The Industrial Value Chain Initiative

A Japanese contribution to Smart Manufacturing

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Hosei University, Tokyo, and President of IVI
1. Introduction to IVI

2. Scenario based 20 use cases

3. Loosely defined standard

4. Development framework for CPS

5. Future contribution and global context
What is IVI – Industrial Value Chain Initiative?

- Established in June 2015 mainly by 53 Japanese manufacturers initiated by METI and JSME-MSD. Currently, IVI has already more than 140 members.

- Supports building collaboration scenarios and use cases of connected manufacturing among different enterprises based on a loosely defined standard.

- Provides and manages a repository of loosely defined standard models that can be continuously changed in accordance with unexpected future requirements.
Some IVI Members
IVI Key Concepts

Connected Manufacturing

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

Loosely Defined Standard (LDS)

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

Humans remain key

Cyber world and physical world come closer, but are not 1:1. Artificial systems require designers and engineers as well as operators. The human being remains key also in the production of the future.
Agenda

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IVI’s first 20 Projects

IVI has run 20 projects between September and March, covering use cases in four areas:

1. Reaction on changes in globally and locally connected factories
2. Emerging IoT technologies for production line management
3. Platform for connected world in design and manufacturing
4. New era of Human centric manufacturing powered by IoT

Each project was run involving several companies, sometimes competitors, in a novel collaboration.

By this, we learn how to connect real enterprises.
Examples of Use Cases (Area #4)

New era of Human centric manufacturing powered by IoT

- Robotics line building for SMEs using cloud knowledge database
- Proactive machine communicating with workers in IoT environment
- Advanced quality assurance by connecting data - Towards zero failure production
- Standardization of working styles in "Man-Machine collaborative factories"
- Remote consulting service of production engineering by bill of process information
Standardization of working styles in "Man-Machine collaborative factories"

匠の技術継承による負荷の平準化
株式会社ジェイテクト 剎谷工場

Work load leveling by succeeding to the EXPERT SKILL(TAKUMI)

JTEKT CORPORATION Kariya plant
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Loosely Defined Standard

Interface is adjusted

Connected operations in site A

Interface

Specification
For Connection

Connected operations in site B

Reference model

Loosely defined standard

Specification is adjusted

Connected operations in site A

Specification For Connection

Connected operations in site B
Profile for system integration

Each independent application defines interfaces to the selected schema.

C-LDS

Common profile

Common profiles shall be defined by differences from the reference model.

S-LDS

Independent data models

Different company

Implementation profile
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IT and Actual World Modeling

Actor

Activity

Thing

Information

Actual world Technology

Information Technology

Actor

Data

Logic

Data

Logic

Logic
Logic can be executed by the corresponding trigger. Digitalized information can go to the cyber world. IoT device attached can send data downwards. Cyber and physical world are NOT 1:1!
LDS Development Process Cycles

- **S-LDS**: specific models of LDS
- **C-LDS**: Common models of LDS

**FY2015**
- **C-LDS**: Model definition → S-LDS
- **S-LDS**: Scenario definition → Pilot systems
- **IoT tools** → Industrial implementation and evaluation

**FY2016**
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20 scenarios
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Future Contribution from IVI

Redefine the border between:

- Digital and Analog
- Competitive and Collaborative

New demand by fusion of cyber and physical worlds

Reconstruct manufacturing line as parts

Products traceability in S/C
Equipment traceability in E/C
Information (Data) traceability
Technology (IP) traceability

Global

Large Manufacturer

Midsize Manufacturer

SME Manufacturer

Domestic

user
customer

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World’s IIoT Initiatives and IVI

Visionary standard for manufacturing of the future

Mass customization (Lotsize 1)

Factory Automation Suppliers and IT vendors

Factory creates value

Knowledge of human creates value

Manufacturers and Fabrication SMEs

Open and Closed strategy

IT service providers and Platformers

Big data
Artificial Intelligence (AI)

Data creates value

Efficient migration from manufacturing today to tomorrow

Business innovation by IIoT

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Thank you!

http://iv-i.org