

# China Industry 4.0

以「創新驅動、品質為先、綠色發展、結構優化」為發展戰略



在2020年實現又大又強



縮短與國際先進水平差距  
能基本滿足國內需求

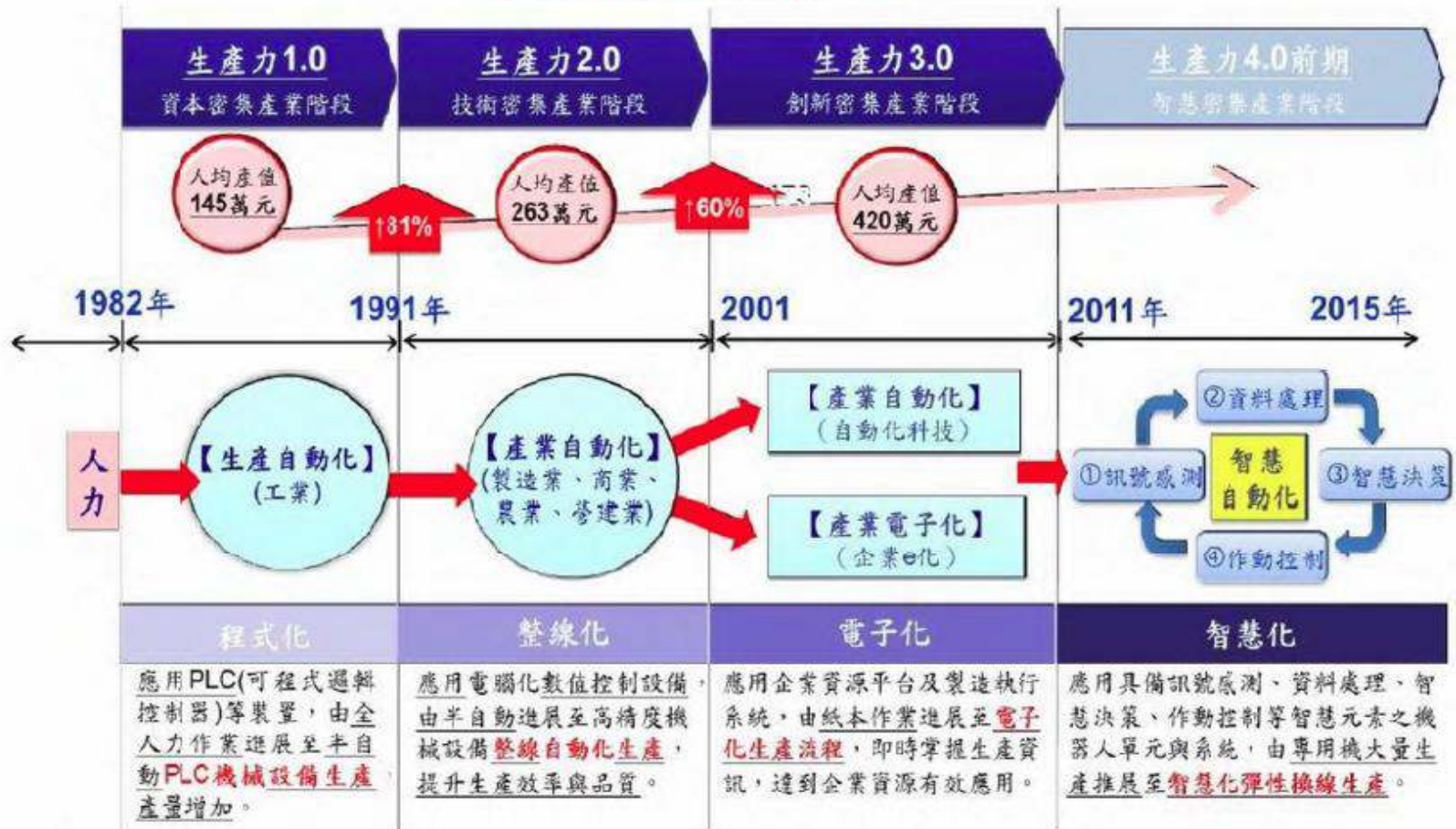


# South Korea Industry 4.0

4 Strategies	8 Challenges
Creating next manufacturing paradigm with convergence	Process innovation using IT and S/W
	Creation of convergent growth engine
Strengthening core capability in key industries	Advancing material and components
	Enhancing soft power in manufacturing industry
Enhancing competitiveness with manufacturing innovation	Supplement of human resource and location with demand-oriented
	Leading R&D hub of the North-east Asia
Promoting overseas expansion	Expansion and utilization of FTA
	Maximization achievement of summit diplomacy

# Taiwan Industry 4.0

## 生產力4.0



# Eco-system for Smart Machine Industry, Taiwan

## 智慧機械產業生態體系 (經濟部工業局2016年7月)



# Taiwan Industry 4.0 Example

## 設備智慧化

### 案例：工具機智能化軟體

主軸監控系統



線上顫振迴避與參數優化系統



線上即時製程解析系統



稼動率監控



線上即時防碰撞系統(CPS)



# Background of Industry 4.0 @ FCU



FCU co-operate with

Siemens Shanghai

Cincinnati IMS &

CIMFORCE

- 1<sup>st</sup>: Steam Engine & Mechanical manufacturing
- 2<sup>nd</sup>: Mass Production and Electrical
- 3<sup>rd</sup>: Automation
- 4<sup>th</sup>: Smart and networking

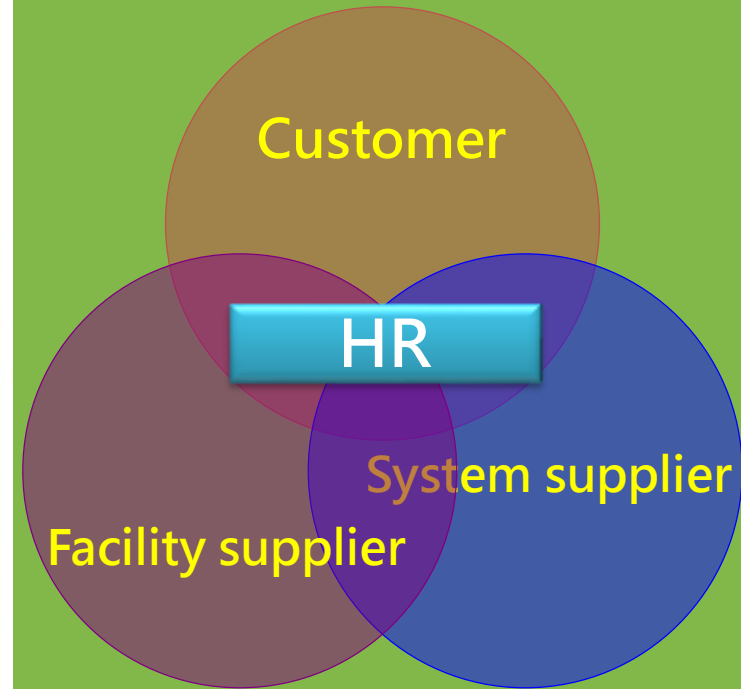
- **Social network; Big data (COBS)**
- **Internet of Things; IoT (COI)**
- **IoS; IoD (D-School)**
- **Smart Manufacturing Center (COE)**



# The Frame of Industry 4.0 at FCU



Global trend for Industry 4.0

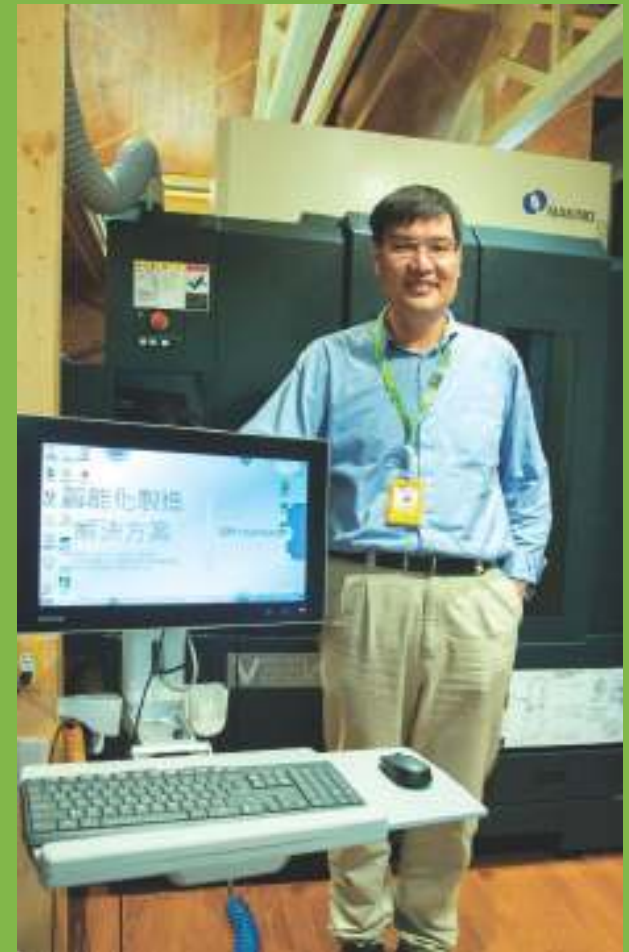
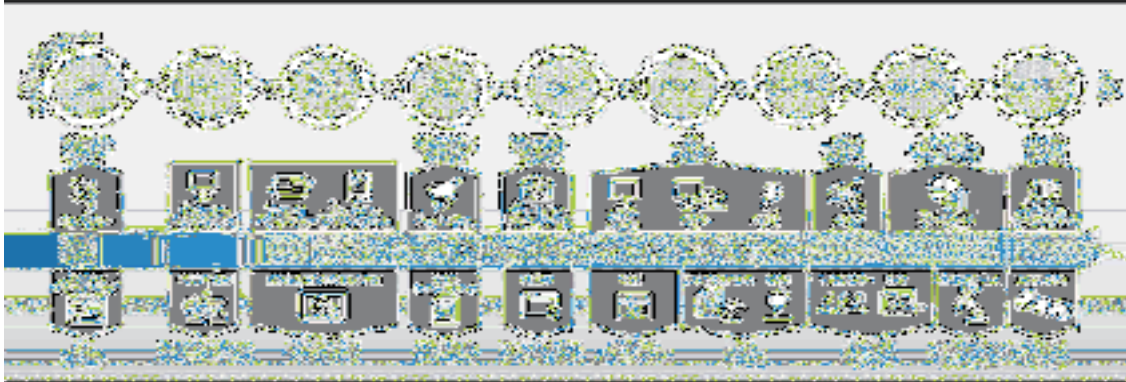


- HR in FCU
- Cooperation companies

# System supplier for FCU Industry 4.0

## CIMFORCE

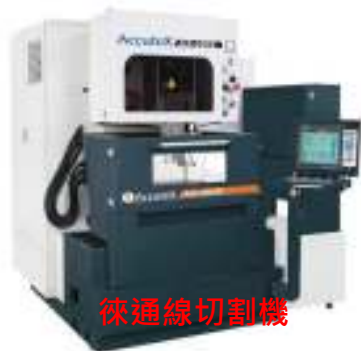
- CIMFORCE founded at 2013  
good at software of  
CAD/CAM/CAE+PLM+MES



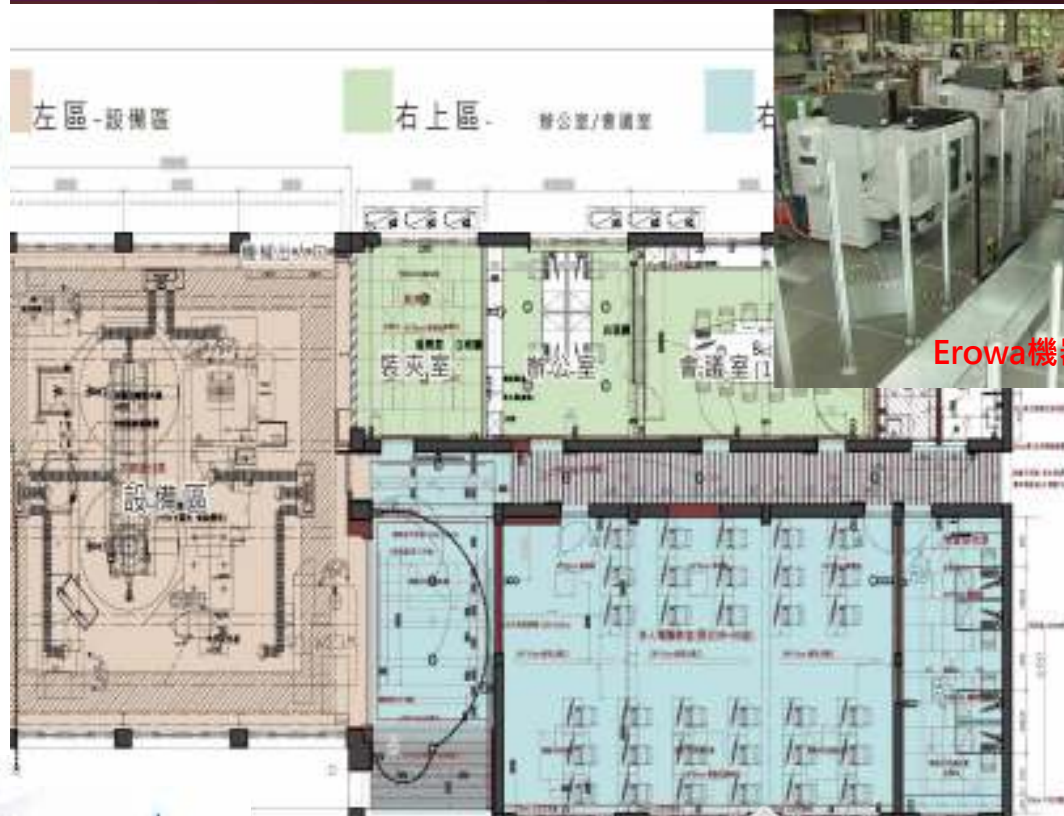


# System Supplier CIMFORCE

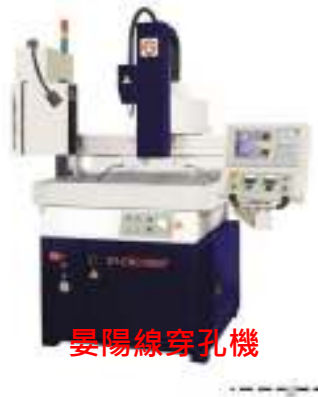
台科大工業4.0實作中心2-1



狹通線切割機



Erowa 機器人系統



晏陽線穿孔機

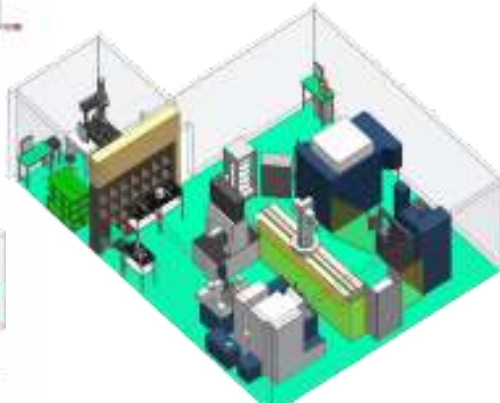
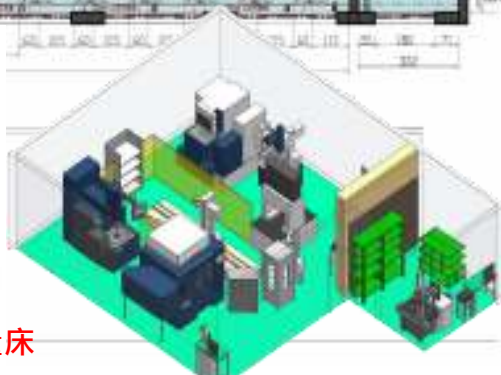


Makino 放電加工機

Makino 中心切削機



Hexagon 三次元量床



# System Supplier CIMFORCE

台科大工業4.0實作中心2-2



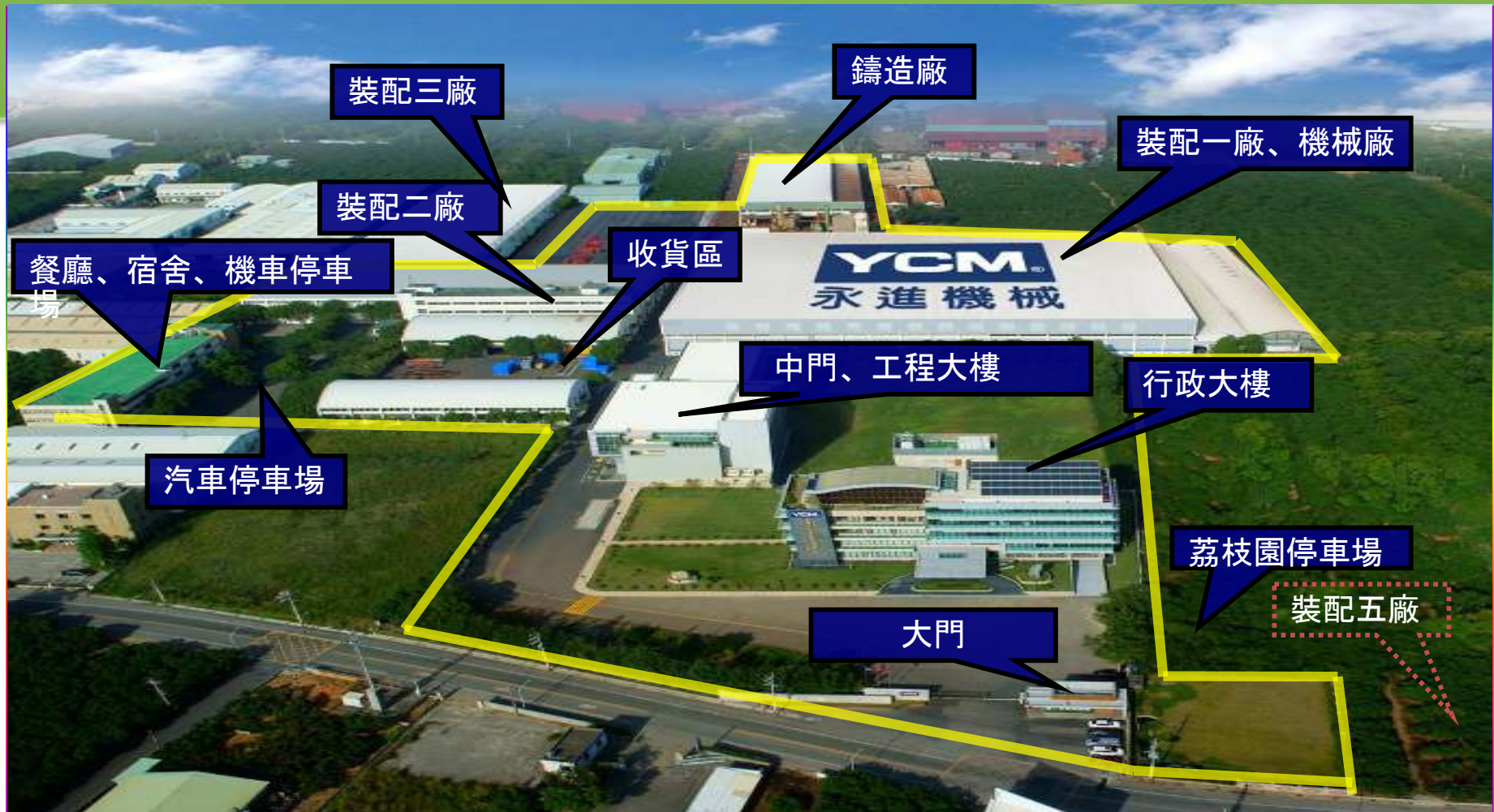
模具製造管理系統

品名Item	廠牌Brand
CAM	ESPRIT
Simulation	NCSPEED
PLM	TEAMCENTER
CMM	PC-DMIS
CAD	ARCOCAD



# Facility Supplier YCM

## YCM in Central Science Park



# Facility Supplier YCM

## YCM Production Process



# Facility Supplier

## YCM Smart Production Line



### 永進機械-智能化航太機身結構治具加工設備開發

#### 關鍵問題

- 工具機以泛用型車機為主,長期以來缺乏資訊工程相關領域的整合,故缺乏相關智慧化應用軟體的發展。
- 工具機資訊領域缺乏與生產製程平台整合應用。
- 工具機設備目前缺乏機建網相關應用技術

#### 關鍵技術發展策略

- 以航太結構件加工應用技術,導入智慧化應用技術,生產排程智慧化,並以工具機智慧通訊技術整合MES與ERP系統通訊接口。
- 建立工具機線上監控可視化機動監控技術,以雲端大數據分析應用,強化工具機設備與雲端智慧製造的連結。



機件保潔  
直線滑配



自動報到



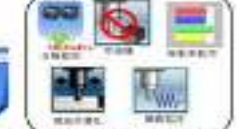
航太零件表面幾何數據  
數值分析



機建網環境增值功能

快速拓機結構演進化技術

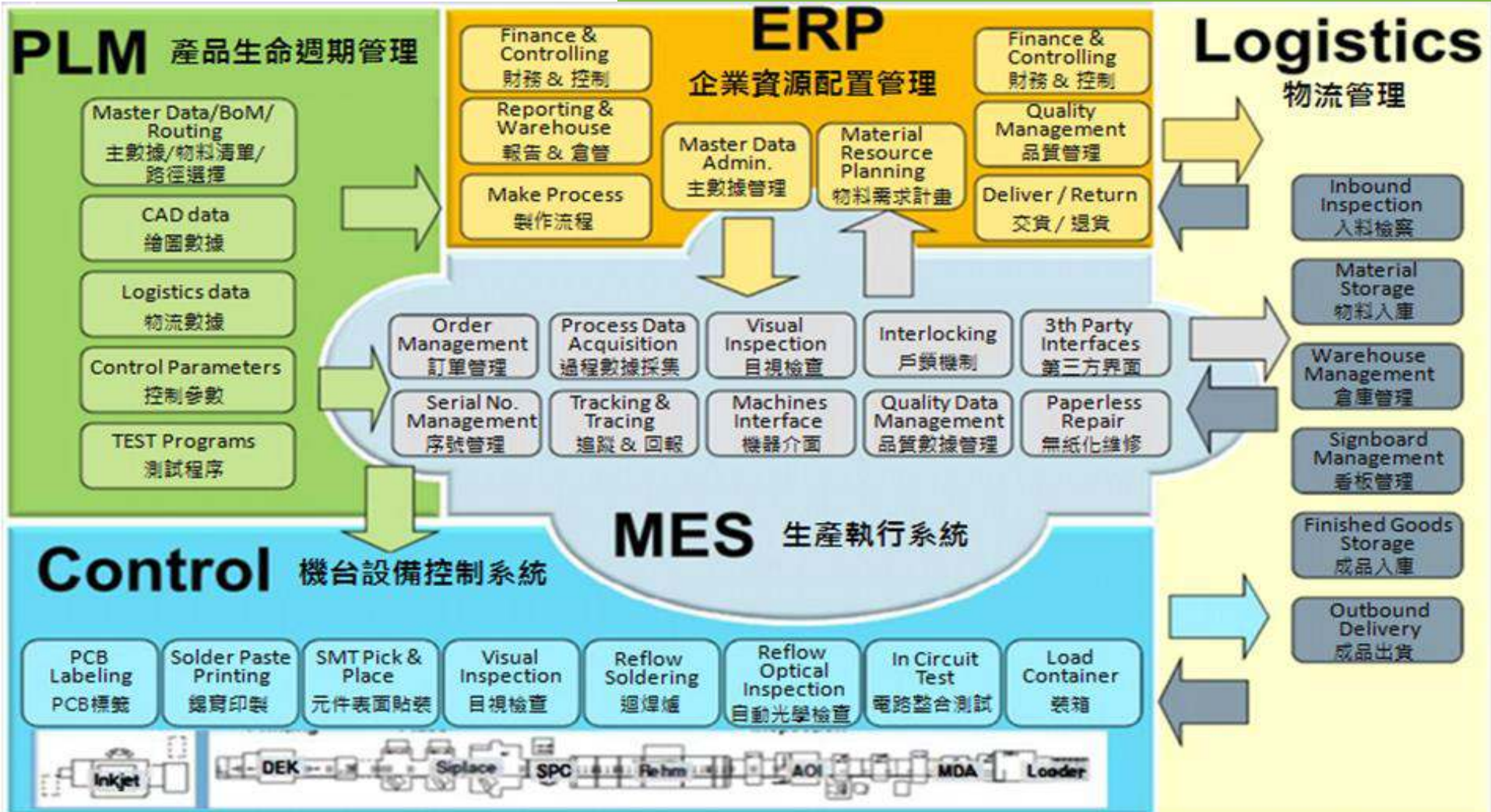
5軸削削精皮磨技技術



智慧化製程監控及調控

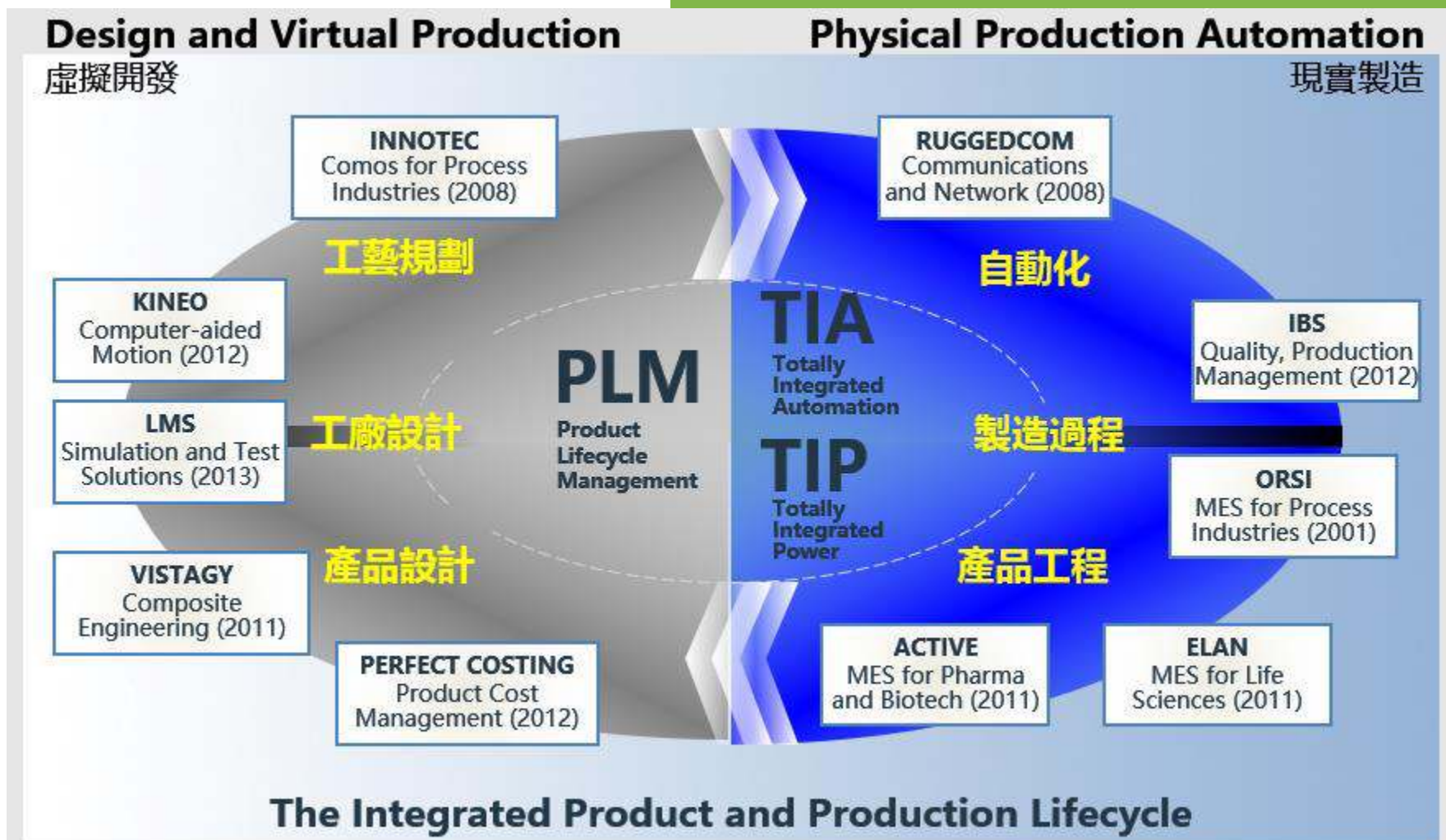
# Facility Supplier @FCU

## Siemens, Chengdu Digital Plant



# Facility Supplier @FCU

## Siemens Real and Cyber Integration



# FCU Action plan for Industry 4.0

## Man Power

a. Manufacturing Systems	b. Supplier Chain	c. Logistic & Services
EE	IE	Computer Science
AC	AE	Communication Depart.
Precision Mech.		
	GEDC	

## Maker Space

Maker Space : IOT Lab/CDIO Room

## Resources

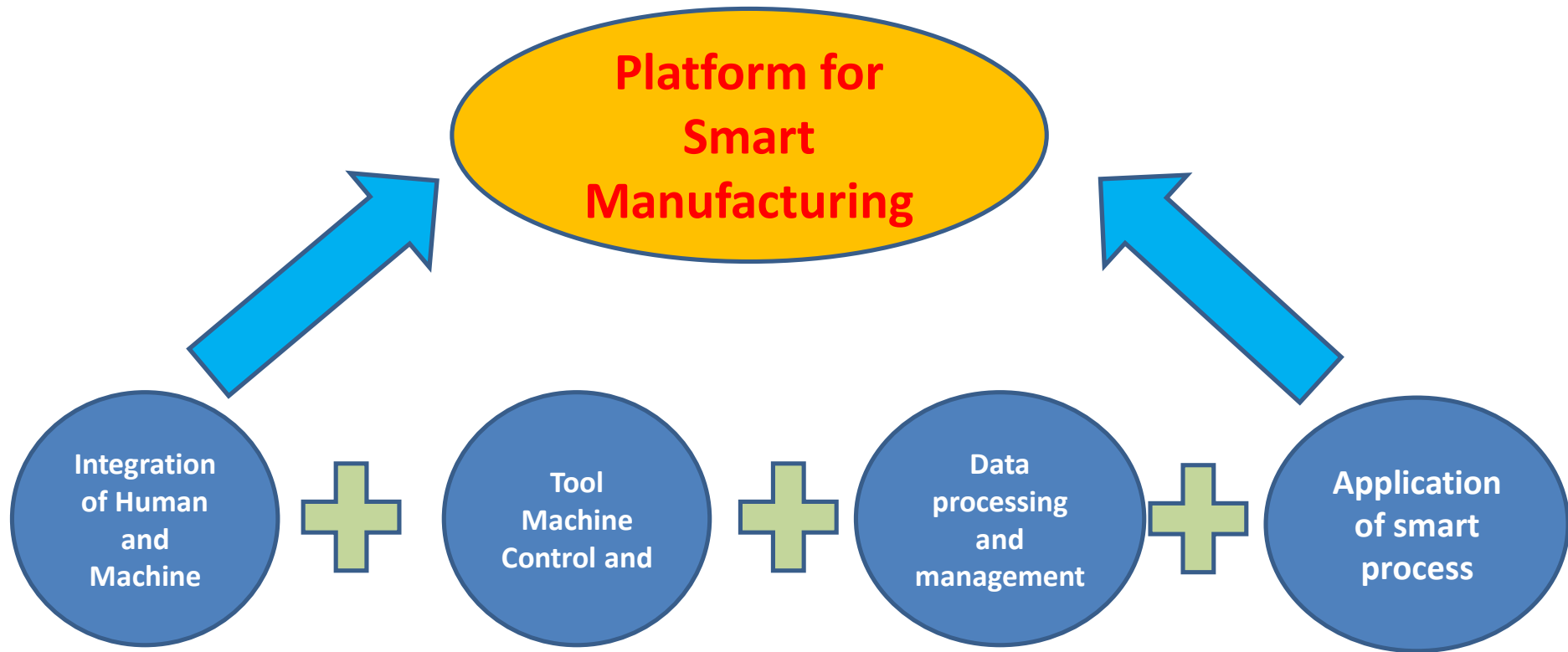
- a. Seed lectures
- b. Interdisciplinary Students

## Facilities

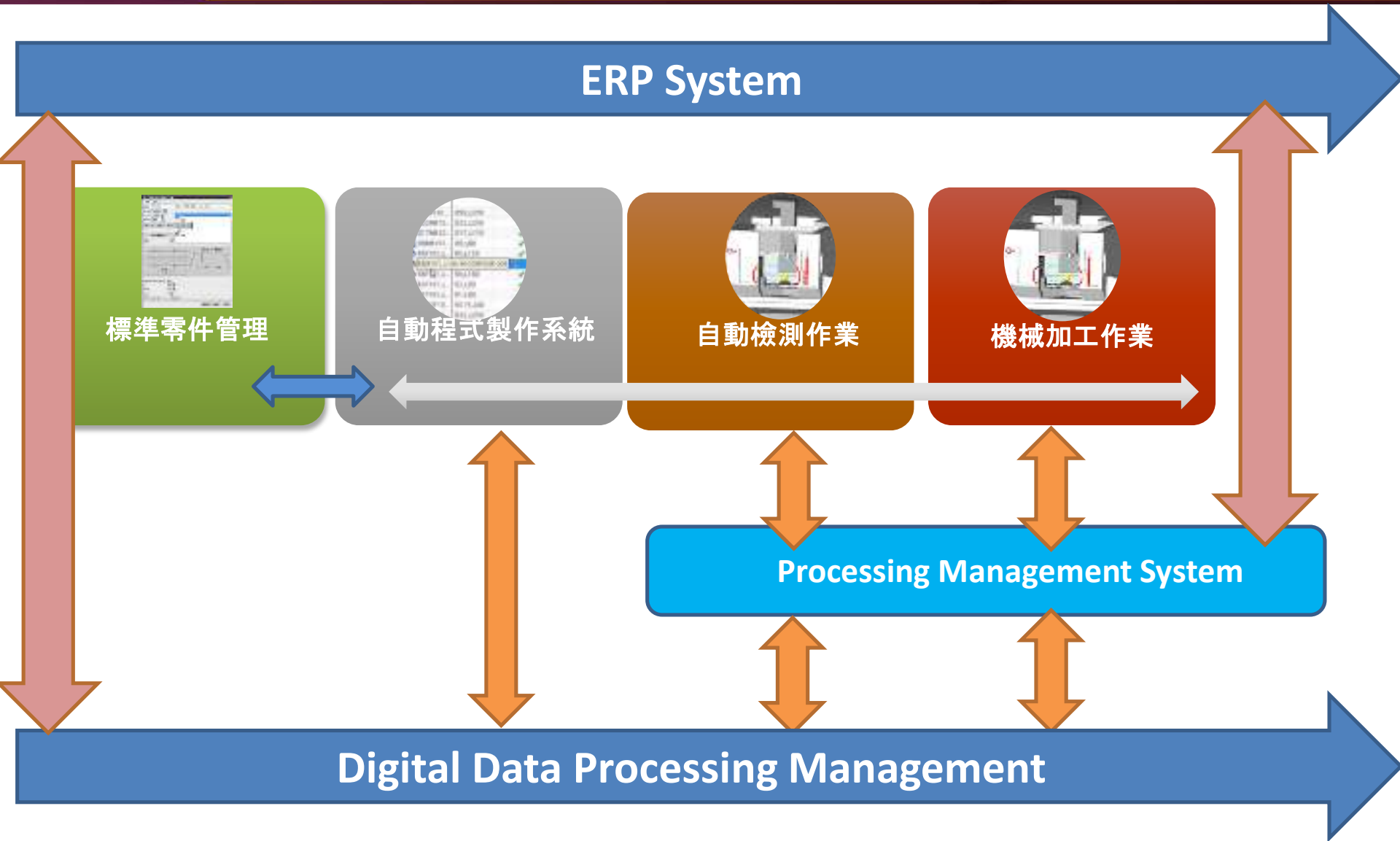
FCU Facilities	Cooperation Companies
CNC machines	CIMFORCES
	YCM
Cutting Machines....	HIWIN
	PTC Windchill.....
	AIDC



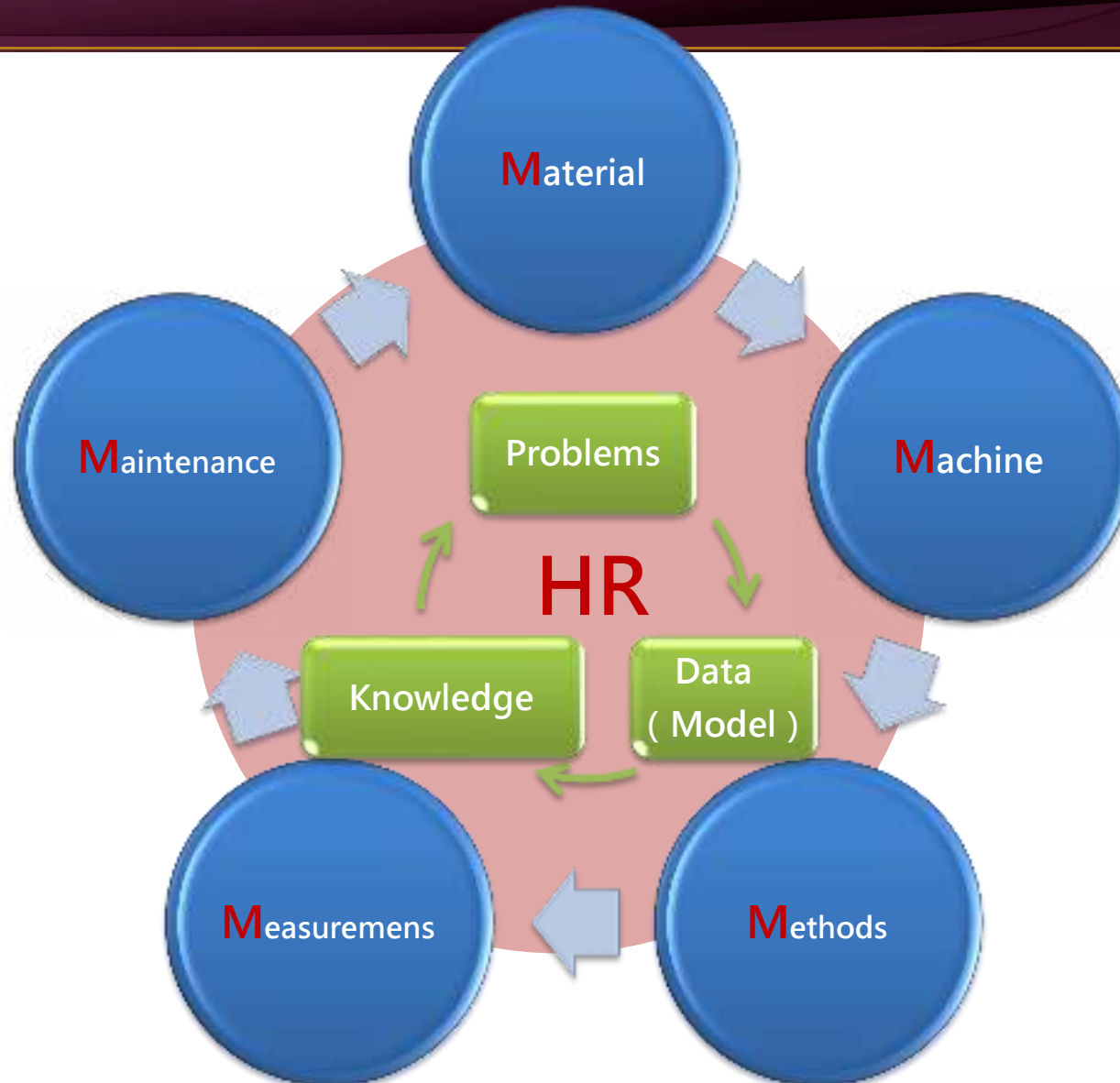
# Platform for Smart Manufacturing in FCU



# Platform for ERP

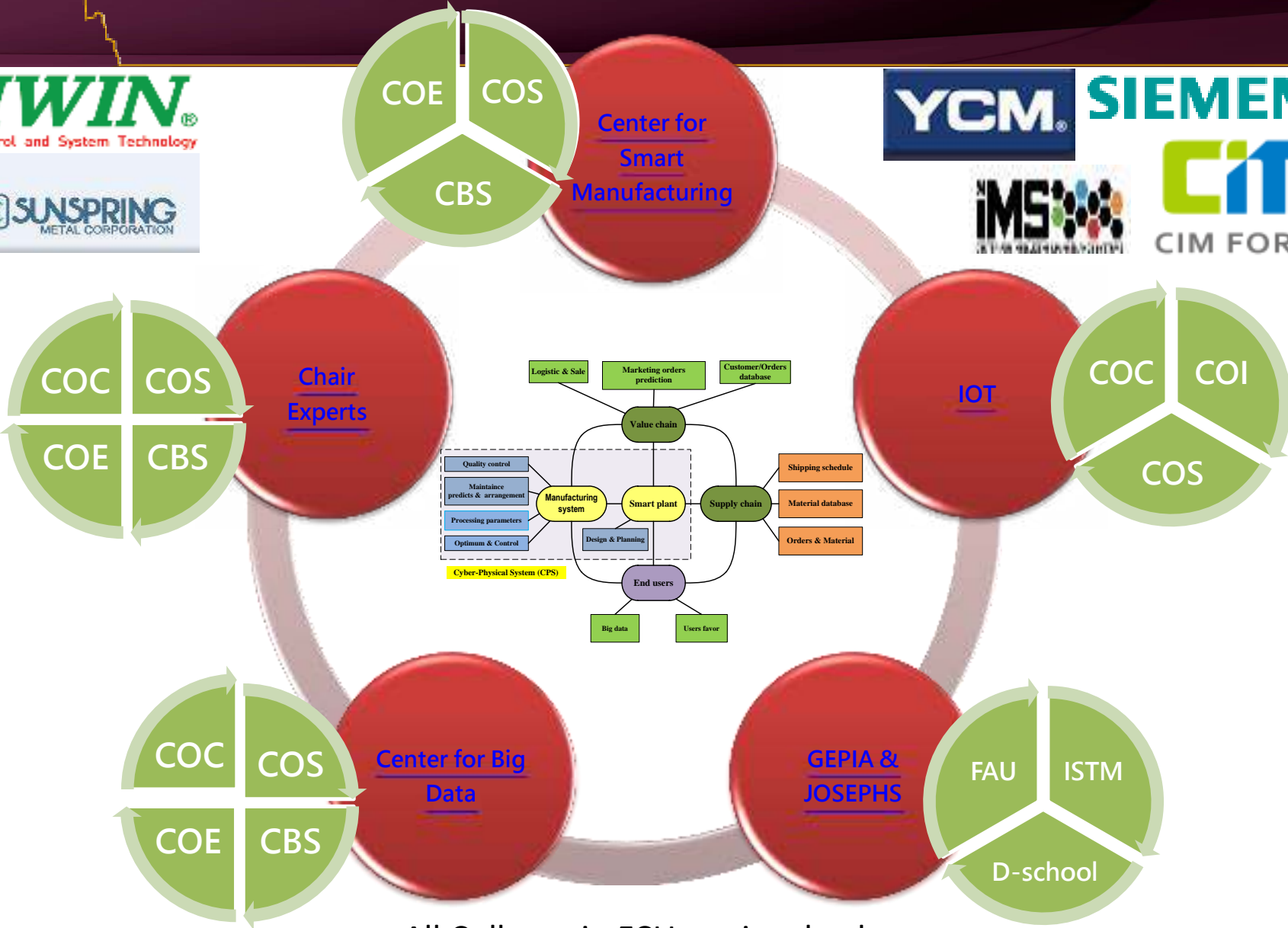


# Human Resources



Sources: Jay Lee et al. Books in Mandarin “大數據到智慧生產與服務創新”

# FCU HR & Centers

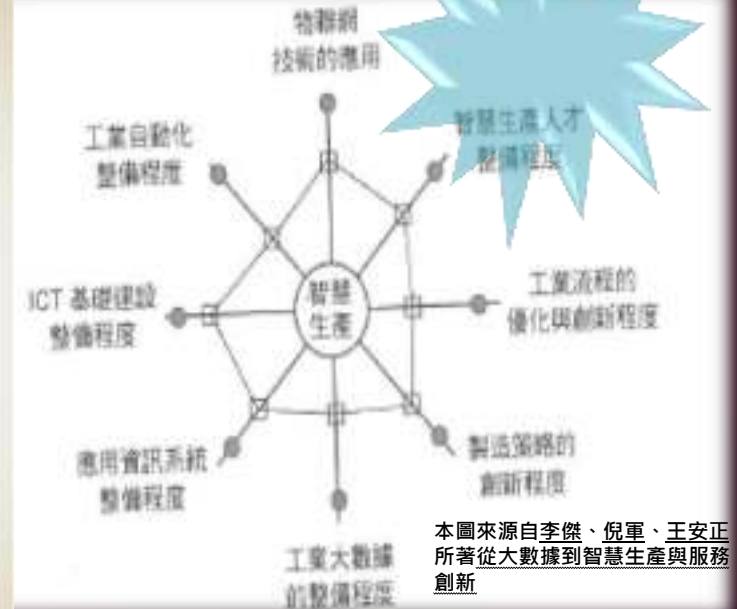
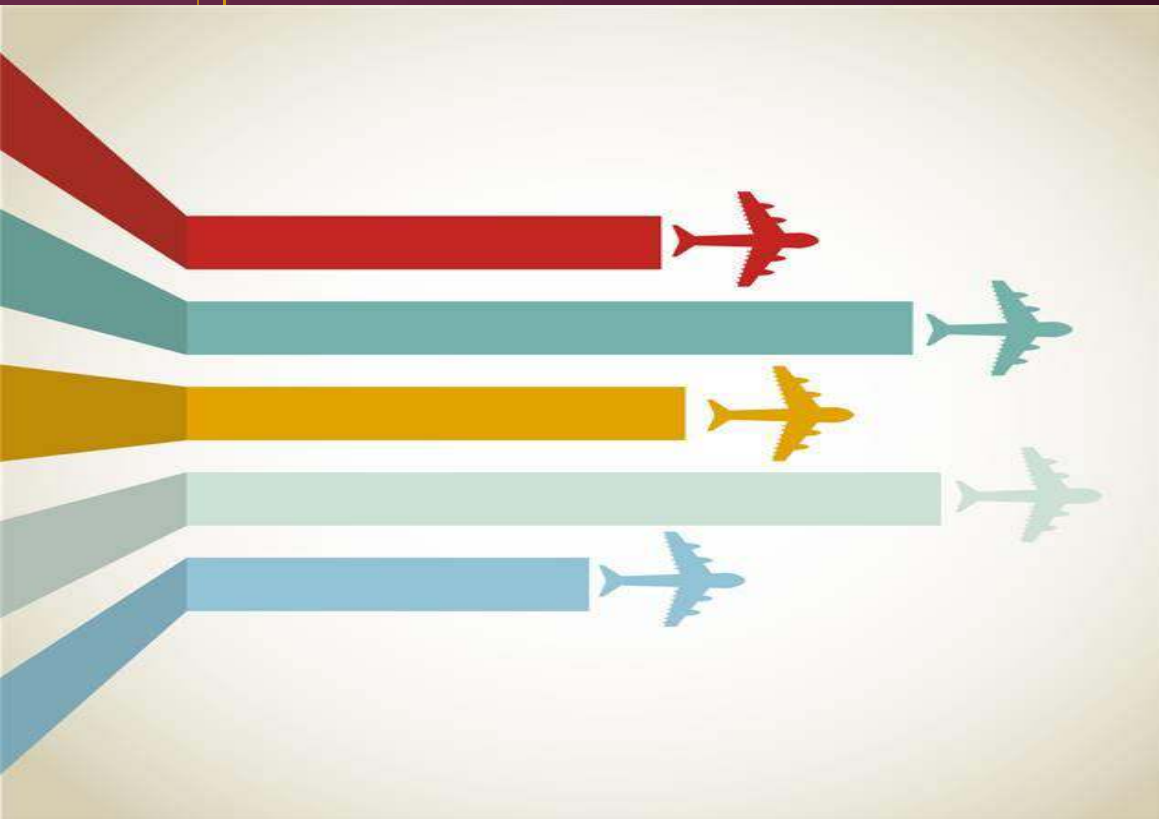


All Colleges in FCU are involved

# Research & Development Needs for Industry 4.0

- ◎ **What services are helpful?**
- ◎ **What business models make sense?**
- ◎ **How to technically implement software services?**
- ◎ **How to provide self-healing, self-organizing or self-optimizing production and negotiation capabilities?**
- ◎ **How to protect investments of existing plants?**
- ◎ **How to model and store virtual models ?**
- ◎ **How to interact between virtual and real world?**
- ◎ **How to reach industrial performance?**
- ◎ **How to provide a secure network?**
- ◎ **How to model and standardize interfaces towards physical objects and services?**
- ◎ **How to connect devices into the internet?**
- ◎ **How to model self-awareness across vendors regarding functionality, requirements etc.?**

# Industry 4.0 @ FCU



Thanks for your attentions