

*Joint Research –  
Examples of  
Good Practice and  
Future Challenges*

**Prof. YC Heng**

Vice President

National Taiwan University of Science and Technology

# The History & World University Rankings of TAIWAN TECH

1974

Founded as  
The National Taiwan Institute of  
Technology

The first higher education  
institution in Taiwan's  
technological education system

1979  
Master  
Program  
started

1982  
Ph.D.  
Program  
started

1997

Renamed as  
**The National Taiwan  
University of Science and  
Technology**

## Times Higher Education 100 Under 50 Rankings



Year 2015

Ranked  
41



Taiwan

Ranked  
1

## Times Higher Education Global University Employability Ranking



Year 2016

Ranked  
73



Taiwan

Ranked  
1

(just published Times Higher Education Global University Ranking)

# Research Landscape - Germany



605,000 staff in R&D including  
361,000 researchers

Gross domestic expenditure on research and  
development 80 bn euros

Almost 1,000 publicly funded  
research institutions

Grants and fellowships supporting  
52,000 international researchers

500 innovation clusters and  
networks

 **Fraunhofer  
Headquarters**



# Academic Cooperation between Taiwan & Germany (2015)

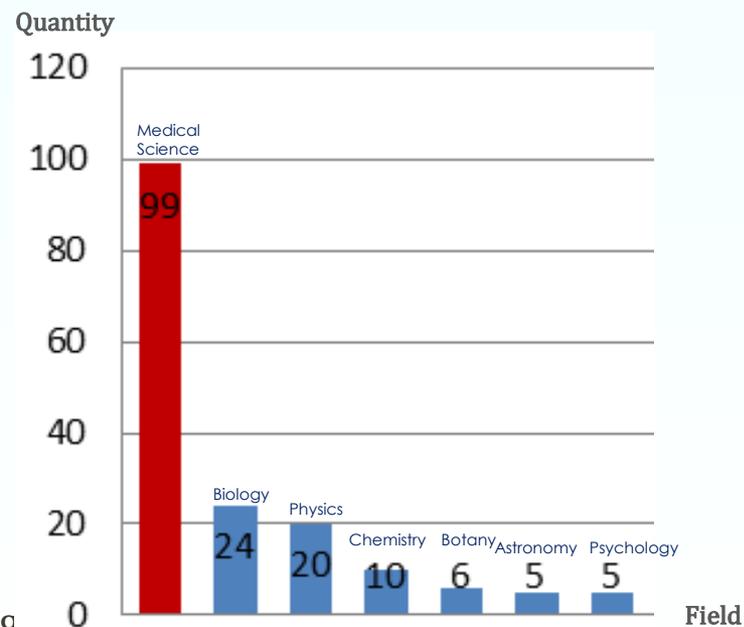
- 189 papers
- Top 3 Research Fields & Institutions

- Research Fields

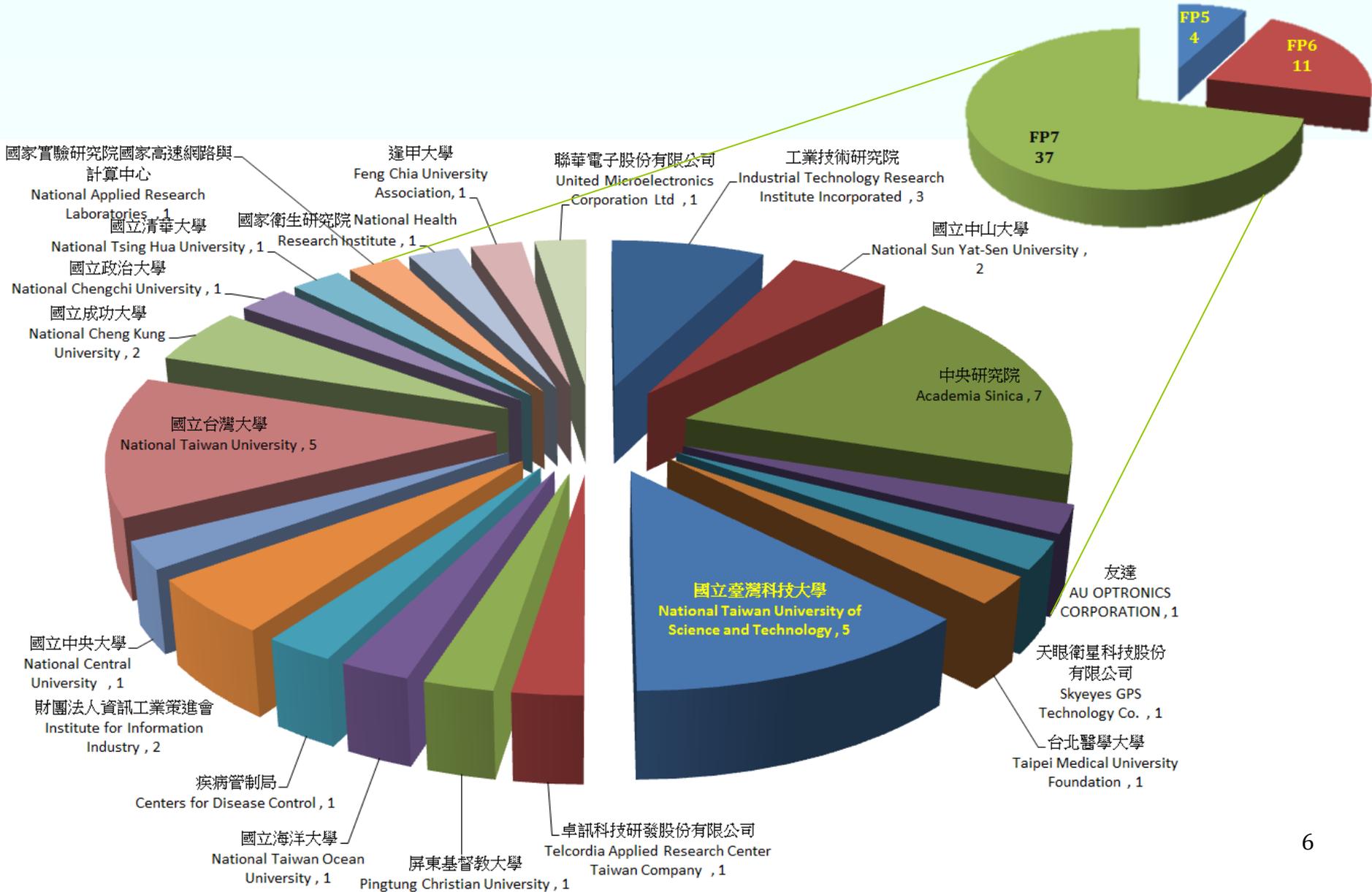
- Medical Science
- Biology
- Physics

- Institutions

- National Taiwan University
- Academia Sinica
- Chang Gung University
  
- Ruprecht-Karls-Universität Heidelberg
- Max-Planck-Institut für Sonnensystemforschung
- Hamburger University



# Taiwan's Participation in EU FP Projects



# Taiwan's Participation in EU FP7 EcoShopping Projects

## EcoShopping

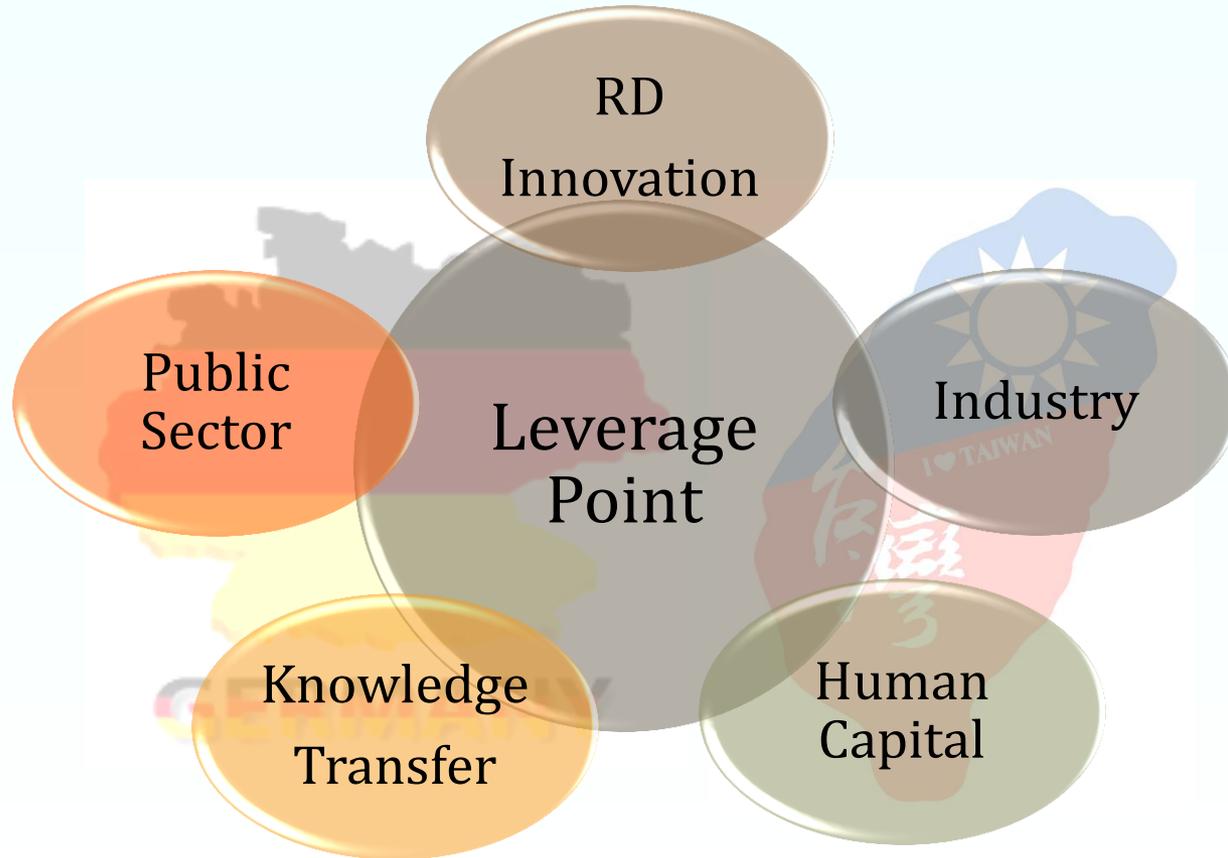
### Energy efficient & Cost competitive retrofitting solutions for Shopping buildings (2013-2017)

#### ➤ Participants:

- 16 Institutes (ENERGOSYS, SOLINEL, AIT, ISA, NOVAMINA, IZNAB, ANCODARQ, GeoClimaDesign AG, CNR, SYMelec, BRE, RED, YASAR UNIVERSITESI, NTUST)
- 11 countries (Hungary, Germany, Spain, Austria, Portugal, Croatia, Poland, UK, Italy, Turkey, Taiwan)



# Industry-Academia Cooperation



# Cultivation of Seed Instructors and Students Oversea

- **Collaborated with RWTH Aachen University International Academy**
  - **2016 Summer school program for seed teacher**
    - Mid-Sept. 2016, 3-week courses
    - Subject: Introduction of Industry 4.0
    - Selected seed instructors from partner universities
    - Financial support from Taiwan's Ministry of Education
  
  - **2016 Summer school program for students**
    - 2016/8/8-2016/8/26, 3-week courses
    - Subject: Production Technology meets Industry 4.0
    - Selected 10 students from partner universities
    - Financial support from partner universities

# Industry 4.0 Implementation Center

## ➤ Equipment Setup



# Industry 4.0 Implementation Center

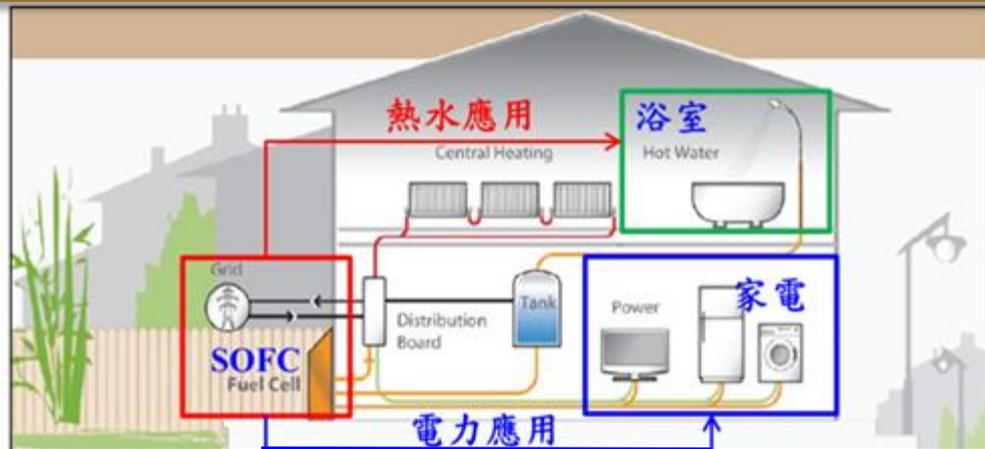
## ➤ Industrial Partners



# The cooperation of SUNFIRE (GmbH) , CHINA STEEL (R.O.C) and NCU

- Sunfire supplies CHINA STEEL with 50KW Solid Oxide Fuel Cell (SOFC).
- Sunfire's SOFC technology uses a ceramic solid electrolyte to convert fuel into electric power and heat at an operating temperature of around 800°C.
- CHINA STEEL is developing (1) Combined Heat and Power System, CHPs 、 (2) manufacture of BOP (the balance of plant of a SOFC) system 、 (3) marketing, sell and service of BOP system. We anticipate the market scale is about 8 billion TWD 。
- **Prof. Tseng, Chung-jen (NCU) promoted the cooperation between Sunfire and China Steel.**

## HIGH-PERFORMANCE ENERGY BUNDLE FOR RESIDENTIAL BUILDINGS



# Global pioneer-Thermoablation Needling Instrument with Tissue Injection

## Clinical Demands

- Develop anti-adhesion, stable electromagnetic & Thermoablation Equipment
- Operate suction / injection (dosing, sterilization, anesthesia area, burning with hot circulating cooling) on the affected area, reducing the number of times the needle pining the area to improve the clinical applications and convenience

- Needles and ancillary equipment development / Inspection
- Needle fine features and processing
- Anti-adhesion / heat treatment technology
- Multi-function needle design and development
- Testing Product Technology
- Trial production

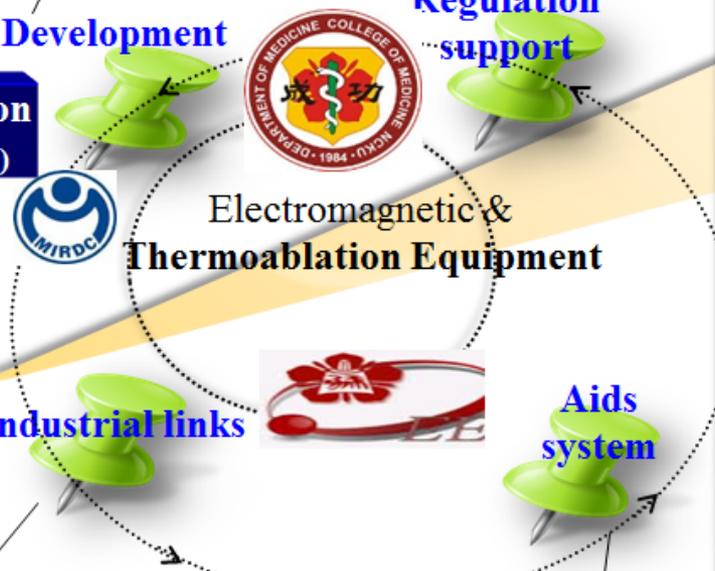
- Planning and execution of clinical trials
- Design / safety / efficacy trials of product
- Preclinical product testing
- Official Application
- Product feasibility assessment



## Device Development

## Regulation support

## The Research Planning of Innovation & Advanced Technology (FY2012)



Electromagnetic & Thermoablation Equipment



- Technical Features
  - ✓ **Multi-functional injection certainly decreases** the frequency of pining
  - ✓ The use of electricity principle to destroy the tumor tissue by heating the tumor cells within the magnetic field
- Patent portfolio
  - ✓ Electromagnetic & Thermoablation injection contains 9 patents domestic and international

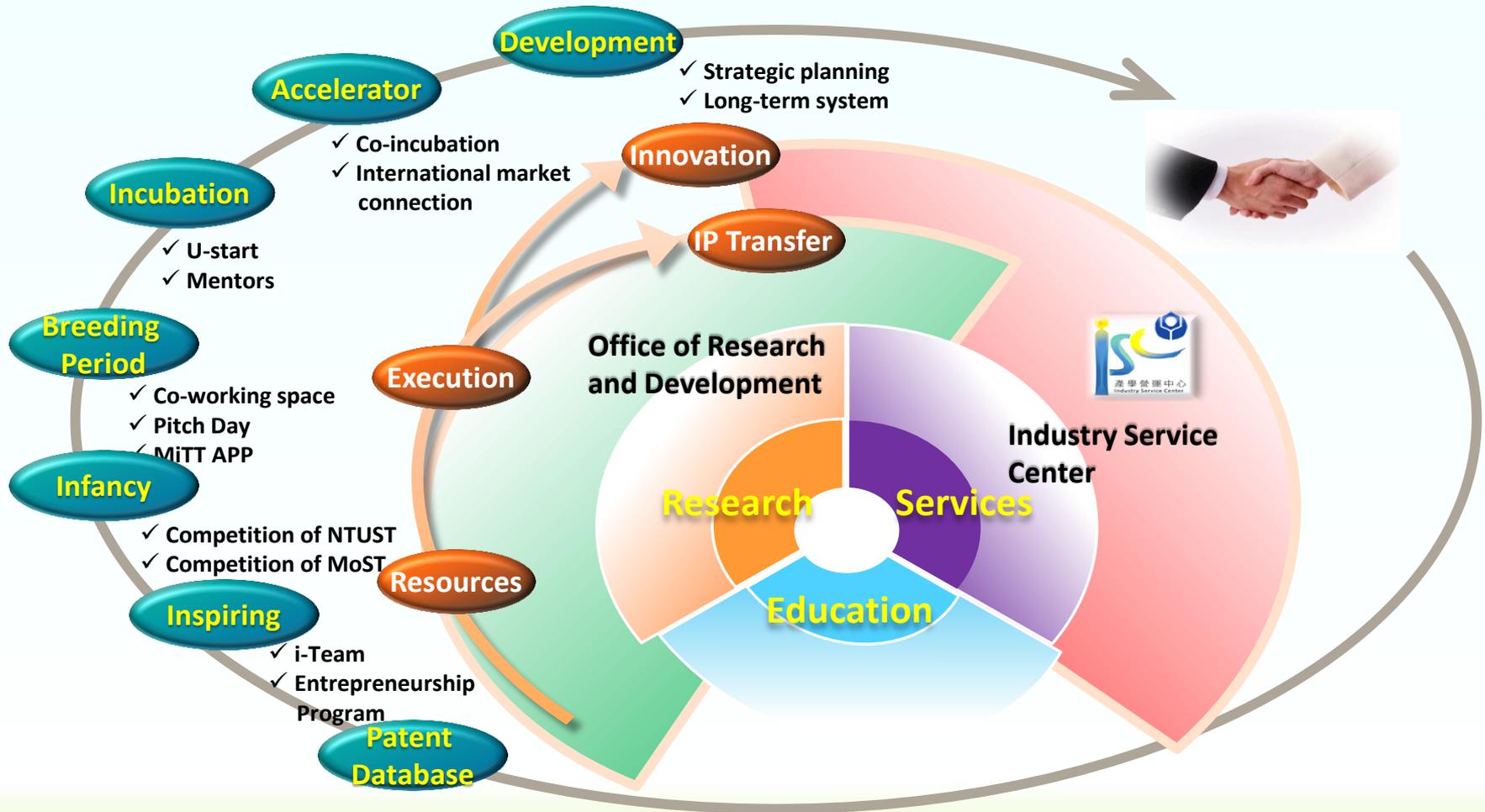
- ✓ Chun-Yu Bio-Tech (alloy process), Fairy Plover (syringes), UNEEC (MIM machining)
- ✓ Earning MED. Company

Development & system certification of high efficiency, high depth magnetic field and application coil

- **Completed** Electromagnetic & Thermoablation needling in 4 different products, also applied for clinical test
- Application in liver, and thyroid indications
- **Won Concours Lepine Innovation Show in Paris- Invent Awards Gold Medals**
- Recognized by the International Standard Test, make it be on the market in a short period of time
- Create production value of future profit above \$0.1 billion NT dollars for domestic liver cancer curing
- **Facilitate** a Startups **Earning MED. Company** to apply in pet treatment

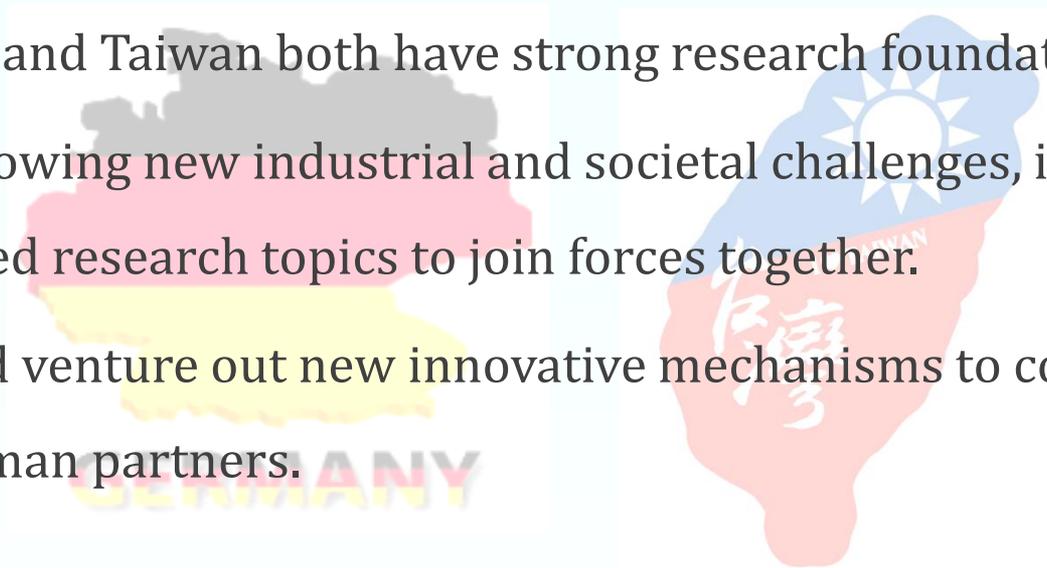


# International joint research's overall eco-system



# Conclusion

- Germany and Taiwan both have strong research foundations.
- Facing growing new industrial and societal challenges, it make sense, on selected research topics to join forces together.
- We would venture out new innovative mechanisms to collaborate with German partners.



# Thank you for your attention!

