke-NUS GMS)



Prof Wong Tien Yin  
(SERI)



Prof Michael Chee  
(Duke-NUS GMS)

## Clinician Scientists Awards (CSA)

Senior Investigator  
**7 awardees**

Investigator  
**16 awardees**

## Other Research Scholarships

Master of Clinical Investigation  
**8 awardees**

AST-PhD Scholarship  
**2 awardees**

MD- PhD Scholarships  
(tenable at Duke-NUS GMS)  
**2 awardees**

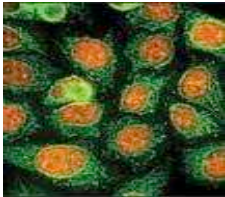
MBBS-PhD Scholarships (local and UK)  
**24 awardees**

# Translational Flagship Programmes



- Programmes must:  
Span basic to TCR;  
Bring best people across Singapore together, + international collaborators
- Each award S\$25mil over 5 years

## CANCER



Singapore  
Gastric  
Cancer  
Consortium

## EYE DISEASE



Translational  
Research  
Innovations in  
Ocular Surgery

## NEUROSCIENCE



Vulnerability,  
Disease Progression  
and Treatment in  
Schizophrenia and  
related psychoses

## METABOLIC DISEASE



Developmental  
Pathways to  
Metabolic  
Diseases

## INFECTIOUS DISEASE



New Treatment  
Strategies against  
Dengue  
(STOP Dengue)

# Singapore Gastric Cancer Consortium

PI: Yeoh Khay Guan, NUS YLL SOM

## 2 clinical cohorts (biomarkers; imaging)

4000 Chinese, Indians & Malays at high risk gastric cancer;  
All patients diagnosed with gastric cancer in 4 largest public hospitals

Role of RUNX gene in gastric cancer

## Genomic analyses of gastric cancer

## Early phase clinical trials, pharmacogenetics

6 projects, ~100 patients

# Translational and Clinical Research (TCR) Infrastructure Developments



## Strategic Infrastructure Grants

*Funding Investigational Medicine Unit (IMU) & other research space at Kent Ridge and Outram campuses*

## Singapore Clinical Research Institute (SCRI)

*One-stop centre providing support to conduct late-phase clinical trials*

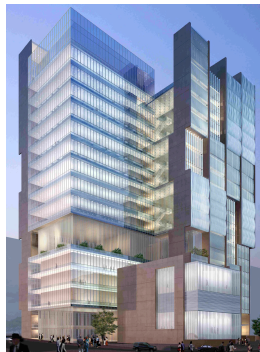
## Clinical Imaging Research Centre (CIRC)

*Developing and validating state-of-the-art imaging tools and enabling the study of novel interventions in humans*

# #4: Forge basic science to clinical research links



Biopolis  
Research Institutes



NUS  
Sch of Med



NHG Institutions & Services  
National University  
Hospital

# #4: Forge basic science to clinical research links



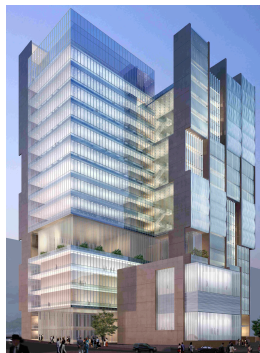
Biopolis  
Research Institutes



Experimental  
Therapeutics  
Centre

Institute of  
Medical  
Biology

Singapore  
Institute  
for Clinical  
Sciences



Singapore  
Bioimaging  
Consortium

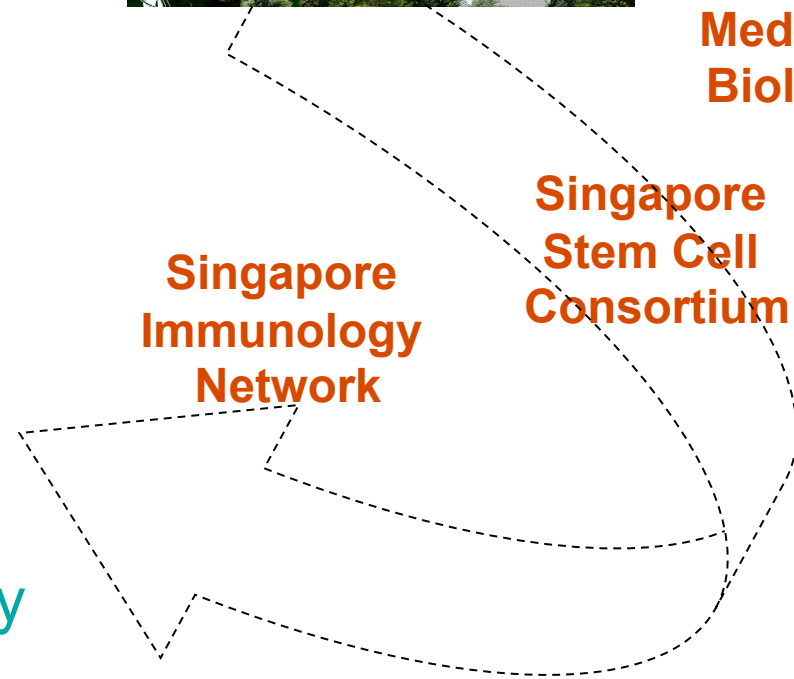


Singapore  
Immunology  
Network

Singapore  
Stem Cell  
Consortium

NUS  
Sch of Med

National University  
Hospital



# #4: Forge basic science to clinical research links

## Engineering in Med



Biopolis  
Research Institutes

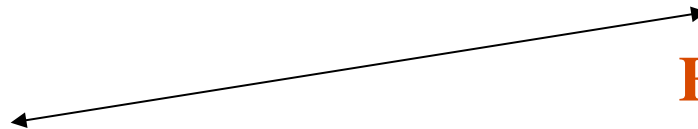
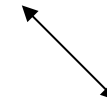


NUS Engineering



NUS  
Sch of Med

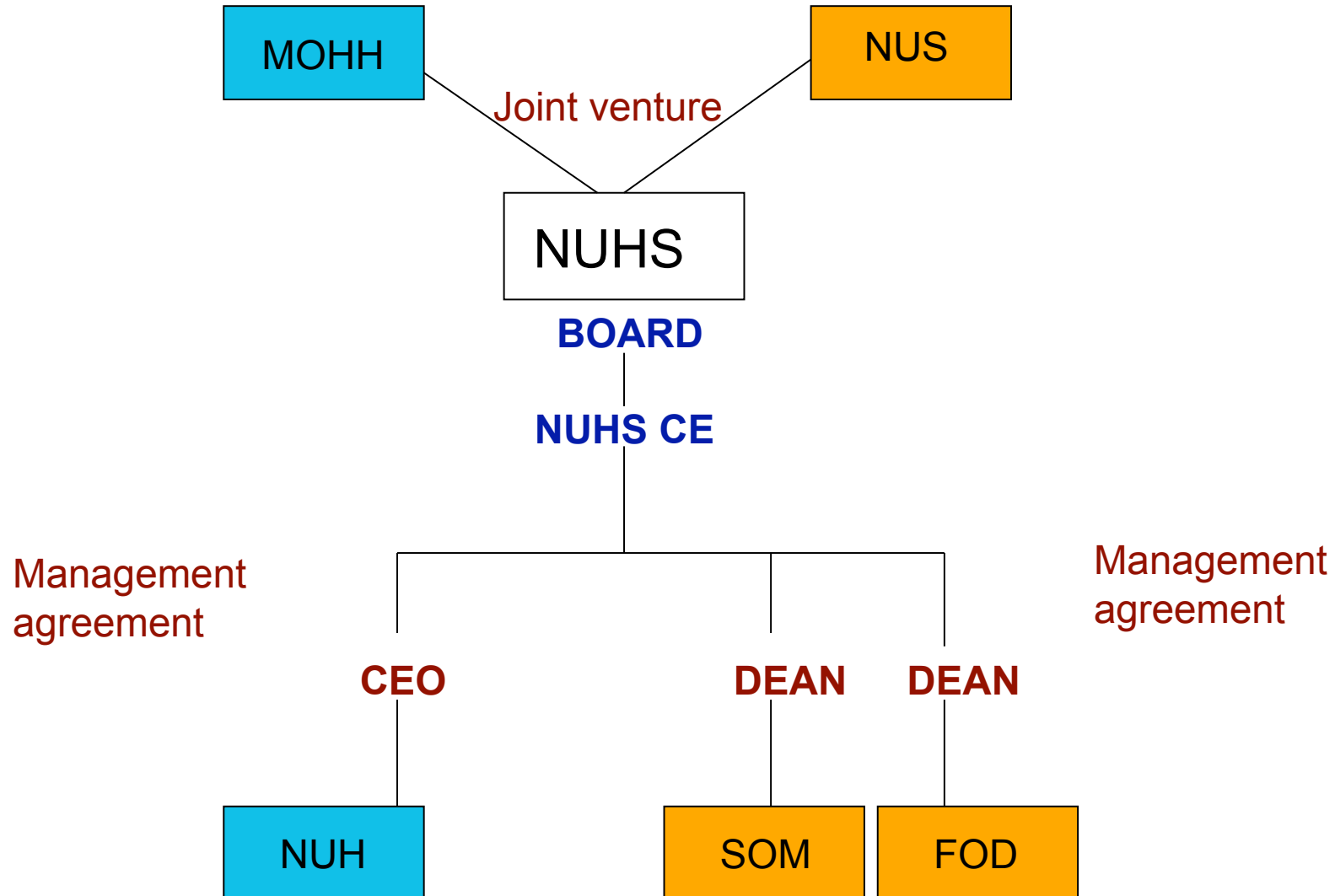
National University  
Hospital



Fusionopolis



# #5: Set up Academic Medical Centre National University Health System



# Formation of NUHS

- NUHS allows 4 Critical Platforms :
  - ✓ **INTEGRATED** strategic planning
  - ✓ **ONE** common budget & resource allocation system
  - ✓ **HARMONISED** HR framework
  - ✓ **INTEGRATED** space management

# Progress since Feb 08



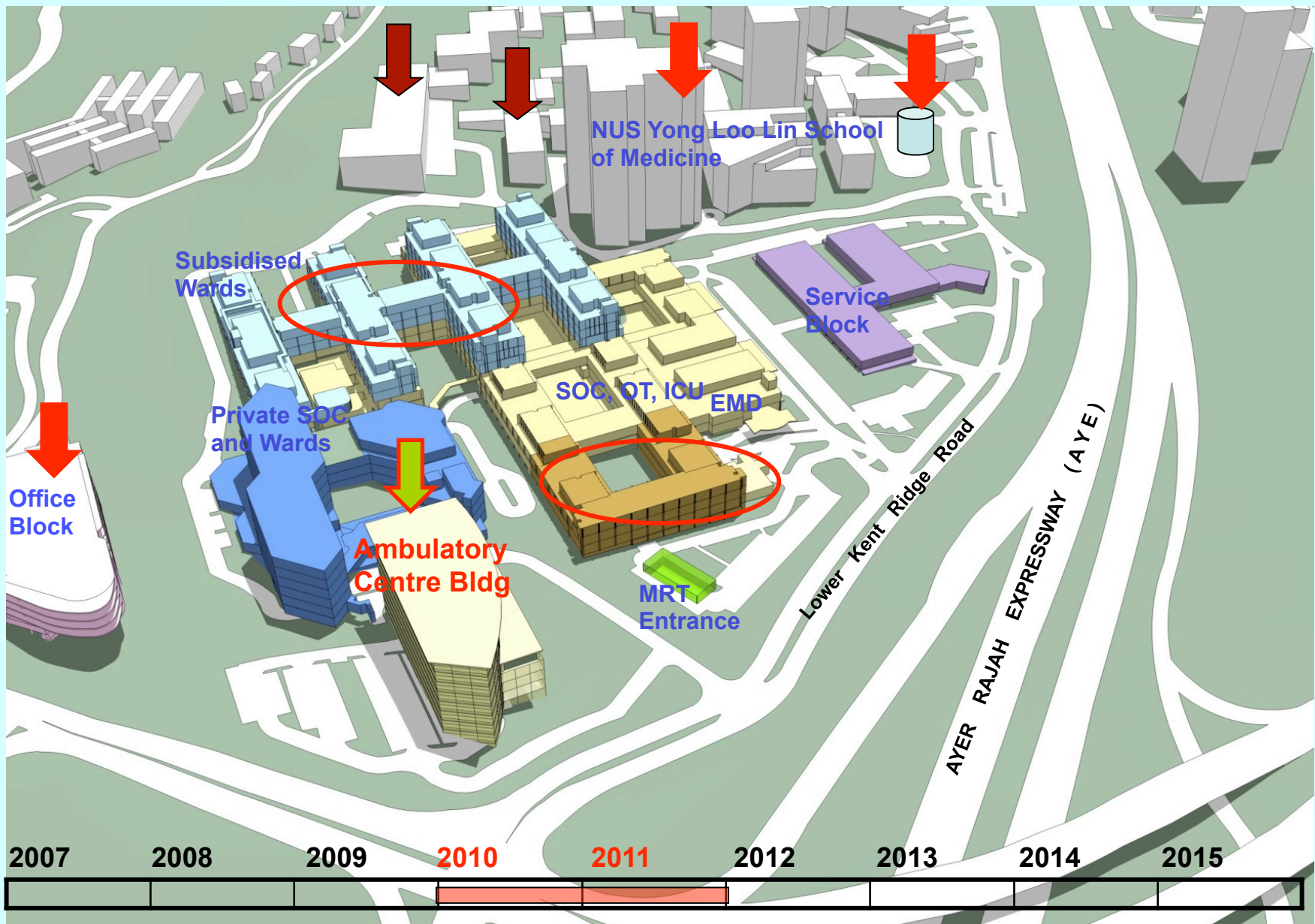
- **Clinical departments have been reorganised**
  - 5 clusters formed 1 Jul 08 : Medicine; Surgery; Orthopaedics-Hand & reconstructive Microsurgery; Paediatrics; Dental
  - Clinical Specialist departments – NUS & NUH combined
- **Integrated NUHS-wide processes finalised & being rolled out to departments**
  - include procurement, approval of new clinical services, recruitment, planning, budgeting and reporting cycles
- **Financial Integration** – oversight & allocation at NUHS level
- **HR** – physicians fully harmonised

# NUHS Focus

Identify & invest significantly in focus areas

- Asian phenotype
- POC, early phase in man
  
- Establish new National Cancer & National Heart Centres

# NUHS redevelopment plan



# Major challenges



- Having sufficient senior physician-scientists
- Clinical work – heavy; better incentivised; more certain career
- Developing substantial research within a lean and highly efficient healthcare system
- Culture that values clinical prowess more

# Conclusion



- Why BMS was selected
- Approach – highly coordinated, emphasis on building human capital; close linkages to industry from start
- Focus on “Asian phenotype”, proof-of-concept & early phase in man;
- Multi-disciplinary – basic BMS & TCR; Engineering & medicine

# Conclusion



## Critical success factors:

- Strong long-term government commitment
- Adequate sustained support (\$)
- Visionary & strong leadership
- Very close coordination



THANK YOU !