Special Address: Roles of Research and Innovations in the Private Sector in National Strategy for Research and Innovations and Thailand 4.0

Dr. Wilaiporn Chetanachan
Director of Corporate Technology Office, SCG

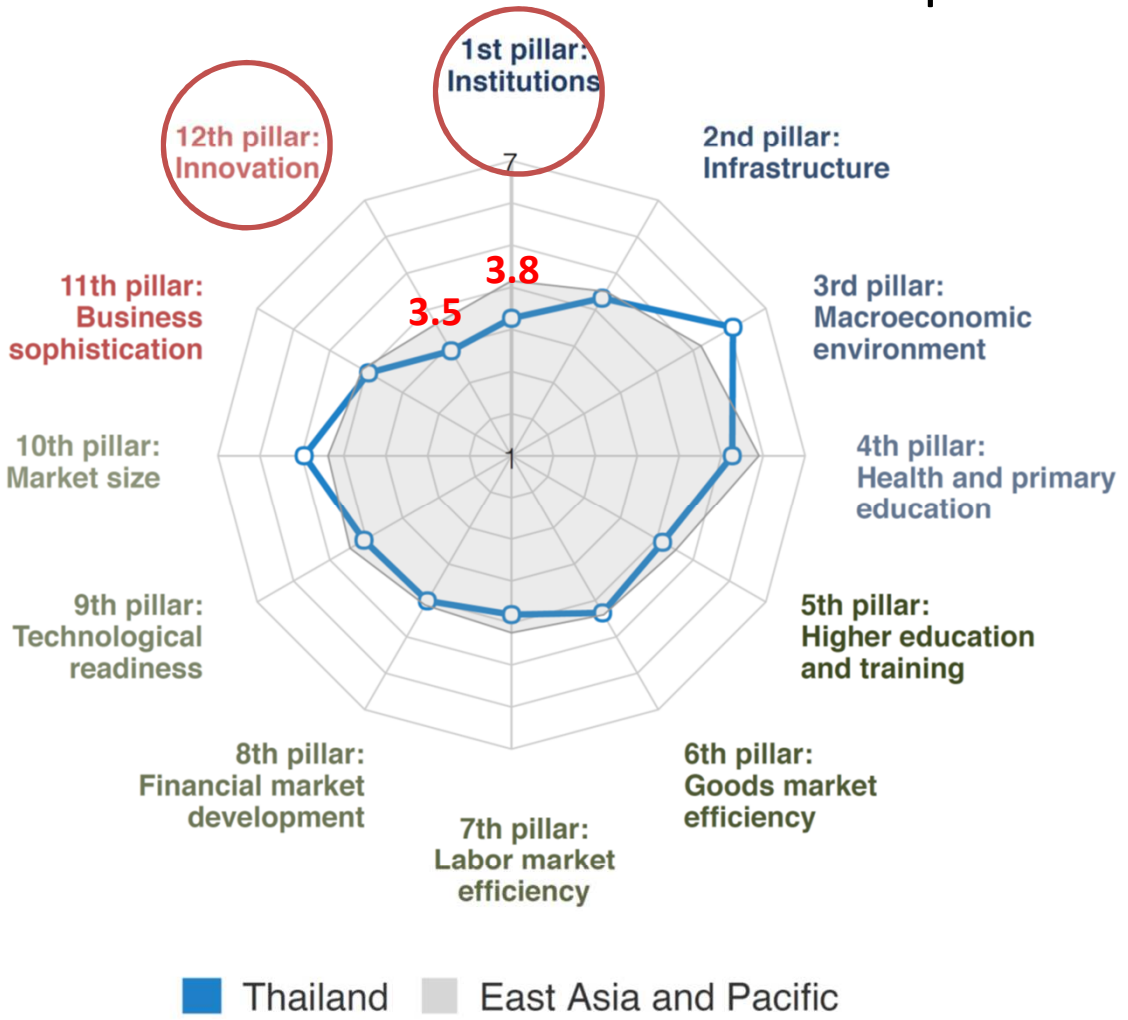
Building Human Intellectual Capital for Thailand 4.0
Annual ATPAC-MOST-OHEC-IPST Conference Marriott Suites on Sand Key, Clearwater Beach, Florida, USA
Date: January 26, 2018, 9:40-10:10 am

Agenda

1. **Thailand Innovation for Future Economic Growth**
2. SCG Innovation Ecosystem
3. Human Capability for Thailand 4.0

Thailand's Performance Overview

- Thailand needs innovation to increase our competitiveness



Source: International Monetary Fund; World Economic Outlook Database (April 2017)

No Way out but Innovation

"Increasing the Industry Competitiveness, increasing the competitiveness of the nation"

Thailand 4.0 – Innovation/Value-based Economy

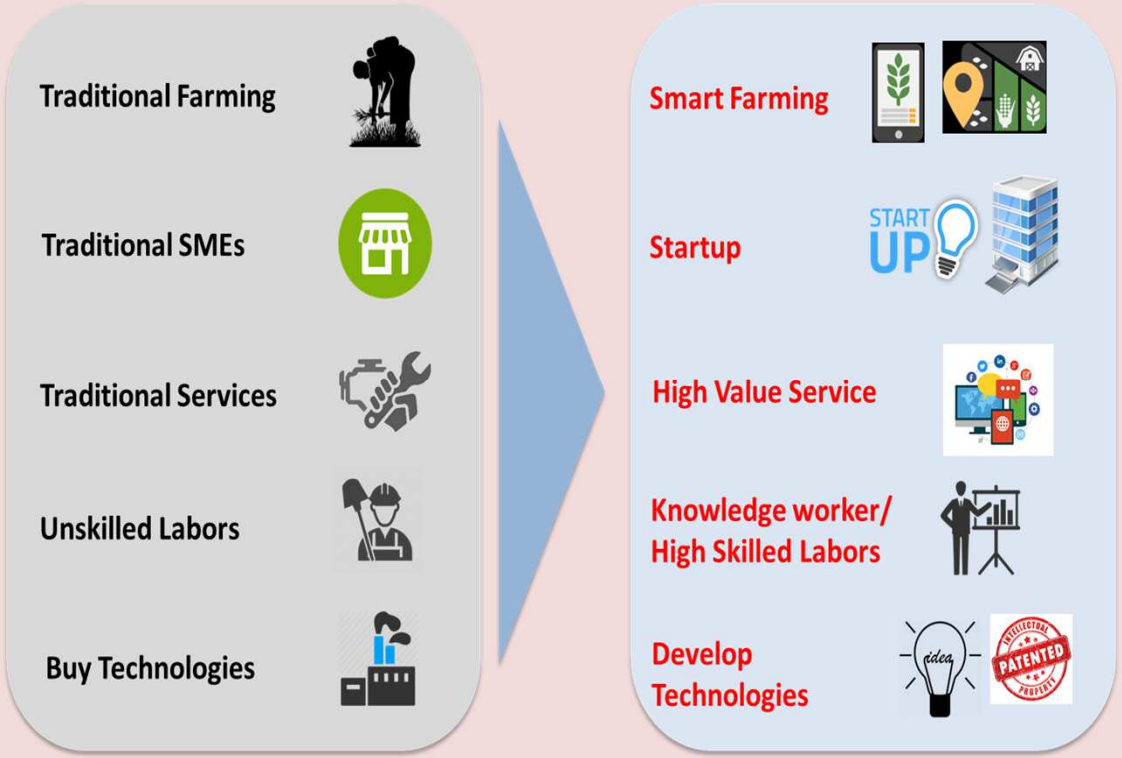
- **Thailand Economic Progression**

Thailand 1.0
Agriculture Based Economy

Thailand 2.0
Light Industry Based Economy

Thailand 3.0
Heavy Industry Based Economy

- **Thailand 4.0: Focus on technology and innovation to add product & service value**



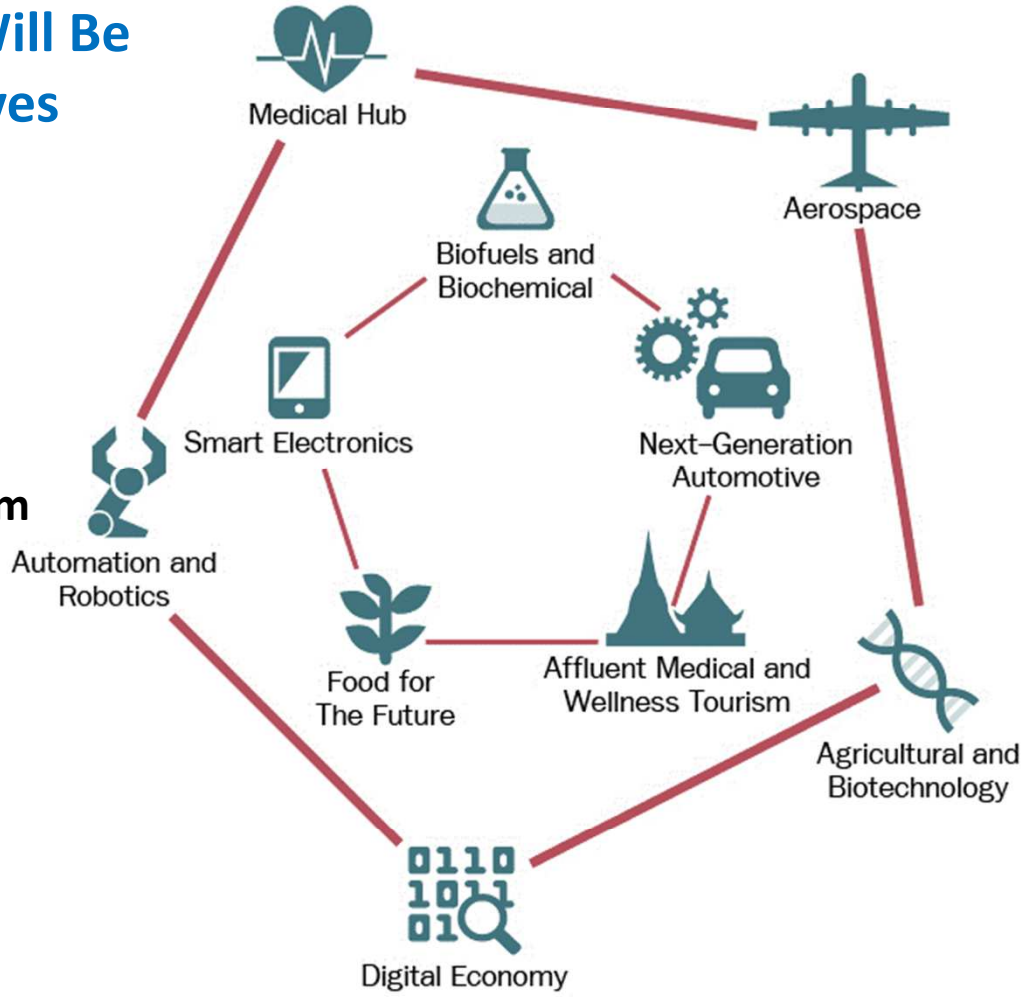
Source: THAILAND BOARD OF INVESTMENT, www.boi.go.th

10 Targeted Industries: Mechanism to Drive Economy for the Future

Investment in S-Curve Industries Will Be Granted Privileges and Tax Incentives

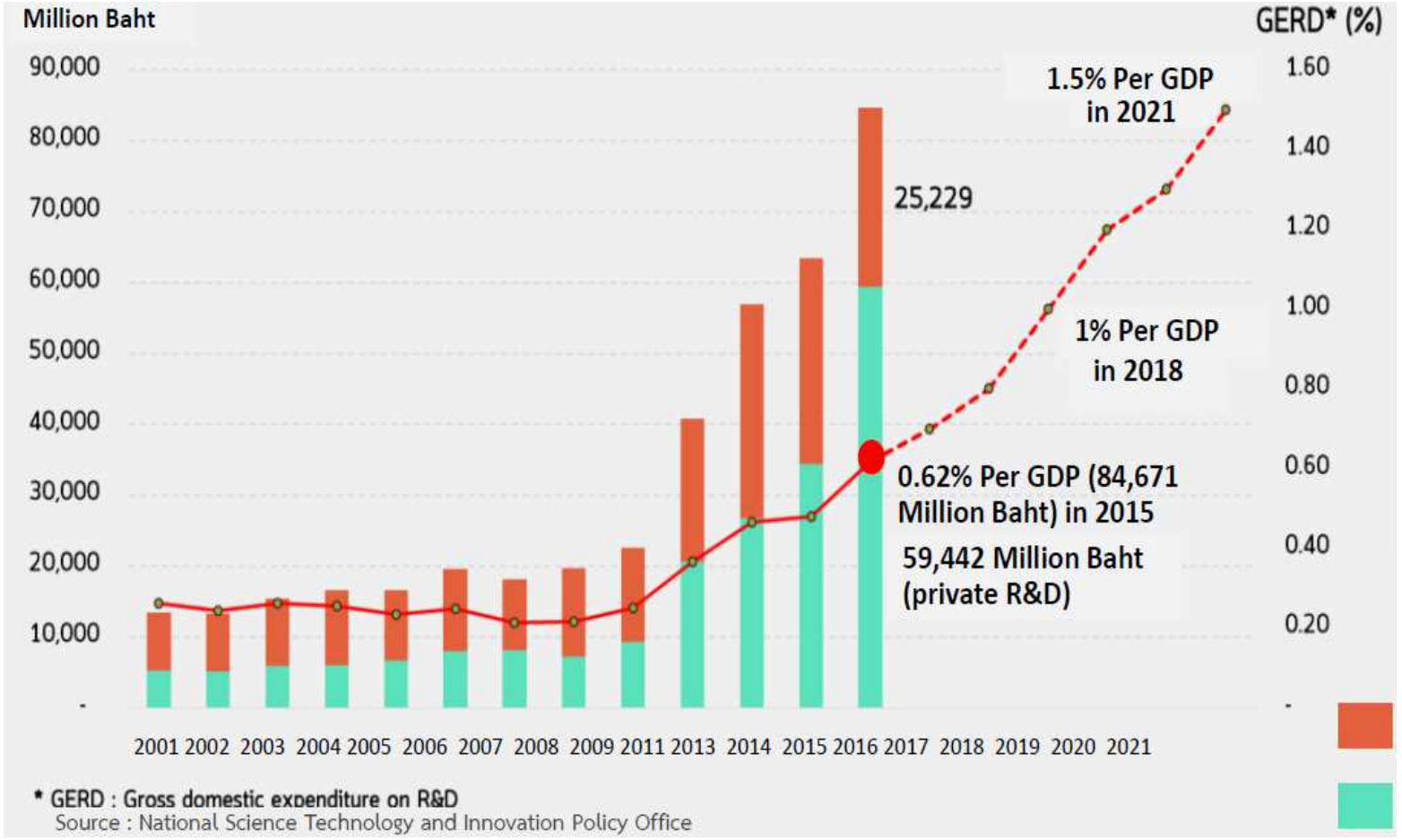
- **1st S-Curve**
  - Next-Generation Automotive
  - Biofuels and Biochemical
  - Smart Electronics
  - Food for The Future
  - Affluent Medical and Wellness Tourism

- **New S-Curve**
  - Aerospace
  - Medical Hub
  - Agricultural and Biotechnology
  - Automation and Robotics
  - Digital Economy



Source: THAILAND BOARD OF INVESTMENT, www.boi.go.th

Thailand needs Much More Investment in R&D



Agenda

1. Thailand Innovation for Future Economic Growth
2. **SCG Innovation Ecosystem**
3. Human Capability for Thailand 4.0

SCG Overview

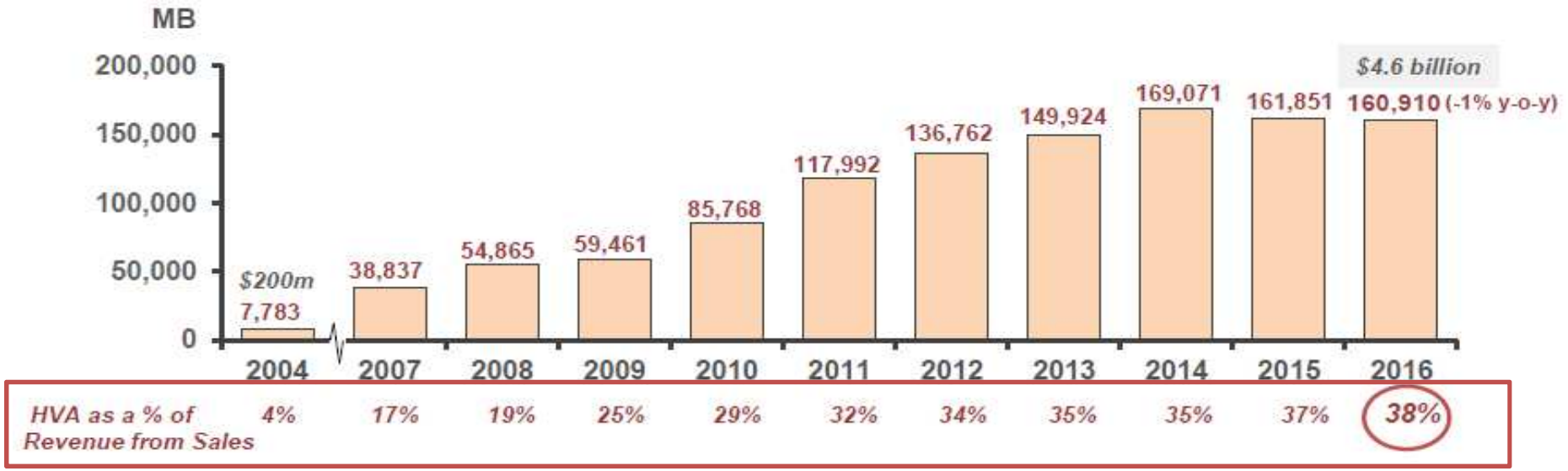
- ***Founded in 1913 and listed in 1975 on the SET***
- ***Market cap approximately of $17.6 Billion*** *(as of Jun 017)*
- ***+54,000 staffs (1/3 are regional staffs)*** *(as of Jun 017)*
- ***R&D and product design team: 1,823 Staffs*** *(Ph.D. 108)*
- ***Key figures (2016):***
  - ***Total Assets 540 Billion Baht ($15.4 Billion)***
  - ***Net Sales 423.4 Billion Baht ($12 Billion)***
  - ***Net Profit 56.1 Billion Baht ($1.6 Billion)***
  - ***Innovation Spending > 4 Billion Baht (> $ 114 Million)***

CBM *Cement-Building materials*	***Chemicals***	***Packaging***

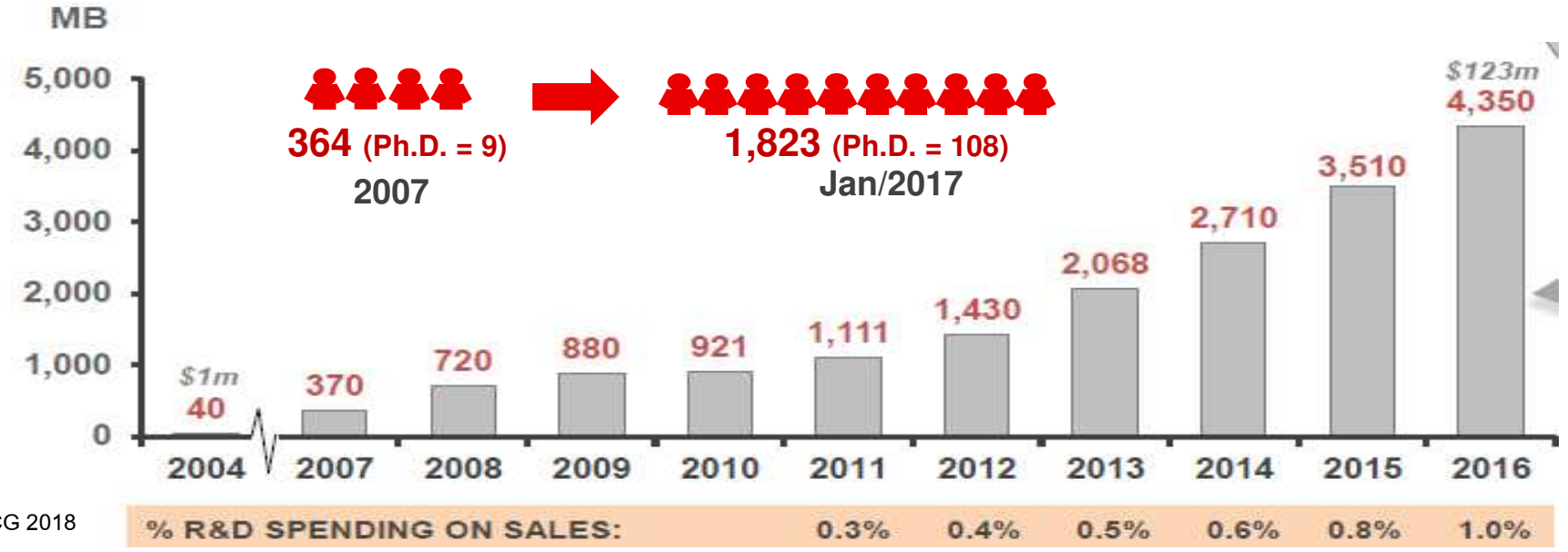
"SCG will become A Regional Business Leader with emphasis on Innovation and Sustainability"

Moving towards HVA

1. HVA's Revenue from Sales



2. R&D Spending, 3. R&D product and design team



Moving towards Solution with HVA products and Services

A Viable Value to Customer

Living Solutions

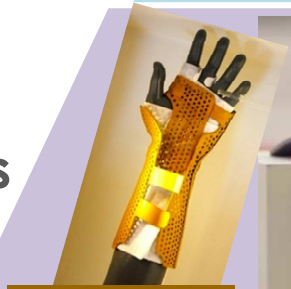

ELDER Care Solution


GEOLUXE Pyrolithic Stone


Top Hat Roofing Solution


Speedy Terrazzo Cement

Medical Solutions


Poly-Cast Polymer Splint


MiniSURE Kit Medical Operation Tools


E-beam Sterilization for Syringe, Bottle, Blood Collector, etc.

Antimicrobial Dental plaster


Lightweight Packaging Solution

Self-venting Film

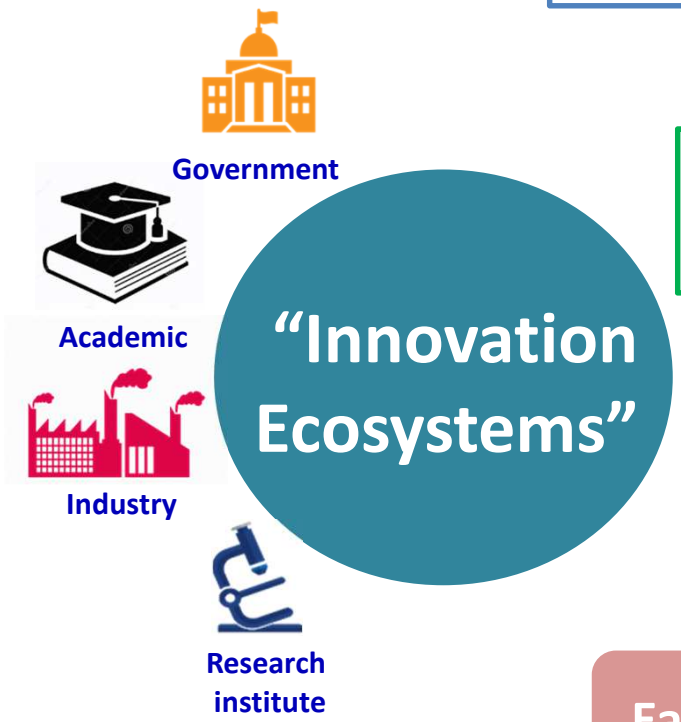
Food Safety Packaging

Flexographic Preprint

Packaging Solutions

SCG

Innovation Ecosystems



Collaborative Network

Engage university, partner & customer

SCG Open Innovation Center

Gateway to connect & Innovate

Strategic Investment

Early access to disruptive technology & business model
Co-invest with VC and partners

Early stage commercialization

Products, services and solutions
Minimum viable product

SCG Collaborative Network for Innovation

CU KMUTT MU CMU NSTDA AIT KMUTNB KU TU KMITL

Collaborative Project: 589
(18% of total projects, 44% of total expenses)

Domestic partner: 390

International partner: 199

Calera Corporation
Econotech
Envergent Technologies LLC
Exxon
GATECH
IPST
Miliken
National Inst. of standard & tech.
Paper Consultants International
NJIT
PSU
Stony Brook U.
The Florida State U.
U. Of California, Berkeley
U. of Waterloo
Western Michigan U.

DATACHEM
Fibria Celulose

Arkema
Certech
Dini Engineering
EMPA, Swiss Federal Laboratories for Materials Science and Technology
Federico II University of Naples
Humburg Innovation GmbH
Imperial College
Inventia AB
Martin Luther U.
More research
Norner Inno.
OXFORD
Plaxica Limited
Polymer Insitute Brno, Technique University of DAMSTADT
Technical University of Munich
University of Leeds

Beijing University of Chemical Tech.
MCN Material Technologies
Tianjin U.
Zhejiang U.

HiBot
JAIST
Kyoto U.
Osaka U.
Tohoku U.
Tokyo Tech.

A*star

Forest Prod. R&D Institute, Department of Science & Tech.

Monash U.

NSTDA BIOTEC MTEC NANOTEC NECTEC DECC

BUU SUT RMUTT MJU TISTR Department of Science Service SU MSU KKU RMUTK SWU

SIIT JGSEE PETROMAT Siam Photon

*Data from R&D report 2012-2016

Example: Collaborative research with leading Universities

Berkeley
UNIVERSITY OF CALIFORNIA

3-D printing technology using cement polymer

BLOOM
The room for living

COROLLA
3D Breathable Facade

SCG

SCG Open Innovation Center:
Gateway to Connect and Innovate

Grand Opening on 19th July 2017

- **Exhibition area** to inspire partners (Example of 50 innovative projects)
- **Lab facilities** for ideas demonstration
- **Meeting facilities** to connect the world
- **Technology Bridging Platform** to exchange idea and technology

Contact:
openinnovation@scg.com

Thailand Science Park, INC 2, Tower D, FL 9

SCG Open Innovation Center

Real Cases: Innovation Displays

Sea Cement

Antimicrobial Dental Plaster

3D-Printing Cement

Innovation Displays:

R&D to Commercialization

Paper Pot

Self Venting Package

Poly-Cast

Strategic Investment-Technology Companies

norner™

*A leading Innovation and Technology center, specializing in **material and polymer industries**, based in Norway*

LYSANDO
LIFE SAVING PROTEINS

*A technology leader in the area of **antimicrobial proteins**, based in Liechtenstein*

SCG

Agenda

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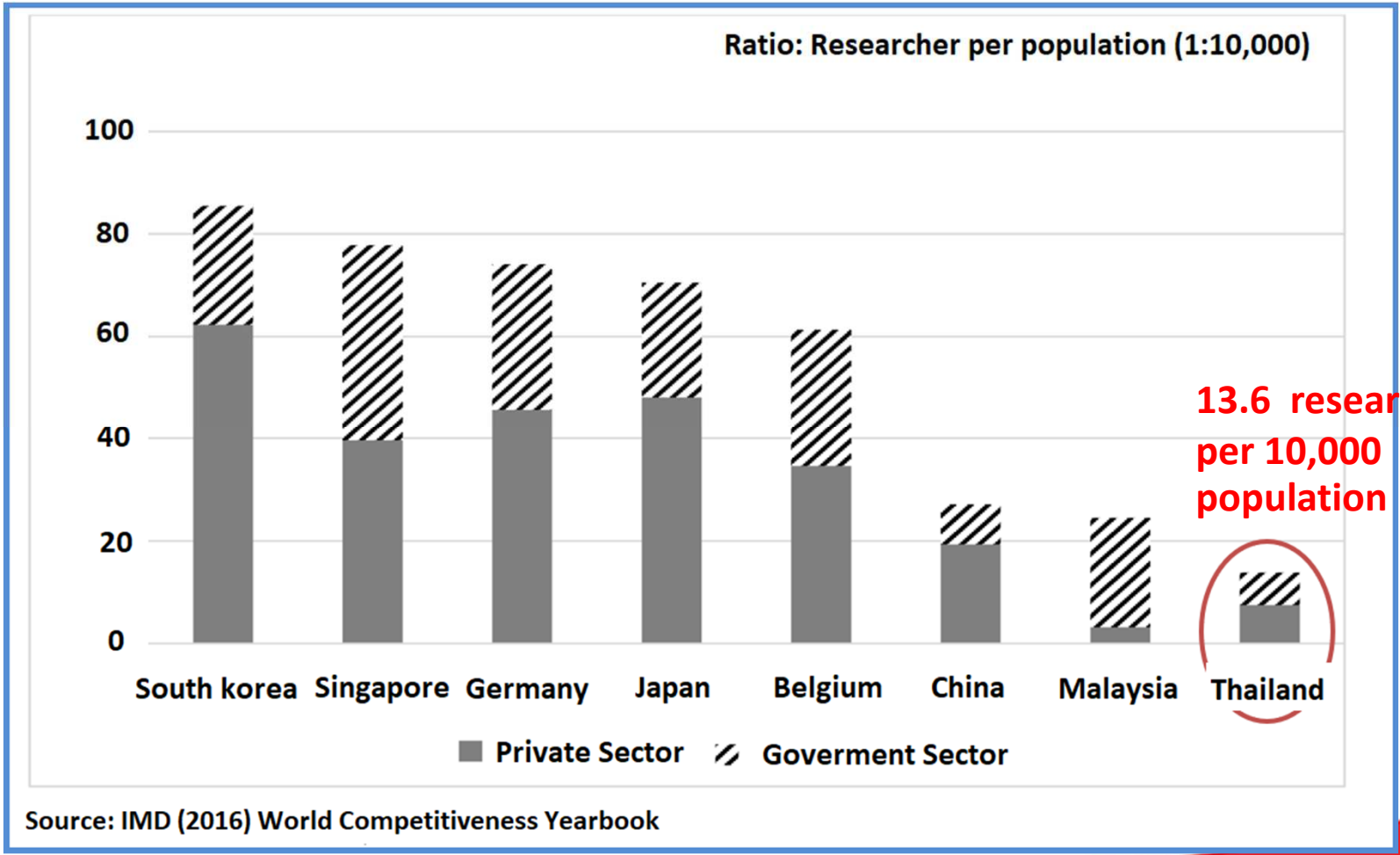
2. SCG Innovation Ecosystem
3. **Human Capability for Thailand 4.0**

Thailand needs More Researchers

Current Situation: Thailand has low ratio of researchers per population compared to others



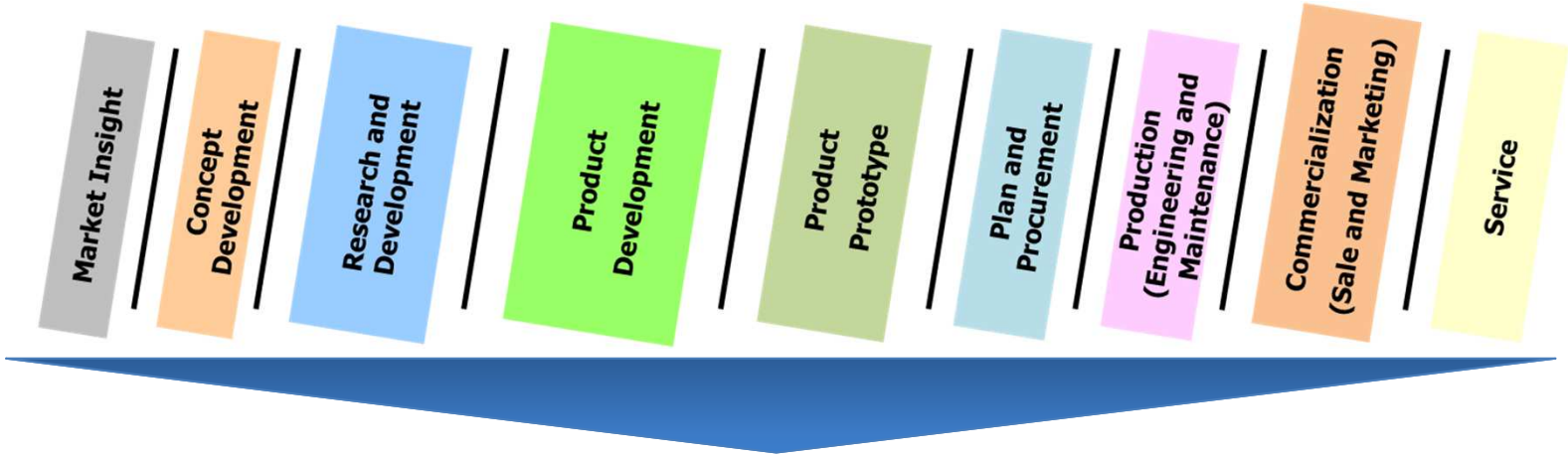
Source: IMD (2016) World Competitiveness Yearbook

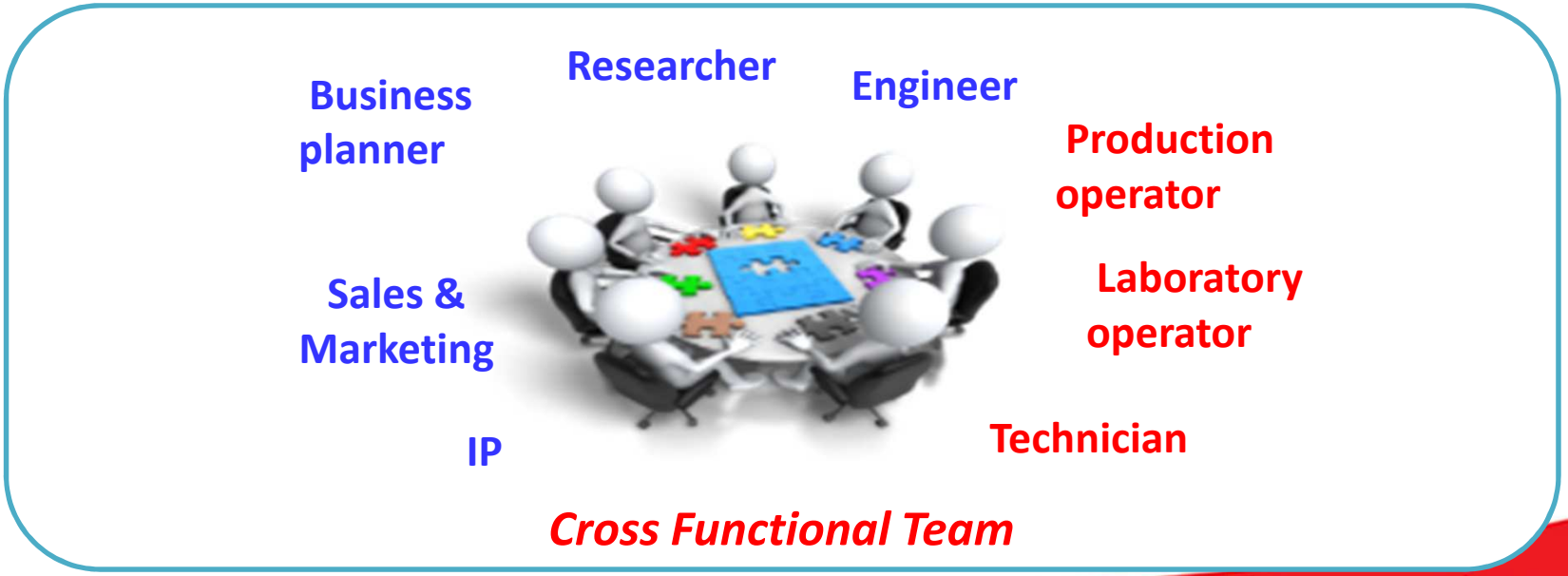
Goal: Increasing Researchers to serve S-Curve Industries

Target Industries	Personnel requirements Science and Technology (person per 5 years)		
	Bachelor	Master	Ph.D.
1. Automotive	**10,339**	**809**	**85**
1.1 Automobile and Transport equipment manufacturing	9,770	770	85
1.2 Automobile for the future	569	39	-
2. Electronics	**13,047**	**2,002**	**485**
2.1 Computer, Electrical and Electronic Manufacturing	9,845	980	415
2.2 Smart electronic	3,202	1,022	70
3. High value truism & service	**5,962**	**513**	**202**
4. Agroindustry	**12,114**	**424**	**138**
4.1 Agriculture, Forestry and Fisheries	8,970	275	30
4.2 Agro & Biotechnology	3,144	147	108
5. Food	**14,945**	**1,085**	**112**
5.1 Food & beverage manufacturing	8,660	455	50
5.2 Food for the future	6,285	630	62
Total	**56,407**	**4,833**	**1,022**

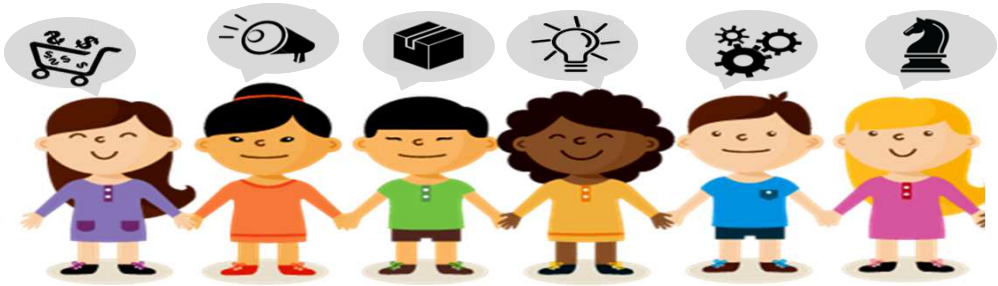
Human Capability: Teamwork

- *We need cross-functional team to drive R&D to commercialization*





Cross Functional Working Team



Customer

Cross functional working team is a key driving for innovation

BLOCKS BEHAVIORS

Work Alone / Lack of Teamwork

Lack of Openness

Lack of Sharing /Discussion

DRIVER BEHAVIORS

Open minded & deep listening

Networking

Brainstorming

Learning: Need to Build Innovative Culture

Self-Learning/
Learning from experts

Innovative culture

Brainstorm

Create new idea
& solution

70: 20: 10 Holistic Development for Learners Effectiveness

70	20	10
Learning from Experience	Learning from Others	Formal Learning / Self Learning
• On the Job Training • Job Rotation • Project Assignment • Simulation / Off the job • Lead Team • Etc.	• Coaching & Mentoring • Reflection & Feedback • After Action Review • Group Discussion • Guru talk • Networking • Etc.	• Classroom (Technical, Professional, Leadership, General Knowledge & Skills • Self-Study (e-Learning, reading)

Coaching is a significant tool in development for leaders to help employees learn, perform and grow

Corporate Vs Startup

- Highly research skill oriental
- Technology platform & roadmap
- Network & collaboration
- Project management
- Product liability & compliance

- Test & Learn
- Learn fast
- Entrepreneurship mindset
- Risk taking
- New business models

25

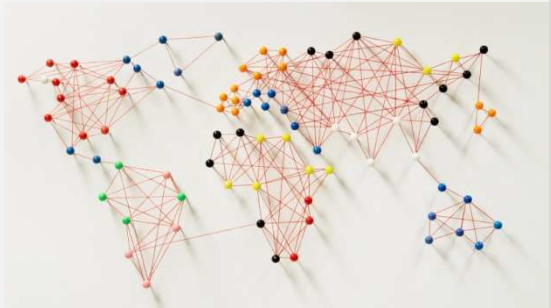
Summary and Key Learning

Commitment and Leadership

Innovation Culture and Cross Functional Team

Focus on commercialization of R&D

Ecosystems & Research Alliance



Integration of IP throughout value chain

Measurable Business Outcomes (KPI)

26

Thank You

Story board

Thailand Innovation for Future Economic Growth

- Thailand situation and performance
- Thailand 4.0 & transformative shift
- S-curve industries
- Speeding R&D budget in private & government

Sharing: Private sector to build innovation ecosystems

- SCG Introduction & strategy
- Moving towards Solution with HVA products and Services
- SCG Innovation ecosystem: Collaboration, Open innovation center

Human Capability for Thailand 4.0

- Increasing Researchers to serve S-Curve Industries
- Teamwork &Capability
- Learning: Need to Build Innovative Culture
- Next Generation of Researchers (Corporate compared to startup)

Target Industries	Personnel requirements Science and Technology (person per 5 years)		
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