Abstract:
OASIS PPS (Production Planning and Scheduling) specifications deal with problems of decision-making in all manufacturing companies who want to have a sophisticated information system for production planning and scheduling. PPS specifications provide XML schema and communication protocols for information exchange among manufacturing application programs in the web-services environment. Part 1: Core Element especially focuses on information model of core elements which can be used as ontology in the production planning and scheduling domain. Since the elements have been designed without particular contexts in planning and scheduling, they can be used in any specific type of messages as a building block depending on the context of application programs.
**Status:**

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1 Introduction

This document prescribes how to describe contents of the XML messages which are used for exchanging
the information on Production Planning and Scheduling by some application software programs.
If information is exchanged between production planning and scheduling applications, the enterprise can
develop systems comparatively easily at a low cost and make them more competitive for the whole
enterprise. To make matters better, the systems will be able to have high extendability in future.
This specification aims at production planning and scheduling for all kinds of products and services
provided by manufacturing enterprises. Production scheduling explained in this specification can be
divided into scheduling in the whole enterprise including some areas and sites, and detailed scheduling
within an individual area and work-centers.
The scope of this specification doesn’t include optimization logic for solution, special knowledge of
individual enterprises, concrete solution methods for production planning and scheduling, and planning
for the total supply chain.

1.1 Terminology
The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD
NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described
in [RFC2119].

1.2 Normative References
[RFC2119] S. Bradner, Key words for use in RFCs to Indicate Requirement
[PPS02] OASIS Public Review Draft 03, PPS (Production Planning and Scheduling) Part
2: Transaction Messages, Version 1.0, http://docs.oasis-
open.org/pps/v1.0/pr03/pps-transaction-messages-1.0.pdf
[PPS03] OASIS Public Review Draft 03, PPS (Production Planning and Scheduling) Part
3: Profile Specifications, Version 1.0, http://docs.oasis-
open.org/pps/v1.0/pr03/pps-profile-specifications-1.0.pdf

1.3 Non-Normative References
[PSLXWP] PSLX Consortium, PSLX White Paper - APS Conceptual definition and
implementation, http://www.pslx.org/

1.4 Terms and definitions
Plan
Unit for intensive information of related orders corresponding to a specific period on a discrete
time scale, or calculated information based on the schedule under the related orders. This can
represent actual results when the related events have been occurred.
Order
Unit of requirement describing concrete item, resource or operation in a specific place at a specific time. This can also represent the results to the requirement.

Party
Customer who is a sender of an order and has a demand to make a decision, or supplier who is a receiver in case that a decision-maker sends the demand that can’t be handled inside.

Item
Object to be produced or consumed by production activities. The quantity or the quality of item is changed during the production activity. Examples include product, parts, module, unit, work in process and materials.

Resource
Object that can provide essential function for production activities. The capacity of function is used during production activity, and is available again after finishing the production. Examples include equipment, machine, device, labor and tool.

Process
Segment of production activities indicating a certain production line or method. This takes duration from start time to end time, and gives added value to the producing item. One process may have two or more than two processes detailed in the lower levels.

Lot
Instance of a specific volume of item that exists in a specific place at a specific time. Generally the specific time corresponds to start or end of an operation, and the specific volume is equal to the quantity of item produced or consumed by the operation.

Task
Unit of necessity to execute a specific operation at a specific time, indicating the volume of used capability provided by the applicable resource. This can represent both capacity value provided by resource at a specific time point, and aggregated total value of capacity provided by resource during specific duration.

Operation
Actual processing element to be executed by a specific task, and to produce or consume a specific lot. It is a concrete instance of particular processes in production activities.
2 Primitive Elements

2.1 Structure of primitive elements

Primitive elements are the minimum series of element that corresponds to the most basic domain objects. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:complexType name="PrimitiveType">
  <xsd:sequence>
    <xsd:element ref="Compose" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Produce" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Consume" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Assign" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Relation" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Location" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Capacity" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Progress" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Spec" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Start" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="End" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Event" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Price" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Cost" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Priority" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Display" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Description" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Author" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Date" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:string" use="required"/>
  <xsd:attribute name="key" type="xsd:long"/>
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="parent" type="xsd:string"/>
  <xsd:attribute name="type" type="xsd:string"/>
  <xsd:attribute name="status" type="xsd:string"/>
  <xsd:attribute name="party" type="xsd:string"/>
  <xsd:attribute name="plan" type="xsd:string"/>
  <xsd:attribute name="order" type="xsd:string"/>
  <xsd:attribute name="item" type="xsd:string"/>
  <xsd:attribute name="resource" type="xsd:string"/>
  <xsd:attribute name="process" type="xsd:string"/>
  <xsd:attribute name="lot" type="xsd:string"/>
  <xsd:attribute name="task" type="xsd:string"/>
  <xsd:attribute name="operation" type="xsd:string"/>
</xsd:complexType>
```

- id attribute SHOULD represent an identifier of this element.
- key attribute SHOULD represent a key used in the local applications.
- name attribute SHOULD represent the name of this element.
- parent attribute SHOULD represent the identifier of the inherited element of this element.
- type attribute SHOULD represent the division of this element.
- status attribute SHOULD represent the status of this element.
- party attribute SHOULD represent an identifier of the party associated with this element.
- plan attribute SHOULD represent the identifier of the plan associated with this element.
- order attribute SHOULD represent the identifier of the order associated with this element.
2.2 List of primitive elements

This specification defines nine primitive elements: Party, Plan, Order, Item, Resource, Process, Lot, Task, and Operation. The type of those elements SHOULD be represented with the following XML schema.

```
<xsd:element name="Party" type="PrimitiveType"/>
<xsd:element name="Plan" type="PrimitiveType"/>
<xsd:element name="Order" type="PrimitiveType"/>
<xsd:element name="Item" type="PrimitiveType"/>
<xsd:element name="Resource" type="PrimitiveType"/>
<xsd:element name="Process" type="PrimitiveType"/>
<xsd:element name="Lot" type="PrimitiveType"/>
<xsd:element name="Task" type="PrimitiveType"/>
<xsd:element name="Operation" type="PrimitiveType"/>
```

2.2.1 Party element

Party element represents a customer or a supplier. Customer is an object that requests some products or services to the enterprise. The requests are sent to a person who is in charge of production planning and
scheduling. Supplier is an object providing some products or services to the enterprise. Supplier receives orders from the enterprise, and provides corresponding items, resources or processes for the enterprise.

2.2.2 Plan element

Plan element represents a value planned for particular products or services. The value shows volume of the products or services required or resulted during certain period of time. Typical cases of planning period include day, week and month.

2.2.3 Order element

Order element represents an object of information produced to request some products or services. Order is source to create production orders that are finally dispatched to the plant floor. Orders can be divided into inventory order, capacity order and production order according to the type of request.

Example: Ten “A” products are requested.

```
<Order id="Z01" item="A">
  <Spec type="quantity"><Qty value="10"/></Spec>
</Order>
```

Example: Three labors in group “B” are requested.

```
<Order id="Z02" resource="groupB">
  <Spec type="quantity"><Qty value="3"/></Spec>
</Order>
```

Example: Switching operation is requested two times.

```
<Order id="Z03" process="change01">
  <Spec type="quantity"><Qty value="2"/></Spec>
</Order>
```

Example: Order which consist of 10 of “A” and 5 of “B” is totally 3,000 yen.

```
<Order id="Z00">
  <Compose order="Z01"/>
  <Compose order="Z02"/>
  <Price value="3000" unit="yen"/>
</Order>
```

2.2.4 Item element

Item element represents a product, component, parts, work in process (WIP), raw material and other items. Item is produced by any processes, and after that, it is consumed by another processes. Lot is an instance of the corresponding item.

2.2.5 Resource element

Resource element represents a resource, which is an object enabling production, transportation, storage, inspection and other various services. As resource can produce tasks to execute operations, it is assigned to an operation by considering its volume of capacity.
2.2.6 Process element

Process element represents a process that has a function to produce value. Process can be defined as a segment of activities in production process. It produces and consumes production items by being executed during certain period of time.

2.2.7 Lot element

Lot element represents a production lot. Production lot is an object corresponding to a concrete item that actually exists in a specific place at a specific date and time. Lot is produced by an operation and finally consumed by another operation or discarded.

2.2.8 Task element

Task element represents a task, which is an object showing the usage of a specific resource capability for a specific period of time. Schedule may request a certain volume of task for each resource assigned to execute the appropriate operations.

Example: Task corresponding to the volume that 3 labors work load is required for 2 days

```
<Task id="T01">
  <Capacity type="human"><Qty value="3"/></Capacity>
  <Capacity type="duration"><Qty value="2" unit="day"/></Capacity>
</Task>
```

2.2.9 Operation element

Operation element represents a segment of activities that is actually dispatched to plant floor. Operation identifies an executable function at a specific place on a plant floor for a specific time. Operation is associated with a specific lot and task by executing those activities.
3 Relational Elements

3.1 Structure of relational elements

Relational elements represent any relations between primitive elements. A relational element can have properties. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:complexType name="RelationalType">
  <xsd:sequence>
    <xsd:element ref="Location" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Capacity" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Progress" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Spec" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Start" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="End" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Event" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Price" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Cost" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Priority" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Display" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Description" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Author" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Date" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Qty" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Char" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Time" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:string"/>
  <xsd:attribute name="key" type="xsd:long"/>
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="type" type="xsd:string"/>
  <xsd:attribute name="status" type="xsd:string"/>
  <xsd:attribute name="apply" type="xsd:string"/>
  <xsd:attribute name="party" type="xsd:string"/>
  <xsd:attribute name="plan" type="xsd:string"/>
  <xsd:attribute name="order" type="xsd:string"/>
  <xsd:attribute name="item" type="xsd:string"/>
  <xsd:attribute name="resource" type="xsd:string"/>
  <xsd:attribute name="process" type="xsd:string"/>
  <xsd:attribute name="lot" type="xsd:string"/>
  <xsd:attribute name="task" type="xsd:string"/>
  <xsd:attribute name="operation" type="xsd:string"/>
</xsd:complexType>
```

- **id** attribute SHOULD represent an identifier of this element.
- **key** attribute SHOULD represent a key used in the local applications.
- **name** attribute SHOULD represent the name of this element.
- **type** attribute SHOULD represent the division of this element.
- **status** attribute SHOULD represent the status of this element.
- **apply** attribute SHOULD represent application type of this element. This element is a disjunctive (OR) content under the parent element, if the attribute value is "disjunctive".
- **party** attribute SHOULD represent an identifier of the party associated with this element.
- **plan** attribute SHOULD represent the identifier of the plan associated with this element.
- **order** attribute SHOULD represent the identifier of the order associated with this element.
• item attribute SHOULD represent the identifier of the item associated with this element.
• resource attribute SHOULD represent the identifier of the resource associated with this element.
• process attribute SHOULD represent the identifier of the process associated with this element.
• lot attribute SHOULD represent the identifier of the lot associated with this element.
• task attribute SHOULD represent the identifier of the task associated with this element.
• operation attribute SHOULD represent the identifier of the operation associated with this element.

• Location element SHOULD represent the location associated with this element.
• Capacity element SHOULD represent the capacity status of this element.
• Progress element SHOULD represent the progress of this element.
• Spec element SHOULD represent the specification of this element.
• Start element SHOULD represent the start event of this element.
• End element SHOULD represent the completion event of this element.
• Event element SHOULD represent the optional event under this element.
• Price element SHOULD represent the price of this element.
• Cost element SHOULD represent the cost of this element.
• Priority element SHOULD represent the priority of this element.
• Display element SHOULD represent how to display this element.
• Description element SHOULD represent the description of this element.
• Author element SHOULD represent the author of this element information.
• Date element SHOULD represent the date of this element information.
• Qty element SHOULD represent the quantity of this element.
• Char element SHOULD represent the qualitative value of this element.
• Time element SHOULD represent the time of this element.

### 3.2 List of relational elements

This part of specifications defines five relational elements: Compose, Produce, Consume, Assign, and Relation. Relational element defines relationship between the parent element and those that characterize the element. The type of this element SHOULD be represented with the following XML schema.

```xml
<xsd:element name="Compose" type="RelationalType"/>
<xsd:element name="Produce" type="RelationalType"/>
<xsd:element name="Consume" type="RelationalType"/>
<xsd:element name="Assign" type="RelationalType"/>
<xsd:element name="Relation" type="RelationalType"/>
```

#### 3.2.1 Compose element

Compose element defines a hierarchical relation between the parent element and another same primitive element that addresses one level upper or lower than the target element. This element can represent that the object referred to in this element composes or be composed by the parent element.

Example: Product “A” family includes product “A1” and product “A2”.
Example: Product “B” is assembled with 2 of parts “C1” and 3 of parts “C2”.

Example: 2 of parts “C1” are used for product “B1”, and 5 of parts “C1” are used for product “B2”.

### 3.2.2 Produce element

*Produce* element defines a relation between processes and items, or a relation between operations and lots. This element can show the quantity of the item or lot produced by the process or operation respectively, or how many items or lots are produced by the process or the operation respectively.

### 3.2.3 Consume element

*Consume* element defines a relation between processes and items, or a relation between operations and lots. This element can show the quantity of the item or lot consumed by the process or operation respectively, or how many items or lots are consumed by the process or operation respectively.

### 3.2.4 Assign element

*Assign* element defines a relation between processes and resources, or a relation between operations and tasks. This element can show the volume of capacity provided by the resource or task assigned for the process or operation respectively, or how many resources or tasks are used.

### 3.2.5 Relation element

*Relation* element can show that the parent element has a specific relation to other primitive elements. This element can additionally define relational classes between primitive elements. Examples include precedence relations and pegging relations.
4 Specific Elements

4.1 Structure of specific element

Specific elements are defined to represent any properties of the primitive element. This element MAY be
described more than once on the same parent element if the value is historical. Those multiple properties
have time stamp. The type of this element SHOULD be represented with the following XML schema and
SHOULD fulfill the following constraints.

```xml
<xsd:complexType name="SpecificType">
  <xsd:sequence>
    <xsd:element ref="Start" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="End" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Event" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Price" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Cost" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Priority" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Display" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Description" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Author" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Date" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Qty" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Char" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Time" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:string"/>
  <xsd:attribute name="key" type="xsd:long"/>
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="type" type="xsd:string"/>
  <xsd:attribute name="status" type="xsd:string"/>
  <xsd:attribute name="apply" type="xsd:string"/>
</xsd:complexType>
```

- **id** attribute SHOULD represent an identifier of this element.
- **key** attribute SHOULD represent a key used in the local applications.
- **name** attribute SHOULD represent the name of this element.
- **type** attribute SHOULD represent the division of this element.
- **status** attribute SHOULD represent the status of this element.
- **apply** attribute SHOULD represent application type of this element. Specification of the element is
  relative, if the value is "relative ".
- **Start** element SHOULD represent the start event of this element.
- **End** element SHOULD represent the completion event of this element.
- **Event** element SHOULD represent the optional event under this element.
- **Price** element SHOULD represent the price of this element.
- **Cost** element SHOULD represent the cost of this element.
- **Priority** element SHOULD represent the priority of this element.
- **Display** element SHOULD represent how to display this element.
- **Description** element SHOULD represent the description of this element.
- **Author** element SHOULD represent the author of this element information.
4.2 List of specific elements

For specific elements, this part of specifications has four elements: Location, Capacity, Progress, and Spec. The type of this element SHOULD be represented with the following XML schema.

```
<xsd:element name="Location" type="SpecificType"/>
<xsd:element name="Capacity" type="SpecificType"/>
<xsd:element name="Progress" type="SpecificType"/>
<xsd:element name="Spec" type="SpecificType"/>
```

4.2.1 Location element

Location element represents a location. When the expression of location has structure, multiple values can be set by describing different names of the data. Change of the location depending on time can also be represented by multiple values.

Example: Customer’s address

```
<Party id="ABC Inc.">
  <Location type="address"><Char value="123 ABC street"/></Location>
  <Location type="city"><Char value="Cambridge"/></Location>
  <Location type="state"><Char value="MA"/></Location>
  <Location type="code"><Char value="02139"/></Location>
  <Location type="country"><Char value="USA"/></Location>
</Party>
```

4.2.2 Capacity element

Capacity element represents volume of capability provided by resources, items or processes. In the case of resource capability, it may show available amount of corresponding tasks. In the case of Items, it shows the available amount of Lots. And for Processes, it shows maximum ratio of production. All of this information is represented in a time horizon.

Example: Inventory level of “material01”

```
<Item id="material01">
  <Capacity><Qty value="150"/></Capacity>
</Item>
```

Example: Temporal change of the material

```
<Item id="material01">
  <Capacity><Qty value="150"/><Time value="2005-04-10T00:00:00"/></Capacity>
  <Capacity><Qty value="200"/><Time value="2005-04-17T00:00:00"/></Capacity>
</Item>
```

Example: Material location information: Stock of “material01” is 150 located at “storage01”

```
<Item id="material01">
  <Location value="storage01"/>
</Item>
```
4.2.3 Progress element

Progress element represents progress of order and operation, or status of lot and task. This element shows the latest data, status or progress at a specific time point. This element MAY represent a change of time-dependent values.

4.2.4 Spec element

Spec element represents various specifications for primitive elements. The content can be represented with a pair of a spec name and a value. This element can also represent time-dependent change of the value. The value of the specification is represented with one data type of a numerical value, characters and date time. Spec elements with the same specification name under a common parent element SHOULD be represented with the same data type.
5 Eventual Elements

5.1 Structure of eventual element

Eventual elements represent any properties that occur at one time point. Any type of events can be specified by using this element. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:complexType name="EventualType">
  <xsd:sequence>
    <xsd:element ref="Priority" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Display" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Description" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Author" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Date" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Qty" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Char" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Time" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:string"/>
  <xsd:attribute name="key" type="xsd:long"/>
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="type" type="xsd:string"/>
  <xsd:attribute name="status" type="xsd:string"/>
  <xsd:attribute name="apply" type="xsd:string"/>
  <xsd:attribute name="condition" type="xsd:string"/>
  <xsd:attribute name="value" type="xsd:string"/>
</xsd:complexType>
```

- `id` attribute SHOULD represent an identifier of this element.
- `key` attribute SHOULD represent a key used in the local applications.
- `name` attribute SHOULD represent the name of this element.
- `type` attribute SHOULD represent the division of this element.
- `status` attribute SHOULD represent the status of this element.
- `apply` attribute SHOULD represent application type of this element. The condition of this element is exclusive, if the value is "exclusive".
- `condition` attribute SHOULD represent the condition of this element.
- `value` attribute SHOULD represent the qualitative value of this element.
- `Priority` element SHOULD represent the priority of this element.
- `Display` element SHOULD represent how to display this element.
- `Description` element SHOULD represent the description of this element.
- `Author` element SHOULD represent the author of this element information.
- `Date` element SHOULD represent the date of this element information.
- `Qty` element SHOULD represent the quantity of this element.
- `Char` element SHOULD represent the qualitative value of this element.
- `Time` element SHOULD represent the time of this element.
5.2 List of eventual elements

This part of specifications defines three eventual elements: Start, End, and Event. The Start and End are special cases of Event element. The type of this element SHOULD be represented with the following XML schema.

```xml
<xsd:element name="Start" type="EventualType"/>
<xsd:element name="End" type="EventualType"/>
<xsd:element name="Event" type="EventualType"/>
```

5.2.1 Start element

Start element represents a start event of orders, processes or operations. In case of order, this element represents an event at the earliest start time of corresponding operations.

5.2.2 End element

End element represents an end event of orders, processes or operations. In case of order, this element represents an event at the latest end time of corresponding operations.

5.2.3 Event element

Event element represents an event associated with a customer, supplier, item, resource, process or operation. Event brings any action or any status change at a specific time point. In general, the status value of item or resource changes discontinuously before the event.
6 Accounting Elements

6.1 Structure of Accounting element

Accounting element represents any accounting information such as profit revenue and cost spending. Price and cost associated with goods and services are the target of the elements. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:complexType name="AccountingType">
  <xsd:sequence>
    <xsd:element ref="Priority" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Display" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Description" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Author" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Date" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Qty" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Char" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Time" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:string"/>
  <xsd:attribute name="key" type="xsd:long"/>
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="type" type="xsd:string"/>
  <xsd:attribute name="status" type="xsd:string"/>
  <xsd:attribute name="value" type="xsd:string"/>
  <xsd:attribute name="condition" type="xsd:string"/>
  <xsd:attribute name="apply" type="xsd:string"/>
</xsd:complexType>
```

- **id** attribute SHOULD represent an identifier of this element.
- **key** attribute SHOULD represent a key used in the local applications.
- **name** attribute SHOULD represent the name of this element.
- **type** attribute SHOULD represent the division of this element.
- **status** attribute SHOULD represent the status of this element.
- **apply** attribute SHOULD represent application type of this element. The condition of this element is exclusive, if the value is "exclusive".
- **condition** attribute SHOULD represent the condition of this element.
- **value** attribute SHOULD represent the qualitative value of this element.

- **Priority** element SHOULD represent the priority of this element.
- **Display** element SHOULD represent how to display this element.
- **Description** element SHOULD represent the description of this element.
- **Author** element SHOULD represent the author of this element information.
- **Date** element SHOULD represent the date of this element information.
- **Qty** element SHOULD represent the quantitative value of this element.
- **Char** element SHOULD represent the qualitative value of this element.
- **Time** element SHOULD represent the temporal value of this element.
6.2 List of accounting elements

For accounting elements, *Price* element and *Cost* element are defined in this specification. The type of this element SHOULD be represented with the following XML schema.

```xml
<xsd:element name="Price" type="AccountingType"/>
<xsd:element name="Cost" type="AccountingType"/>
```

6.2.1 Price element

*Price* element represents a price. This element can be used to represent price information of primitive element and some properties.

6.2.2 Cost element

*Cost* element represents a cost. This element can be used to represent cost information of primitive element and some properties.
7 Administrative Elements

7.1 Structure of Administrative Elements

Administrative elements represent any administrative information, which is not the main body of the problem domain but the information how to deal with the domain information. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:complexType name="AdministrativeType">
  <xsd:sequence>
    <xsd:element ref="Qty" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Char" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element ref="Time" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="type" type="xsd:string"/>
  <xsd:attribute name="status" type="xsd:string"/>
  <xsd:attribute name="apply" type="xsd:string"/>
  <xsd:attribute name="condition" type="xsd:string"/>
  <xsd:attribute name="value" type="xsd:string"/>
</xsd:complexType>
```

- `name` attribute SHOULD represent the name of this element.
- `type` attribute SHOULD represent the division of this element.
- `status` attribute SHOULD represent the status of this element.
- `apply` attribute SHOULD represent application type of this element. The condition of this element is exclusive, if the value is "exclusive".
- `condition` attribute SHOULD represent the condition of this element.
- `value` attribute SHOULD represent the qualitative value of this element.
- `Qty` element SHOULD represent the quantitative value of this element.
- `Char` element SHOULD represent the qualitative value of this element.
- `Time` element SHOULD represent the temporal value of this element.

7.2 List of Administrative Elements

For administrative elements, `Priority`, `Display`, `Description`, `Author` and `Date` elements are defined in this specification. The type of this element SHOULD be represented with the following XML schema.

```xml
<xsd:element name="Priority" type="AdministrativeType"/>
<xsd:element name="Display" type="AdministrativeType"/>
<xsd:element name="Description" type="AdministrativeType"/>
<xsd:element name="Author" type="AdministrativeType"/>
<xsd:element name="Date" type="AdministrativeType"/>
```
7.2.1 Priority element

Priority element represents the priority of the primitive element or the parent element. This information is used to make a decision for planning or scheduling.

7.2.2 Display element

Display element is an element to set how to display the parent element. This element can specify colors or display locations on the screen.

7.2.3 Description element

Description element is an element to set an optional comment of the parent element. The comment data type is a character string.

7.2.4 Author element

Author element represents the author and its related information such as the authoring date. This information is not about the target domain model, but information processing model.

7.2.5 Date element

Date element is an element that shows the creation date, expire date, revising date, and so forth. This information is for administrative use of the domain model.
8 Data Elements

8.1 Qty element

Qty element SHOULD represent quantitative information. This element can be used to represent the quantitative numerical data by decimal type data format. Unit of the value can be set in this element, and representation of fraction is available. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:element name="Qty">
  <xsd:complexType>
    <xsd:attribute name="name" type="xsd:string"/>
    <xsd:attribute name="type" type="xsd:string"/>
    <xsd:attribute name="status" type="xsd:string"/>
    <xsd:attribute name="apply" type="xsd:string"/>
    <xsd:attribute name="condition" type="xsd:string"/>
    <xsd:attribute name="value" type="xsd:decimal"/>
    <xsd:attribute name="count" type="xsd:long"/>
    <xsd:attribute name="unit" type="xsd:string"/>
    <xsd:attribute name="base" type="xsd:decimal"/>
  </xsd:complexType>
</xsd:element>
```

- `name` attribute SHOULD represent the name of this element.
- `type` attribute SHOULD represent the division of this element.
- `status` attribute SHOULD represent the status of this element.
- `apply` attribute SHOULD represent application type of this element. The condition of this element is exclusive, if the value is "exclusive".
- `condition` attribute SHOULD represent the condition of this element.
- `value` attribute SHOULD represent the content corresponding to the qty element.
- `count` attribute SHOULD represent the countable value of this element.
- `unit` attribute SHOULD represent the type of currency unit data of this element.
- `base` attribute SHOULD represent the base data of this element. The value of the "value" attribute is divided with this value.

Example: 1/3 meters

```xml
<Qty value="1" unit="m" base="3"/>
```

Example: 3 weeks (discrete time scale)

```xml
<Qty count="3" unit="week"/>
```

8.2 Char element

Char element SHOULD represent character data. This element can be used to represent a qualitative value of specification or a value of location. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:element name="Char">
  <xsd:complexType>
    <xsd:attribute name="val" type="xsd:string"/>
    <xsd:attribute name="loc" type="xsd:string"/>
    <xsd:attribute name="type" type="xsd:string"/>
    <xsd:attribute name="status" type="xsd:string"/>
    <xsd:attribute name="apply" type="xsd:string"/>
    <xsd:attribute name="condition" type="xsd:string"/>
    <xsd:attribute name="value" type="xsd:decimal"/>
    <xsd:attribute name="count" type="xsd:long"/>
    <xsd:attribute name="unit" type="xsd:string"/>
    <xsd:attribute name="base" type="xsd:decimal"/>
  </xsd:complexType>
</xsd:element>
```
<xsd:complexType>
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="type" type="xsd:string"/>
  <xsd:attribute name="status" type="xsd:string"/>
  <xsd:attribute name="apply" type="xsd:string"/>
  <xsd:attribute name="condition" type="xsd:string"/>
  <xsd:attribute name="value" type="xsd:string"/>
  <xsd:attribute name="count" type="xsd:long"/>
  <xsd:attribute name="unit" type="xsd:string"/>
  <xsd:attribute name="base" type="xsd:string"/>
</xsd:complexType>
</xsd:element>

- *name* attribute SHOULD represent the name of this element.
- *type* attribute SHOULD represent the division of this element.
- *status* attribute SHOULD represent the status of this element.
- *apply* attribute SHOULD represent application type of this element. The condition of this element is exclusive, if the value is “exclusive”.
- *condition* attribute SHOULD represent the condition of this element.
- *value* attribute SHOULD represent the content corresponding to the qty element.
- *count* attribute SHOULD represent the countable value of this element.
- *unit* attribute SHOULD represent the type of currency unit data of this element.
- *base* attribute SHOULD represent the base data of this element. The value of the “value” attribute is divided with this value.

### 8.3 Time element

*Time* element SHOULD represent a specific time. Time is represented by a continuous time scale, or a specific discrete time scale. The type of this element SHOULD be represented with the following XML schema and SHOULD fulfill the following constraints.

```xml
<xsd:element name="Time">
  <xsd:complexType>
    <xsd:attribute name="name" type="xsd:string"/>
    <xsd:attribute name="type" type="xsd:string"/>
    <xsd:attribute name="status" type="xsd:string"/>
    <xsd:attribute name="apply" type="xsd:string"/>
    <xsd:attribute name="condition" type="xsd:string"/>
    <xsd:attribute name="value" type="xsd:dateTime"/>
    <xsd:attribute name="count" type="xsd:long"/>
    <xsd:attribute name="unit" type="xsd:string"/>
    <xsd:attribute name="base" type="xsd:dateTime"/>
  </xsd:complexType>
</xsd:element>
```

- *name* attribute SHOULD represent the name of this element.
- *type* attribute SHOULD represent the division of this element.
- *status* attribute SHOULD represent the status of this element.
- *apply* attribute SHOULD represent application type of this element. The condition of this element is exclusive, if the value is “exclusive”.
- *condition* attribute SHOULD represent the condition of this element.
- *value* attribute SHOULD represent the content corresponding to the qty element.
• count attribute SHOULD represent the countable value of this element.
• unit attribute SHOULD represent the type of currency unit data of this element.
• base attribute SHOULD represent the base data of this element. The value of the “value” attribute is divided with this value.

Example: noon on May 13th, 2005

```xml
<Time value="2005-05-13T12:00:00"/>
```

Example: 2 months later since the present month (May, 2005) (discrete time scale)

```xml
<Time count="2" unit="month" base="2005-05-01T00:00:00"/>
```
9 Conformance

A document or part of document confirms OASIS PPS Core Elements if all elements in the artifact are consistent with the normative text of this specification, and the document can be processed properly with the XML schema that can be downloaded from the following URI.

http://docs.oasis-open.org/pps/v1.0/pps-schema-1.0.xsd
A. Object Class diagram

Figure A-1 shows the structure of primitive objects in this specification with a UML class diagram. Each object corresponds to each XML element. In this figure, arrows represent relative information between the source and destination objects. When an arrow has role names, it corresponds to an independent XML element in the specification. This figure doesn’t include all the information of XML schema but the partial information of the primitive elements.
B. Cross reference of elements

Table B-1 shows the relations between elements. The row headers represent parent elements and the column headers represent child elements. Symbol * in the table means 0 or more than 0 element can be described.

Table B-1 Element and sub-element relations

<table>
<thead>
<tr>
<th>Party</th>
<th>Plan</th>
<th>Order</th>
<th>Item</th>
<th>Resource</th>
<th>Process</th>
<th>Lot</th>
<th>Task</th>
<th>Operation</th>
<th>Compose</th>
<th>Produce</th>
<th>Consume</th>
<th>Assign</th>
<th>Relation</th>
<th>Location</th>
<th>Capacity</th>
<th>Progress</th>
<th>Spec</th>
<th>Start</th>
<th>End</th>
<th>Event</th>
<th>Price</th>
<th>Cost</th>
<th>Priority</th>
<th>Display</th>
<th>Description</th>
<th>Author</th>
<th>Date</th>
<th>Qty</th>
<th>Char</th>
<th>Time</th>
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</tbody>
</table>
The following table B-2 shows the correspondence between elements and attributes. The row headers show the element name, and the column headers show attribute the name. The characters in the table represent data types. The character in the table are used as follows: "U" denotes identification character of element, “P” denotes an identification character of referencing elements, “S” denotes the character string, “D” denotes a decimal number, “N” denotes an integer number and “T” for date time. Boldface means required information.

Table B-2 Element and attribute relations

<table>
<thead>
<tr>
<th></th>
<th>id</th>
<th>key</th>
<th>name</th>
<th>parent</th>
<th>type</th>
<th>status</th>
<th>apply</th>
<th>condition</th>
<th>value</th>
<th>count</th>
<th>unit</th>
<th>base</th>
<th>party</th>
<th>plan</th>
<th>order</th>
<th>item</th>
<th>resource</th>
<th>process</th>
<th>lot</th>
<th>task</th>
<th>operation</th>
</tr>
</thead>
<tbody>
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C. Acknowledgements

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

Participants:
- Shinya Matsukawa, Hitachi
- Tomohiko Maeda, Fujitsu
- Masahiro Mizutani, Unisys Corporation
- Akihiro Kawauchi, Individual Member
- Yuto Banba, PSLX Forum
- Osamu Sugi, PSLX Forum
- Hideichi Okamune, PSLX Forum
- Hiroshi Kojima, PSLX Forum
- Ken Nakayama, Hitachi
- Yukio Hamaguchi, Hitachi
- Tomoichi Sato, Individual
- Hiroaki Sasaki, Individual
### D. Revision History

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