



**Asia-Pacific
Economic Cooperation**

2009/SOM1/IPEG/SEM/012

Session: 5

Technology Transfer Experience in Thailand - NSTDA

Submitted by: National Science and Technology Development Agency



**From Mind to Market: The Highs and Lows of
Technology Transfer
Singapore
23-24 February 2009**



**National Science and Technology
Development Agency**

TT Experience in Thailand, NSTDA

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Vice President, NSTDA

Executive Director, Technology Management Center ,NSTDA

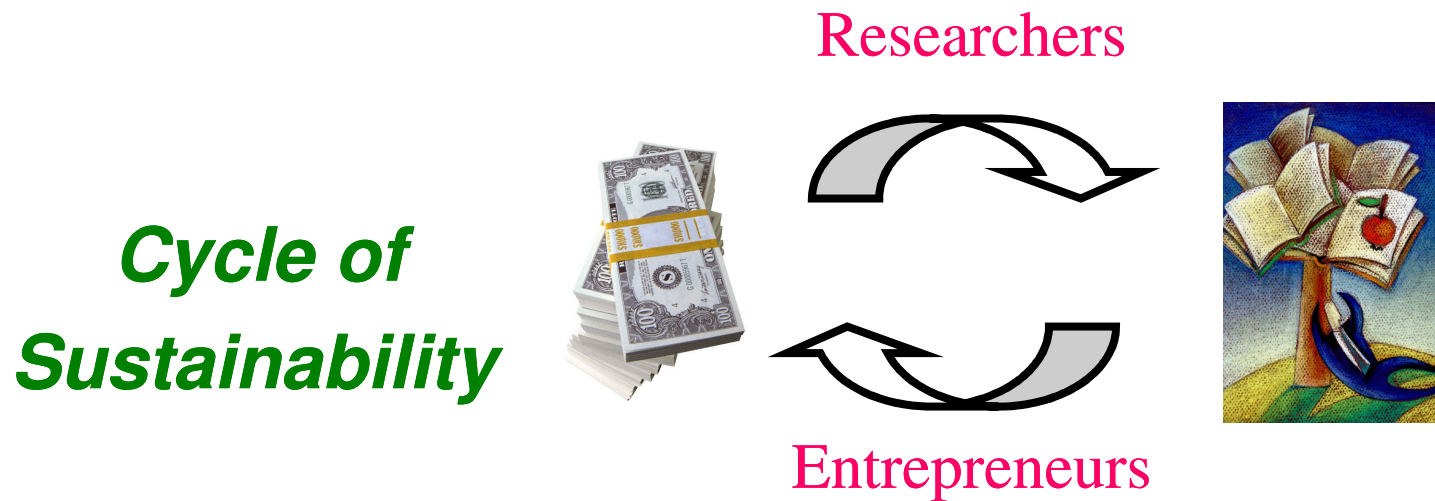
Past President, International Association of Science Parks (IASP)

The 28th APEC-IPEG's Capacity Building Seminar on Technology Transfer :

Grand Copthorne Waterfront Hotel, Singapore

23-24 February 2009

Philosophy for Commercialization of R&D



Researchers turn Money into Knowledge

Entrepreneurs turn Knowledge into Money

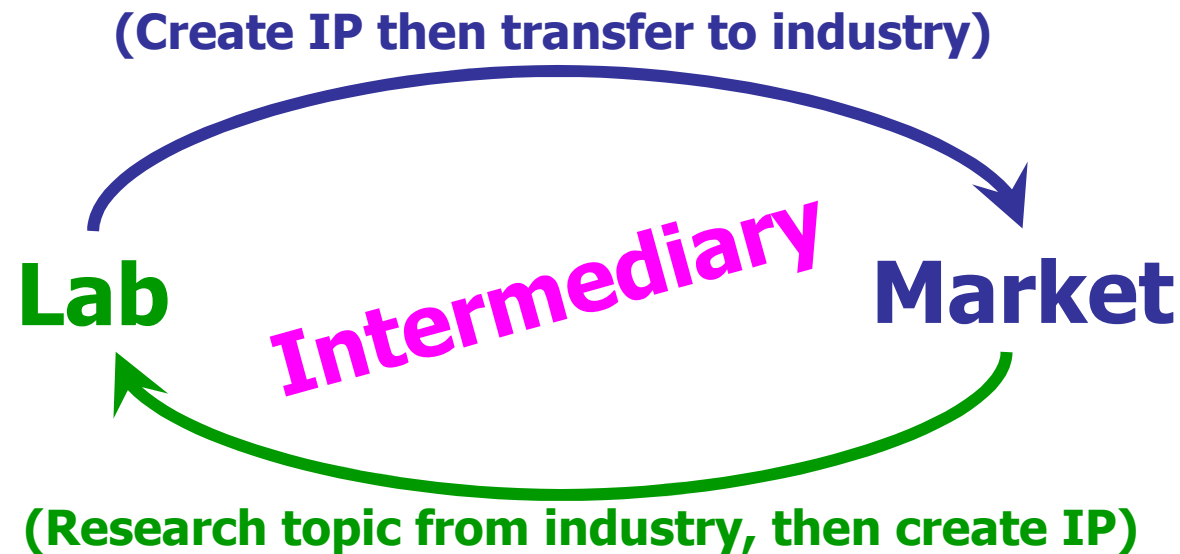
How to manage:

- *From Lab to Market???*
- *From Market to Lab???*

Approaches to commercialization of R&D and commercializable R&D

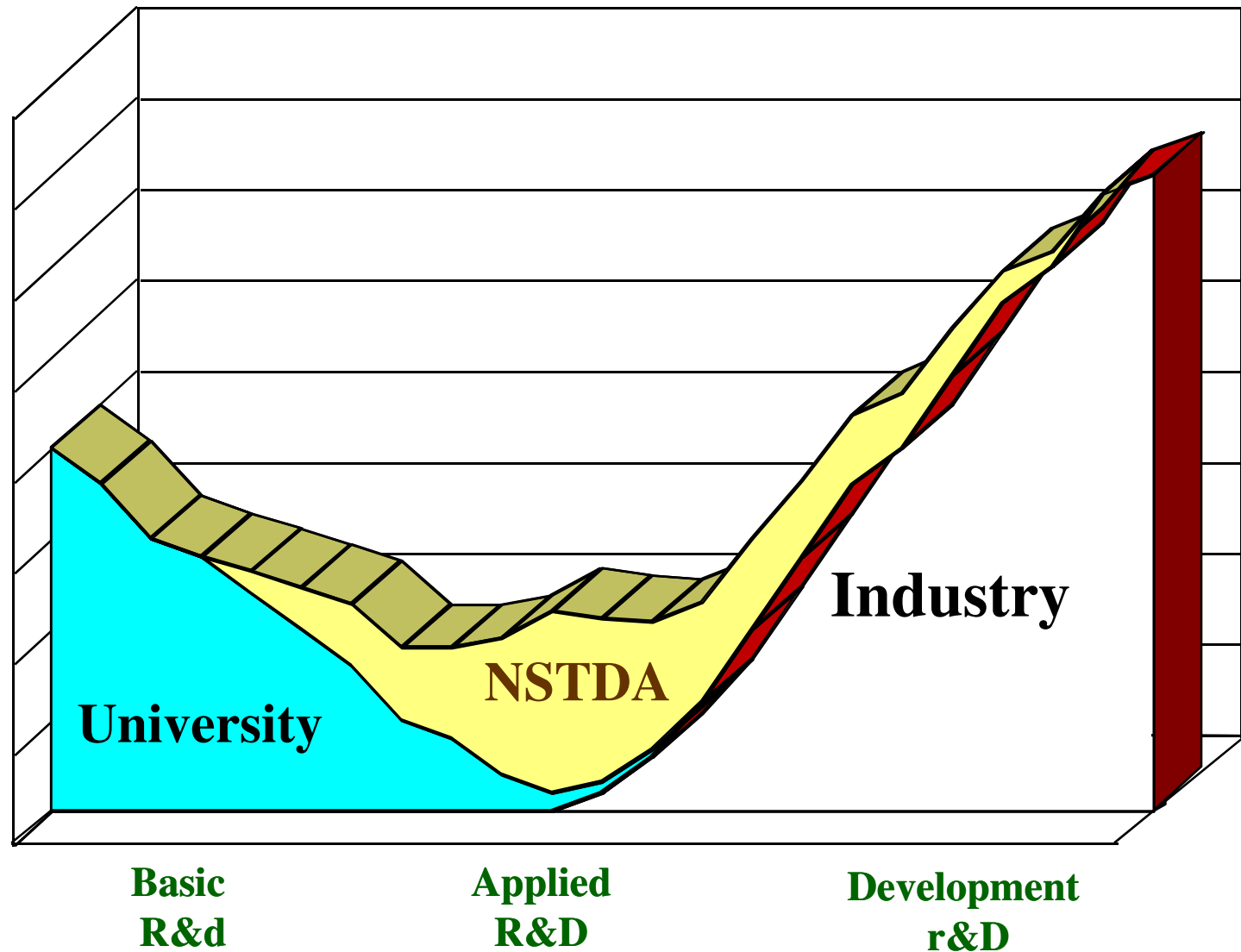
1. From Lab to Market
2. From Market to Lab

Role of Intermediary is essential



Positioning of NSTDA

A Bridge between Knowledge Institutes and industry



National Science and Technology Development Agency (NSTDA)

Science and Technology Development Act 1991

NSTDA

**National Center
for Genetic
Engineering and
Biotechnology
(BIOTEC)**

**National
Metal and
Materials
Technology
Center
(MTEC)**

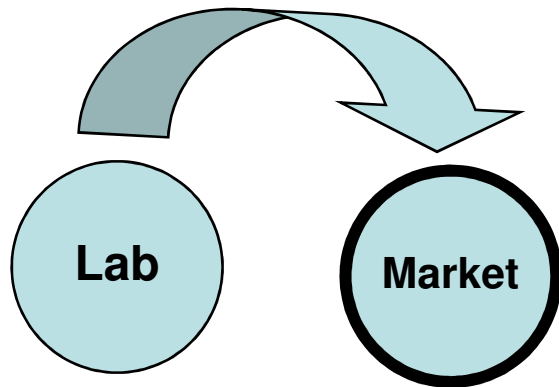
**National
Electronics and
Computers
Center
(NECTEC)**

**National
Nanotechnology
Center
(NANOTEC)**

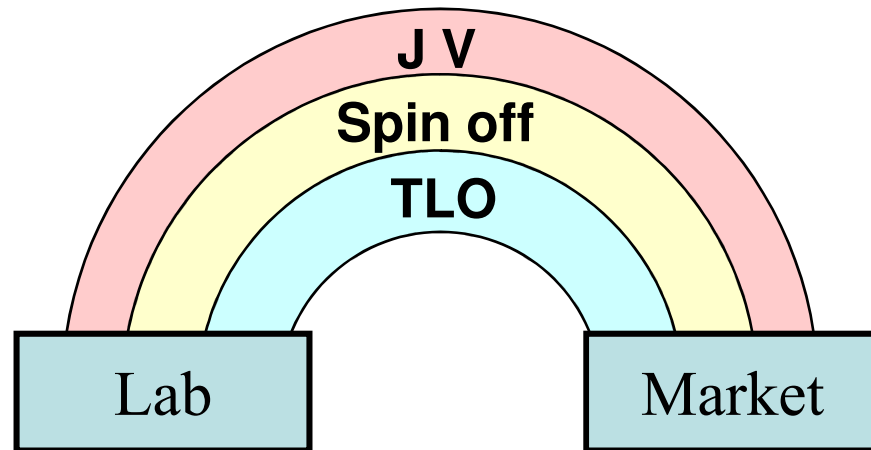
**Technology
Management
Center
(TMC)**

Lab to Market : Commercialization of R&D

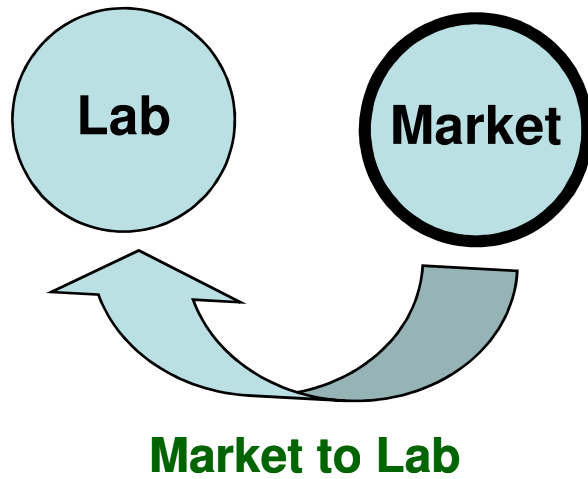
Lab to Market



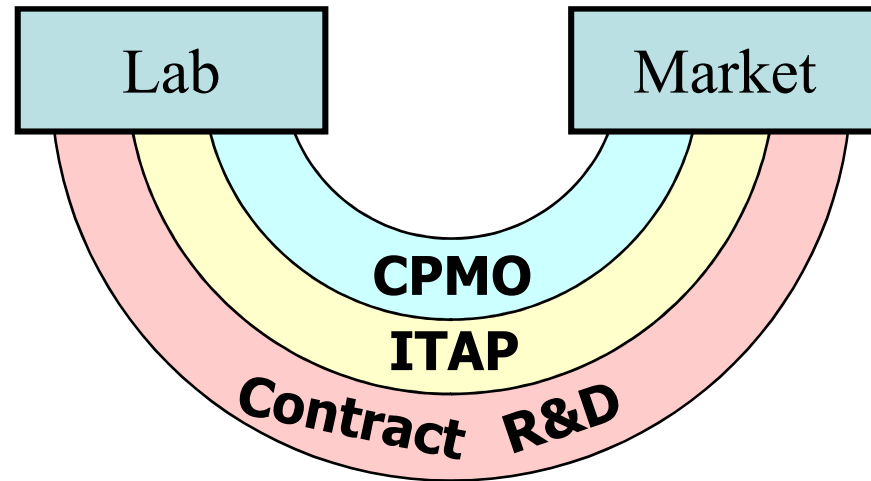
NSTDA Mechanisms



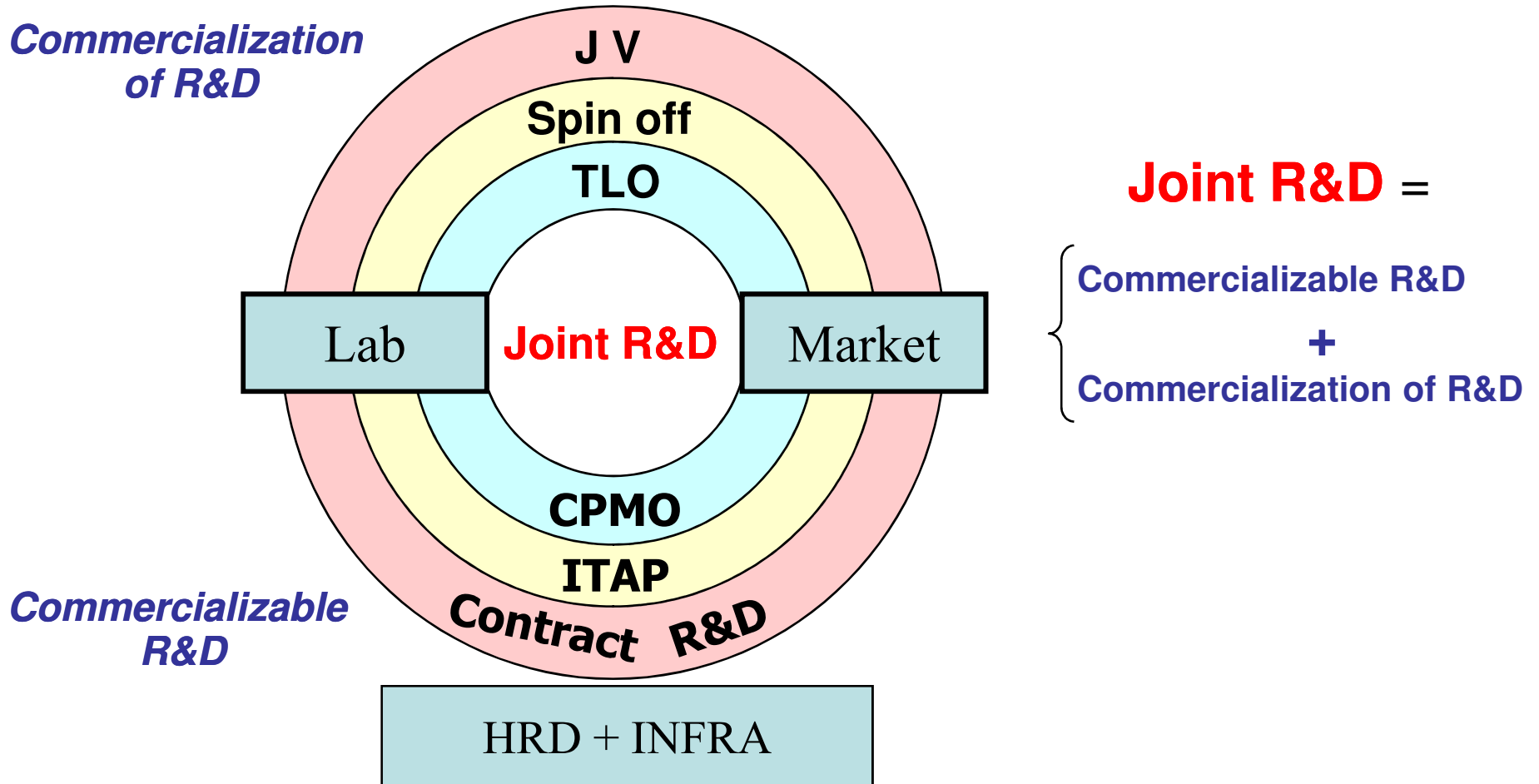
Market to Lab : Commercializable R&D



NSTDA Mechanisms



Technology Transfer



Lab to Market

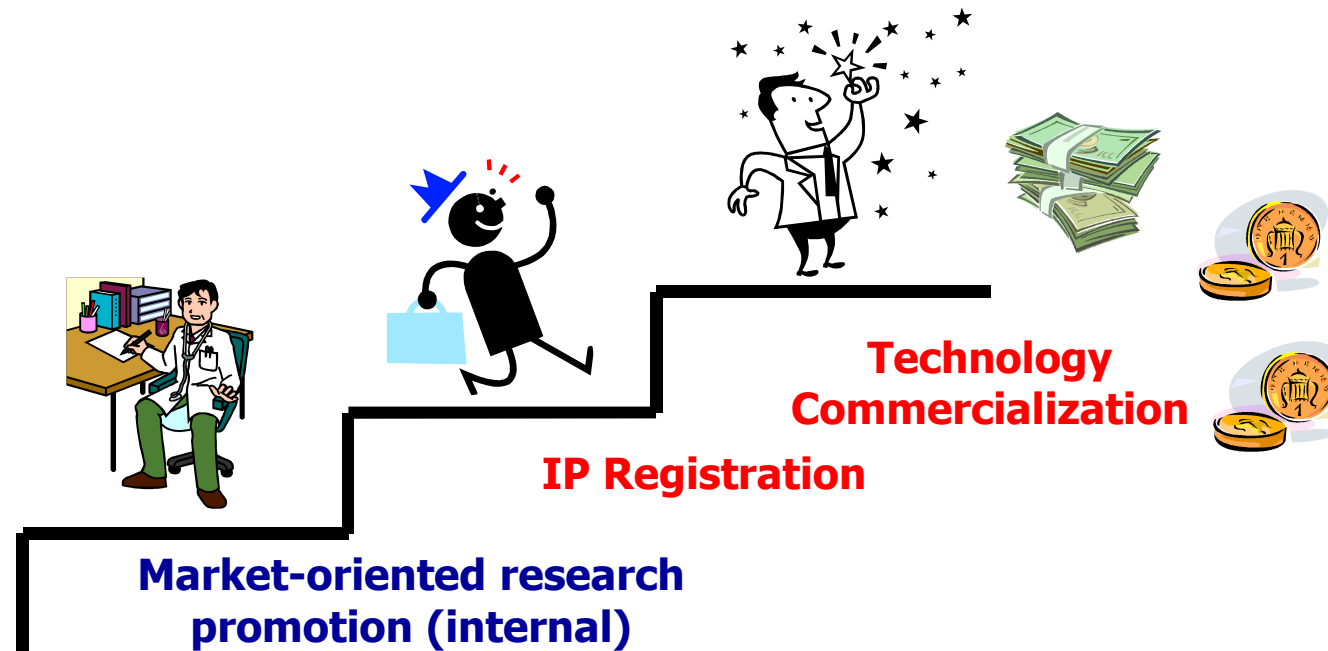
MECHANISMS:

- Carry out applied R&D
- IP Protection
- Technology Licensing
- Spin-off Researchers
- Joint Venture Company
- Financial Assistance

} TLO
function

Technology Licensing Office (TLO)

- Manage NSTDA's intellectual properties
- Market NSTDA's IPs
- Develop internal IP policy and regulations
- Provide IP service to SMEs



Example

Licensing Partnership: Commercialization of Dental Implant

- **ADTEC (Advanced Dental Technology Center)** is a university spin off which carries out collaborative research with NSTDA in TSP
- **Wants to license technology for making titanium dental implant (currently 100% imported)**
- **User of product needs service from dentist**
- **Dentist needs training in use of new product (implant by surgery)**
- **TLO helps ADTEC license to local company and sign MOU with 10 Dental Schools to implement workshops for dentists and students**

Example

Spin-off + Licensing Partnership: Commercialization of RFID Technology

- NSTDA researcher develops RFID technology
- Government procurement for RFID chips as animal tags
- NSTDA **researcher spins off** to set up company & NSTDA licenses technology to new start-up company
- NSTDA collaborates with start-up company to further develop RFID technology

Example

Spin-off + Investment Partnership : Commercialization of Diagnostic Kits

- NSTDA funds university researcher in medical biotechnology
- Researcher develops diagnostic methods for Hepatitis B and C virus, Cholera, Dengue
- Researcher **starts-up new company** to produce diagnostic kits with NSTDA as co-investor (joint venture partner)
- New company continues research in new diagnostic methods

Example

Investment Partnership : Commercialization of DNA Technology

- NSTDA's DNA Technology lab carries out R&D from which the lab develops services *eg.* GMO testing, DNA fingerprinting, DNA Marker Development, DNA Diagnosis
- To grow the services NSTDA splits up the lab to keep the R&D within NSTDA and spin out the services.
- NSTDA is partnering with private sector to **set up Joint Venture company** for commercialization of services
- The DNA Technology lab can continue to commercialize its future technology through this JV company

Example

Joint R&D + Investment Partnership : Commercialization of Advanced Ceramics

- NSTDA dispatches researchers to carry out **collaborative research** in advanced ceramics in a company in the U.K.
- The U.K. company has very strong links with Cambridge University labs
- After 4 years the U.K. company decides to bring its production base of advanced ceramic products to Thailand
- NSTDA is partnering with the U.K. company to set up a **joint venture Thai company** which will be a breeding ground for further R&D collaboration as well as commercialization of the fruit of R&D

Example

Financial Partnership : Commercialization of Biogas Generation Technology

- Tapioca flour mill needs appropriate technology for their waste water treatment
- NSTDA has technology for Biogas Generation from waste water from tapioca mills
- NSTDA partners with bank to **provide low interest loan** to enable flour mill to invest in the waste water treatment technology (approx. \$1.5m)
- After demonstrating the viability of this technology, NSTDA is able to commercialize the technology to many more companies

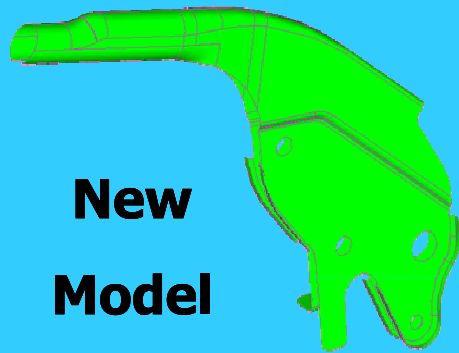
Market to Lab

Mechanisms :

- **Contract R&D**
- **Joint R&D**
- **Consultancy Service (builds relationships that can lead to contract R&D and Joint R&D)**
- **Provision of Facilities *eg.* SP, SWP, Incubators**

Contract R&D

Hand Break for Sedan



Project to improve performance of traveling unit of 155 mm towed howitzer

Rapid Testing Kit for Yellow Head Virus and GAV (Gill Associated Virus) in Black Tiger Shrimp



Project to improve quality of Small Pearl Tapioca (เม็ดสาคู) for Beverage



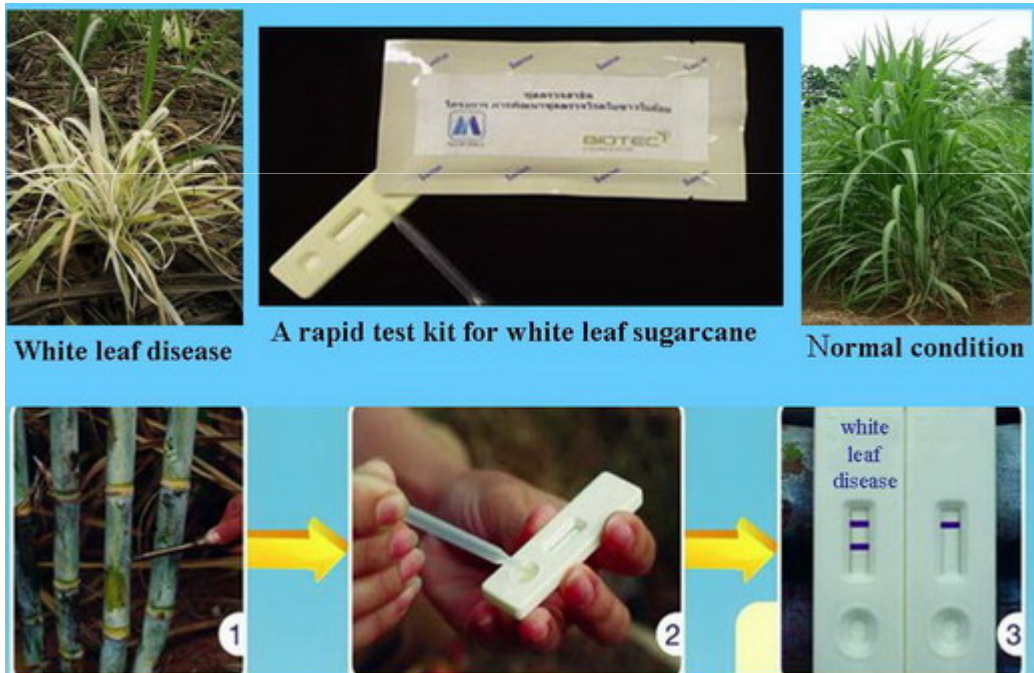
Joint R&D

Ultimate goal in public-private partnership in R&D

- Joint R&D with private sector (in line with NSTDA's strength) such as
 - Novartis + BIOTEC
 - Shisheido + NANOTEC
 - Betagro + BIOTEC
 - Siam Cement Group + MTEC
- NSTDA's International Co-operation Office for Co-ordinating international partners and Alliance Development Office for domestic partners

Examples of Joint R&D

BIOTEC & MITR PHOL (Rapid Test Kit for White Leaf Disease in Sugarcane)



BIOTEC & MITR PHOL
(Prototype Equipment for Determining Sucrose in Sugarcane Juice)



Examples of Joint R&D



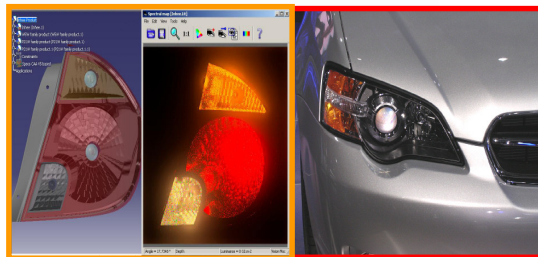
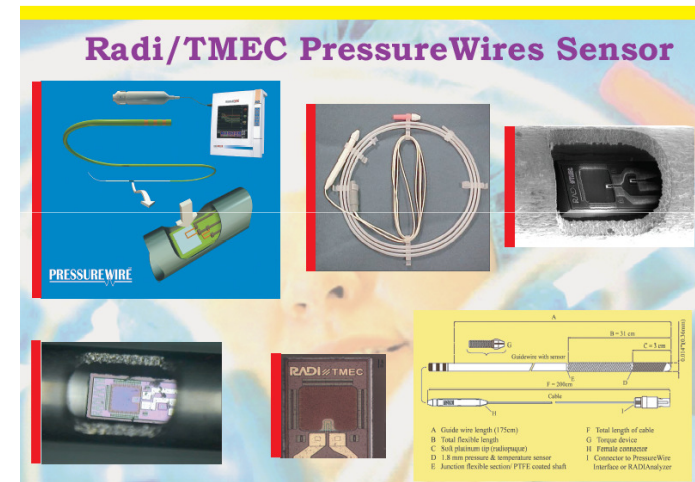
MTEC & Yamaha (Foldable Side Mirror)



MTEC & TAMRONGTHAI 2003
(Chassis Engineering Design for Motor Tricycle)



TMEC & RADI Medical System (Blood Pressure Sensor MEMS)



MTEC & Wichien Dynamic Industry
(Automotive Lighting)

NECTEC & PTT
[Electronic Control Unit (ECU) & Energy Management]



Consultancy Service

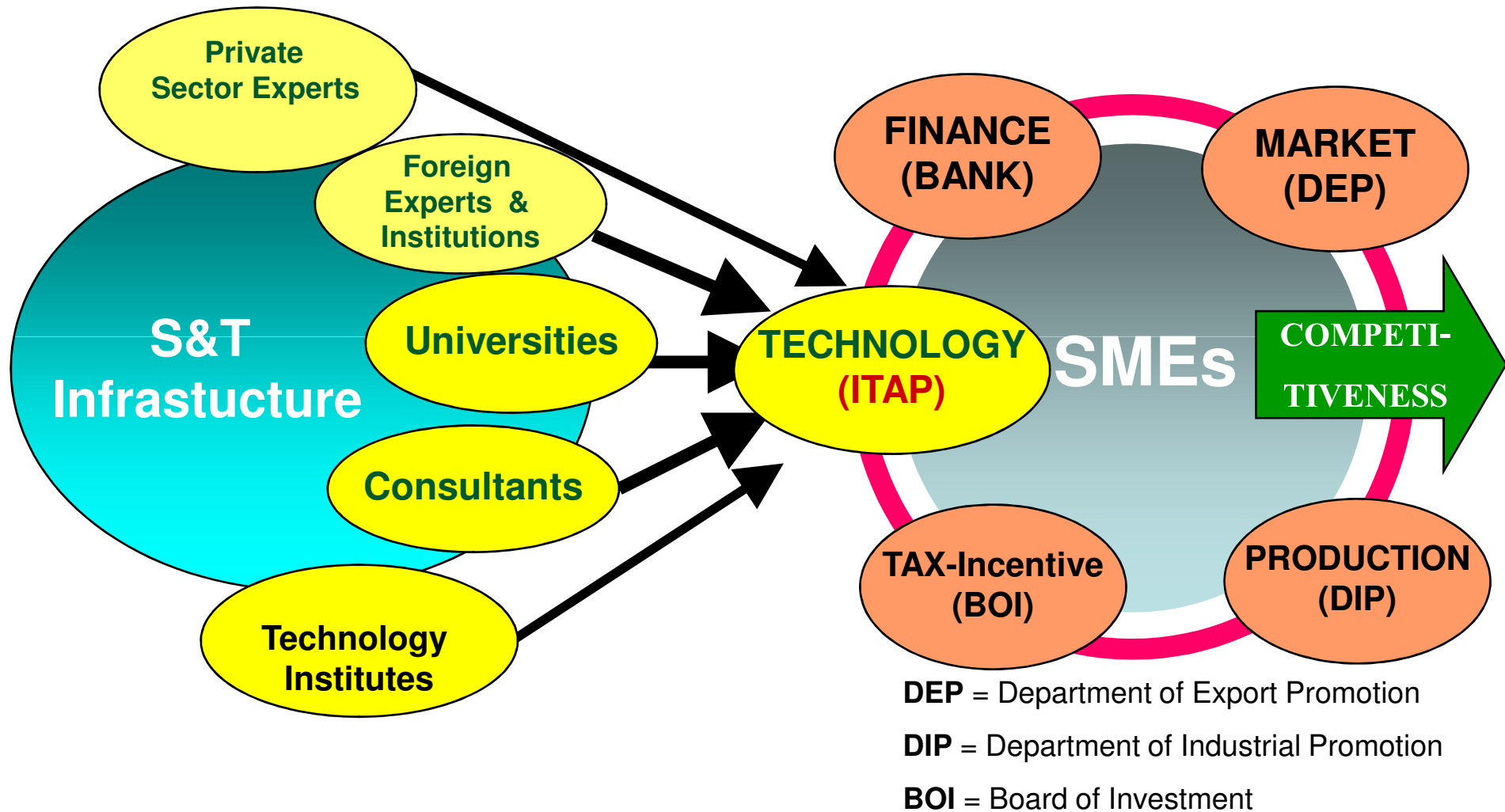
Industrial Technology Assistance Program (ITAP)

① “ *...investigates and solves technical problems, upgrades technology in firms...* ”

- Diagnose production problems, source local or overseas experts to solve problems, subsidize expenses
- Attach local university people to overseas experts, help technology transfer to firms and universities
- Promote university researchers as experts, create industry-university linkage, *encourage collaborative and contract R&D*

② “ *... assists the private sector to search for, and acquire appropriate technology...* ”

iTAP : Technology Solution Provider



Examples

Rubber Track for Tractors

First manufacturer in Thailand



Challenges

- Want to create high value products from natural rubber
- New Regulation : Rubber Tire substitute Metal Track for environmental friendly tractors

Support from ITAP

- Specialist from China to develop new design and process of rubber track

Outcome

- First in Thailand to market the 100% natural rubber track
- Create new brand "Star Track"
- Set up new company for new market opportunity
- 95 MBaht Export to EU in first year
- Set up R&D Unit in Thailand Science Park

Mould Mate

B International and Technology

Atmosphere control for closed system poultry farm

VENTTECH
VC-1
Ventilation Controller

- ควบคุมการทำงานของพัดลมได้ 7 Step ขึ้นไป 1 Step
- มีระบบควบคุมที่แม่นยำและเชื่อถือได้ในระบบอัตโนมัติ
- สามารถตั้งพารามิเตอร์ได้ตามความต้องการใช้งาน
- สามารถใช้กับพัดลมที่มีแรงดันไฟฟ้า 220V-240V
- มีระบบป้องกันการลัดวงจรและไฟไหม้
- มีสายการเชื่อมต่อพัดลมได้ 7 ช่องที่ติดตั้งด้วยหน้า
- ได้ 100 วัน และรองรับในตู้ควบคุมเมื่อไฟดับ

- ตัวเครื่องและชุดหัว Sensor สามารถเชื่อมกับระบบควบคุม
- หัว Sensor จำนวนอุณหภูมิ 0-100 °C ความละเอียด 0.1 °C
- หัว Sensor จำนวน RH 10-99% ความละเอียด 1% RH
- หัว Sensor สำหรับสัญญาณในระบบมาตรฐาน 4-20 mA เพื่อป้องกัน
- การลัดวงจรของสัญญาณ
- หัว Sensor มีไฟกระพริบเพื่อแสดงสถานะการทำงานของ
- หัว Sensor อุณหภูมิ 4 จุด (ภายในโรงเรือน 3 จุด ภายนอก 1 จุด)
- หัว Sensor RH 1 จุด
- หัว Sensor สามารถเชื่อมกับโมดูลในกรณีไม่ใช้งาน หรือทำการ
- ต่อสายการเชื่อมต่อ (RCA Quick Jack)

- สามารถเชื่อมต่อกับระบบควบคุมอัตโนมัติ
- ใช้งาน Parameter ได้โดยไม่ต้องสัมผัสตู้
- ได้ 3 ไร่/เดือน
- มีสาขาที่ผลิตและจำหน่ายอุณหภูมิ, ความชื้น, การทำงาน
- ของระบบทั้งหมด

Challenges

- Need to import control system from abroad
- Imported system need modification to use in local environment

Support from iTAP

- Specialist from KMUTT for design and prototype

Outcome

- Developed system is more suitable for local environment
- Serves user specifications better compared to imported system
- Substitution for import: local market demand ~50,000 units

Bedtime milk ... for deep sleep



Dairy Home Co., Ltd.



Challenges

- To determine melatonin content in fresh milk
- To produce pasteurized milk with high melatonin content

Support from iTAP

- R&D by Thai specialist to increase melatonin in fresh milk
- Analysis of remaining melatonin after pasteurization

Outcome

- New product : High-melatonin pasteurized milk
- Patent filed

Carpet Maker



Challenges

- How to upgrade to upper market (made-to-order carpets)
- Need enormous variety of color shades

Support from iTAP

- Specialist from Thai University to develop dyeing process, quality control room and new dyeing facilities

Outcome

- High accuracy of dyeing process
- Set up standard color matching lab
- > 10,000 new color shades produced from new process

iTAP Network

Central Region

- Thailand Science Park, NSTDA

Northern Region

- Northern NSTDA (Chiangmai) (NNSTDA)

Northeastern Region

- Khonkaen University (KKU)
- Maha Sarakham University (MSU)
- Ubon RaJathanee University (UBU)
- Suranaree University of Technology (SUT)

Western Region

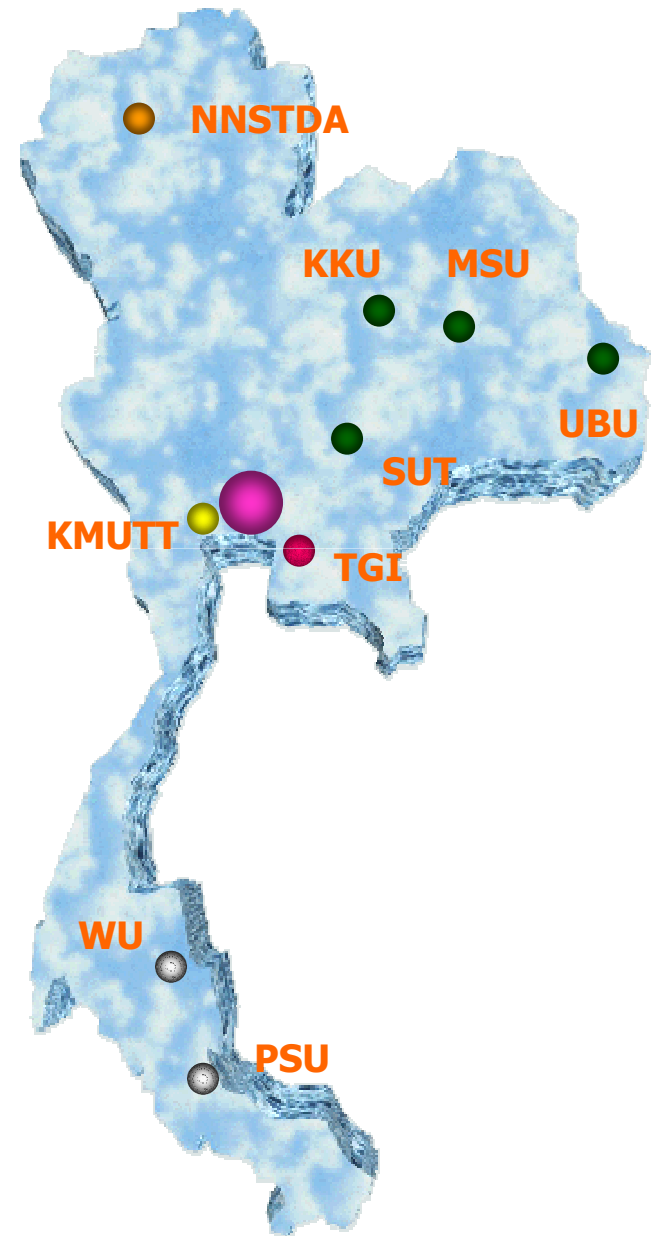
- King Mongkut's University of Technology Thonburi (KMUTT)

Eastern Region

- Thai-German Institute (TGI)

Southern Region

- Walairak University (WU)
- Prince of Songkla University (PSU) (2 Nodes)



Provision of Facilities Thailand Science Park

- **Build up collaboration between public and private sector researchers**
- **Knowledge, technology and information exchange**
- **Use of laboratory and hi-tech equipment**
- **Incubator for start-up companies**



Phase 1

- Total area 140,000 sq.m.
- number of tenants 62 Thai 75%: Foreign 25%
small 70% medium 15% large 15%
- Employment > 500 positions 60% are researchers



Thailand Science Park Phase 2



State-of-the-art R&D facilities
120,000 sq.m. of space
one 13-story tower
three 10-story buildings

construction already began in
2007, and will be fully completed
in 2010



Private sector support

Technology

- Information and technology acquisition
- Industrial consultancy
- Testing and analytical services
- Contract/Joint research

Financial

- Research Grant
- Soft loan
- Joint investment
- Tax incentive program for R&D expenditure

Infrastructure

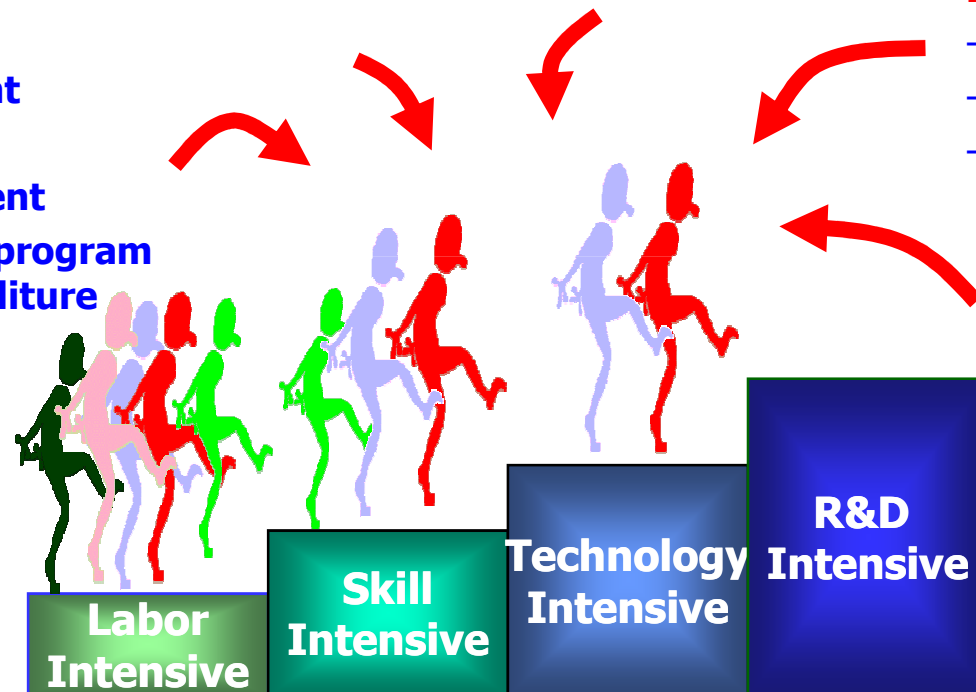
- Thailand Science Park
- Software Park Thailand

Human Resource

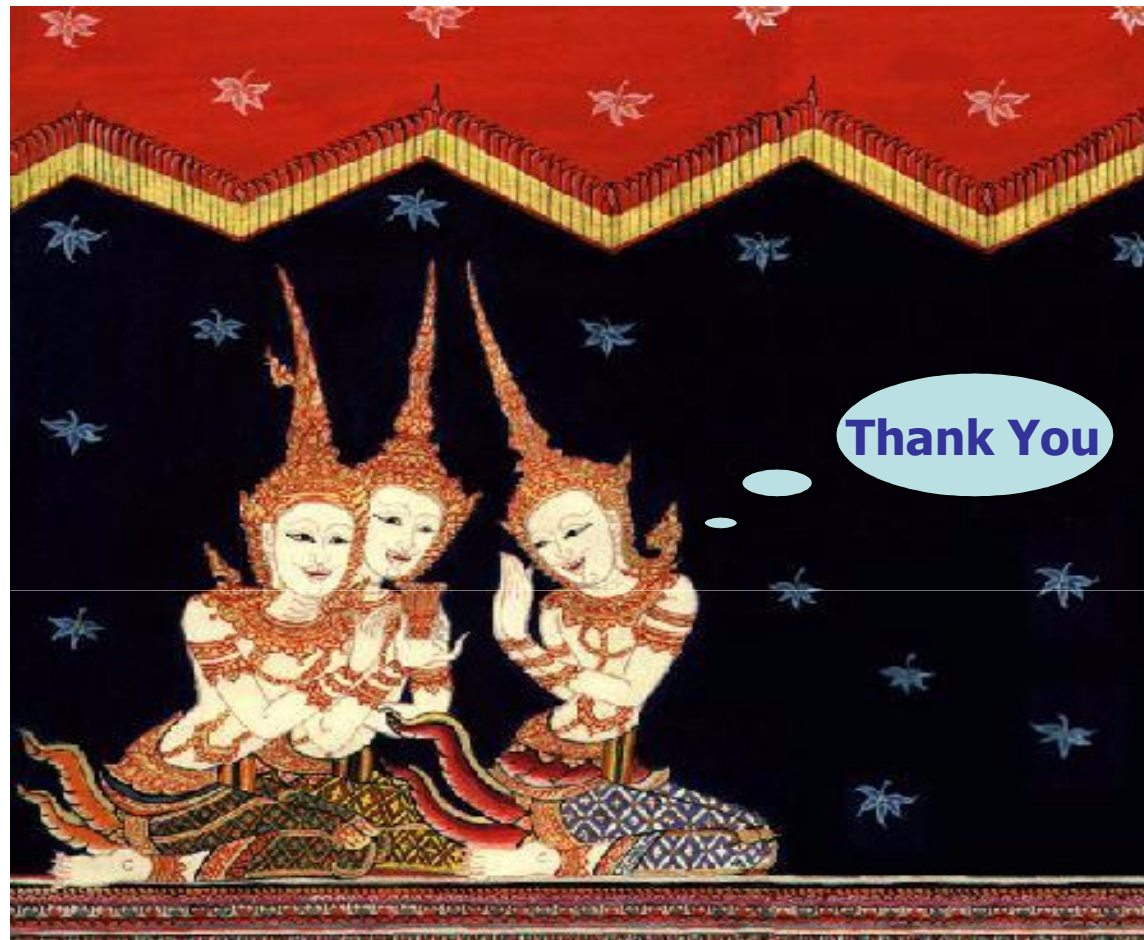
- Training
- Specialist database
- specialist recruitment

Business and IP

- Technology Business incubation
- IP management
- IP commercialization



**NSTDA already supported
more than 2,500 companies**



BIOTEC
a member of NSTDA

**ศูนย์
NSTDA**

TMC
a member of NSTDA

MTEC
a member of NSTDA

NECTEC
a member of NSTDA

NANOTEC
a member of NSTDA