Initiatives on Manufacturing Innovation and Transformation of Industrial City

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ASEM-EMM Seoul Initiative on the 4th Industrial Revolution

ASEM-EMM (Asia-Europe, Economic Minister's Meeting) Sept 21-22, 2017 Seoul Korea

"Innovative Partnership for Inclusive Prosperity"

COMMON PRINCIPLES

- Sustainable growth through inclusiveness
- *Diffusion of creativity and innovation*
- Collaboration based on openness
- Fairness and transparency in competition

POLICY RESPONSES

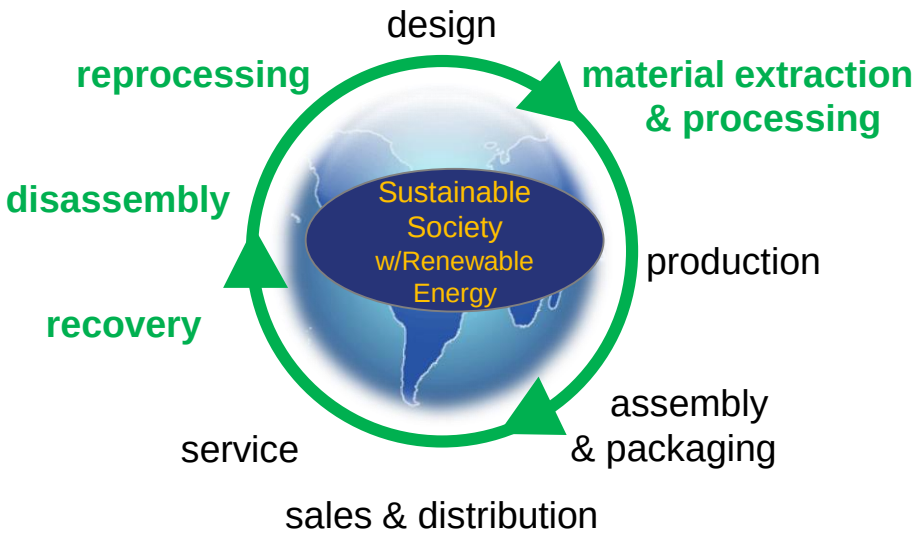
- Cooperation for an innovation-friendly regulatory framework
- *Fostering favorable conditions for digital transformation*
- *Capacity building for MSMEs*
- *Facilitating R&D collaboration*
- Improving human capital and workplaces

» MSME: Micro, small, medium enterprise

Convergence of OT & IT

Hardware-centric Development + **Software-centric Development**

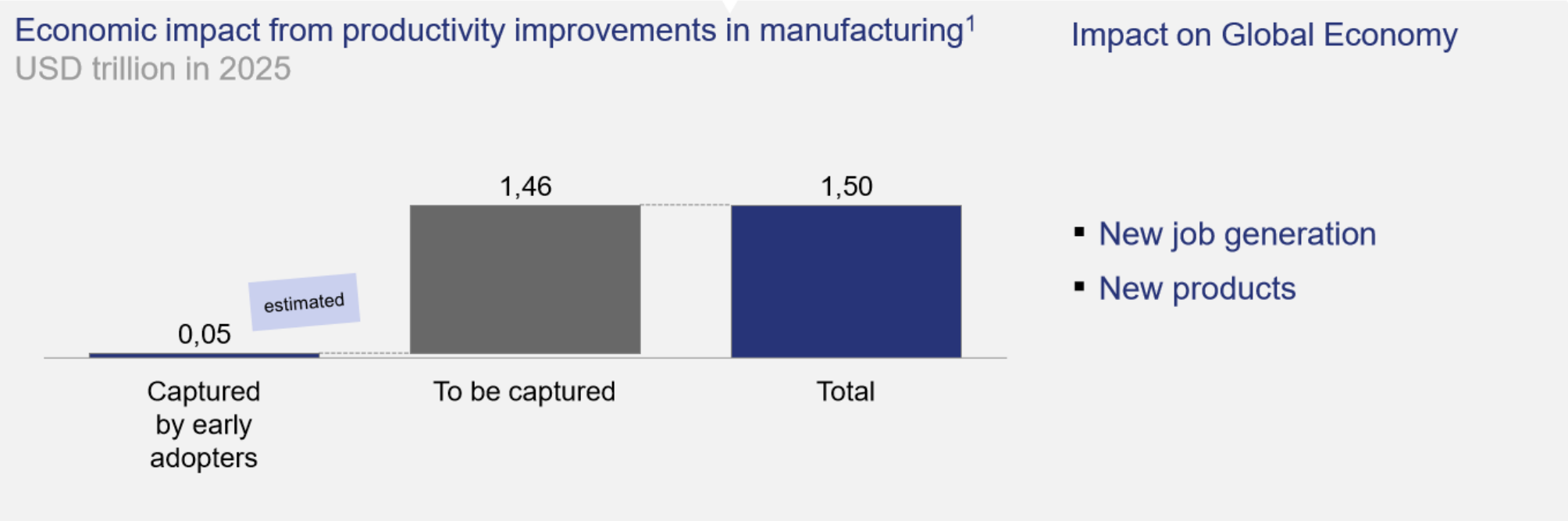
Integrated value chain



Digital transform & Connected

Man-oriented	➡	Man + IOT
Local, Sequential	➡	Global, Simultaneous
Physical space	➡	Physical + Virtual space
Technologies	➡	IIOT, AI, Big Data, Robotics, 3-D, MR

Economic Impact from Productivity Improvement could reach **$1.5 Trillion USD ($1.2- 3.7T) but only captured $0.05T so far**

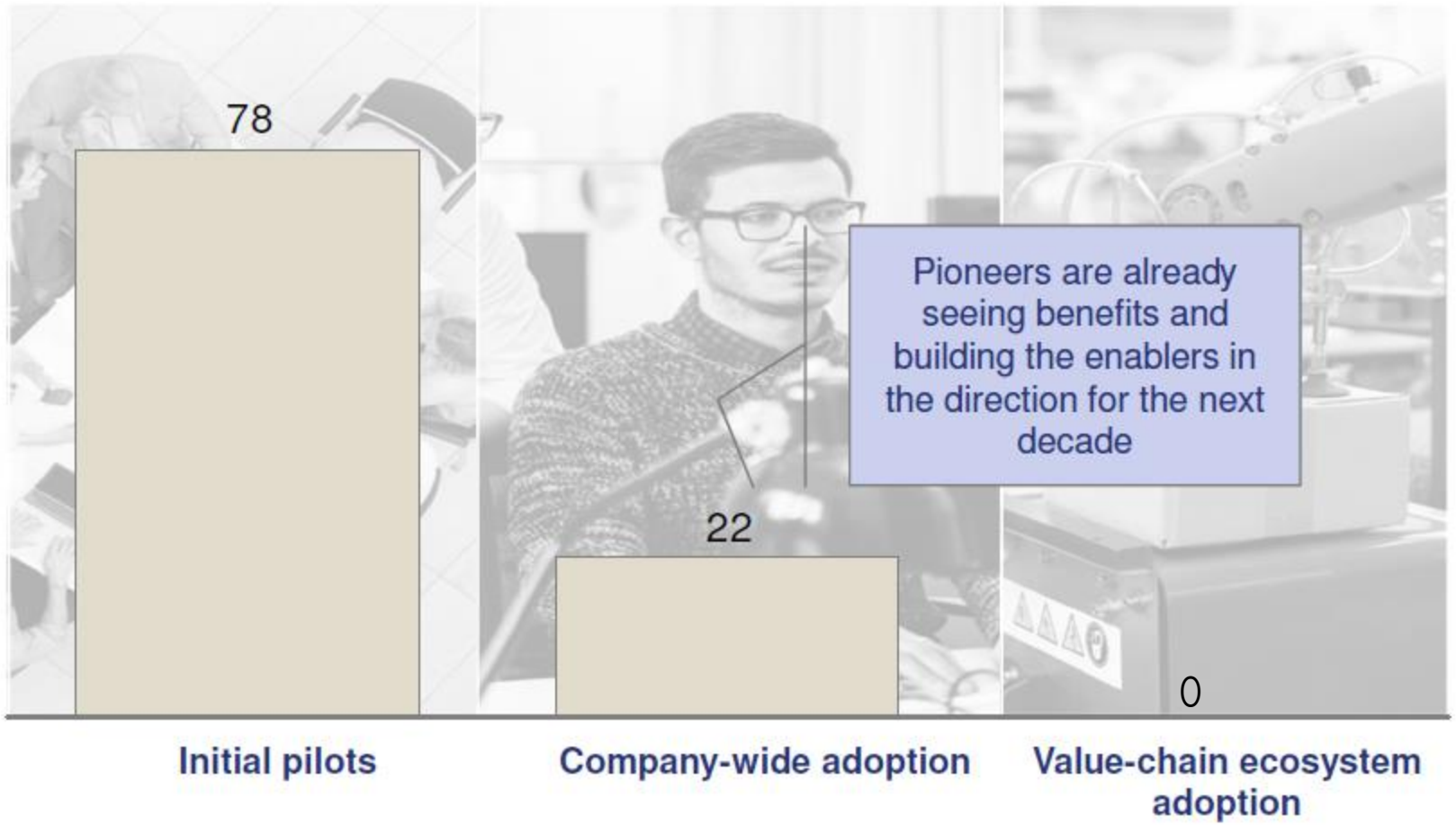


1 From McKinsey Global Institute, based on estimated 3-9% gross productivity increase per annum

Source: McKinsey Global Institue

Majority of companies (78%) are in “initial pilots” phase while pioneering companies are building a competitive edge

Percent of companies in the different stages of 4IR technology adoption in production



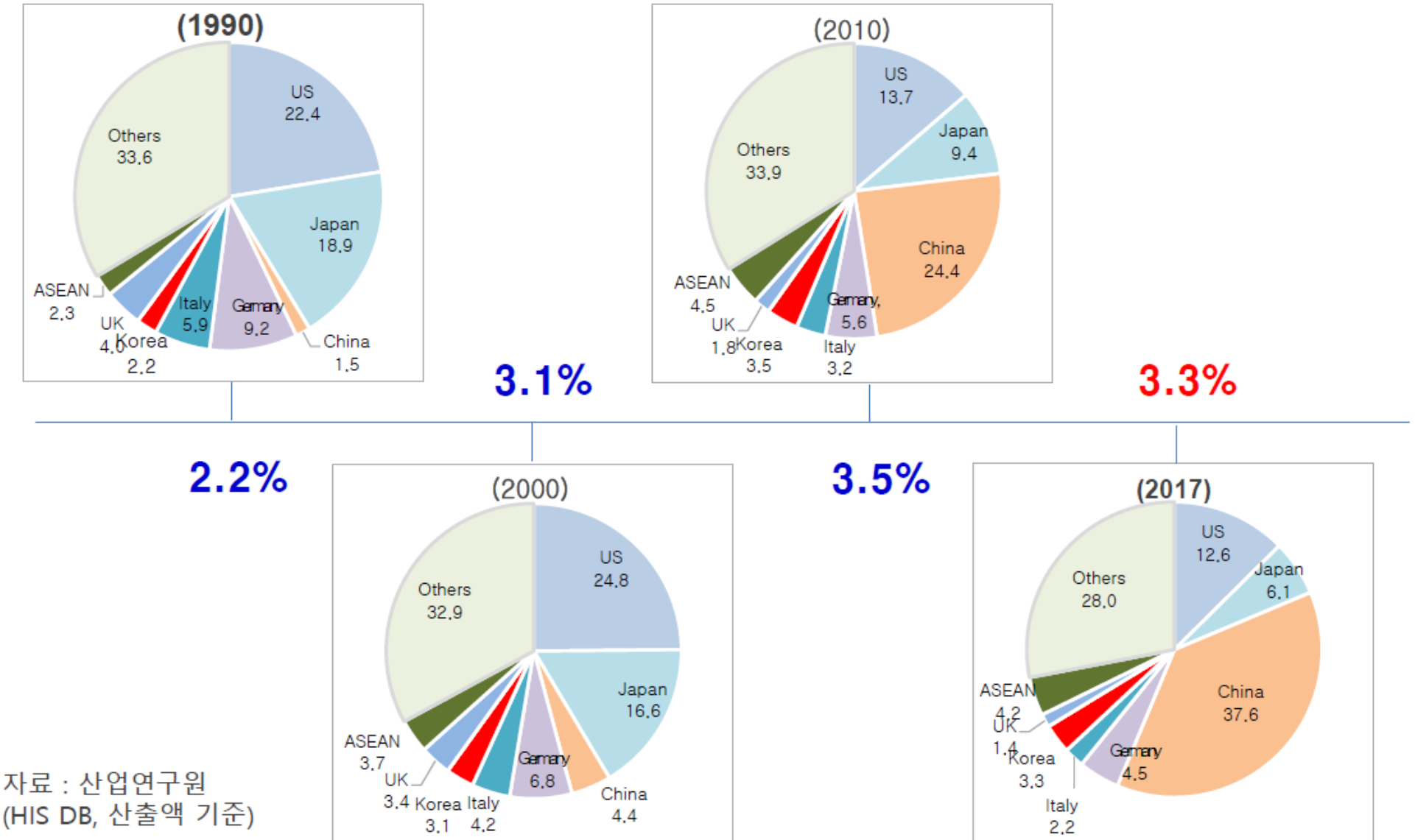
Key insights

- The lessons learnt from the 22% of pioneering companies **offer an opportunity for cross-industry dissemination and replicability**
- There is **no evidence of any experience of a completed transformation beyond company level**

Source: McKinsey’s Digital Manufacturing Global Expert Survey 2017

Table of Contents

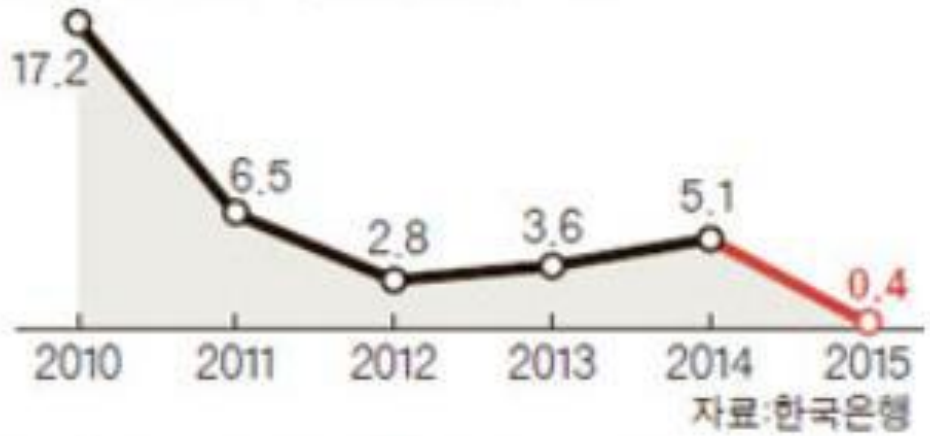
Manufacturing In Korea – Signs of crisis (Manufacturing product declines)



자료 : 산업연구원
(HIS DB, 산출액 기준)

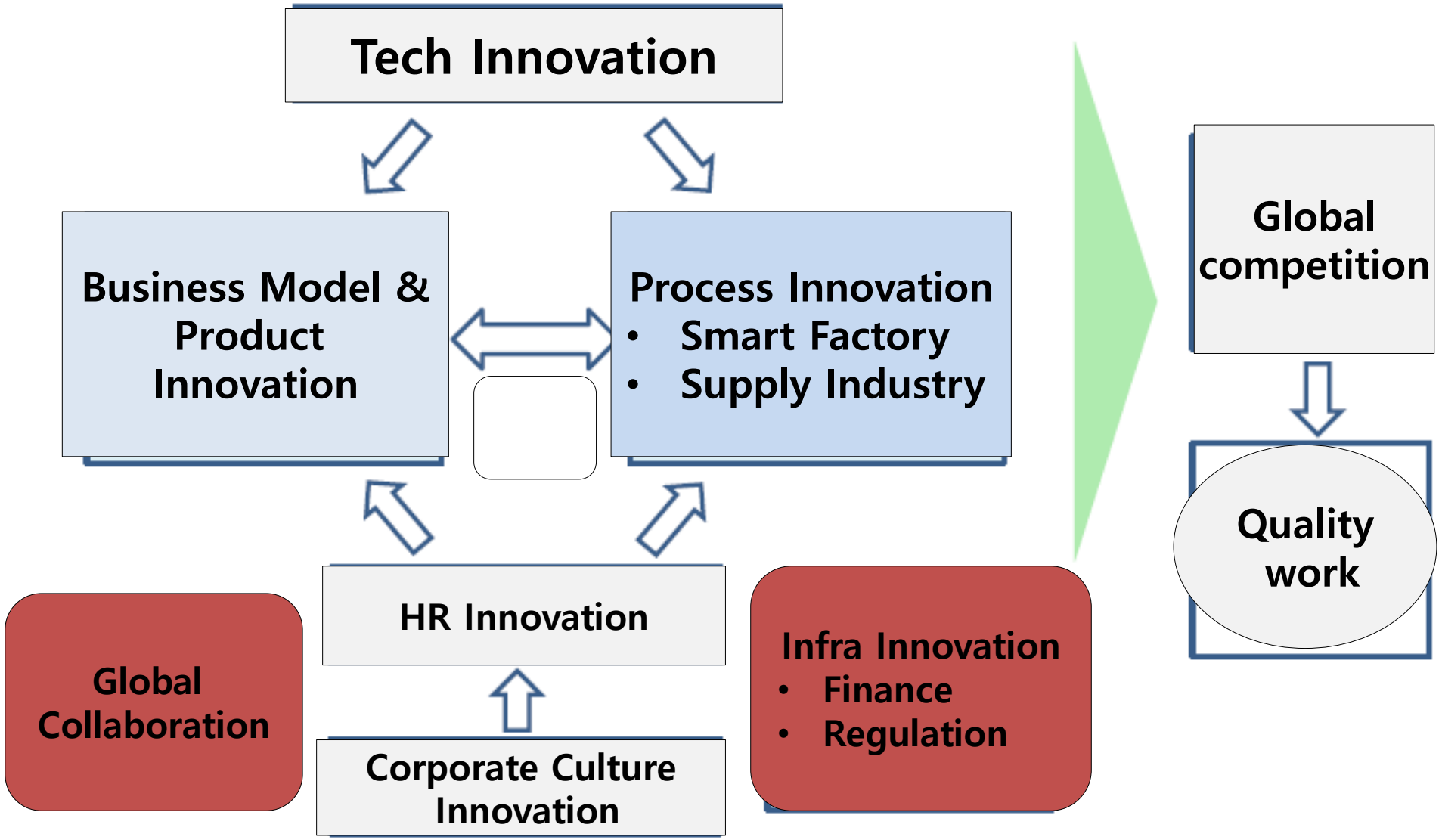
Manufacturing in Korea – Signs of crisis (2)

Manufacturing Growth Rate (%)



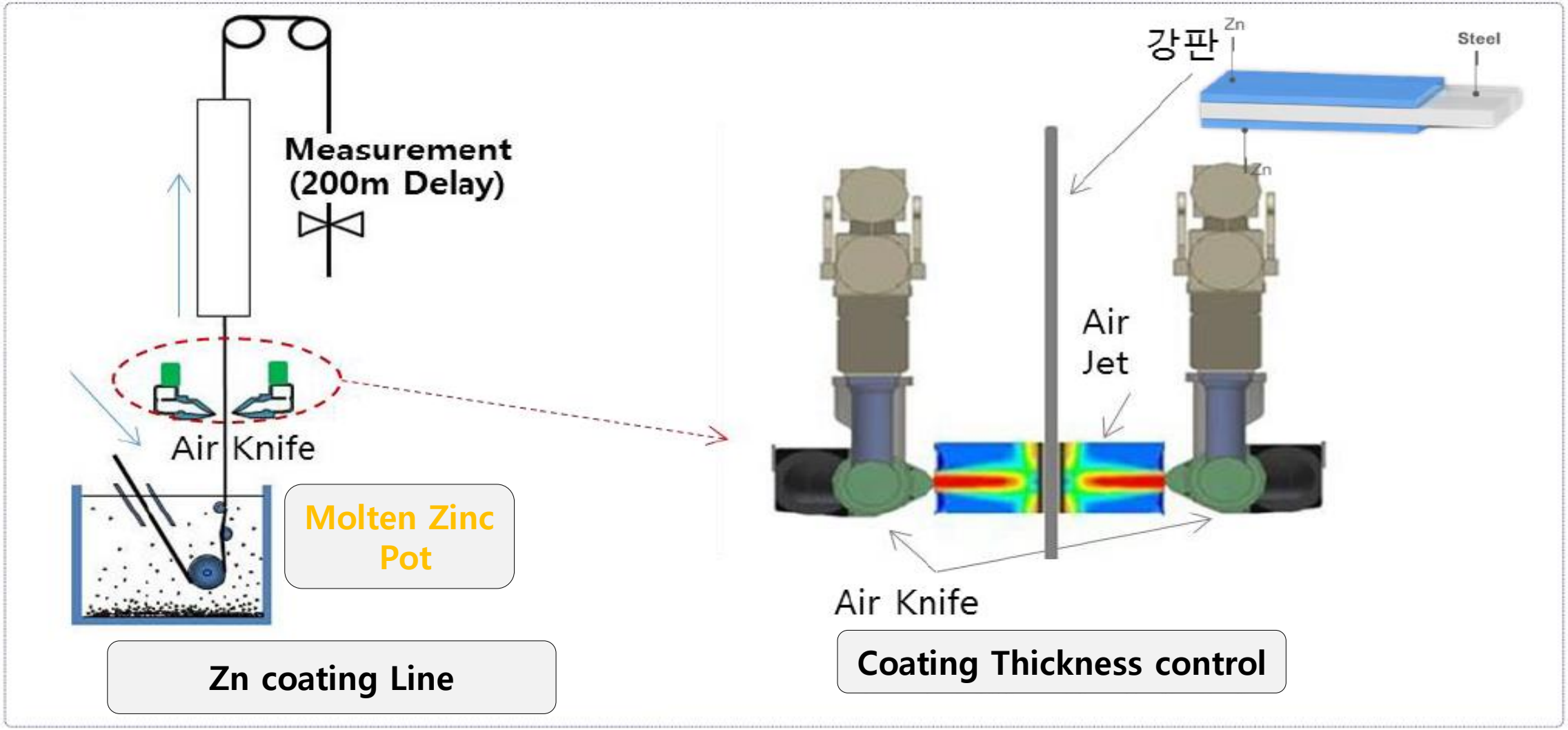
Average Operating Rate in Korea Manufacturing

Transformation by Innovation



Process Innovation

Zn Coating Optimization of Automotive Steel by Using AI Model

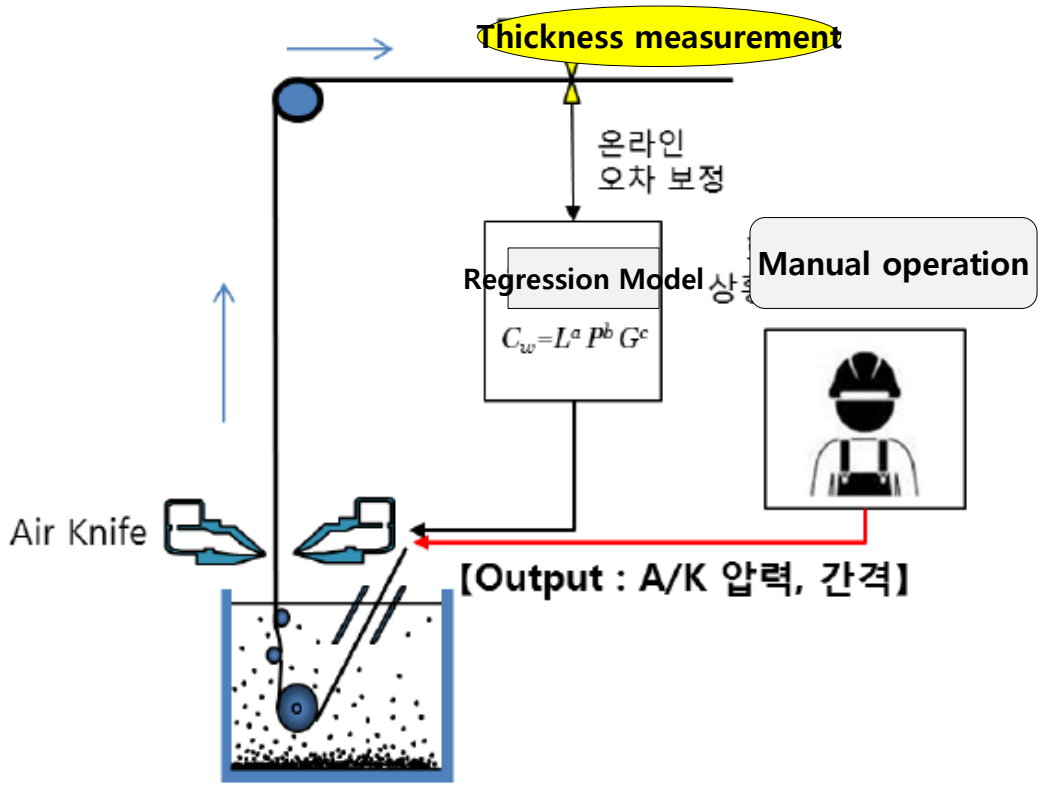


- CGL (Continuous Galvanizing Line - POSCO

IOT/AI Machine Learning Based Coating Weight Control System

As-Was

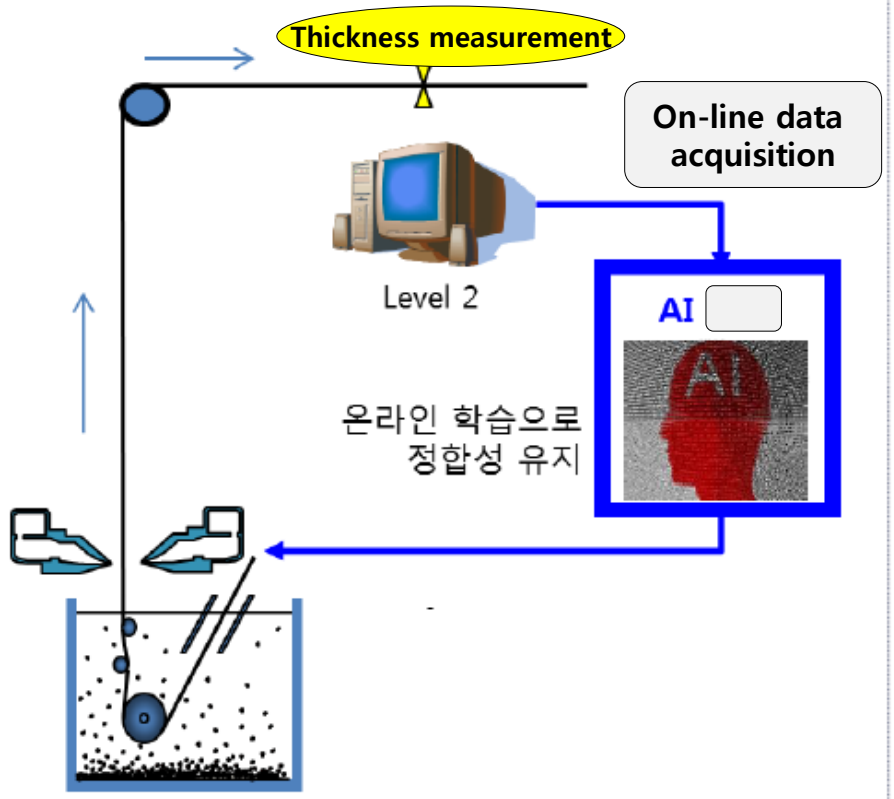
Regression Model+ Manual



Decrease accuracy when changing Steel type and equipment type

As-Is

AI Based Model

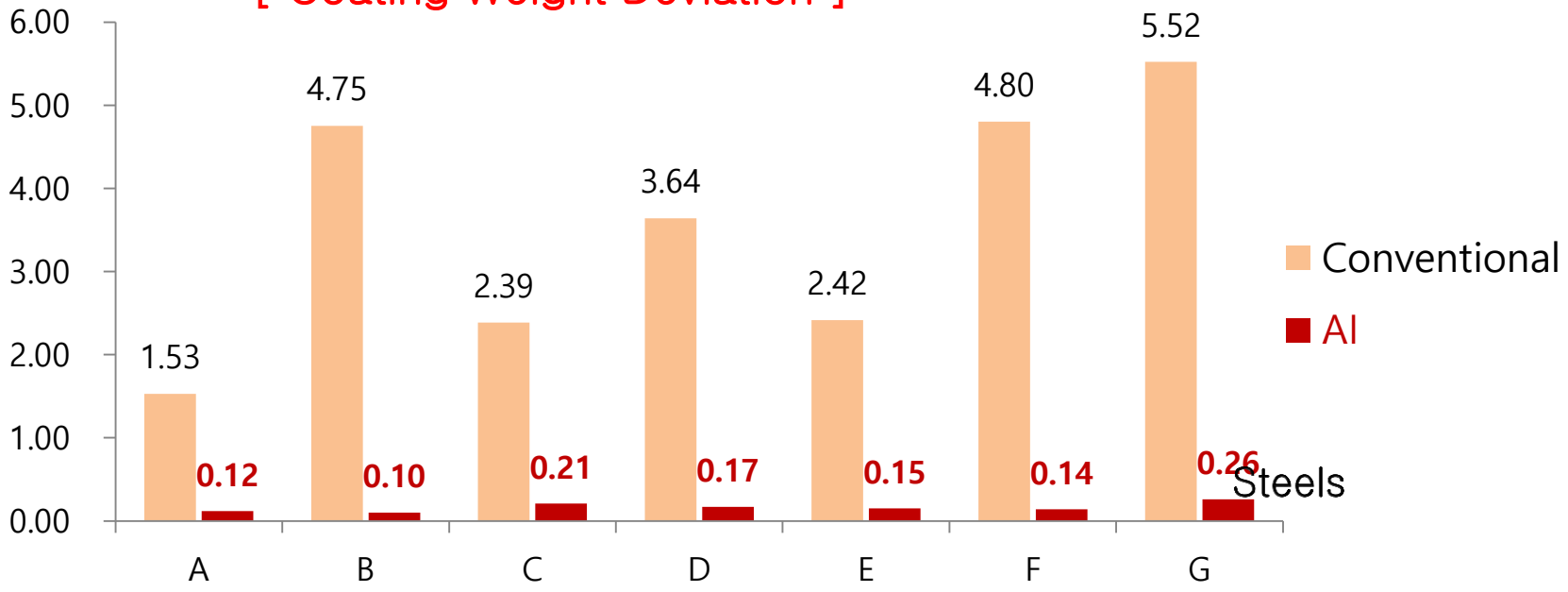


AI machine learning + operator's know-how

Coating Weight Control in CGL

Results Performance of coating control is improved
84% → 99% (Al)

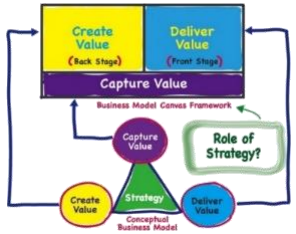
[Coating Weight Deviation]



Reference: POSCO

UNIST developed Smart Manufacturing Level Assessment Tool

▣ 5 Phase Approach for Smartization of SME

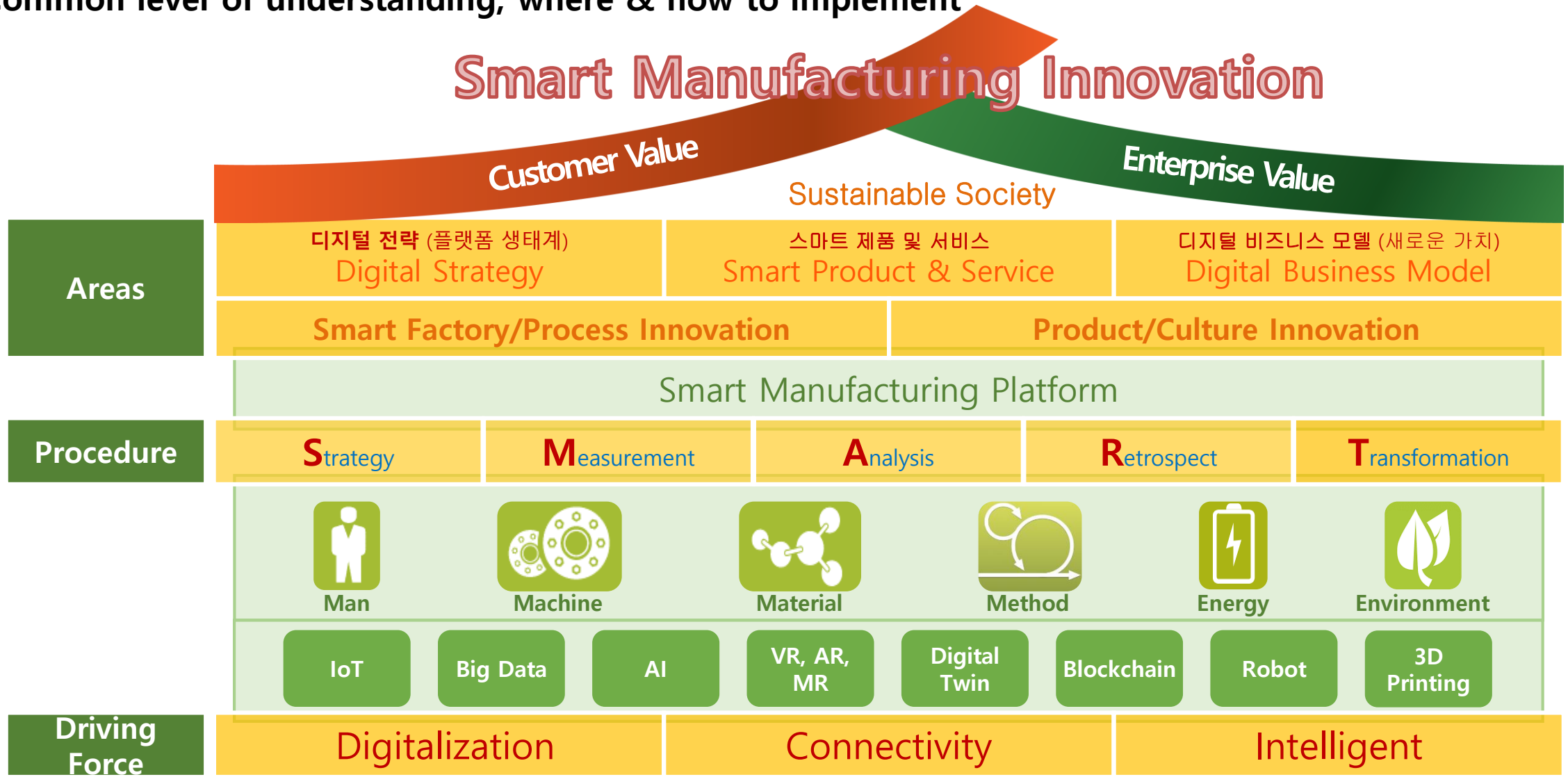
Diagnosis	Product	Process	Business Model	Business Success
				
- Understand 4IR Concepts - Diagnose & Build Strategy	- Develop Smart Products - Develop Smart Services	- Build Smart Prod. System	- Innovate Business Model	- Develop Global Eco-System - Become a Global leader
Strategy Development	**Smart Product & Service Development**	**Smart Process Development**	**Business Model Innovation**	**Globalization**

- Manufacturing Innovation with the 4IR Concepts, Training Material (O)
- SME Development Program - Phase I (O)
- Smart Manufacturing Level (SML) and Strategy Planning Module (O)

- Smart Product/Service Development Guide (~2017.12)
- Digital Business Model Guide (~2017.12)
- SME 4IR Business Strategy Guide

Smart Manufacturing Level Assessment Tool

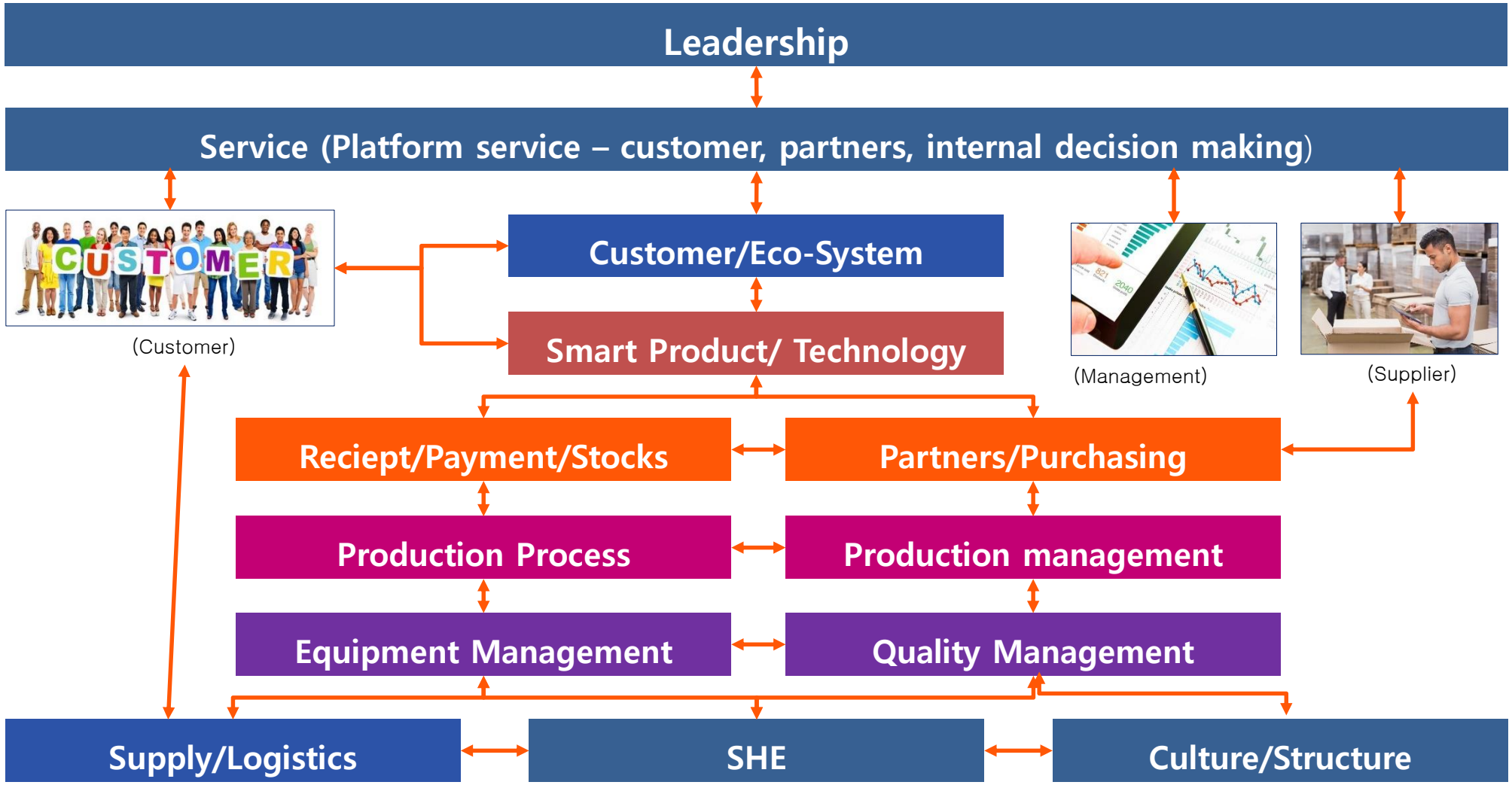
▣ **Common level of understanding, where & how to implement**



UNIST 4차 산업혁신연구소, 한국인더스트리4.0협회

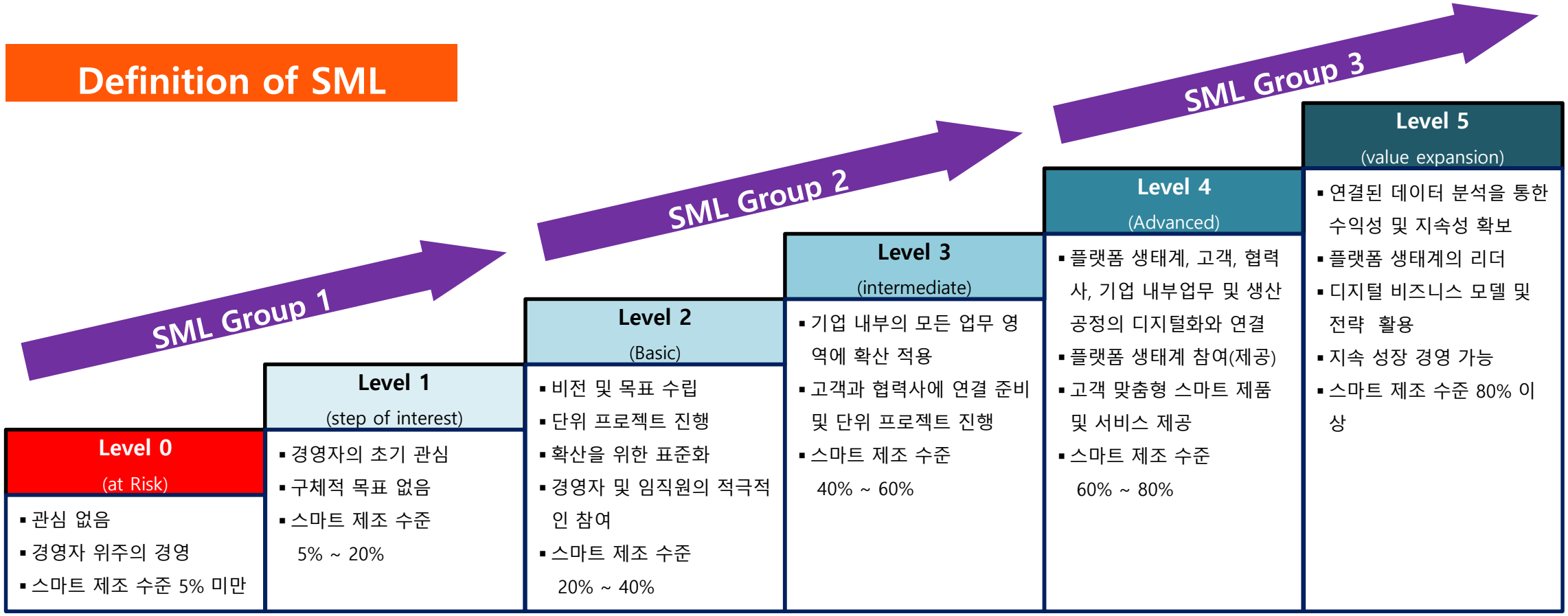
Smart Manufacturing Level Assessment Tool (Structure)

▣ Scope of Assessment



Smart Manufacturing Level Assessment Tool (Criteria)

▣ 6 levels of Smart Manufacturing Readiness

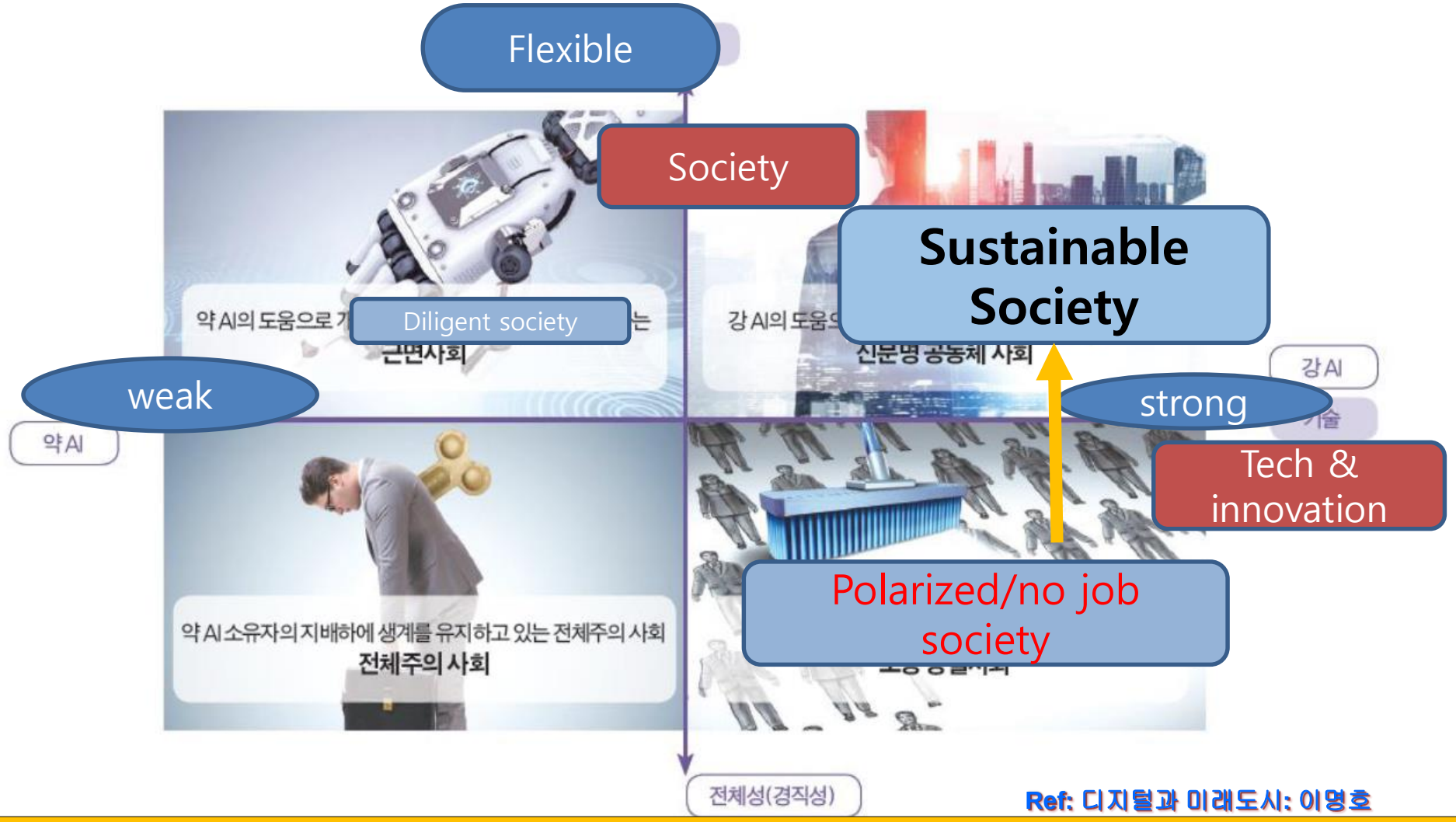


Smart Manufacturing Level Assessment Tool (Criteria - example)

수준 구분	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Smart Manufacturing Leadership	관심 없다.	경영자 초기관심 구체적인 목표 없다.	비전 및 목표 수립 단위 프로젝트 진행	내부 업무 확산 적용 고객, 협력 사 연결 준비	고객 맞춤형 서비스 스마트제조생태계조성	연결 가치 최적화 새로운 BM 및 전략
Manufacturing Automation Level						
	공장 및 업무 자동화 5% 이하	공장 및 업무 자동화 5%~20%	공장 및 업무 자동화 20%~40%	공장 및 업무 자동화 40%~60%	공장 및 업무 자동화 60%~80%	공장 및 업무 자동화 80%~100%
Digitalization Level						
	디지털화 5% 아하	디지털화 5%~20%	디지털화 20%~40%	디지털화 40%~60%	디지털화 60%~80%	디지털화 80%~100%
Connectivity/Intelligence Level						
	연결/지능화 5% 이하	연결/지능화 5%~20%	연결/지능화 20%~40%	연결/지능화 40%~60%	연결/지능화 60%~80%	연결/지능화 80%~100%
SML : Smart Manufacturing level	스마트 제조 5% 이하	스마트 제조 5%~20%	스마트 제조 20%~40%	스마트 제조 40%~60%	스마트 제조 60%~80%	스마트 제조 80%~100%

Table of Contents

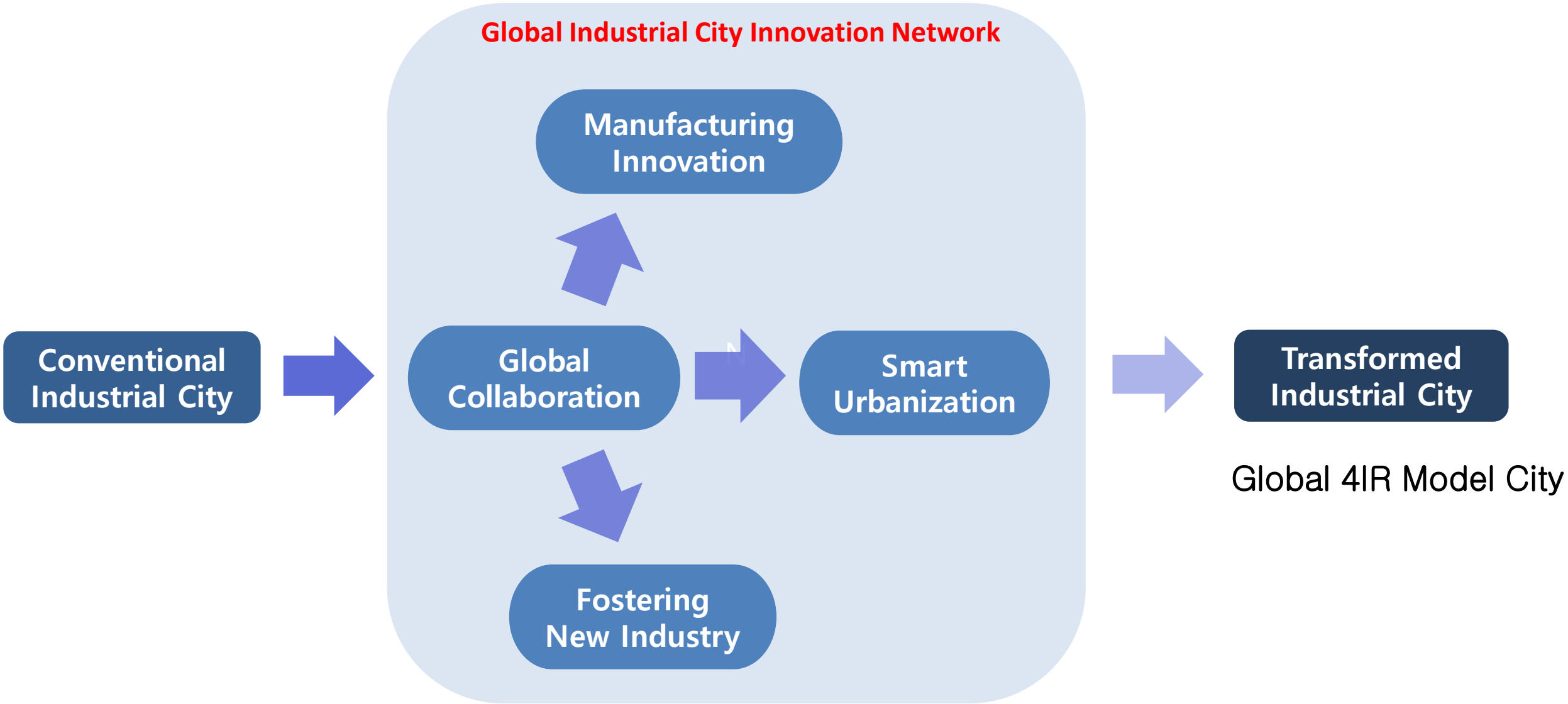
Which type of industrial city we want to build?



Ref: 디지털과 미래도시: 이명호

Transform a city heavily dependent on conventional manufacturing into a smart industrial city

Transformation of Conventional Industrial City



Transformation of manufacturing industrial city

Transform to a sustainable and smart industrial city

Current Manufacturing Industry

Global Innovation Network - Build a Platform

Future Manufacturing Industry

Manufacturing Sector
- Energy
- Petro-Chemical
- Shipbuilding
- Automotive
- E&E
- Consumer Goods
- Steel Mills
- Equipment Fab
- Farm Equipment
- Textile

Innovation
- Business Model
- Product
- Production

Technology
- IoT, AI, Big Data
- Robotics, CPS, Added Materials

Servitization
- P maintenance
- Circular Economy

Skills & Employment
- Education, Reskill
- Quality of Work

Sustainable Production
- Efficient Energy
- Renewable
- Sustainable Society

New Manufac Cluster City

Smart City
- Sustainable City
- Education, Diversity & Job Growth
- Global Ecosystem
- Integrated Value Chain
- Quality of Life Work-life balance

Concluding Remarks

- Digital Transformation has to take place in Process, Product and Business Model
- While companies recognize opportunities of I4.0, many do not know where and how to start.
- Evaluation tool to provide a common level of understanding and where to start and how to implement across all industries is recommended

Invite to join the International collaboration community
to transform manufacturing oriented city into a smart city.

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