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Connected industries open framework (CIOF) for manufacturing ecosystems

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About IVI (Industrial Value Chain Initiative)

- ✓ Established in June 2015 mainly by 53 Japanese manufactures (264 members in Jan. 2018) initiated by METI and JSME-MSD.
- ✓ Support to build business scenario and use cases of connected manufacturing among different enterprises referring to loosely defined standard
- ✓ Provide and manage a repository of the loosely defined standard models that can be continuously changed in accordance with the future requirements.

Connected manufacturing

Manufacturers focus and invest on their core competitive production processes while dynamically connecting to other enterprises in a supply chain both in cyber and physical worlds.

Heterogeneous Standard

LDS does not mean that a specification is loosely defined. It rather means that the standardization process is loosened to adjust to the industrial diversity of the actual world.

IIoT/Smart Manufacturing Initiatives in Japan

Industrial Value Chain Initiative Membership (as January, 2019):

250 Members

Manufacturing member

91 Large enterprises

70 SMEs

Supporting member

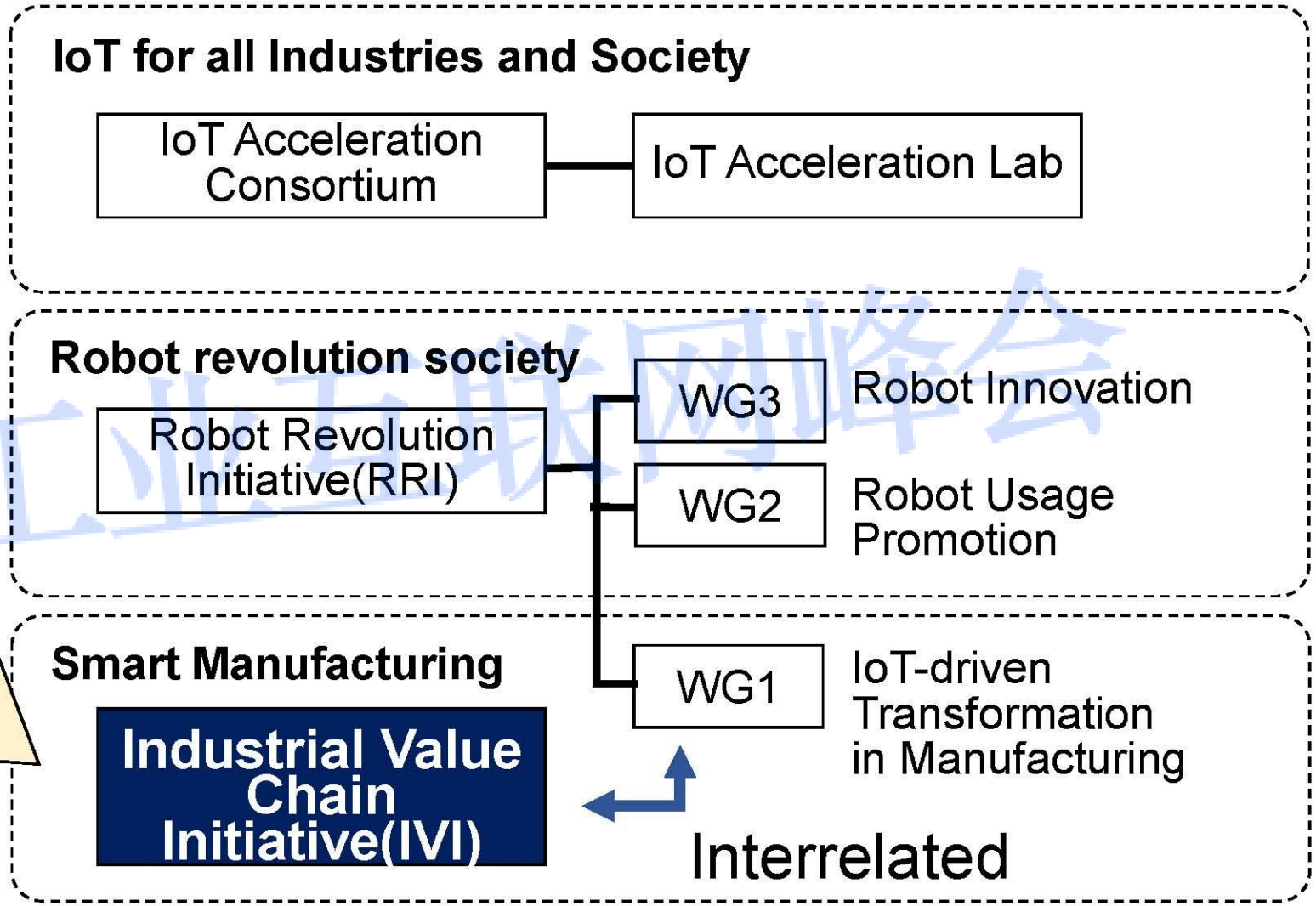
26 Large enterprises

48 SMEs

Sponsor member

15 Organizations

SMEs are **50%** of the total



Some Members of IVI

250+ companies, 600+ individuals

Smart Manufacturing Scenarios in 2018

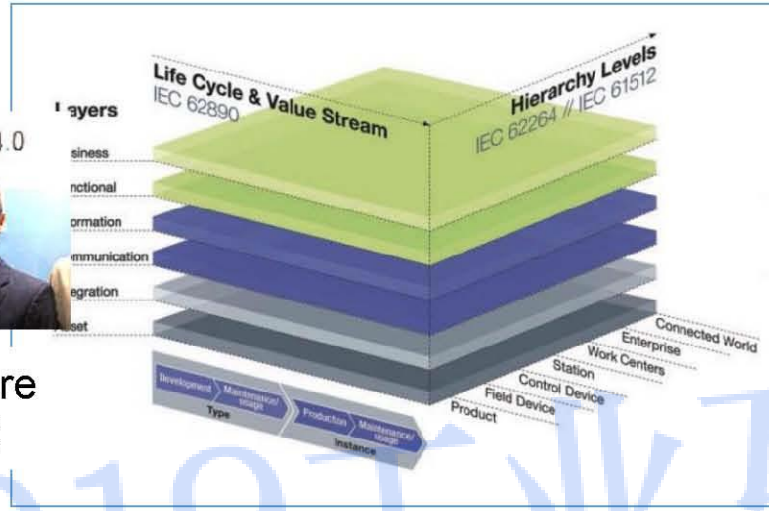
No	Title	Facilitator
1	Key performance Index for connectable factory floors and management	Yamazaki Mazak Corporation
2	Secure and large-scale data distribution services	Toshiba Corporation
3	Visualization of decision making based on risk and loss in equipment failure prediction	Daikin Industries, Ltd.
4	Improvement of quality, productivity and automation for AI based production line	Mazda Motor Corporation
5	Predictive maintenance and quality control anyone can use by using sensor data	Misuzu Industries Corporation
6	Incorporation of quality according to worker characteristics using BOP	Brother Industries, ltd.
7	Simplification and efficiency improvement in the operation phase of robot equipment	Yaskawa Electric Corporation
8	Visualization of achievements of people / goods / behavior analysis and optimization	Mazda Motor Corporation
9	Evolution to high-efficiency manufacturing by autonomization	Nikon Corporation
10	Visualization of the kaizen situation at remote manufacturing sites	Ricoh Co., Ltd.
11	Visualization and optimization of energy consumption and productivity of manufacturing facilities	Panasonic Industrial Devices Sunx Co., Ltd.
12	Optimization by tracking the actual time and location of parts transportation trucks	Mazda Motor Corporation
13	Progress announcement service for small and medium enterprises	Fujitsu Limited
14	Real-time data collection and utilization between factory processes by extended MES	Kojima Industries Corporation
15	Construction of small parts management system using digital tag	Dmw Corporation
16	Quality control for each worker - Secure real-time management of quality KPI -	IHI Corporation
17	Stabilization of product quality by using AI on edge of production	Mitsubishi Electric Corporation
18	Improvement of quality in material production line	Mitsubishi Electric Corporation
19	Extensive and continuous data collection and analysis	CKD Corporation

2015 : 20 scenarios　2016 : 25 scenarios　2017 : 22 scenarios　2018 : 19 scenarios

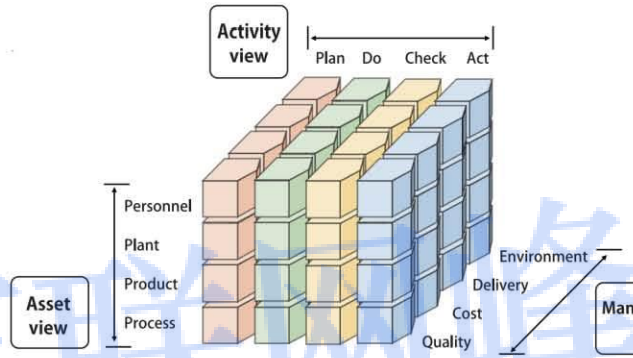
Overview of Global Smart Manufacturing

Reference Architecture Model Industrie 4.0

PLATTFORM INDUSTRIE4.0



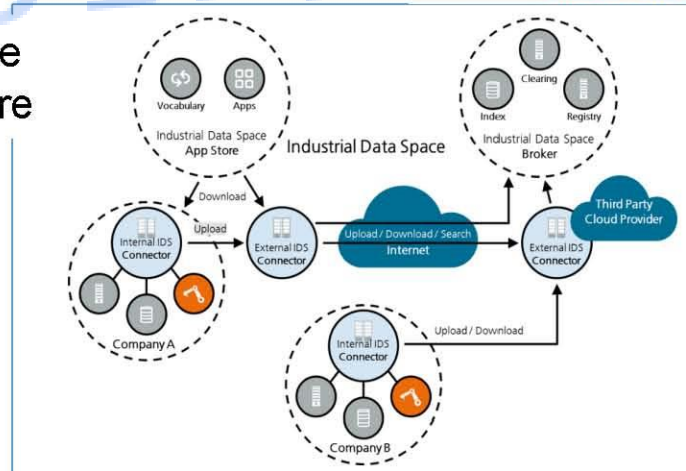
IV Industrial Value Chain Initiative



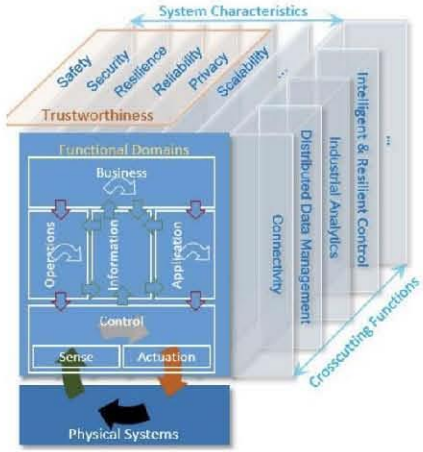
Industrial Value Chain Reference Architecture

INTERNATIONAL DATA SPACES ASSOCIATION

Industrial Data Space Reference Architecture



industrial internet CONSORTIUM



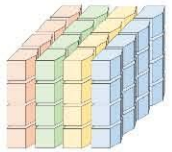
Industrial Internet Reference Architecture

Key Enablers of Smart Manufacturing by IVI

16 Charts

16CHA

Smart Manufacturing Unit



SMU

Advanced study groups

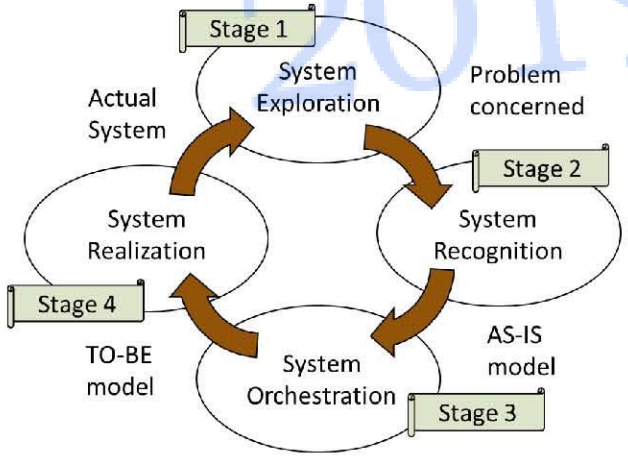
ASG

IVIM

Industrial Value Chain Implementation Method

IVRA

Industrial Value Chain reference architecture



SMS

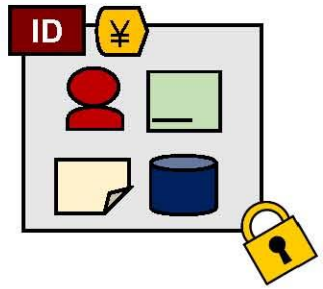
Smart Manufacturing Scenario

CIOF

Connected Industries Open Framework

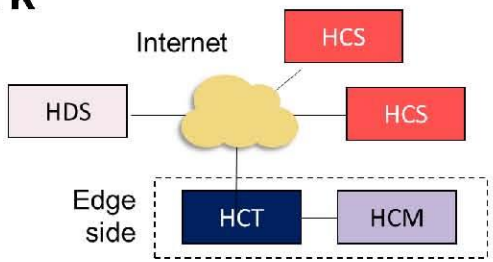
PLU

Portable Loading Unit

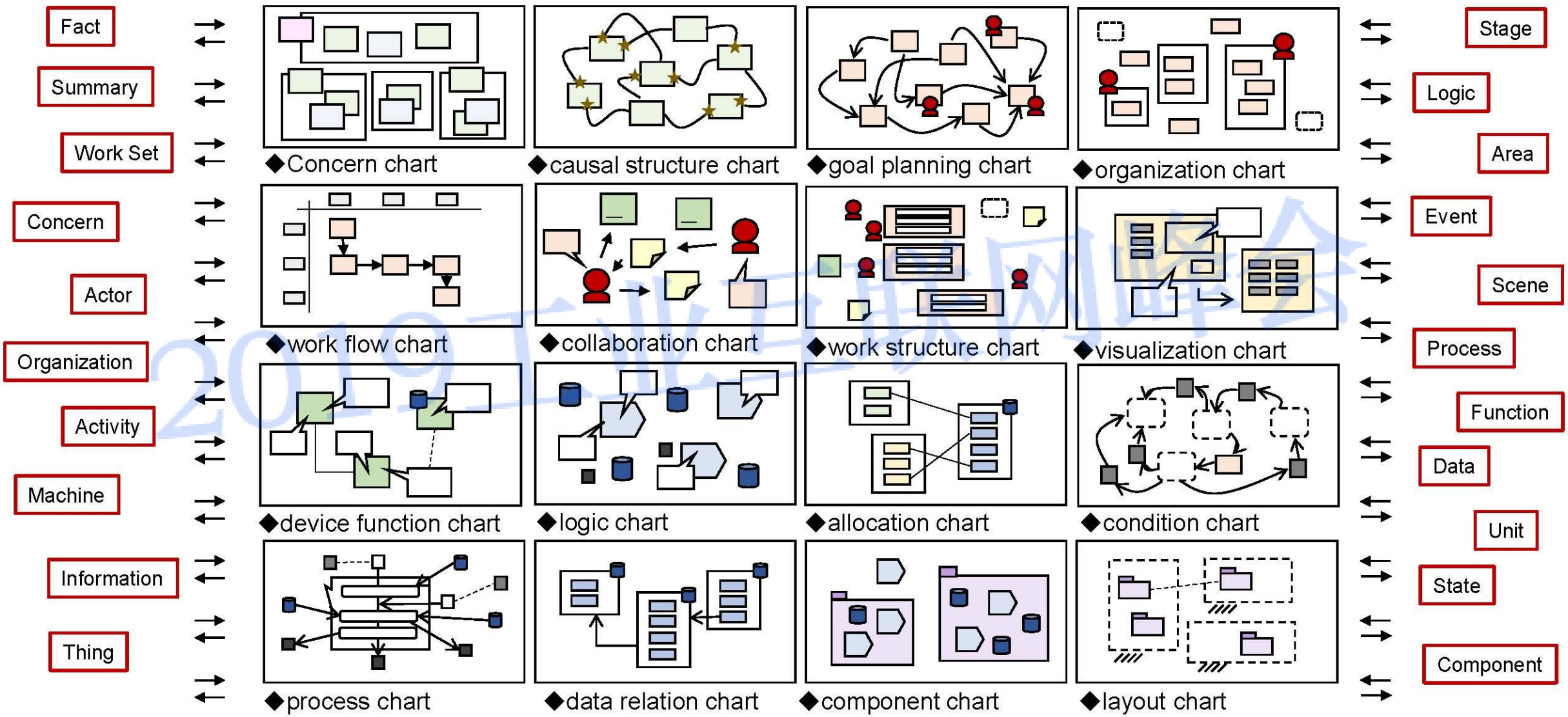


Data Sovereignty Network

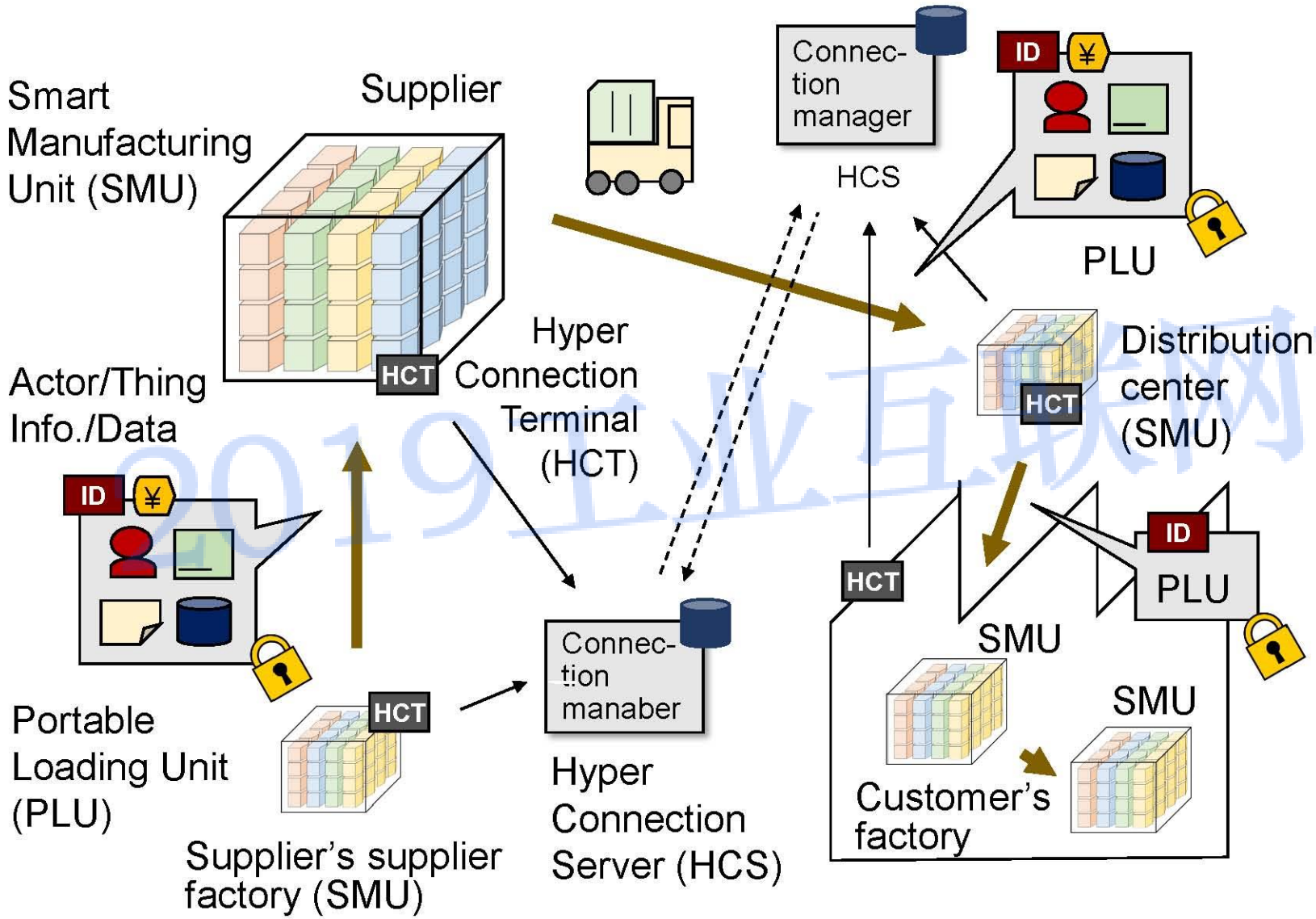
DSN



16 Digital tools of IVIM learning cycle

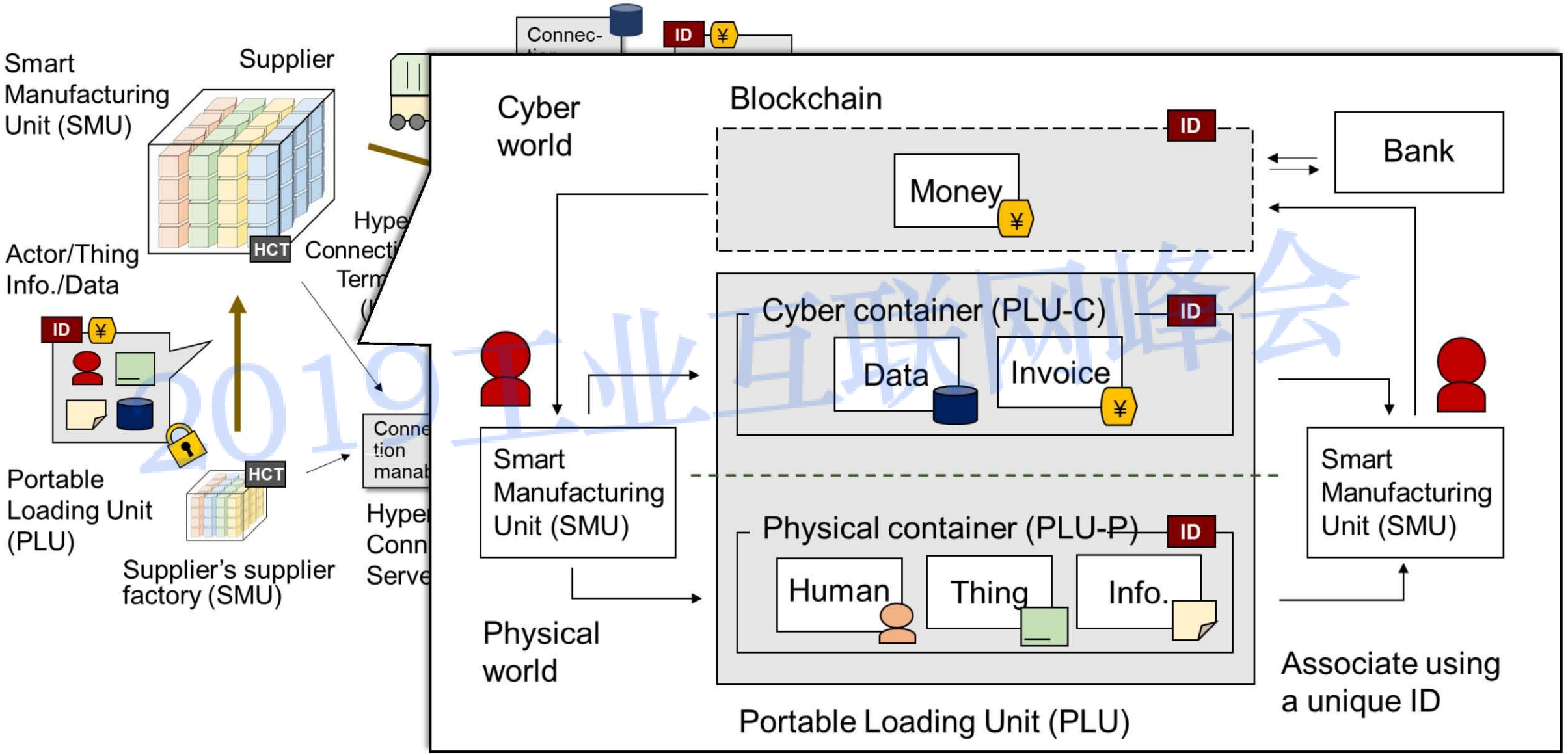


IVRA for Connected Industries



- ✓ Outside data can be obtained correctly ?
- ✓ Data is absolutely true without tampering?
- ✓ Right things can be identified by data?
- ✓ Heterogeneous semantics are acceptable?
- ✓ Data sovereignty and IPR are controlled?

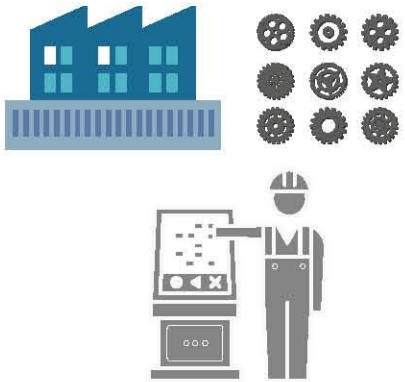
Cyber Physical and Financial integration



Connection using a common dictionary

FANUC

DMG MORI



(Manufacturing PF) Data provider's side | Data receiver's side (Manufacturing PF)

Compo-nent | Connection terminal | Connection server | Connection server | Connection terminal | Compo-nent

CP → HCT → HCS → HCS → HCT → CP

HITACHI
Inspire the Next

Service at sender side

Local dictionary of the sender

MAP

Common dictionary

Common dictionary

MAP

Local dictionary of the receiver

Service at receiver side

MITSUBISHI ELECTRIC

Hyper Connection Server (HCS)

Data connection server	Transaction history server	Common dictionary server	Public key server

Life cycle management of common dictionaries

Competitive (Closed)

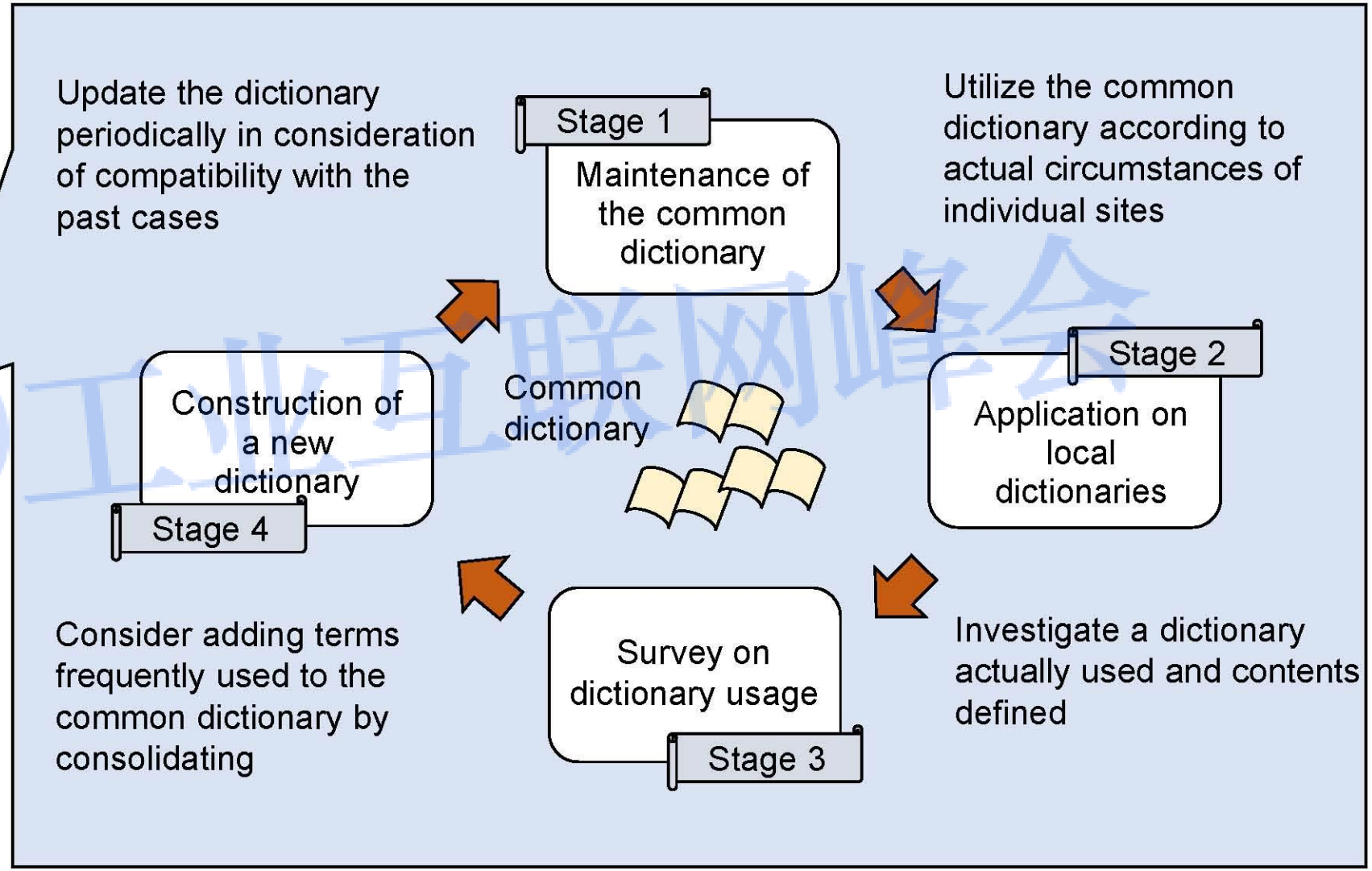
Content

Operative（Disclosed）

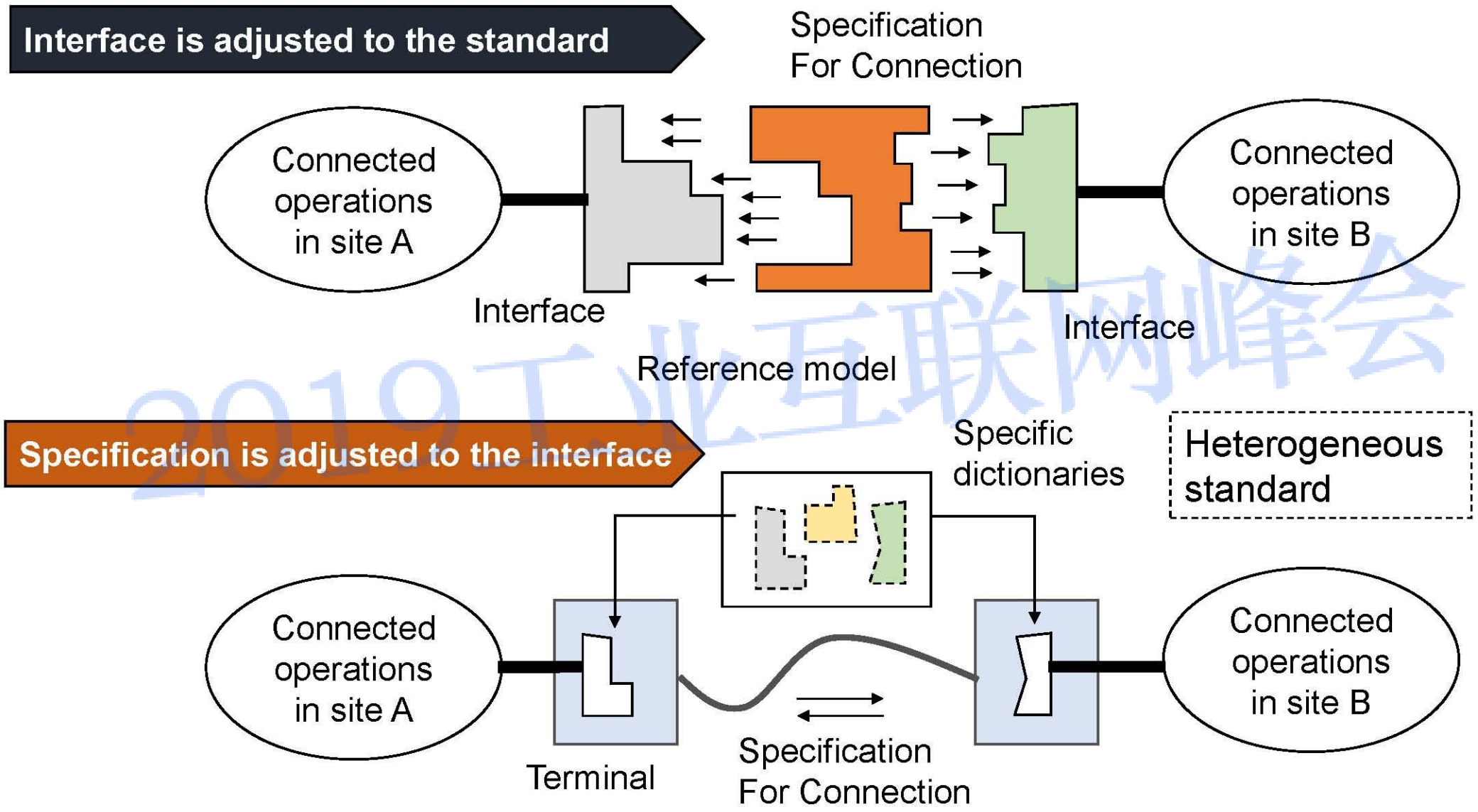
Index

Cooperative (Open)

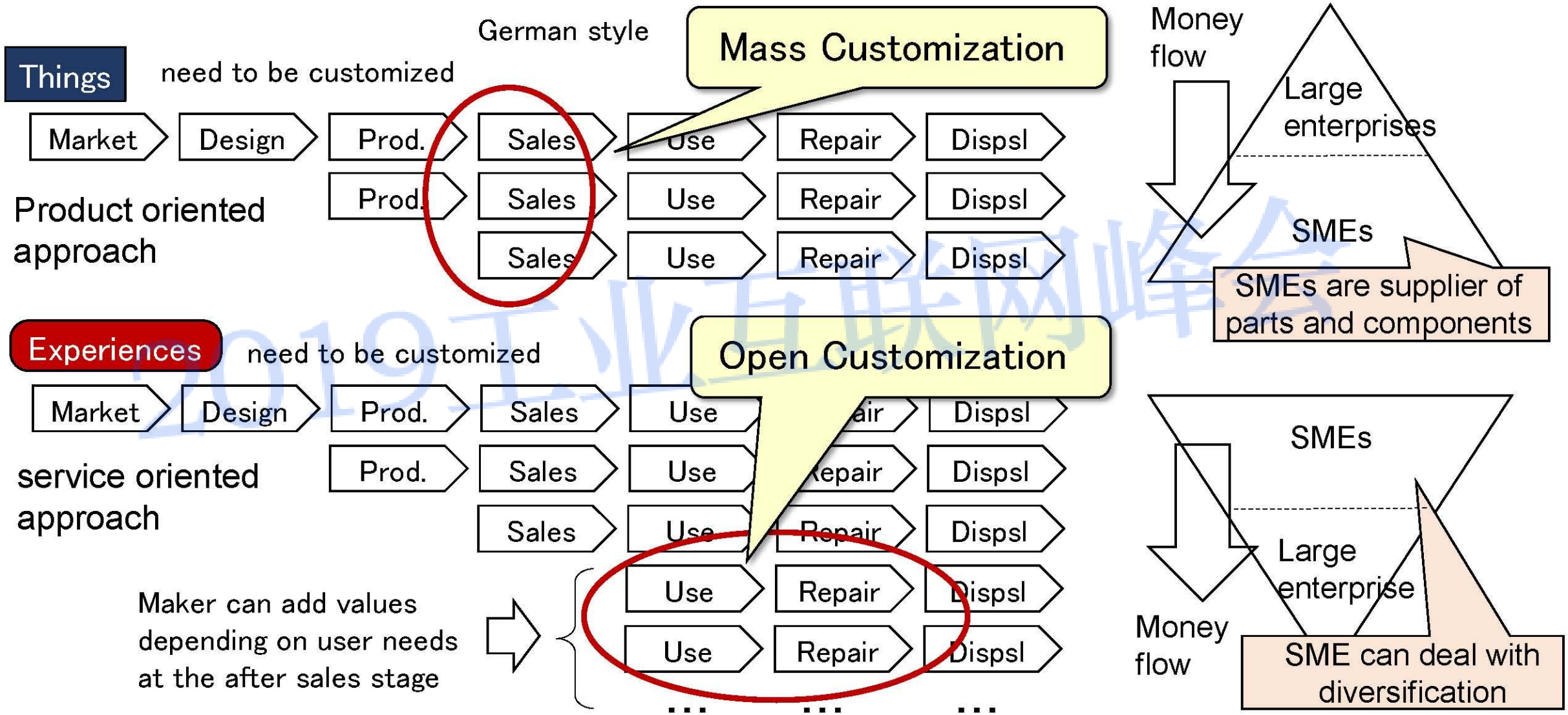
Format



Loosely defined standard



Facing Personalization and Diversity



谢谢！

http://iv-i.org