

# Industry 4.0 in Thailand

*Kanchana Wanichkorn  
National Science, Technology and Innovation Policy Office  
The 1<sup>st</sup> Khon Kaen Business Forum  
Khon Kaen, Thailand  
26 September 2017*





# Thailand 4.0 towards Innovative/Value based Industry : National Agenda



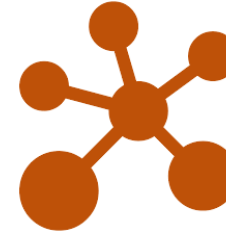
21<sup>st</sup> century human resources



Innovation driven enterprise



Enhance competitiveness of target industries



Strengthen 6 regions 18 provincial clusters and 76 provinces



Connect Thailand to the world

## 20-year Development Strategy

<b>Administrative Mechanism</b> <ul style="list-style-type: none"> <li>• Reform of Public Administration</li> <li>• Public-Private-People Partnership (Pracharat)</li> <li>• International Agreement</li> <li>• Law &amp; Regulation</li> </ul>	<b>Physical Infrastructure</b> <ul style="list-style-type: none"> <li>• Water</li> <li>• Forest</li> </ul>	<ul style="list-style-type: none"> <li>• Environment</li> </ul>
	<b>Connectivity Infrastructure</b> <ul style="list-style-type: none"> <li>• Digital network</li> </ul>	<ul style="list-style-type: none"> <li>• Transportation and logistics</li> </ul>
	<b>Intellectual Infrastructure</b> <ul style="list-style-type: none"> <li>• Education and learning network</li> <li>• Research &amp; Development</li> </ul>	<ul style="list-style-type: none"> <li>• Science, Technology and Innovation</li> </ul>
	<b>Social Infrastructure</b> <ul style="list-style-type: none"> <li>• Welfare</li> <li>• Social immunization</li> </ul>	<ul style="list-style-type: none"> <li>• Health</li> </ul>

# 5+5 Target Industries: Shift 5 existing sectors towards more knowledge-based and high value added industries and create 5 new waves of the future

Short-medium term

Long term

## First S-curve:

- Food for the future
- Smart electronics
- Next-generation automotive
- High quality tourism
- Agro and biotechnology

## New S-curve:

- Bio-based energy and chemicals
- Digital industry
- Medical and health industry
- Industrial Robotics
- Logistics and aviation

# Industry 4.0 in Thailand 4.0 development context

- More than robotics, automation, artificial intelligence (AI) and Internet of Things (IoT)
- Modernization of Thai industries, especially SMEs, to **enhance competitiveness** by increasing the **technological base** through the development and integration of **digitalization** and other enabling technologies to **improve productivity and develop new products and services**.



Source: BMBF, Implementing Industrie 4.0, 2016

# SME Need Assessment for Common Technologies

## Electronics & Electric Appliance

- EV Prototype
- Super capacitor
- Lithium carbon battery for EV
- IoT (Software & Sensor)
- LED technology
- Smart factory
- Renewable Energy

## Food

- Beef cattle breeding
- Manufacturing standards
- Packaging for extending shelf life
- Food supplement for elderly
- Extraction technology from natural products
- Sensory testing/ technology
- Demand/Supply Analysis of Food Industry

## Petrochemical

- Upgrading manufacturing process
- Energy efficiency

## Construction Materials

- Energy saving house
- Green products
- Nanomaterial

## Machinery and Metal Works

- Industrial robotic and automation
- EV prototype
- Lithium carbon battery for EV
- Industrial fishery technology
- 3D printing and scanning
- Smart factory

## All clusters

- Software ERP/MRP/MES

## Fashion and lifestyle

- Trend analysis to investigate region, population and consumer demand
- Body scanning
- Innovation for medical textile, home textile, sportswear
- Natural fiber from waste

## Rubber and Para Wood

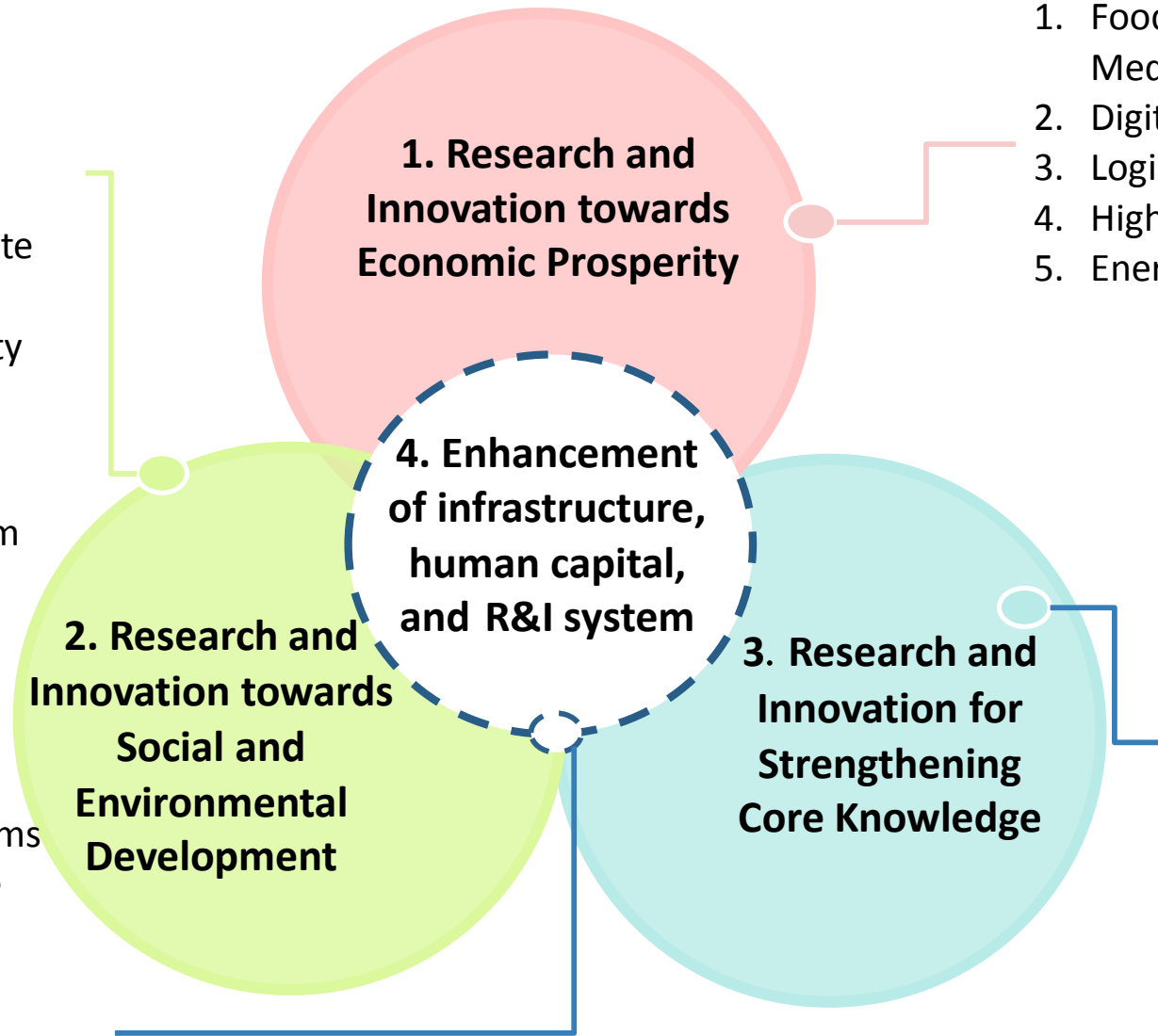
- Technology to analyze the rubber supply in Thailand and global market
- Rubber tapping machine
- Raw material preparation for farmers
- Compound material for tyre (light-weighted, better road adhesion, and low rolling resistance)
- Tyre recycling

# National Research and Innovation Strategy



1. Aging society and the Thai society in the 21st Century
2. Thai Citizen in the 21st Century
3. Public health and Wellness
4. Water management, Climate changes, and Environment
5. Urbanization and Smart City

1. Reformation of the national research and innovation system
2. Research personnel and networks
3. Research and Innovation management system
4. Economic Zone of Innovation
5. Incentive systems & mechanisms
6. National Quality Infrastructure
7. Scientific and technological infrastructures for enhancing agricultural and medical industries.



1. Food, Agriculture, Biotechnology and Medical Technology
2. Digital Economy and Information
3. Logistics
4. High value added services
5. Energy

1. Platform Technology
  - Biotechnology
  - Nanotechnology
  - Advanced materials
  - Digital technology
2. Fundamental social and humanities knowledge
3. Frontier Research

# Research and Innovation towards Economic Prosperity



## Research and Innovation Themes

### Food, Agriculture, Biotechnology and Medical Technology

Modern agriculture

High value added food and Functional Ingredient

Biologics

Medical devices

### Digital Economy and Information

Robotics and Automation

Unmanned Aerial Vehicle

Space industry technology

IoT and big data

Smart electronics and terminal endpoint technology

Digital content

### Logistics

Next generation automation

Smart logistics

Aviation

Rail transport system

### High value added services

Medical Services

Wellness Tourism

Community Based Tourism

Sustainable Competitiveness Tourism

### Energy

Biofuel

Bioenergy

Energy Efficiency

Energy Storage

# Proposed Spearhead R&I Programs for multi-year block grants

## Lot 1

- Modern Agriculture
- Biologics
- High value added food and Functional Ingredient
- IoT and Big data
- Smart Logistics

## Lot 2

- Robotics and Automation
- Digital Content
- Biofuel
- Energy Storage
- Medical Devices
- .....

## Lot 3

- Bioenergy
- Energy Efficiency
- Next generation automation
- .....



- Healthy, Productive Aging and Cohabitation of a multi-age population
- Thais and Youth 4.0
- Healthcare Service
- Water Management
- Regional and Provincial Development (Province 4.0)
- Zoning and land use

- Thailand to the World
- Government 4.0
- Climate Change
- .....

- Country Security
- Natural resource Management and Utilization
- Health Promotion and Disease Prevention
- Care and treatment system
- Smart and Livable Cities
- .....



# Example : Modern Agriculture plan (5-year)



## Application

Resource use efficiency	High productivity	Cost Saving	Reduce GHG emissions	Sustainable Agriculture and Consumption	Climate Adaptation	High value products	Bioeconomy
-------------------------	-------------------	-------------	----------------------	-----------------------------------------	--------------------	---------------------	------------

## Product Groups

Seed/Breeds	Smart farm						Post harvest	Safety & standard	
Seed/variety	Precision Fertigation	Precision Irrigation	Precision Pest Mgt.	Green house	Mechanization/ Automatic system	Forecasting and Early warning system	Biocontrol	packaging	Diagnostics/Sensors
Breeding stock	Feed/Dietary Supplement	Biosecure	Aquaculture system	Livestock production system	Traceability system	Pre/probiotic	Animal vaccine		

## Target to be achieved

- Agri tech are widely used by farmers, which help increase productivity, efficient use of resources, optimize input resources, reduce production cost, increase revenue
- Quality and safety yield, high value added products, become safety and sustainability production hub, traceability and standardized
- Creation of chain industry such as agricultural technology service business, Biotechnology Business such as biochemical, animal vaccine, animal nutrition

## Tech/Platform Tech. to be developed locally

Molecular Breeding	Genome& Bioinformatics	System biology	Sensor	Remote sensing	GeoMapping	Image processing	IoT	VRT	Encapsulation
Gene editing	Fermentation	Enzyme tech	HTP screening	Modeling	Cloud/ Big data	Decision Support System	Mechanization (Auto. System)	Smart material	

## R&D Collaboration with Industrial partner

collaboration with university, gov. agency, research institution, private sector, both domestically and internationally

## Executions

<b>Managing Body</b> <ul style="list-style-type: none"> <li>• Chair</li> <li>• ODU</li> <li>• Industry Consortium</li> </ul>	<b>Funding support x,xxx MB</b>  <b>Gov 50%: Private 50%</b>	<b>Supporting measures</b> <ul style="list-style-type: none"> <li>• Create and develop human capital in a shortage fields ex. Breeder, physiologist, plant pathologist, geoclimate modeling</li> <li>• Infrastructure ex. High throughput genotyping/phenotyping screening/ Pilot Plant/Germplasm Bank /Cloud</li> <li>• Efficient Registration process of bio products</li> <li>• Incentives for applying modern technology and such as tax incentive for green and safety product</li> </ul>
------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

# Example : Knowledge, Skills and Ability needed in Precision Farming of Agricultural and Biotechnology Industry

The need of Agricultural manpower  
**71,500 persons**



Base on an assumption that precision farming is applied for 50% of agricultural industry



Number Needed	Qualification	Knowledge, Skills
equipment operator 10,000 person	Diploma/High Vocational Certificate	PA operation ex. monitor, controller installation measurement solving problem equipment repairation including electrical system hydraulic and software
Agronomist 11,400 person	Bachelor/Master In Agriculture and Biology	Advise to farmers regarding farm management, operating tools for data collection in the farm area
Precision equipment Technician 4,300 person	High Voc./Bachelor	General Knowledge on PA ex. installation measurement solving problem equipment repairation including electrical system hydraulic and software
Technical Support 2,900 person	High Voc./Bachelor	Related software operation ex. Use of database, use of spatial information to create digital map
Precision Sales Specialist 4,000 person	Bachelor	General knowledge on PA technology, accounting, business, writing and communication skills

28% equipment operator  
32% Agronomist  
12% Precision equipment Technician  
8% Technical Support  
11% Precision Sales Specialist  
9% Others such as Soil data collector, Data analysis, accountant

หมายเหตุ: 1.) ความต้องการกำลังคนส่วนเพิ่มของอุตสาหกรรมเกษตรและเทคโนโลยีชีวภาพ ประมาณการโดย TDRI (2558) โครงการการประมาณการและปฏิรูปกลไกการบริหารจัดการกำลังคนในสาขา วทน.ของประเทศไทย นำเสนอต่อ สวทช. 2.) ข้อมูลโครงสร้างอาชีพ ความรู้และทักษะเฉพาะสาขาใช้ตัวอย่างจากการสำรวจในผู้ประกอบการเกษตรรายย่อยในสหรัฐอเมริกา  
ที่มา: Erickson, Fausti, Clay, and Clay (2015)

# Science, Technology and Innovation (STI) Packages for Entrepreneurship and Future Industry Development

## TECH&RDI

**Research, Development and Innovation Consultancy Services**

- Innovation and Technology Assistance Program (ITAP) for SMEs by NSTDA
- Innovation Coupon by NIA
- STI for OTOP Upgrade by TISRT
- Industrial R&D Services by agencies under MOST

## FINANCE

**Financial Supports and Tax Incentives**

- Competitiveness Fund (10,000M) + BoI Investment Incentives
- SME Transformation Fund (20,000M – soft loan)
- Technology and Entrepreneurship Development (TED) Fund (2,500M – matching grant)
- 300% Tax Deduction for RDI

## HRD

**Manpower Support & Linkage to Universities**

- Talent Mobility (Researchers)
- STI Work-integrated Learning (Vocational Technicians and Engineers)
- Customized Training (Skilled Labors)
- Company R&D Center (CRDC) Facilitation Center

## INFRA

**STI Infrastructure and Services**

- Special Economic Zone of Innovation: Food Innopolis, EECi, Thailand Science Park, Regional Science Parks, Innovation Districts
- MOST One Stop Service for Metrology, Standards, Testing and Quality (MSTQ) Infrastructure & Services

## START UP

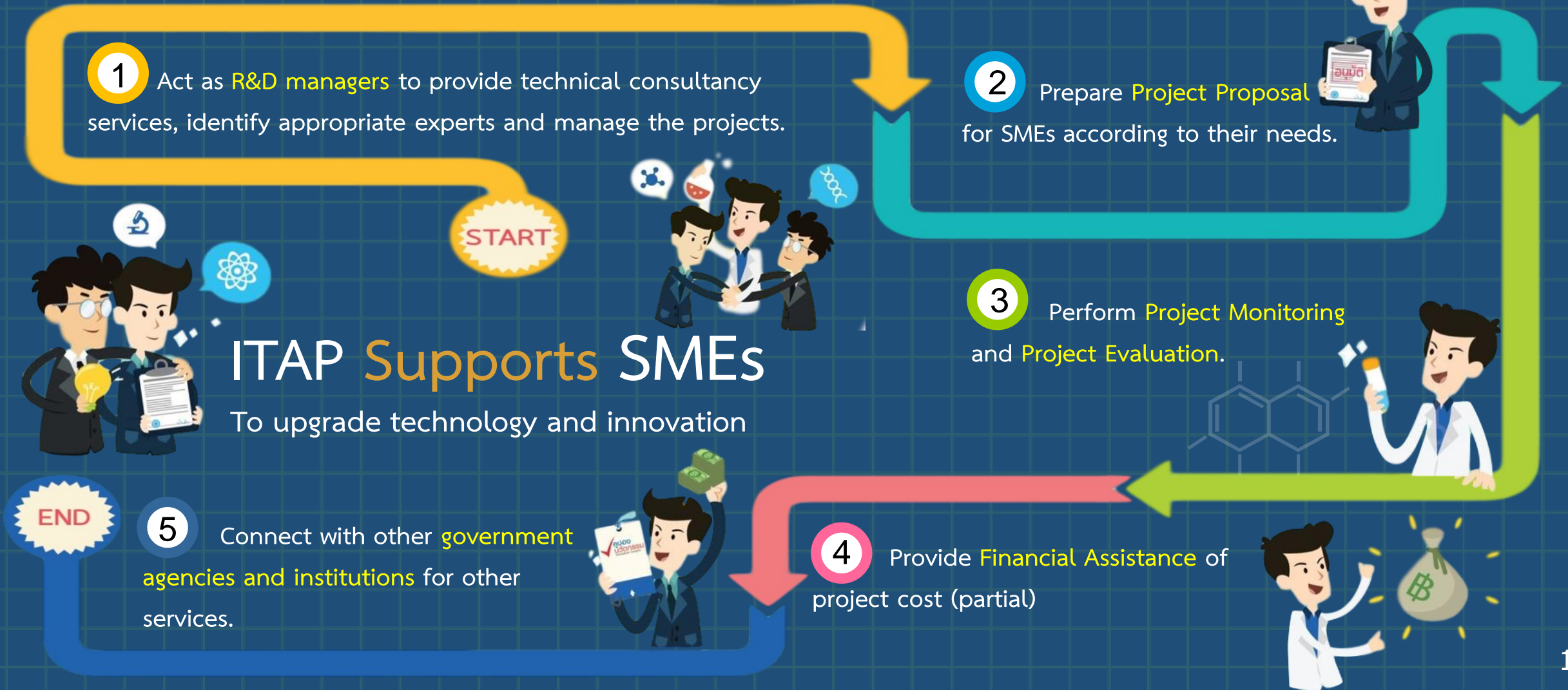
**Entrepreneurship & Startup Development**

- Startup Thailand Awareness Program
- Entrepreneurial University
- Startup and VC Funds
- Sectoral and Regional Startup Development
- Regulatory Sandbox

# How ITAP helps Thai SMEs to innovate?

Capacity : 2016

- 17 ITAP networks across Thailand
- 100 Industrial Technology Advisors
- 1,000 technical experts in networks
- 1,000 projects per year



# BoI – STI Packages for Competitiveness Enhancement (BOI++)

## Competitiveness Fund

Matching grant for investment projects engaged in:



Human Resources/HRD



Research Development & Innovation



Technology Transfer & acquisition








Collaboration with foreign & local academic institution






## Tax Incentives

Corporate income tax exemption max. 15 years for 10 targeted industries

### Strengthening Existing S-Curve

-  Next-Generation Automotive
-  Smart Electronics
-  Affluent and Wellness Tourism
-  Food Processing Industry
-  Agriculture and Biotechnology

### Seeding New S-Curve

-  Digital
-  Robotics
-  Medical Hub
-  Aviation and Logistics
-  Biofuels and Bio-chemicals

# Technology and Innovation-based Enterprise Development Fund



## TED FUND

### Objectives

To provide matching Grant or “Conditional Recoverable” Grant

for the development of

- new products or services
- new production/service process

### Target Groups

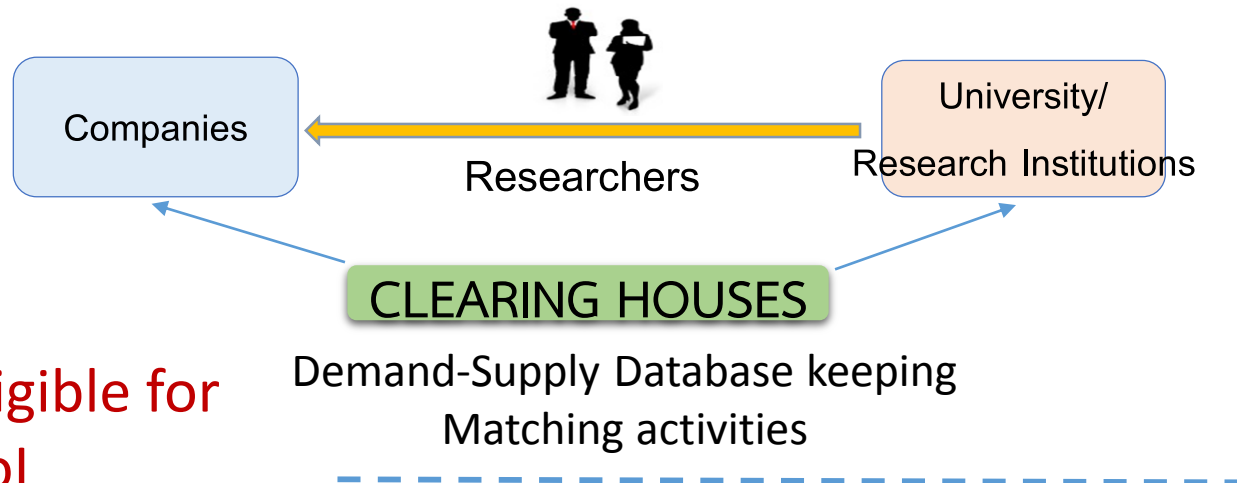
- University/Vocational Students or
- Students who graduated not over 7 years or
- University or Research Institution personnel
- SMEs
- Startups

which affiliate with universities or research institutions

# Manpower Support and Linkage to Universities

## Talent *Mobility*

The Cabinet approved this program on 18 January 2015



Eligible for  
BoI  
Incentives  
and 300%  
Tax  
Support

**WiL** Work-integrated Learning

- School in the Factory
- Apprenticeship
- Cooperative Education



CRDC@  
KMUNB



CRDC@  
KMUTT

**Company  
R&D Center  
(CRDC)  
Facilitation  
Centers**

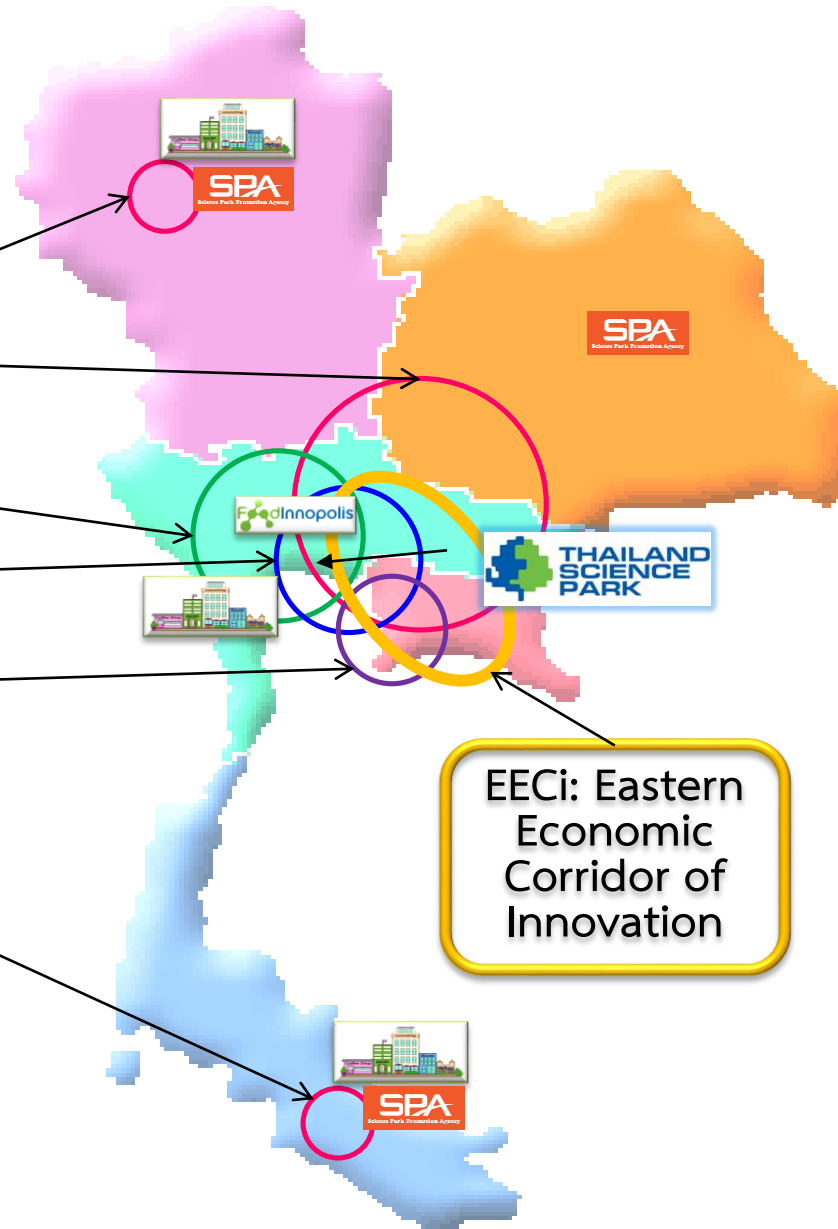


- Access to lab space and engineering equipment
- One stop solution for a company setting up R&D Unit in Thailand
- Linkages to government incentives, i.e., BOI, Tax 300%, research funding, testing facilities

# Economic Zones of Innovation

## Major Industrial Clusters

- Electronics
- Food
- Automotive
- Petrochemicals
- Rubber/Palm/Sea Food



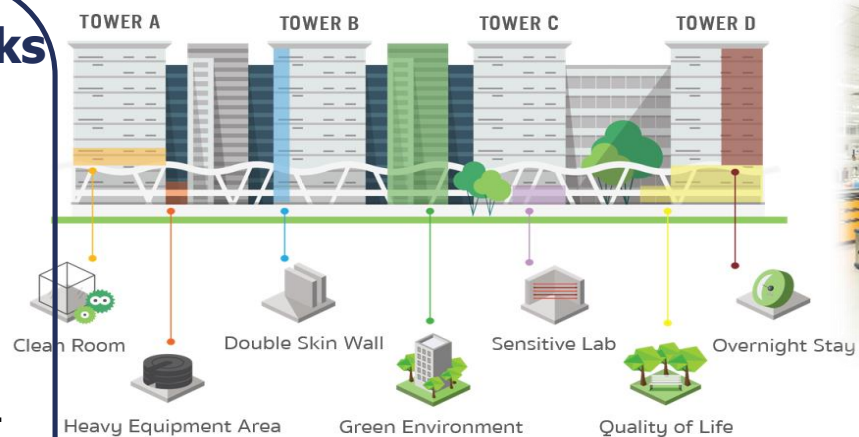




## Access to National Labs in Thailand Science Parks

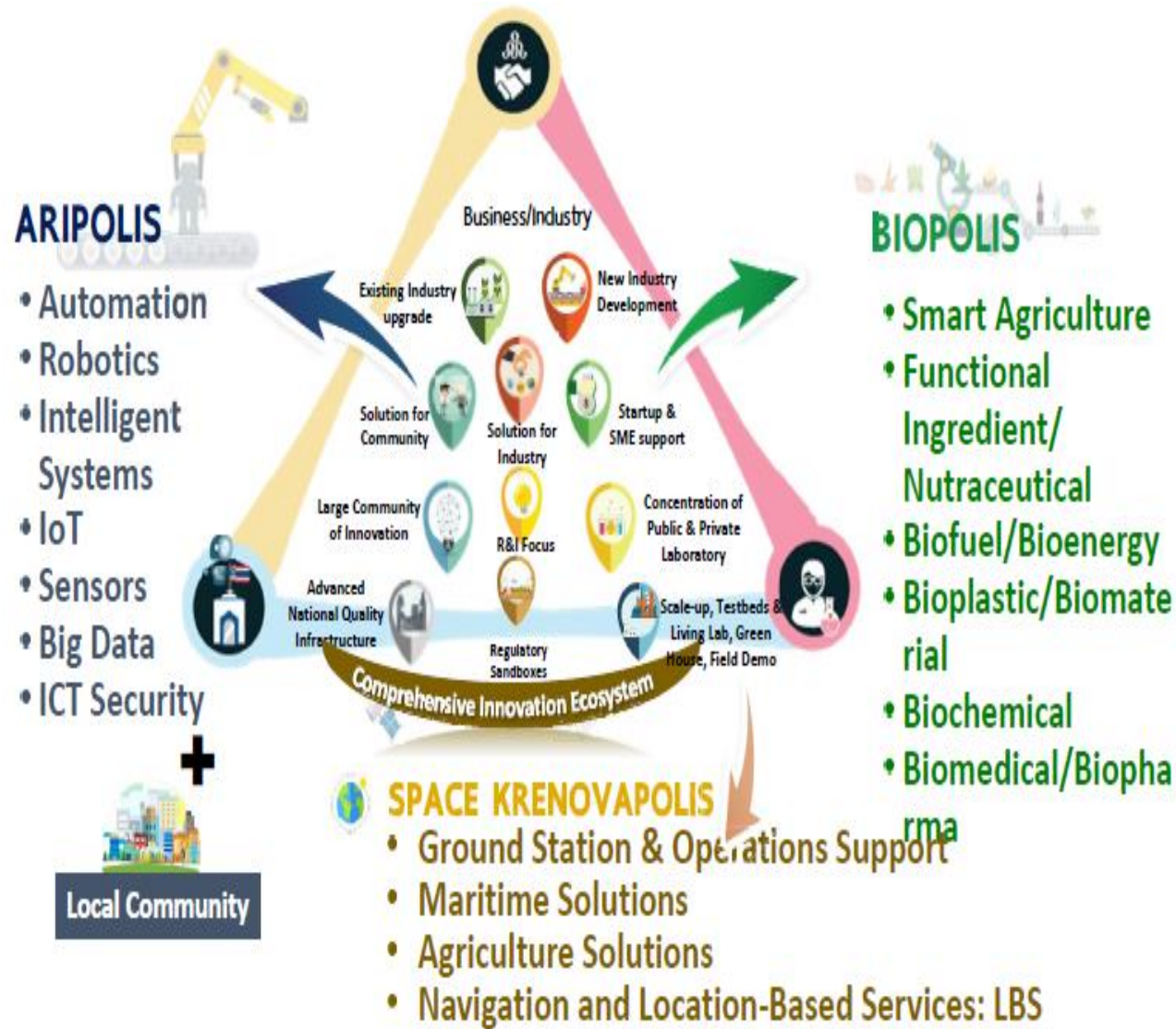


- Food & Feed Innovation Center
- Thailand Bioresources Research Center
- NANO Cosmeceutical Lab
- Integrative Biorefinery
- BIOTEC Information System
- NSTDA Central Testing Center (NCTC)
- National Advanced Nano characterization Center (NANC)
- RDI One Stop Service

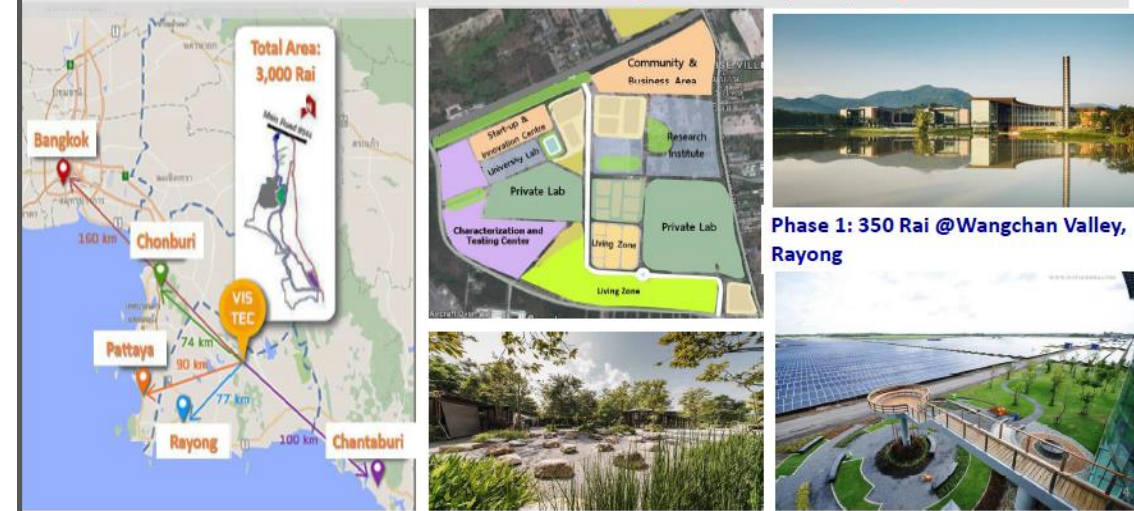


**20,000 m<sup>2</sup>**  
Ready-to-move-in

# Eastern Economic Corridor of Innovation (EECi)



EECi Location 1: ARIPOLIS & BIOPOLIS at Wangchan Valley, Rayong



EECi Location 2 : SPACE KRENOVAPOLIS (SKP) Sriracha, Chonburi



# EEC INCENTIVES



## BOI Special Privileges

- 8 years corporate income tax waiver plus **50%** reduction for another 5 years
- Potential **15** years corporate income tax waiver plus grants for strategic projects in EEC (Thailand Competitive Fund)
- Potential maximum **17%** personal income tax for management, investor, expert of companies in target industries with HQ and facilities situated in EEC

## Physical Infrastructure

- Long-term land lease **50+49** years
- Fast track [Special PPP/EIA process]
- One Stop Service

## EEC exclusives

- Free trade zone
- Non-tax incentives VISA + Work permit
- Financial incentives holding foreign currency account

**NATIONAL  
STARTUP  
COMMITTEE**

**BUILD UP AWARENESS**

To grow STARTUP communities.

**EASE OF DOING BUSINESS**

To enhance STARTUP's competitiveness & growth

**STRENGTHEN ECOSYSTEM**

To raise the next generation entrepreneurs  
and tech talents.

**INCENTIVES & SUPPORTS**

To stimulate investments in STARTUP.

# Innovate Thailand: Enhancing Industrial Innovation Performance

A new initiative to be proposed by the Ministry of Science and Technology



**SME Innovation:** Enhance capacity for innovation through R&D, industrialization and internationalization

## Innovation Infrastructural

**Services:** Enable Institutes to effectively provide MSTQ and IP services to companies in target industries

## Ease of Doing Innovation

**Business:** Build up industrial innovation ecosystem & develop/train STI workforce, focused primarily on key economic zones of innovation such as Food Innopolis, EECi, Technopolis, Regional Science Parks and Science Park Networks



**Food  
for the Future &  
BioTech**



**Next-generation  
Automotive  
& Aviation**



**Smart Electronics,  
Robotics & Automation**



**Medical Devices &  
Healthcare**



**AgricultureTech &  
Machinery**

# Environment Surrounding ASEAN / Mekong Countries

## Strengths

- Young, growing population and expanding middle class
- Abundant natural resources, biodiversity
- Open, flexible economies with diversified export structures
- Large FDI inflows and regional production networks
- Growing dynamic SMEs
- Ability to manage great diversity

## Opportunities

- Strategic location in expanding Asia with huge market potential
- Strong cultural links
- Deep manufacturing and technology links with NE Asia
- Potential to increase energy, water, and food production (security)
- Potential to develop regional hubs in various new areas (education, health, logistics, tourism, finance)
- Strong record of macroeconomic & financial cooperation initiatives

## Challenges

- Huge development gaps
- Absence of an effective regional fund for resource redistribution
- Increasing risk of falling into the middle income trap
- Low education attainments and large unskilled workforce
- Lack of harmonized policies to manage labor mobility
- Absence of regional R&D strategy

Common interests in growing science, technology and innovation and applying them for development.

# ASEAN STI Partnership Contribution

Endorsed by ASEAN S&T Ministers on 29 October 2016

## Pledge of USD 1 million from Thailand

### Objectives

- Support the implementation of ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025
- Extend the opportunities for wider collaborations with ASEAN dialogue partners and other interested parties on a partnership basis
- Facilitate Public-Private-People-Partnership (PPPP) to create common market for knowledge, research and innovation

### Components

1. STI Enculturation, Capacity Development & Talent Mobility

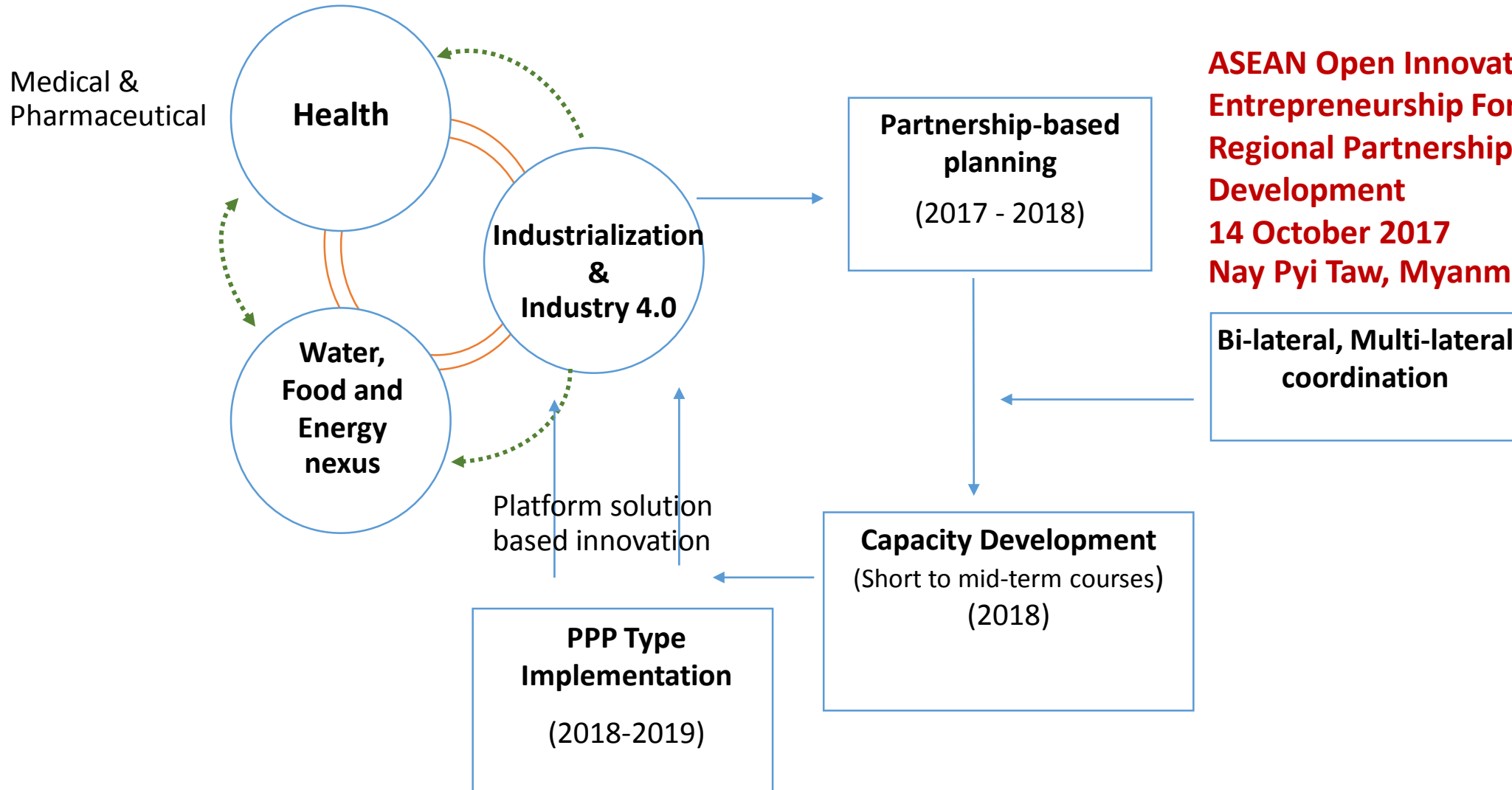
2. Collaborative Research & Development

3. Open Innovation & Entrepreneurship

**in-kind or in-cash support, at least three countries**

# ASEAN Platform for Open Innovation & Entrepreneurship

(benchmarking against the European Technology Platform)



**ASEAN Open Innovation and Entrepreneurship Forum: Regional Partnership for Development**  
**14 October 2017**  
**Nay Pyi Taw, Myanmar**





# CLMVT and Mekong Frameworks

<p><b>GMS</b> CLMVT + China (Yunnan, Gwangxi)/ ADB</p> <ul style="list-style-type: none"> <li>• Economic Corridors</li> </ul>	<p><b>MJ</b> CLMVT + Japan</p> <ul style="list-style-type: none"> <li>• Industrial Infrastructure Development &amp; Hard Connectivity</li> <li>• Industrial HRD &amp; Soft Connectivity</li> <li>• Dawei Project</li> <li>• Thailand +1</li> </ul>
<p><b>ACMECS</b> CLMVT</p> <ul style="list-style-type: none"> <li>• Trade &amp; Investment</li> <li>• Agriculture (Contract Farming)</li> <li>• HRD</li> </ul>	<p><b>MGC</b> CLMVT + India</p> <ul style="list-style-type: none"> <li>• Culture &amp; Education</li> </ul>
<p><b>LMI</b> CLMVT + USA</p> <ul style="list-style-type: none"> <li>• Environment &amp; Water</li> <li>• Energy Security</li> <li>• Women</li> <li>• SMEs</li> </ul>	<p><b>MK</b> CLMVT + ROK</p> <ul style="list-style-type: none"> <li>• ICT</li> <li>• Agriculture &amp; Rural Development</li> <li>• Mekong Institute at Khon Kaen</li> <li>• Trilateral Partnership (TICA &amp; KOICA for ASEAN countries)</li> </ul>
<p><b>MLC</b> CLMVT + China</p> <ul style="list-style-type: none"> <li>• Economic &amp; Sustainable Development</li> <li>• Social, Cultural &amp; People-to-People contacts</li> </ul>	



**National Science Technology and Innovation Policy Office**  
**319 Chamchuri Square Building, 14<sup>th</sup> Floor**  
**Phayathai Road, Patumwan**  
**Bangkok, 10330 Thailand**  
**Tel: + 66 2160 5432 to 37**  
**Fax: +66 2160 5438**  
**<http://www.sti.or.th>**