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Japan-Germany Standardization Collaboration
in Industrie 4.0 and Industrial Internet of Things (IIoT)
- Second Stage 2020 -

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Contents

- Bilateral approach on harmonizing standardization

- Usage View of Seamless and Dynamic Engineering of Plants (SDP)

- Outlook for the second stage activities

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

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- Based on initial contacts in 2016
- Preparation of 2017 G20 meeting
- Confirmed direction:
  - Development of common use cases
  - Use of the reference models in focused areas
  - Identification of standardization requirements
  - Support of standardization work

[From the presentation by Dr. Jens Gayko]

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Use case approach

- 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 the 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.

- 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.

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日本 **– German Cooperation**
Common Publications

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Joint discussion papers on use case study

[From the presentation by Dr. Jens Gayko]

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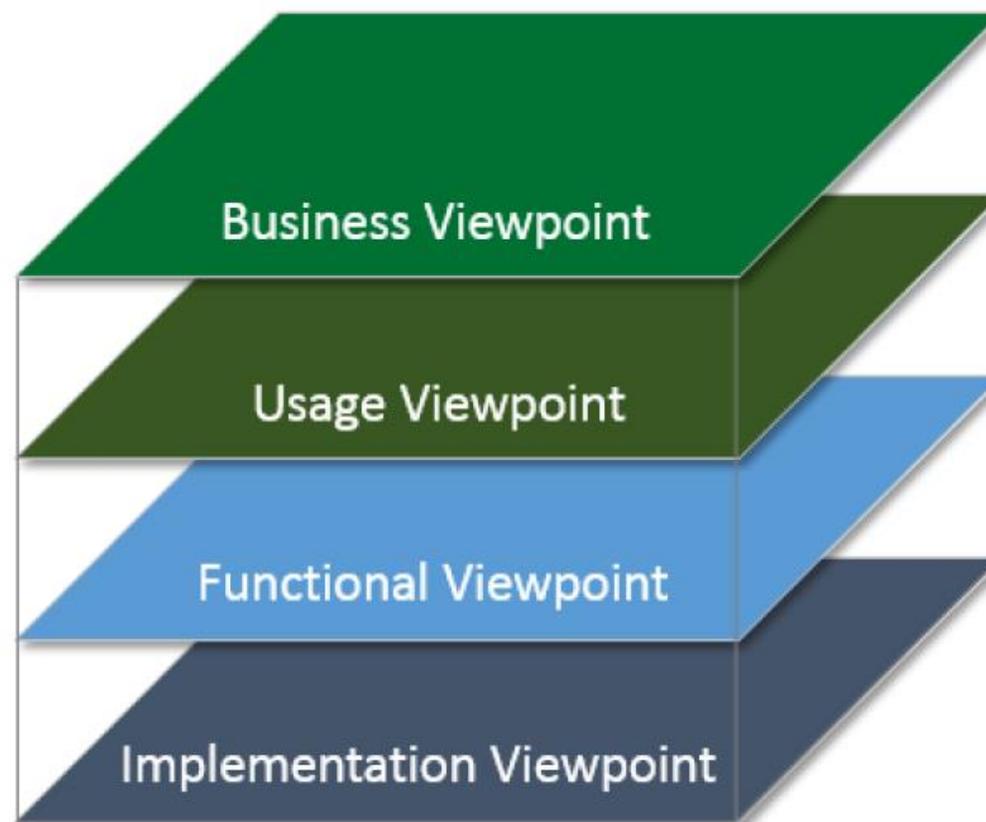
Top-down Approach to Standardization

- Traditionally standardization work has been done, based on the "consensus" principle, assuming that technology is already known.

- In smart manufacturing era, standardization can not start from the existing standards or technology, but from the user's high level vision and demand. Then detailed requirements are derived.

- Application scenario is a high level description for the future target.

- Requirements for standardization are derived from such high level user description in a top-down manner.

- Before going into the detailed technical discussion, it is important to agree on the requirements for target of standardization.

- Application Scenario
  - describes how industry perceives its digital future,
  - indicates areas posing challenges, e.g. standards, research, security, legal framework, labor, etc.

Top-down Approach to Standardization
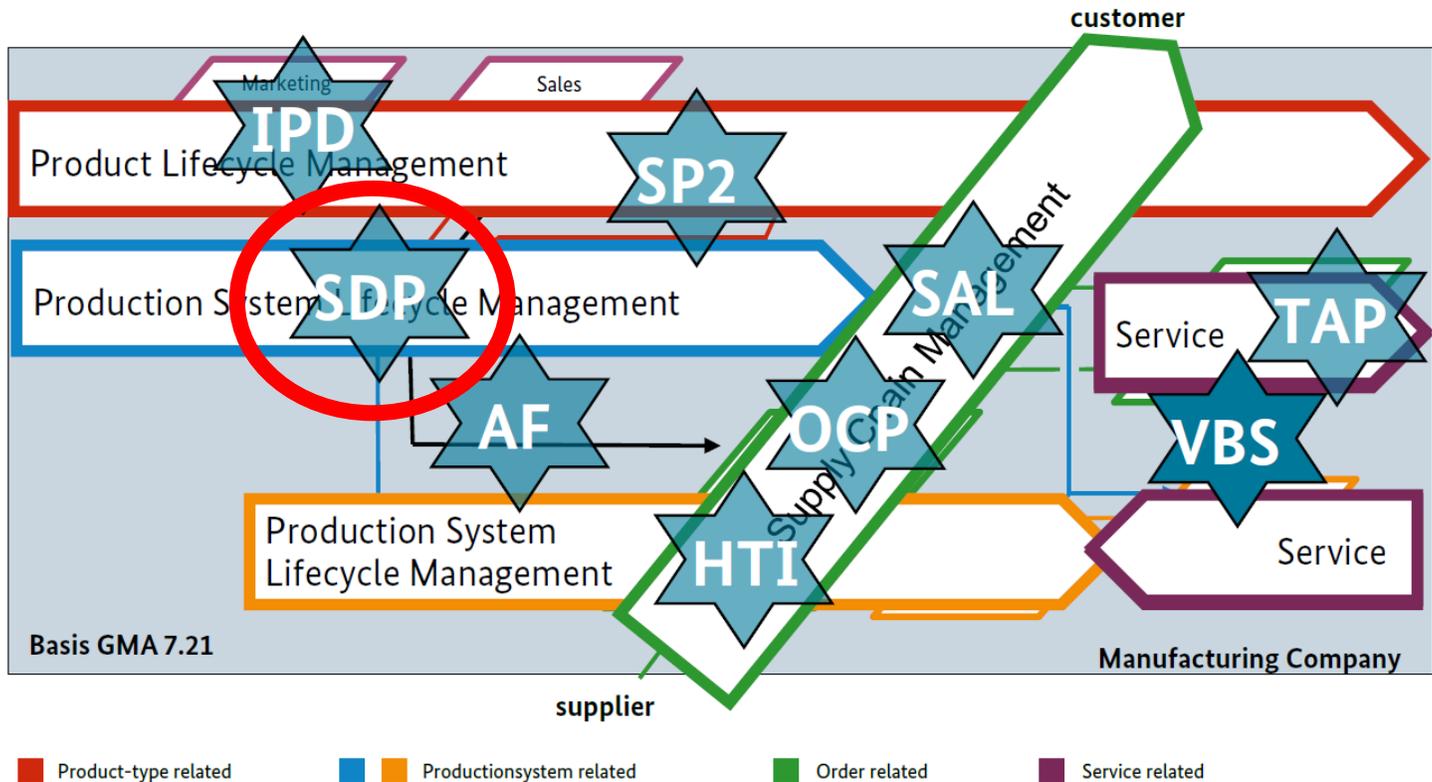
- Industrial Internet Consortium (IIC) Industrial Internet Reference Architecture (IIRA)

  - Industrial Internet Architecture Viewpoint

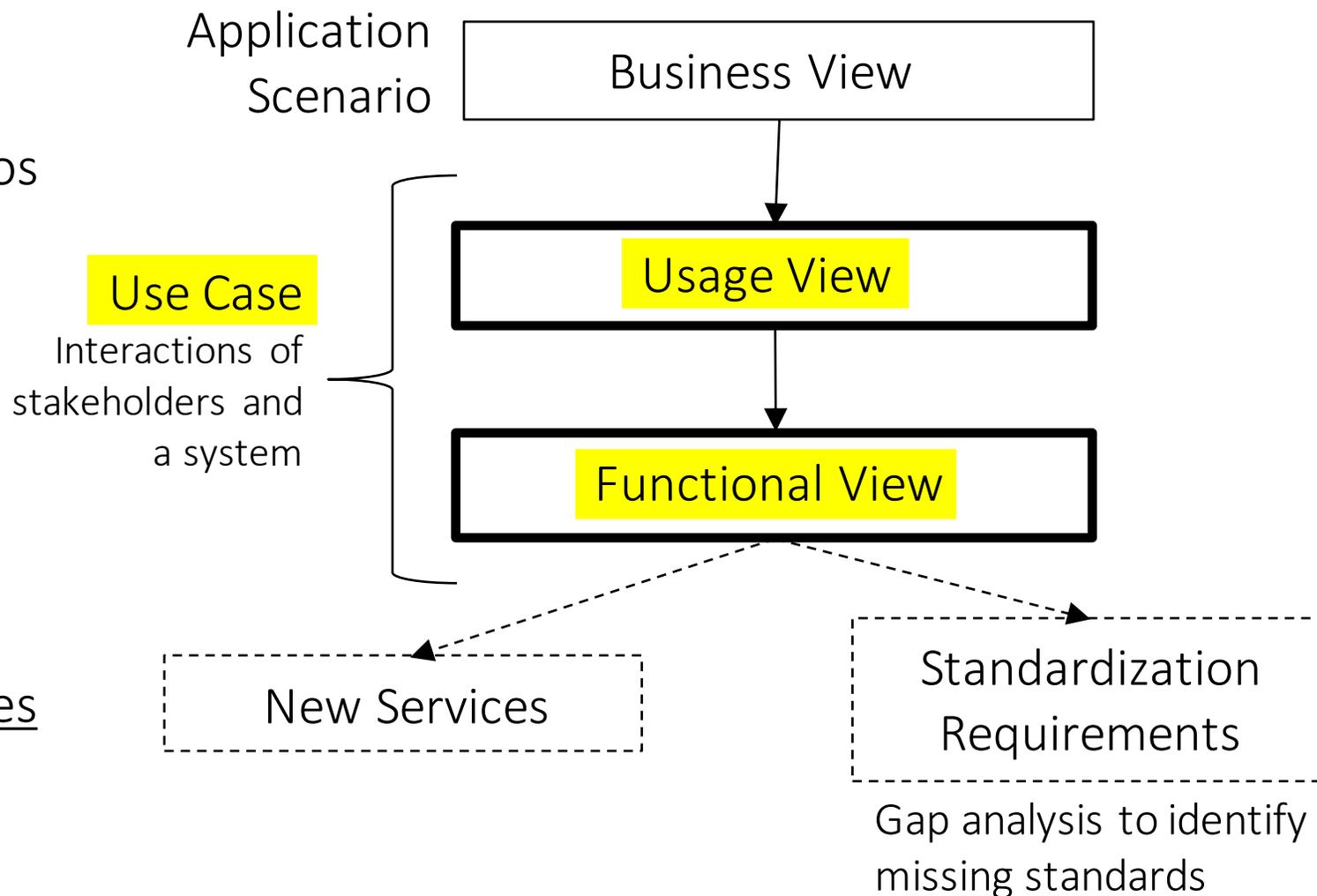# Top-down Approach to Standardization: Use Case

Top-down Approach

Possible future business scenarios

⬇

Technical use cases

⬇

New products, solutions, services
&
Standardization requirements

Application Scenario

Business View

Use Case
Interactions of stakeholders and a system

Usage View

Functional View

New Services

Standardization Requirements

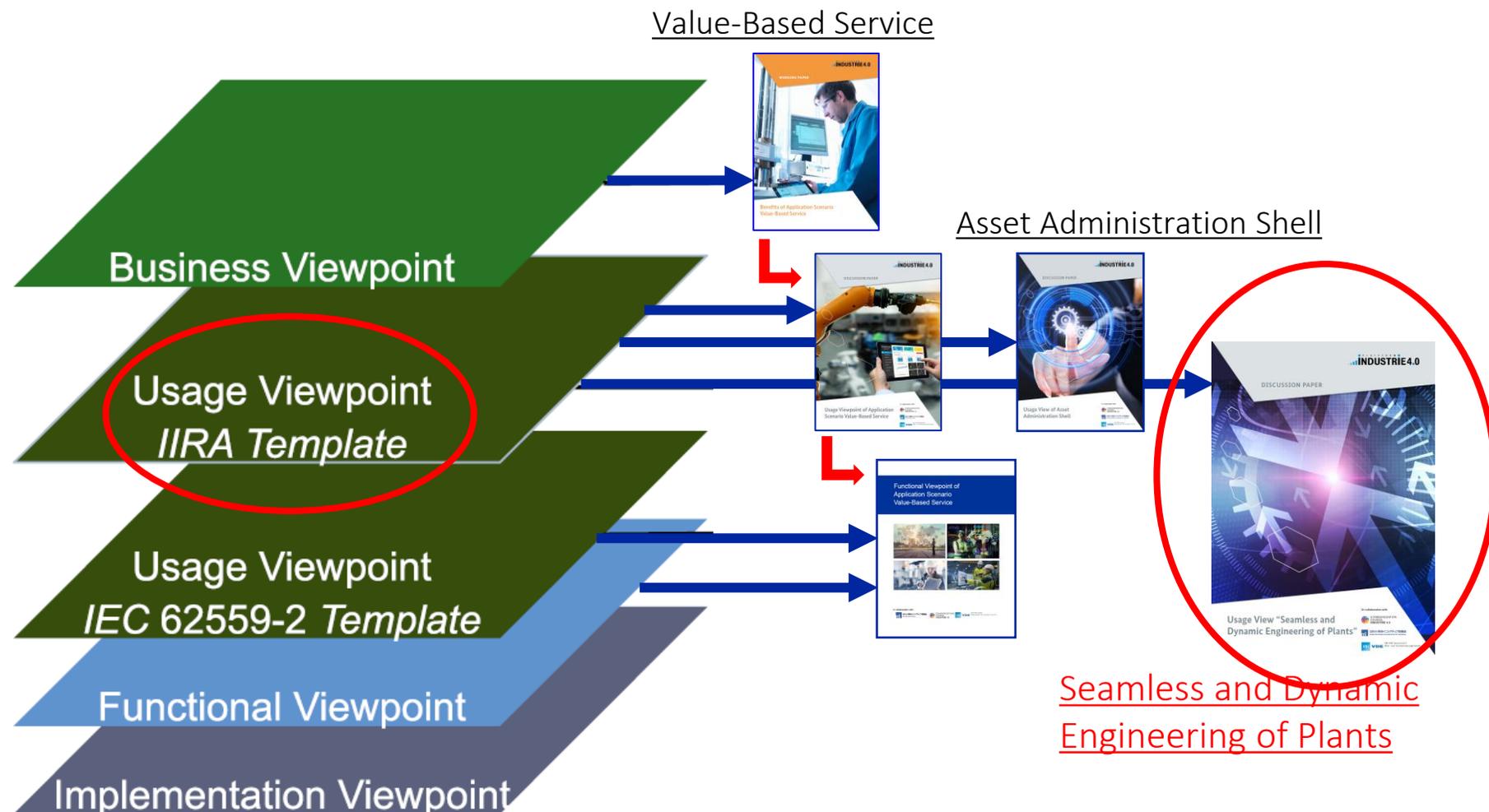Gap analysis to identify missing standards

Use-Case Driven Top-down Approach: Summary

Top-down approach

The starting point is possible future business scenarios, from which more technical use case descriptions are derived.

These use cases are the basis to derive new products, solutions, and services as well as standardization requirements.

# "Seamless and Dynamic Engineering of Plants"

The overall principle of the application scenario "**Seamless and Dynamic Engineering of Plants**" is that in an initial engineering process for engineering and construction of a plant, <mark>an integrating plant model is created, which is maintained and kept consistent throughout the lifecycle of the realized plant in permanently interrelated processes between engineering, operation and service of the plant</mark>.

The core of this application scenario is a plant model on which the partners involved can set up adequately. They can put their information into the model and extract from the model the information they need. This integrating plant model is the basis for information about the plant thus (new) value-added services can be created. <mark>The engineering of plants becomes more dynamic in the sense that changes of the plant become more frequent, more short-term, and the partners involved have to work in a more integrated, forward-looking, and thus reflexive way (meaning with regard to possible consequences of changes).</mark>

Such a model is the prerequisite for the future competitiveness of plant engineering and construction business.

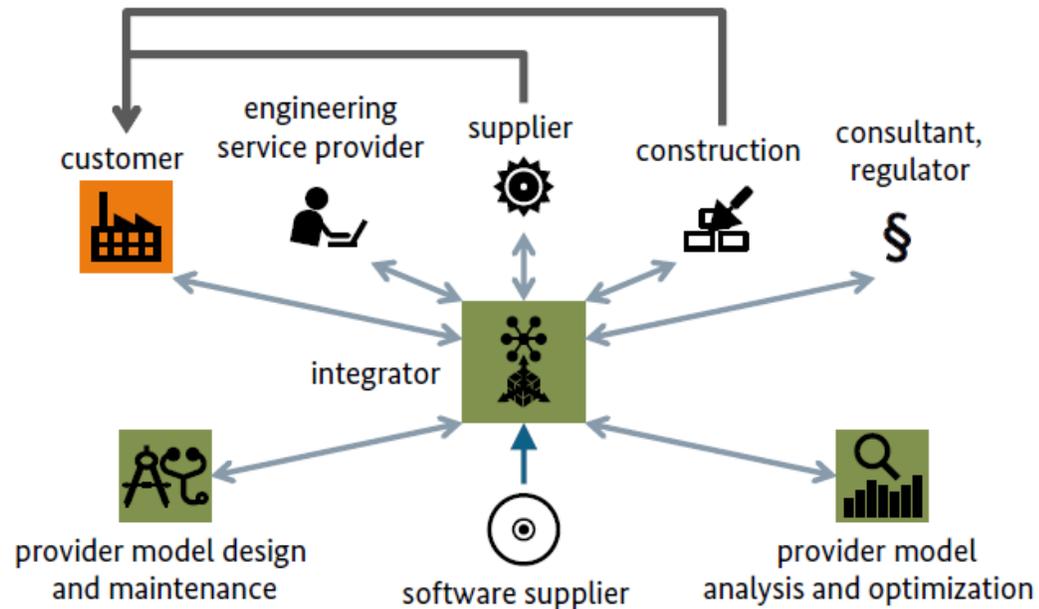# Business view of application scenario SDP

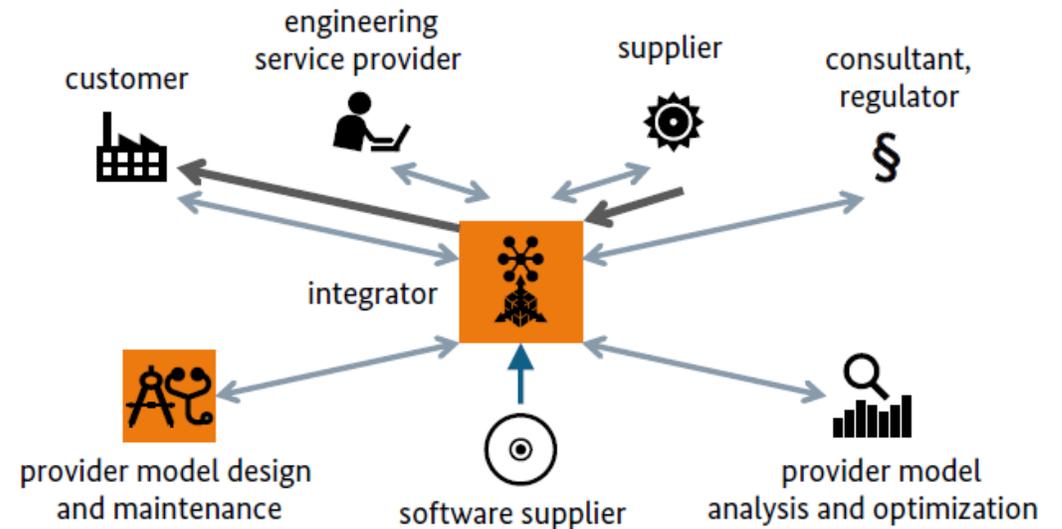Value network according to business view of application scenario SDP

Source: Plattform Industrie 4.0
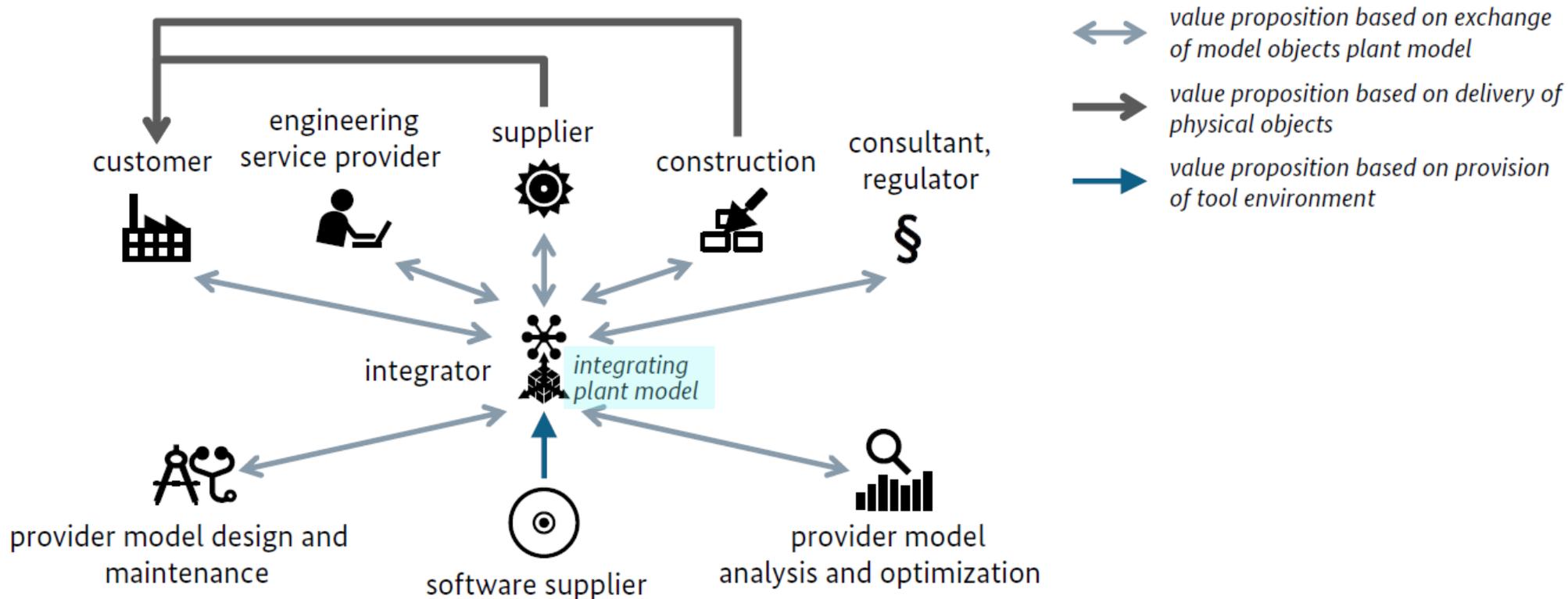
Different business exemplifications of application scenarios SDP

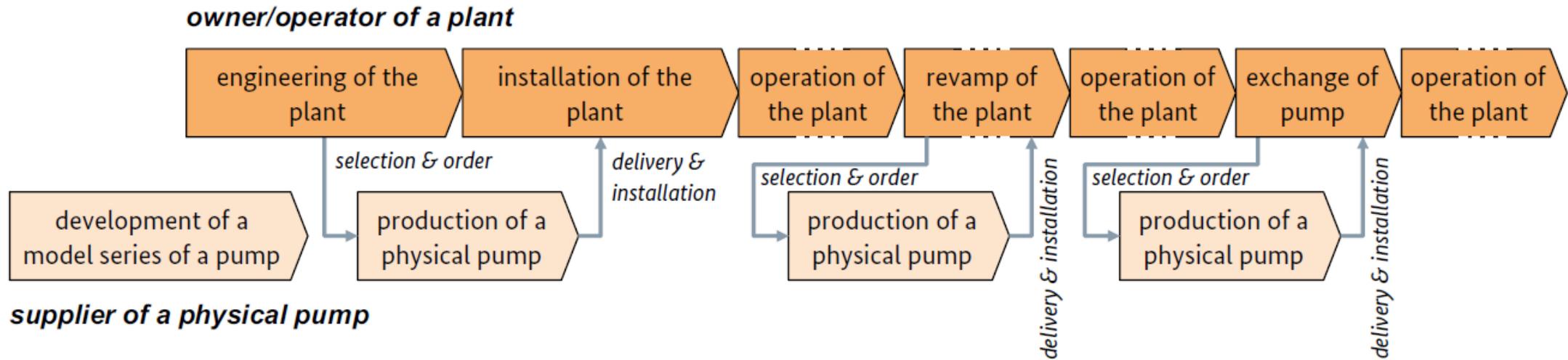Source: Plattform Industrie 4.0

The integrating plant model is a specific exemplification of a set of models which includes all model objects that are considered in a specific case.

Overview of usage view of "Seamless and Dynamic Engineering of Plants"

Source: Plattform Industrie 4.0

SDP: Examples for illustration
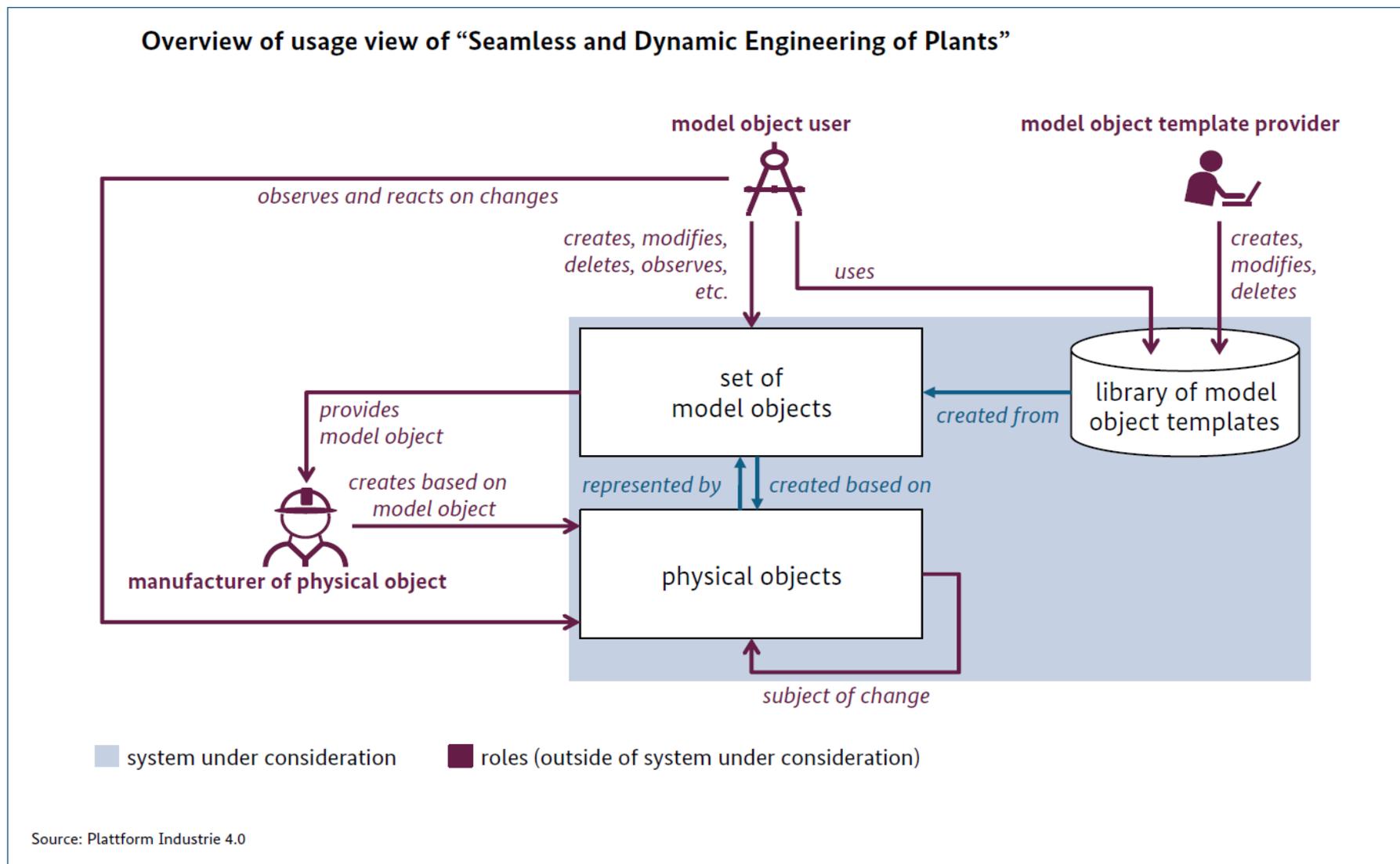
1. Installation and replacement of a physical pump

2. Virtual commissioning

3. Engineering of modular plants

4. Recipe-driven production of active pharmaceutical ingredients

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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

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)

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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.

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- 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. To widen the perspective, the cooperation seeks also to involve future visions of standardization related to smart manufacturing.

- The underlying aim and motivation for the collaboration is to maintain an open forum for timely information sharing and active discussion on any interesting issues of smart manufacturing and its standardization.