

**Service Oriented Architecture Information Model
(SOA IM)**

V 0.1

July 2005

Table of Contents

1.0 INTRODUCTION	1
2.0 SOA INFORMATION MODEL (IM)	1
2.1 SOA INFORMATION MODEL ENTITIES	1
2.1.1 Action	1
2.1.2 Activity	2
2.1.3 Agent	3
2.1.4 Application	4
2.1.5 Argument	4
2.1.6 Association	4
2.1.7 Choice	5
2.1.8 ChoiceReference	5
2.1.9 Cluster	6
2.1.10 CollaborativeProcess	6
2.1.11 CollaborativeProcessFlow	7
2.1.12 CPRole	7
2.1.13 Criteria	8
2.1.14 Decision	8
2.1.15 Device	9
2.1.16 EmailAddress	10
2.1.17 Event	10
2.1.18 InformationalReference	11
2.1.19 InputOutput	11
2.1.20 Matrix	12
2.1.21 Message	13
2.1.22 MessageContent	13
2.1.23 MessageRequest	14
2.1.24 Metric	14
2.1.25 ModelReference	15
2.1.26 Organization	15
2.1.27 PostalAddress	16
2.1.28 ProcedureConfirmation	16
2.1.29 Protocol	17
2.1.30 Rule	17
2.1.31 RuleContent	18
2.1.32 Sequence	18
2.1.33 Service	19
2.1.34 Stage	20
2.1.35 System	20
2.1.36 TelephoneNumber	21
2.1.37 Trigger	21
2.1.38 User	22
3.0 COLLABORATIVE PROCESS INFORMATION DOCUMENT	23
3.1 SOA IM HIERARCHY	23
3.2 OASIS EBXML REGISTRY FORMAT FOR CPID	25
3.2.1 SOA IM RIM Format	25
3.2.2 CPID Creation	26
4.0 REFERENCES	34

1.0 Introduction

Semantic integration is a key aspect of today's Service Oriented Architecture (SOA). Using the Federated Enterprise Reference Architecture (FERA), Semantion developed a set of Service Oriented Architecture (SOA) specifications needed to provide full SOA support from both a functional and an implementational point of view.

Semantion addresses SOA semantic integration providing two SOA specifications: SOA Information Model (IM) and SOA Collaboration Semantics (CS). SOA IM can be stored in a standard registry like OASIS ebXML Registry or OASIS UDDI and used to provide informational support for both context and content related to any business process. The SOA IM is presented in a form of an open standard-based XML document referred to as the Collaborative Process Information Document (CPID) that can be either created manually or generated from a business process definition using a visual modeling tool.

This document contains SOA IM details and CPID creation rules based on the OASIS ebXML Registry Information Model (RIM) [ebRIM] and OASIS ebXML Registry Services (RS) [ebRS] standard specifications. CPID creation rules based on the OASIS UDDI will be provided in one of the future releases of this document.

2.0 SOA Information Model (IM)

SOA IM supports SOA Collaboration Semantics (CS) and enables information management of both context and content related to a collaborative process.

One-to-one and one-to-many relationships between SOA IM entities are presented as they are and using Association entity as well. Many-to-many relationships are presented using the Association entity only. Association is explained in Section 2.1.6.

2.1 SOA Information Model Entities

This section covers all SOA IM entities and their attributes.

2.1.1 Action

A consequence of an event taking place.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Action's name
description	String4000	Detailed description
event	String256	Event which this action relates to
reference	String256	Unique ID of the reference
type	String256	The type of the Action (Alert/Compensation/Information/Insertion/Termination/Trigger Flow)

Associated with

- An Event where Event is the target object and association type is "IsActionOf"

Parent: Event

2.1.2 Activity

A task or operation performed by a federate or by a local SOA Federation agent.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Activity's name
description	String4000	Detailed description
collaborativeProcessFlow	String256	CollaborativeProcessFlow's ID
stage	String256	Unique ID of the Stage entity associated with this Activity
resourceAssignmentType	String256	The resourceAssignmentType values can be: Agent, User, Service, Rule or Admin.
resourceAssignment	String256	An ID of the resource that will perform the activity or an ID of a rule or an administrator that will select a resource that will perform the activity. Either the rule or the administrator is used when more than one resource can perform the activity.
timeToComplete	String256	A period of time for which the activity must be completed. If the value for this attribute is not provided the time to complete is unlimited. The value for this attribute is specified using the XSD duration format (e.g., PT1H means one hour).

Associated with

- A CollaborativeProcessFlow where the CollaborativeProcessFlow is the target object and association type is “IsActivityIn”.

Parent: CollaborativeProcessFlow

2.1.3 Agent

The Agent performs an activity or makes a decision or executes an event’s action according to some predefined procedure or logic.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Agent’s name
description	String4000	Detailed description
collaborativeElement	String256	The ID of an activity or a decision or an event’s action performed by the agent
activityStatus	String256	Agent activity status (Active/Inactive/Dormant)
locationType	String256	Agent location type (Fixed/Mobile)
processingType	String256	Agent processing type (Instant/Queue)
activityType	String256	Agent type (CART/Decision)
owner	String256	The ID of the owner (administrator) that registered the agent.
protocol	String256	The ID of the protocol (WSDL, CPPA, etc.) used to communicate with the agent.
modelReference	String256	The reference for the document that contains agent logic in the original agent modeling language format (UML, BPMN, text or other).
rule	String256	The ID of a Rule that the decision type agents will use in making a decision.
version	String16	Agent’s version

Associated with

- An Activity where the Activity is the target object and association type is “IsAgentFor” or
- A Decision where the Decision is the target object and association type is “IsAgentFor”
- An Action where the Action is the target object and association type is “IsAgentFor”
- A Trigger where the Trigger is the target object and association type is “IsAgentFor”

Parent: Activity or Decision or Action or Trigger

2.1.4 Application

The Application is a program running on a System or Device.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Application's name
description	String4000	Detailed description
type	String256	The type of the application.

Associated with

- An Activity or a Decision where the Activity or Decision is the target object and association type is "Supports".
- A System or a Device where the System or Device is the target object and association type is "RunsOn"

2.1.5 Argument

An argument used in a business rule.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Argument's name
description	String4000	Detailed description

Associated with

- A Rule(s) where the Rule is the target object and association type is "IsArgumentOf"

2.1.6 Association

Associates two SOA IM entities. Association types can be dynamically defined. There is a pre-defined set of association types that includes all types used in this document.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Association's name
description	String4000	Detailed description
sourceObject	String256	Source object in the association
targetObject	String256	Target object in the association
type	String256	Association type (any type)

2.1.7 Choice

A choice made by a decision.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Choice's name
description	String4000	Detailed description
decision	String256	Decision which this choice relates to
choiceReference	String256	Unique ID of the reference
time	DateTime	Time when Choice is confirmed

Associated with

- A Decision where the Decision is the target object and association type is "IsChoiceOf"

Parent: Decision

2.1.8 ChoiceReference

An XML document that contains choice value.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	ChoiceReference's name
description	String4000	Detailed description
choice	String256	Choice which ChoiceReference relates to.
documentId	String256	XML document that contains choice value
type	String256	Document type (any type)

value	String256	Document's reference
-------	-----------	----------------------

Associated with

- A Choice where the Choice is the target object and association type "IsChoiceReferenceFor"

May be associated with

- An Activity where the Activity is the target object and association type is "IsInputOf"

Parent: Choice

2.1.9 Cluster

The Cluster groups related events from one or more collaborative process flows which execution is co-related.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Cluster's name
description	String4000	Detailed description
correlation	String256	Logical expression that enables stage transformation of "Slave" events.
eventIdList	String256	A list of events' IDs
stageList	String256	A list of events' stages
typeList	String256	Type of the events in the cluster (Lead/Slave)

Associated with

- A CollaborativeProcessFlow where the CollaborativeProcessFlow is the target object and association type is "IsClusterIn"

2.1.10 CollaborativeProcess

A collaborative process is a set of roles, collaborative process flows and other collaborative elements that represent collaborations between (autonomous) business entities. The collaborative process can have one or more collaborative process flows depending on types and number of collaborations involved in it.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	CollaborativeProcess's name
description	String4000	Detailed description

2.1.11 CollaborativeProcessFlow

A collaborative process flow is a set of correlated activities, events and decisions that represent a collaboration between roles belonging to (autonomous) business entities.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	CollaborativeProcessFlow's name
description	String4000	Detailed description
collaborativeProcess	String256	CollaborativeProcess which this CollaborativeProcessFlow relates to
stage	String256	The stage of the CollaborativeProcessFlow (Start/Progress/End)
timeToComplete	String256	A period of time for which the collaborative process flow must be completed. If the value for this attribute is not provided the time to complete is unlimited. The value for this attribute is specified using the XSD duration format (e.g., PT1H means one hour).

Associated with

- A CollaborativeProcess where the CollaborativeProcess is the source object and association type is "Includes"

Parent: CollaborativeProcess

2.1.12 CPRole

CPRoles perform activities and decisions.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	CPRole's name

description	String4000	Detailed description
-------------	------------	----------------------

Associated with

- A User where the User is the source object and association type is "AssignedToRole"
- An Agent where the Agent is the source object and association type is "AssignedToRole"
- An Organization where the Organization is the source object and association type is "AssignedToRole"
- A CollaborativeProcess where the CollaborativeProcess is the source object and association type is "HasRole"
- An Activity or Decision where the Activity or Decision is the target object and association type is "Performs"

2.1.13 Criteria

The Criteria is an input for a Decision. The Decision makes a choice based on one or more criteria provided.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Criteria's name
description	String4000	Detailed description
type	String256	The type of the Criteria (Information/MessageRequest)

Associated with

- A Decision where the Decision is the target object and association type is "IsCriteriaOf"

2.1.14 Decision

A specific activity in the collaborative process flow that makes choices.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Decision's name
description	String4000	Detailed description

choiceType	String256	The type of the decision's choices (Binary/Primary/Derivative)
collaborativeProcessFlow	String256	CollaborativeProcessFlow's ID
stage	String256	Unique ID of the Stage entity associated with this Decision
resourceAssignmentType	String256	The resourceAssignmentType values can be: Agent, User, Service, Rule or Admin.
resourceAssignment	String256	An ID of the resource that will make the decision or an ID of a rule or an administrator that will select a resource that will make the decision. Either the rule or the administrator is used when more than one resource can make the decision.
timeToComplete	String256	A period of time for which the decision must be completed. If the value for this attribute is not provided the time to complete is unlimited. The value for this attribute is specified using the XSD duration format (e.g., PT1H means one hour).

Associated with

- A CollaborativeProcessFlow where the CollaborativeProcessFlow is the target object and association type is "IsDecisionIn".

Parent: CollaborativeProcessFlow

2.1.15 Device

The Device is a mobile computing resource.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Device's name
description	String4000	Detailed description
type	String256	The type of the device

Associated with

- An Activity or Decision where the Activity or Decision is the source object and association type is "IsSupportedOn".

2.1.16 EmailAddress

The EmailAddress defines attributes of an email address.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
userOrOrganization	String256	User or Organization this address relates to.
address	String256	Email address
type	String256	The type of the email address (Office/Home)

May be associated with

- A User where the User is the target object and association type is “IsEmailAddressOf”
- An Organization where the Organization is the target object and association type is “IsEmailAddressOf”

Parent: User or Organization

2.1.17 Event

An event is a collaborative element that represents a progression point in time in the collaborative process flow of a specific interest to federates. They represent that something happens during the collaborative process flow.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Event’s name
description	String4000	Detailed description
type	String256	Event’s type (Start/Flow/End)
collaborativeProcessFlow	String256	CollaborativeProcessFlow’s ID
stage	String256	Unique ID of the Stage entity associated with this Event
timeToComplete	String256	A period of time for which all event’s actions must be completed. If the value for this attribute is not provided the time to complete is unlimited. The value for this attribute is specified using the XSD duration format (e.g., PT1H means one hour).

May be associated with

- A Cluster where the Cluster is the target object and association type is "IsClusteredBy"
- A CollaborativeProcessFlow where the CollaborativeProcessFlow is the target object and association type is "IsEventIn"

Parent: CollaborativeProcessFlow

2.1.18 InformationalReference

A reference to a document associated with an InputOutput.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	InformationalReference's name
description	String4000	Detailed description
documentId	String256	ID of a document that relates to the InformationalReference
type	String256	Type of the referenced document (any document type or ChoiceDoc)
value	String256	Document's reference
version	String16	Version of the document represented by this InformationalReference

Associated with

- A Criteria where the Criteria is the target object and association type is "IsReferenceFor"
- An InputOutput where the InputOutput is the target object and association type is "IsReferenceFor"
- A Trigger where the Trigger is the target object and association type is "IsReferenceFor"
- A Metric where the Metric is the target object and association type is "IsReferenceFor"

2.1.19 InputOutput

The InputOutput is informational (XML document or message) element that is registered to carry required data for the activity to be performed.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID

name	String256	InputOutput's name
description	String4000	Detailed description
type	String256	The type of InputOutput (Input/Output/Both)
time	DateTime	Time when InputOutput is confirmed

Associated with

- An Activity where the Activity is the target object and association type is "IsInputOf" and/or
- An Activity where the Activity is the target object and association type is "IsOutputOf"
- A Decision where the Decision is the target object and association type is "IsCriteriaOf"
- A Trigger where the Trigger is the target object and association type is "IsInputOf"

2.1.20 Matrix

The Matrix is assigned to each Activity's input and Decision's criteria and it controls the use of the input/criteria during the execution of the Activity/Decision.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Matrix's name
description	String4000	Detailed description
activityDecision	String256	Activity or Decision which this Matrix relates to
inputCriteria	String256	Input or criteria which this Matrix relates to
cType	String256	Defines input coordination character (Latest/Configured)
iType	String256	Defines if single or more than one input/criteria instance is expected (Single/Multiple)
sType	String256	Defines the sequence of the input processing (All/Select)
tType	String256	Defines time character of the input (ASAP/AsAvailable)

Associated with

- An Activity for each its input where the Activity is the target object and association type is "IsMatrixOf"
- A Decision for each its criteria where the Decision is the target object and association type is "IsMatrixOf"
- A Trigger for each its input where the Trigger is the target object and association type is "IsMatrixOf"

Parent: Activity and Input, Trigger and Input or Decision and Criteria

2.1.21 Message

A message that contains an XML formatted content that could be a request, response or something else.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Message's name
description	String4000	Detailed description
documentId	String256	MessageContent ID
value	String256	MessageContent reference

Associated with

- A Trigger where the Trigger is the target object and association type is "IsMessageFor"
- An InputOutput where the InputOutput is the target object and association type is "IsMessageFor"
- A Criteria where the Criteria is the target object and association type is "IsMessageFor"
- An Action where the Action is the target object and association type is "IsMessageFor"

2.1.22 MessageContent

The MessageContent is the content of the Message.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
Id	String256	Unique ID
name	String256	MessageContent's name
description	String4000	Detailed description

Associated with

- A Message where the Message is the target object and association type "IsMessageContentFor"

2.1.23 MessageRequest

The MessageRequest defines message requests used during the collaborations.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
Id	String256	Unique ID
name	String256	MessageRequest's name
description	String4000	Detailed description
type	String256	The type of the MessageRequest (any type)

Associated with

- A Trigger where the Trigger is the target object and association type "IsMessageRequestFor"
- An InputOutput where the InputOutput is the target object and association type is "IsMessageRequestFor"
- Criteria where the Criteria is the target object and association type is "IsMessageRequestFor"

2.1.24 Metric

The Metric contains quantifiable value defining a specific performance variable and its state during the collaboration process.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Metric's name
description	String4000	Detailed description
argument	String256	The name of the argument representing the Metric
frequency	String256	Specifies how frequently is metric calculated (AtChange/AtSchedule)
source	String256	Metric's source (document, message, system,

		etc.)
type	String256	Metric's type (CycleTime/SumInst/QtyInst/QtyAgg/QtyMin/QtyMax)
value	String256	Metric's value
collaborativeProcess	String256	The ID of the CollaborativeProcess which this Metric relates to

Associated with

- Rule's Argument where the Argument is the target object and association type "IsMetricOf"
- CollaborativeProcess where the Collaborative process is the target object and association type is "IsMetricOf"

Parent: CollaborativeProcess and Argument

2.1.25 ModelReference

A reference entity that represents a document containing an agent model or a service model (i.e., UML, BPMN, text, etc.).

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
Id	String256	Unique ID
name	String256	ModelReference's name
description	String4000	Detailed description
documentId	String256	ID of a document that relates to the ModelReference
value	String256	Document's reference
version	String16	Version of the document represented by this InformationalReference

Associated with

- An Agent where the Agent is the target object and association type is "IsModelReferenceFor"
- A Service where the Service is the target object and association type is "IsModelReferenceFor"

2.1.26 Organization

Provides information on organizations.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
Id	String256	Unique ID
name	String256	Organization's name
description	String4000	Detailed description
parent	String256	Parent organization (if applicable)
primaryContact	String256	Unique ID of the person (User) who is the primary contact for the organization

May be associated with

- An Action (if the Action is Alert type only) where the Action is the target object and association type is "IsSubscriberTo"

2.1.27 PostalAddress

The PostalAddress defines attributes of a postal address.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
userOrOrganization	String256	User or Organization this address relates to.
streetNumber	String256	Street number
street	String256	Street name
city	String4000	City name
stateOrProvince	String256	State or province name
postalCode	String256	Postal (ZIP) code
country	String256	Country name

May be associated with

- A User where the User is the target object and association type is "IsPostalAddressOf"
- An Organization where the Organization is the target object and association type is "IsPostalAddressOf"

Parent: User or Organization

2.1.28 ProcedureConfirmation

The ProcedureConfirmation is a run-time entity that specifies the current confirmation status of procedure type SAO IM collaborative entities.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
Id	String256	Unique ID
Name	String256	ProcedureConfirmation's name
Description	String4000	Detailed description
collaborativeEntity	String256	A unique ID of a collaborative entity (Action) which this ProcedureConfirmation relates to
Value	String256	The value of the ProcedureConfirmation (Start/End)

Associated with

- An Action where the Action is the target object and association type "IsProcedureConfirmationOf"

Note: The above Association is a run-time Association that is created during the collaboration.

Parent: Action

2.1.29 Protocol

Provides information about a protocol (i.e., ebXML CPA, WSDL, etc.) used for a collaboration with a service or an agent or a user .

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Organization's name
description	String4000	Detailed description
documentId	String256	Unique ID of a document containing the protocol
type	String256	Protocol's type (i.e., CPA, WSDL, etc.)

May be associated with

- A Service where the Service is the target object and association type is "IsProtocolFor"
- An Agent where the Agent is the target object and association type is "IsProtocolFor"
- A User where the User is the target object and association type is "IsProtocolFor"

2.1.30 Rule

The Rule represents a business rule that will be submitted to the rule engine.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Rule's name
description	String4000	Detailed description
conditionList	String256	A list of unique IDs of the RuleContents that represent the rules.
valueList	String256	A list of values that will be used if applied Rule gives Boolean value true
valueType	String256	The type of the values

Associated with

- A Decision where the Decision is the target object and association type is "IsRuleFor"
- A Decision where the Decision is the target object and association type is "IsAssignmentRuleFor"
- An Activity where the Activity is the target object and association type is "IsAssignmentRuleFor"

2.1.31 RuleContent

The RuleContent represents the content of the Rule.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Rule's name
description	String4000	Detailed description

Associated with

- A Rule where the Rule is the target object and association type "IsRuleContentFor"

2.1.32 Sequence

The Sequence defines an order in which activities, decisions and events are executed.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID

name	String256	Sequence's name
description	String4000	Detailed description
entityIdList	String256	A list of IDs of the collaborative entities which execution is controlled by the Sequence
predecessorList	String256	A list of the collaborative entity's predecessor
successorList	String256	The collaborative entity's successor

Associated with

- An Event's Action, Activity or Decision where the Action, Activity or Decision is the source object and association type is "IsSequenceFor"
- A CollaborativeProcessFlow where the CollaborativeProcessFlow is the target object and association type is "IsSequenceFor"

Parent: Event's Action, Activity or Decision

2.1.33 Service

The Service performs an activity or makes a decision or executes an event's action according to some predefined procedure or logic.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Service's name
description	String4000	Detailed description
collaborativeElement	String256	The ID of an activity or a decision or an event's action performed by the service
protocol	String256	The ID of the protocol used to communicate with the service (WSDL, CPPA, etc.).
modelReference	String256	The reference for the document that contains service logic in the original service modeling language format (UML, BPMN, text or other).
rule	String256	The ID of a Rule that the decision type services will use in making a decision.
version	String16	Service's version

Associated with

- An Activity where the Activity is the target object and association type is "IsServiceFor" or "IsServiceFor"
- A Decision where the Decision is the target object and association type is "IsServiceFor"

- An Action where the Action is the target object and association type is “IsServiceFor”

Parent: Activity or Decision or Action

2.1.34 Stage

The Stage is a run-time entity that specifies the current stage of process type collaborative entities: collaborative process flow, activity, decision or event.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Stage’s name
description	String4000	Detailed description
collaborativeEntity	String256	A unique ID of an Event, CollaborativeProcessFlow, Activity or Decision which this Stage relates to
startTime	String256	Stage’s start time
endTime	String256	Stage’s end time (the time when the event, collaborative process flow, activity or decision changed the stage)
value	String256	The value of the Stage (New/Confirmed/Escalated/Finished for events or Start/Progress/Escalated/End for collaborative process flows and activities/decisions)

Associated with

- An Activity where the Activity is the target object and association type "IsStageOf" or
- A CollaborativeProcessFlow where the CollaborativeProcessFlow is the target object and association type "IsStageOf" or
- A Decision where the Decision is the target object and association type "IsStageOf" or
- An Event where the Event is the target object and association type "IsStageOf"

Note: All above Associations are run-time Associations that are created during the collaboration.

Parent: Activity or CollaborativeProcessFlow or Decision or Event

2.1.35 System

The System is a non-mobile computing resource.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	System's name
description	String4000	Detailed description
type	String256	The type of the system.

Associated with

- An Activity or Decision where the Activity or Decision is the source object and association type is "IsSupportedOn".

2.1.36 TelephoneNumber

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
userOrOrganization	String256	User or Organization this telephone number relates to.
type	String256	Telephone number type (Office/Home/Mobile/Beeper/Fax)
countryCode	String256	Country code
areaCode	String4000	Area code
number	String256	Telephone number
extension	String256	Extension (if provided)

May be associated with

- A User where the User is the target object and association type is "IsTelephoneNumberOf"
- An Organization where the Organization is the target object and association type is "IsTelephoneNumberOf"

Parent: User or Organization

2.1.37 Trigger

The Trigger is a condition that creates an event.

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
id	String256	Unique ID
name	String256	Trigger's name
description	String4000	Detailed description
type	String256	The type of the trigger (Information/Flow/Message/MessageRequest/Rule)
event	String256	Unique ID of the event that is created by this trigger

Associated with

- An Event where the Event is the target object and association type is "IsTriggerOf"

Parent: Event

2.1.38 User

<i>Attribute</i>	<i>Type</i>	<i>Description</i>
Id	String256	Unique ID
Name	String256	User's name
description	String4000	Detailed description
organization	String256	Organization that user works for.
firstName	String256	User's First name
middleName	String256	User's middle name
lastName	String256	User's last name

May be associated with

- An Action (if the Action is Alert type only) where the Action is the target object and association type is "IsSubscriberTo"
- An Organization where the Organization is the target object and association type is "WorksFor"

Parent: Organization

3.0 Collaborative Process Information Document

Collaborative Process Information Document (CPID) is an XML document that contains SOA IM for a collaborative process. It can be written in a standard registry language such as OASIS ebXML Registry or OASIS UDDI.

This section documents CPID format and creation rules with OASIS ebXML Registry. We plan to add OASIS UDDI format and creation rules in one of the future releases of this document.

By using standard formats, CPID can be generated from a business process definition in a visual modeling tool. CPID contains a complete information model of a collaborative process. Submitting the content of this document to a standard registry will generate the collaborative process information model that together with SOA CS enable full open standard-based support for collaborative processes of any type and complexity.

3.1 SOA IM Hierarchy

This section presents a high level hierarchy of SOA IM entities needed for a collaborative process information modeling. The following figure visualizes the hierarchy:

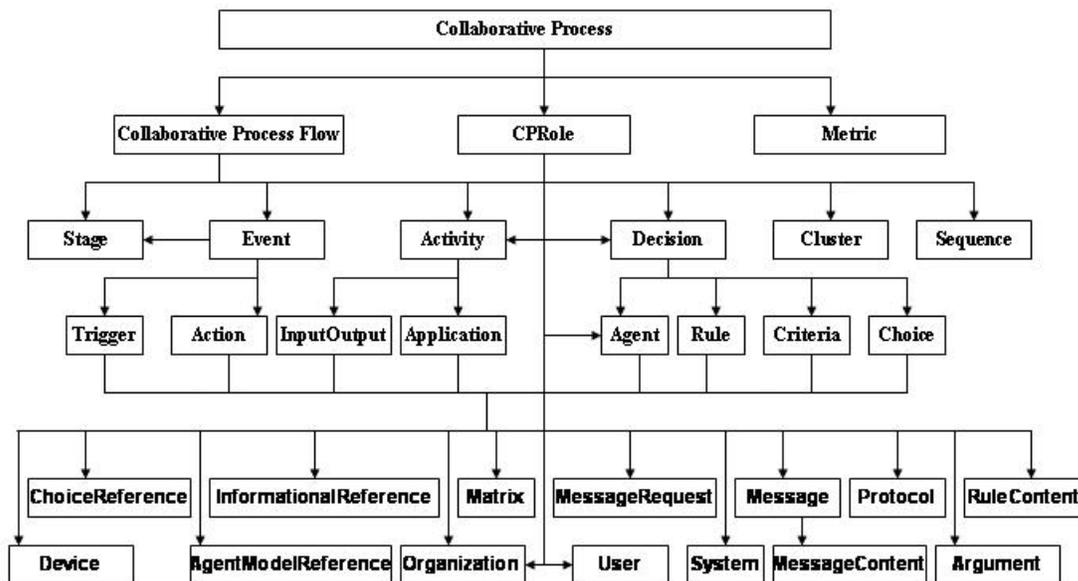


Figure 1: SOA Information Model (High Level)

Following paragraphs explain SOA IM hierarchy presented in *Figure 1*.

CollaborativeProcess is a root entity that represents a business process. It includes *CollaborativeProcessFlows*, *CPRoles* and *Metrics*.

CollaborativeProcessFlow is a set of correlated *Activities*, *Events* and *Decisions* that represent collaboration between roles belonging to (autonomous) business entities. Each flow instance has the instance number and goes through *Stages*. *Sequences* are used if the specific order of executions is required. An *Activity* is a task or an operation performed by a federate or by a local SOA Federation agent. Each *Activity* has one or more inputs and it produces one or more outputs. Since an output of one *Activity* can be an input for another *Activity*, both inputs and outputs are modeled using the *InputOutput* entity. A *Matrix* is assigned to each *Activity*'s input and it controls the use of the input during the execution of the *Activity*.

A *Decision* is a specific activity in the *CollaborativeProcessFlow* that makes choices. *Decisions* are supplied with specific inputs called *Criteria* and possible outputs called *Choices*. An *Agent* is an entity that performs an activity or makes a decision according to some predefined procedure or logic that might also include business *Rules*. A business *Rule* is a logic encapsulated as an expression with sets of *Arguments* defining a domain of interest for the rule. *Applications* run on *Systems* or *Devices* supporting *Activities* and *Decisions*.

An *Event* represents a node (progression point in time) in the *CollaborativeProcessFlow* of a specific interest to participants. It represents that something happens during the *CollaborativeProcessFlow*. *Events* can trigger alerts or insertion of the business logic from another *CollaborativeProcessFlow*. *Events* can be organized into *Clusters* or combine to form compound *Events*. They progress through *Stages* in the life cycle whereby each *Stage* change has a meaning to the participants. *Events* can take place in the federated context or in each of the systems that are federated. A *Trigger* is a condition that creates an *Event*. It could be an output of an *Activity*, result of the execution of a *Rule* or a *Metric* reaching a value, or just the fact that another *Event* has happened. *Triggers* link *Events* with other elements in the collaborative process orchestration. An *Action* is a consequence of an *Event* taking place. It can be an alert message, insertion of a flow, compensation within a flow, link to another flow or termination of a flow, or another trigger (flow trigger). One *Event* can have more *Actions*. Other collaborative process elements (Users, Organizations) can subscribe to or publish *Events*.

Each *CollaborativeProcessFlow* has a set of *CPRoles* that play in it. Each participant (User, Organization, Agent) in the collaboration is assigned to a *CPRole*. *CPRoles* perform *Activities* and *Decisions*.

A *Metric* is information that contains quantifiable value defining specific performance variables and their states during the collaboration.

SOA Collaboration Semantics includes documents and/or *Messages* and *MessageRequests* flows. The content of the documents is referenced by *InformationalReferences* and *ChoiceReferences* while the content of *Messages* is referenced by the *MessageContent*. An *AgentModelReference* is a reference entity that represents a document containing an *Agent* model.

3.2 OASIS ebXML Registry Format for CPID

The current format of the *Collaborative Process Information Document (CPID)* is supported by *OASIS ebXML Registry Information Model (RIM)* [ebRIM] and *OASIS ebXML Registry Services (RS) Specifications v2.1* [ebRS]. An additional feature, from *OASIS ebXML Registry Specifications v3.0*, that relates to HTTP binding is also included in the current CPID format. *OASIS ebXML Registry Specifications v3.0* were recently approved (01 May, 2005) as OASIS standard. The next release of the SOA IM specifications will upgrade CPID format to *OASIS ebXML Registry v3.0* as soon as it completes implementation of modified and new v3.0.

First, all SOA IM entities are “translated” into RIM meta-data and then RS Life Cycle Manager *SubmitObjects* request is used to submit and deploy SOA IM in a Registry that implements OASIS ebXML Registry standard. CPID can be created either manually or using a visual modeling tool. For the visual modeling tool to generate a CPID from a collaborative process model, the translation from the collaborative process model to CPID formatted in OASIS ebXML RIM and RS must be supported. The following sections explain how it can be done.

3.2.1 SOA IM RIM Format

SOA IM RIM format includes the following RIM meta-data entities:

- *Association*
- *ExtrinsicObject*
- *Slot*

Other RIM meta-data entities (i.e., *Classification*, *ClassificationNode*, *ClassificationScheme*, *Service*, *ServiceBinding*, etc.) can be used as well but *Association*, *ExtrinsicObject* and *Slot* are mandatory for SOA IM. For example, *Classification*, *ClassificationNode* and *ClassificationScheme* can be used to implement classifications of any collaborative information from SOA IM and/or another metadata and content stored in the registry. More information about all these meta-data entities is provided in [ebRIM]

Associations are used to define associations between objects in the information model. Association cardinality can be on-to-one, one-to-many and many-to-many.

ExtrinsicObjects provide metadata that describes submitted content whose type is not intrinsically known to the registry and therefore must be described by means of additional attributes (e.g., mime type). *ExtrinsicObjects* can also be used to add business entities of any type even if they do not represent the content.

Slots provide a dynamic way to add arbitrary attributes to registry objects. This enables extensibility within the Registry Information Model.

3.2.2 CPID Creation

CPID creation is based on the following OASIS ebXML Registry Information Model (RIM) and Registry Services (RS) XML schemas:

- *rim-2.1.xsd*
- *rs-2.1.xsd*
- *query-2.1.xsd*

rim-2.1.xsd is OASIS ebXML RIM XML schema, *rs-2.1.xsd* is OASIS ebXML RS XML schema and *query-2.1.xsd* is OASIS ebXML RS query-related XML schema.

rim-2.1.xsd and *rs-2.1.xsd* define CPID format and registry XML-based requests needed to submit CPID and create all SOA IM entities and associations in ebXML Registry. *query-2.1.xsd* defines OASIS ebXML Registry query language required to query SOA IM collaborative information from the registry.

Each SOA IM entity must be represented by an *ExtrinsicObject*. Standard *ExtrinsicObject* metadata attributes will be used plus *Slots* when SOA IM entity specific attributes have to be added. This is the standard approach for creating SOA IM entities in OASIS ebXML RIM.

For example, this is how collaborative process *Demo CP* would be presented in CPID:

```
<rim:ExtrinsicObject id = "cp-id" objectType = "CollaborativeProcess" >
  <rim:Name>
    <rim:LocalizedString value = "Demo CP"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Demo Collaborative Process"/>
  </rim:Description>
</rim:ExtrinsicObject>
```

As you can see in *Section 2.1.10 CollaborativeProcess*, all *CollaborativeProcess* attributes are supported by default *ExtrinsicObject* attributes. However, when SOA IM

entity requires extra attributes in addition to RIM default attributes, Slots must be specified. For example:

```
<rim:ExtrinsicObject id = "cpf-id" objectType = "CollaborativeProcessFlow">
  <rim:Name>
    <rim:LocalizedString value = "Demo CPF"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Demo Collaborative Process Flow"/>
  </rim:Description>
  <Slot name="collaborativeProcess" slotType="String">
    <rim:ValueList>
      <rim:Value>cp-id</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="stage" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
</rim:ExtrinsicObject>
```

Now when *CollaborativeProcess* and *CollaborativeProcessFlow* are created, we will create an Association between them:

```
<rim:Association id = "DemoCPDemoCPF-id"
  associationType = "Includes"
  objectType = "Association"
  sourceObject = "cp-id"
  targetObject = "cpf-id">
  <rim:Name>
    <rim:LocalizedString value = "Demo CP - Demo CPF"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Associates Demo Collaborative Process Flow with
      Demo Collaborative Process "/>
  </rim:Description>
</rim:Association>
```

Finally, the following is a simple CPID whose content demonstrates how some key SOA IM entities and their associations should be specified:

```

<?xml version = "1.0" encoding = "UTF-8"?>
<rs:SubmitObjectsRequest
  xmlns = "urn:oasis:names:tc:ebxml-regrep:registry:xsd:2.1"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "urn:oasis:names:tc:ebxml-regrep:rim:xsd:2.1
    http://www.oasis-open.org/committees/regrep/documents/2.1/schema/rim.xsd
    urn:oasis:names:tc:ebxml-regrep:registry:xsd:2.0
    http://www.oasis-open.org/committees/regrep/documents/2.1/schema/rs.xsd"
  xmlns:rim = "urn:oasis:names:tc:ebxml-regrep:rim:xsd:2.1"
  xmlns:rs = "urn:oasis:names:tc:ebxml-regrep:registry:xsd:2.1">

  <rim:LeafRegistryObjectList>
    <rim:ExtrinsicObject id = "cp-id" objectType = "CollaborativeProcess" >
      <rim:Name>
        <rim:LocalizedString value = "Demo CP"/>
      </rim:Name>
      <rim:Description>
        <rim:LocalizedString value = "Demo Collaborative Process"/>
      </rim:Description>
    </rim:ExtrinsicObject>

    <rim:ExtrinsicObject id = "cpf-id" objectType = "CollaborativeProcessFlow">
      <rim:Name>
        <rim:LocalizedString value = "Demo CPF"/>
      </rim:Name>
      <rim:Description>
        <rim:LocalizedString value = "Demo Collaborative Process Flow"/>
      </rim:Description>
      <Slot name="collaborativeProcess" slotType="String">
        <rim:ValueList>
          <rim:Value>cp-id</rim:Value>
        </rim:ValueList>
      </Slot>
      <Slot name="stage" slotType="String">
        <rim:ValueList>
          <rim:Value></rim:Value>
        </rim:ValueList>
      </Slot>
    </rim:ExtrinsicObject>

    <rim:Association id = "DemoCPDemoCPF-id"
      associationType = "Includes"
      objectType = "Association"
      sourceObject = "cp-id"
      targetObject = "cpf-id">
      <rim:Name>
        <rim:LocalizedString value = "Demo CP - Demo CPF"/>
      </rim:Name>
      <rim:Description>
        <rim:LocalizedString value = "Associates Demo Collaborative Process Flow with Demo Collaborative Process "/>
      </rim:Description>
    </rim:Association>

    <rim:ExtrinsicObject id = "event-id" objectType = "Event">

```

```

<rim:Name>
  <rim:LocalizedString value = "Demo Event"/>
</rim:Name>
<rim:Description>
  <rim:LocalizedString value = "Demo Collaborative Process Flow event"/>
</rim:Description>
<Slot name="type" slotType="String">
  <rim:ValueList>
    <rim:Value>Flow</rim:Value>
  </rim:ValueList>
</Slot>
<Slot name="collaborativeProcessFlow" slotType="String">
  <rim:ValueList>
    <rim:Value>cpf-id</rim:Value>
  </rim:ValueList>
</Slot>
<Slot name="stage" slotType="String">
  <rim:ValueList>
    <rim:Value></rim:Value>
  </rim:ValueList>
</Slot>
</rim:ExtrinsicObject>

<rim:Association id = "DemoEventDemoCPF-id"
  associationType = "IsEventOf"
  objectType = "Association"
  sourceObject = "event-id"
  targetObject = "cpf-id">
  <rim:Name>
    <rim:LocalizedString value = "Demo Event - Demo CPF"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Associates Demo Event with Demo Collaborative Process Flow"/>
  </rim:Description>
</rim:Association>

<rim:ExtrinsicObject id = "agent-id" objectType = "Agent">
  <rim:Name>
    <rim:LocalizedString value = "Demo Agent"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "DemoAgent."/>
  </rim:Description>
  <Slot name=" collaborativeElement " slotType="String">
    <rim:ValueList>
      <rim:Value>activity-id</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="activityStatus" slotType="String">
    <rim:ValueList>
      <rim:Value>Active</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="locationType" slotType="String">
    <rim:ValueList>
      <rim:Value>Fixed</rim:Value>
    </rim:ValueList>
  </Slot>
</rim:ExtrinsicObject>

```

```

    </rim:ValueList>
  </Slot>
  <Slot name="processingType" slotType="String">
    <rim:ValueList>
      <rim:Value>Instant</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="activityType" slotType="String">
    <rim:ValueList>
      <rim:Value>CART</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="owner" slotType="String">
    <rim:ValueList>
      <rim:Value>urn:uuid:3c760a70-91f8-11d9-b5e0-0050da30f668</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="agentProtocol" slotType="String">
    <rim:ValueList>
      <rim:Value> urn:uuid:3c760a70-91f8-11d9-b5e0-3450f40f594</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="agentModelReference" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="rule" slotType="String">
    <rim:ValueList>
      <rim:Value>rule-id</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="version" slotType="String">
    <rim:ValueList>
      <rim:Value>2.0.5</rim:Value>
    </rim:ValueList>
  </Slot>
</rim:ExtrinsicObject>

<rim:ExtrinsicObject id = "activity-id" objectType = "Activity">
  <rim:Name>
    <rim:LocalizedString value = "Demo Activity"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Demo activity"/>
  </rim:Description>
  <Slot name="stage" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="resourceAssignmentType" slotType="String">
    <rim:ValueList>
      <rim:Value>Agent</rim:Value>
    </rim:ValueList>
  </Slot>

```

```

<Slot name="resourceAssignment" slotType="String">
  <rim:ValueList>
    <rim:Value>agent-id</rim:Value>
  </rim:ValueList>
</Slot>
<Slot name="timeToComplete" slotType="String">
  <rim:ValueList>
    <rim:Value>PT5M</rim:Value>
  </rim:ValueList>
</Slot>
</rim:ExtrinsicObject>

<rim:Association id = "DemoAgentDemoActivity-id"
  associationType = "IsAgentFor"
  objectType = "Association"
  sourceObject = "agent-id"
  targetObject = "activity-id">
  <rim:Name>
    <rim:LocalizedString value = "Demo Agent - Demo Activity"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Associates Demo Agent with Demo Activity"/>
  </rim:Description>
</rim:Association>

<rim:ExtrinsicObject id = "input-id" objectType = "InputOutput">
  <rim:Name>
    <rim:LocalizedString value = "Demo Input"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Demo Input of Demo Activity"/>
  </rim:Description>
  <Slot name="type" slotType="String">
    <rim:ValueList>
      <rim:Value>Input</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="time" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
</rim:ExtrinsicObject>

<rim:ExtrinsicObject id = "input-reference-id" objectType = "InformationalReference">
  <rim:Name>
    <rim:LocalizedString value = "Demo Input Informational Reference"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Demo Informational Reference for Demo Input"/>
  </rim:Description>
  <Slot name="documentId" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>

```

```

<Slot name="type" slotType="String">
  <rim:ValueList>
    <rim:Value>OrderFromStore</rim:Value>
  </rim:ValueList>
</Slot>
<Slot name="value" slotType="String">
  <rim:ValueList>
    <rim:Value></rim:Value>
  </rim:ValueList>
</Slot>
<Slot name="version" slotType="String">
  <rim:ValueList>
    <rim:Value></rim:Value>
  </rim:ValueList>
</Slot>
</rim:ExtrinsicObject>

<rim:Association id = "DemoInformationalReferenceDemoInput-id"
  associationType = "IsReferenceFor"
  objectType = "Association"
  sourceObject = "input-reference-id"
  targetObject = "input-id">
  <rim:Name>
    <rim:LocalizedString value = "Demo Informational Reference - Demo Input"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Associates Demo Informational Reference - Demo Input"/>
  </rim:Description>
</rim:Association>

<rim:Association id = "DemoInputDemoActivity-id"
  associationType = "IsInputOf"
  objectType = "Association"
  sourceObject = "input-id"
  targetObject = "activity-id">
  <rim:Name>
    <rim:LocalizedString value = "Demo Input - Demo Activity"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Associates Demo Input with Demo Activity"/>
  </rim:Description>
</rim:Association>

<rim:ExtrinsicObject id = "output-id" objectType = "InputOutput">
  <rim:Name>
    <rim:LocalizedString value = "Demo Output"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Demo Output of Demo Activity"/>
  </rim:Description>
  <Slot name="type" slotType="String">
    <rim:ValueList>
      <rim:Value>Output</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="time" slotType="String">

```

```

    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
</rim:ExtrinsicObject>

<rim:ExtrinsicObject id = "output-reference-id" objectType = "InformationalReference">
  <rim:Name>
    <rim:LocalizedString value = "Demo Output Informational Reference"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Demo Informational Reference for Demo Output"/>
  </rim:Description>
  <Slot name="documentId" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="type" slotType="String">
    <rim:ValueList>
      <rim:Value>OutputDoc</rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="value" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
  <Slot name="version" slotType="String">
    <rim:ValueList>
      <rim:Value></rim:Value>
    </rim:ValueList>
  </Slot>
</rim:ExtrinsicObject>

<rim:Association id = "DemoInformationalReferenceDemoOutput-id"
  associationType = "IsReferenceFor"
  objectType = "Association"
  sourceObject = "output-reference-id"
  targetObject = "output-id">
  <rim:Name>
    <rim:LocalizedString value = "Demo Informational Reference - Demo Output"/>
  </rim:Name>
  <rim:Description>
    <rim:LocalizedString value = "Associates Demo Informational Reference - Demo Output"/>
  </rim:Description>
</rim:Association>

<rim:Association id = "DemoOutputDemoActivity-id"
  associationType = "IsOutputOf"
  objectType = "Association"
  sourceObject = "output-id"
  targetObject = "activity-id">
  <rim:Name>
    <rim:LocalizedString value = "Demo Output - Demo Activity"/>
  </rim:Name>

```

```
<rim:Description>
  <rim:LocalizedString value = "Associates Demo Output with Demo Activity"/>
</rim:Description>
</rim:Association>

</rim:LeafRegistryObjectList>
</rs:SubmitObjectsRequest>
```

All ids (i.e., cp-id, cpf-id, event-id, etc.) specified in the previous examples are logical ids that will be converted into UUIDs (Universally Unique IDs) in Semantion Registry.

CPID for any collaborative process can be created using the same principals and format explained and demonstrated in the previous examples. *Figure 1, SOA Information Model (High Level)* shows the hierarchical tree of SOA IM entities used in CPID. For each SOA IM entity, detailed attribute lists and associations with other entities are explained in *Section 2.1*.

4.0 References

[ebRIM] ebXML Registry Information Model Specification
<http://www.oasis-open.org/specs>

[ebRS] ebXML Registry Services Specification
<http://www.oasis-open.org/specs>