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PSLX Engineering Specification

APS Agent Model

PSLX-02

Version 0.2

Update History

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2 <Note>

3 PSLX Consortium Japan and the members do not take on the responsibility
4 for any losses caused by using this specification and the contents
5 of this specification.

6

1 Introduction

1.1. Purpose of This Specification

This specification decides the basic frame for implementing the concept of APS as an IT system in individual manufacturing enterprises and the indispensable specification for implementation. The basic structure of the system decided in this specification differs from the structure of the former system development. The basic structure concretely indicates the form of new information system architecture that must be introduced by the future manufacturing enterprises. PSLX thinks that the information system architecture defined in this specification is necessary for realizing APS.

1.2. Intended Readers

The intended readers of PSLX Engineering Specification are as below. Manager in charge of IT of manufacturing enterprise, Engineering staff in IT section of manufacturing enterprise, Consultant in IT strategy of manufacturing enterprise, Consultant in production management, Manager of SI enterprise, Manager of software vendor, Engineering staff of software package vendor, Student of production management

1.3. Structure of Specification

The structure of this specification is as below. Chapter 2 defines the functions that the whole APS must have. This chapter clarifies the information exchanges between APS and the outside, and lists the use cases on the APS side applied to the information exchanges. Chapter 3 prescribes the interfaces between APS and the outside in order to define the external specification as an information system. Chapter 4 defines the specification of APS agents for actually realizing APS. Chapter 5 shows the more detailed specifications of the important functions in APS such as planning or scheduling.

1 **1.4. Extension of Specification**

2 The interfaces defined in this specification do not include all the
3 interfaces possessed by APS when individual manufacturing enterprises
4 actually implement APS. This specification does not restrict that
5 the interfaces other than the interfaces provided in this chapter are
6 added. It is not a necessary condition for APS to implement all the
7 provided interfaces.

8 **1.5. Policy on Copying Specification**

9 PSLX Consortium Japan owns copyright on this specification. However
10 it is free to copy this specification and distribute the copies. It
11 is also free to translate the contents of this specification into
12 foreign languages except English. But it is prohibited to modify the
13 contents of this specification without the permission of PSLX
14 Consortium Japan. When referring to a part or all parts of the
15 contents in this specification for another document, write URL
16 (<http://www.pslx.org>) of the applicable item on the WWW site of PSLX
17 Consortium Japan preserving this specification.

2. General Structure of APS

2.1. Scope and Boundary of APS

As Figure 1 shows, APS is placed on the contact point between the demand/supply chain from a customer to a supplier and the engineering chain from designing to manufacturing.

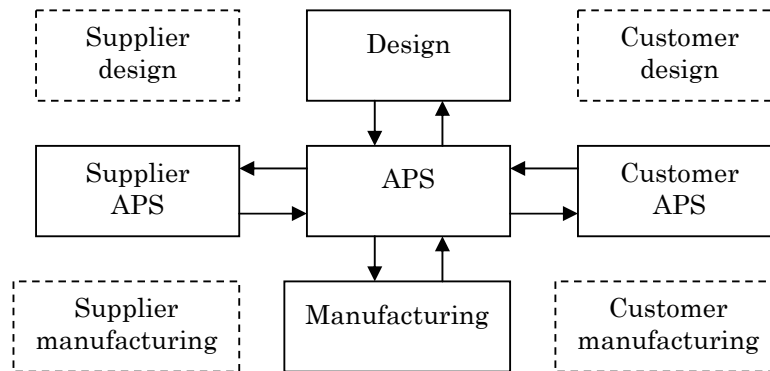


Figure 1 Scope of APS

Design, APS, manufacturing, customer APS and supplier APS in Figure 1 are called a business component respectively. It is important to classify the interactions between these business components into the demands and the applicable functions in order to define APS.

2.2. Exchanging Information with External Components

At first, the flows of information between APS and external business components are classified. The items are concretely shown as below for the information exchanges with a customer, with the design side and with the manufacturing side in order to confirm the contents of flows.

◇ Information exchange with a customer

The contents of information exchange with a customer are classified in the relation between APS and the business components. It can be considered that the information exchange with a supplier is replaced with the information exchange with a customer from a different

1 standpoint. So this chapter omits the information exchange with a
2 supplier.

3 ●Estimation information (customer \leq APS)

4 Estimation information is the answer about the product number of
5 applicable items, the due date, the quantity of producible goods and
6 the price to “estimation request” from a customer.

7 ●Unofficial information (customer \Rightarrow APS)

8 Unofficial information is the information that the contents to be
9 ordered in the near future are sent from a customer, not an official
10 order.

11 ●Order information (customer \Rightarrow APS)

12 This is the information representing the contents of the order from
13 a customer. When the order is received, APS usually answers
14 acceptance, reservation, rejection etc. And also the information,
15 like changing or canceling the sent order may be sent from a customer
16 to APS. Some order information may not decide all the necessary
17 specifications.

18 ●Option data (customer \Rightarrow APS)

19 The information about the concrete contents of product specification
20 in the order information may be separately sent from a customer to
21 APS. The option data is the information about the specification of
22 the product ordered by a customer. The option data is sent in the
23 case of an unofficial order and also in the case of the definite order.
24 Conversly, the information, “option data decision request” to ask the
25 option data is sent from APS to a customer.

26 ●Duetime information (customer \leq APS)

27 This duetime information is the information about the duetime for an
28 order from a customer such as an unofficial order or a definite order.
29 There are many cases where this information is sent from APS to a
30 customer as a response to “duetime inquiry.” Some of duetime
31 information may be used for promising the duetime, “firm promise of

1 duetime” besides for notifying the customer of the forecast value of
2 duetime.

3 ●Complaint (customer =>APS)

4 This is the information to be sent from a customer to APS when any
5 faults occur after the customer receives a product. Some measures,
6 as “complaint procedure” must be taken by APS for the complaint from
7 the customer by APS.

8 ●Shipping notification (customer <=APS)

9 This is the information to notify that the product is shipped for the
10 definite order. When a customer receives the notification, the
11 customer can prepare for accepting a product beforehand by receiving
12 this information.

13 ●Receipt notification (customer =>APS)

14 This is the information to prove that the contents and the quantity
15 of products shipped to a customer are ordered after supplying the
16 product. This is sent from a customer to APS when or after delivering
17 products. This information is used for settling the accounts later.

18 ●Product information (customer <=APS)

19 This is the information that the data of dealt product is sent before
20 receiving the order from a customer. This information includes the
21 information about a new product, stopping to manufacture the product,
22 and the detailed specification or the price of each product. This
23 information may be sent to a customer by the decision on APS side and
24 may be sent to respond to the inquiry from a customer.

25 ●Inventory information (customer <=APS)

26 This is the information to show the stock of dealt products to a
27 customer. By opening this information, the customer can judge
28 whether the product can be supplied in the short duetime. Generally,
29 this inventory information is shown to a customer for responding to
30 “inventory inquiry” from the customer.

31 ●Plan information (customer <=APS)

1 This information is advanced from the open inventory information, and
2 opens also the schedule in order to show the number of products to
3 be finished in the near future except the finished products. However
4 this case is only between the closely cooperated enterprises. The
5 plan may be sent from APS to a customer regularly and the required
6 items may be shown to the request from a customer.

7 ●Booking-type production (customer \leq APS)

8 The booking-type production is shown to a customer as the measures
9 to indicate the quantity of the future finished products without
10 opening the plan information. The booking-type production shows only
11 the number of products to be finished in each time bucket and conceals
12 the inside schedule information.

13 ●Inventory information (customer \Rightarrow APS)

14 This inventory information opens the stock in the customer's material
15 warehouse to APS. By knowing the company's products in stock, the
16 timing of ordering from a customer and the number of products in stock
17 can be forecasted to some degree.

18 ●Plan information (customer \Rightarrow APS)

19 This information is advanced from the open inventory information of
20 customer, and opens the customer's production plan or scheduling
21 information to APS. Thus the future order from a customer can be
22 forecasted very certainly. It is possible to say that the unofficial
23 information is one form to open this plan information.

24 ●Demand information (customer \Rightarrow APS)

25 This is the information that the future plans not to be reflected on
26 the customer production plan, or the information about sales plan or
27 forecasting created originally by a customer are shown to APS by a
28 customer. It can be said that this demand information is shown for
29 sharing the information in CPFR (Collaborative Planning, Forecasting
30 and Replenishment).

31 ◇ **Information exchange with design side**

1 The contents of information exchange between APS and the design
2 department are classified as the relation between APS and the business
3 components.

4 ●Manufacturing method (design =>APS)

5 This is the information about what equipment and what conditions are
6 necessary for making the individual products. This information also
7 gives the detailed constraints on the individual production and the
8 evaluation for quality. This is the master information for APS.

9 ●Production facility information (design =>APS)

10 This is the information about which facility must be used for making
11 products. This information includes the information about the
12 alternative facility.

13 ●Manufacturing person hour (design =>APS)

14 This is the information about how many person hours are required
15 according to the specification of product in every production process.

16 ●Design information (design =>APS)

17 This is the information about design, such as the structures of product
18 and parts, the specifications and the drawing information and so on.
19 In APS, manufacturing BOM is managed and modified based on the product
20 structure information as occasion demands. Most of information is
21 directly sent to the manufacturing field. If the design is changed,
22 this design information must be sent to the manufacturing field.

23 ●Quality information (design <=APS)

24 As a result of producing, the information about faults or room for
25 improvement is gained. Such information is sent from APS to the
26 design department as the quality information.

27 ●Manufacturing BOM information (design <=APS)

28 This is BOM information with the original information on the
29 manufacturing side. This information differs from the BOM made by

1 the design department. The contents of design information may be
2 changed when considering the manufacture possibility.

3 ●Individual product request (design \leq APS)

4 When the design must be operated based on the individual customer's
5 request in the individual order production, the customer's request is
6 sent from APS to the design side as an individual product request.

7 ●Individual product option (design \Rightarrow APS)

8 As a result that the design is progressed based on the request from
9 a customer in the individual order production, the individual option
10 to the customer request is sent from the design side to APS. The
11 production is executed based on the content of this option in the
12 production field.

13 ✧ **Information exchange with manufacturing**

14 The relations with manufacturing are classified as the information
15 exchange between APS and the business components.

16 ●Production progress (manufacturing \Rightarrow APS)

17 As a result of producing in the manufacturing field, the information
18 about the quantity of products is sent to APS as the production
19 progress. There are the cases where the production progress is gained
20 whenever producing, and where the production progress is gained in
21 every specific time bucket.

22 ●Completion progress (manufacturing \Rightarrow APS)

23 This is the information about whether manufacturing is completed for
24 the manufacturing schedule in the production field or not.

25 Completion progress may be gained whenever production is completed
26 or may be gained in every specific time bucket.

27 ●Operation progress (manufacturing \Rightarrow APS)

28 Production progress is the result information on the production side,
29 such as the quantity of produced items. On the other hand, operation
30 progress is the result information on the facility side. As a result

1 of ending production, the information about operation conditions of
2 facility is sent. Operation progress is often sent with being
3 collected for the specific period.

4 ●Inspection progress (manufacturing =>APS)

5 Inspection progress shows whether the product meets the required
6 quality or not. The product rejected by test is abolished or
7 reproduced. The timing of sending the inspection progress is the
8 same as the production progress.

9 ●Facility abnormality (manufacturing =>APS)

10 This is one form of operation progress of facility. The facility
11 abnormality is sent to APS at real time when the facility operates
12 abnormally.

13 ●Quality abnormality (manufacturing =>APS)

14 This is one form of inspection progress. The abnormality can be
15 notified by the human's decision even if the routine inspection process
16 is not especially established. The information about quality
17 abnormality is sent to APS at real time and APS immediately takes
18 measures.

19 ●Progress abnormality (manufacturing =>APS)

20 The manufacturing field watches that the materials are delayed to
21 arrive or the specific process is much later than the expected time
22 to finish and then judges whether the delays influence the whole
23 production. In such a case, the conditions are immediately sent to
24 APS as the progress abnormality.

25 ●Manufacturing schedule (manufacturing <=APS)

26 As a result of production scheduling, APS sends the manufacturing
27 schedule for each facility or worker to the manufacturing side.
28 Manufacturing schedule may be sent in every time bucket, or may be
29 sent at real time. And also there is the information about the
30 correction or the cancellation of the once issued manufacturing
31 schedule.

1 ●Shipping schedule (manufacturing \leq APS)

2 This is the information instructing to ship products. Shipping
3 schedule is sent with considering the specified due date when the
4 products in stock are pegged to order, or after receiving the
5 information that the finished products are in the finished product
6 stock by the production progress.

7 ●Issue schedule (manufacturing \leq APS)

8 This schedule instructs to ship the material stock or the work in
9 process to be managed in order to start production. This schedule
10 is given to the supplies for outsourcing process.

11 ●Maintenance schedule (manufacturing \leq APS)

12 This is the information for APS to instruct the manufacturing side
13 to operate the maintenance of facilities and processes besides the
14 operation about manufacturing. The production field may execute the
15 maintenance in its own right not through APS. Such a case is not
16 a target for this schedule.

17 ●Maintenance request (manufacturing \geq APS)

18 Even if the production field executes maintenance independently, it
19 is necessary to adjust the maintenance to the whole production
20 schedule. The production field asks APS not to use the facility for
21 the fixed period for producing because of maintaining.

22 ●Process specification (manufacturing \leq APS)

23 APS sends the engineering information required for establishing a new
24 process, improving the model for a new product and maintaining to the
25 manufacturing field. The contents of information to be sent are not
26 recognized in APS and the engineering information sent from the
27 design side is given to the manufacturing side as the process
28 specification just as it is.

2.3. Basic Functions To Be Possessed By APS

As Figure 1 shows, the existence of APS is decided in the interaction between APS itself and four peripheral business components. The former section classifies the contents of the information exchanges between these four components. This section classifies what functions are provided to these four business components by APS. The functions classified in this section are the external specification of APS.

◇ Functions for customer (use case)

The functions to be provided to a customer are given as use cases as below. The use cases given are examples and do not include all functions. Each of use cases is not essential.

ID No.	Use case
UC-C01	Answer the information, such as a sum of money, the duetime, and the quantity of products, to the estimation request.
UC-C02	Accept the unofficial information.
UC-C03	Accept an order and answer the information about acceptance, reservation and rejection.
UC-C04	Accept the order of which options are not decided yet.
UC-C05	Accept the additional option data for an order.
UC-C06	Answer or promise the duetime to the inquiry about duetime.
UC-C07	Accept a complaint and handle the content of complaint.
UC-C08	Send the shipping notification when shipping products, if necessary.
UC-C09	Receive the receipt notification.
UC-C10	Send the new product information or the revision price information appropriately.
UC-C11	Handle the inquiry about the inventory information.
UC-C12	Handle the inquiry about the plan information.
UC-C13	Show the booking-type production and execute reservation and so on.
UC-C14	Change the booking-type production if necessary.

1

2

◇ **Functions for supplier (use case)**

3

The functions to be provided to a supplier are classified as use cases as below. The use cases given are examples and do not include all functions. Each of use cases is not essential.

4

5

ID No.	Use case
UC-S01	Send the unofficial information regularly.
UC-S02	Send an order or the information about change and cancellation.
UC-S03	Accept the answer, such as acceptance, reservation and rejection, to an order.
UC-S04	Send the additional option data or deal with the option data decision request.
UC-S05	Receive the shipping notification, and prepare for receiving and accepting products.
UC-S06	After accepting products, send the receipt notification.
UC-S07	Receive the production information to be irregularly sent.
UC-S08	Receive the inventory information to be sent regularly or irregularly.
UC-S09	Receive the plan information to be sent regularly or irregularly.
UC-S10	Open the inventory information or deal with the inquiry.
UC-S11	Open the plan information or deal with the inquiry.
UC-S12	Open the demand information or deal with the inquiry.

6

7

◇ **Functions for design (use case)**

8

The functions to be provided to the design side are shown as use cases as below. The use cases given are examples and do not include all functions. Each of functions is not essential.

9

10

ID No.	Use case
UC-D01	Receive the manufacturing method (including the changed information) to be sent irregularly.
UC-D02	Receive the production facility information (including the

	changed information) to be sent irregurally.
UC-D03	Receive the manufacturing person hour (including the changed information) to be sent irregurally.
UC-D04	Receive the design information (including the changed information) to be sent irregurally.
UC-D05	Handle the inquiry about the quality information.
UC-D06	Handle the inquiry about the contents of manufacturing BOM information.

1

2

◇ **Functions for manufacturing (use case)**

3

The functions to be provided to the manufacturing side are given as use cases as below. The use cases given are examples and do not include all the functions. Each of functions is not essential.

4

5

ID No.	Use case
UC-M01	Accept the production progress.
UC-M02	Accept the completion progress.
UC-M03	Accept the operation progress.
UC-M04	Accept the inspection progress.
UC-M05	Accept the facility abnormality and take the necessary measures.
UC-M06	Accept the quality abnormality and take the necessary measures.
UC-M07	Accept the progress abnormality and take the necessary measures.
UC-M08	Send the manufacturig schedule.
UC-M09	Send the shipping schedule.
UC-M10	Send the issue schedule.
UC-M11	Send the maintenance schedule.
UC-M12	Accept the maintenance request and reflect it on the schedule.
UC-M13	Send the process specification information.

6

1 At the same time, there is the request to the external business
2 component from APS. When the request cannot be soluted in APS, the
3 request is sent to the outside of APS to achieve the target.

4 PSLX specification does not describe how to connect with the external
5 business component actually in such a case. However Chapter 4
6 explains that PSLX external agents actually connecting with the
7 external business components are defined and only the interfaces of
8 the agents for the inside are decided.

3. External Interface of APS

This chapter defines the form of interface to be published to the outside as the entire system by APS. The function provided by the system takes the form that APS does any process for the message received from the external business component through the interface if necessary and sends the message back synchronously or asynchronously.

The messages sent from APS to the external business component are handled by APS external agents explained in Chapter 4, and so this chapter does not explain. When exchanging the same message with the outside, there may be two ways: the way by the interface explained in this chapter and the way by the APS external agent. In the former, the trigger (the side to act first) is on the outside, and in the latter, the trigger is APS itself.

3.1. Message Switching System

The messages received by APS are roughly divided into three types: ① message to send the required business data (information sending type), ② message to get the required business data (information inquiring type), ③ message to execute the required business processing (processing request type). Moreover these messages are developed into the various applicable types.

If the process to switch messages is activated basically from the outside, there are the basic patterns, acceptance (accept), rejection (reject), and receipt (receipt) by APS for the message as the figure shows.

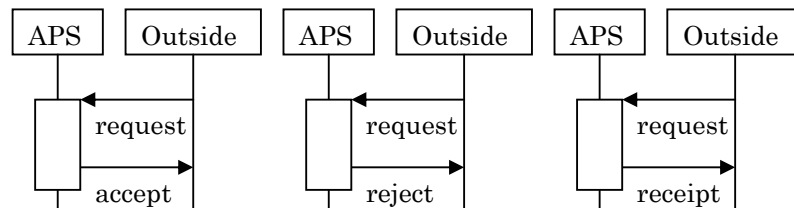
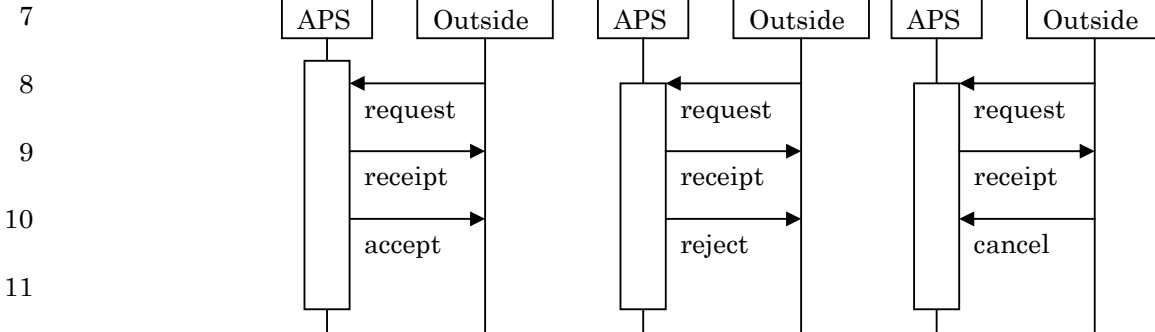


Figure 2 Basic Patterns of Message Response

1 In the case where only the received message is returned and the answer
 2 is reserved when receiving the message and the message is handled later
 3 in the above figure, there are three patterns; APS accepts the message
 4 after processing, APS rejects the message after processing, and the
 5 message, cancellation (cancel) is sent from outside.

6



12

13 Figure 3 Patterns for Reserving Answer

14 **3.2. External Interface List**

15 The names of interfaces prescribed by PSLX are expressed in the form
 16 combining the identifier indicating the message switching system and
 17 the data contents to be sent. The following list shows the external
 18 interfaces possessed by APS. The symbol ○ means that the interface
 19 exists. The symbol △ means that the interface exists but is not
 20 recommended.

21 As the list shows, the interfaces with the same name exist for the
 22 different business component in PSLX. These interfaces with the same
 23 name have basically the same structure, but they are implemented as
 24 the different interface when the target components are different.

Interface name	Customer	Supplier	Design	Manufacturing
setPlan	○	○		
getPlan	○	○		
setSchedule	○	○	○	○
getSchedule	○	○	○	○

setCalculation	○	○		
getCalculation	○	○		
setParameter	○	○	○	○
getParameter	○	○	○	○
setProduct		○	○	○
getProduct	○	○	○	○
setProcess		○	○	○
getProcess	○	○	○	○
setOrder	○			○
getOrder		○	○	○
setOption	○	○	○	○
getOption	○	○	○	○
setEstimation		○	○	○
getEstimation	○			
setComplaint	○		○	○
getComplaint		○	○	○
setProgress	○	○	○	○
getProgress	○	○		
setEmergency		○	○	○
getEmergency		△	△	△
setStock	○	○		○
getStock	○	○		○
setLoad		○		○
getLoad	○			○
setCapacity		○		○
getCapacity	○			○
setLot				○
getLot				○
setTask				○
getTask				○

1

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3

4

The following explains the interfaces to be published to the customer request, to the supplier request, to the design side request, and to the manufacturing side request as four business components.

1

3.3. Interface for Customer

2

The external interfaces prepared for the customer business component (actor) are as below.

3

Name	setPlan	Division	Information sending type
Send	Forecast information	Response	Receipt confirmation
Explanation	Set up the forecast information of customer.		
UC	UC-C02		
Remarks			

4

Name	getPlan	Division	Information inquiring type
Send	Request	Response	Supply scheduling
Explanation	Show the supply scheduling of APS.		
UC			
Remarks			

5

Name	setParameter	Division	Information sending type
Send	Parameter data	Response	Receipt confirmation
Explanation	Set up the specific parameter such as a business index in APS.		
UC			
Remarks			

6

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter data
Explanation	Inquire the specific parameter of APS.		
UC			
Remarks			

7

Name	setCalculation	Division	Information sending type
Send	Calculation information	Response	Receipt confirmation
Explanation	Set up the way of calculating parameter in APS.		
UC			
Remarks			

1

Name	getCalculation	Division	Information inquiring type
Send	Request	Response	Calculation information
Explanation	Inquire the calculation of parameter from APS.		
UC			
Remarks			

2

Name	setSchedule	Division	Information sending type
Send	Schedule	Response	Receipt information
Explanation	Set up the schedule of customer in APS.		
UC	UC-C02		
Remarks			

3

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule
Explanation	Show the schedule of APS to the customer.		
UC	UC-C09, UC-C12, UC-C03		
Remarks			

4

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information

Explanation	Show the product data to the customer's inquiry.
UC	UC-C10
Remarks	

1

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Provide the manufacturing process information such as the possessed facilities to the inquiry.		
UC			
Remarks			

2

Name	setOrder	Division	Information sending type
Send	Order information	Response	Receipt information
Explanation	Set up the customer order. The customer order includes the precision of the definite order or the unofficial order.		
UC	UC-C02, UC-C03, UC-C04, UC-C13, UC-C14		
Remarks			

3

Name	getOrder	Division	Information inquiring type
Send	Requesst	Response	Order information
Explanation	The customer inquires of APS about the duetime of order or the quantity of products that can be provided.		
UC			
Remarks			

4

Name	setOption	Division	Information sending type
Send	Option data	Response	Receipt information

Explanation	Set up the option consisting of the order in addition to the order. This message is used when the option is decided later than the order.
UC	UC-C05
Remarks	

1

Name	getEstimation	Division	Information inquiring type
Send	Estimation request	Response	Estimation
Explanation	The customer requests APS to estimate the price, quantity, and duetime of the product.		
UC	UC-C01		
Remarks			

2

Name	setComplaint	Division	Information sending type
Send	Complaint information	Response	Complaint answer
Explanation	Show the complaint against the product or service received by the customer to APS.		
UC	UC-C07, UC-C14		
Remarks			

3

Name	setProgress	Division	Information sending type
Send	Progress information	Response	Receipt information
Explanation	The customer reports the progress of supplying and receiving the product to APS.		
UC			
Remarks			

4

Name	getProgress	Division	Information inquiring type
------	-------------	----------	-------------------------------

Send	Request	Response	Progress information
Explanation	The customer asks the progress of the related order or operations to APS.		
UC			
Remarks			

1

Name	setStock	Division	Information sending type
Send	Inventory information	Response	Receipt information
Explanation	Set up the stock state of the product provided by APS that the customer has presently. This message is used for VMI.		
UC			
Remarks			

2

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	The customer asks the present or future stock value possessed by APS.		
UC	UC-C11		
Remarks			

3

Name	getLoad	Division	Information inquiring type
Send	Request	Response	Load information
Explanation	The customer asks APS the present or future load.		
UC			
Remarks			

4

Name	getCapacity	Division	
Send	Request	Response	Capacity information
Explanation	The customer asks the production capacity of APS. The production capacity corresponds to a seat for reserving.		
UC	UC-C03		
Remarks			

1

2

3.4. Interface for Supplier

3

The external interfaces prepared for the supplier business component (actor) are as below.

4

Name	setPlan	Division	Information sending type
Send	Plan information	Response	Receipt confirmation
Explanation	Set up the supply scheduling of supplier in APS.		
UC	UC-S09		
Remarks			

5

Name	getPlan	Division	Information inquiring type
Send	Request	Response	Plan information
Explanation	Provide the production planning of APS to the supplier.		
UC	UC-S01, UC-S11, UC-S12		
Remarks			

6

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt confirmation
Explanation	Set up the specific parameter such as a business index in APS.		

UC	
Remarks	

1

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the specific parameter of APS.		
UC			
Remarks			

2

Name	setCalculation	Division	Information sending type
Send	Calculation information	Response	Receipt confirmation
Explanation	Set up the calculation of parameter in APS.		
UC			
Remarks			

3

Name	getCalculation	Division	Information inquiring type
Send	Request	Response	Calculation information
Explanation	Inquire the calculation of parameter from APS.		
UC			
Remarks			

4

Name	setSchedule	Division	Information sending type
Send	Schedule information	Response	Receipt information
Explanation	Set up the schedule of supplier in APS and take linkage. Make preparations to receive products by sending the shipping schedule.		

UC	UC-S05, UC-S09
Remarks	

1

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule information
Explanation	Show the related parts of schedule in APS to the supplier.		
UC	UC-S01, UC-S11		
Remarks			

2

Name	setProduct	Division	Information sending type
Send	Product information	Response	Receipt information
Explanation	Register the product information possessed by the supplier such as the catalog information or the price list in APS.		
UC	UC-S07		
Remarks			

3

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information
Explanation	The supplier asks the product information for producing to APS, if necessary.		
UC			
Remarks			

4

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receipt information

Explanation	The supplier registers the production process information such as its own equipment or strongest engineering in APS.
UC	UC-S07
Remarks	

1

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	The supplier inquires the production process information of APS for producing.		
UC			
Remarks			

2

Name	setOrder	Division	
Send	Order information	Response	Receipt information
Explanation	The supplier promises the due date and the quantity of production to APS.		
UC			
Remarks			

3

Name	getOrder	Division	Information inquiring type
Send	Request	Response	Order information
Explanation	The supplier inquires the order information to its own company. The orders are the unofficial order besides the definite order.		
UC	UC-S01, UC-S02, UC-S03		
Remarks			

4

Name	getOption	Division	Information inquiring type
Send	Request	Response	Option information

Explanation	The supplier inquires the option data of the order to its own company. When the option is not decided, this message can also request the option data decision.
UC	UC-S04
Remarks	

1

Name	setEstimation	Division	Information sending type
Send	Estimation information	Response	Receipt information
Explanation	The supplier sets up the estimation information such as the due date in APS.		
UC			
Remarks			

2

Name	getComplaint	Division	
Send	Request	Response	Complaint information
Explanation	Receive the complaint information against the supplier from APS.		
UC			
Remarks			

3

Name	setProgress	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the present production progress information in APS for the received order.		
UC			
Remarks			

4

Name	getProgress	Division	Information inquiring type
------	-------------	----------	----------------------------

Send	Request	Response	Process information
Explanation	Inquire the facts that the product is supplied by the supplier and accepted.		
UC	UC-S06		
Remarks			

1

Name	setEmergency	Division	Information sending type
Send	Emergency information	Response	Receipt information
Explanation	Notify APS that the emergencies, like delay of progress and trouble occur when producing.		
UC			
Remarks			

2

Name	getEmergency	Division	Information inquiring type
Send	Request	Response	Emergency information
Explanation	Receive the emergency information besides the order. When receiving this message, the necessary measures must be taken immediately such as rescheduling.		
UC			
Remarks	(This function is not recommended.)		

3

Name	setStock	Division	Information sending type
Send	Inventory information	Response	Receipt information
Explanation	Report the stock value of the related items possessed by the supplier to APS.		
UC	UC-S08		
Remarks			

4

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	The supplier inquires the stock value managed by APS.		
UC	UC-S10		
Remarks			

1

Name	setLoad	Division	Information sending type
Send	Load information	Response	Receipt information
Explanation	The supplier registers its own load in APS.		
UC			
Remarks			

2

Name	setCapacity	Division	Information sending type
Send	Capacity information	Response	Receipt information
Explanation	Register the production capacity of supplier in APS.		
UC			
Remarks			

3

4

3.5. Interface for Design

5

The external interfaces prepared for design business component (actor) are as below.

6

Name	setSchedule	Division	Information sending type
Send	Schedule information	Response	Receipt information
Explanation	Set up the operation schedule of design in APS.		
UC			
Remarks			

7

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Receipt information
Explanation	Inquire the schedule created by APS. The design operation may be included in the inquired schedule.		
UC			
Remarks			

1

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt confirmation
Explanation	Set up the specific parameter related with design in APS.		
UC			
Remarks			

2

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the specific parameter of APS.		
UC	UC-D05		
Remarks			

3

Name	setProduct	Division	Information sending type
Send	Design information	Response	Receipt information
Explanation	Set up the product information as a design result in APS. Manufacturing BOM information is set up here.		
UC	UC-D01, UC-D04		
Remarks	Both setProduct and setProcess can handle the operation information and the event information.		

4

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information
Explanation	Inquire the product information set up in APS.		
UC	UC-D05, UC-D06		
Remarks			

1

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receiving information
Explanation	Set up the production process information as a design result. The production resource information and the way of producing are set up here.		
UC	UC-D01, UC-D02, UC-D03, UC-D04		
Remarks	In changing design, even if the data is deleted, the data is stored as a past history. Both setProduct and setProcess can handle the operation information and the event information.		

2

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the production process information of APS.		
UC	UC-D05, UC-D06		
Remarks			

3

Name	setOrder	Division	Information sending type
Send	Order	Response	Receipt information
Explanation	Notify the content that the options are decided in the design.		
UC			
Remarks			

1

Name	getOrder	Division	Information inquiring type
Send	Request	Response	Order information
Explanation	Receive the request to design. When the designing is required for the customer order, APS creates the design request to the design side.		
UC			
Remarks			

2

Name	setOption	Division	Information sending type
Send	Option information	Response	Receipt information
Explanation	Design the option to meet the request to each order and set up the results.		
UC			
Remarks			

3

Name	getOption	Division	Information inquiring type
Send	Request	Response	Option information
Explanation	Inquire the contents of the option specified by the customer himself. This message may be required for designing other parts.		
UC			
Remarks			

4

Name	setEstimation	Division	Information sending type
Send	Estimation information	Response	Receipt information

Explanation	Set up the estimation information such as the production person hour or the price for the given request.
UC	UC-D05
Remarks	

1

Name	setComplaint	Division	Information sending type
Send	Complaint information	Response	Receipt information
Explanation	Set up the message when there is the problem in designing that can never be soluted and the basis of customer's request must be changed.		
UC			
Remarks			

2

Name	getComplaint	Division	Information inquiring type
Send	Request	Response	Complaint information
Explanation	Pick up the complaint information from APS and take the necessary measures.		
UC	UC-D05		
Remarks			

3

Name	setProgress	Division	Information sending type
Send	Progress information	Response	Receipt information
Explanation	Set up the progress for the design operation instructed by APS.		
UC			
Remarks			

4

Name	setEmergency	Division	Information sending type
Send	Emergency information	Response	Receipt information
Explanation	Notify APS that the state in need of the urgent measures such as a serious design mistake occurs.		
UC			
Remarks			

1

Name	getEmergency	Division	Information inquiring type
Send	Request	Response	Emergency information
Explanation	Get the information that some emergency occurs and the urgent measures are needed.		
UC			
Remarks	(This function is not recommended.)		

2

3

3.6. Interface with Manufacturing

4

The external interfaces prepared for manufacturing business components (actor) are as below.

5

Name	setSchedule	Division	Information sending type
Send	Schedule	Response	Receipt information
Explanation	Set up the demand schedule originally created or the definite schedule in APS.		
UC	UC-M12		
Remarks			

6

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule

Explanation	The manufacturing side adopts the schedule created by APS.
UC	UC-M08, UC-M09, UC-M10, UC-M11
Remarks	

1

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt confirmation
Explanation	Set up the specific parameter related with manufacturing in APS.		
UC			
Remarks			

2

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the specific parameter of APS.		
UC			
Remarks			

3

Name	setProduct	Division	Information sending type
Send	Product information	Response	Receipt information
Explanation	Set up the product information (manufacturing BOM information) required on the manufacturing side in APS.		
UC			
Remarks	Both setProduct and setProcess can handle the operation information and the event information.		

4

Name	getProduct	Division	Information
------	------------	----------	-------------

			inquiring type
Send	Request	Response	Product information
Explanation	Adopt the product information (manufacturing BOM information) from APS.		
UC			
Remarks	Both getProduct and getProcess can handle the operation information and the event information.		

1

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the information related with production process such as the equipment originally required on the manufacturing side or the constraints.		
UC			
Remarks	Both setProduct and setProcess can handle the operation information and the event information.		

2

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Adopt the information related with production process such as equipment or constraints.		
UC			
Remarks	Both getProduct and getProcess can handle the operation information and the event information.		

3

Name	setOrder	Division	Information sending type
Send	Order information	Response	Receipt information
Explanation	Request APS to reflect the necessary operations such as maintaining on the manufacturing side on the entire plan.		
UC			

Remarks	
---------	--

1

Name	getOrder	Division	
Send	Request	Response	Order information
Explanation	Adopt the various production schedule information to manufacturing such as production schedule, shipping schedule, issue schedule and other schedules for maintaining from APS.		
UC	UC-M08, UC-M09, UC-M10, UC-M11		
Remarks			

2

Name	getOption	Division	Information inquiring type
Send	Request	Response	Option information
Explanation	Adopt the option data information as the content of production schedule from APS.		
UC	UC-M13		
Remarks			

3

Name	setEstimation	Division	Information sending type
Send		Response	Receipt information
Explanation	Set up the time required for production and the quantity of producible products for APS.		
UC			
Remarks			

4

Name	setComplaint	Division	Information sending type
Send	Complaint information	Response	Receipt information
Explanation	Set up this message in APS when there is any defect in the received order.		

UC	
Remarks	

1

Name	getComplaint	Division	Information inquiring type
Send	Request	Response	Complaint information
Explanation	Pick up the related information out of the defect information from the customer or others and then take the measures against the defect.		
UC			
Remarks			

2

Name	setProgress	Division	Information sending type
Send	Progress information	Response	Receipt information
Explanation	Set up the progress conditions related with operations such as the production progress, the completion progress and the inspection progress in APS.		
UC	UC-M01, UC-M02, UC-M03, UC-M04		
Remarks	This message may be sent immediately after completing or may be sent regularly (e.g. in every evening).		

3

Name	setEmergency	Division	Information sending type
Send	Emergency information	Response	Receipt information
Explanation	Notify APS that the unexpected emergency occurs, like equipment fault, quality trouble, and big delay of progress.		
UC	UC-M05, UC-M06, UC-M07		
Remarks			

4

Name	getEmergency	Division	Information inquiring type
Send	Request	Response	Emergency information
Explanation	Receive the content of emergency from APS and then take the necessary measures.		
UC			
Remarks	(This function is not recommended.)		

1

Name	setStock	Division	Information sending type
Send	Inventory information	Response	Receipt information
Explanation	Set up the actual survey value or the forecast value of the stock state.		
UC			
Remarks			

2

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	Inquire the theoretical value of stock created by APS.		
UC			
Remarks			

3

Name	setLoad	Division	Information sending type
Send	Load information	Response	Receipt information
Explanation	Set up the actual value or the forecast value of load of production resources, like equipment or labors, in APS. Operation progress is set up using this message.		
UC			
Remarks			

1

Name	getLoad	Division	Information inquiring type
Send	Request	Response	Load information
Explanation	Inquire the theoretical value of resource load set up by APS.		
UC			
Remarks			

2

Name	setCapacity	Division	Information sending type
Send	Capacity information	Response	Receipt information
Explanation	The manufacturing side sets up the present or future production capacity in APS.		
UC			
Remarks			

3

Name	getCapacity	Division	Information inquiring type
Send	Request	Response	Capacity information
Explanation	Inquire the theoretical value of production capacity created by APS.		
UC			
Remarks			

4

Name	setLot	Division	Information sending type
Send	Lot information	Response	Receipt information
Explanation	Set up the information related with lot in APS.		
UC			
Remarks			

5

Name	getLot	Division	Information inquiring type
Send	Request	Response	Lot information
Explanation	Inquire the information related with the lot possessed by APS.		
UC			
Remarks			

1

Name	setTask	Division	Information sending type
Send	Task information	Response	Receipt information
Explanation	Set up the information related with task in APS.		
UC			
Remarks			

2

Name	getTask	Division	Information inquiring type
Send	Request	Response	Task information
Explanation	Inquire the information related with the task possessed by APS.		
UC			
Remarks			

3

4

1 **4. Agent Model**

2 This chapter explains the internal system of APS for realizing each
3 function of the interfaces to the outside explained in the former
4 chapter. PSLX constructs the system in a unit of agent, which can
5 behave individually and independently for realizing the functions of
6 APS.

7 Agent is what the enterprise system is divided into every operation
8 or every application program. It is premised that individual agents
9 can make decision independently with concealing the detailed
10 information in order to that the components in the enterprise may be
11 recognized as the agent defined in this chapter.

12 **4.1. Basic Configuration of APS Agent**

13 In PSLX, the form to realize APS consists of various agents. These
14 agents constructing APS are called APS Agent. In APS, these agents
15 cooperate with each other and realize the functions defined as the
16 external interface.

17 APS agents can be classified into two types: the internal agent and
18 the external agent. The internal agent is the agent that can realize
19 the functions of APS by itself or by cooperating with other APS agents.
20 On the other hand, the external agent is the agent that must connect
21 with the business components on the outside of APS to realize the
22 functions.

23 The interfaces in each APS agent differ from the interface in the whole
24 APS explained in the former chapter and are originally set up in every
25 agent. How to transfer the interface provided to the outside by APS
26 to which interface in the related APS agent depends on each form of
27 implementation.

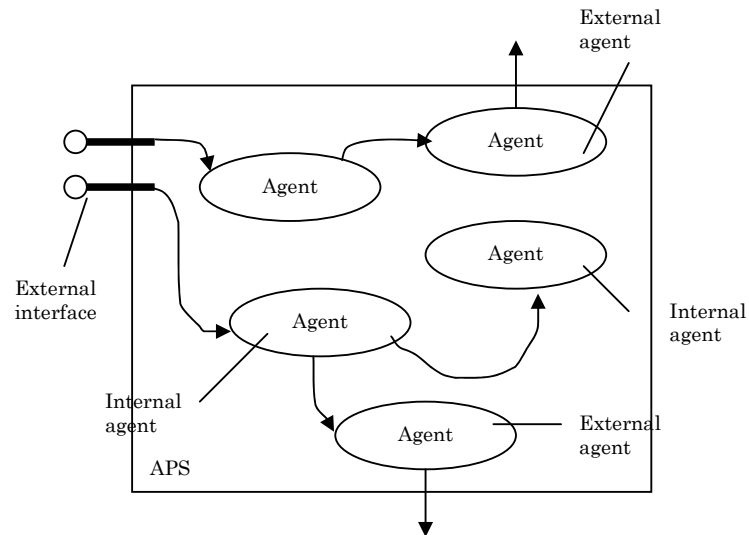


Figure 4 Concept of APS Agent

APS external agents have the function to conceal the functions possessed by the external components for APS and the original interfaces. In short, it can be regarded that APS external agents substitute for the external business components.

PSLX prescribes the interfaces that this APS external agent must have. The external functions are called via this interface possessed by the external agent from the inside of APS.

Therefore when designing the actual external business component applying to the interface of APS external agents defined in this chapter, APS directly connects with the outside. When connecting the external legacy business component with APS, the connection is realized by programming the system to assimilate the difference, for example separately mapping in the APS external agent.

In APS, there is a possibility that the constructions of APS agent itself or the internal structures differ in each implementation. This specification prescribes only three interfaces: Planning agent, Scheduling agent and Federation management agent.

These three agents are very important to realize the functions of APS in APS agents. The interfaces related with agents other than these

1 agents given in this specification can be handled by extending the
2 specification in the future.

3 **4.2. Internal Agent**

4 The internal agents of APS agents execute the content in APS on their
5 own responsibility. The following ten agents of APS agents given in
6 Part 1 “Grand Design for Manufacturing Enterprises” of PSLX
7 Engineering Specification correspond to the internal agents.

8 The next chapter prescribes the details of the interfaces of Planning
9 agent, Scheduling agent and Federation agent in these internal agents.

10 The agents other than the above three agents are given as one example
11 of the agent structures for realizing APS in this specification.

12 Transportation agent and Federation management agent of the shown
13 internal agents manage the flows of goods and information beyond
14 enterprises. To be precise, these agents are not internal agents but
15 they are taken as the internal agents for convenience with considering
16 the possibility that they directly link with the internal agent on
17 the outside.

18 ●Top management agent (1)

19 When producing, at first Top management agent decides the
20 production management. The production management described in
21 this section is the decision-making on how the management resources
22 should be distributed from the standpoint of enterprise management.
23 To be concrete, the production management is the information about
24 when, how many products and which product family should be
25 produced for the market demand. Top management agent decides
26 the production management from the viewpoint of management with
27 considering the financial conditions of enterprise.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-101	Decide the production management. (1)
UC-102	Decide the model change scheduling. (2 3)

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●Planning agent (2)

Planning agent is the agent creating various plans related with production. The plan described in this section is what decides the information about what items are produced, how to produce, by when items are produced, or the information about the specification and capacity of resource for production. Planning agent decides such information integrately based on any index with considering the entire balance.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-201	Make a trial calculation of the required production capacity. (1)
UC-202	Set up the production order. (2)
UC-203	Draw up the required production process. (6)
UC-204	Show the reserve power of production capacity. (9)
UC-205	Calculate the future theoretical stock value. (1 0)
UC-206	Reflect the forecast information of customer on a plan. (2 7)
UC-207	Make the plan with considering the external plan. (2 8)

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●Scheduling agent (3)

Scheduling agent adjusts the various necessary operations on the time following the plan set by Planning agent with closely considering consuming the resources and materials required for executing the plan. Scheduling agent gets solutions with considering the peculiar constraints of various production fields in order to bring the schedule progress to the reality as much as possible.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-301	Verify the possibility of executing the production order. (2)

UC-302	Set up the schedule by scheduling. (3)
UC-303	Investigate the due date by the temporary scheduling. (4)
UC-304	Reflect the manufacturing progress on schedule. (5)
UC-305	Make a test calculation of the required production capacity in details. (7)
UC-306	Execute scheduling for maintenance. (8)
UC-307	Fix the manufacturing schedule for the definite order. (1 5)
UC-308	Execute rescheduling only the plan order. (1 6)
UC-309	Calculate the latest day of option data decision. (2 1)
UC-310	Execute scheduling including the meta parts. (2 1)
UC-311	Decide the model change in every process. (2 4)
UC-312	Calculate the time to change model. (2 5)
UC-313	Reflect the external process on schedule. (2 9)

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●Accounting agent (8)

Accounting agent rightly grasps the manufacturing cost of each production by enterprise and provides the basic information to decide the best way of producing from a viewpoint of cashflow. The master information required for calculating the cost such as the basic unit is managed by this agent and updated whenever necessary.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-801	Provide the basic data on profits. (2 3)

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●Transportation agent (1 0)

Transportation agent makes the plan for transportation between enterprises or in the enterprise and manages to execute the plan actually. When executing the production spreading over some sites,

1 it is important to synchronizing the production process and the
2 transportation process by this transportation agent.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1001	Make the transportation schedule. (1 3)

3
4 ●Capacity control agent (1 1)

5 Capacity control agent makes an adjustment to keep the production
6 capacity required for realizing the production management. The
7 adjustable range of physical production capacity is limited in every
8 factory and so the best way is selected out of various choices, for
9 example increase of facility capacity, prolongation of operation time
10 and usage of the outside production resources.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1101	Adjust the production capacity. (2)
UC-1102	Decide the production capacity. (7)

11
12 ●BOM management agent (1 5)

13 BOM management agent manages the engineering information for planning
14 and scheduling on production. The current BOM manages mainly the
15 information of parts lists. But this agent has also the process
16 procedure information and provides the basic information for
17 calculating the load of resource and the material requirements at the
18 same time, which is one of APS features. This agent also manages the
19 items for BTO-type product --- an end product is decided by combining
20 various options.

21

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1501	Investigate the supplier that is available to produce. (1 1)
UC-1502	Show the process information required for production. (1 9)

UC-1503	Show the items of which option is decided. (2 0)
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●Option control agent (1 6)

Option control agent manages the order including the vagueness that all the options of product are not decided beforehand, and controls the period from the time to receive the order first to the time when all the options are decided finally. Option control agent provides the information of decided parts for enabling to start producing partially in spite of this period. At the same time this agent provides the information for requesting the option decision for the not-decided parts.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1601	Set up the specification partially. (2 9)
UC-1602	Set up the option data decision request. (2 0)

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●Pegging control agent (1 7)

Pegging control agent controls the relations between the customer order and the production order or between the production order and each manufacturing schedule. This corresponds to the pegging control. This agent takes measures for various cases and requests from the simple pegging, like product number management, to the pegging in the case of dividing and merging lots, like MRP.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1701	Peg the received order to the product stock. (4)
UC-1702	Peg the received order to the production order. (4)
UC-1703	Associate the production order with the manufacturing schedule. (1 8)
UC-1704	Associate the production order with the manufacturing progress. (1 8)
UC-1705	Reflect the manufacturing progress on the order. (1 9)

UC-1706	Peg the manufacturing schedule according to the definite option. (2 3)
UC-1707	Peg the material stock to the production order. (2 4)
UC-1708	Calculate how many products are made from the present materials. (2 4)

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●Federation mangement agent (1 8)

Federation management agent supports the interactive communication when exchanging the non-formated data about production between enterprises or between organizations. Generally a considerable number of person hours are needed for making the information exchange beyond the wall of organizations practicable because the terms and the data formats are different. But this agent assimilates each local difference and always makes the information exchange with the high trustworthy available.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1801	Inquire the product stock. (2 6)
UC-1802	Publish the inventory information. (2 6)
UC-1803	Inquire the forecast information. (2 7)
UC-1804	Publish the forecast information. (2 7)
UC-1805	Inquire the production order. (2 8)
UC-1806	Publish the production order. (2 8)
UC-1807	Inquire the related schedule information. (2 9)
UC-1808	Open the schedule information to the specific party. (2 9)

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15

4.3. External Agent

The list shows the interfaces to be possessed by APS external agents. Each external agent actually exchanges messages with the outside by these interfaces in behalf of APS.

1 The symbol ○ in the table means that the interface of the function
2 applied by the external agent in the line must be implemented. The
3 symbol × means that the applicable function can exist theoretically
4 but can be replaced with the interface of the entire APS.

5 The interfaces given in this section are only the interfaces actually
6 exchanging information with the outside. Indeed, the interfaces to
7 realize the various additional functions related with the external
8 business components can be defined besides these interfaces.

Interface name	Customer	Supplier	Design	Manufacturing
setPlan	○	○		
getPlan	○	○		
setSchedule	○	○	○	○
getSchedule	○	○	○	○
setCalculation	○	○		
getCalculation	○	○		
setParameter	○	○	○	○
getParameter	○	○	○	○
setProduct	○	○	×	×
getProduct		○	○	○
setProcess	○	○	×	×
getProcess		○	○	○
setOrder		○	○	○
getOrder	○			○
setOption		○	×	×
getOption	○		○	
setEstimation	×		×	
getEstimation		○		○
setComplaint		○	○	○
getComplaint	×		×	×
setProgress	○	○		
getProgress	○	○	○	○
setEmergency		○	○	○
getEmergency		×	×	×
setStock	×	×		×
getStock	○	○		○
setLoad	×			×
getLoad		○		○
setCapacity	×			×
getCapacity		○		○
setLot				×
getLot				○
setTask				×

getTask				○
---------	--	--	--	---

1

2

The following shows the types of agents and the interfaces prescribed in every business component on the outside.

3

4

4.4. Agent for Customer

5

The agents for customer are Sales agent and Inventory control agent as below. The outlines and use cases of each agent are given.

6

7

●Sales agent (7)

8

Sales agent makes the sales planning and manages the actual customer order for selling products in the management department. This agent stands between a customer and a production field, and deals with an urgent order, answers the due date, and moreover follows the phased setup of individual options.

9

10

11

12

Name	Explanation (No. in parentheses is a collaboration No.)
UC-701	Set up the sales target. (2)
UC-702	Estimate the duetime of order. (4)
UC-703	Create the sales planning. (9)
UC-704	Forecast a demand. (9)
UC-705	Request the option data decision. (2 1)

13

14

●Inventory control agent (1 2)

15

It is necessary to use the stock effectively in order to assimilate the demand change of market and to realize the balanced production as much as possible. Inventory control agent makes the decision about when and how much stock must be owned on which position of the supply chain.

16

17

18

19

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1201	Calculate the proper stock value. (1 0)

20

21

1 The interfaces to be possessed by these external agents for customer
2 are as below.

Name	setPlan	Division	Information sending type
Send	Plan information	Response	Receipt information
Explanation	Show the supply scheduling created by APS to the customer.		
UC			
Remarks			

3

Name	getPlan	Division	Information inquiring type
Send	Request	Response	Plan information
Explanation	Inquire the demand planning possessed by the customer.		
UC			
Remarks			

4

Name	setSchedule	Division	Information sending type
Send	Schedule information	Response	Receipt information
Explanation	Set up the schedule created by APS for the customer. This message can be used for sending the shipping schedule when shipping.		
UC			
Remarks			

5

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule information
Explanation	Inquire the production schedule possessed by the customer.		

UC	
Remarks	

1

Name	setCalculation	Division	Information sending type
Send	Calculation information	Response	Receipt information
Explanation	Set up the information about the calculation of parameter.		
UC			
Remarks			

2

Name	getCalculation	Division	Information inquiring type
Send	Request	Response	Calculation information
Explanation	Inquire the information about the calculation of parameter.		
UC			
Remarks			

3

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt information
Explanation	Set up the information about parameter.		
UC			
Remarks			

4

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information

Explanation	Inquire the information about parameter.
UC	
Remarks	

1

Name	setProduct	Division	Information sending type
Send	Product information	Response	Receipt information
Explanation	Register the product catalog information of the own company for the customer.		
UC			
Remarks			

2

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Register the production equipment or processes of the own company for the customer.		
UC			
Remarks			

3

Name	getOrder	Division	Information inquiring type
Send	Request	Response	Order information
Explanation	Take out the order from the customer to the own company.		
UC			
Remarks			

4

Name	getOption	Division	Information inquiring type
Send	Request	Response	Option information

Explanation	Ask the option data as the content of order to the customer. This message can be used as the option data decision request.
UC	
Remarks	

1

Name	setProgress	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the progress conditions for the customer. This message can be used for sending the information when shipping products.		
UC			
Remarks			

2

Name	getProgress	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Ask the results of operation such as supplying or accepting a product to the customer.		
UC			
Remarks			

3

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	Inquire the stock value of the own company's products in the material stock of customer.		
UC			
Remarks			

4

1

4.5. Agent for Supplier

2

The examples of agents for supplier are Purchasing agent or SCM agent as below. The outlines and use cases of each agent are given.

3

4

5

●Purchasing agent (6)

6

Purchasing agent supplies the required materials from outside suppliers following the production management or the production order plan. And also outsourcing with supply management like process outsourcing is a target. This agent manages suppliers to minimize the loss in the production spreading over enterprises.

7

8

9

10

Name	Explanation (No. in parentheses is a collaboration No.)
UC-601	Create the purchasing planning of long-term due date product. (1 2)

11

12

●SCM agent (9)

13

SCM agent manages the information of the related enterprises on the supply chain such as customers, the enterprises related with distribution or transportation, suppliers and partners. And this agent acts to always keep the best network for enterprises. It is the important work for this agent to evaluate the related enterprises and search new members.

14

15

16

17

18

Name	Explanation (No. in parentheses is a collaboration No.)
UC-901	Make a trial calculation of the capacity of supplier. (1)
UC-902	Keep the capacity in supplier. (7)
UC-903	Show the stock value in supplier. (1 0)
UC-904	Select the best supplier. (1 1)

19

20

21

The interfaces to be possessed by these external agents for supplier are as below.

22

Name	setPlan	Division	Information sending type
Send	Plan information	Response	Receipt information
Explanation	Set up the production planning created by APS for the supplier.		
UC			
Remarks			

1

Name	getPlan	Division	Information inquiring type
Send	Request	Response	Plan information
Explanation	Inquire the supply scheduling information of the supplier.		
UC			
Remarks			

2

Name	setSchedule	Division	Information sending type
Send	Schedule information	Response	Receipt information
Explanation	Set up the production schedule for the supplier.		
UC			
Remarks			

3

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule information
Explanation	Inquire the production schedule of the supplier.		
UC			
Remarks			

4

Name	setCalculation	Division	Information sending type
------	----------------	----------	--------------------------

Send	Calculation information	Response	Receipt information
Explanation	Set up the information about calculation of parameter.		
UC			
Remarks			

1

Name	getCalculation	Division	Information inquiring type
Send	Request	Response	Calculation information
Explanation	Inquire the information about calculation of parameter.		
UC			
Remarks			

2

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt information
Explanation	Set up the information about parameter.		
UC			
Remarks			

3

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the information about parameter.		
UC			
Remarks			

4

Name	setProduct	Division	Information sending type
Send	Product information	Response	Receipt information

Explanation	Set up the information about the product to be produced for the supplier. Both setProduct and setProcess can send the manufacturing BOM.
UC	
Remarks	

1

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information
Explanation	Inquire the product information of the supplier.		
UC			
Remarks			

2

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the production process information to be a content of production for the supplier. The operation information and the event information can be sent. Both setProduct and setProcess can send the manufacturing BOM.		
UC			
Remarks			

3

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the production process information of the supplier.		
UC			
Remarks			

4

Name	setOrder	Division	Information sending
------	----------	----------	---------------------

			type
Send	Order information	Response	Receipt information
Explanation	Issue an order to the supplier.		
UC			
Remarks			

1

Name	setOption	Division	Information sending type
Send	Option information	Response	Receipt information
Explanation	Set up the option data information together with the order to the supplier. This message is used when the timing to set up an order and the timing to decide the option data differ.		
UC			
Remarks			

2

Name	getEstimation	Division	Information inquiring type
Send	Request	Response	Estimation information
Explanation	Get the estimation information about duetime or quantity from the supplier.		
UC			
Remarks			

3

Name	setComplaint	Division	Information sending type
Send	Complaint information	Response	Receipt information
Explanation	Report the complaint against a product or service of the supplier.		
UC			
Remarks			

4

Name	setProgress	Division	Information sending type
Send	Progress information	Response	Receipt information
Explanation	Report the supply state or the receiving state of the received products to the supplier.		
UC			
Remarks			

1

Name	getProgress	Division	Information inquiring type
Send	Request	Response	Progress information
Explanation	Inquire the related information out of the production progresses of the supplier.		
UC			
Remarks			

2

Name	setEmergency	Division	Information sending type
Send	Emergency information	Response	Receipt information
Explanation	Send the information to the supplier when the urgent measures are needed.		
UC			
Remarks			

3

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	Inquire the present or future stock value possessed by the supplier.		
UC			
Remarks			

1

Name	getLoad	Division	Information inquiring type
Send	Request	Response	Load information
Explanation	Inquire the present or future load of the supplier.		
UC			
Remarks			

2

Name	getCapacity	Division	Information sending type
Send	Request	Response	Capacity information
Explanation	Inquire the present or future production capacity of the supplier. The production capacity corresponds to a production seat in the booking-type production.		
UC			
Remarks			

3

4

4.6. Agent for Design

5

The examples of agent for design are Product design agent and Process design agent as below. The outlines and use cases of each agent are shown.

6

7

8

●Product design agent (4)

9

Product design agent generates the detailed information about functions and forms of product itself and how to use the product. The product information generated is defined by being constructed as parts and so on. This parts construction or the optional specification is the important information for deciding the way of manufacturing.

10

11

12

13

Name	Explanation (No. in parentheses is a collaboration No.)
UC-401	Clarify the new product option data. (2 3)

14

1
2
3
4
5
6
7

●Process design agent (5)

Process design agent designs the production process, which is the device to transcribe the design information of various products into the concrete goods. Process design agent also builds a new factory and increases production lines. Process design agent decides various rules or constraints for making individual products at the same time when designing these production processes.

Name	Explanation (No. in parentheses is a collaboration No.)
UC-501	Propose the necessary production facility and transportation facility. (6)
UC-502	Set up the rules and constraints for production. (6)
UC-503	Clarify the new process design information. (2 3)

8
9

10
11

The following shows the interfaces to be possessed by these external agents for design.

Name	setSchedule	Division	Information sending type
Send	Schedule information	Response	Receipt information
Explanation	Set up the schedule on designing originally created in APS.		
UC			
Remarks			

12

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule information
Explanation	Set up the production schedule including designing.		
UC			
Remarks			

1

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt information
Explanation	Set up the information about parameter.		
UC			
Remarks			

2

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the information about parameter.		
UC			
Remarks			

3

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information
Explanation	Inquire the product model as a result of design. Both getProduct and getProcess can inquire the manufacturing BOM information.		
UC			
Remarks			

4

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the production process information as a result of design. Both getProduct and getProcess can inquire the manufacturing BOM information.		
UC			

Remarks	
---------	--

1

Name	setOrder	Division	Information sending type
Send	Order information	Response	Receipt information
Explanation	Send the design request based on the base plan created by APS to the design side.		
UC			
Remarks			

2

Name	getOption	Division	Information inquiring type
Send	Option information	Response	Receipt information
Explanation	Inquire the option data as a result of design.		
UC			
Remarks			

3

Name	setComplaint	Division	Information sending type
Send	Complaint information	Response	Receipt information
Explanation	Set up the complaint to the design side and make it take measures.		
UC			
Remarks			

4

Name	getProgress	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the progress state of designing.		
UC			
Remarks			

5

Name	setEmergency	Division	Information sending type
Send	Emergency information	Response	Receipt information
Explanation	Notify the design side that the emergency occurs and make it take measures.		
UC			
Remarks			

1

2

4.7. Agent for Manufacturing

3

The examples of agents for manufacturing are MES agent and Maintenance agent as below. The outlines and use cases of each agent are shown.

4

5

●MES agent (1 3)

6

MES agent does various managements following the created manufacturing schedule when actually manufacturing. The core function of MES (Manufacturing Execution System) can be described as one of the forms that this agent is put into effect. MES agent directly manages individual equipment and labors, and clarifies the correspondence between the production schedule and the progress.

7

8

9

10

11

Name	Explanation (No. in parentheses is a collaboration No.)
UC-1301	Execute manufacturing under the manufacturing schedule. (5)
UC-1302	Collect and calculate the manufacturing progresses. (5)

12

13

●Maintenance agent (1 4)

14

Maintenance agent plans various operations such as maintenance in order that the production system can always provide the expected capacity, and manages the execution. Maintenance agent always watches the conditions of production resources, and decides the measures and handles the conditions whenever the abnormality is found.

15

16

17

18

Name	Explanation (No. in parentheses is a
------	---------------------------------------

	collaboration No.)
UC-1401	Set up the maintenance conditions. (8)
UC-1402	Watch the state of facility. (8)
UC-1403	Set up the maintenance scheduling. (8)

1

2

3

4

The interfaces to be possessed by these external agents for manufacturing are as below.

Name	setSchedule	Division	Information sending type
Send	Schedule information	Response	Receipt information
Explanation	Set up the manufacturing schedule.		
UC			
Remarks			

5

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule information
Explanation	Inquire the production schedule originally created by the manufacturing side.		
UC			
Remarks			

6

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt information
Explanation	Set up the information about parameter.		
UC			
Remarks			

7

Name	getParameter	Division	Information
------	--------------	----------	-------------

			inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the information about parameter.		
UC			
Remarks			

1

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information
Explanation	Inquire the product information originally designed by the manufacturing side. Both getProduct and getProcess can inquire the manufacturing BOM information.		
UC			
Remarks			

2

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the production process information about the facilities or operations originally designed by the manufacturing side. Both getProduct and getProcess can inquire the manufacturing BOM information.		
UC			
Remarks			

3

Name	setOrder	Division	Information sending type
Send	Order information	Response	Receipt information
Explanation	Set up the production order for the manufacturing side. changeOrder can be used for changing order and cancelOrder can be used for canceling.		
UC			

1

Remarks	
---------	--

Name	getOrder	Division	Information inquiring type
Send	Request	Response	Order information
Explanation	Receive the order requested from the manufacturing side. The targets are the operations for maintenance and so on.		
UC			
Remarks			

2

Name	getEstimation	Division	Information inquiring type
Send	Request	Response	Estimation inforamtion
Explanation	Inquire the estimation information about the person hours, the duetime and the quantity of producible products for manufacturing.		
UC			
Remarks			

3

Name	setComplaint	Division	Information sending type
Send	Complaint information	Response	Receipt information
Explanation	Send the complaint information to the manufacturing side and make it take the measures.		
UC			
Remarks			

4

Name	getProgress	Division	Information inquiring type
Send	Request	Response	Progress

			information
Explanation	Ask the progress state to the manufacturing side.		
UC			
Remarks			

1

Name	setEmergency	Division	Information sending type
Send	Emergency information	Response	Receipt information
Explanation	Notify the manufacturing side that the emergency occurs, and make it take the measures immediately.		
UC			
Remarks			

2

Name	GetStock	Division	Information sending type
Send	Request	Response	Inventory information
Explanation	Inquire the stock information grasped by the manufacturing side.		
UC			
Remarks			

3

Name	getLoad	Division	Information inquiring type
Send	Request	Response	Load information
Explanation	Inquire the load information grasped by the manufacturing side.		
UC			
Remarks			

4

Name	getCapacity	Division	Information sending type
------	-------------	----------	--------------------------

Send	Request	Response	Capacity information
Explanation	Inquire the production capacity information grasped by the manufacturing side.		
UC			
Remarks			

1

Name	getLot	Division	Information inquiring type
Send	Request	Response	Lot information
Explanation	Inquire the production lot information.		
UC			
Remarks			

2

Name	getTask	Division	Information inquiring type
Send	Request	Response	Task information
Explanation	Inquire the task information for resources.		
UC			
Remarks			

1 5. Details of Interface

2 The definition of each agent and the interfaces between agents in APS
 3 are located as the future extension specification for PSLX. In this
 4 specification, the interface specifications for three interfaces:
 5 Planning agent, Scheduling agent and Federation management agent
 6 given as below are prescribed. The roles of these internal agents
 7 are very important for the entire functions of APS and greatly
 8 influence APS behavior.

9 5.1. Interface List

10 The following list shows the names of interfaces in Planning agent,
 11 Scheduling agent, Federation management agent.

Interface name	Planning	Scheduling	Federation management
initPlan	○		
makePlan	○		
initSchedule		○	
makeSchedule		○	
setParameter	○		○
getParameter	○		○
setCalculation	○		○
getCalculation	○		○
setConstraint	○		
getConstraint	○		
setPlan	○		○
getPlan	○		○
setSchedule		○	○
getSchedule		○	○
setParty	○	○	
getparty	○	○	
setProduct	○	○	○

getProduct	○	○	○
setProcess	○	○	○
getProcess	○	○	○
setOrder	○	○	○
getOrder	○	○	○
setEstimation		○	○
getEstimation		○	○
setComplaint			○
getComplaint			○
setProgress		○	○
getProgress		○	○
setEmergency			○
getEmergency			○
setStock	○	○	○
getStock	○	○	○
setLoad	○	○	○
getLoad	○	○	○
setCapacity	○	○	○
getCapacity	○	○	○
setLot		○	
getLot		○	
setTask		○	
getTask		○	

1

2

5.2. Planning Agent

3

The interfaces of Planning agent are as below.

Name	initPlan	Division	Processing request type
Send	Processing content	Response	Processing result
Explanation	Initialize for planning.		
UC			
Remarks			

4

Name	makePlan	Division	Processing request type
Send	Processing content	Response	Processing result
Explanation	Make a plan.		
UC	UC-201, UC-203, UC-206, UC-207		
Remarks			

1

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt information
Explanation	Set up the parameter required for planning.		
UC	UC-206, UC-207		
Remarks			

2

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the parameter required for planning.		
UC	UC-201		
Remarks			

3

Name	setCalculation	Division	Information sending type
Send	Calculation information	Response	Receipt information
Explanation	Set up the calculation.		
UC	UC-206, UC-207		
Remarks			

4

Name	getCalculation	Division	Information inquiring type
------	----------------	----------	----------------------------

Send	Request	Response	Calculation information
Explanation	Inquire the result of calculation.		
UC			
Remarks			

1

Name	setConstraint	Division	Information sending type
Send	Constraint information	Response	Receipt information
Explanation	Set up the constraint.		
UC			
Remarks			

2

Name	getConstraint	Division	Information inquiring type
Send	Request	Response	Constraint information
Explanation	Inquire the constraint.		
UC			
Remarks			

3

Name	setPlan	Division	Information sending type
Send	Plan value information	Response	Receipt information
Explanation	Set up the plan.		
UC	UC-202, UC-206, UC-207		
Remarks			

4

Name	getPlan	Division	Information inquiring type
Send	Request	Response	Plan value

			information
Explanation	Inquire the plan.		
UC			
Remarks			

1

Name	setParty	Division	Information sending type
Send	Enterprise information	Response	Receipt information
Explanation	Set up the customer information or the supplier information.		
UC			
Remarks			

2

Name	getParty	Division	Information inquiring type
Send	Request	Response	Enterprise information
Explanation	Inquire the customer information or the supplier information.		
UC			
Remarks			

3

Name	setProduct	Division	Information sending type
Send	Product information	Response	Receipt information
Explanation	Set up the product information.		
UC			
Remarks			

4

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information

Explanation	Inquire the product information.		
UC			
Remarks			

1

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the production process information.		
UC			
Remarks			

2

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the production process information.		
UC			
Remarks			

3

Name	setOrder	Division	Information sending type
Send	Order information	Response	Receipt information
Explanation	Set up the order.		
UC			
Remarks			

4

Name	getOrder	Division	Information inquiring type
Send	Request	Response	Order information
Explanation	Inquire the order.		
UC			
Remarks			

5

Name	setStock	Division	Information sending
------	----------	----------	---------------------

			type
Send	Inventory information	Response	Receipt information
Explanation	Set up the stock.		
UC			
Remarks			

1

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	Inquire the stock.		
UC	UC-205		
Remarks			

2

Name	setLoad	Division	Information sending type
Send	Load information	Response	Receipt information
Explanation	Set up the load.		
UC			
Remarks			

3

Name	getLoad	Division	Information inquiring type
Send	Request	Response	Load information
Explanation	Inquire the load.		
UC			
Remarks			

4

Name	setCapacity	Division	Information sending type
Send	Capacity information	Response	Receipt information
Explanation	Set up the production capacity.		

UC	
Remarks	

1

Name	getCapacity	Division	Information inquiring type
Send	Request	Response	Capacity information
Explanation	Inquire the production capacity.		
UC	UC-204		
Remarks			

2

3

5.3. Scheduling Agent

4

The interfaces possessed by Scheduling agent are as below.

Name	initSchedule	Division	Processing request type
Send	Processing content	Response	Processing result
Explanation	Initialize the scheduling.		
UC			
Remarks			

5

Name	makeSchedule	Division	Processing request type
Send	Processing content	Response	Processing result
Explanation	Execute the scheduling.		
UC	UC-302, UC-308, UC-309, UC-310, UC-311, UC-312		
Remarks			

6

Name	setSchedule	Division	Information sending type
Send	Scheduling information	Response	Receipt information
Explanation	Set up the content of scheduling.		

UC	UC-313
Remarks	

1

Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Scheduling information
Explanation	Inquire the content of scheduling.		
UC			
Remarks			

2

Name	setParty	Division	Information sending type
Send	Enterprise information	Response	Receipt information
Explanation	Set up the customer information or the supplier information.		
UC			
Remarks			

3

Name	getParty	Division	Information inquiring type
Send	Request	Response	Enterprise information
Explanation	Inquire the customer information or the supplier information.		
UC			
Remarks			

4

Name	setProduct	Division	Information sending type
Send	Product information	Response	Receipt information
Explanation	Set up the product information.		

UC	
Remarks	

1

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information
Explanation	Inquire the product information.		
UC			
Remarks			

2

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the production process information.		
UC			
Remarks			

3

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the production process information.		
UC			
Remarks			

4

Name	setOrder	Division	Information sending type
Send	Order information	Response	Receipt information
Explanation	Set up the order.		
UC	UC-306, UC-307		
Remarks			

5

Name	getOrder	Division	Information inquiring type
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Send	Request	Response	Order information
Explanation	Inquire the order.		
UC			
Remarks			

1

Name	setEstmate	Division	Information sending type
Send	Estimation information	Response	Receipt information
Explanation	Set up the estimation information.		
UC			
Remarks			

2

Name	getEstimate	Division	Processing request, Information inquiring type
Send	Request	Response	Estimation information
Explanation	Execute the estimation and inquire the result.		
UC	UC-301, UC-303, UC-305		
Remarks			

3

Name	setProgress	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the progress information of operation.		
UC	UC-304		
Remarks			

4

Name	getProgress	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the progress information of operation.		

UC	
Remarks	

1

Name	setStock	Division	Information sending type
Send	Inventory information	Response	Receipt information
Explanation	Set up the stock		
UC			
Remarks			

2

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	Inquire the stock.		
UC			
Remarks			

3

Name	setLoad	Division	Information sending type
Send	Load information	Response	Receipt information
Explanation	Set up the load.		
UC			
Remarks			

4

Name	getLoad	Division	Information inquiring type
Send	Request	Response	Load information
Explanation	Inquire the load.		
UC	UC-305		
Remarks			

5

Name	setCapacity	Division	Information sending type
Send	Capacity information	Response	Receipt information
Explanation	Set up the production capacity.		
UC			
Remarks			

1

Name	getCapacity	Division	Information inquiring type
Send	Request	Response	Capacity information
Explanation	Inquire the production capacity.		
UC			
Remarks			

2

Name	setLot	Division	Information sending type
Send	Lot information	Response	Receipt information
Explanation	Set up the production lot information.		
UC			
Remarks			

3

Name	getLot	Division	Information inquiring type
Send	Lot information	Response	Receipt information
Explanation	Inquire the production lot information.		
UC			
Remarks			

4

Name	setTask	Division	Information sending type
Send	Request	Response	Task information
Explanation	Set up the task information for resources.		

UC	
Remarks	

1

Name	getTask	Division	Information inquiring type
Send	Task information	Response	Receipt information
Explanation	Inquire the task information for resources.		
UC			
Remarks			

2

3

5.4. Federation Management Agent

4

The interfaces possessed by Federation management agent are as below.

Name	setPlan	Division	Information sending type
Send	Plan value information	Response	Receipt information
Explanation	Set up the plan information.		
UC			
Remarks			

5

Name	getPlan	Division	Information inquiring type
Send	Request	Response	Plan information
Explanation	Inquire the plan information.		
UC	UC-1803, UC-1804		
Remarks			

6

Name	setSchedule	Division	Information sending type
Send	Schedule information	Response	Receipt information
Explanation	Set up the production schedule information.		
UC			

1

Remarks	
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Name	getSchedule	Division	Information inquiring type
Send	Request	Response	Schedule information
Explanation	Inquire the production schedule information.		
UC	UC-1807, UC-1808		
Remarks			

2

Name	setParameter	Division	Information sending type
Send	Parameter information	Response	Receipt information
Explanation	Set up the parameter required for planning.		
UC			
Remarks			

3

Name	getParameter	Division	Information inquiring type
Send	Request	Response	Parameter information
Explanation	Inquire the parameter required for planning.		
UC			
Remarks			

4

Name	setCalculation	Division	Information sending type
Send	Calculation information	Response	Receipt information
Explanation	Set up the calculation.		
UC	UC-206, UC-207		
Remarks			

1

Name	getCalculation	Division	Information inquiring type
Send	Request	Response	Calculation information
Explanation	Inquire the calculation.		
UC			
Remarks			

2

Name	setProduct	Division	Information sending type
Send	Product information	Response	Receipt information
Explanation	Set up the product information.		
UC			
Remarks			

3

Name	getProduct	Division	Information inquiring type
Send	Request	Response	Product information
Explanation	Inquire the product information.		
UC			
Remarks			

4

Name	setProcess	Division	Information sending type
Send	Process information	Response	Receipt information
Explanation	Set up the production process information.		
UC			
Remarks			

5

Name	getProcess	Division	Information inquiring type
Send	Request	Response	Process information

Explanation	Inquire the production process information.
UC	
Remarks	

1

Name	setOrder	Division	Information sending type
Send	Order information	Response	Receipt information
Explanation	Set up the order.		
UC			
Remarks			

2

Name	getOrder	Division	Information inquiring type
Send	Request	Response	Order information
Explanation	Inquire the order.		
UC	UC-1805, UC-1806		
Remarks			

3

Name	setEstimation	Division	Information sending type
Send	Estimation informaton	Response	Receipt information
Explanation	Set up the estimation information.		
UC			
Remarks			

4

Name	getEstimation	Division	Information inquiring type
Send	Request	Response	Estimation information
Explanation	Inquire the estimation information.		
UC			
Remarks			

1

Name	setComplaint	Division	Information sending type
Send	Complaint information	Response	Receipt information
Explanation	Set up the complaint information.		
UC			
Remarks			

2

Name	getComplaint	Division	Information inquiring type
Send	Request	Response	Complaint information
Explanation	Inquire the complaint information.		
UC			
Remarks			

3

Name	setProgress	Division	Information sending type
Send	Progress information	Response	Receipt information
Explanation	Set up the progress information of operation.		
UC			
Remarks			

4

Name	getProgress	Division	Information inquiring type
Send	Request	Response	Process information
Explanation	Inquire the progress information of operation.		
UC			
Remarks			

5

Name	setEmergency	Division	Information sending type
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Send	Emergency information	Response	Receipt information
Explanation	Set up the emergency information.		
UC			
Remarks			

1

Name	getEmergency	Division	Information inquiring type
Send	Request	Response	Emergency information
Explanation	Inquire the emergency information.		
UC			
Remarks			

2

Name	setStock	Division	Information sending type
Send	Inventory information	Response	Receipt information
Explanation	Set up the stock.		
C			
Remarks			

3

Name	getStock	Division	Information inquiring type
Send	Request	Response	Inventory information
Explanation	Inquire the stock.		
UC	UC-1801, UC-1802		
Remarks			

4

Name	setLoad	Division	Information sending type
Send	Load information	Response	Receipt information

Explanation	Set up the load.
UC	
Remarks	

1

Name	getLoad	Division	Information inquiring type
Send	Request	Response	Load information
Explanation	Inquire the load.		
UC			
Remarks			

2

Name	setCapacity	Division	Information sending type
Send	Capacity information	Response	Receipt information
Explanation	Set up the production capacity.		
UC			
Remarks			

3

Name	getCapacity	Division	Information inquiring type
Send	Request	Response	Capacity information
Explanation	Inquire the production capacity.		
UC			
Remarks			

4