



EcoSystem of Drug Discovery in Taiwan

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Outline



- **A Glimpse of Taiwan's Drug Discovery Industry**
- **Engines That Drive the Growth of Taiwan's
Biotech Industry**
- **BioCluster-ecosystem: Drug Commercialization
Center**

A Glimpse of Taiwan's Drug Discovery Industry

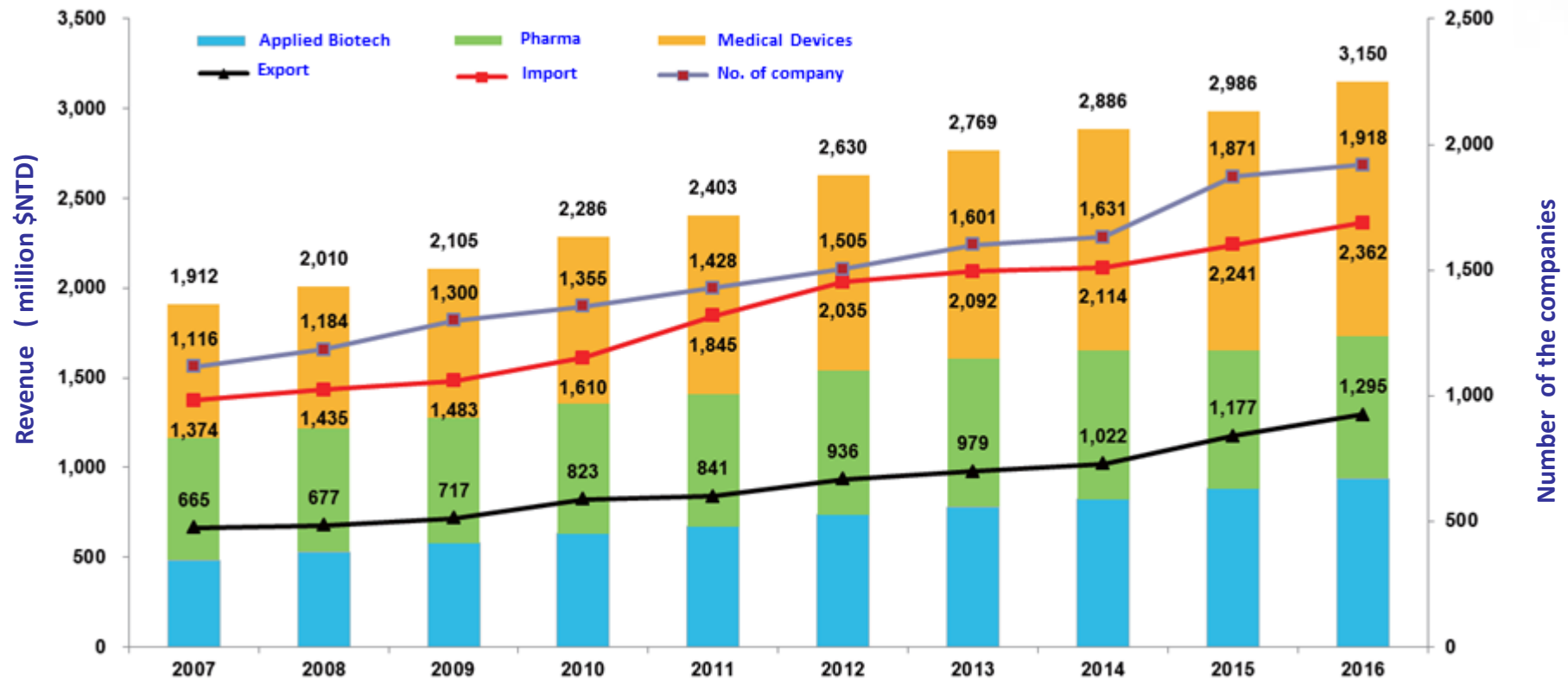


Taiwan's Biotech Industry Grows Continuously

◆ 5.7 % CAGR, Compound Annual Growth Rate

◆ Overall revenue exceeds 10 billion USD in 2016

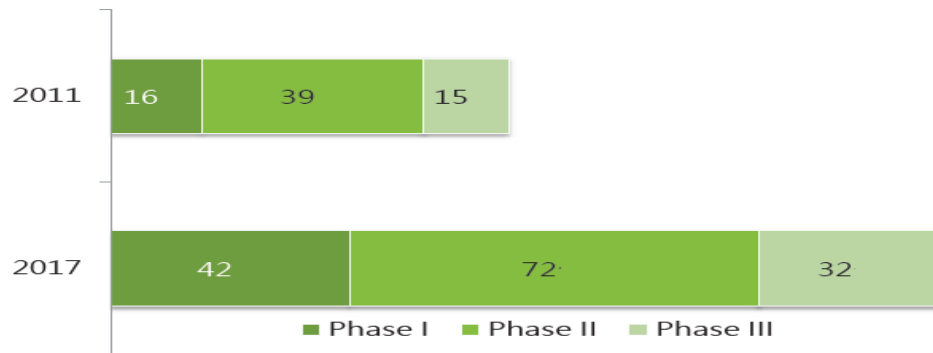
- ✓ 2.6 billion USD in pharmaceuticals,
- ✓ 4.7 billion USD in medical devices
- ✓ 3.1 billion USD in applied biotechnology



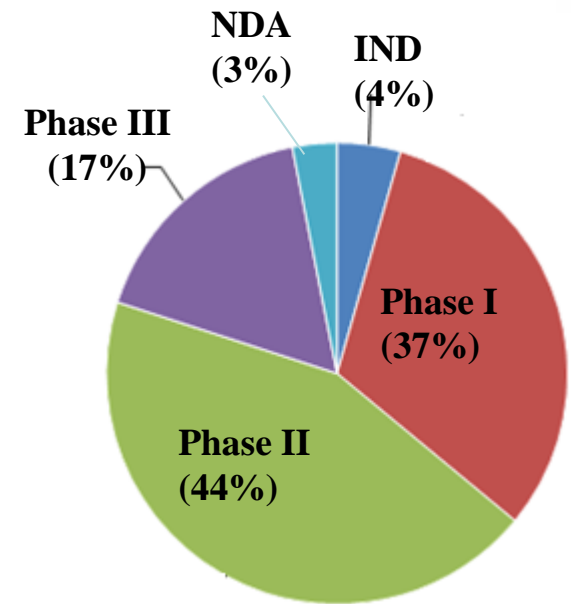
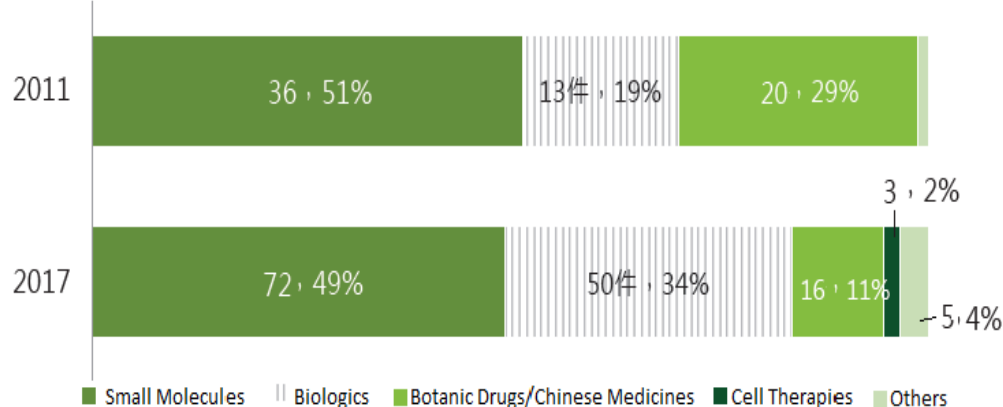
Taiwan's Innovative Capability in New Drug Development

In 2017, 200+ new drugs, >50% filed US-IND

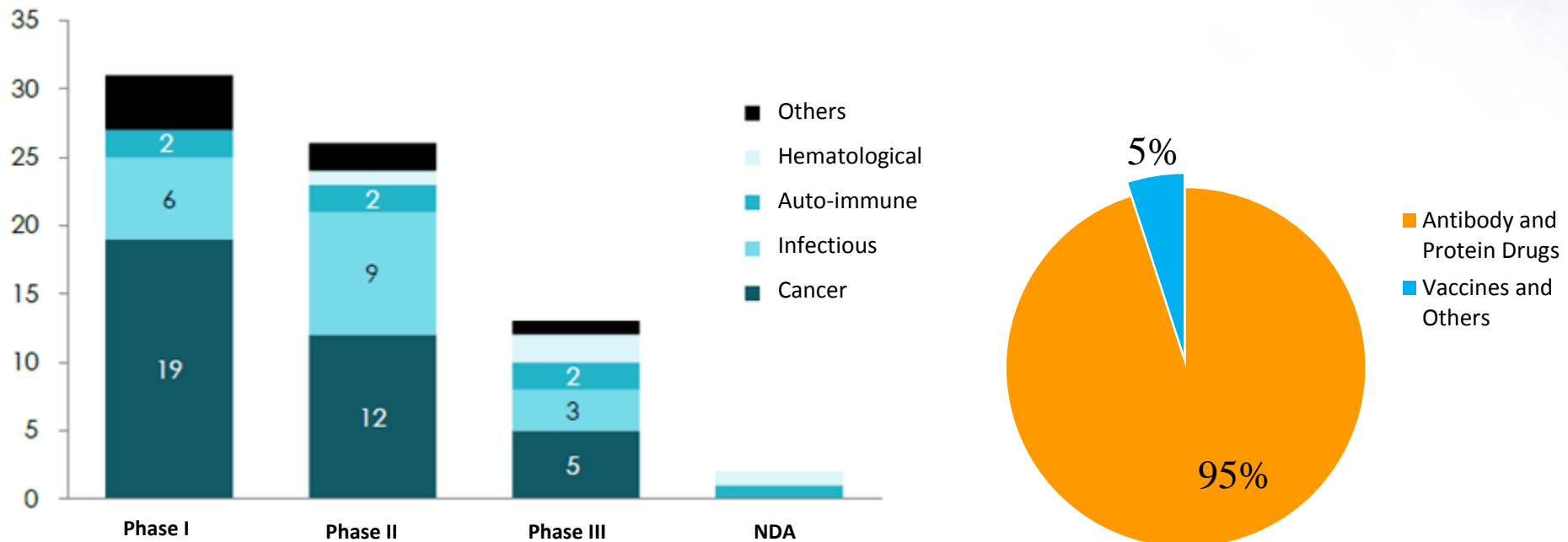
- New Drug Pipelines Doubled from 2011 to 2017



- Biologics increased greatly from 19% to 34%

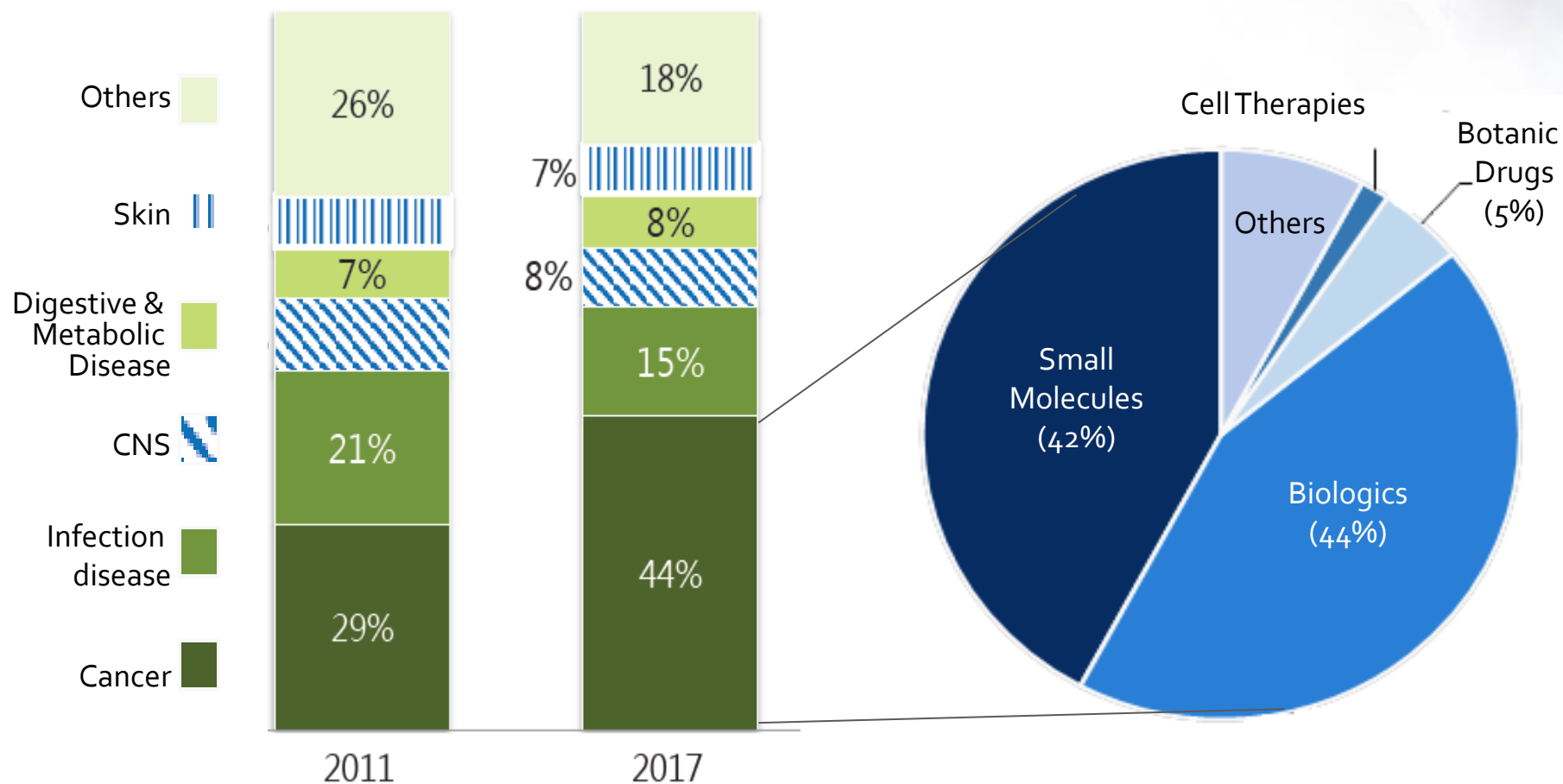


Pipeline for Biologics Is Expanding In Taiwan



Source: ITIS, DCB (2017)

Indication Focus of New Drugs in Pipelines





Engines That Drive the Growth of Taiwan's Biotech Industry



Comprehensive Education and Training Programs

5,000+ undergraduates/year in life sciences

140 +
Universities
and
Graduate
Schools

Pilot Educational
Programs in
Translational
Medicine and
Agriculture

Ph.D. On-the-job
Training Program

Basic Science

Regulation,
Patent, and
Marketing

Industrial Case
Studies

Practical
Training

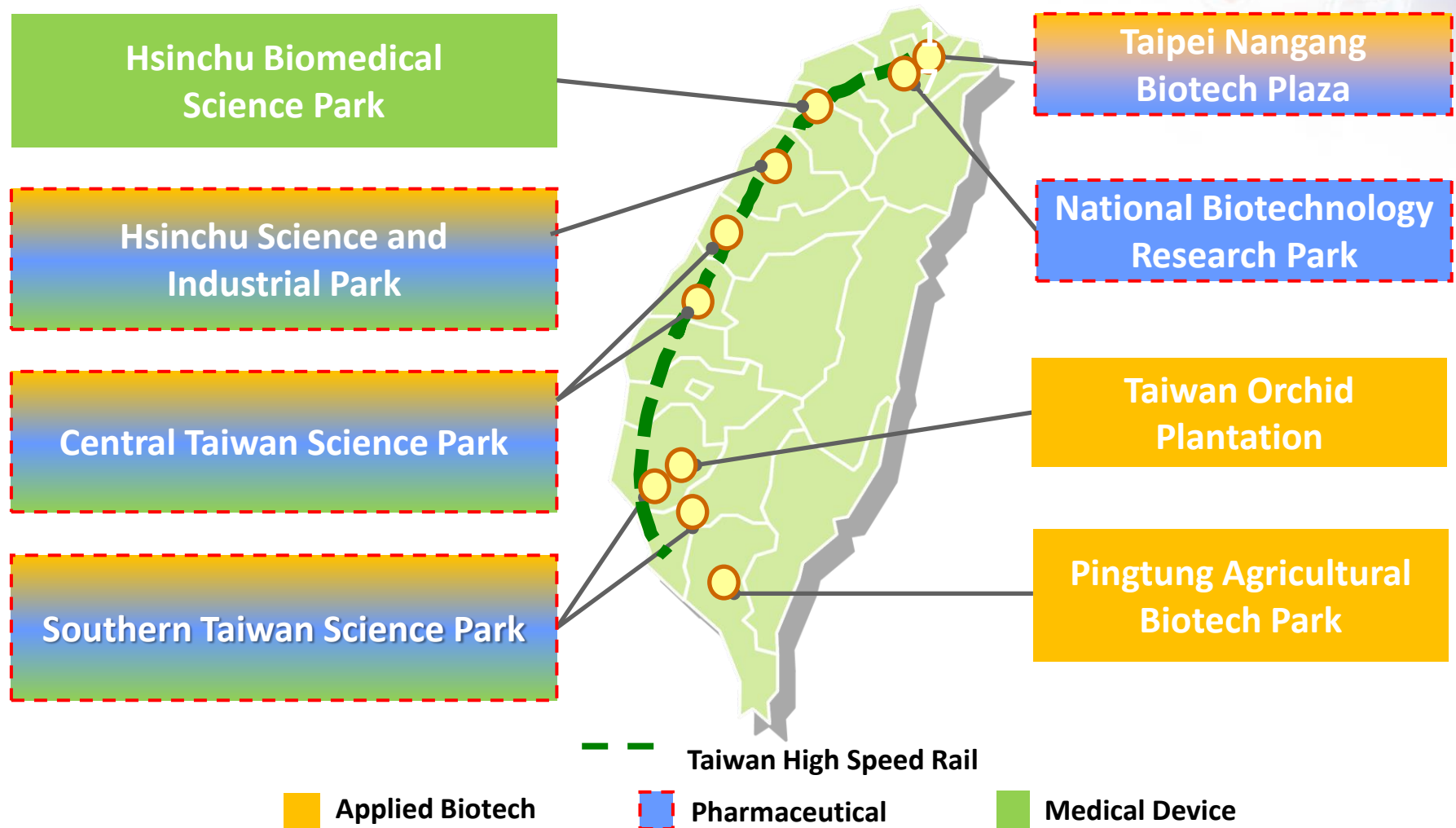
Biotech

Medical
Device

Pharmaceuticals

Partnership
between
University &
Industry

High Speed Rail Links Biotech Parks ~Strengthen the Cluster Effect~



Investment Incentives for Biotech Industry

Government R & D Assistance Program

- Promotion program for commercialization of biotechnology, grants for small business innovation research, new leading product development program, etc.

Low Interest Loan

- Loans for the purchase of automation machines and equipment, loans for upgrading small & medium enterprises, traditional industry stimulus loans, industrial innovation and R & D promotion loans, etc.

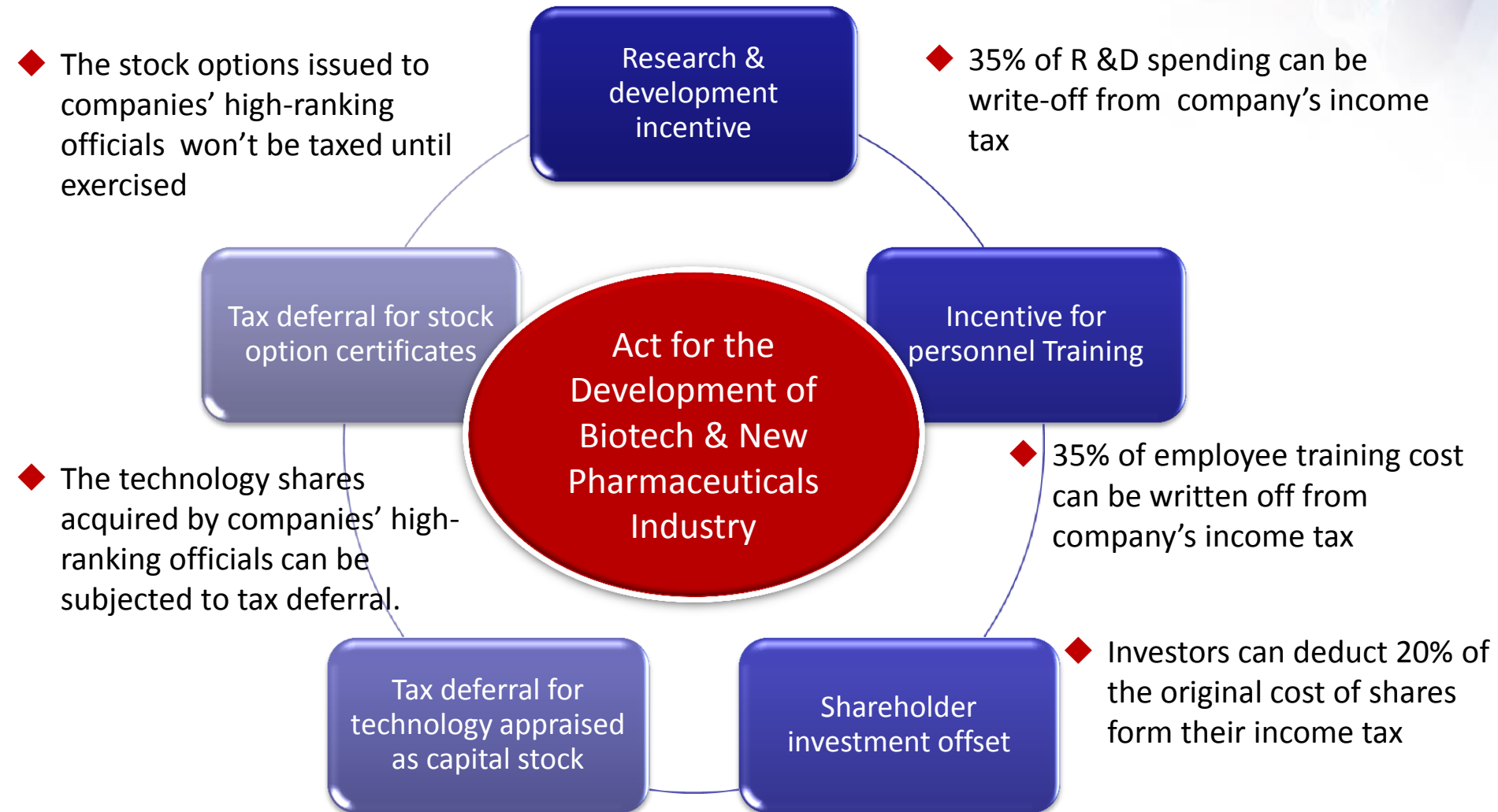
Joint Investment from the Government Fund

- National development fund by Executive Yuan

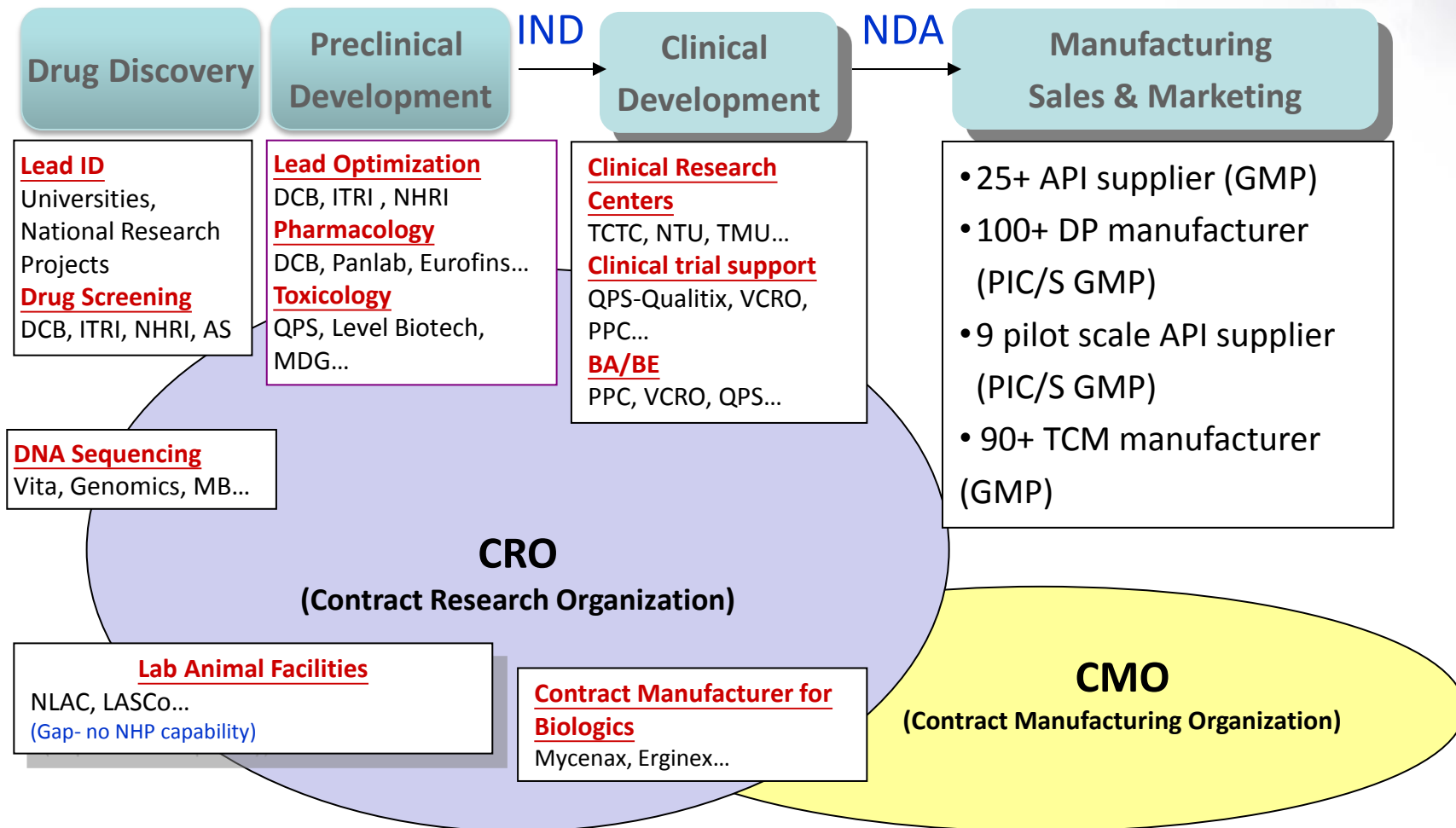
Stock Listing (IPO) Recommendation

- The Industrial Development Bureau has promulgated regulations to relax the listing requirement of local biotech companies to apply for IPO on Taiwan Stock Exchange and OTC Exchange.

Tax Incentives for Biotech Companies in Taiwan



Superb Infrastructure to Support Pharmaceutical R&D



High Quality of Drug Manufacture

PIC/S GMP

- Starting in **2015**, all medicinal product manufacturers should be in compliance with PIC/S GMP
- **100+** Finished Product Manufacturers

GMP

- **25** Active Pharmaceutical Ingredient Manufacturers
- **90+** Chinese Medicine Factories

January, 2013
Join PIC/S

GMP
Since 1982

cGMP
Since 1995

cGMP
PIC/S GMP
Since 2007

Global
Harmonization

← 1980s' →

← 1990s' →

← 2007.12~ →

Clinical Trial Supported by Clinical Research Centers



China Medical University Hospital Clinical Trial Center



Taipei Veterans General Hospital Clinical Research Center



Joint Clinical Research Center, TMU



National Cheng Kung University Hospital CTC



Chang-Gung Memorial Hospital, Linkou



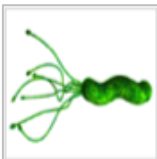
National Center of Excellence for Clinical Trial & Research

TCTC-Disease-Specific Clinical Trial Consortia



肺癌臨床試驗聯盟

Lung Cancer Consortium



胃腸疾病與幽門桿菌合作聯盟

Gastrointestinal Disease
And Helicobacter Consortium



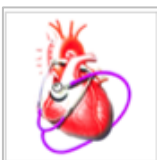
慢性阻塞性肺病聯盟

COPD Consortium



乳癌臨床試驗合作聯盟

Breast Cancer Consortium



高血壓相關疾病聯盟

Hypertension Associated
Cardiac Disease Consortium



成人感染症臨床試驗聯盟

Adult Infectious Diseases



婦科癌症研究聯盟

GYN Oncology Group



血脂和動脈粥樣硬化聯盟

Lipid and Atherosclerosis Consortium



精神疾病臨床試驗聯盟

Mental Disorders Consortium



癌症早期臨床試驗聯盟

Oncology Phase I Consortium



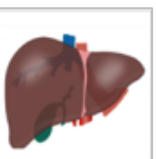
小兒感染症聯盟

Pediatric Infectious Diseases Alliance



中風臨床試驗聯盟

Stroke



肝炎及肝癌臨床試驗聯盟

LiverNet Consortium



腎臟疾病臨床試驗聯盟

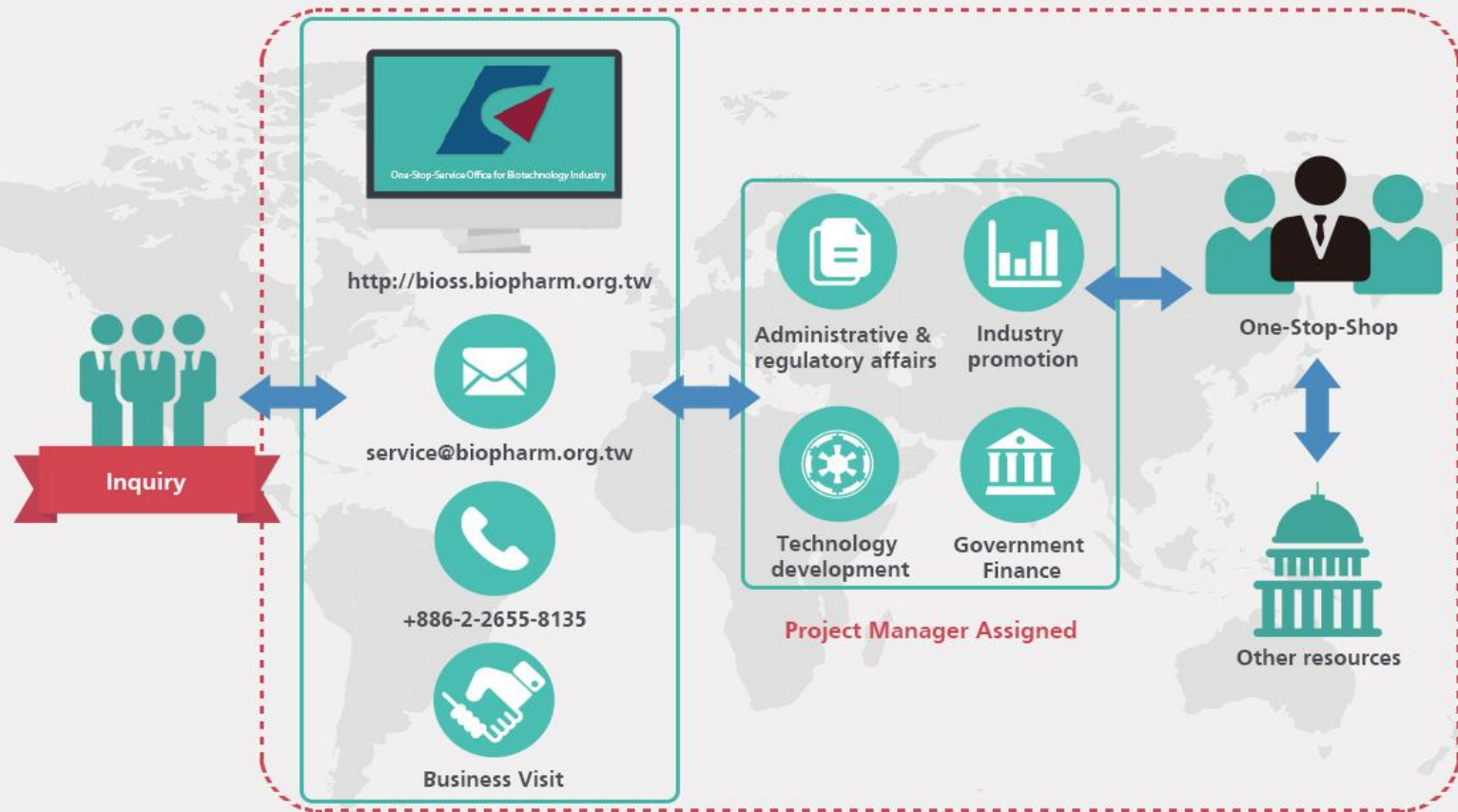
Acute Kidney Injury & Renal Diseases

Government Single Contact for Biotechnology



BPIPO - One Stop Shop for Taiwan's Biotech Industry

1 Day – Reply in one day **1** Week - Follow up on a one week basis **1** Month - Solution in one month



BioCluster-ecosystem

Drug Commercialization Center



Biomedical Industrial Innovation Program (BIIP)



Initiated in 2016

Vision : Become the hub of biomedical R&D in the Asia-Pacific region

- develop 20 new drugs & 80 different high-value medical devices by 2025
- creating an NT-trillion-dollar pharmaceutical industry

Action Plan

Build a comprehensive ecosystem

Connect to global market resources

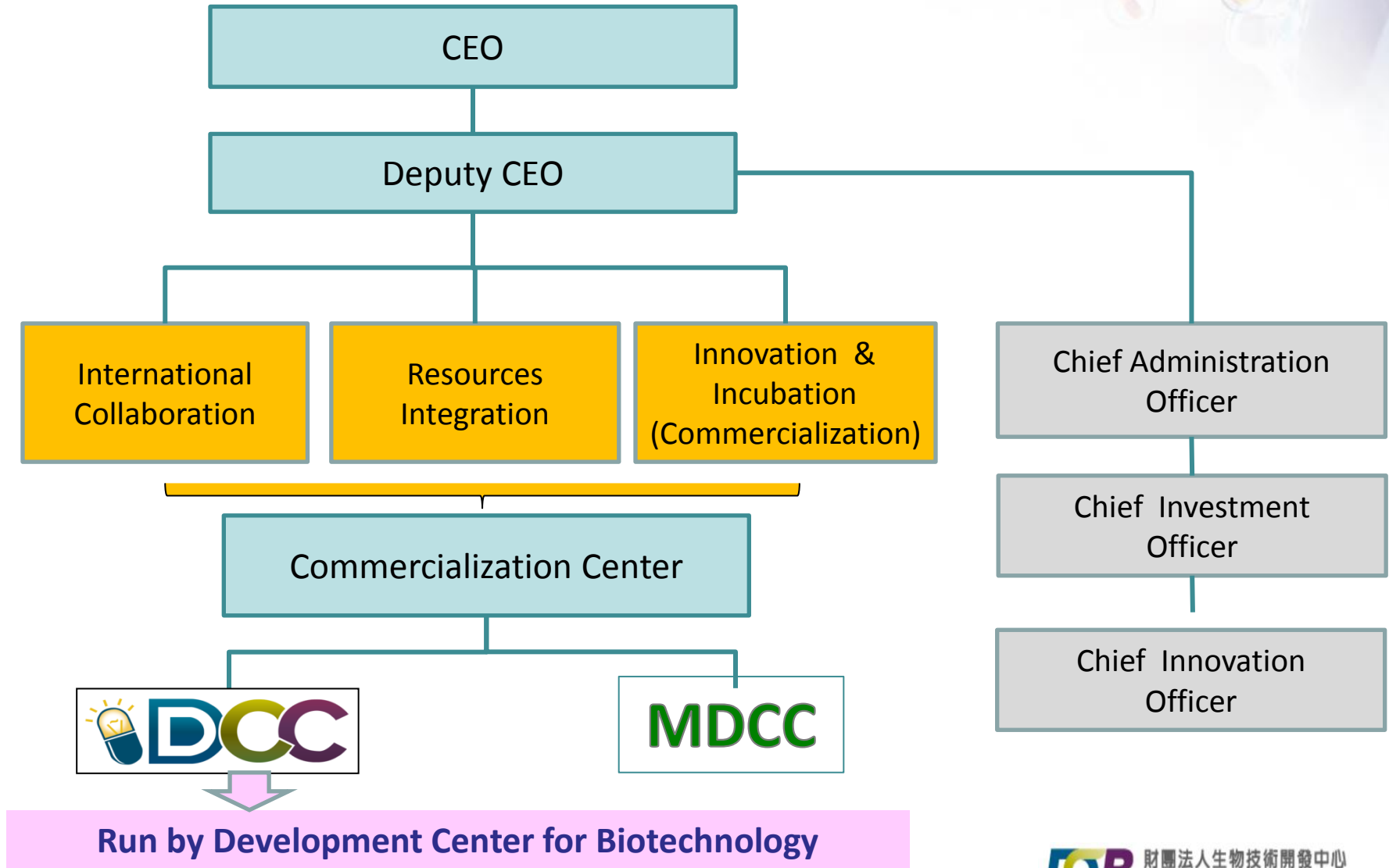
Integrate innovative business clusters

Promote specialized key industries

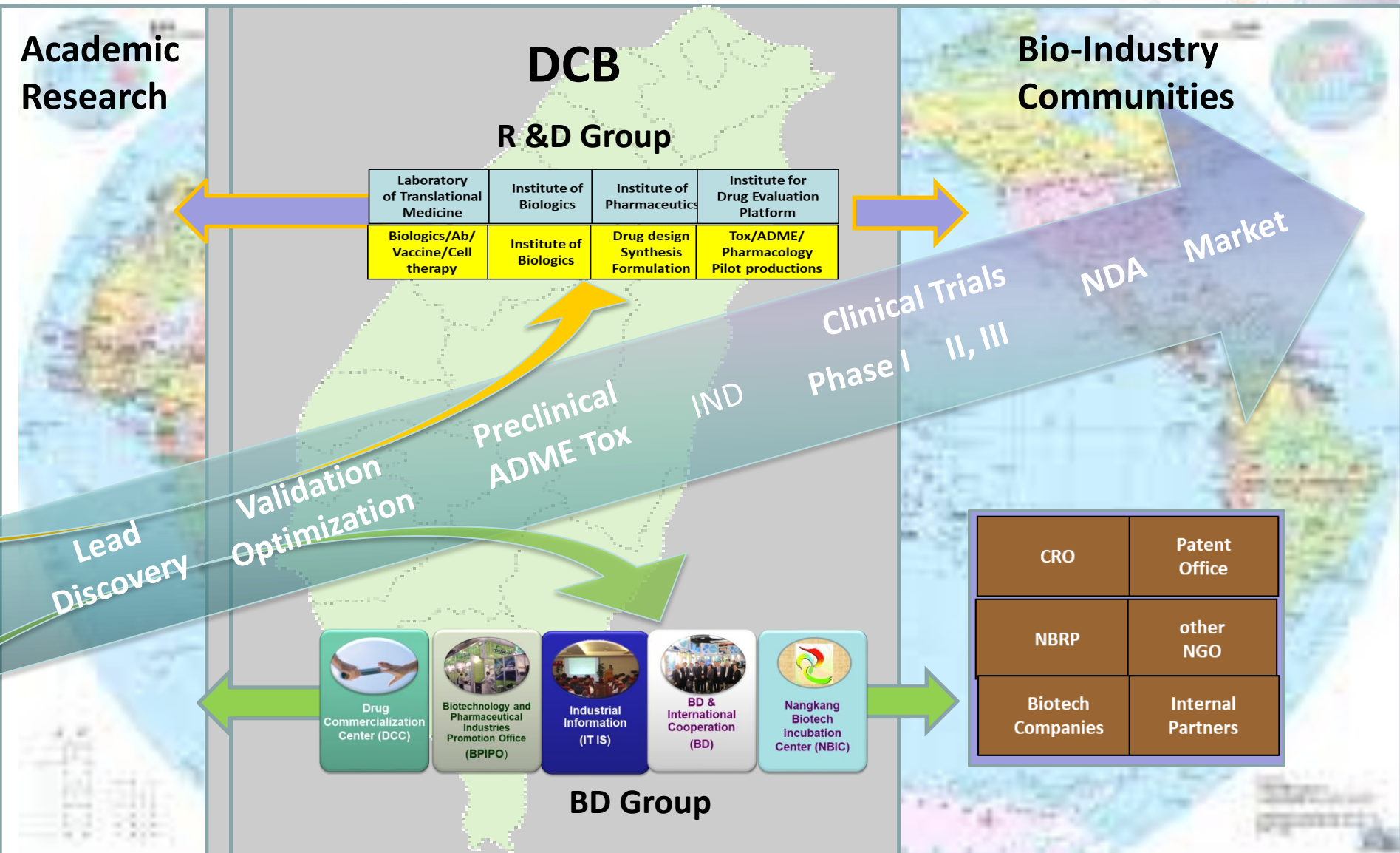
Resources integration

The comprehensive ecosystem : personnel training, capital, topic selection, intellectual property, regulations, and resources.

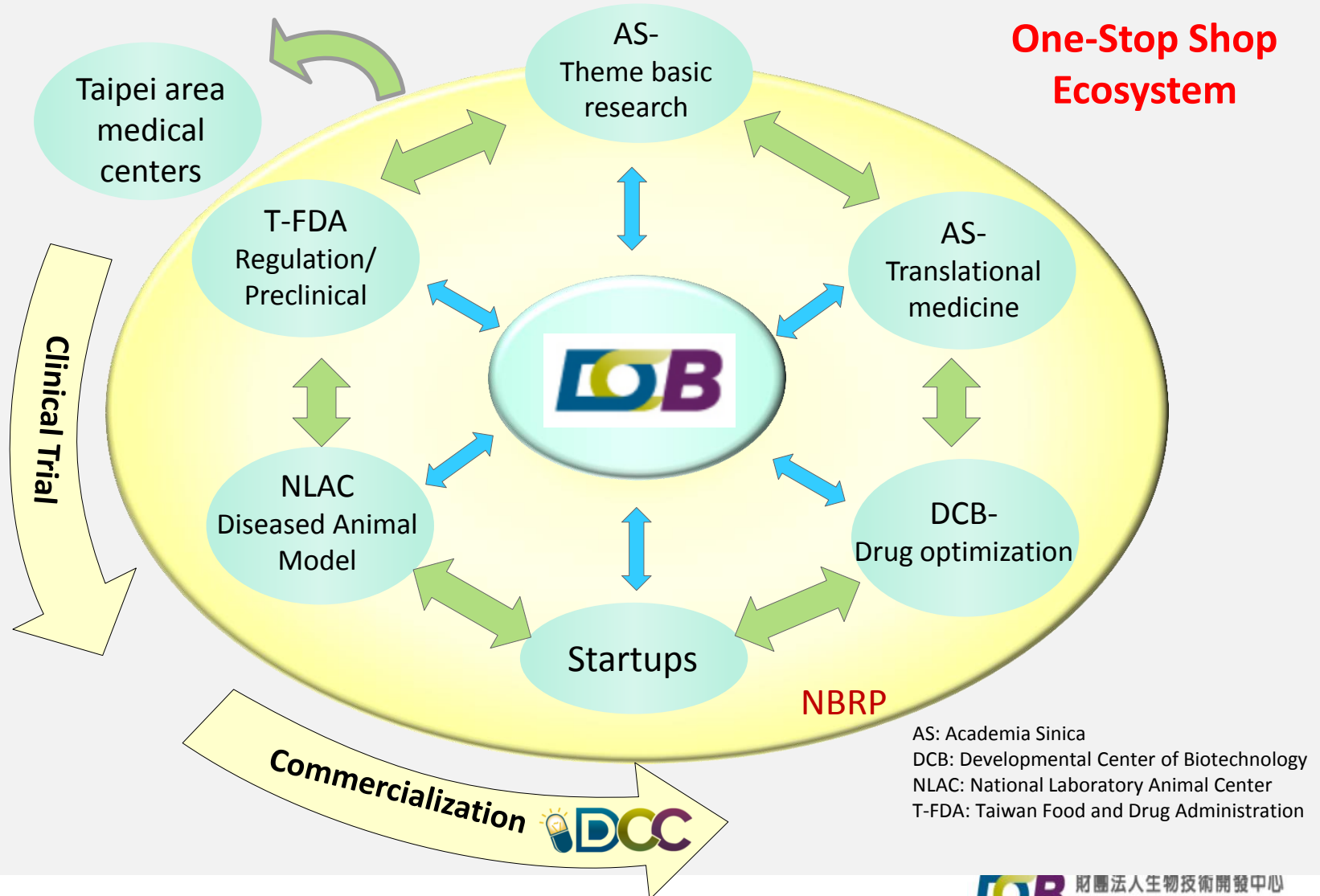
Biomedical Industrial Innovation Program (BIIP)



Development Center for Biotechnology



DCC Position in NBRP



Drug Commercialization Center (DCC)



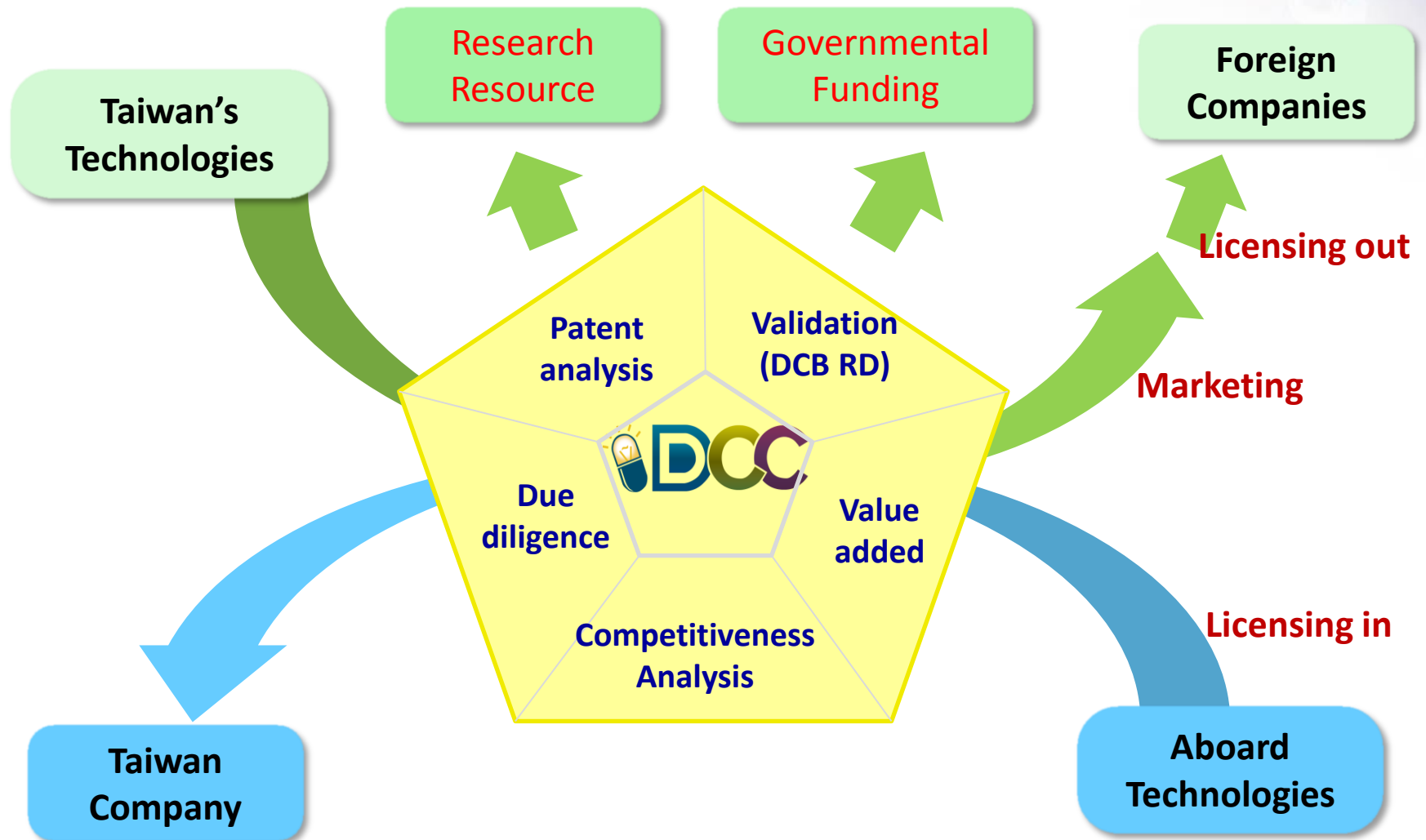
**Academic-Industry
Collaboration**

**Technology
Licensing**

**Start-up
Company**

**International
Marketing**

Examples: Service Model for Industry

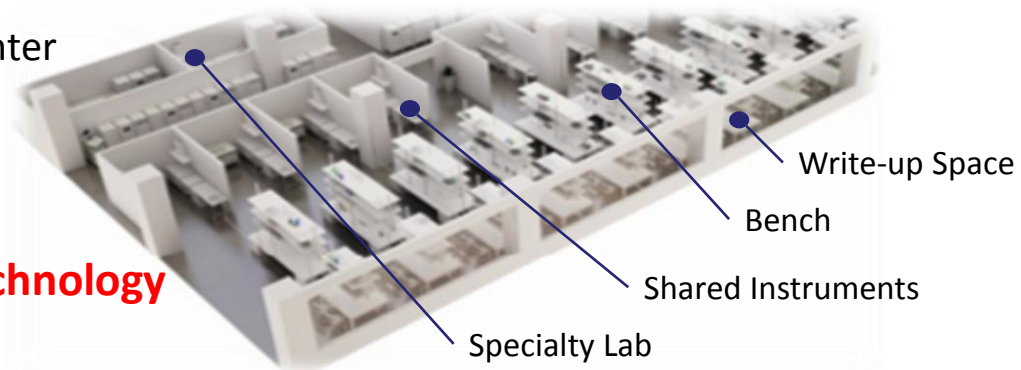


DCB/DCC is Located in National Biotechnology Research Park (NBRP)

Intelligent Green Buildings at NBRP



- Bldg. A: Translational Medicine Research Center
- Bldg. B: Core Thematic Research Center
- Bldg. C: Innovation Incubation Center
- Bldg. D: Bioinformatics Service Center
- **Bldg. E: Development Center for Biotechnology**
- Bldg. F: Food and Drug Administration
- Bldg. G: National Laboratory Animal Center



Successful Examples (2011~2017)

Licensing



Academic Industrial Collaborations

Start-up



Thank You for Your Attention

