Following entity for PhysicalThing is added to Table 7.2

Name	Annotations	Class Expressions
PhysicalThing (physical thing)	Definition: an abstract placeholder to organize physical entities in robotic service environment	Parent Class: owl:Thing

Figure 3 is revised including PhysicalThing as follows.

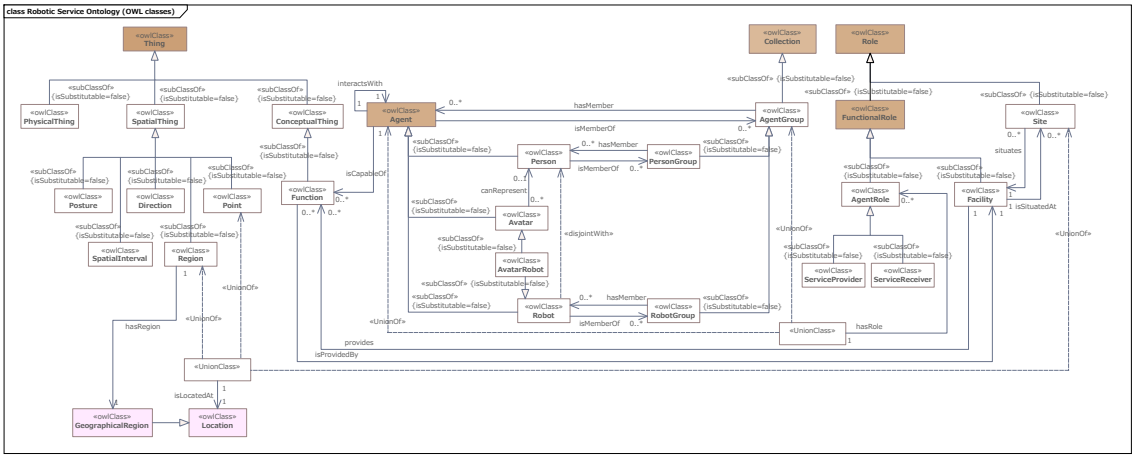


Figure 3 Robotic Service Ontology (OWL classes).

Figure 7 is revised as follows.

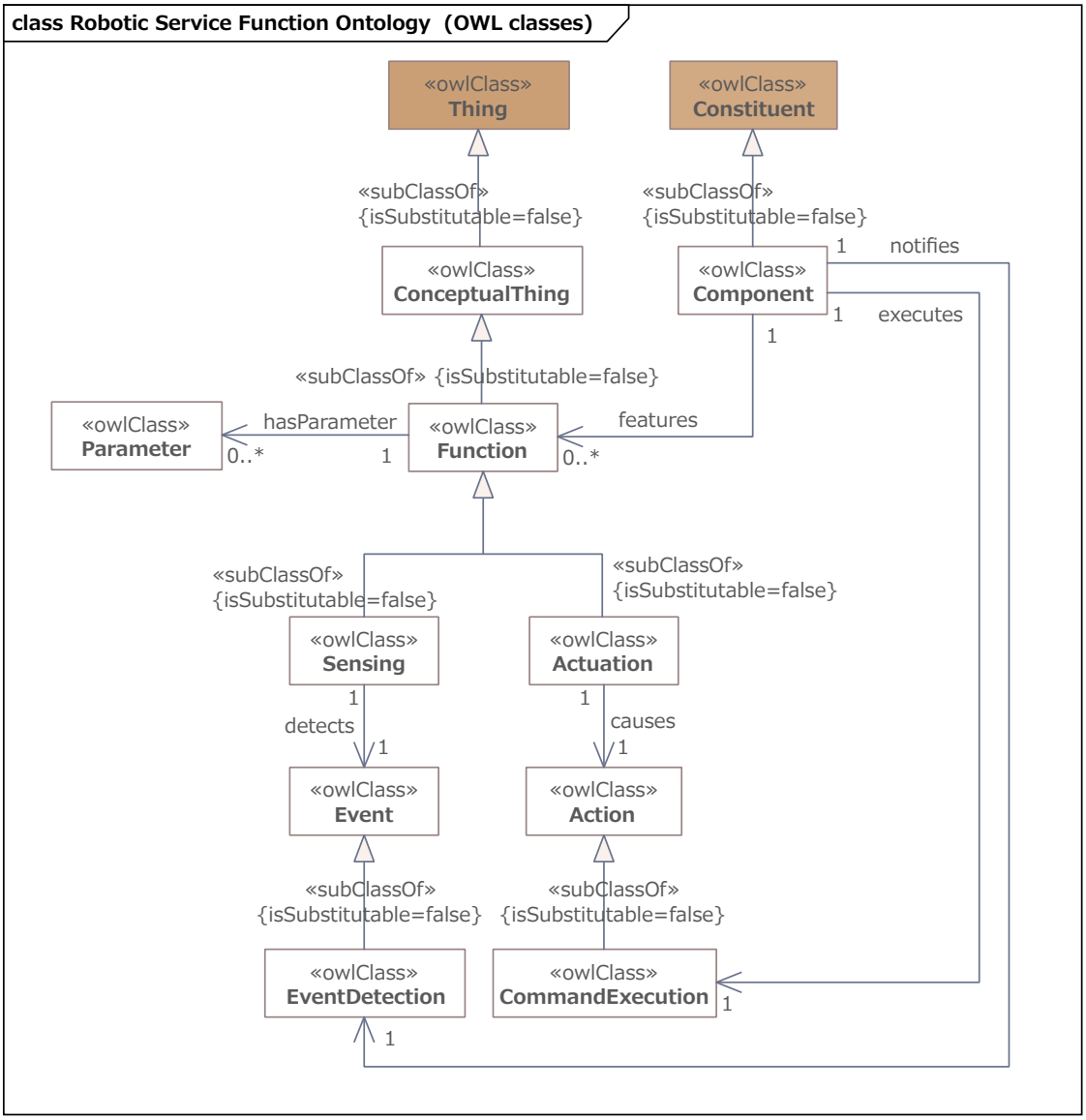
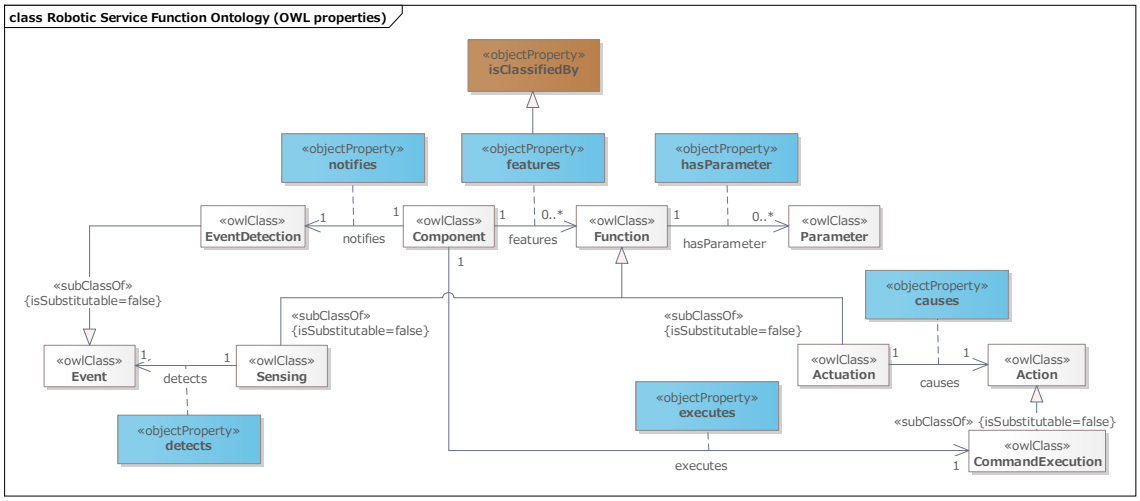


Figure 8 is also revised as follows.



Definitions of two classes EventDetection and CommandExecution, and also properities notifies and executes are added to Table 7.6 as follows.

Name	Annotations	Class Expressions
Actuation (actuation)	Definition: a function to actuate something	Parent Class: roso:Function Disjoint With: roso-fnct:Sensing
CommandExecution (command execution)	Definition: representation of a command execution as an action, which is caused by a component as a responce to an execution request from services that utilize the component	Parent Class: roso-inct:Action
Component (component)	Definition: a functional module that provides robotic functions such as actuation or sensing	Parent Class: cmns-col:Constituent
EventDetection (event notification)	Definition: represention of an event notification as an event, which is caused by a component to notify a real-world event detected by the component of services that utilize the component	Parent Class: roso-inct:Event
Parameter (parameter)	Definition: a value that have effects on a behavior of a component's function	
Sensing (sensing)	Definition: a function to sense something	Parent Class: roso:Function Disjoint With: roso-fnct:Actuation

Name	Annotations	Property Axioms
causes (causes)	Definition: represents actions that a function can actuate	Domain: roso-fnct:Actuation Range: roso-inct:Action
detects (detects)	Definition: represents events that a function can sence	Domain: roso-fnct:Sensing Range: roso-inct:Event
executes (executes)	Definition: represents execution of an action commanded to a component	Domain: roso-fnct:Component Range: roso-fnct:CommandExecution
features (features)	Definition: represents functions that a component can provide	Parent Property: cmns-cls:*isClassifiedBy* Domain: roso-fnct:Component Range: roso:Function
hasParameter (has parameter)	Definition: represents parameters that a function has	Domain: roso:Function Range: roso-fnct:Parameter
notifies (notifies)	Definition: represents notification of an event detected by a component	Domain: roso-fnct:Component Range: roso-fnct:EventDetection

Definitions are also added to robotic service function ontology as follows.

```
<owl:Class rdf:about="&roso-fnct;EventDetection">
    <rdfs:label>event detection</rdfs:label>
    <rdfs:subClassOf rdf:resource="&roso-inct;Event"/>
    <skos:definition>represention of an event detection as an event, which is caused by a component to
notify a real-world event detected by the component of services that utilize the
component</skos:definition>
</owl:Class>

<owl:Class rdf:about="&roso-fnct;CommandExecution">
    <rdfs:label>command execution</rdfs:label>
    <rdfs:subClassOf rdf:resource="&roso-inct;Action"/>
    <skos:definition>representation of a command execution as an action, which is caused by a
component as a responce to an execution request from services that utilize the
component</skos:definition>
</owl:Class>
```

```
<owl:ObjectProperty rdf:about="&roso-fnct;notifies">
    <rdfs:label>notifies</rdfs:label>
    <rdfs:domain rdf:resource="&roso-fnct;Component"/>
    <rdfs:range rdf:resource="&roso-fnct;EventDetection"/>
    <skos:definition>represents notification of an event detected by a component</skos:definition>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="&roso-fnct;executes">
    <rdfs:label>executes</rdfs:label>
    <rdfs:domain rdf:resource="&roso-fnct;Component"/>
    <rdfs:range rdf:resource="&roso-fnct;CommandExecution"/>
    <skos:definition>represents execution of an action commanded to a component</skos:definition>
</owl:ObjectProperty>
```