

CIOF Practical Seminar 2020

Part 2

CIOF Architecture Overview and System Implementation Procedure

October 1, 2020

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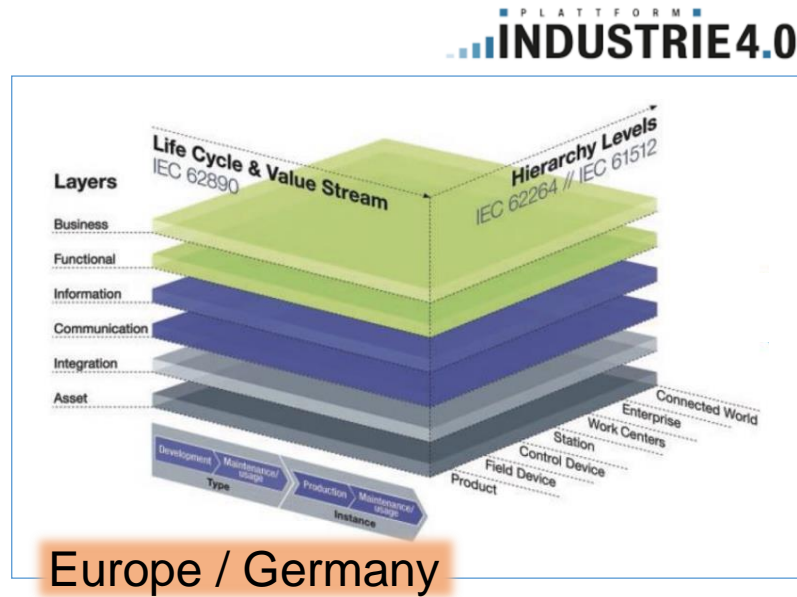


1. IVI Technology System and CIOF
2. Explanation of CIOF Architecture
3. Use Cases and Operating Procedures
4. Functional Requirements for Edge Controllers
5. Explanation by Sample Scenario
6. How to participate in the project

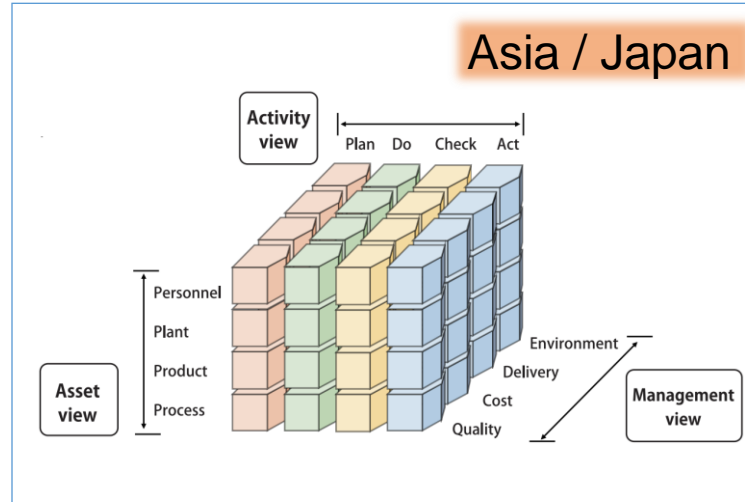
Reference Architecture (Manufacturing field)



Reference Architecture
Model Industrie 4.0

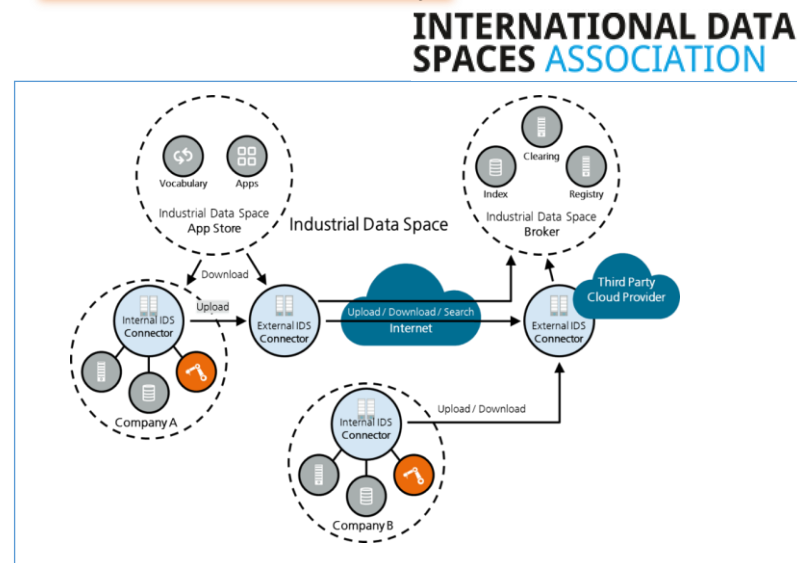


Asia / Japan

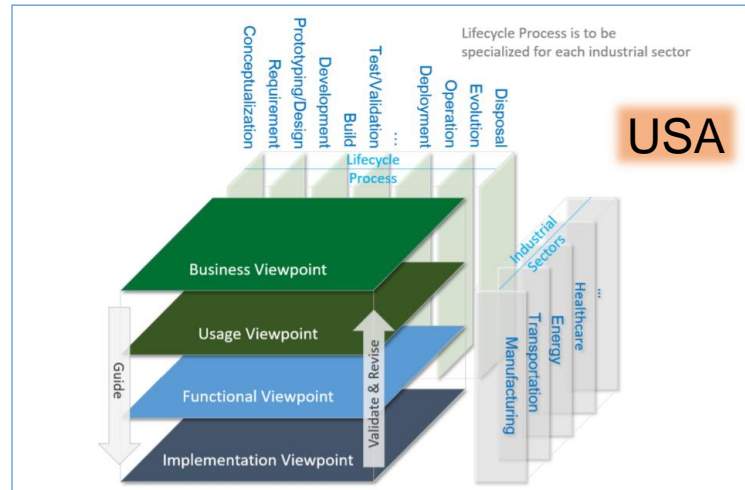


Industrial Value Chain
Reference Architecture

Industrial Data Space
Reference Architecture



USA



Industrial Internet
Reference Architecture

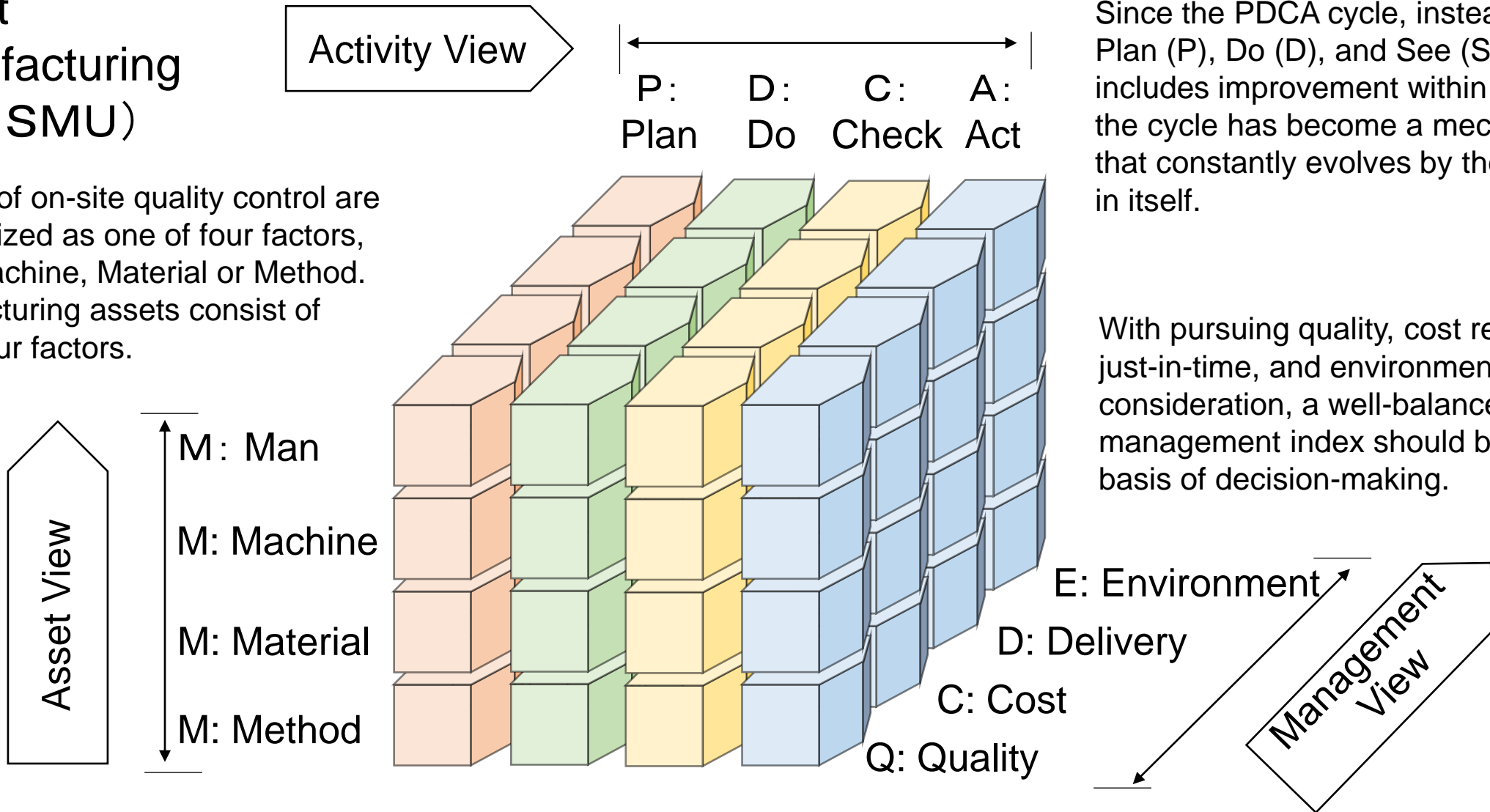


What are the characteristics (goodness) of Japanese manufacturing?



Smart Manufacturing Unit (SMU)

Factors of on-site quality control are summarized as one of four factors, Man, Machine, Material or Method. Manufacturing assets consist of these four factors.

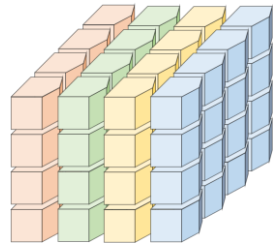


Since the PDCA cycle, instead of Plan (P), Do (D), and See (S) cycle, includes improvement within itself, the cycle has become a mechanism that constantly evolves by the factors in itself.

With pursuing quality, cost reduction, just-in-time, and environmental consideration, a well-balanced management index should be the basis of decision-making.



Smart Manufacturing Unit (SMU)



Activity View (PDCA)

Asset View (4M)

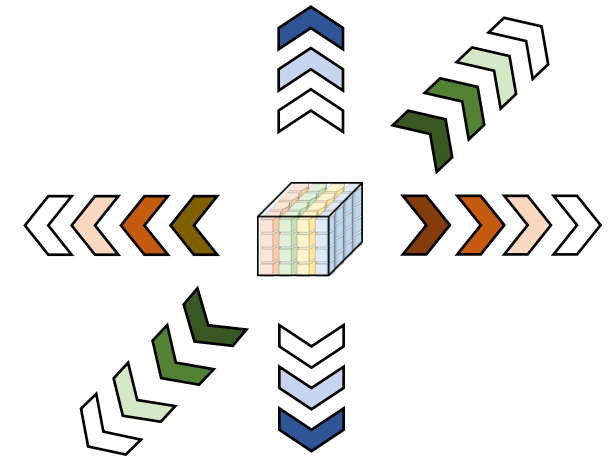
Management View (QCDE)

Three-axis Value Chain

Product Axis

Service Axis

Knowledge Axis

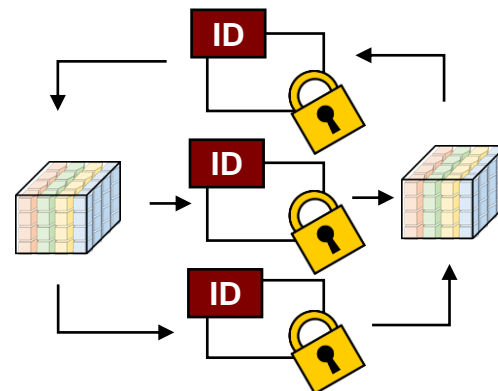


Portable Loading Unit (PLU)

Value Container

Cyber Container

Physical Container



IVI Ontology



actor



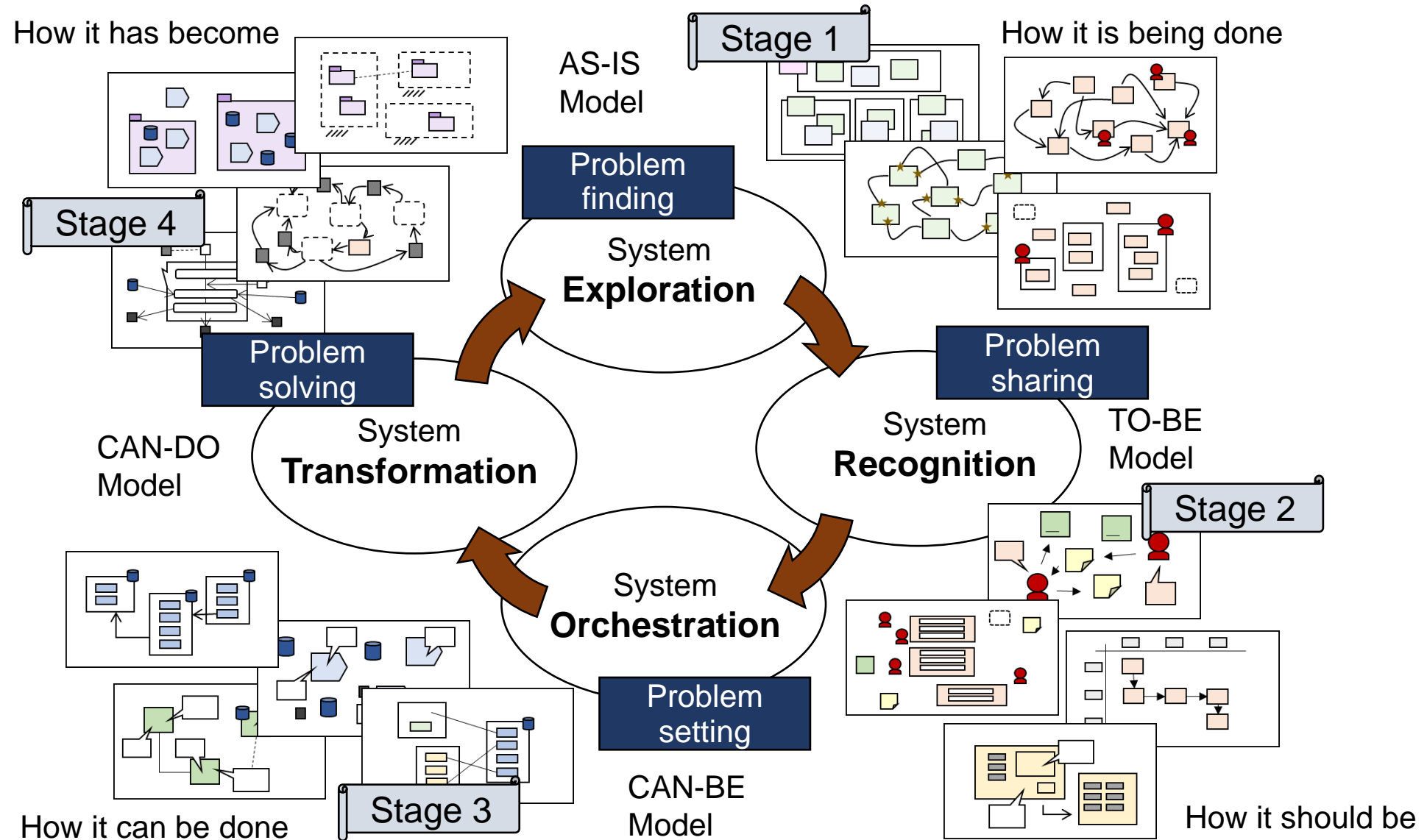
information



thing



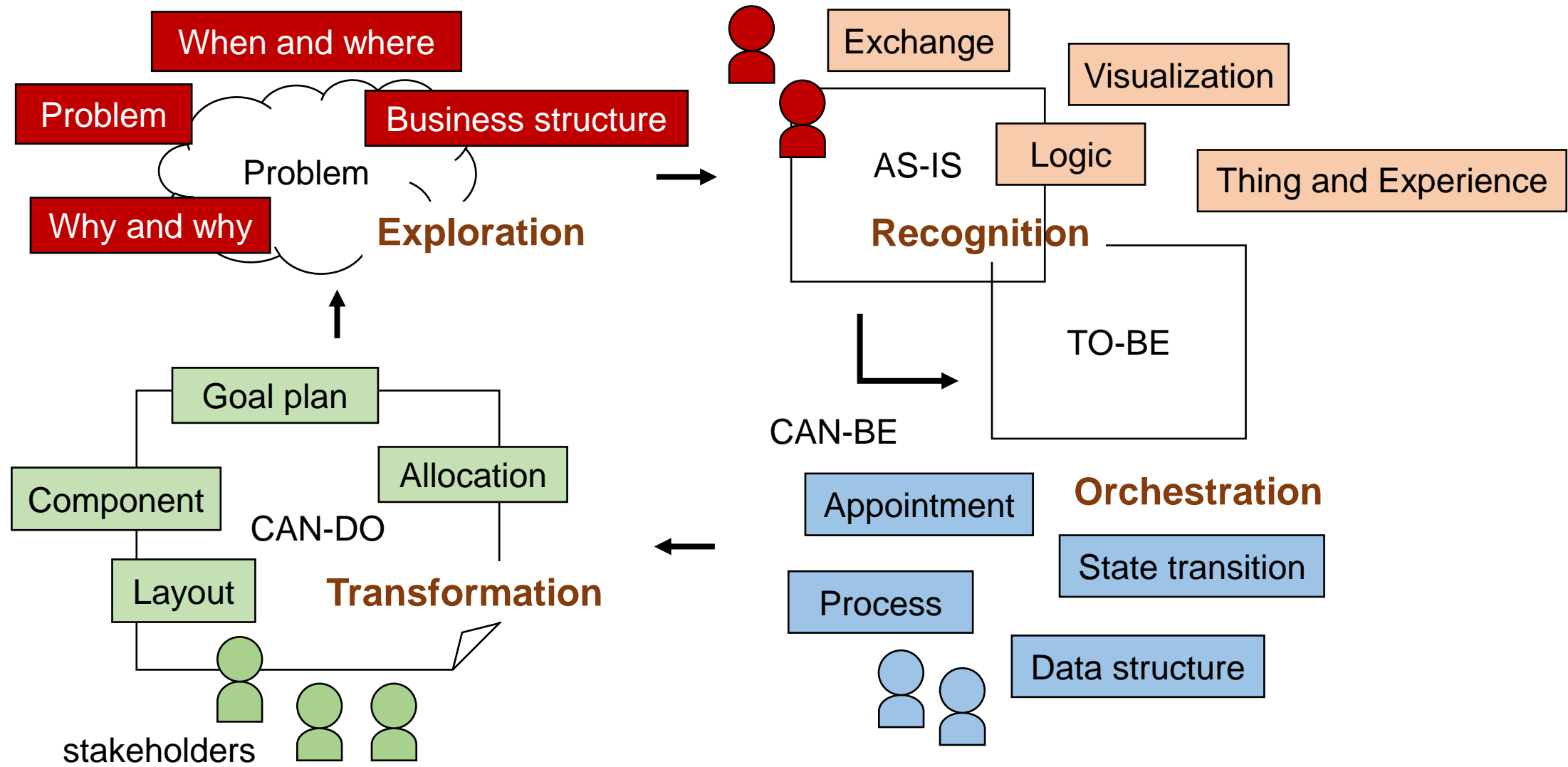
data





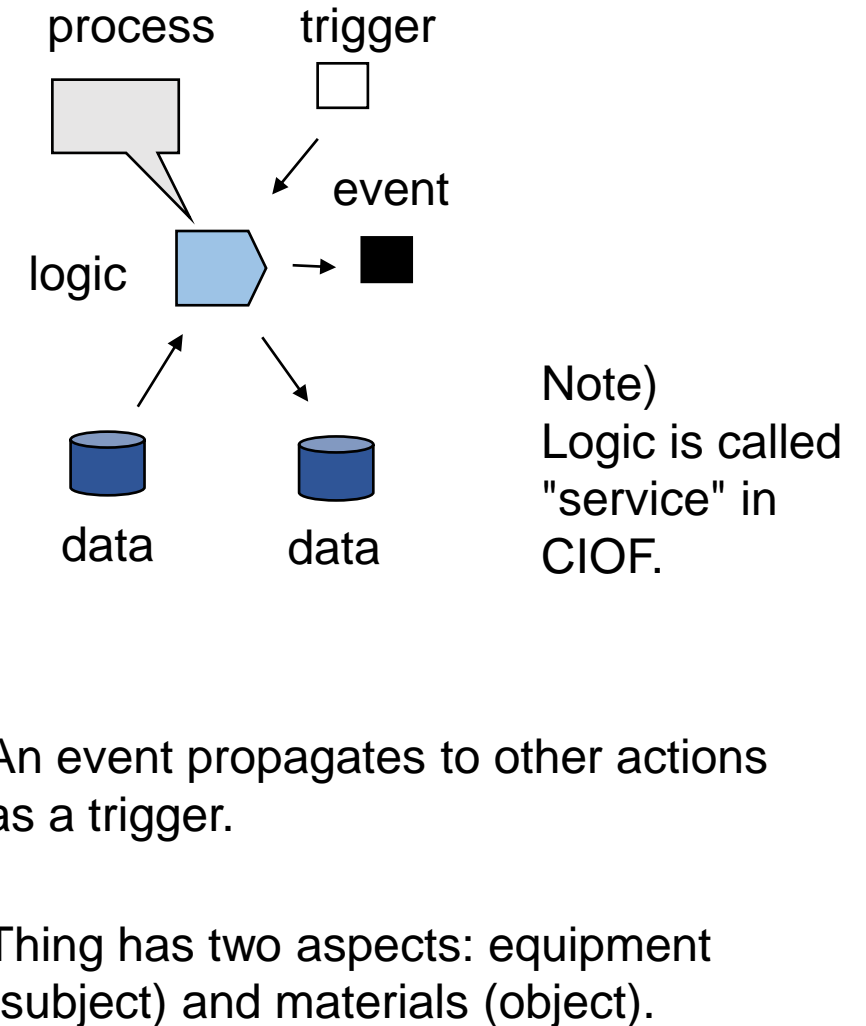
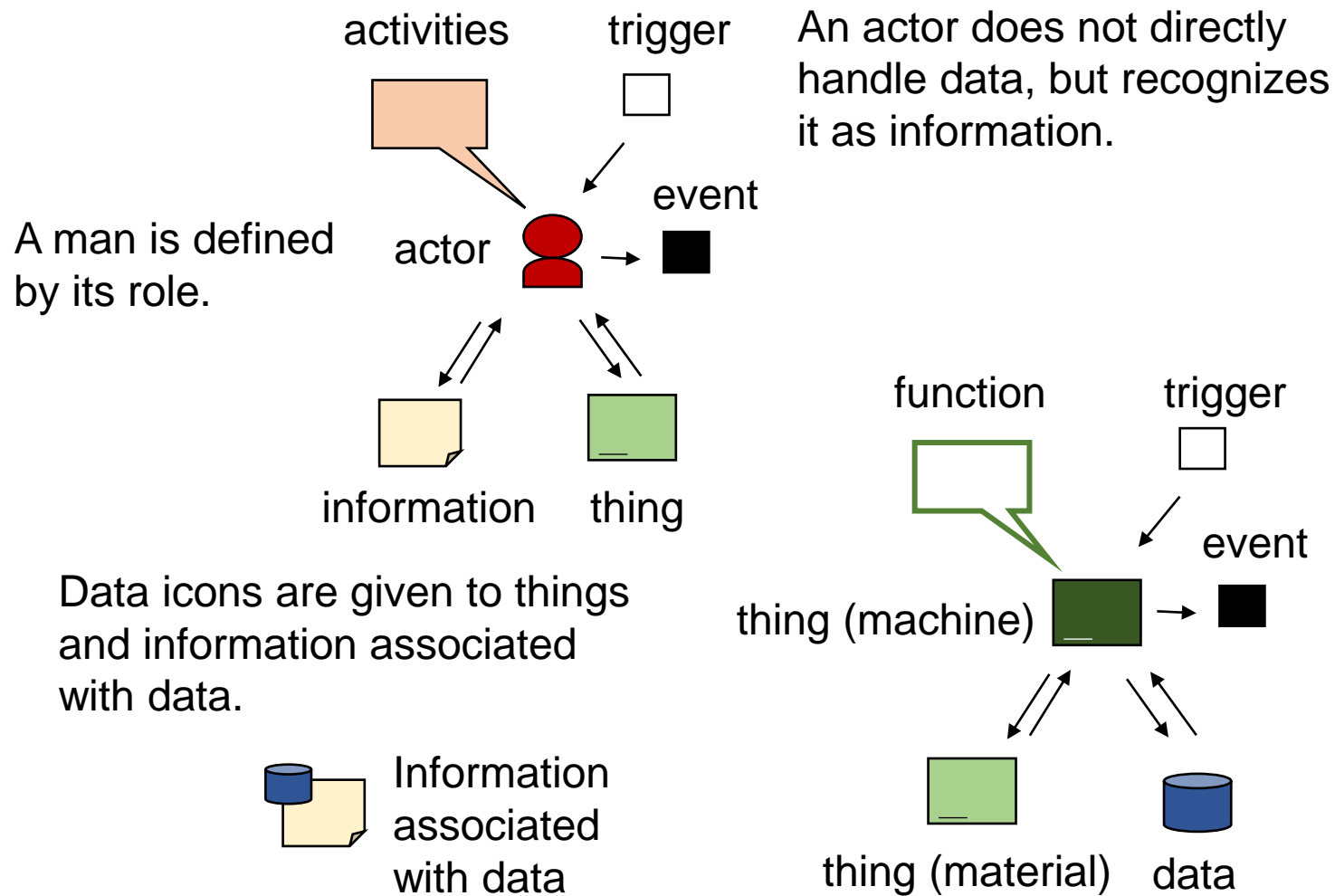
- AS-IS
 - To describe the current way of working and how to proceed the work as it is, and mutually understand what the problem is and what is the cause of the problem.
- TO-BE
 - To show specifically what one will actually realize in future so that it will be understood by the related people and become a common goal, not what they should be, nor what they want to be as an ideal thing.
- CAN-BE
 - To clarify specific procedures of solutions to achieve an ideal situation and prepare tools and resources for that purpose.
- CAN-DO
 - To deal with human problems (inertia, resistance, etc.), money problems, time problems, uncertainties, etc. in order to actually realize the solution.



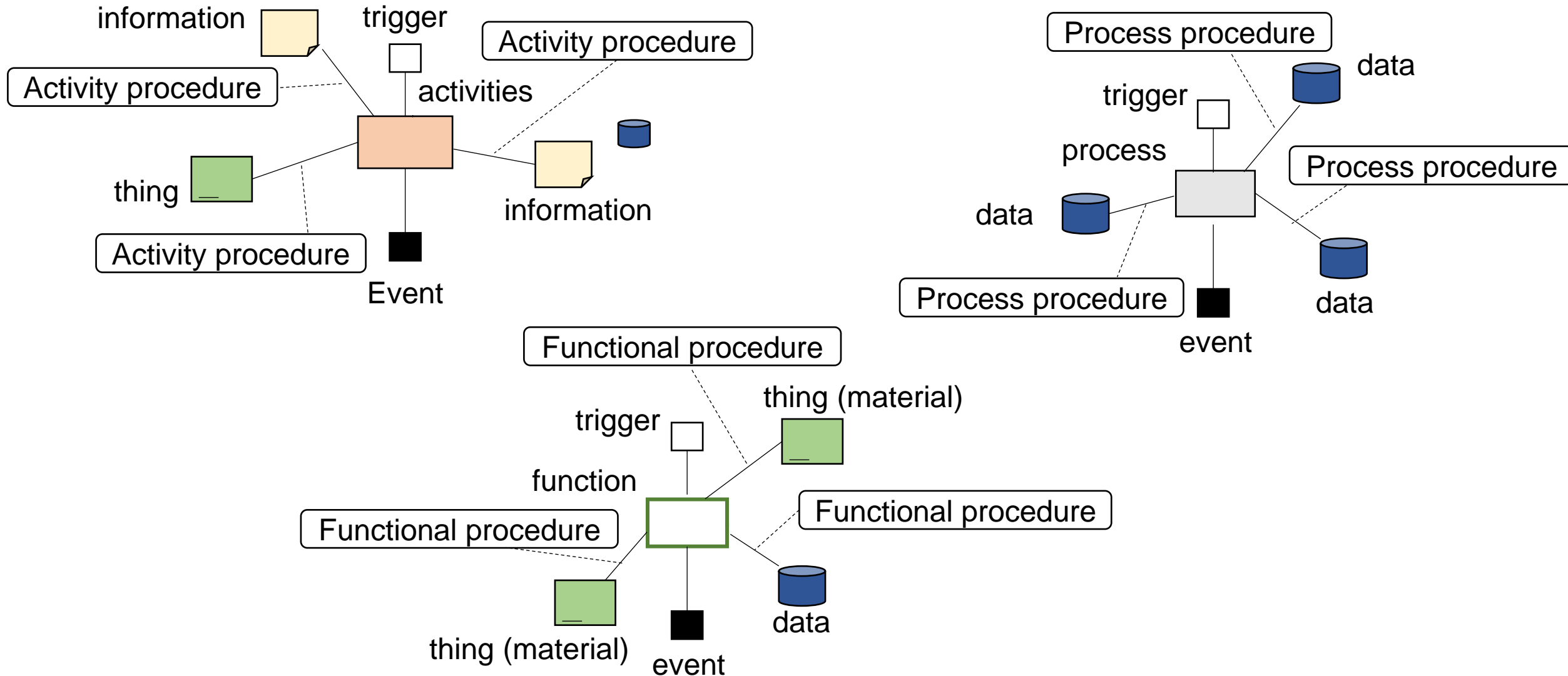




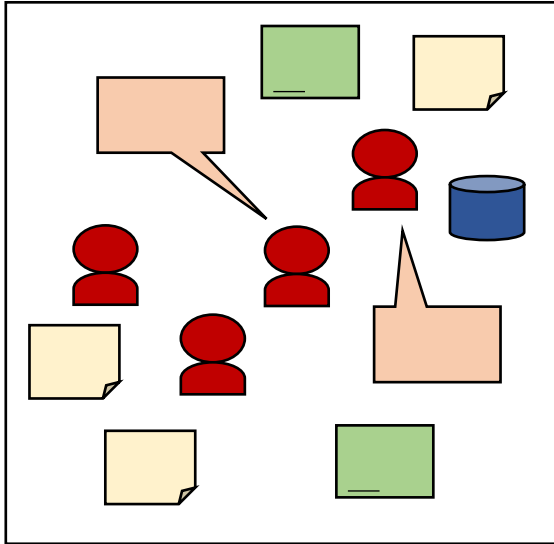
Operation Level Modeling



Operation Level Modeling (details)



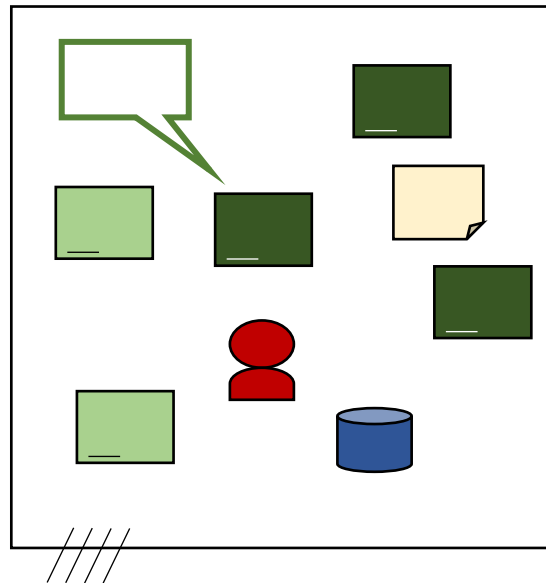
Organization



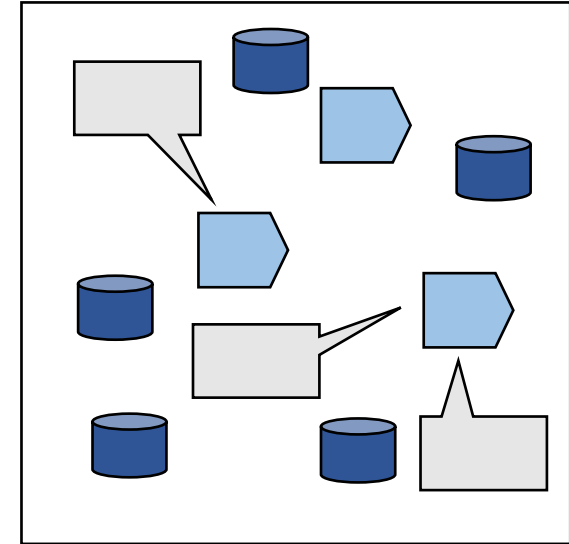
A unit that is organized from a human view is defined as an “organization”.

A unit that is organized from a physical view is defined as an “area”.

Area



Component

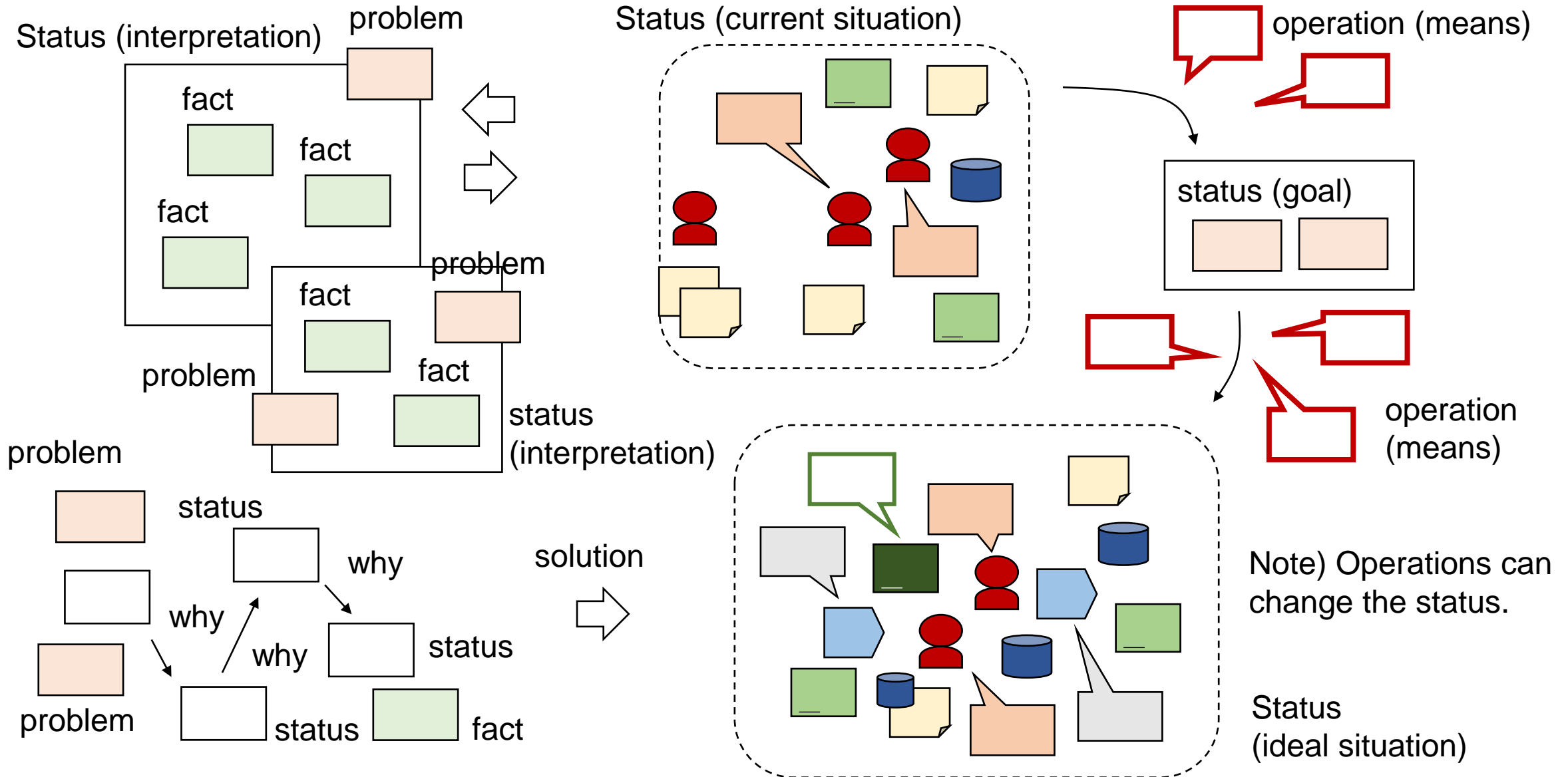


A unit that is organized from a cyber view is defined as a “component”.

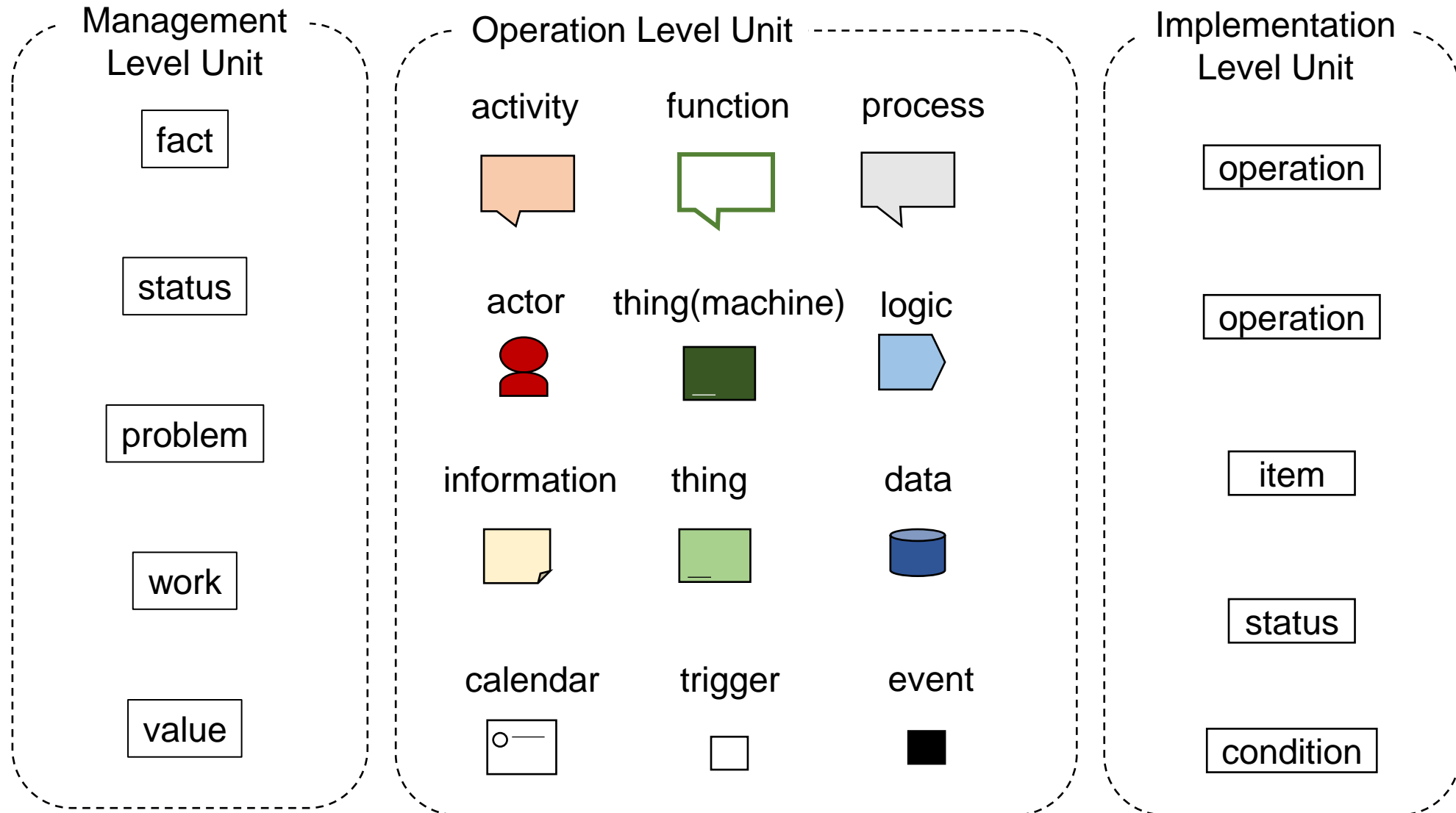
Note) An area can contain organizations and components.



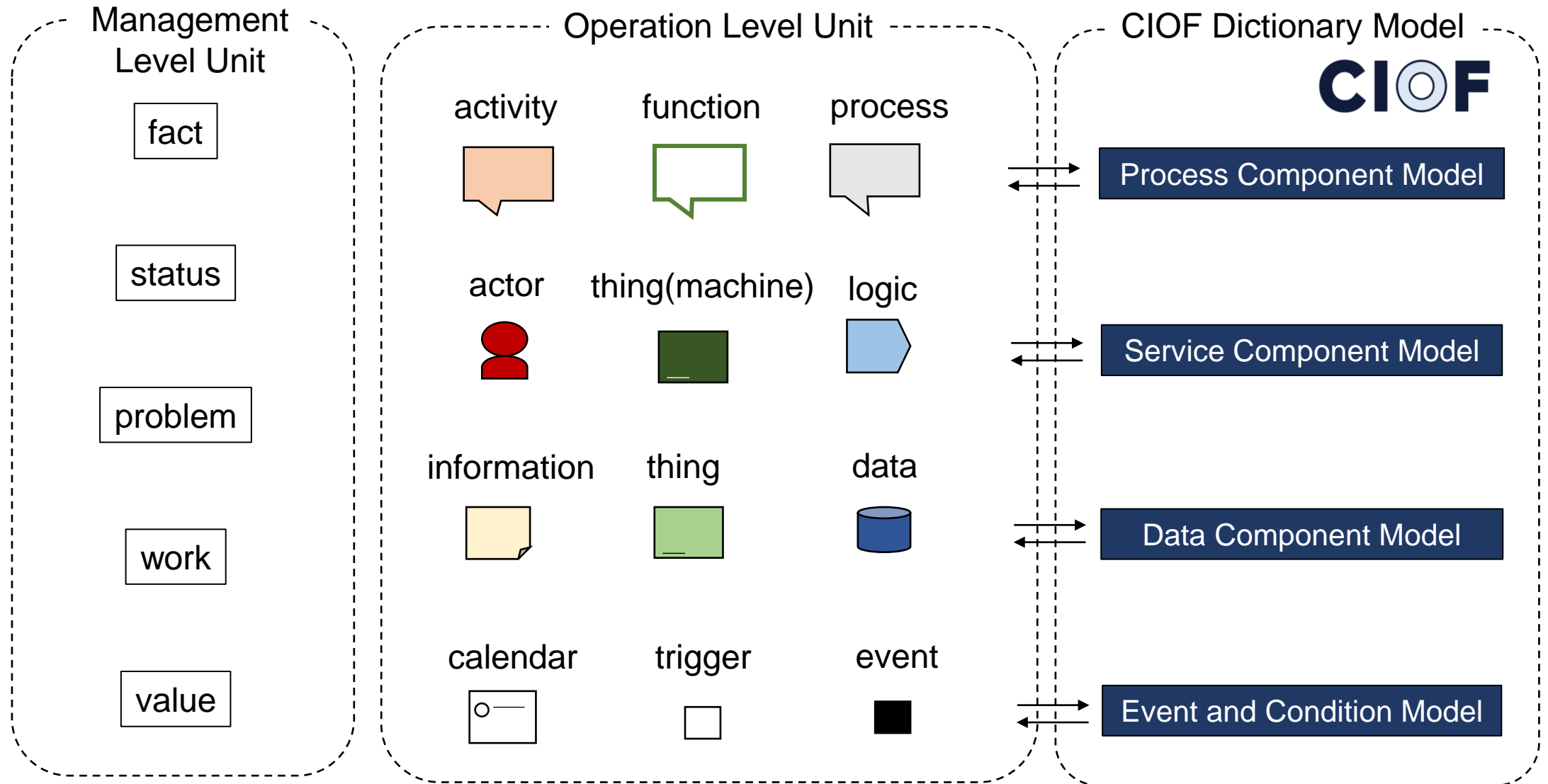
Relationship between Ontology and EROT



Ontology (Basic vocabulary which describes the target world)

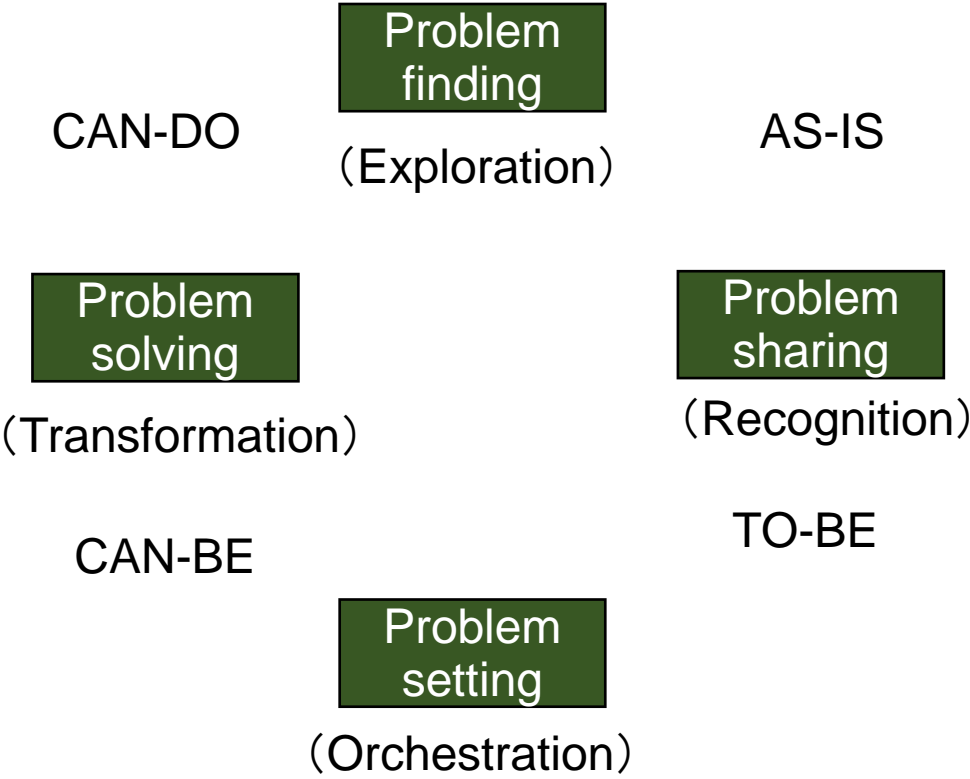


Ontology (Basic vocabulary which describes the target world)

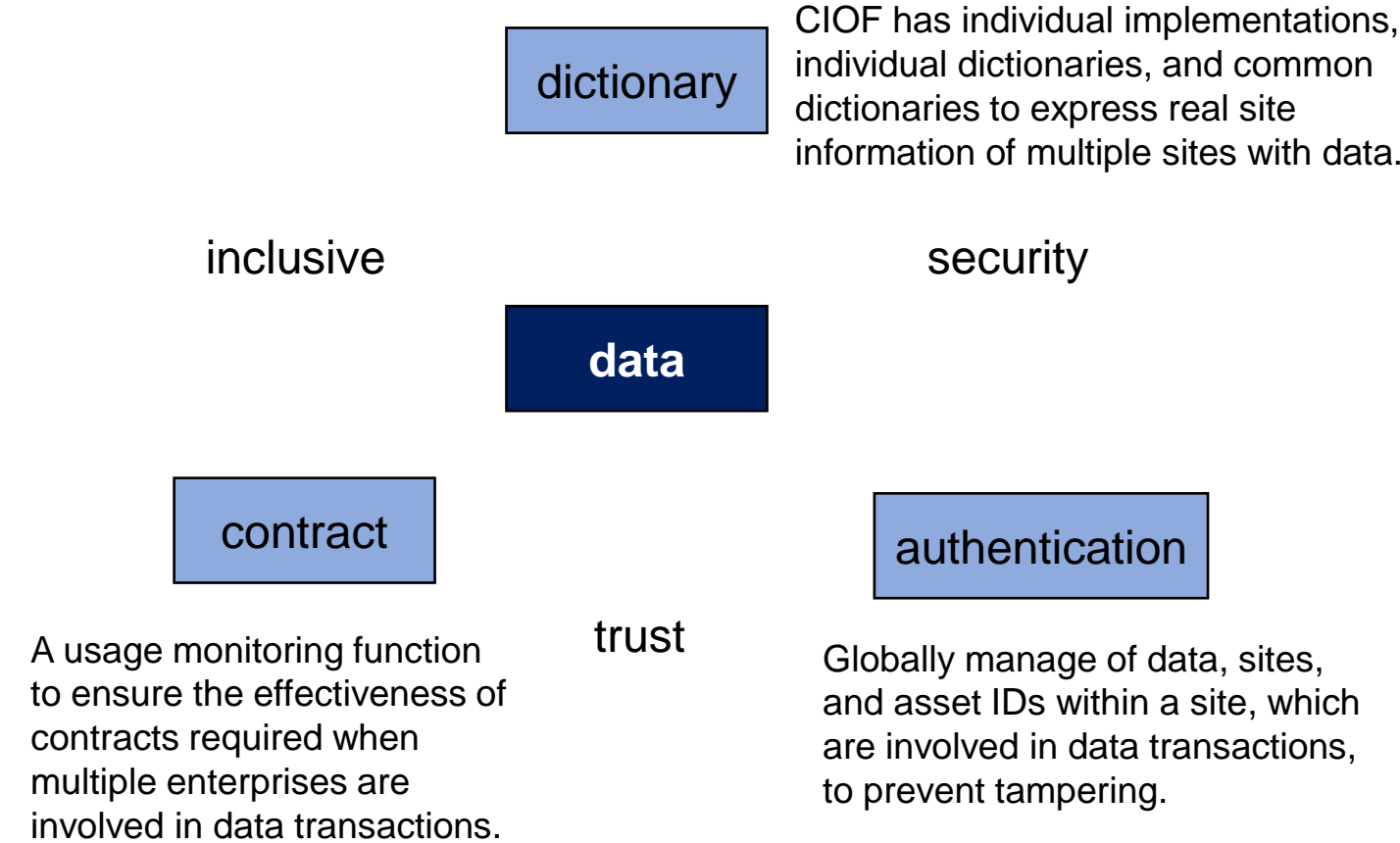




Smart Thinking (EROT)



Connected Industries Open Framework (CIOF)



1. IVI Technology System and CIOF
2. Explanation of CIOF Architecture
3. Use Cases and Operating Procedures
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6. How to participate in the project



- **Basic service**
 - Machine configuration settings, asset settings (implementation), user settings, authorization, ID issuance, etc.
- **Contract service**
 - Creating individual contracts and common contracts, communication with a partner, inquiry of contract information, management of history record, etc.
- **Transmission service**
 - Data transmission such as PUSH / PULL, Pub / Sub, and collect, history record, destination authentication, encryption, route setting, recovery, etc.
- **Dictionary service**
 - Registration of common dictionaries and external dictionaries, search function, recommendation function, public subscription, history (version) management, etc.





- Conversion service
 - Transmission data conversion, record conversion, parameter conversion, API setting, rule setting, test environment, etc.
- Search service
 - Account search, profile search, business matching, transaction history inquiry, corporate group setting, etc.
- Certificate service
 - Inquiry of data transmission history, inquiry of data usage record, issuance of certificate, validity guarantee function, tampering history management, etc.
- Authentication service
 - Global ID function, software authentication, hardware authentication, certificate authority management, etc. (not to be implemented)





- Data Trading
 - Data trading is the process of establishing and fulfilling data rights and obligations in advance for both data providers and data users when transmitting data between different terminals. A trading involves a series of actions, making a contract, transmission of actual data, fulfillment of rights and obligations and expiration of the contract. The target data here is called trading data.
- Trading Data
 - Trading data is individual data that is the target data of data trading. A hyper connection server, HCS, assigns a unique ID to it. The HCS ID and the trading data ID are globally unique. A hash is generated for trading data and by saving the hash instead of the trading data, it is possible to match the trading data. In addition, this hash is used for traceability of the trading data.





Overall Architecture



The trading data received from HCT is transmitted to another HCS or a subordinate HCT, which exists one or more on the Internet in order to actually send and receive trading data.

HDS manages common, individual and external dictionaries, and queries, registers, updates, and deletes them. In addition, it semi-automatic generates and recommends a common dictionary from individual dictionaries by name identification.

HCS manages dictionary registration and trading contract registration. Also, checks history and requests certificates and has a user interface for configuration.

Framework Management User

FCS (Framework Control Server)

History server

HCS (Hyper Connection Server)

HCM (Hyper Connection Manager)

HCT (Hyper Connection Terminal)

Controller

Service implementation

HDS (Hyper Dictionary Server)

Data Conversion Server

History server

HCS (Hyper Connection Server)

HCM (Hyper Connection Manager)

HCT (Hyper Connection Terminal)

Controller

Service implementation

There is only one FCS on the Internet. It controls multiple HCSs and history servers and manages their IDs and physical addresses.

A History server manages data trading contracts, records of actual trading data sent and received by the HCSs, and data usage records sent from HCTS as a distributed ledger.

For devices inside a firewall and contained in a specific area near the edge, HCT serves as a point of contact with the outside when sending and receiving data, and centrally manages security and traceability.

A data conversion server converts the values of common and individual dictionaries when HCT sends or receives trading data.










Logical hierarchy	Description
Connected World	This shows the entire server and physical world of the world. Various networks are self-propagatingly forming ecosystems without prior agreements here. This is a world consisting of such multiple ecosystems.
COIF World	The entire range to which CIOF services are applicable. It can be defined as a connected world in which CIOF is involved. This corresponds to the range managed by the FCS.
Domain	A unit in which various enterprises are united by one platform company or organization. This corresponds to the range managed by HCS. An enterprise always belongs to one domain.
Enterprise	A unit that independently handles data trading and corresponds to a company or business unit. The scope of control by an enterprise may extend to multiple factories. Therefore, an enterprise can have multiple sites.
Site	Site is a range in which machines cooperate with each other and is managed by one HCT. The movement of things and movement of data are managed in this unit. The inside of the site is protected from the outside by a firewall.
Edge	The world inside the edge where real-time performance is required. There are edge devices that correspond to hardware, service implementations and data implementations that correspond to software, and are managed by unique IDs.
Physical Asset	A collection of units that function individually as individual assets. Hardware and software are integrated and can be recognized as a visible object. It corresponds to the final connected object (thing) in IoT.





CIOF Hierarchy



Logical hierarchy	CIOF Assets	Hierarchy of Authority	ID Hierarchy
Connected World			Standard Global Code
COIF World	Framework Control Server	 Framework Administrator	Unique ID in CIOF World
Domain	Hyper Connection Server	 Domain Administrator	
Enterprise	Hyper Connection Manager	 Enterprise Administrator	Unique ID in the domain
Site	Hyper Connection Terminal	 Trading Administrator	
Edge	Edge Control Unit	 Implementation Administrator	Unique ID in the domain
Physical Asset			Service-specific ID





Standard Global Code

Theoretically, there is no unique ID in every world, but it is possible to determine ID uniquely by specifying a specific field or standard. CIOF allows you to connect to any external system by associating a unique ID in the CIOF world with an external global ID.

Unique ID in CIOF world

Since CIOF is a distributed system that connects platforms managed by different enterprises, common ID management is minimized because each platform functions autonomously. For example, there are domain IDs, enterprise IDs and site IDs.

Unique ID in a domain

Most of the data used by CIOF is managed by a common ID within a domain, that is, within a platform defined for each HCS. If an enterprise or site is transferred to another domain, different IDs will be needed to be issued.

Management ID in a controller

IDs that are local inside the edge can be independently issued and managed separately from the IDs managed by CIOF. An Edge Controller is responsible for the association between the CIOF-managed IDs and the unique internal IDs.

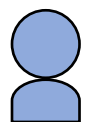
Service-specific ID

Various assets that are actually used in the field are set with unique IDs set by each manufacturer and service provider. These IDs can be used as they are as management IDs inside the controller.





Management Hierarchy



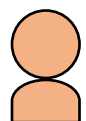
Framework Administrator

A Framework Administrator manages the entire CIOF world, adds new domains, registers, and manages enterprises and sites. He also manages the legitimacy of trading history, issues certificates, and manages security.



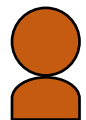
Domain Administrator

A Domain Administrator manages common dictionaries, accepts enterprise registrations, manages, and maintains HCS and charges and supports enterprises for each platform. He sets the authority such as IDs and passwords for enterprises.



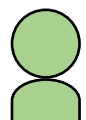
Enterprise Administrator

An enterprise Administrator sets sites under control (HCTs) as an administrator of an enterprise, sets users who can log in HCM, and sets authority of trading administrators, implementation administrators, and dictionary administrators.



Trading Administrator

A trading Administrator has authority to create contracts for data trading. He manages data distribution of data belonging to target sites in all other sites including his own enterprise.



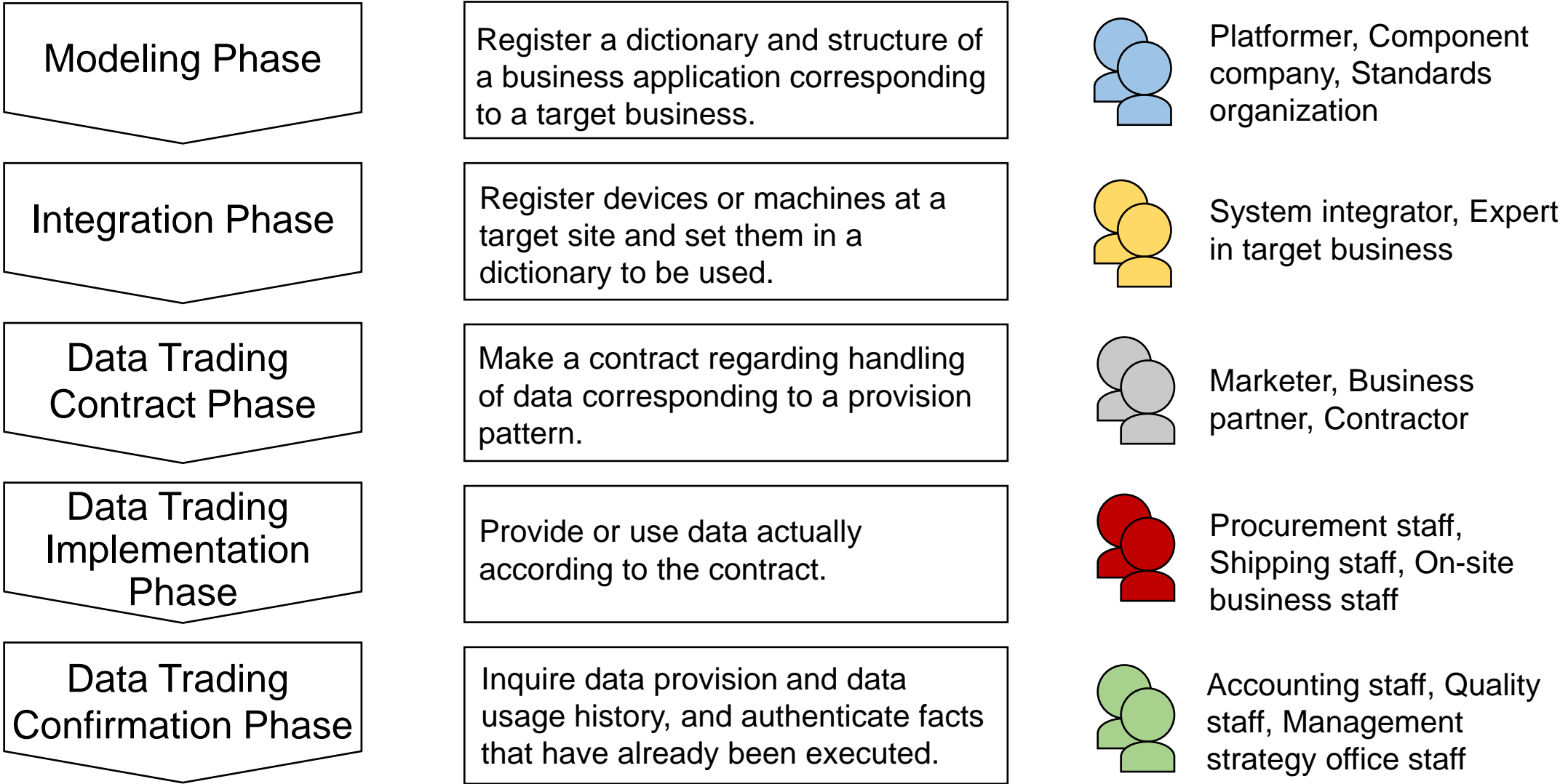
Implementation Administrator

An implementation Administrator manages data implementation and service implementation at individual sites. He also manages addition and deletion of edge controllers in a site, data implementation and service implementation handled in a controller, and correspondences to internal IDs valid in each controller.





Five Phases of Data Trading





Common dictionary

Platform company

- ✓ A common dictionary is used to associate data and service terms between different terminals. It is registered by a platform company or a standards organization.

External dictionary

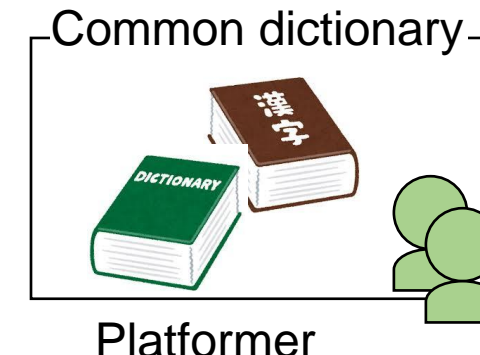
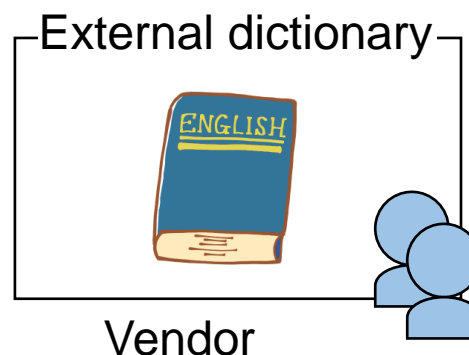
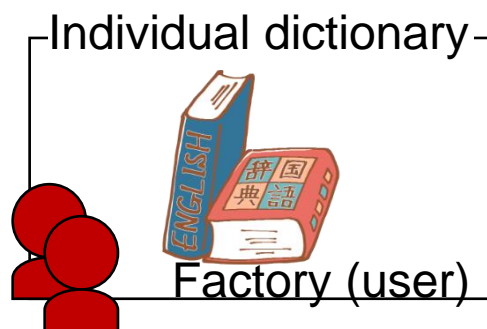
Component company

- ✓ An external dictionary is created by a provider of an application or device, and the contents are imported and used in an individual dictionary by an enterprise who trades data.

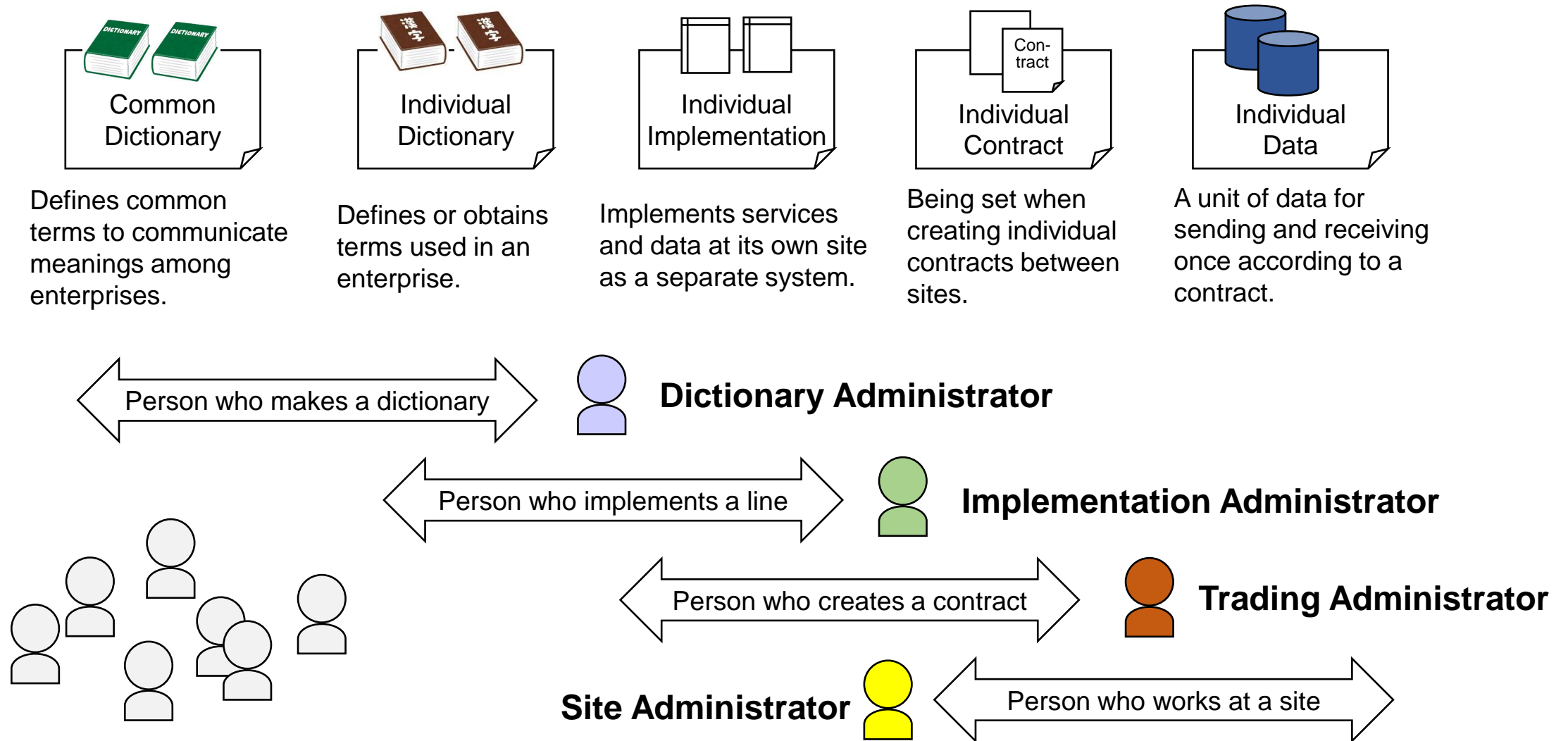
Individual dictionary

Companies connected by data

- ✓ An individual dictionary is defined using the contents of data and services that are implemented independently in each terminal. Data is traded with the contents.



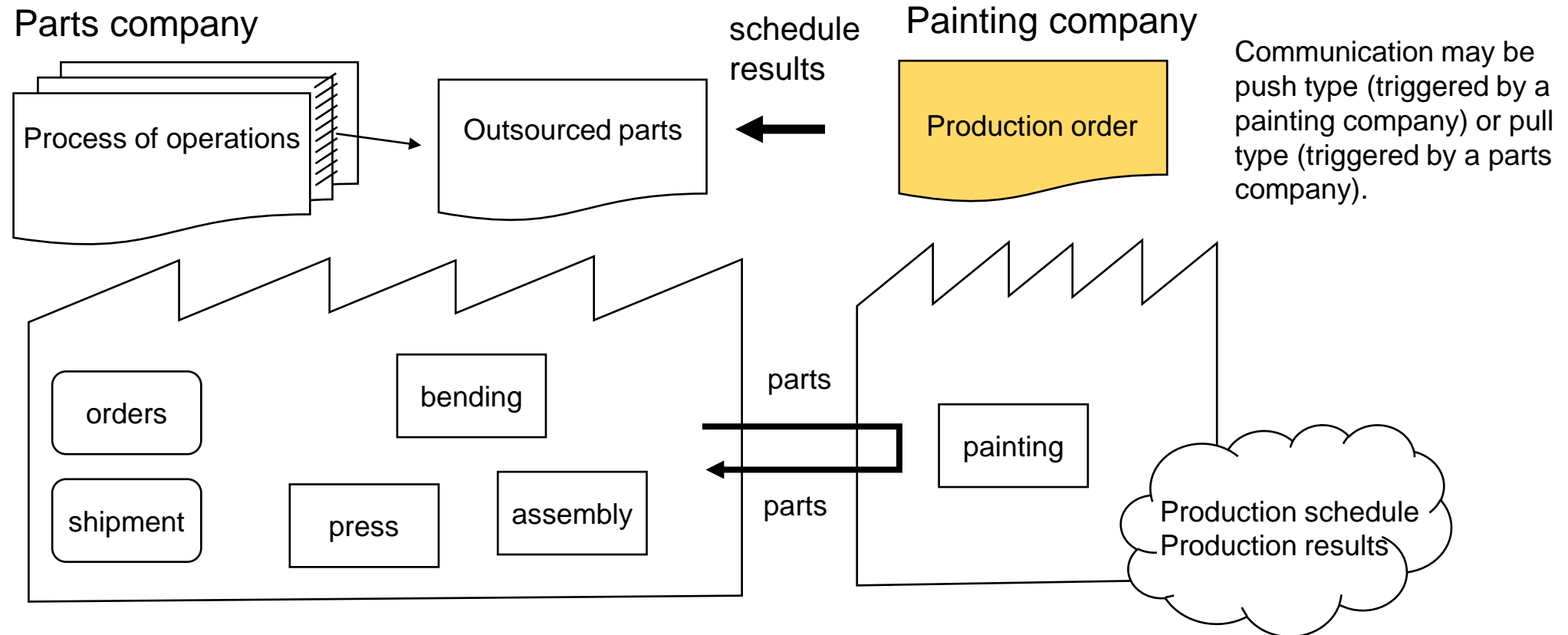
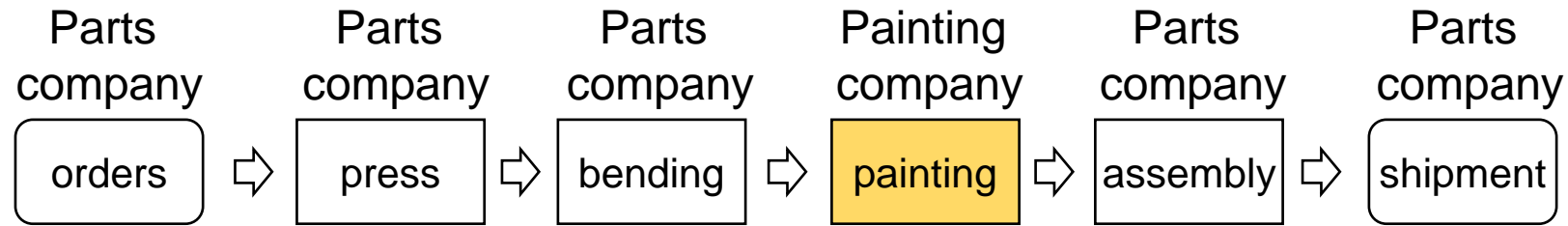
Relationship between Common Dictionary and Trading Data



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Use Case (1)

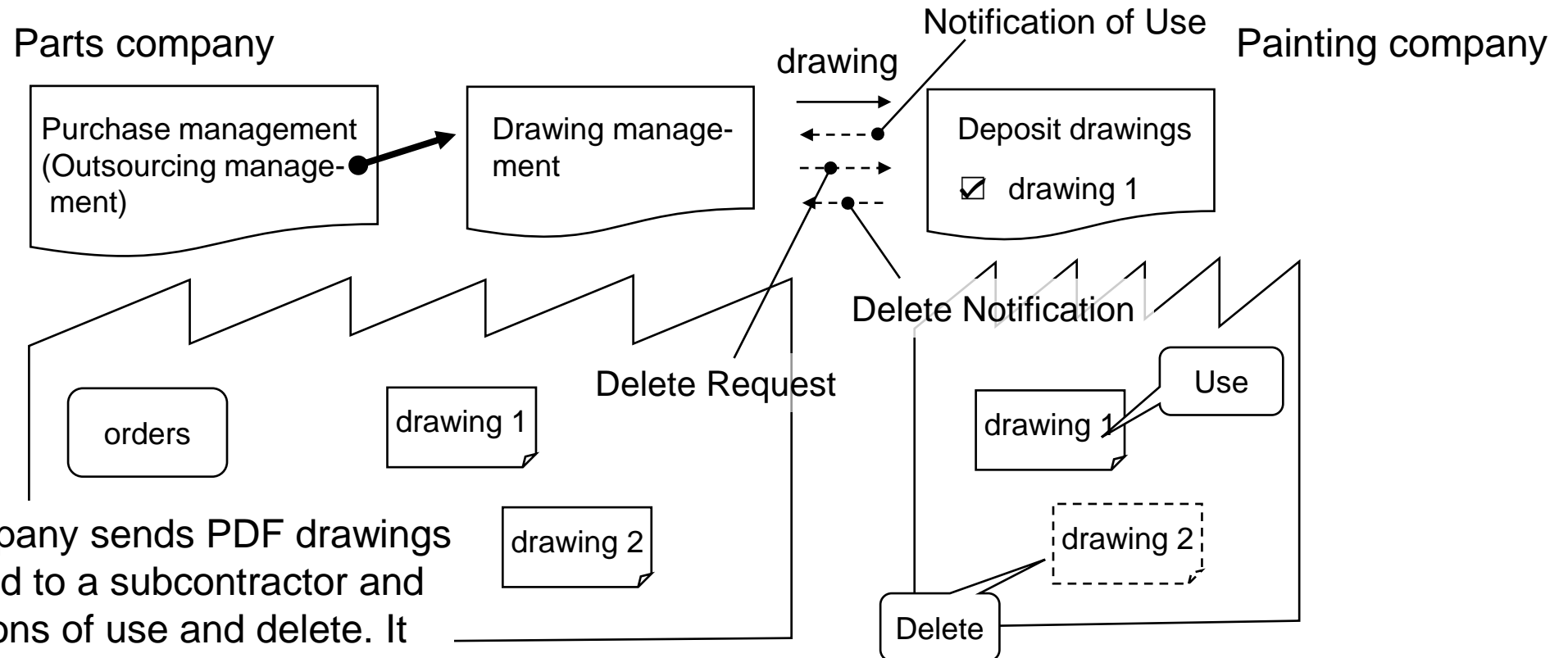
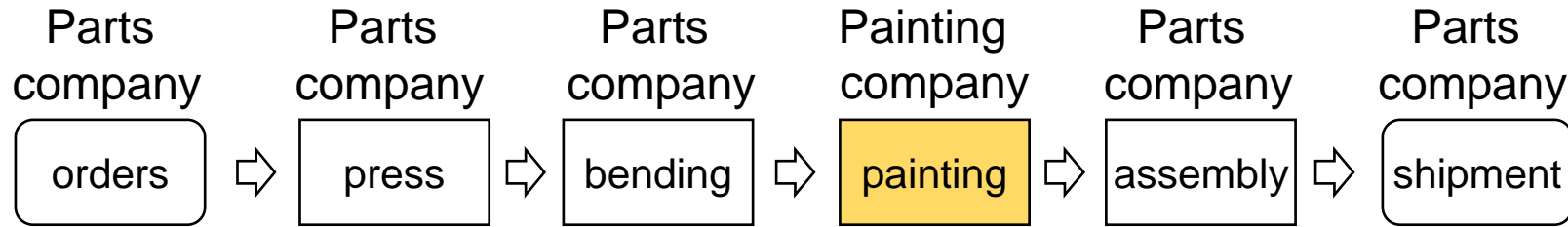


The start, schedule, and results of processes outsourced to a subcontractor are sent regularly to the ordering company.





Use Case (2)

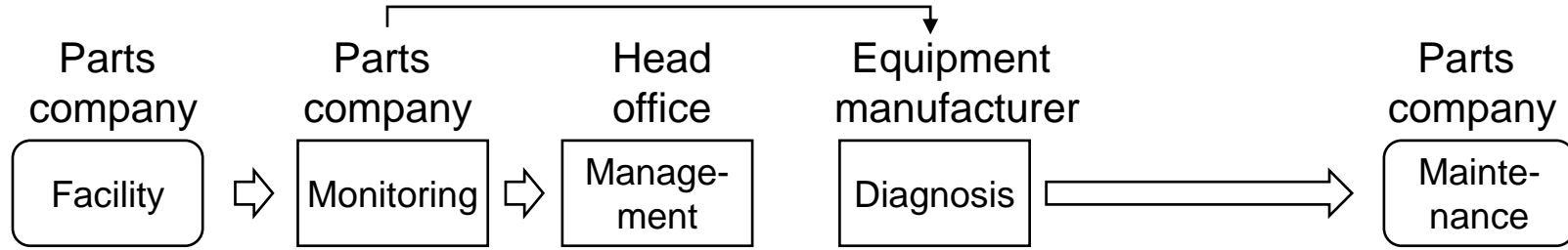


The ordering company sends PDF drawings of parts outsourced to a subcontractor and receives notifications of use and delete. It sends a delete request if necessary.

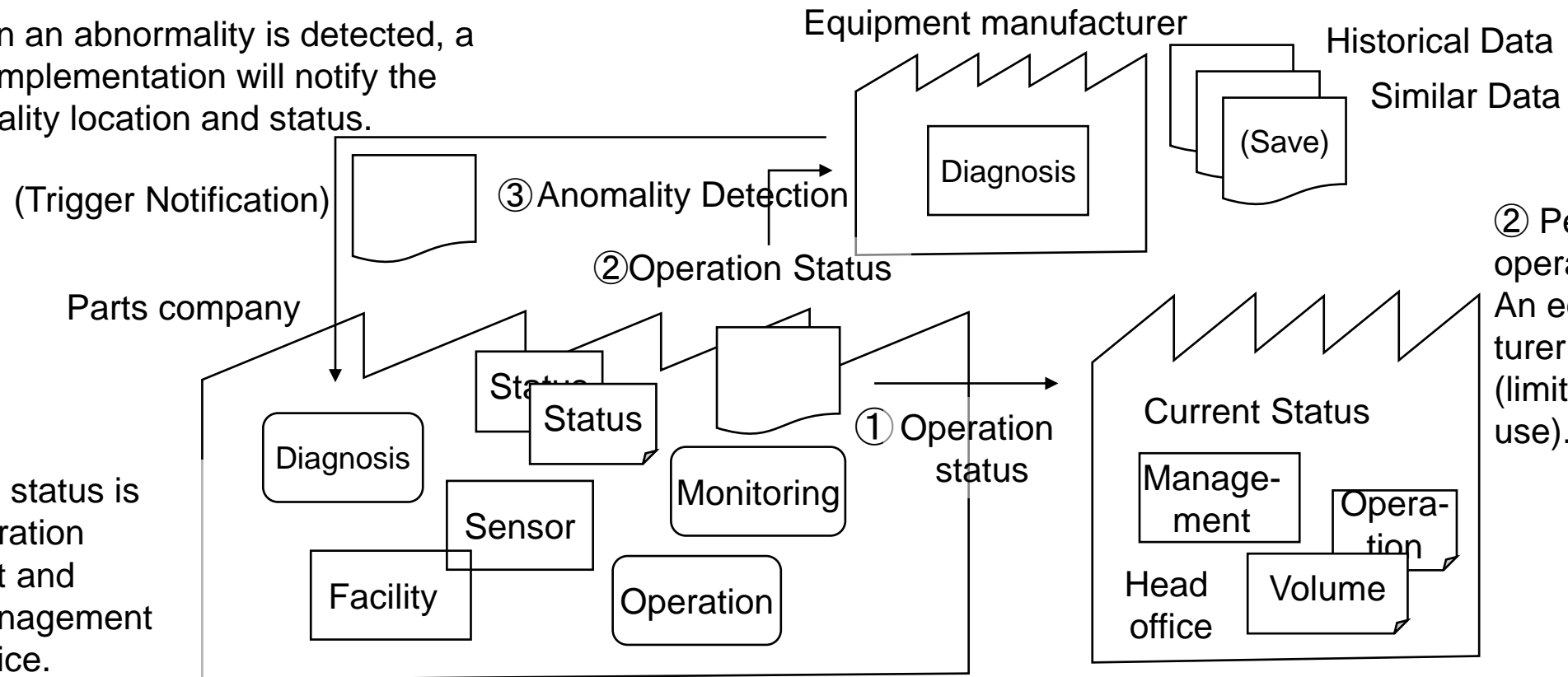




Use Case (3)



③ When an abnormality is detected, a trigger implementation will notify the abnormality location and status.



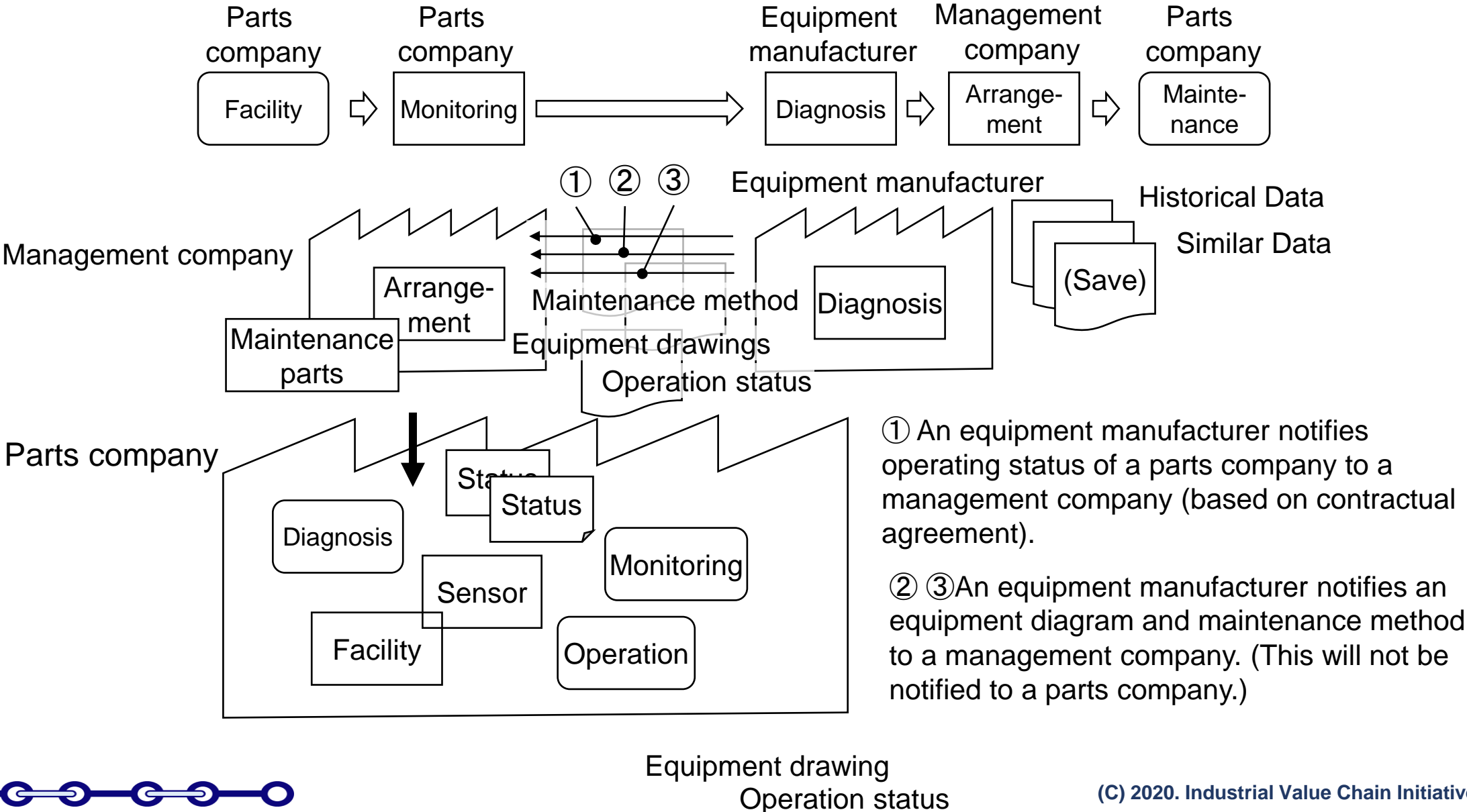
② Periodically provides operating status (PUSH). An equipment manufacturer can save the data (limited to diagnostic use).

① Operation status is used for operation management and progress management at a head office.





Use Case (4)



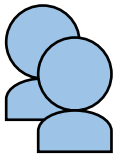


Five Phases of Data Trading



Modeling Phase

Register a dictionary and structure of a business application corresponding to a target business.



Platformer, Component company, Standards organization

Integration Phase

Register devices or machines at a target site and set them in a dictionary to be used.



System integrator, Expert in target business

Data Trading Contract Phase

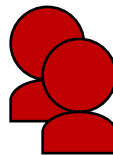
Make a contract regarding handling of data corresponding to a provision pattern.



Marketer, Business partner, Contractor

Data Trading Implementation Phase

Provide or use data actually according to the contract.



Procurement staff, Shipping staff, On-site business staff

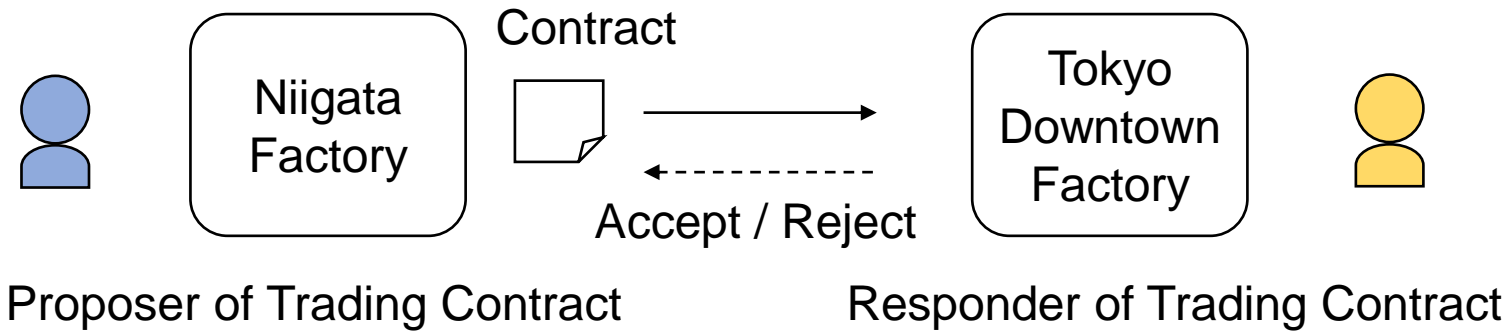
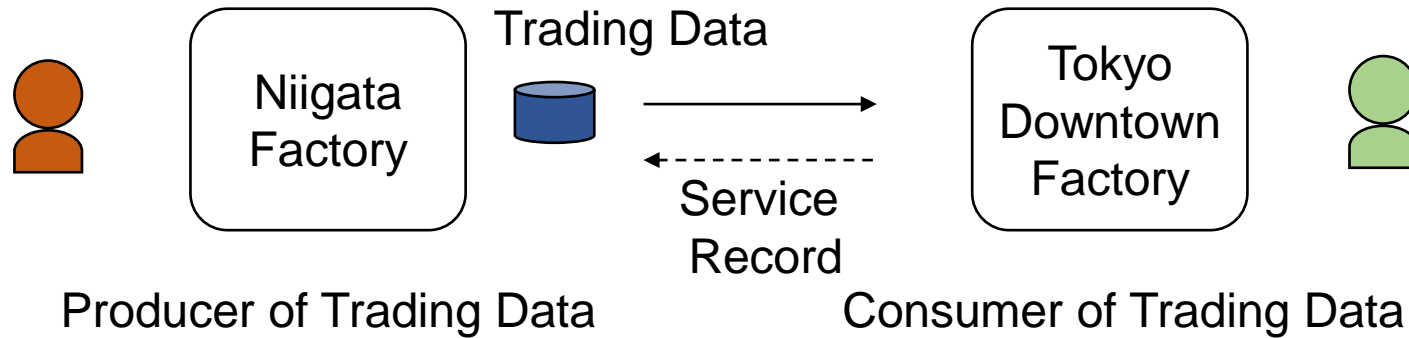
Data Trading Confirmation Phase

Inquire data provision and data usage history, and authenticate facts that have already been executed.

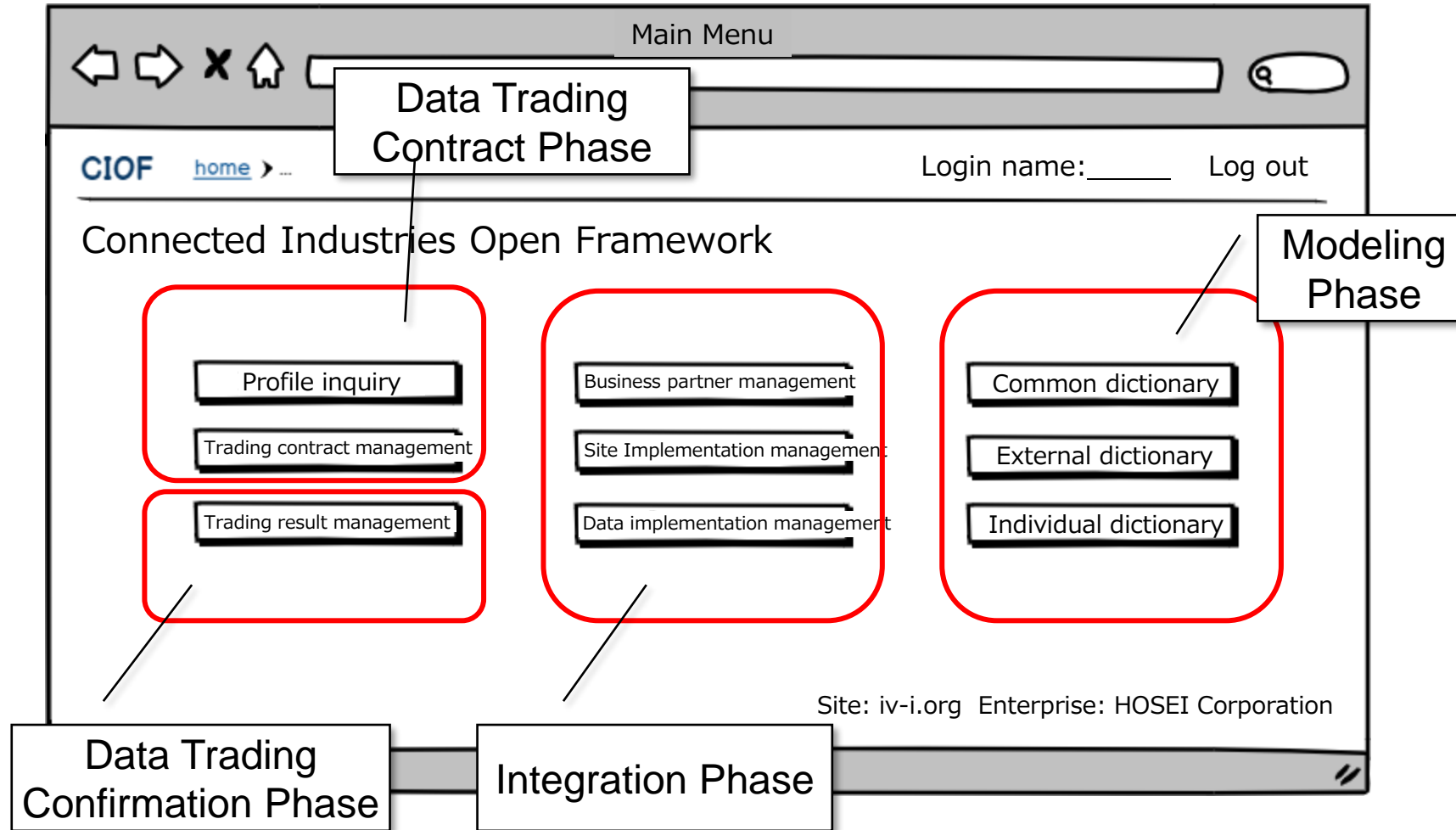


Accounting staff, Quality staff, Management strategy office staff





Proposer of a trading contract may be a provider or a consumer of the trading data.





Enterprise Profile Inquiry



04-01

Search for registered enterprise

CIOF Home > Profile inquiry

Enterprise inquiry

Enterprise ID: 1234567890

Enterprise Name: University of California

Enterprise Description: The west coast of the U.S., go

Enterprise Place: Tokyo

Enterprise English name: California University

Enterprise URL: http://hosei.ac.jp

Enterprise Description: Comprehensive

Enterprise Place: Tokyo

Contents of an enterprise are displayed.

04-02

Service profile

CIOF Home > Profile inquiry > Enterprise profile > Service profile

Enterprise: Hosei University

Enterprise English name: Hosei University

Enterprise Place: Tokyo

Enterprise Site name: Tokyo factory #1

Service Name: AI-based defect detection

Service Description: Defective products are inspected using image data of the processed surface

Service Dictionary: IVI common dictionary

Services that an enterprise has are displayed.

04-03

Data profile

CIOF Home > Profile inquiry > Enterprise profile > Data profile

Enterprise: Hosei university

Enterprise English name: Hosei University

Enterprise Place: Tokyo

Enterprise Site name: Tokyo factory #1

Data Name: Operating conditions Machine A

Data Description: Operating time, start, stop for one month

Data ID: UCHARHF5DFLU

Data Dictionary: IVI common dictionary

Data item profile

Item #	Name	Description	Data type	Main key	Required
01	Record ID	For data identification	Character	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
02	Sensor ID	For data identification	Character	<input type="checkbox"/>	<input checked="" type="checkbox"/>
03	Measured value	Measured value	Number	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Data held by an enterprise is displayed.





05-01

A list of contracts being created is displayed.

Trading contract management

Contracts in progress Recruited trading Trading in progress Communication history

☐ Proposal ☐ Response

Status	Category	Contract name	Data name	Enterprise	Date
Proposal	Proposal	Contract001	Current sensor abnormal	法政鉄鋼	2020/7/2
Recruiting	Proposal	Contract002	Environmental data for a day	法政鉄鋼	2020/7/2

05-02

Contract drafting flow

Trading contract management

Contracts in progress Recruited trading Trading in progress Communication history

☐ Provision ☐ Use

Status	Category	Contract name	Data name	Enterprise	Date
In progress	Proposal	Contract001	Current sensor abnormal	Hosei Steel	2020/7/2
In progress	Proposal	Contract002	Environmental data for a day	Hosei Steel	2020/7/2
In progress	Proposal	Contract001	Current sensor abnormal	Hosei Steel	2020/7/2
In progress	Proposal	Contract002	Environmental data for a day	Hosei Steel	2020/7/2
In progress	Proposal	Contract002	Environmental data for a day	Company A	2020/7/3
In progress	Proposal	Contract002	Environmental data for a day	Company B	2020/7/4

Contract drafting flow

Trading contract management

Contracts in progress Recruited trading Trading in progress Communication history

☐ End of trading

Use

Contract name	Data name	Date of recruiting	Status	Enterprise	Date
ct001	Current sensor abn.	2020/7/2	Apply	Hosei Steel	2020/7/2
ct002	Environmental data	2020/7/2	Apply	Company A	2020/7/3
ct001	Current sensor abn.	2020/7/2	Apply	Company B	2020/7/4
			Apply	Company C	2020/7/4

A list of communication history related to contracts

Contract drafting flow

Trading contract management

Contracts in progress Recruited trading Trading in progress Communication history

From [] To [] [Q search]

Site	Content	Trading name	Date
第一工場	Yes, if it is paid.	First trading	2020/7/11
研究室	Yes, as the contract is.	Sending abnormal value	2020/7/10

A list of ongoing trading is displayed.

Recruited contracts and its application list





Contents of a Trading Contract



05-04-03

Contract drafting flow

CIOF

home > Trading contract management > Trading contract reading

Trading contract edit

Contract name

First trading

ID

A9LXA3RL6ELQ4

Description

CIOF's memorable first trading

Date

2020/9/3

Business partner

University of Southern California

Site

North bldg.

Status

during application

Common dictionary

IVI Common dictionary: V12

Provider

Consumer

Proposer

Responder

Show all

Hide all

Detail

Data profile

Data

Machining temperature

Data

Sensor

Description

Temperature while machining

Description

All of sensor data

Item #	Name	Compliant	Implementation name	Description	Data type	Required
01	Record ID	01	ID	Unique key	Character	<input checked="" type="checkbox"/>
02	Sensor ID			For sensor identification	Character	<input checked="" type="checkbox"/>
03	Measured value	03	Sensor value	Measured value		

Service profile (Provide)

Service

Verification of sensor value

Description

Determine if the sensor value is normal

Category	Description	Process
Normal end	Abnormalities in the test	Test process
Repeat per day	Every 8:00	Callender

Service profile (Consume)

Service

Temperature monitoring

Description

Alarm when abnormal

Category	Description	Process	Contents of record	Record
Normal end	End of process A	Process A	Operating time(s)	<input checked="" type="checkbox"/>
Abnormal end	Process A abnormal			<input type="checkbox"/>

Contract Overview

Individual terms of the contract

Contract profile

Contract

Contract item	Contents of contract	Modification
Basic contract	Basic design document123-456.pdf	
Individual contract	ABC Corporation Individual trading contract.pdf	Correct
Confidential information rules	Provisions-20200202.pdf	Correct

Contract terms

Contract item	Contents of contract	Modification
Purpose of use	The data subject to this transaction shall be used for production control conducted by Paygate. It shall not be used for any other purpose.	
Consumer	The data subject to this transaction and the data obtained by processing the data subject to this transaction shall be used only by persons in the production control section of the relevant product division and shall not be used by any other person.	Correct

Individual terms

Contract item	Contents of contract	Modification
Period of use	Up to the delivery date of the finished product manufacturer (+ leeway)	
Storage location	Can be stored on a server owned by the production control department	Correct
Secondary use	NG	Correct
Third party offers	NG	Correct
Delete obligation	Yes (must be reported at the time of deletion)	
Period of use	10 years	Add

Message

I'm looking forward to working with you.

Cancel

Resend

Target trading data

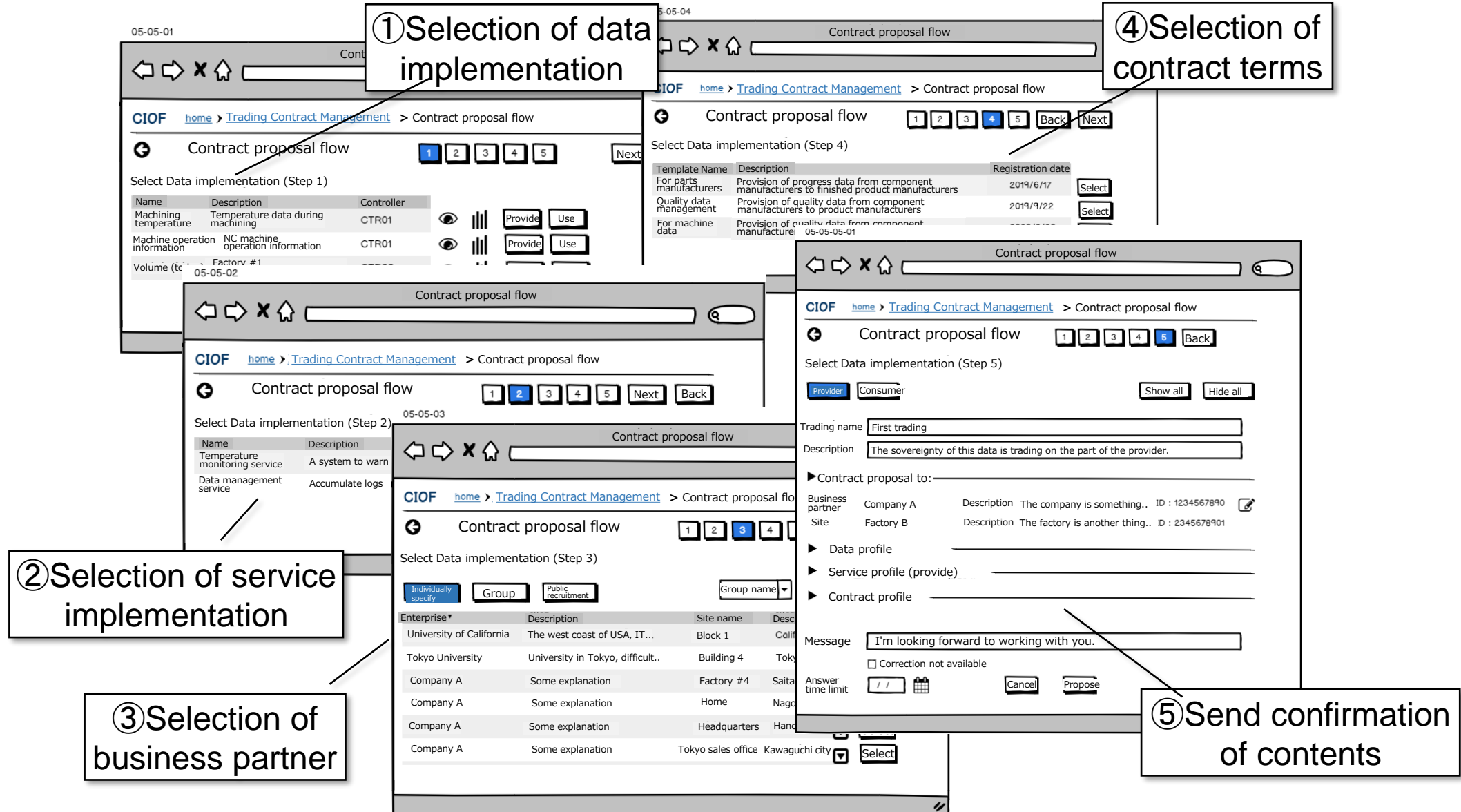
Service of the provider

Service of the consumer



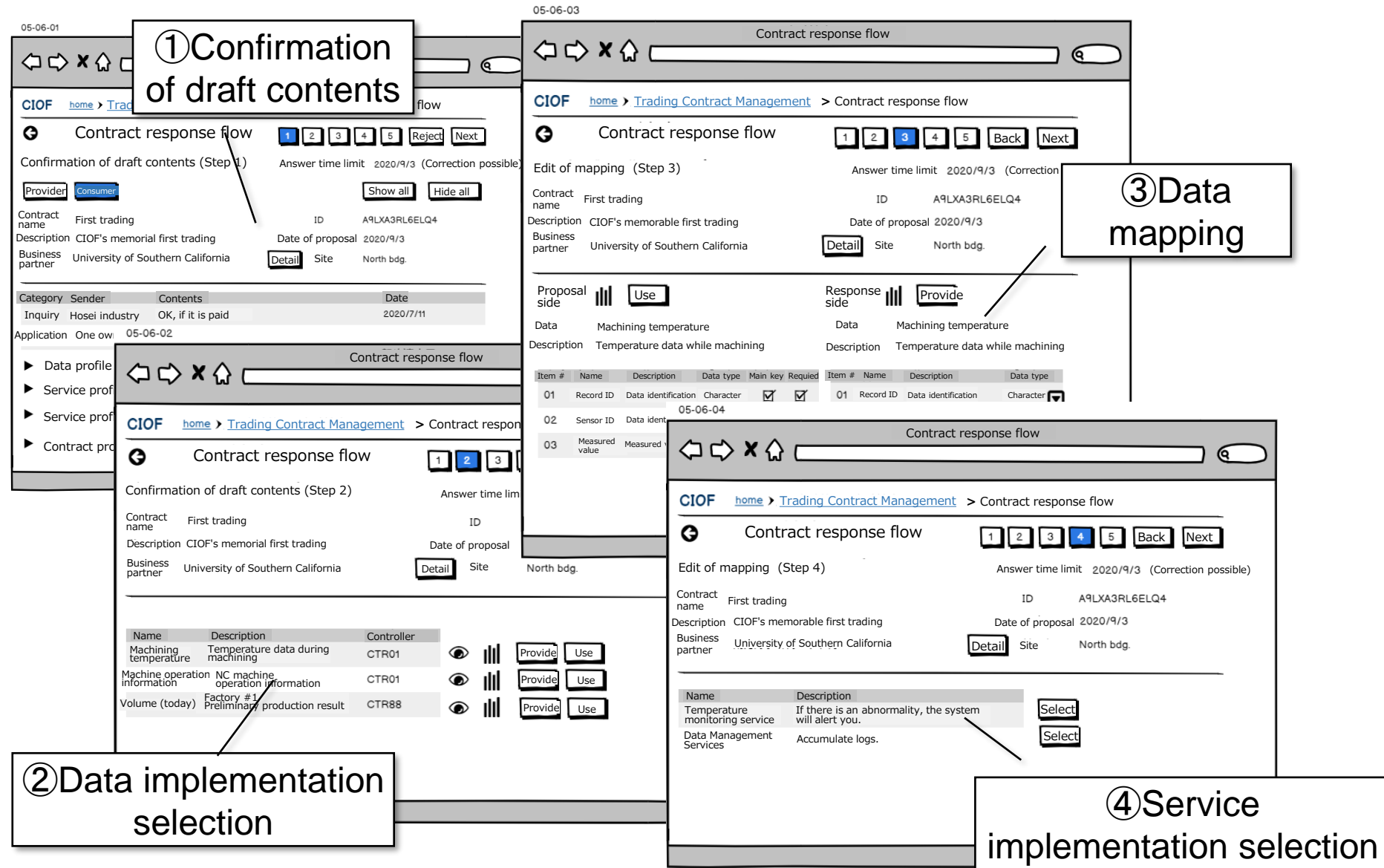


Trading Drafting Flow





Trading Application Flow



Service Usage Record (certificate)



06-01

Select a trading contract

Trading record management

List of trading contracts

List of data implementation

Provision Use Filter by date: From To

Status	Category	Contract name	Data name	Ent
In progress	06-04	Contract001	Current sensor abnormal	H

Contract drafting flow

06-04

Inquire data operation records

Contract drafting flow

Trading data usage record

Trading data ID GVHSNNQKUMG2

Data name Sensor data output information

Description Time series of data obtained from sensors

Provider Hosei university (Ichigaya number 1 factory)

Trading name First trading

Data operation records

Category	Date & time	Event
Generation	2020/6/12 14:55:13	Hosei
Send	2020/6/12 14:55:16	Hosei
Receive	2020/6/12 14:56:22	Hosei
Save	2020/6/12 14:56:25	Hosei

Service operation records

Issue certificate

Inquire a service execution record

Issue of service certificate (Unit of trading data)

Trading contract

Contract name Trading contract001

Send current sensor values on demand for specified devices

Business partner Hosei Steel

Contract issue date 2020/7/2

Contract ID JAD2G6

Data profile

Data name Current sensor

Common name Sensor results

For monitoring the operating status of equipment in Line 2

Data ID RPBFCCLNVHB3LNPNTMZJER

Trading data

Generating terminal -22

Generating controller

Generating service Sensor monitoring

Data generating date: 07/2 14:55:13

Trading data ID 4T3AE9LTSJZAZ5TL9

Generating # 2

of records 45

of bytes 241,000

Display and issue the certificate

Number	Service Impl.	Event Impl.	Actual results	Messages	Date of use
2	Sensor only.	Analysis result	Normal		2020/7/2 10:12:34
2	Sensor only.	Analysis result	Abnormal	The value in part 2 is abnormal.	2020/7/3 14:10:23

1. IVI Technology System and CIOF
2. Explanation of CIOF Architecture
3. Use Cases and Operating Procedures
4. Functional Requirements for Edge Controllers
5. Explanation by Sample Scenario
6. How to participate in the project

Level 0: Required

- Internet Connection Function
- Service Configuration Management Function
- Data Configuration Management Function
- Trading Contract Management Function
- Trading Data Send Function
- Trading Data Receive Function
- Request Send / Receive Function

Level 1

- Trading Data Delete Function
- Execution Log Management Function
- Implementation Status Management Function
- Service Record Management Function
- Event Monitoring Function
- Start Request Function
- Calendar Management Function
- Database Query Function
- Trading Data Tracing Function

Level 2





Edge Controller Function (checklist)



Edge controller name: _____

Development company name: _____

- | | |
|--|--|
| <input type="checkbox"/> Internet Connection Function | <input type="checkbox"/> Request Send / Receive Function |
| <input type="checkbox"/> Implementation Status Management Function | <input type="checkbox"/> Trading Data Delete Function |
| <input type="checkbox"/> Service Configuration Management Function | <input type="checkbox"/> Database Query Function |
| <input type="checkbox"/> Data Configuration Management Function | <input type="checkbox"/> Trading Data Trace Function |
| <input type="checkbox"/> Trading Contract Management Function | <input type="checkbox"/> Trigger Event Monitoring Function |
| <input type="checkbox"/> Service Record Management Function | <input type="checkbox"/> Calendar Management Function |
| <input type="checkbox"/> Trading Data Send Function | <input type="checkbox"/> Start Request Function |
| <input type="checkbox"/> Trading Data Receive Function | <input type="checkbox"/> Execution Log Management Function |





- Internet Connection Function

An edge controller uses HTTP for the communication protocol with HCT, and makes it possible to use the REST / API provided by HCT. As a security setting for communication, it supports basic authentication using ID and API key issued in advance by HCM.

- Execution Log Management Function

An edge Controller saves its own start and stop logs as local records. In addition, start and stop logs under the controller are recorded locally as service implementation. Also, event implementations and communication with HCT under the controller are recorded.



- Trading Contract Management Function

5. Acquisition of Transaction Contract

An edge controller acquires all the contents of trading contracts registered at that time from HCTs at the time of startup or required timing, in which the service implementations under the controller are involved. It associates the ID of each trading contract with the IDs of the corresponding service implementation, data implementation, process implementation, and event implementation.

- Service Configuration Management Function

1. Get Service Implementation

An edge controller identifies all the implemented software modules under it as service implementation based on the contents received from HCTs. For identification, internal IDs managed independently by an edge controller and service implementation IDs set by CIOF are associated with each other on one-to-one basis.

- Data Configuration Management Function

3. Get Data Implementation

Based on the contents of data implementation received from HCTs, an edge controller identifies all the implementation of the data configuration model provided or used by service implementation under the controller as data implementation. If database is located inside the edge controller, the internal ID corresponding to the table name in the database and the data implementation ID set by CIOF are associated with each other on one-to-one basis.



- Trading Data Receive Function

7. Recieve Trading Data

An edge controller immediately sends contents of trading data received from HCT to the service implementation specified in a trading contract. If there is no response from the service implementation, it retries for a certain period of time. If there is a normal response from the service implementation, reports it to HCT as a service record (send).

- Trading Data Send Function

8. Send Trading Data

When an edge controller receives data for CIOF from the service implementation, it configures the trading data using the contract information as a clue and immediately sends it to HCT. The trading data ID in the reply from HCT is associated with the internal ID of the sent trading data and managed.



- Request send / receive function

9. Get request parameter

10. Send request parameter

An edge controller immediately sends the contents of request parameter received from HCT to the service implementation specified in the trading contract. When a request parameter for CIOF is received from the service implementation, the trading parameter is configured using the contract information as a clue and immediately sent to HCT.



- Trading Data Delete Function

When an edge controller receives a data delete request for transaction data from HCT as a request parameter, it notifies the related service implementation of the request and reports the result when all deletions are completed.



- Implementation Status Management Function

2. Service Implementation Status Notification

4. Data Implementation Status Notification

An edge controller notifies HCT of status of service implementation, process implementation, event implementation, and data implementation under itself. If the content set in HCM is different from the actual implementation, the fact is notified to HCT.

- Service Record Management Function

11. Service record notification

An edge controller manages event information received from service implementation under itself in association with a trading contract. If the received event information corresponds to the trading contract being traded and there is an obligation to report a record, it is immediately sent as a service record (use) to HCT.





- Event Monitoring Function

An edge controller monitors executions of event implementation defined in a trading contract. If the event implementation is specified as a trigger implementation in another process implementation, it issues a start request for the process implementation.

- Start Request Function

When a start request for a process implementation is issued, an edge controller requests the corresponding service implementation to start the target process implementation and monitors whether it is actually executed.





- Calendar Management Function

6. Acquisition of Calendar

An edge controller acquires calendar information from HCT and generates process implementation and event implementation of service implementation which has calendar function. The service implementation which has calendar function activates an event implementation according to calendar information.



- Database Query Function

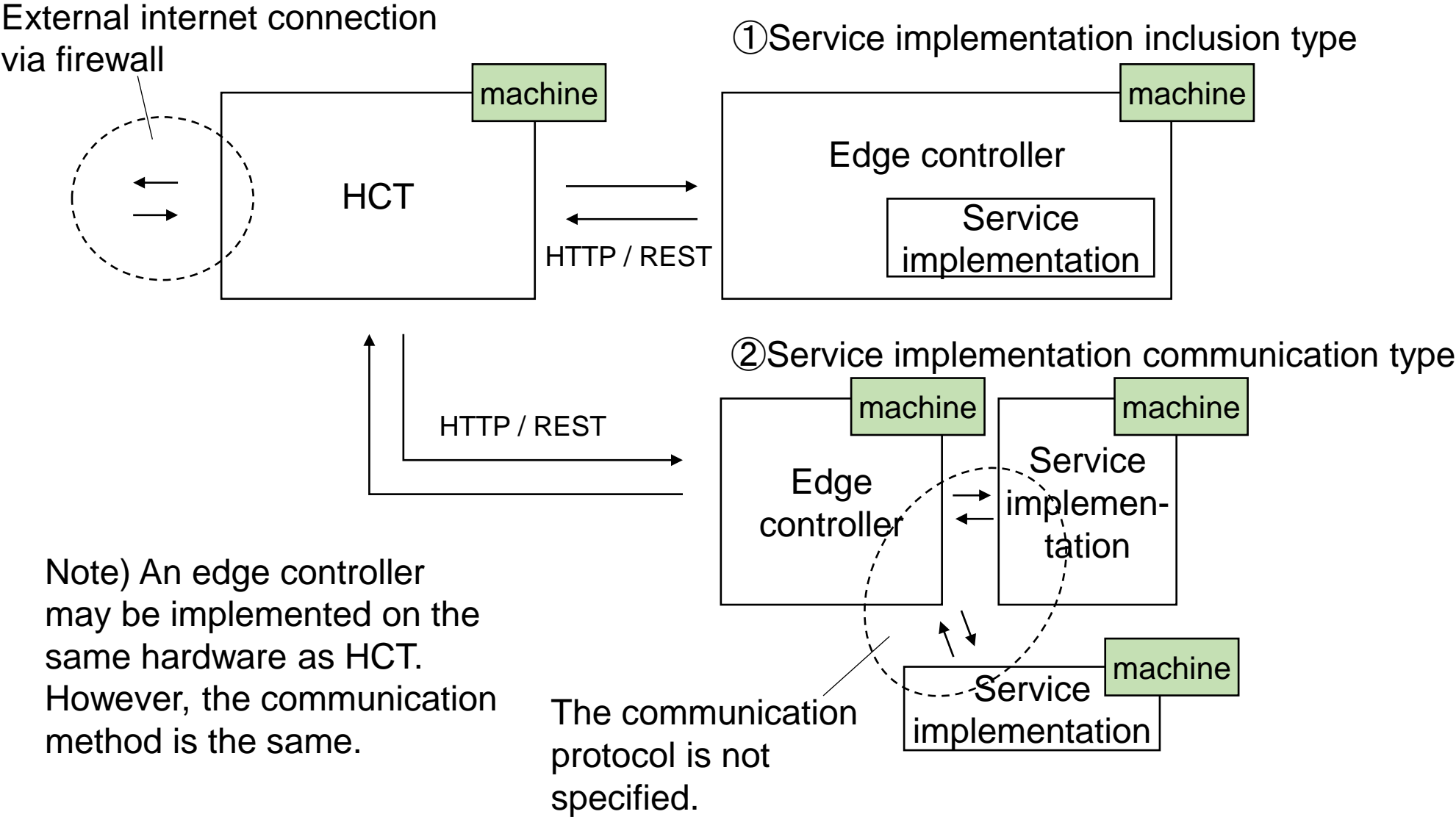
An edge controller requests service implementation which has database function to provide trading data corresponding to data implementation. If request parameter is specified, it limits the target record. Trading data ID received from HCT and record ID in a database are managed in association with each other in a database.

- Trading Data Tracing Function

When service implementation which has database function saves trading data, an edge controller notifies HCT as a service record (save). In addition, when the corresponding trading data is provided in another trading contract or used in an external service, it is notified to HCT as a service record (read).



External internet connection
via firewall





Organizing Terminology



The smallest unit of software that can be understood by a business operator. As one step in a business process, the results obtained there can be used in other businesses.

A unit which actually processes data as a function of software. Service implementation can be configured and related to data implementation and event implementation.

Data implementation which shows structures for holding data provided or used by process implementation on a record-by-record basis. It corresponds to implementation schema or DB table definition.

Edge controller

Service implementation

Process implementation

Process implementation

Event implementation

A unit for grasping service implementation by characteristic events which occur at their time. It is a component for defining process implementation and relates between process implementations.

Event implementation

Trigger implementation

Data implementation

A unit for showing the relationship when a process implementation is started by activating another event implementation.

Data implementation

Data implementation

Service implementation

Process implementation

Event implementation



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No	Description	HTTP	API name
1	Get Service Implementations	GET	service_implementations
2	Put Service Implementation Status	PUT	service_implementations
3	Get Data Implementations	GET	data_implementations
4	Put Data Implementation Status	PUT	data_implementations
5	Get Trading Contracts	GET	trade_contracts
6	Get Calendars	GET	calendars
7	Get Trading Data	GET	messages
8	Post Trading Data	POST	messages
9	Get Request Parameters	GET	requests
10	Post Request Parameters	POST	requests
11	Post Service Record	POST	service_record





Overview

API List

Service implementation

1.GET service implementation

2. POST Service Implementation Status

Data implementation

3.GET Data implementation

4.PUT Data implementation status

5.GET Trading contract

6.GET Calendar

Trading data

API Reference for Edge Controller Unit(Ver 2.10)

This document defines API specifications for edge controllers that can be used in HCT.

Revision History

Ver.	Date of change	Contents of change
1.00	2020/01/19	First edition release
1.01	2020/01/30	History management API change
1.02	2020/02/17	History management API change
2.00	2020/08/26	Major revisions due to new CIOF
2.10	2020/09/17	Changes for request parameters

GET /hct/api/v2/service_implementations

Requests example 1

Headers

Content-Type: application/json
Authorization: Bearer xxxxxxxxxxxxxx

Responses 200

Headers

Content-Type: application/json

Body

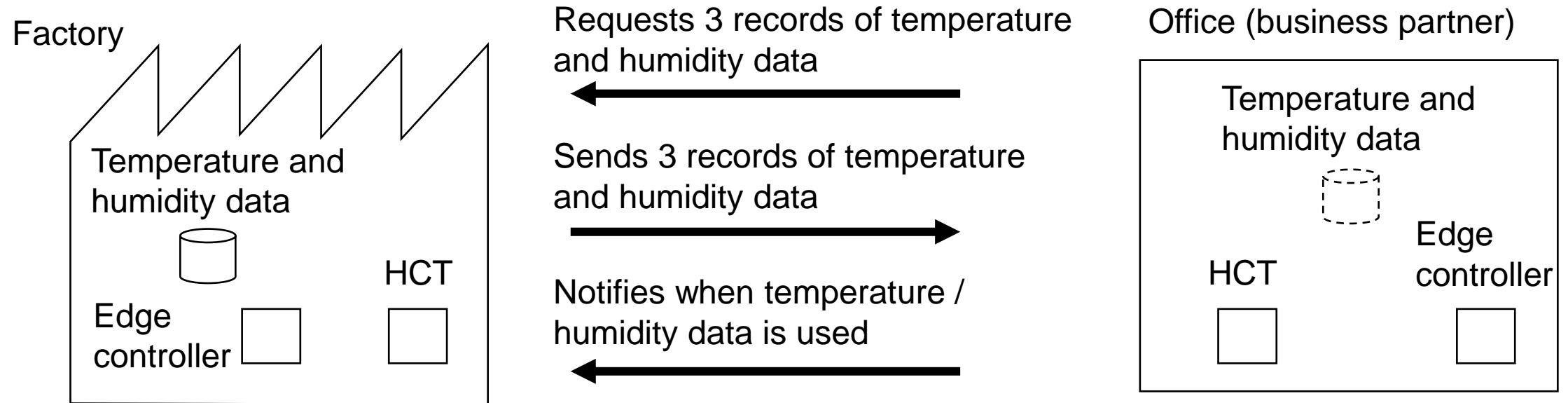
[
 {
 "id": "10501",
 "local_id": "x5VrQsPfiqrzc2J",
 "name": "環境情報取得サービス",
 "description": "環境データを取得する",
 "device_id": [
 "device001"
],
 "process_implementations": [
 {



The Story Sssumed by the Parameters of This Specification



1. Office side requests factory side (assuming this is another company because it is a business partner) 3 records of current temperature and humidity data.
2. The factory side sends the office side 3 records of temperature and humidity data.
3. When the office uses the received temperature and humidity data, it notifies it.

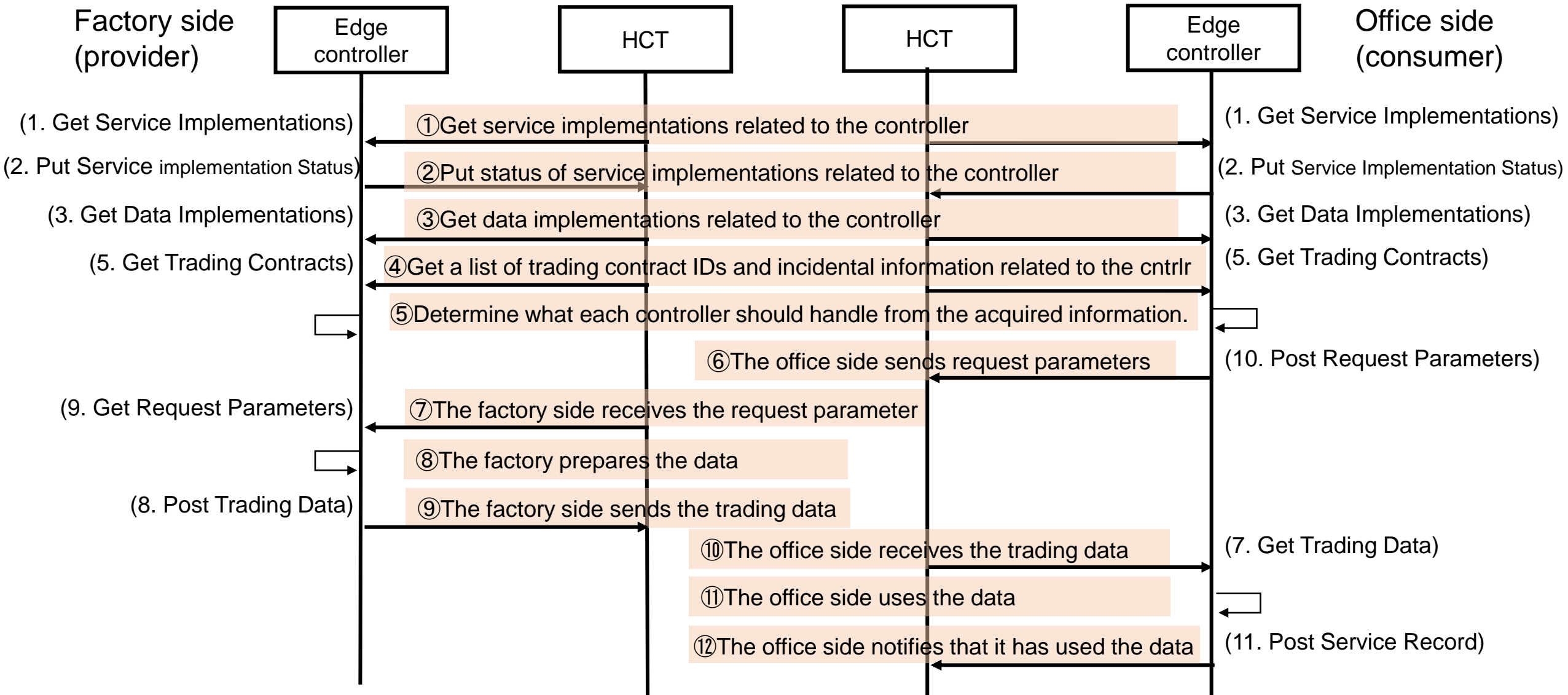


* Since the sample story is a pull type trading, the API, written in section 6. Calendar acquisition, is not used.





API Usage Procedure According to the Story

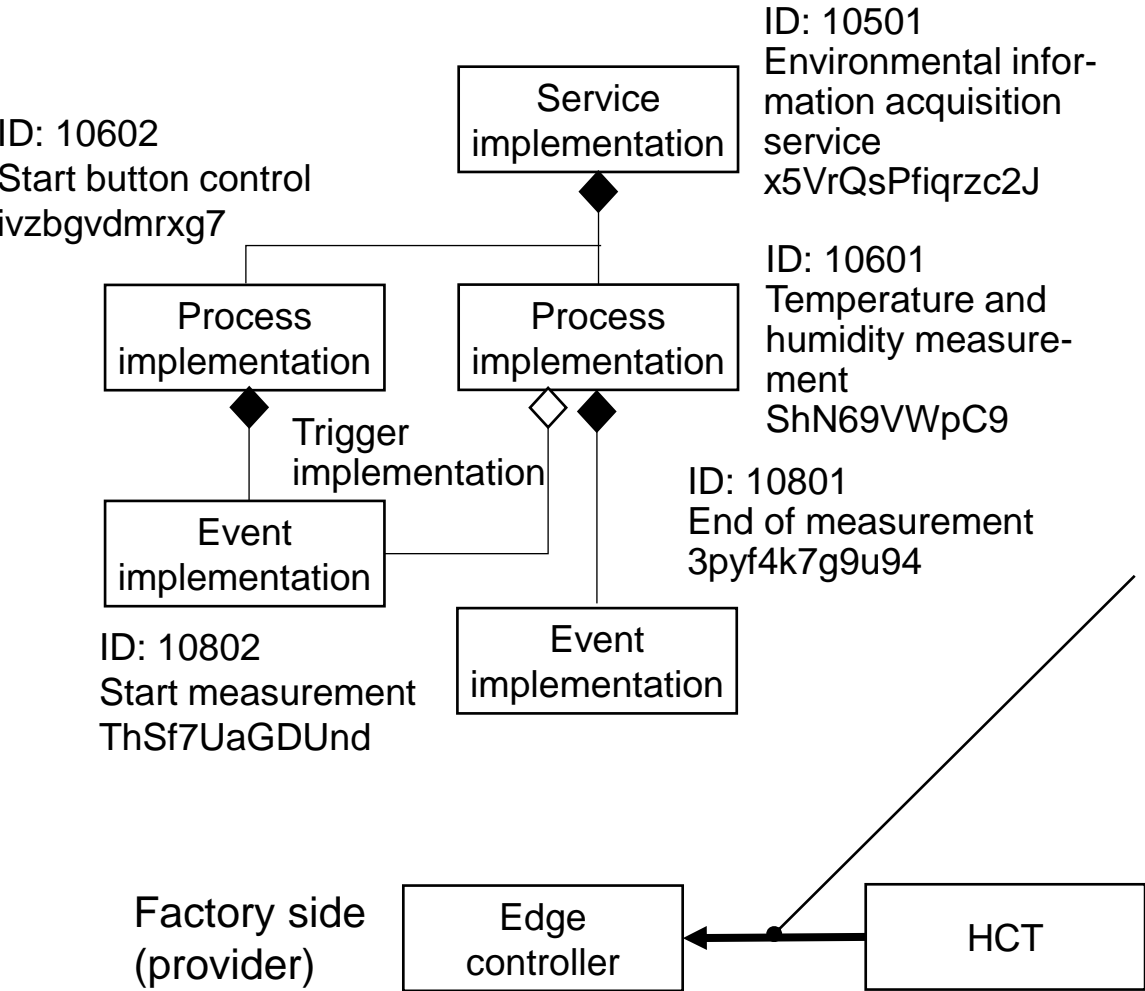




Step 1 (1. Get Service Implementations)



Get Service Implementations related to the controller



GET /hct/api/v2/service_implementations

```
[
{
  "id": "10501",
  "local_id": "x5VrQsPfiqrzc2J",
  "name": "Envrnmntl information acquisition service",
  "description": "Get environment data",
  "device_id": [
    "device001"
  ],
  "process_implementations": [
    {
      "id": "10601",
      "local_id": "ShN69VWpC9",
      "name": "Mesuremnt of temperature and humidity",
      "description": "Msr temperature and post the value",
      "process_operation_implementations": [
        {
          "id": "10701",
          "index": "1",
          "description": "Generate measurements",
          "data_implementation_id": "10901",
          "operation_type": "create"
        }
      ]
    }
  ]
},
]
```

```
"event_implementations": [
  {
    "id": "10801",
    "local_id": "3pyf4k7g9u94",
    "event_type": "monitor",
    "name": "Measurement end",
    "description": "Event which ends measurement"
  },
  {
    "id": "10802",
    "local_id": "ThSf7UaGDUnd",
    "event_type": "trigger",
    "name": "Measurement start",
    "description": "Event which starts measurement"
  }
]
]
```

The trigger implementation is set as event_type = "trigger".

It is shown that data (measured value) is generated by this process.



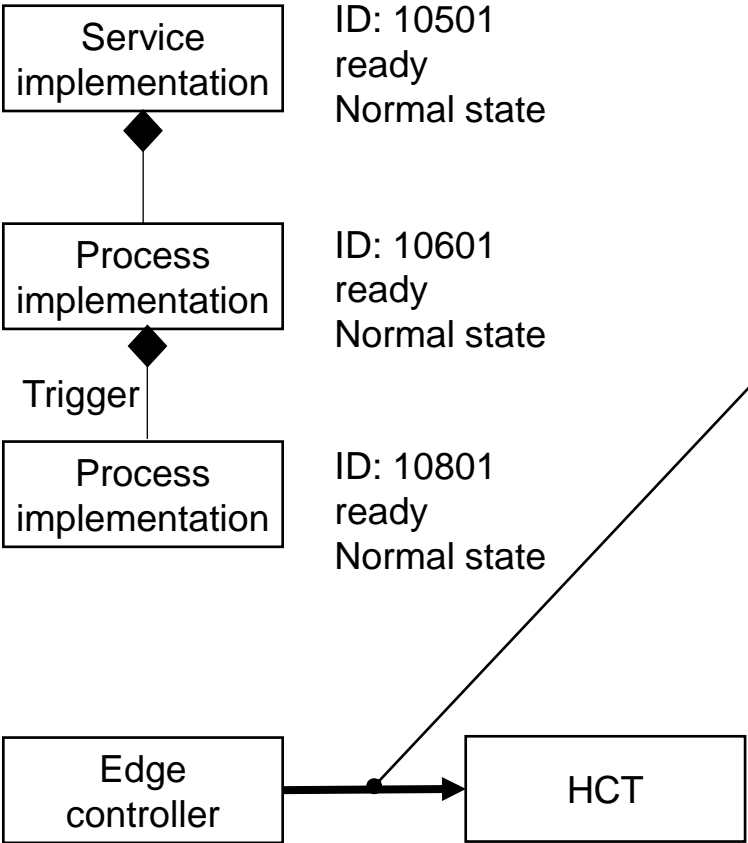


Step 2 (2. Put Service Implementation Status)



Put the Status of Service Implementation related to the controller

PUT /hct/api/v2/service_implementations



```
[
{
  "id": "10501",
  "local_id": "x5VrQsPfiqrzc2J",
  "status": "ready",
  "remarks": "Normal state",
  "process_implementations": [
    {
      "id": "10601",
      "local_id": "ShN69VWpC9",
      "status": "ready",
      "remarks": "Normal state",
      "event_implementations": [
        {
          "id": "10801",
          "local_id": "ThSf7UaGDUnd",
          "status": "ready",
          "remarks": "Normal state"
        }
      ]
    }
  ]
}
]
```

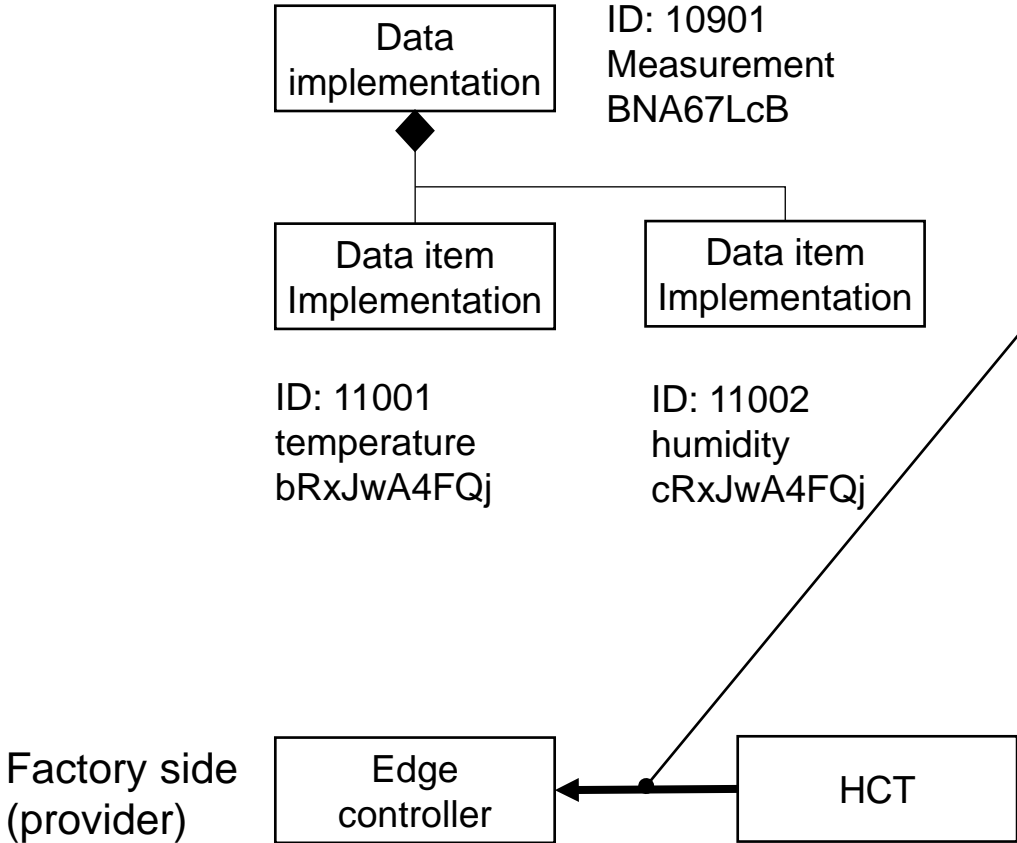




Step 3 (3. Get Data Implementations)



Get Data Implementations associated with the controller



GET /hct/api/v2/data_implementations

```
[
  {
    "id": "10901",
    "local_id": "BNA67LcB",
    "name": "Measured value",
    "description": "Show the measured value",
    "service_implementation_id": "10501",
    "data_property_implementations": [
      {
        "id": "11001",
        "index": "1",
        "local_id": "bRxJwA4FQj",
        "name": "temperature",
        "description": "Show the temperature value in Celsius",
        "data_type": "float",
        "is_primary_key": false,
        "is_required": true,
        "default_value": "null"
      },
      {
        "id": "11002",
        "index": "2",
        "local_id": "cRxJwA4FQj",
        "name": "humidity",
        "description": "Show humidity value in relative humidity",
        "data_type": "float",
        "is_primary_key": false,
        "is_required": true,
        "default_value": "null"
      }
    ]
  }
]
```



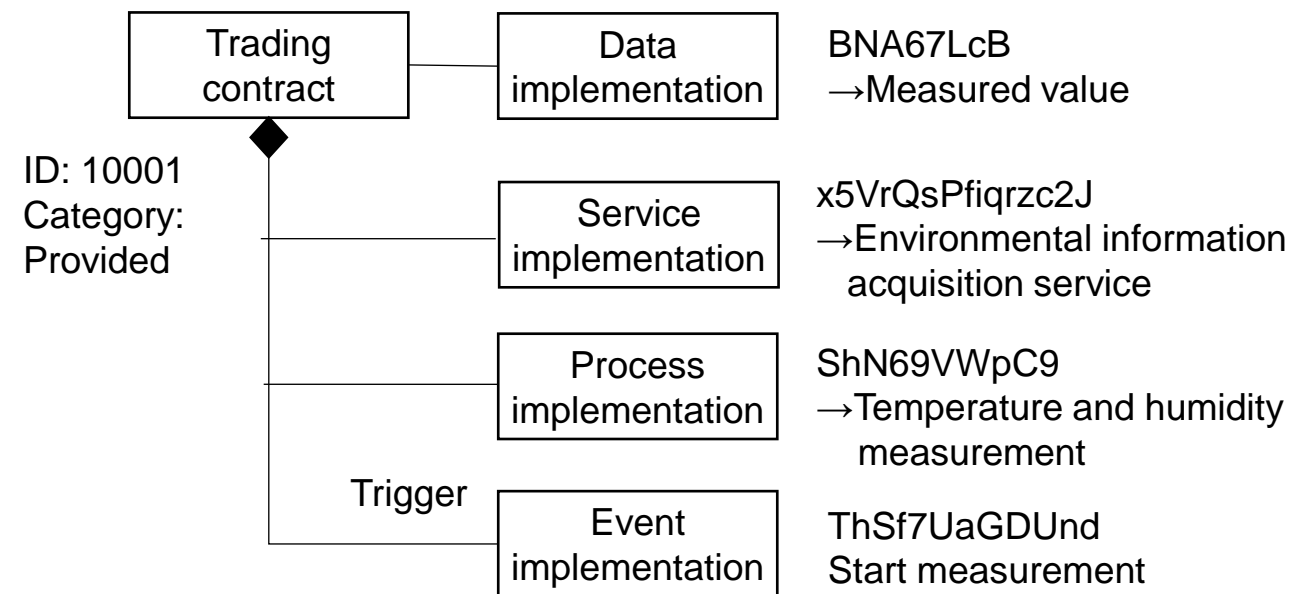
Step 4 (5. Get Trading Contracts)



Get a list of Trading Contract IDs and incidental information related to the controller

GET /hct/api/v2/trade_contracts

```
[
  {
    "id": "10001",
    "contract_type": "produce",
    "data_implementation_local_id": "BNA67LcB",
    "service_implementation_local_id": "x5VrQsPfiqrzc2J",
    "process_implementation_local_id": "ShN69VWpC9",
    "event_implementation_local_id": [
      "ThSf7UaGDUnd"
    ],
    "start_datetime": "2019-06-12T09:10:06.922Z",
    "end_datetime": "2021-06-12T09:10:06.922Z"
  }
]
```

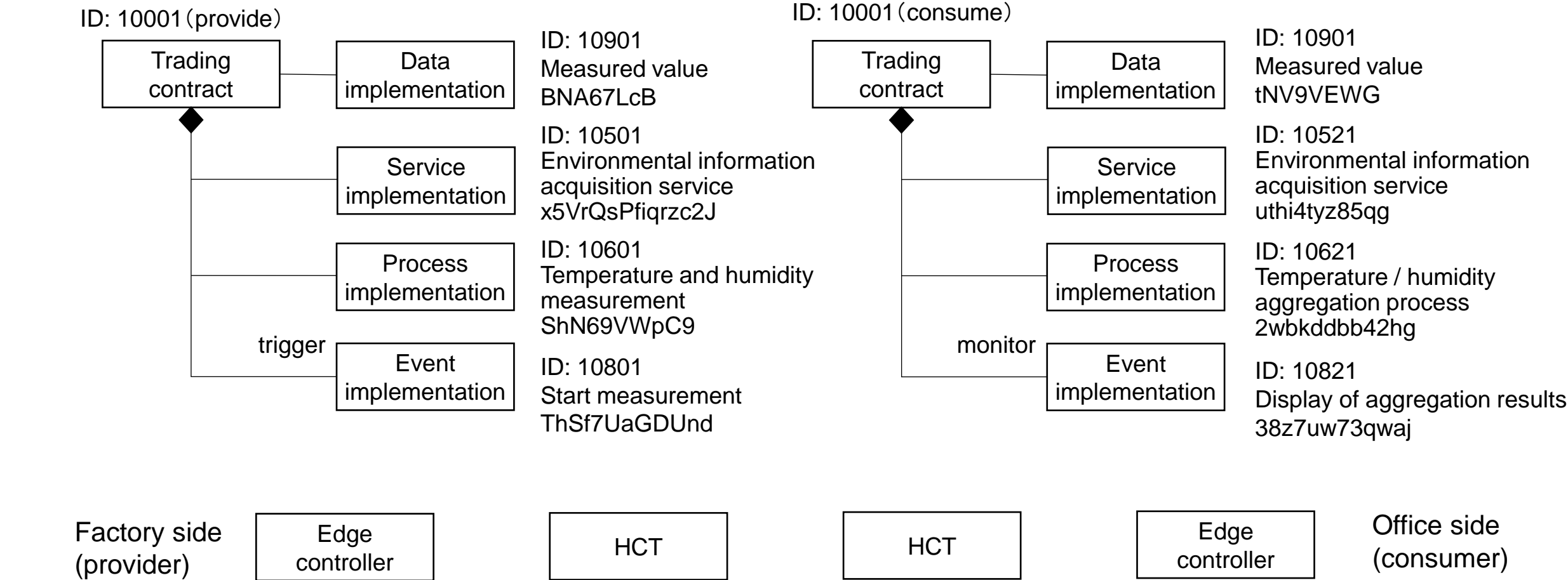




Step 5



Determine what each controller should handle from the acquired information.



Step 6 (10. Send Request Parameters)



Office side sends request parameters

Set the part "Give me the latest 3 records" as a string that the service implementation can understand. For example, set the character string according to where clause of SQL.

Trading contract

Contract ID: 10001
Parameter ID: 20001
Request Category: Generate

POST /hct/api/v2/requests

```
{
  "contract_id": "10001",
  "request_type": "create",
  "created_at": "2016-06-12T09:10:06.922Z",
  "response_limit": "2019-06-12T09:10:06.922Z",
  "condition": "Give me the latest 3 records"
}
```

```
{
  "contract_id": "10001",
  "request_type": "create",
  "created_at": "2016-06-12T09:10:06.922Z",
  "response_limit": "2019-06-12T09:10:06.922Z",
  "condition": "Give me the latest 3 records",
  "request_parameter_id": "20001"
}
```

Factory side
(provider)

Edge
controller

HCT

HCT

Edge
controller

Office side
(consumer)



Step 7 (9. Get Request Parameters)



The factory side receives the request parameters

GET /hct/api/v2/requests

```
[
  {
    "contract_id": "10001",
    "request_type": "create",
    "created_at": "2016-06-12T09:10:06.922Z",
    "response_limit": "2019-06-12T09:10:06.922Z",
    "condition": "Give me the latest 3 records",
    "request_parameter_id": "20001"
  }
]
```

Trading contract

Contract ID: 10001
Parameter ID: 20001
Request Category: Generate

Factory side
(provider)

Edge controller

HCT

HCT

Edge controller

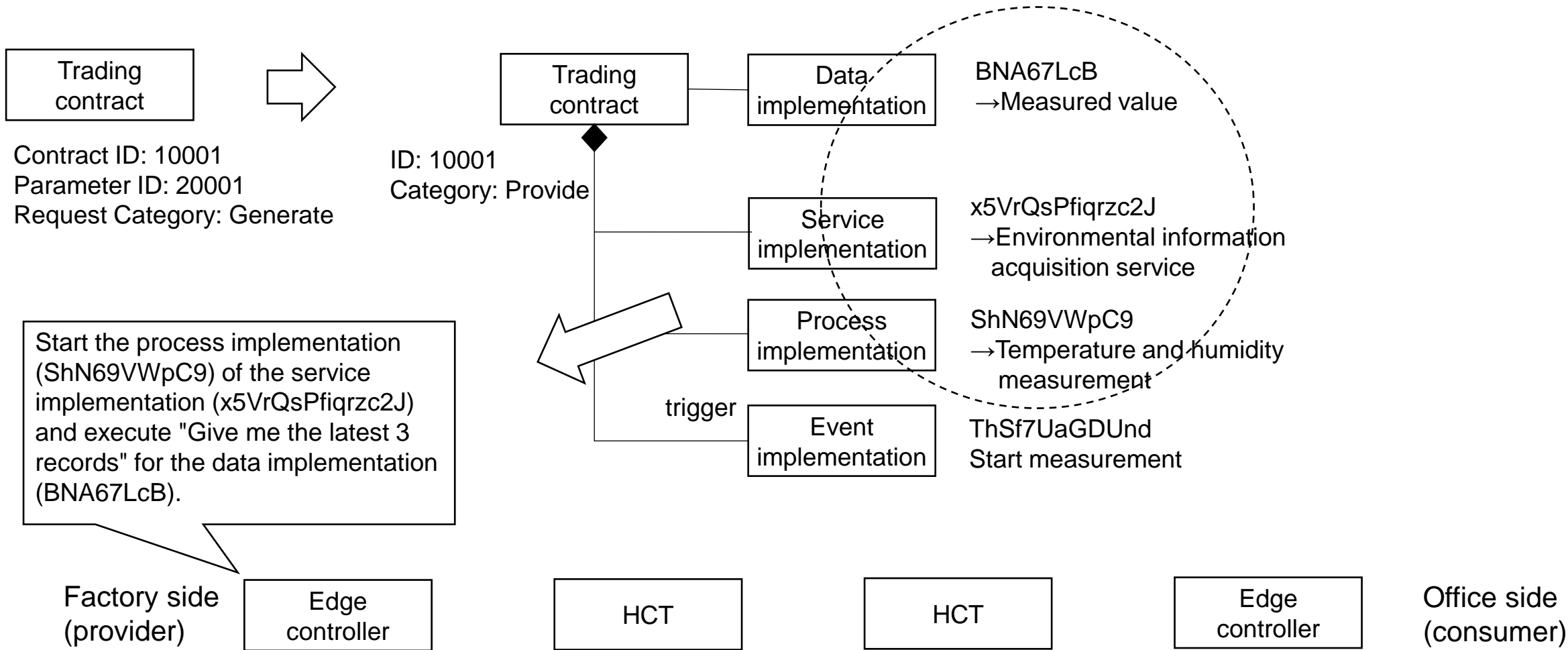
Office side
(consumer)



Step 8



The factory side prepares the data



Step 9 (8. Send Trading Data)



Factory side sends trading data

POST /hct/api/v2/messages

```
{
  "request_parameter_id": "20001",
  "trade_contract_id": "10001",
  "contents": [
    [
      "25",
      "85"
    ],
    [
      "27",
      "80"
    ],
    [
      "21",
      "76"
    ]
  ]
}
```

```
{
  "id": "12345678"
}
```

Trading data ID: 12345678
Request parameter ID: 20001
Trading contract ID:10001

ID	Attribute 1	Attribute 2
1	25	85
2	27	80
3	21	76

Factory side
(provider)



Office side
(consumer)



Step 10 (7. Get Trading Data)



The office side receives trading data

Headers can be added from the dictionary server.

Trading data ID: 12345678
Request parameter ID: 20001
Trading contract ID: 10001

ID	Temperature	Humidity
1	25	85
2	27	80
3	21	76

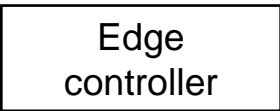
GET /hct/api/v2/messages

```
[
{
  "id": "12345678",
  "domain": "81",
  "request_parameter_id": "20001",
  "trade_contract_id": "10001",
  "headers": [
    "温度",
    "湿度"
  ],

```

```
  "contents": [
    [
      "25",
      "85"
    ],
    [
      "27",
      "80"
    ],
    [
      "21",
      "76"
    ]
  ]
}
```

Factory side (provider)



Office side (consumer)

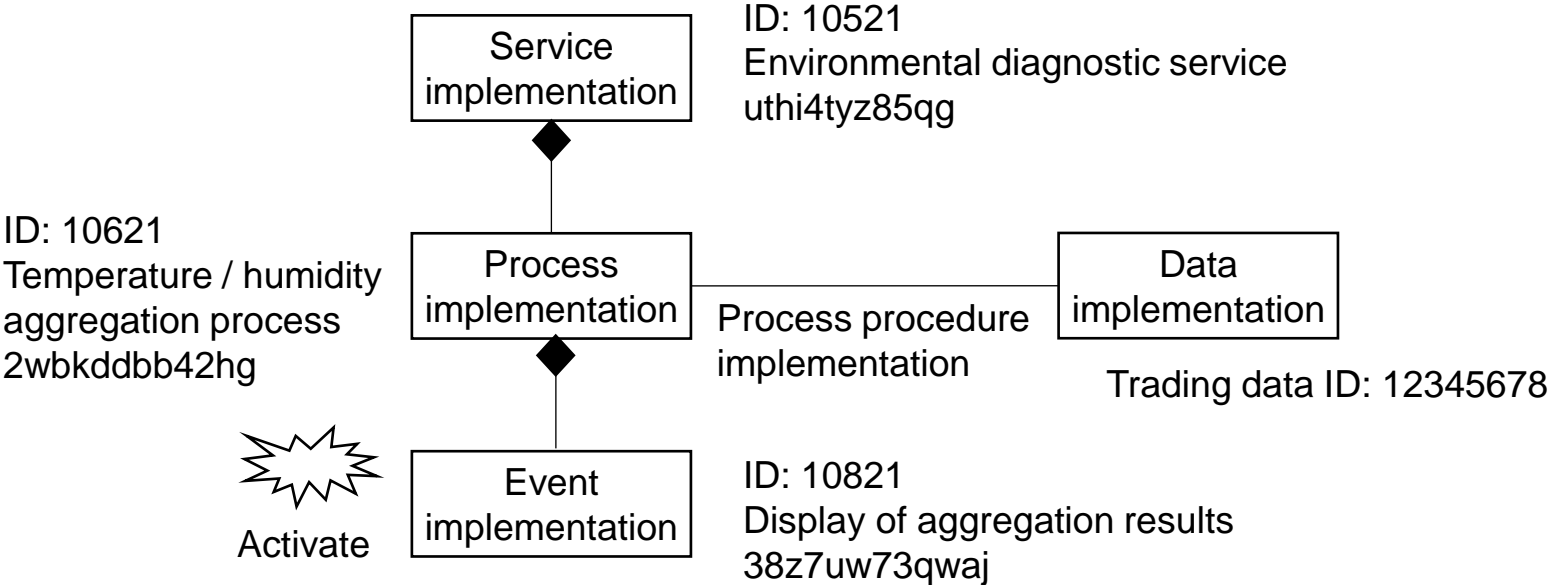




Step 11



The office side uses the data



Factory side
(provider)



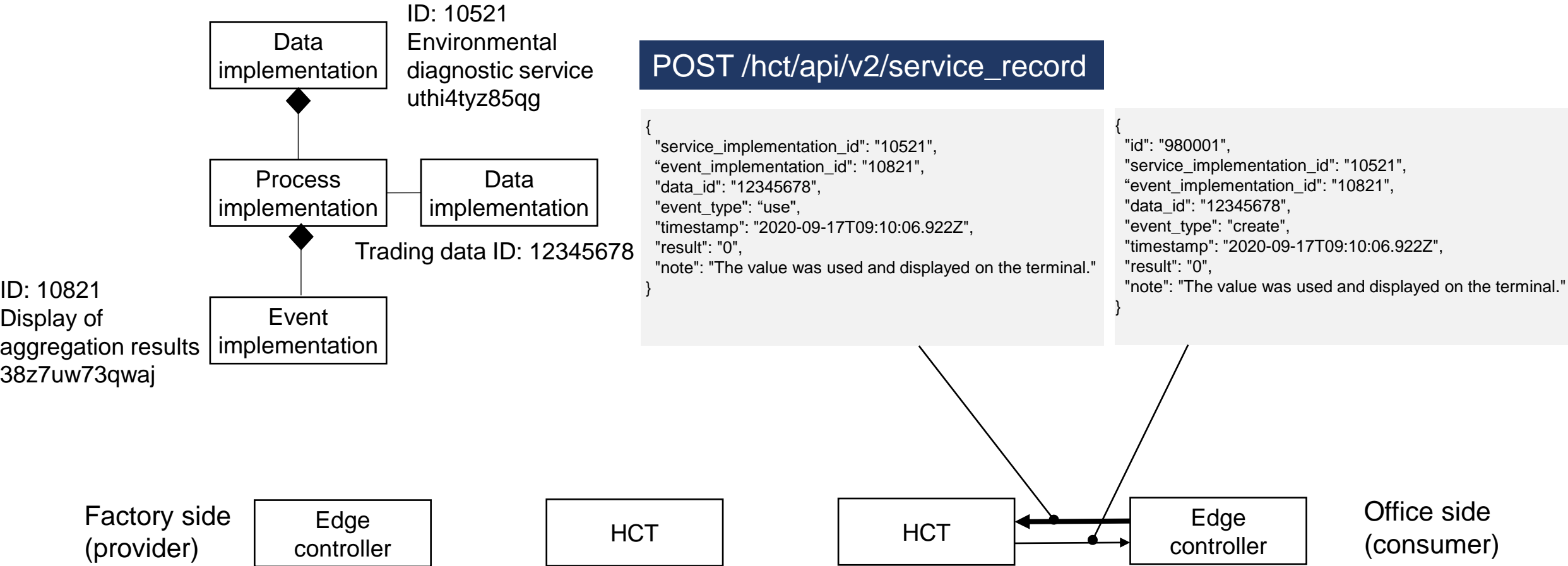
Office side
(consumer)



Step 12 (11. Post Service Record)



Notify that the office side has used the data

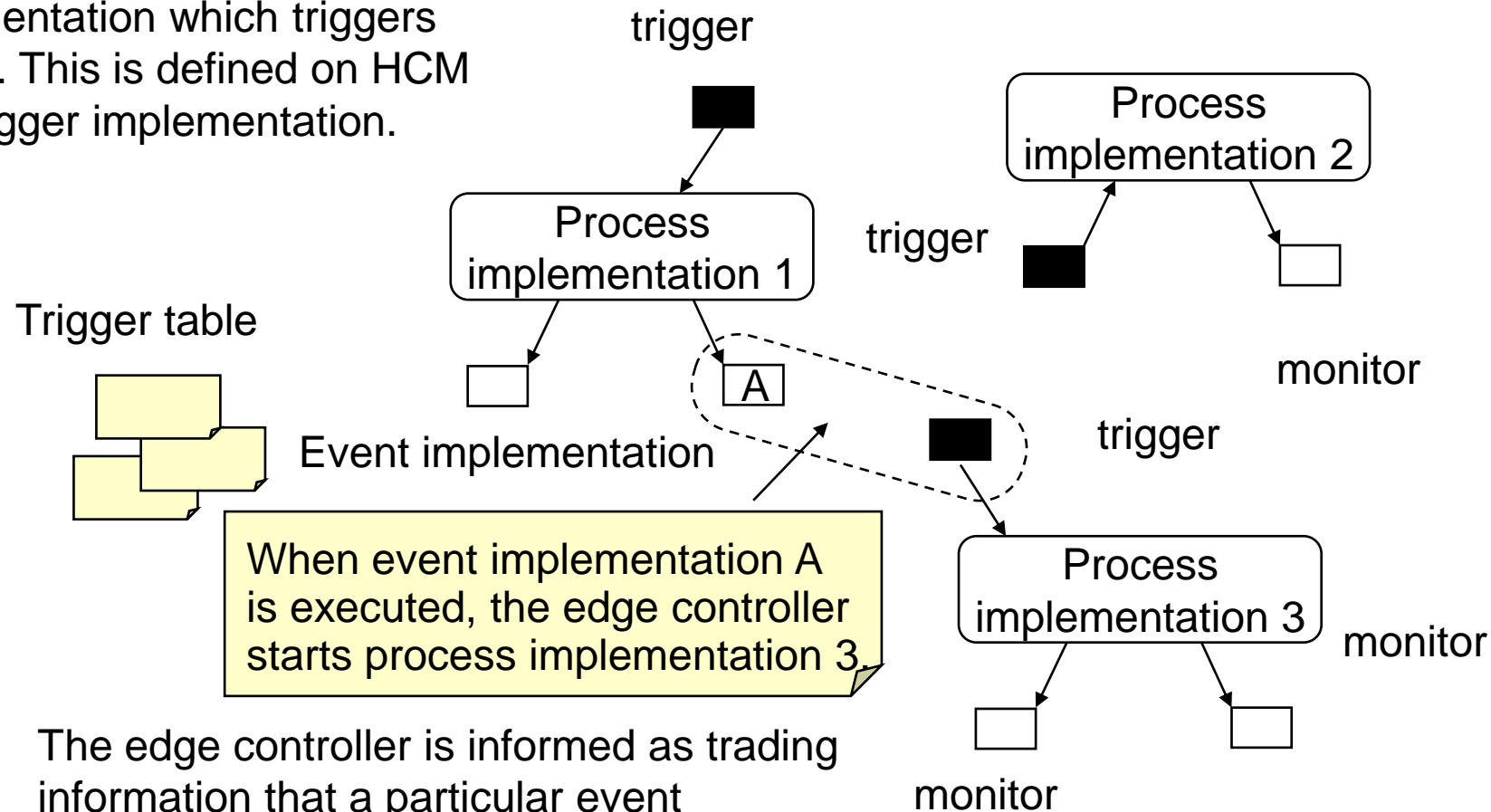




Starting a Process by Event Implementation



There is an event implementation in process implementation which triggers to start. This is defined on HCM as a trigger implementation.



The edge controller is informed as trading information that a particular event implementation is a trigger implementation of another process implementation.





Item name	Data name	Description
Calendar ID	id	ID which identifies the defined calendar
Name	name	Calendar implementation name
Reference date	start_date	Reference date and time for a calendar event to run.
Day of the week	days_of_week	A list with day of the week as an element
Interval	interval	Numerical value corresponding to interval division
Interval type	interval_type	Unit of interval
End date	end_date	Date and time to end monitoring an event
Number of times	number_of_occurrences	Number of times to execute an event After the number of times the event ends.
Time zone	recurrence_time_zone	Applicable time zone

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

minute
hour
day
week
month
year

Service implementation
... "Calendar"

Process implementation
... CalendarID

Process implementation
... "CalendarExecution"

Calendar display dialog

Close

Name

Reference date

時

分

☐ Mon.

☐ Tue.

☐ Wed.

☐ Thu.

☐ Fri.

☐ Sat.

☐ Sun.

Interval

☐

☐ daily

☐ hourly

☐ every minute

☐ weekly

☐ monthly

☐ yearly

End

☐ none

☐ End of the day

☐ Number of times

times

Table name: Refrigerator

ID	Product name	Quantity	Unit	Place
10001	Barley tea	2	L	Refrigerator shelf
10002	BLACK COFFE	1	L	Refrigerator shelf
10003	Vegetables for one day	1	L	Refrigerator shelf
10004	Kimchi	1	pack	Refrigerator shelf
10005	OICOS	4	pieces	Refrigerator shelf
10006	Silk tofu	2	pack	Refrigerator shelf
10007	Okra kelp	3	pack	Refrigerator shelf
10008	Weider jelly	4	bottle	Refrigerator shelf
10009	Can of beer	4	can	Refrigerator shelf
10010	Loin ham	2	pack	Refrigerator shelf
10011	Raw ham	2	pack	Chilled room
10012	Pork wiener	2	pack	Chilled room
10013	Pork shoulder loin	744	g	Chilled room
10014	Chicken thigh meat	817	g	Chilled room
10015	Cut off the pig	748	g	Chilled room
10016	Egg	14	-	
10017	Butter	1	b	
10018	Mayonnaise	1	b	
10019	Ketchup	1	b	

Data Implementation

Data implementation
refrigerator
Inventory movement

Data Item Implementation

Data item implementation	Data implementation
ID	refrigerator
Product name	refrigerator
quantity	refrigerator
unit	refrigerator
Place	refrigerator
Inventory movement	Inventory movement
Item ID	Inventory movement

Table name: Inventory movement

Inventory movement	Item ID	Name	Unit	Area	Quantity	Date and time of movement
10002	10039	Curry powder	pack	Refrigerator shelf	-2	2020/7/13
10003	10038	potato	Pieces	freezer	-2	2020/7/13
10010	10027	onion	Pieces	Vegetable room	-1	2020/7/13
10011	10013	Pork shoulder loin	g	Chilled	-300	2020/7/13
10012	10003	vegetables for one day	L	Refrigerator shelf	1	2020/7/13



Table name: Refrigerator

ID	Product name	Quantity	Unit	Place
10001	Barley tea	2	L	Refrigerator shelf
10002	BLACK COFFE	1	L	Refrigerator shelf
10003	Vegetables for one day	1	L	Refrigerator shelf
10004	Kimchi	1	pack	Refrigerator shelf
10005	OICOS	4	pieces	Refrigerator shelf
10006	Silk tofu	2	pack	Refrigerator shelf
10007	Okra kelp	3	pack	Refrigerator shelf
10008	Weider jelly	4	bottle	Refrigerator shelf
10009	Can of beer	4	can	Refrigerator shelf
10010	Loin ham	2	pack	Refrigerator shelf
10011	Raw ham	2	pack	Chilled room
10012	Pork wiener	2	pack	Chilled room
10013	Pork shoulder loin	744	g	Chilled room
10014	Chicken thigh meat	817	g	Chilled room
10015	Cut off the pig	748	g	Chilled room
10016	Egg	14	-	Refrigerator door
10017	Butter	1	box	Refrigerator door
10018	Mayonnaise	1	bottle	Refrigerator door
10019	Ketchup	1	bottle	Refrigerator door

- D0001
- D0003
- D0001
- D0002
- D0002

Trading data management table

Trading data ID	Data implementation	ID	Service implementation	Process implementation	Fact classification
D0001	refrigerator	10001	DBMS	Save Data	Save
D0001	refrigerator	10002	DBMS	Save Data	Save
D0001	refrigerator	10003	DBMS	Save Data	Save
D0002	refrigerator	10004	DBMS	Save Data	Save
D0002	refrigerator	10005	DBMS	Save Data	Save
D0003	refrigerator	10002	DBMS	Save Data	Modification
D0002	refrigerator	10003	DBMS	Read data	Read
D0002	refrigerator	10003	DBMS	Read data	Read





Table name: Refrigerator

ID	Product name	Quantity	Unit	Place
10001	Barley tea	2	L	Refrigerator shelf
10002	BLACK COFFE	1	L	Refrigerator shelf
10003	Vegetables for one day	1	L	Refrigerator shelf
10004	Kimchi	1	pack	Refrigerator shelf
10005	OICOS	4	pieces	Refrigerator shelf
10006	Silk tofu	2	pack	Refrigerator shelf
10007	Okra kelp	3	pack	Refrigerator shelf
10008	Weider jelly	4	bottle	Refrigerator shelf
10009	Can of beer	4	can	Refrigerator shelf
10010	Loin ham	2	pack	Refrigerator shelf
10011	Raw ham	2	pack	Chilled room
10012	Pork wiener	2	pack	Chilled room
10013	Pork shoulder loin	744	g	Chilled room
10014	Chicken thigh meat	817	g	Chilled room
10015	Cut off the pig	748	g	Chilled room
10016	Egg	14	-	Refrigerator door
10017	Butter	1	box	Refrigerator door
10018	Mayonnaise	1	bottle	Refrigerator door
10019	Ketchup	1	bottle	Refrigerator door

D0001
D0001
D0001

Trading 1

Get and save 10001, 10002, 10003 as trading data D0001

Trading data management table

Trading data ID	Data implementation	ID	Service implementation	Process implementation	Fact classification
D0001	refrigerator	10001	DBMS	Save Data	Save
D0001	refrigerator	10002	DBMS	Save Data	Save
D0001	refrigerator	10003	DBMS	Save Data	Save





Table name: Refrigerator

ID	Product name	Quantity	Unit	Place
10001	Barley tea	2	L	Refrigerator shelf
10002	BLACK COFFE	1	L	Refrigerator shelf
10003	Vegetables for one day	1	L	Refrigerator shelf
10004	Kimchi	1	pack	Refrigerator shelf
10005	OICOS	4	pieces	Refrigerator shelf
10006	Silk tofu	2	pack	Refrigerator shelf
10007	Okra kelp	3	pack	Refrigerator shelf
10008	Weider jelly	4	bottle	Refrigerator shelf
10009	Can of beer	4	can	Refrigerator shelf
10010	Loin ham	2	pack	Refrigerator shelf
10011	Raw ham	2	pack	Chilled room
10012	Pork wiener	2	pack	Chilled room
10013	Pork shoulder loin	744	g	Chilled room
10014	Chicken thigh meat	817	g	Chilled room
10015	Cut off the pig	748	g	Chilled room
10016	Egg	14	-	Refrigerator door
10017	Butter	1	box	Refrigerator door
10018	Mayonnaise	1	bottle	Refrigerator door
10019	Ketchup	1	bottle	Refrigerator door

Trading 2

Get and save 10004,
10005 as trading data
D0002

- D0001
- D0001
- D0001
- D0002
- D0002

Trading data management table

Trading data ID	Data implementation	ID	Service implementation	Process implementation	Fact classification
D0002	refrigerator	10004	DBMS	Save Data	Save
D0002	refrigerator	10005	DBMS	Save Data	Save





Table name: Refrigerator

ID	Product name	Quantity	Unit	Place
10001	Barley tea	2	L	Refrigerator shelf
10002	BLACK COFFE	-9	L	Refrigerator shelf
10003	Vegetables for one day	1	L	Refrigerator shelf
10004	Kimchi	1	pack	Refrigerator shelf
10005	OICOS	4	pieces	Refrigerator shelf
10006	Silk tofu	2	pack	Refrigerator shelf
10007	Okra kelp	3	pack	Refrigerator shelf
10008	Weider jelly	4	bottle	Refrigerator shelf
10009	Can of beer	4	can	Refrigerator shelf
10010	Loin ham	2	pack	Refrigerator shelf
10011	Raw ham	2	pack	Chilled room
10012	Pork wiener	2	pack	Chilled room
10013	Pork shoulder loin	744	g	Chilled room
10014	Chicken thigh meat	817	g	Chilled room
10015	Cut off the pig	748	g	Chilled room
10016	Egg	14	-	Refrigerator door
10017	Butter	1	box	Refrigerator door
10018	Mayonnaise	1	bottle	Refrigerator door
10019	Ketchup	1	bottle	Refrigerator door

Trading 3

- D0001
- D0003
- D0001
- D0002
- D0002

Get 10002 as trading data D0003. Update the DB, because there is ID already.

Trading data management table

Trading data ID	Data implementation	ID	Service implementation	Process implementation	Fact classification
D0003	refrigerator	10002	DBMS	Save Data	Modification





Table name: Refrigerator

ID	Product name	Quantity	Unit	Place
10001	Barley tea	2	L	Refrigerator shelf
10002	BLACK COFFE	1	L	Refrigerator shelf
10003	Vegetables for one day	1	L	Refrigerator shelf
10004	Kimchi	1	pack	Refrigerator shelf
10005	OICOS	4	pieces	Refrigerator shelf
10006	Silk tofu	2	pack	Refrigerator shelf
10007	Okra kelp	3	pack	Refrigerator shelf
10008	Weider jelly	4	bottle	Refrigerator shelf
10009	Can of beer	4	can	Refrigerator shelf
10010	Loin ham	2	pack	Refrigerator shelf
10011	Raw ham	2	pack	Chilled room
10012	Pork wiener	2	pack	Chilled room
10013	Pork shoulder loin	744	g	Chilled room
10014	Chicken thigh meat	817	g	Chilled room
10015	Cut off the pig	748	g	Chilled room
10016	Egg	14	-	Refrigerator door
10017	Butter	1	box	Refrigerator door
10018	Mayonnaise	1	bottle	Refrigerator door
10019	Ketchup	1	bottle	Refrigerator door

Transaction 4

- D0001
- D0003
- D0001
- D0002
- D0002

Put 10003 record of trading data D0001 and 10004 record of D0002 upon request

Trading data management table

Trading data ID	Data implementation	ID	Service implementation	Process implementation	Fact classification
D0002	refrigerator	10003	DBMS	Read data	Read
D0002	refrigerator	10003	DBMS	Read data	Read




1. IVI Technology System and CIOF
2. Explanation of CIOF Architecture
3. Use Cases and Operating Procedures
4. Functional Requirements for Edge Controllers
5. Explanation by Sample Scenario
6. How to participate in the project



IVI member	NEDO – CIOF Project Member companies	Currently in the second phase of development (project completed in March 2022)
	IVI Regular member / Support member / Implementation member	Component application is required (reception starts from October 9th)
	IVI regular member (Companies with factories or business facilities)	Demonstration experiments at IVI Business Scenario 2020 (completed in March 2021)
Non-member	IT company (Component development company or integrator)	API information and technical information are public, samples and SDK are not public.
	Companies with factories or business facilities and their business partners	Use of IVI components is possible for both members and non-members

<https://pfcp.iv-i.org/wp/>





概要プラットフォームコンポーネント参加

Three features of the IVI platform components

-Manufacturing takes center stage- <p>ものづくりを実践する企業にとっての価値を最大化することを第一の目的とします。</p> <p>ものづくり企業のものづくり企業によりものづくり企業のためのプラットフォームとして、コストを抑え、効果を最大化することで、結果としてIT企業にとっても大きなメリットがあるしくみとします。</p>	-Open Ecosystem- <p>構成するコンポーネントについて、オープンな仕様にもとづくエコシステムとします。</p> <p>個別の機能を提供するコンポーネントとして、顧客の要望によって、その都度異なるプラットフォーム上で稼働できる環境を作ります。これにより、プラットフォームの側は、より多くのすぐれたコンポーネントを集めるためにさらにつなげる機能が向上していくことを狙っています。</p>	-Data management as intellectual property- <p>企業データの所有者は企業自身とし、ボトムアップなくみづくりを可能とします。</p> <p>プラットフォームで扱うデータは、一義的にはものづくり企業のものです。IVIプラットフォームでは、原則として製造業のエッジ側で得られたデータに関する権利は、その製造業が保持するものとし、ものづくりの技術やノウハウの健全な取引を支援します。</p>
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Participation Method

To participate, please follow the steps below. If you would like to participate, please contact us at the email address below.
mail: office@iv-i.org

- 1.申し込み書を記入し事務局へ送付
- 2.詳細な記述フォームに内容を記入
- 3.モデラーと辞書ツールにて内容を登録
- 4.グレードの登録審査申請を事務局へ送付
- 5.審査WGにて内容を精査
- 6.プラットフォーム委員会にて審査
- 7.認証の場合は事務局から請求書を送付
- 8.グレード登録料の支払い
- 9.グレード認定

(審査期間は申請から1年間となります。)



Grade approval (Component company)

The IVI's Platform Committee will certify the grade of each component.

Grade 1:

- プロフィールとともに I V I モデラーにモデル登録した。
- C I O F 辞書ツールで連携に必要なモデルを定義した。

Grade 2:

- C I O F コンポーネントとしてエッジコントローラの仕様に従い実装した。
- 独自に接続テストを行い、他の C I O F コンポーネントと通信を確認した。

Grade 3:

- I V I が定める認証試験でコンポーネント間の相互接続が確認された。
- C I O F 上で外部辞書を提供し、事業者間のデータ流通を可能とした。

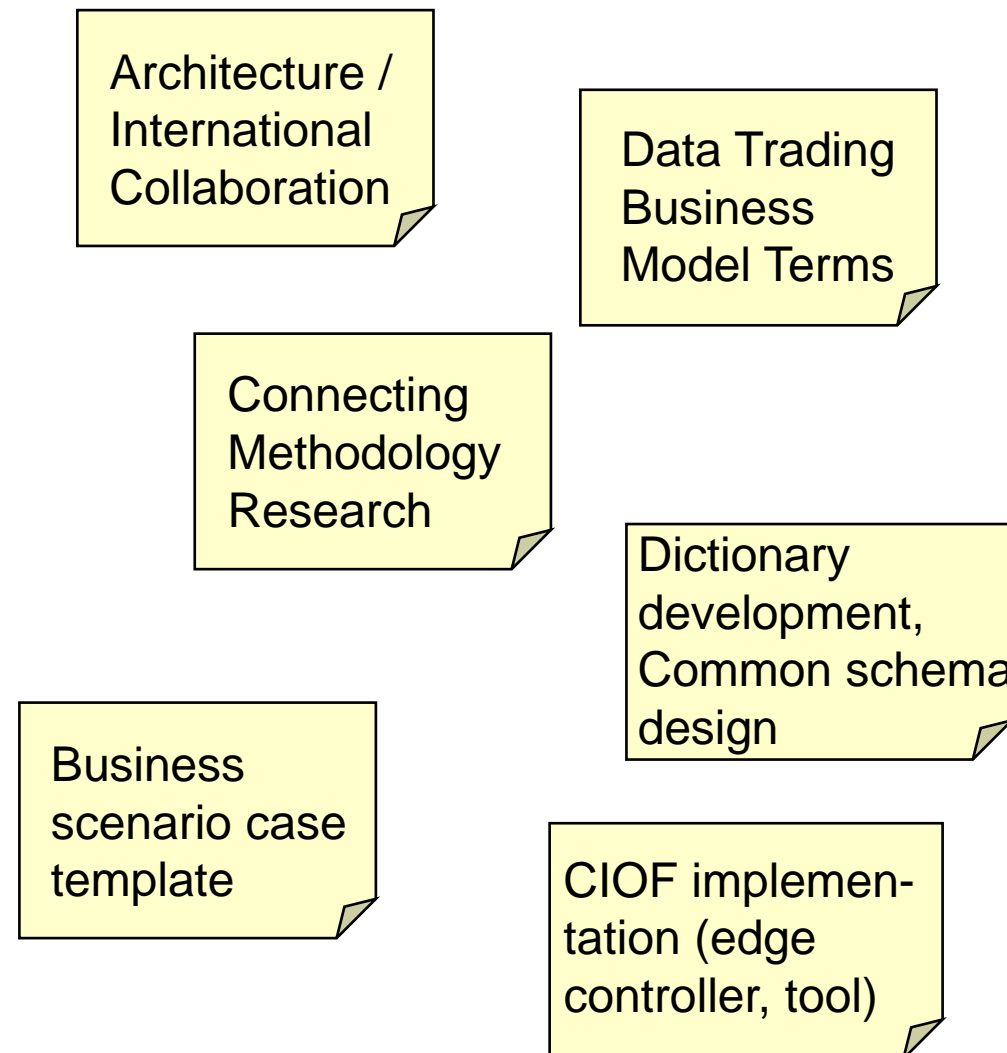
IVI component applications of this year will be accepted from October 9th. The IVI platforms are not recruited this year.





- General Planning Committee / Standard Business WG
 - IVRA promotion and awareness and international expansion
 - Smart thinking standardization
 - CIOF component authentication
- Business Cooperation Committee / Platform WG
 - IVI modeler and smart thinking development
 - Common dictionary / template development
 - CIOF business model construction support

Activities



- Monthly web meeting (from 15:30 on 3rd Thursdays)
- Conducted as a joint WG within this year (Prf. Nishioka participates)
- New member subscriptions starts from the symposium in October
- The first session will include guidance, on Thursday, October 15th.
- SWG activities starts from December, to set the goals
- The final goals are to make reports in March
→ To be announced at Hannover Messe

You can register on the IVI member page. After October 10th, please contact the IVI secretariat

Member page → Group →
Standard Business 2020 /
Platform Joint WG

How to participate



October 15th (Thu.)	IVRA-Next / CIOF Commentary & Discussion
November 19th (Thu.)	CIOF Implementation / IVI Modeler commentary & discussion
December 17th (Thu.)	Business Scenario WG 2020 Analysis
January 21st(Thu.)	Activities divided into individual WGs
February 18th (Thu.)	Activities divided into individual WGs
March 18 th (Thu.)	Report Summary



IVI Open Symposium 2020 -Autumn- ~ The manufacturing revolution is underway despite the effects of the coronavirus ~

Organized by: Industrial Value Chain Initiative (IVI)
Date and time: October 08, 2020 12: 30-18: 40
Place: Part 1 :Web distribution, delivered by Youtube Live
Part 2 :Web conferencing, mutual exchange by MS Teams
Capacity: No particular restrictions

Participation fee: Free

15:00	Break Time
15:10	【Lecture】 “Overcome new normal manufacturing with Smart Thinking” Hideaki Nishimura, IVI Chief Organizer (Brother Industries, Ltd.)
15:30	【Report to current progress of Business Scenario WG, 2020】 Hiroyuki Mizuno, Chairman, IVI Business Cooperation Committee (CKD) Presenters of Scenario WGs ※See “Reports of Business Scenario WG, 2020” for presenters.

	【Part 1】 Opening
12:15	General moderator: Hideaki Nishimura, IVI Chief Organizer (Brother Industries, Ltd.)
12:30	【Opening Remarks】 Yuji Watanabe, IVI Director of Secretariat
12:40	【Invited Lecture】 “Management ‘At Your Side’ with Data” Toshikazu Koike, Emeritus Chairman, Brother Industries, Ltd.
13:20	【IVI Opinion】 “Digitalization, Dataization and the future of Value Economy” Yasuyuki Nishioka, IVI president (Professor, Hosei University)
	【Introduction of excellent cases of Business Scenario WG, 2019】
14:00	16:30 Break Time
16:40	【Highlight of Advanced Study Group】 Introduction of group activity: AI and Deep Learning Applied Research Subcommittee Koji Tomita Chairman, IVI General Planning Committee (Yaskawa Electric) Toshiaki Hirata Project Manager, IVI AI and Deep Learning Applied Research Subcommittee (Computron)
17:00	【IVI Panel discussion】 “Wisdom, Knowledge and Insight of manufacturing to survive the Coronavirus epidemic” Osamu Horimizu, IVI Fellow (Hitachi, Ltd.) Yukihide Seki, IVI Fellow (NEC)

We look forward to your participations
to the symposium.



All of the contents of Business Scenario WG are released at once!



Session 1: Everyone is happy with a little more effort. Move forward with wisdom and ingenuity.

WG number	Title of Business Scenario WG	Presenter
6E02	How to connect for mass customization	Hiroshi Yamamoto, IHI
6C05	Improving operational efficiency by visualizing process capability	Ryosuke Fujita, Kobe Steel, Ltd.
6B01	Predictive maintenance of consumable parts in production equipment	Atsushi Moroshita, Kurita Industry
6A04	Realization of low-cost information acquisition for product management	Hiroshi Toozuka, Leimac

Session 2: Implementation heaven / Analysis paradise, Two tops of IoT

6C02	Improvement in productivity of production line by AI, Forth report	Hidenori Ichimoto, Mazda
6A01	Inspection automation platform, utilization heaven	Hiroshi Honda, CKD
6A03	Die-cast cylinder block material quality improvement	Satoshi Noguchi, Mitsubishi Electric

There will be an online social gathering from 17:40.

Please participate in the venue for direct questions to the presenters of WGs and the venue for discussions (in charge of Prof. Nishioka) of the CIOF to deepen your understanding.

Session 3: Transport that cannot be self-restrained should be three steps, such as visualization, independence and automation.

6C01	Parts storage logistics automation by remote control of transport equipment	Taishi Okuya, Mazda
6E01	Innovation and analysis of "Transport of goods" which does not create value	Keisuke Oshima, Serendip HLDGs
6C03	Visualization of achievements of people and things, part 3 (Next generation IE pursuit)	Arata Yoshioka, Mazda

Session 4: To go to the scene in distance, that is connecting formation.

6C04	Remote manufacturing process (Visual inspection)	Taiki Seto, NIKON
6E03	IVI type manufacturing evolution with edge AI and data distribution	Yasuo Matsuoka, Toshiba
6A02	Edge and remote on-site support	Yasuhiro Yoshimoto, Mitsubishi Electric





Connected Industries Open Framework
Powered by Industrial Value Chain Initiative