Workforce in Robotics and Automation in Manufacturing Industry

Collaboration between Industry and Education Sectors

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FIBO

TOPICS

1. Introduction to Robotics and Automation
2. From manual to automatic
3. Human Resource Development
4. Collaboration Strategy
5. Case-study

Robotics & Automation (RA) Industry Thailand

Thailand 4.0 - Value-based Economy

From *Manufacturing* **To** *Value added with advanced manufacturing*

- RA plays and important role in productivity improvement of manufacturing industries and service business of Thailand
- RA is **an Engine of Growth** of Thailand economics by using knowledge & new technology
- Significant growth in global market of robots (increase 40% per year and expected to reach 61.4 million units sales in 2020)
- Thailand aim for:

Are we ready !?

- Be users
- Be developers
- Be manufacturers

Robotics Cluster – Thailand's Vision & Goal

Goal 2017

Investment in Robotics & Automation

>12,000 MB

Goal 2018 - 2021

- **Investment** in Robotics & Automation >100,000 MB
- **Use** Robotics and Automation in 50% of factory
- **Locally produce** Robotics and Automation at least 30% of import value

Vision 2022

- Be a leading **producers and users** in Robotics & Automation in ASEAN with Thai own technology

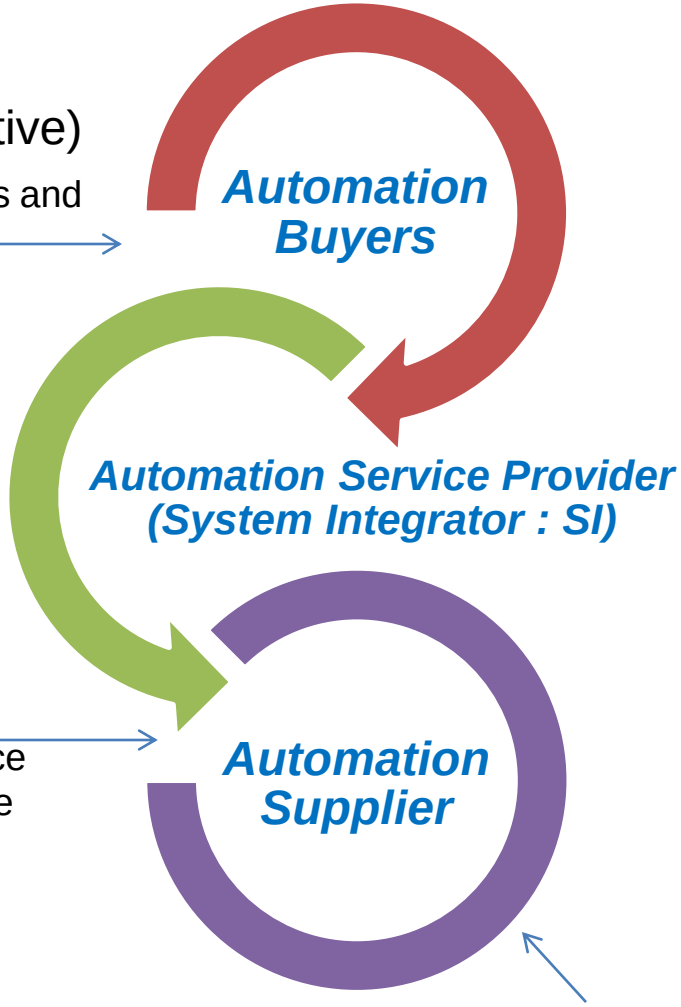
Robotics Cluster – Development strategy

1) Demand Driven (Incentive)

Create the demand of using robots and automation

2) Enhance Competitiveness

- Reduce cost of local manufactureres
- Import tax restructuring: reduce import tax of spare parts to the same level as products (0%)



Outcome

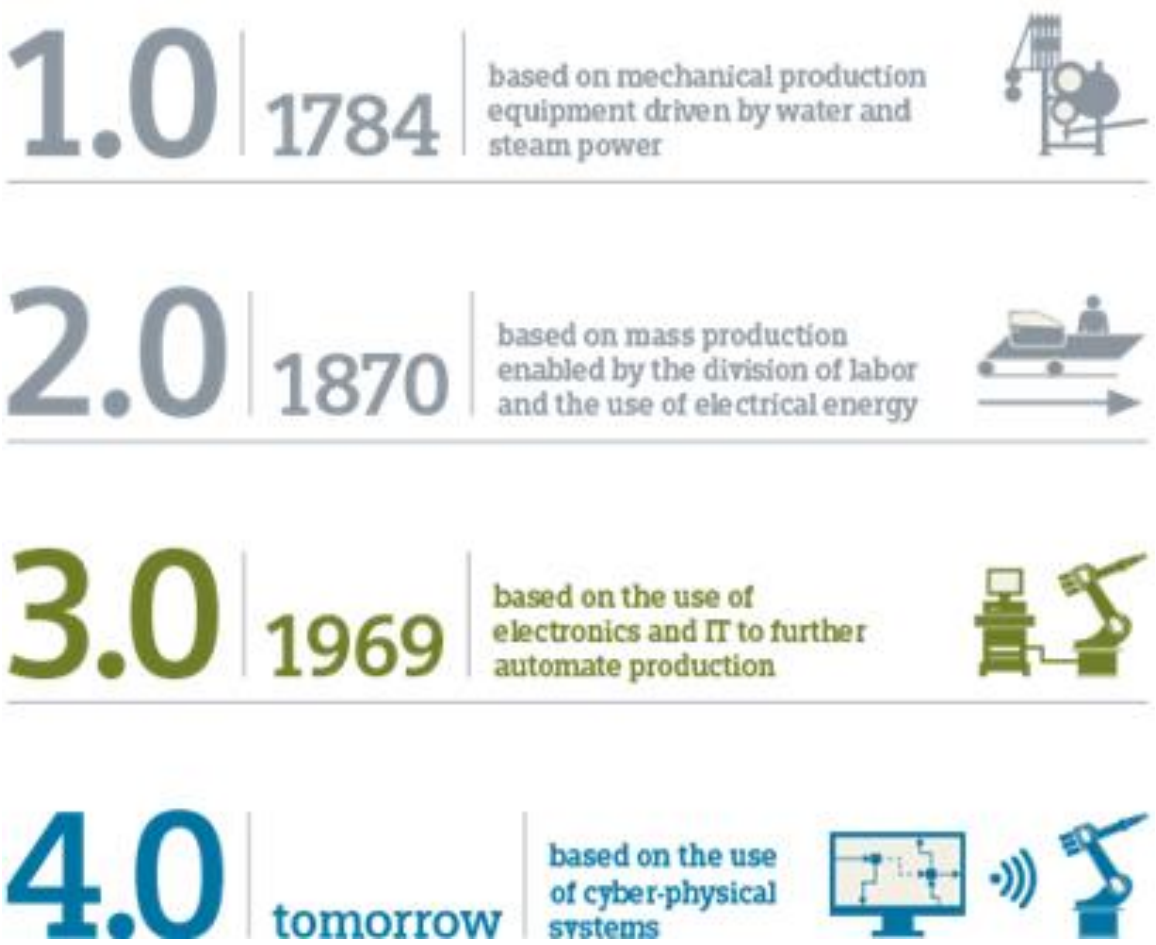
- Industry in Thailand increase productivity
- Local robot manufactuters are able to be a technology owners and brand owners
- Local investment resulting in business expansion

3) Technology Capability Enhancement Center of Excellence (COE)

Technology transfer mechanism 1. Certify technology 2. HR Development 3. Consultant/ Technology Transfer 4 Industrial prototype

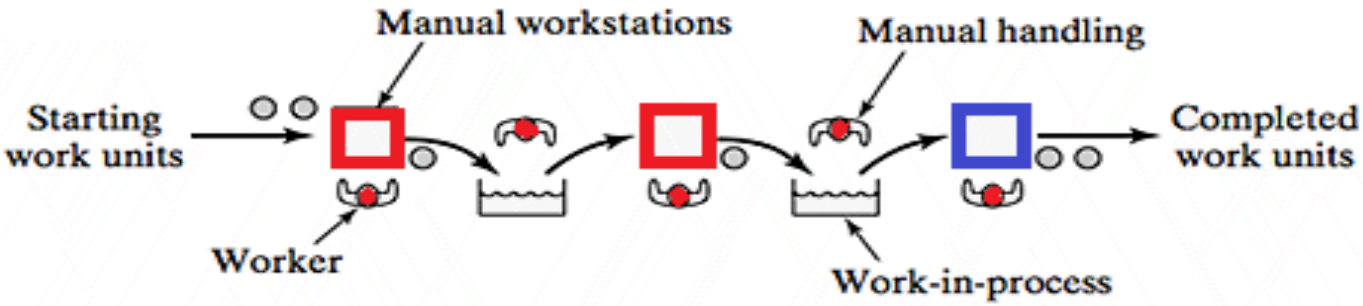
Levels of Automation

Identify the level of automation in your manufacturing system

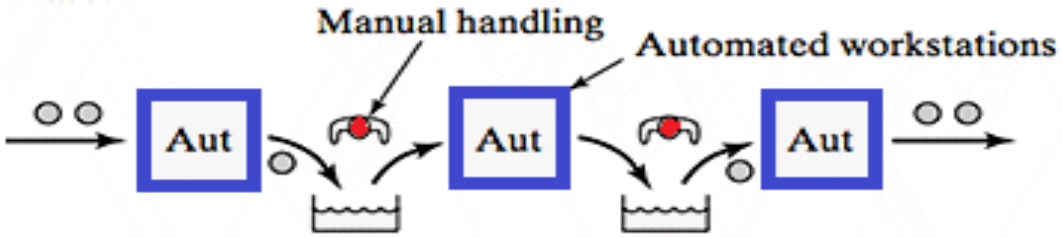


Levels of Automation - Phases

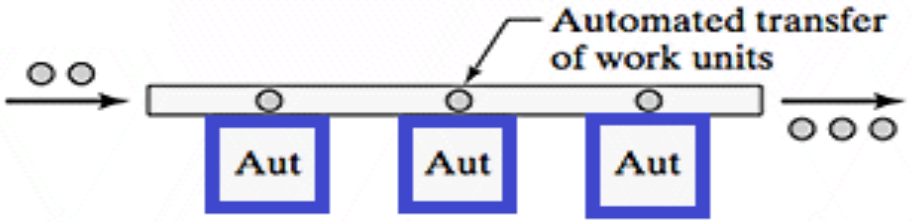
Phase 1
Manual production



Phase 2
Automated production



Phase 3
Automated Integrated production

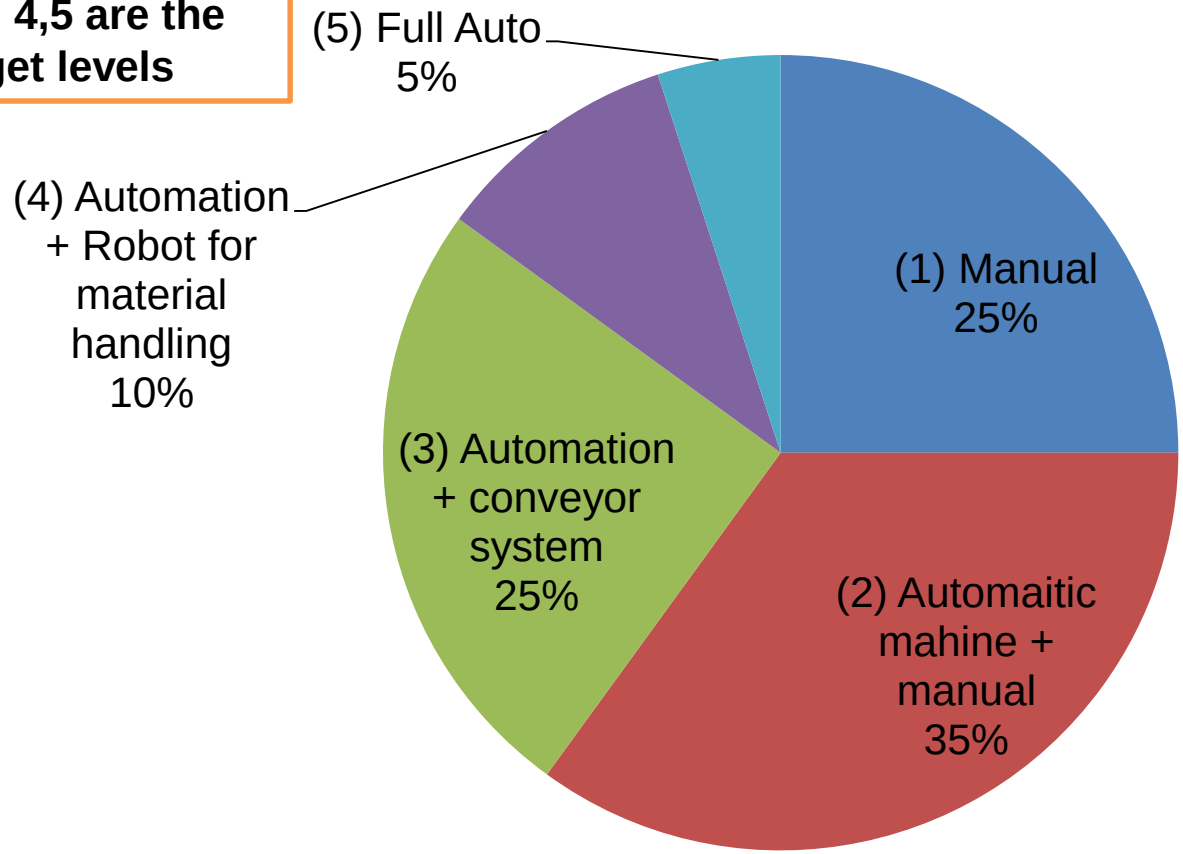


Ref - http://electrical-engineering-portal.com/automation-migration-strategy-in-3-phases

Status of Manufacturing Industry in Thailand

Marginal usage of robotics and automation in manufacturing industry in Thailand. There is a high opportunity (85%) to transform.

Group 4,5 are the target levels



85% of industry have an opportunity to adopt robot & automation to improve process

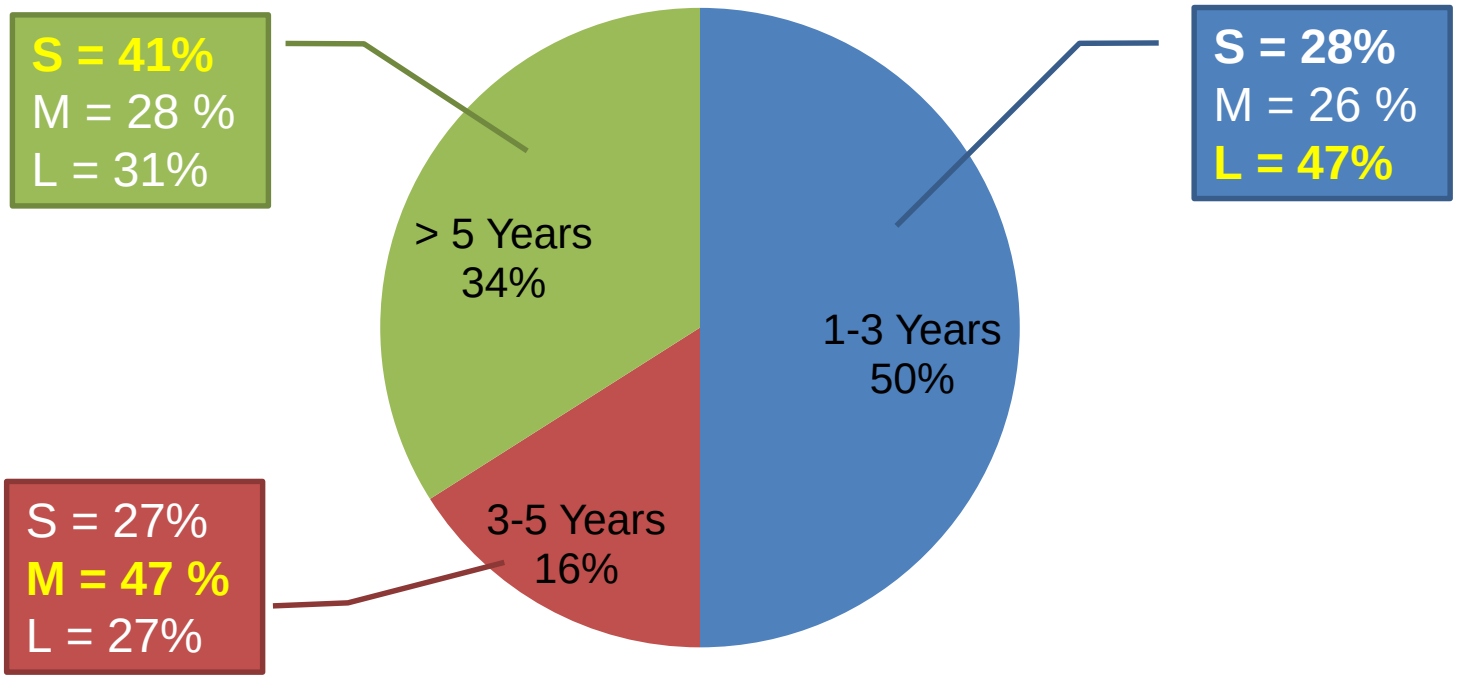
(Group 1,2,3)

Source- from the survey on 94 entrepreneurs, Strategy for improving competency of Thai industry with manufacturing automation system (2015)

Status of Manufacturing Industry in Thailand

50% of industry in Thailand is ready to adapt their manufacturing process to use robotics/automation within 1-3 years

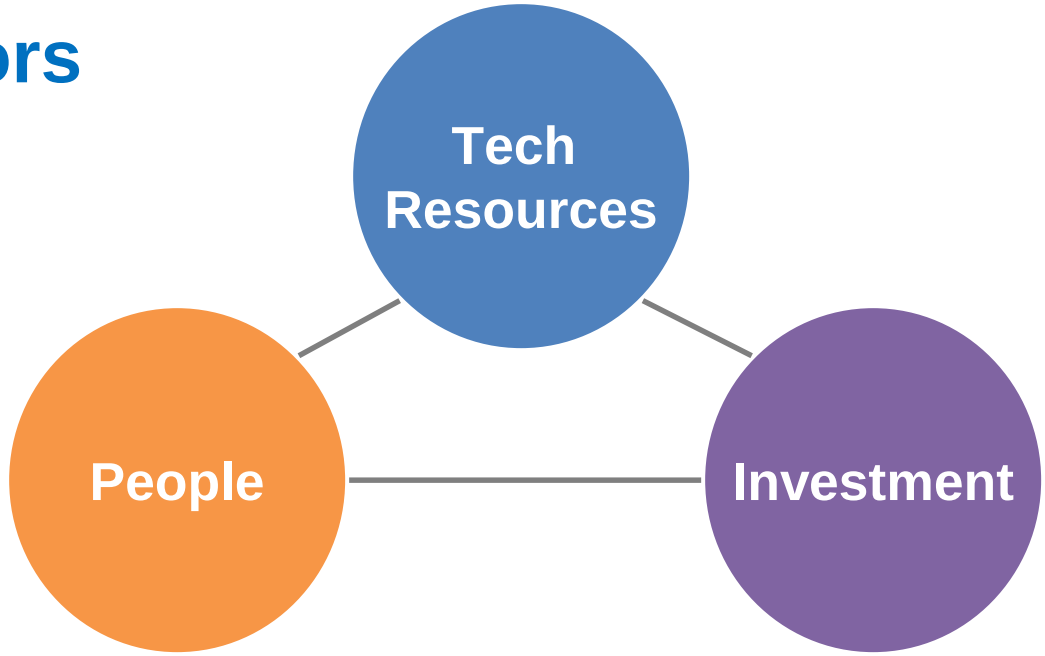
- Majority of **Large** companies are ready to change in 1-3 years.
- Majority of **Medium** companies are ready to change in 3-5 years.
- Majority of **Small** companies are ready to change in later than 5 years.



Source- from the survey on 94 entrepreneurs, Strategy for improving competency of Thai industry with manufacturing automation system (2015)

Migration - Steps & Key Factors

Key Factors



Steps

1. Identify your current position & Needs
2. Optimize process – Operation Research
3. Identify the opportunity for automation
4. Feasibility study
5. Investment & Implementation

Migration Key Factors (1) Investment

- Return of Investment
- Technology & Economic Feasibility
- Government Programs
  - Tax incentive on R&D & process improvement
  - Tax exempt on import - export
  - Super Clusters in Robots and Automation

THAILAND BOARD OF INVESTMENT iTAP NIA สำนักงานนวัตกรรมแห่งชาติ TALENT MOBILITY

Migration Key Factors (2) Tech Resources

- Automation suppliers
  - Equipment and parts
  - Technology availability and feasibility
- Source of knowledge & consultant
  - Academic institutes
  - System Integrators
  - Makers & Vendors
- Research & Development
  - Internal & External

Migration Key Factors (3) People

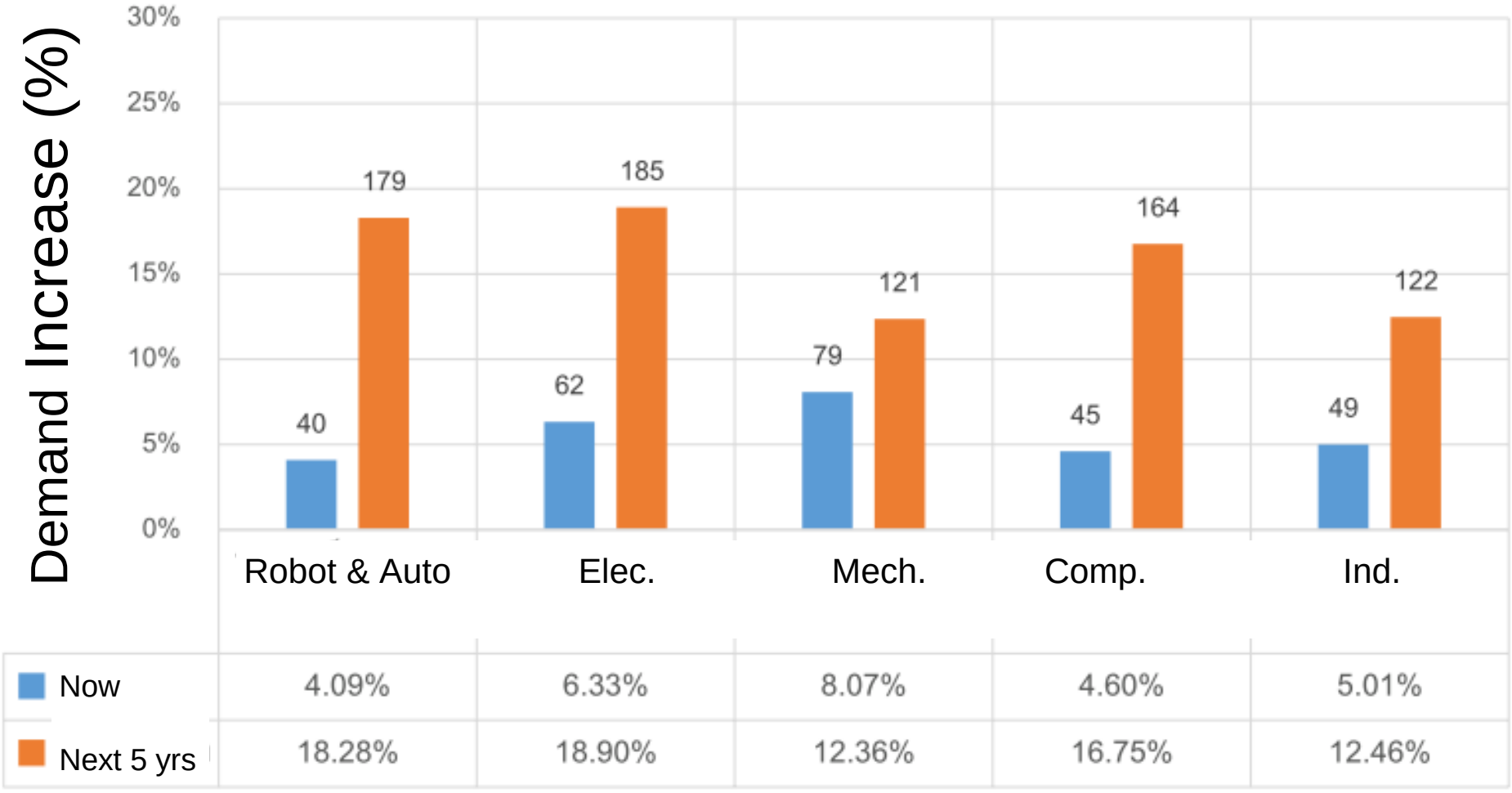
- Vision of the executive
- Resolve workers problems
  - Skilled workers
  - Health and safety
- Prepare people in RA
  - Operate
  - Maintenance
  - Develop

Are We Ready !?

Skills in Robotics and Automation

Mechanics/Manipulation	Electrical and Electronics/ Perception	Computer/Cognition	Technoprenuership
Mechanism Design	PLC (Siemens, ABB, Mitsubishi, Omron)	C/C++/.NET Programming	Business Foundation
SolidWorks/AutoCAD/ Drawing	Circuit Design	Robot Vision/ Image Processing	Factory Operation
Automatic Control	Pneumatics Circuit	Industrial Robot/Conveyor Operation	Technology Company Startup
CNC	Microcontroller	NI/LABView	
	Sensors	Factory Simulation/ARENA	
	Actuators	Intelligent Systems	

Skills Demand in Each Industry



	Robot & Auto	Elec.	Mech.	Comp.	Ind.
Now	4.09%	6.33%	8.07%	4.60%	5.01%
Next 5 yrs	18.28%	18.90%	12.36%	16.75%	12.46%

Survey on 35 companies in 4 main industries:
(1) Automotive (2) Food Agriculture (3) Medical & healthcare (4) Electronics

Migration Key Factors (3) People


Machine Design



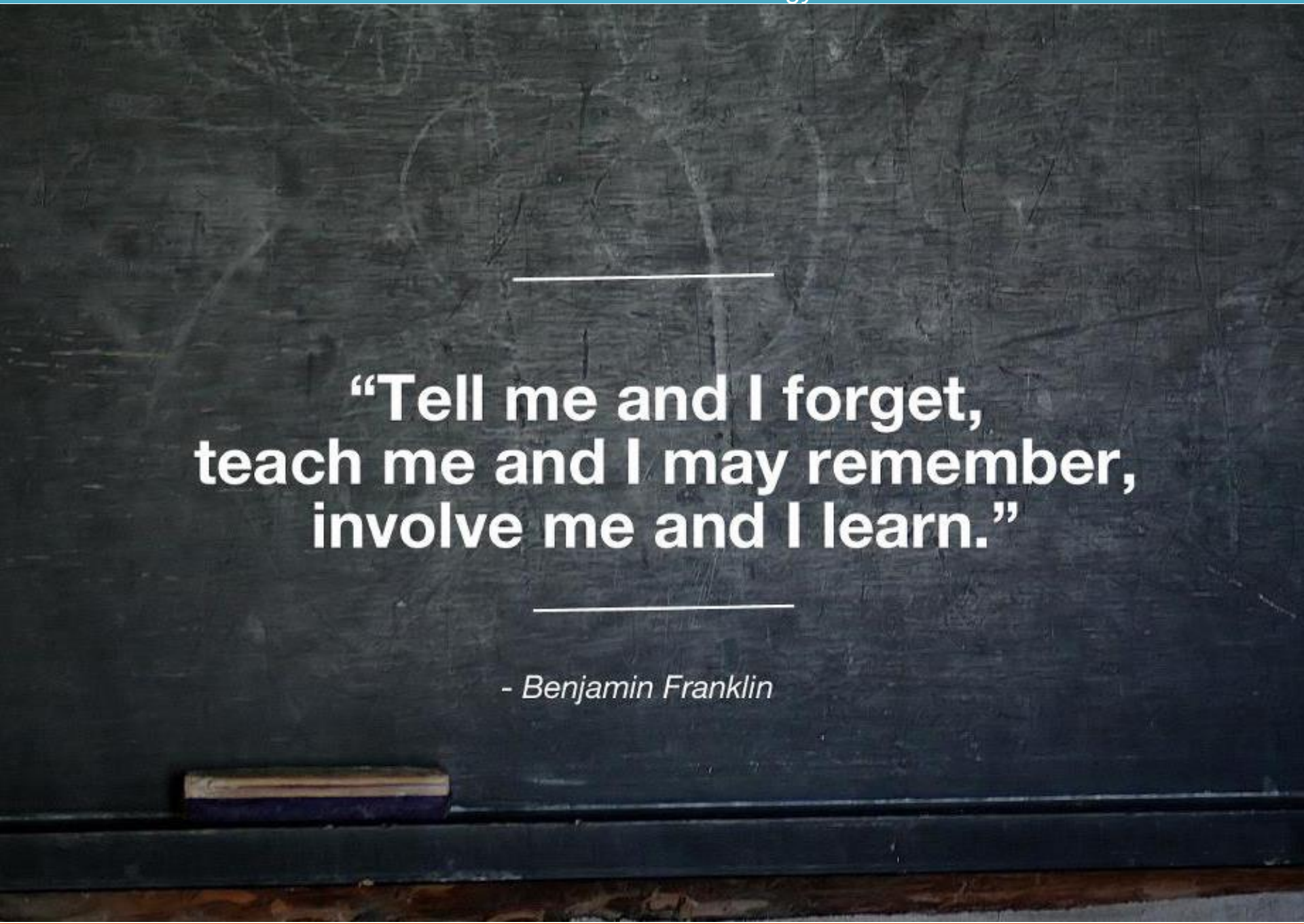
Automation




Computer Vision




BioMedical Robotics


"Tell me and I forget,
teach me and I may remember,
involve me and I learn."
- Benjamin Franklin

Institute of FIeld roBOtics

Organization at FIBO

Robotics for Life
4 Clusters

- Field Robotics
- Edutainment
- Medical
- Industrial

Strong Collaborations with Industries

Research

Industrial Service

Education

Project-based Learning
Case from Research/Industry

- **Project-based Teaching Module**
- (FRA) B.Eng., M.Eng., Ph.D. in Robotics and Automation
- (TEP) M.Sc. in TechnoPreneurship

Main Income
High Societal Impact Projects

Model – Project-based Collaboration

University
- Professors
- Research Labs
- Engineers
- Students

External Funding

Partners
- Universities
- Research Institutes
- Companies

Project

INDUSTRY

Publications
- books
- Journal
- Conference
- Joint dissertation

Student Programs
- Exchange
- Internship
- WIL & Co-op

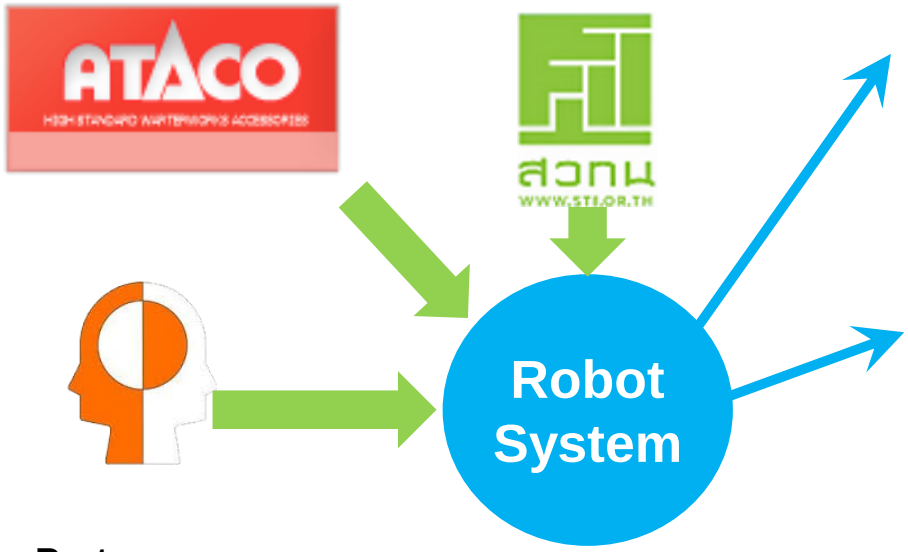
Human resources
- Researchers
- Students

Project Outcome
- Industrial project
- Research project
- Technopreneur (Start-Up)

Case study – Academics & Industry

1. Co-op Industry
2. Co-op Research
3. Industrial Services
4. Tech start-up
5. Contest

Case1 – Co-Op Research Collaboration
Robot for Automatic Valve Trimming System



Expected publications:
1 BE Thesis, 1-2 conference

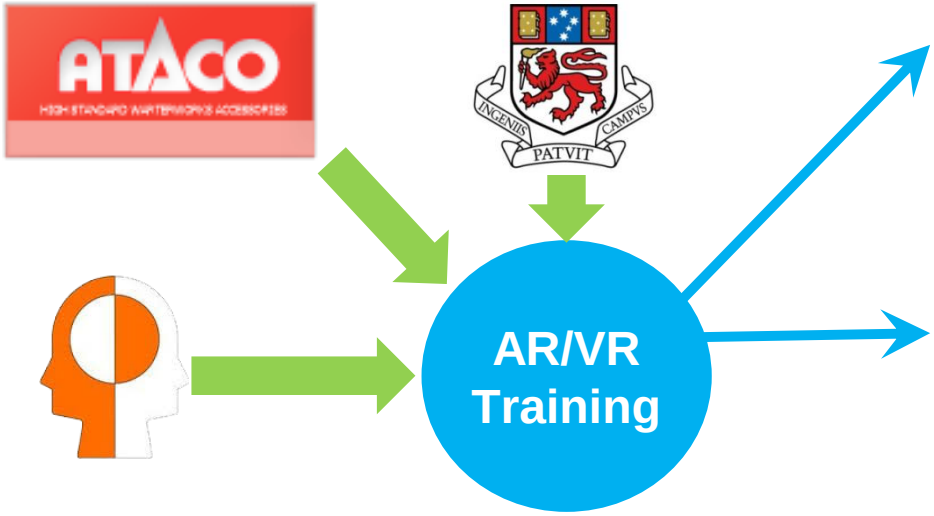
Partners
- Industry - ATACO

Co-op Program
- 1 Academic as a principle investigator
- 1 Master student as a tech consultant
- 3 Bachelor student as a researchers
- 1 Engineers (from Sanwa)
- 6 months

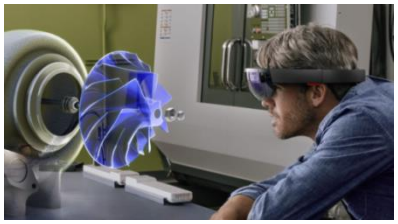
Funding Matching
- ATACO (salary + Equipment)
- TSI (Talent Mobility)

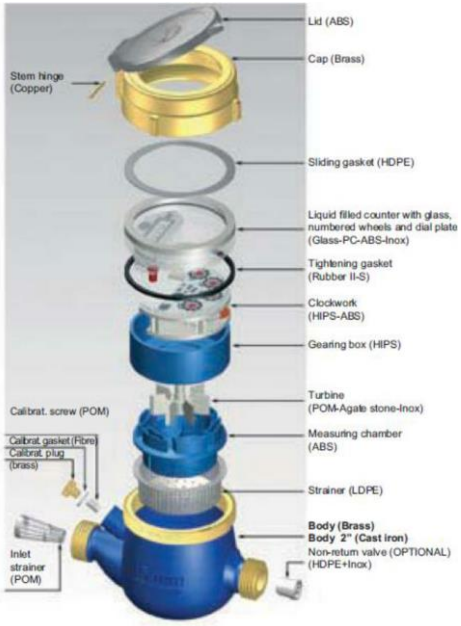
Project Roles
- *ATACO*
  - Real industrial problem in trimming process
  - Provide technical supports for industrial practices
  - Provide access to the working site
  - Support – tools and equipment
- *FIBO*
  - Project manager / Consultant / Researcher

Case2 – Co-Op Research Collaboration
System of VR/AR product assembly training



Expected publications:
1 BE Thesis, 1 Journal, and 1-2 conference





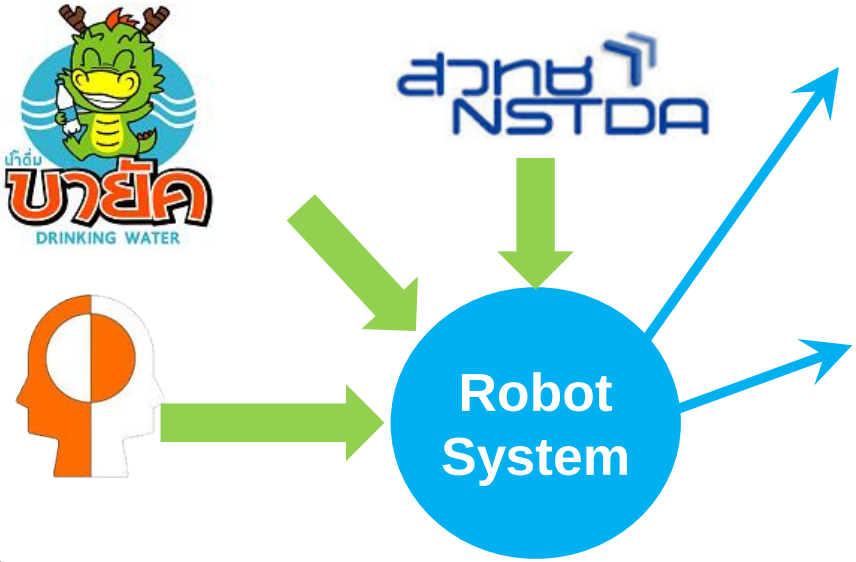
Partners
- University - UTAS
- Industry – ATACO – Asahi Thai Alloy Co. Ltd.

Co-op Program
- 1 Academic as a principle investigator
- 1 student as a researcher
- 6 months (4 at Sanwa + 2 at UTAS)

Funding Matching
- FIBO Research (stipend)
- UTAS (stipend)
- Sanwa (salary + Equipment)

Project Roles
- ***ATACO***
  - Real industrial problem in virtual training
  - Provide technical supports for industrial knowledge and practices
- ***University of Tasmania***
  - Consultant technology in VR/AR consultant
- ***FIBO***
  - Consultant/ Supervise in Robotics
  - Researcher

Case3 – Industrial Services
Automatic Water Bottles Loading



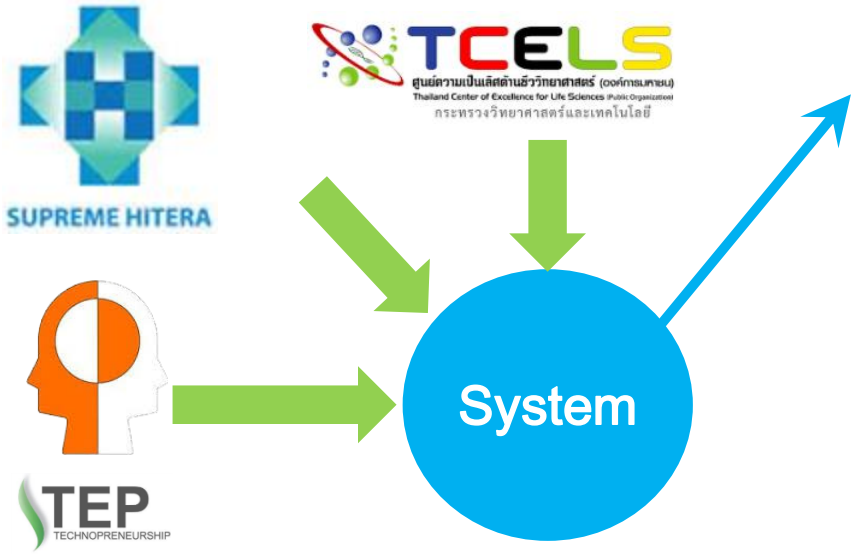
Partners
- Industry – Bayak Co. Ltd.

Industrial Service Team
- 1 Academic as a principle investigator
- 1 FIBO Engineer as a researcher
- 1 Bachelor student as a researcher
- ABB Engineers Team
- 6 months

Funding Matching
- Bayak (Expense + Equipment)
- NSTDA (ITAP)

Project Roles
- ***Bayak***
  - Real industrial problem in water packaging
  - Provide access to the working site
  - Support – tools and equipment
- ***FIBO***
  - Project manager / Consultant / Researcher

Case4 – Tech Start-Up
Automatic Medicine Dispensary System

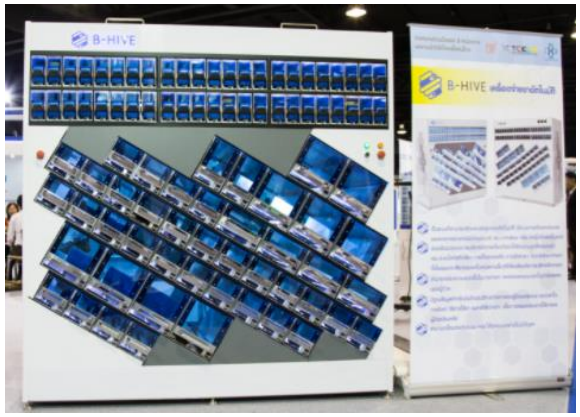


Outcomes

- 3-4 Commercial prototypes
- 1-2 Start-Up companies
- MOU: FIBO – Supreme – Siriraj – TCELS

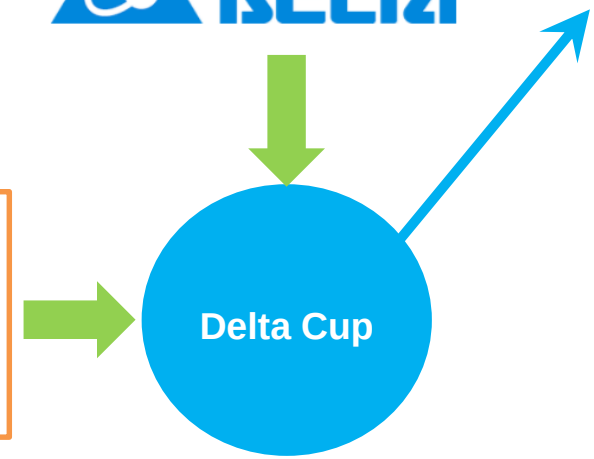
FIBO Roles

- Academics (technical consultant)
- TEP Students (Start-Up company)
- FRA Students (R&D engineers)
- Create ecology



Case5 – Industrial-based Contest
Delta Cup – Advanced Automation Contest

- KMUTT
- KMUTNB
- KMITL
- Chulalongkorn
- Kasetsart



Outcomes
- 5 Teams from Thailand's universities (2017)
- Concept prototypes
- Students develop skills with industrial practice

Delta Support
- Industrial Automation equipment
- Travel and exhibition expense
- Technical support of IA

Universities support
- Academics as a supervisor
- Workplace and facility

What Should We Do ?

Industry

- Talk to Universities
- Tell them what you need in tech & human resources

Education

- Adapt courses & activities to serve the industrial requirements
- Research that serve industrial needs

Together

- Research project and training collaboration
- Coaching via WIL / Co-op / Internship / Start-Up

Institute of FIeld roBOtics

THANK YOU

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