

GERMANY – JAPAN COMMON STRATEGY FOR INDUSTRIE 4.0 AND INDUSTRIAL INTERNET OF THINGS (IIOT)



A BILATERAL APPROACH ON HARMONIZING
STANDARDIZATION

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Common strategy in the field of Industrie 4.0 and Industrial Internet of Things (IIoT)

A bilateral approach on harmonizing standardization

1 - Introduction

With the evolution of technology, changes in smart manufacturing and society are rapidly accelerating. Standardization is a key issue for the success of a smart manufacturing vision of the industries in Japan and Germany. Industrie 4.0 (I 4.0) and Industrial Internet of Things (IIoT) require 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. Nowadays there is an increasing need for global collaboration.

As world leaders in the field of manufacturing technology and production systems, Germany and Japan have made great efforts to promote 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.

The aim of the collaboration between the [Standardization Council Industrie 4.0](#), [Plattform Industrie 4.0](#) and their Japanese partner, [the Robot Revolution & Industrial IoT Initiative](#) is to take advantage of the economic potential of digitalization, achieving a smooth transition into the digital age in both countries and maximising the positive effects on the competitive strength of industry in both countries too. At CeBIT 2017 the cooperation was intensified, especially in the areas of international standards and improved IT security for interconnected industry. The German and Japanese partners agreed to create a common future vision of smart manufacturing standardization and establish a mechanism of proactive information exchange and to work transparently together. Furthermore, the partners agreed to examine substantive areas in standardization Industrie 4.0 and Industrial Internet of Things (IIoT), based on concrete conceptual work e.g. the elaboration of the various Usage Views to achieve a common understanding on the topic of use cases.

These substantive areas were described and published as first edition of the common strategy in 2017. Today, based on the past activities, achievements and significantly changing global circumstances, both partners agreed to “upgrade” the collaboration as the second stage of the common strategy.

Use case approach

The motivation of using such a conceptual approach is based on the fact that in the international community, it is broadly accepted that new standardization activities are particularly useful when driving use cases behind them are formulated and clearly understood. In this respect, an internationally uniform understanding of use cases in the context of I 4.0 and IIoT is a central starting point in that cooperation. Use cases are an instrument to build a bridge, from the driving challenges facing the manufacturing industry to the appropriate possible technical solutions. Use cases also offer the possibility to derive new requirements for standardization.

2 - Retrospective and achievements of the cooperation since 2017

With its beginning in 2017, the cooperation focused on elaborating a common perspective of the use of the reference models. Simultaneously, the cooperation started conceptual work such as the elaboration of the various Usage Views to achieve a common understanding on the topic use cases.

Use of the reference models in the focused areas

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 has been intensively fostered and commonly pushed in ISO/TC184 - IEC/TC 65 Joint Working Group 21.

Elaboration of conceptual work – use cases

It was agreed among the two countries that use cases are important base scenarios to analyse and identify technical requirements for deployment, expansion and new developments of the standards afterwards. The cooperation has reached a common understanding, and now supports the work especially in international standardization groups. The results are presented as discussion papers:



2020 – Discussion Paper

Usage View of Seamless and Dynamic Engineering of Plants

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2019 – Discussion Paper

Usage View of Asset Administration Shell

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2018 – Discussion Paper

Usage Viewpoint of Application Scenario Value-Based Service

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2018 – Discussion Paper

Functional Viewpoint of Application Scenario Value-Based Service

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[Download from German website](#)

Support of standardization and identification of standards requirements

The following areas have been strongly supported in recent years and are still considered to be a driving force in terms of standardization (for more information on the related committees of consideration see also Annex):

- Maturity driven systematic use-case selection scheme for smart manufacturing
- Unified Reference Model – Map & Methodology (URM-MM) framework including the Reference Model Architecture Industrie 4.0 (RAMI4.0) and others
- commenting of AAS concept
- more

3 - Outlook

Both partners agree to continue and even enhance the level of information sharing and to work transparently together towards the next phase of collaboration. The visions, perspectives and approaches of both partners (such as Industrie 4.0 in Germany and Society 5.0/Connected Industries in Japan) will be shared with respects for the cooperative discussion in the field of standardization of smart manufacturing.

Objectives

Both partners will work together to achieve the following objectives. This includes strengthening the foundation of cooperation by:

- reaching a common understanding of standardization approaches and concepts
- continuation and establishment of constant and open information sharing
- supporting the adoption of national/international standards to harmonise the framework conditions for Industrie 4.0 (Germany) and Connected Industries (Japan)
- identifying standardization requirements and providing input for several international standard activities

Scope

The following areas are set as the scope of the cooperation:

- prior study of the subject of standardization, and study for dissemination (Example: Application scenario)
- discussion and consideration of the future vision of standardization in smart manufacturing
- items related to standardization in problem solving future society such as Society 5.0 (Japan)

Setting the new scene – new technologies and topics

In consequence of the achieved exchange level in the identification of standard requirements, the cooperation seeks to foster the technical exchange on new technologies and topics, including:

- continuation of use case elaboration
- elaboration of substantive operation of asset-oriented information and function structuring
- investigation of new utilization of combination of maturity model and use case as input to related organizations
- exploring potential areas of harmonization and aligned activities at international level (ISO/IEC) e.g. edge configuration considerations, examination of standardized requirements for human-machine interaction

These are the examples of the target fields, but this cooperation is not necessarily limited to them.

4 - Summary

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 activities from Standard Development Organizations (SDO) by sharing information and setting up consistent strategy and action plans as stated in this paper. To widen the perspective, the cooperation seeks also to involve future visions of standardization related to smart manufacturing.

Annex: Committees of consideration

<u>IEC - International Electrotechnical Commission</u>	
IEC/SyC SM	Systems Committee, Smart Manufacturing
IEC/TC 65	Industrial-process, measurement, control, and automation
IEC/TC 65/WG 10	Security for industrial process measurement and control - Network and system security
IEC/TC 65/WG 23	Smart Manufacturing framework and concepts for industrial- process measurement, control, and automation
IEC/TC 65/WG 24	Asset Administration Shell for industrial applications
IEC/SC 65A	System aspects
IEC/SC 65E	Devices and integration in enterprise systems
<u>ISO - International Organization for Standardization</u>	
ISO/TC 184	Automation systems and integration
ISO/TC184/SC1	Physical device control
ISO/TC184/SC4	Industrial data
ISO/TC184/SC5	Interoperability, integration, and architectures for enterprise systems and automation applications
ISO/TC184/WG6	Asset intensive industry interoperability
<u>ISO/IEC JTC 1 Joint Technical Committee for Information technologies</u>	
ISO/IEC JTC1/SC 41	Internet of Things and related technologies
ISO/IEC JTC1/SC 42	Artificial Intelligence
ISO/IEC JTC 1/WG 13	Trustworthiness
ISO/IEC JTC 1/AG 8	Meta Reference Architecture and Reference Architecture for systems integration
ISO/IEC JTC 1/AG 11	Digital Twin
<u>ISO/TC184-IEC/TC65</u>	
ISO/TC184-IEC/TC65/Joint Working Group 21	Smart manufacturing reference model(s)
<u>IEEE - Institute of Electrical and Electronics Engineers</u>	
IEEE P2806	System architecture of digital representation for physical objects in factory environments

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About the partners

Please use the following links for more information about the partners involved.



ロボット革命・産業 IoT イニシアティブ協議会
Robot Revolution & Industrial IoT Initiative

[Robot Revolution and Industrial IoT Initiative](#)



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