The common strategy on international standardization in field of the Internet of Things/Industrie 4.0

PLATTFORM INDUSTRIE 4.0 | ROBOT REVOLUTION INITIATIVE | STANDARDIZATION COUNCIL INDUSTRIE 4.0

PLATTFORM INDUSTRIE 4.0 | ロボット革命イニシアティブ協議会 Robot Revolution Initiative | STANDARDIZATION COUNCIL INDUSTRIE 4.0

The common strategy on international standardization in field of the Internet of Things/Industrie 4.0

The objective of the common strategy paper is sharing the recognition of important issues about smart manufacturing. The paper should lead into a statement and (strategic) action plan for important issues about smart manufacturing in terms of Germany-Japan cooperation

1. Long-term view and focused topics of smart manufacturing

Standardization is a key issue for the success of a smart manufacturing vision of the industries in Japan and Germany. Internet of Things (IoT)/Industry 4.0 requires an unprecedented degree of system integration across domain borders, hierarchy borders and life cycle phases. This is only possible if it proceeds from standards and specifications based on consensus. It is critical to consider the standardization as a basis for open and interoperable system architecture for industrial implementation of the vision of smart manufacturing.

As world leaders in the field of manufacturing technology and production systems, Germany and Japan have spent strong effort for promoting smart manufacturing research, developments and industrial implementations. Germany and Japan have agreed to cooperate on standardization in the field of smart manufacturing by sharing the long-term view for smart manufacturing and focusing on common pertinent topics.

2. Current situation

The cooperation partners met twice in Germany on October 7th and December 12th 2016. They formed a joint working group and exchanged information on international standardization for smart manufacturing. The following activities and contributions will be expected and planned for 2017.

2.1 Current key events

In conjunction with G20 Conference:

- Digitizing Manufacturing in the G20 – Conference on Initiatives, Best Practices and Policy Approaches (March 16-17, Berlin),
- G20 Digital Ministers' Meeting (April 6-7, Düsseldorf).

In conjunction with CeBIT:

- CeBIT German-Japan Joint Forum (March 20 – 21, CeBIT Hannover).

2.2 Activities and fora on international standardization

- IEC SMB SEG 7 Smart Manufacturing,
- IEC TC 65 Industrial-process measurement, control and automation,
- ISO SMCC (Smart Manufacturing Coordinating Committee),
- ISO TC 184 Automation Systems and Integration,
- ISO TC 299 Robotics,
- IEC/ISO JTC 1 (e.g. Joint Advisory Group, Working Group 10 – IOT- and System Committee 27 – Security Information Technique).

Collaboration options between Germany and Japan with respect to the standardization activities are in progress with the above standards developing organizations (SDOs), while coordinating the standardization of related elements

which affect suitability for integration into system of systems.

3. Fundamental direction of Germany-Japan cooperation

3.1 Development of detail use cases

For the future views and/or topics agreed between Germany and Japan, ideal operation images should be described in text as “Use Cases”. Use Cases need to show which functions of organization, human and production units would work closely together in how effective manners, then would deliver what values to whom in manufacturing activities.

Use Cases are important base scenarios to analyze and identify technical requirements for deployment, expansion and new developments of the standards afterwards.

3.2 Use of the reference models in the focused areas

(1) Expectation for the reference models

- ISO/IEC requested to promote merging existing reference models/architectures into unified models by eliminating overlaps and clarifying their core contents.
- Existing reference models/architectures have been developed for diversified scales/granularity with various domains/life-cycles at multiple organizations.
- Outcomes delivered by standardizations should make user benefits a central value.

(2) Proposed way of usage: Unified Reference Model – Map and Methodology (URM-MM)

URM-MM aims to provide map and methodology to be referred by SDOs and standard users in open eco-system development. The map and methodology show a procedural guide with relevant international standards and harmonize existing models to guarantee openness and interoperability at each development process. URM-MM assures and accelerates the way forward to the vision of smart manufacturing.

(3) Properties of Unified Reference Model – Map and Methodology (URM-MM)

URM-MM contains properties such as:

- the development process defined for each use-case at appropriate scales and granularity,
- user assistance for selection of an appropriate model from pre-categorized models for each development process to fulfill their aim,
- list of relevant international standards for the selected model which come from existing reference models/architectures such as RAMI4.0.

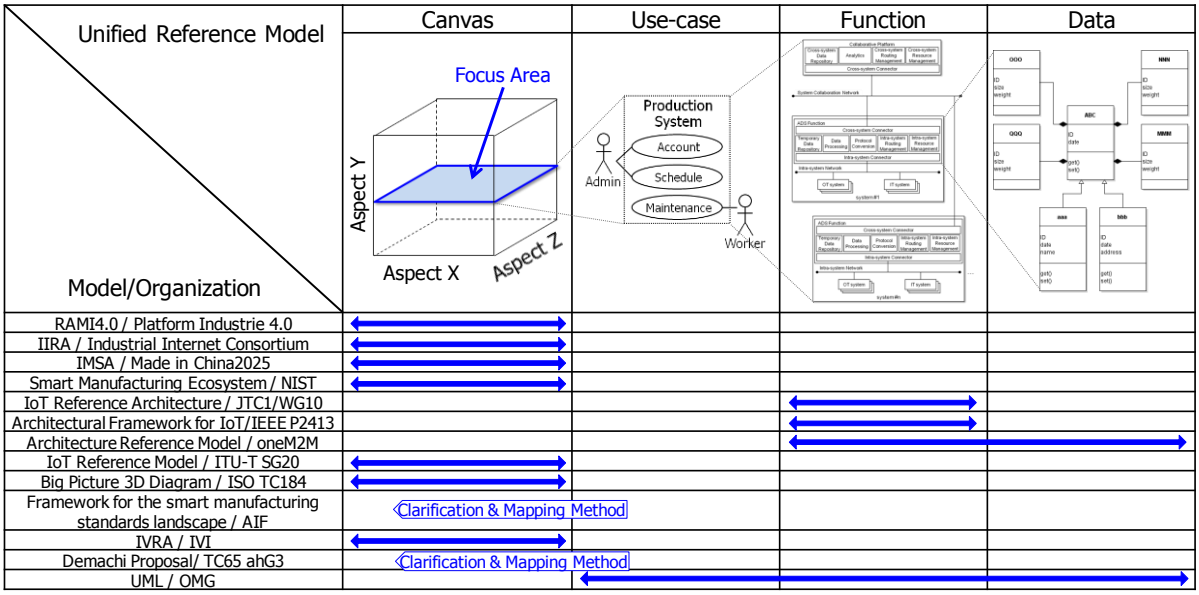

Figure 1 Unified Reference Model – Map and Methodology (URM-MM)

3.3 Identification of standardization requirements

In the areas where new standards are needed, it is required to not only clarify sufficiency of international standards but also list technical requirements that the standard should satisfy. For this purpose, the above process can also be used to identify the requirements. Firstly, use cases are decomposed into group of functions which realize the use cases. And then, it is possible to define data models to be shared among the functions and interfaces between the functions for the use cases. Germany and Japan cooperation will benefit those works of analyzing use cases.

4. Support of standardization works

Reference models and architectures are essential for further standardization work in smart manufacturing. Reflecting the diversity of need and applications, several models have been proposed, and such models set a comprehensive framework for the conceptual and structural design of smart manufacturing systems. In this context, the proposed work on mapping and harmonizing the existing models to achieve higher interoperability should be fostered.

Standardization is critically important for realizing smart manufacturing towards global and sustainable developments. Germany and Japan have agreed to cooperate in the developments of international standards and SDO activities by sharing information and setting up consistent strategy and action plans as stated in this paper.

PLATTFORM INDUSTRIE 4.0
www.plattform-i40.de
For more information, please contact:
Henning Banthien
Secretary General
h.banthien@plattform-i40.de

ロボット革命イニシアティブ協議会
Robot Revolution Initiative
www.jmfrri.gr.jp
For more information, please contact:
Tomoaki Kubo
Secretary General
tomoaki.kubo@jmfrri.gr.jp

STANDARDIZATION COUNCIL INDUSTRIE 4.0
www.sci40.com
For more information, please contact:
Reinhold Pichler
Secretary General
reinhold.pichler@vde.com