Pathway towards Industry 4.0:

Transformation model from Manufacturing Lab to Learning Factory

Seunwook Nam

Senior Reseacher, KETI

KETI Korea Electronics Technology Institute

Smart Factory SMIC Smart Manufacturing Innovation Center

Challenges to the Transformation

Challenges to the Digital Transformation

Connectivity

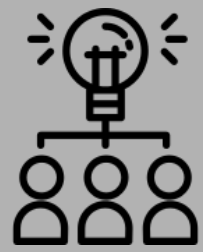
Interoperability

Security

Human vs Machine

And many others…

ETC



Challenges to the Transformation from Lab to Field

Factory field is strict and conservative

1st KPI would be Stability Production rate rather than innovation

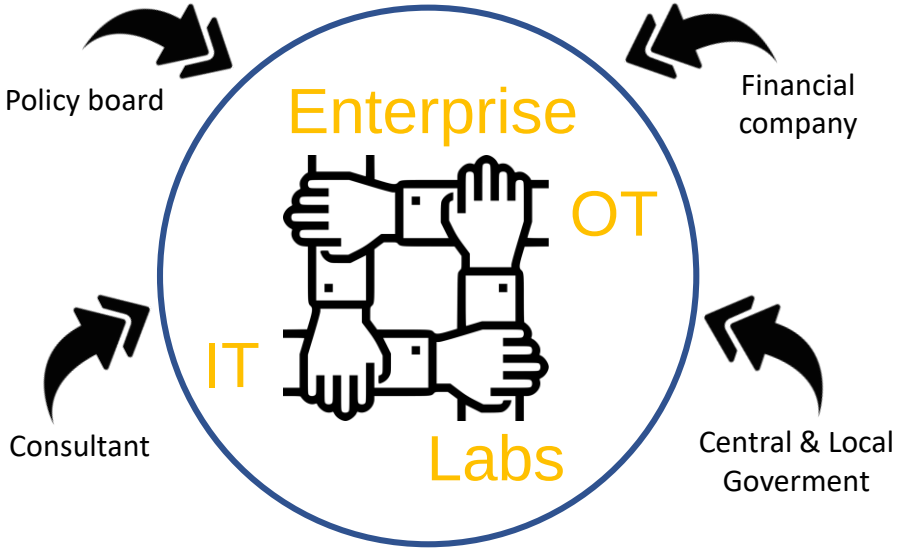
Understanding of new Theory and Technical standard

Domain Excellence Experience and knowhow

SMIC: Testbed based on collaboration

SMIC Smart Factory Smart Manufacturing Innovation Center

Converging R&D



Base on Global Standard

Vertical Integration

Horizontal Integration

Integrated Engineering

Human Machine Collaboration

LS IS, SK telecom, LG CNS, HYUNDAI ROBOTICS, Stratus, KPMG, BALLUFF, BOSSARD, HANCOM 한컴MDS, TÜV SÜD, DOOSAN, STÄUBLI, WIZCORE, SANGMIN, CPLAN, RITTAL, MIDAS, MITSUBISHI ELECTRIC, igus, OMRON, CREVIS, SIEMENS, miliwave, VIRNECT, PATLITE, Autonics, PADX, rexroth A Bosch Company, Miracom, HBL, FESTO, Mando, daliworks, Weidmüller, IR Ingersoll Rand, Hanwha, GAON, J-INNOTECH

- Strong eco-system with 44 members (Aug. 2019)
- From global leaders to potential SMEs
- Various stakeholders from conventional OT to brand new IT

SMIC Core Activity

POC by Testbed

Testbed from requirement

Requirement from the field

- Assembly line of engine for hydrogen fueled car
- Vision inspection with AI, 5G

Challenging testbed

Verification of theory and standard

- Smart Factory Web test
  - → Verification of interoperability: IEC 62541
  - → Verification of plug & works: AAS, IEC62714

Real production testbed

Not demonstration but real production

- SBB(Smart base block)
  - → Modular manufacturing

SMIC testbed ‘requirement from field’ (1/2)

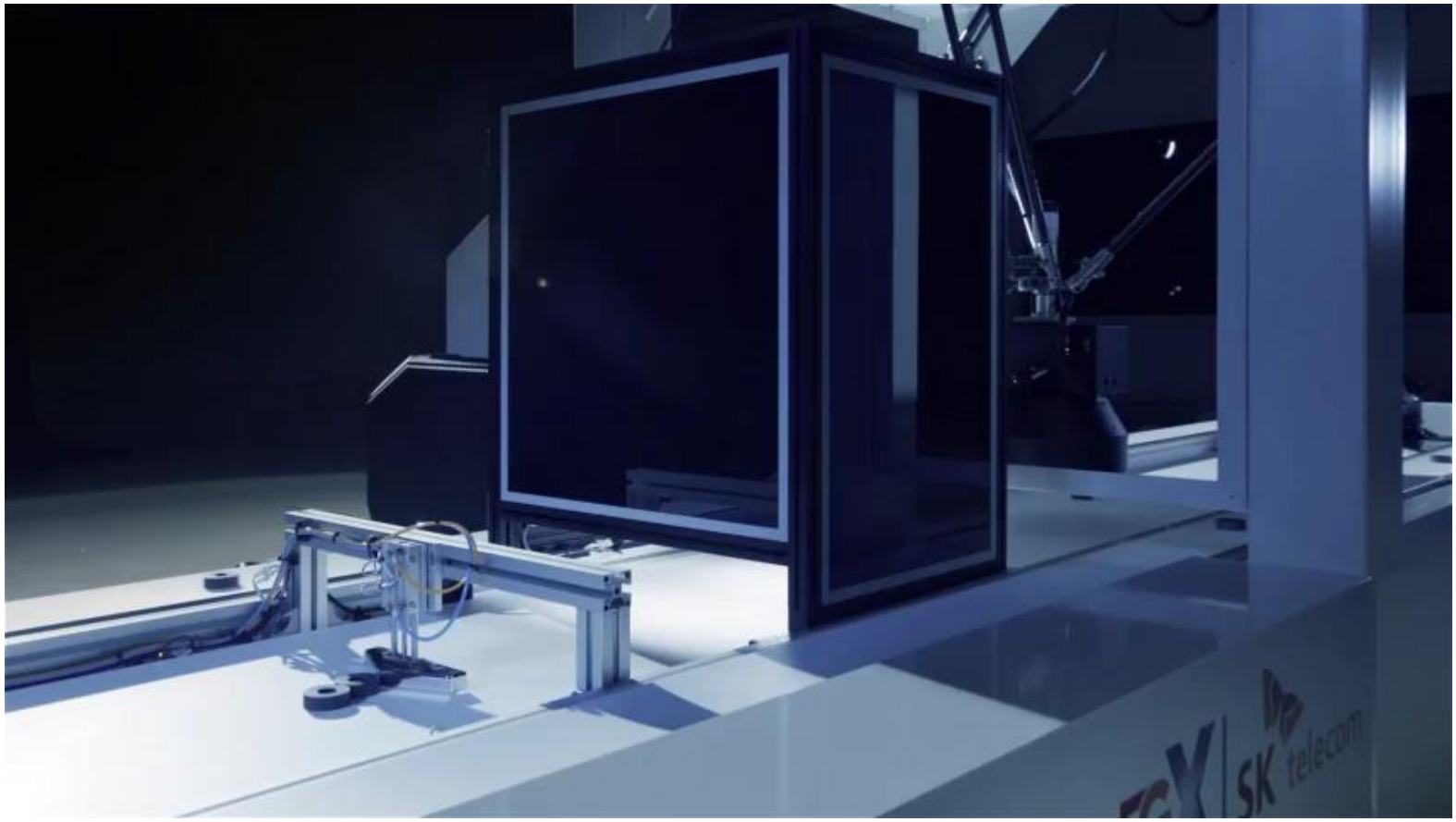
Smart workbench

- Support assembly line with AR
- Skilled up for unskilled operator and reduce human fault
- Engine assembly line for hydrogen fueled car

SMIC testbed ‘requirement from field’ (2/2)

4K Vision inspection

- Converged field solution: 5G+AI+Edge Computing+Cloud
- Installed in real field after POC in SMIC
- Vision inspection for car components



SMIC testbed ‘Real production line’

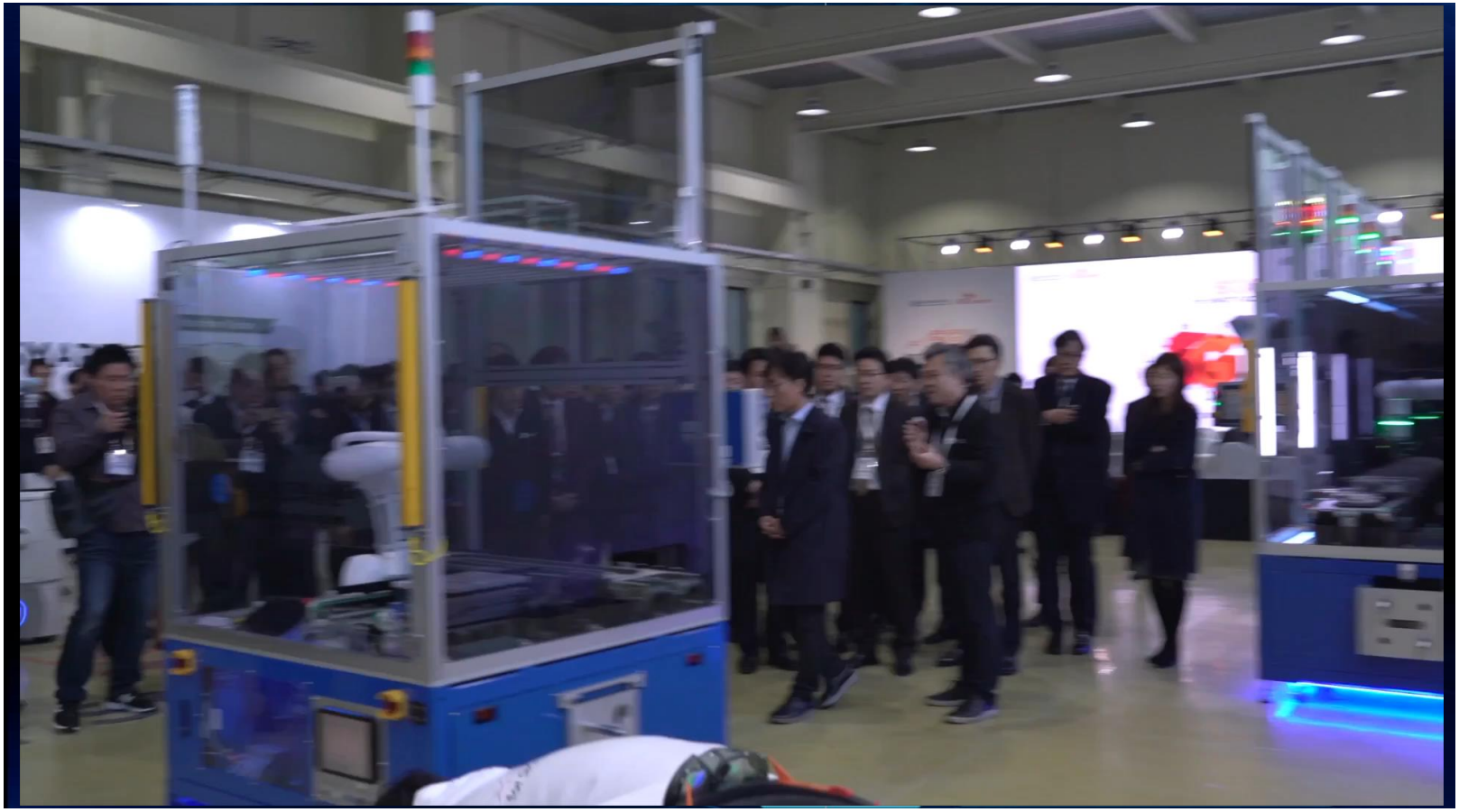
SBB (Smart Base Block)

- Modular production line to full fill the new market requirement
- High challenged interoperability with various player
- Assembly line of temperature atmosphere seonsor

SMIC testbed ‘Real production line’

SBB (Smart Base Block)

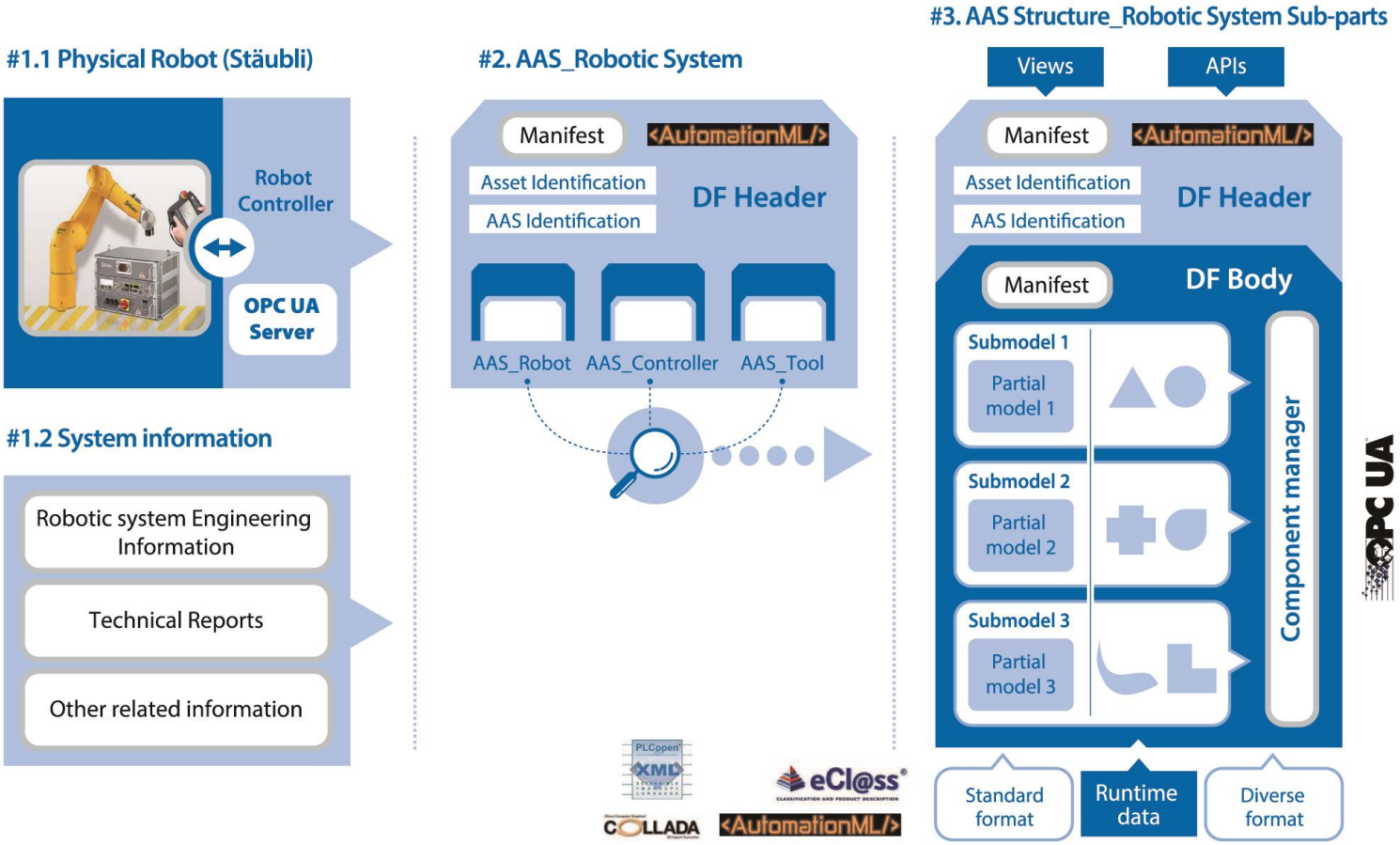
- Modular production line to full fill the new market requirement
- High challenged interoperability with various player
- Assembly line of temperature atmosphere seonsor



SMIC testbed ‘challenging testbed’

Verification of theory and standard

- (AAS) Asset Administration Shell with OPC UA & AML



SMIC testbed ‘challenging testbed’

Smart Factory Web Testbed

IIoT Platform+OT
For Plug & Works

Smart Factory Web
www.smartfactoryweb.com

Smart Factory Web Hub

Field Mgmt Interface

OPC UA I/F Client

Factory-Thing Device Mgmt

Factory-Thing Data Mgmt & Analysis

External Interface

Service Interface (Open API)

Information Model
of OT, by AML

dministration Shell
th: Virtual Representation
with: Technical Functionality

Manifest

Component Manager

SMIC testbed ‘challenging testbed’

Smart Factory Web Testbed in global trade fair

- Simple demonstration of Plug&Works Working

  → Connectivity by OPC UA, Plug&Works by AML

- Visitors: +230, Meetings for cunsulting: +21

IIC Pavilion in HMI 2018 & 2019

IIC Pavilion in SFE 2019

SMIC. ‘Following activities’

Do first and go in to the market

- To make strong ecosystem
- Consulting, Marketing, Education, Seminars based on testbed

Local Exhibition	Global Exhibition	Demo Factory Day	IOCEM	Factory Hackerton
• SFE, SMATOF	• HMI, MWC	• Seminar & MM event	• Consulting	• Developer 경연
				

Technical consulting	For Suppler: to do for next For User: For Brown & Green field	• ’17, 1,400 Visitors • ’18, 2,600	• ’19, , 1,000
Training for Smart Manufacturing	Co-education project with UNIV	• ’17, 3 UNIVs, 1 Orgs • ’18, 4 UNIVs, 2 Orgs	• ’19, 8 UNIVs, 4 Orgs.

SMIC. Lab to learning factory