OASIS ebXML RegRep
Registry Information Model Version 4.0

Draft 4

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http://wxforge.wx.ll.mit.edu:8080/jira/secure/ReleaseNote.jspa?projectId=10023&styleName=Html&version=10076

This Version:

http://docs.oasis-open.org/regrep/4.0-cd4-draft-11/specs/core/regrep-rim-4.0-draft-1.html

http://docs.oasis-open.org/regrep/4.0-draft-14.0-cd4-draft1/specs/core/regrep-rim-4.0-draft-1.odt

http://docs.oasis-open.org/regrep/4.0-draft-1cd4-draft1/specs/core/regrep-rim-4.0-draft-1.pdf

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http://docs.oasis-open.org/regrep/4.0-cd3-draft1/specs/core/regrep-rim.html

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http://docs.oasis-open.org/regrep/v3.0/specs/regrep-rim-3.0-os.html

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Latest Approved Version:

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Related Work:

This specification replaces or supercedes:

- [specifications replaced by this standard - OASIS as well as other standards organizations]
- [specifications replaced by this standard - OASIS as well as other standards organizations]

This specification is related to:

- [specifications related to this standard - OASIS as well as other standards organizations]
- [specifications related to this standard - OASIS as well as other standards organizations]

Declared XML Namespace(s):

This following table lists the namespace prefixes defined and / or referenced by this specification.

Namespace Prefix	Namespace URI	Defining Specification
enc	http://www.w3.org/2003/05/soap-encoding	A normative XML Schema [XML Schema Part 1], [XML Schema Part 2] document for the "http://www.w3.org/2003/05/soap-encoding" namespace can be found at http://www.w3.org/2003/05/soap-encoding.
env	http://www.w3.org/2003/05/soap-envelope	SOAP Version 1.2 Part 1. A normative XML Schema [XML Schema Part 1], [XML Schema Part 2] document for the "http://www.w3.org/2003/05/soap-envelope" namespace can be found at http://www.w3.org/2003/05/soap-envelope.
lcm	urn:oasis:names:tc:ebxml-regrep:xsd:lcm:4.0	ebXML RegRep Services and Protocols 4.0 (ebRS)
mime	http://schemas.xmlsoap.org/wsdl/mime/	WSDL namespace for WSDL MIME binding.
query	urn:oasis:names:tc:ebxml-regrep:xsd:query:4.0	ebXML RegRep Services and Protocols 4.0 (ebRS)
rim	urn:oasis:names:tc:ebxml-regrep:xsd:rim:4.0	ebXML RegRep Registry Information Model 4.0 (ebRIM)
rs	urn:oasis:names:tc:ebxml-regrep:xsd:rs:4.0	ebXML RegRep Services and Protocols 4.0 (ebRS)
wsdl	http://schemas.xmlsoap.org/wsdl/	WSDL 1.1 namespace defined by WSDL 1.1 specification.
xacml	urn:oasis:names:tc:xacml:2.0:policy:schema:os	XACML 2.0 Core: eXtensible Access Control Markup Language (XACML) Version 2.0
xacmlc	urn:oasis:names:tc:xacml:2.0:context:schema:os	XACML 2.0 Core: eXtensible Access Control Markup Language (XACML) Version 2.0
xs	http://www.w3.org/2001/XMLSchema	XML Schema [XML Schema Part 1], [XML Schema Part 2] specification
xsi	"http://www.w3.org/2001/XMLSchema-instance	W3C XML Schema specification [XML Schema Part 1], [XML Schema Part 2].

Table 1: Namespaces Used

Abstract:

This document defines the types of metadata and content that can be stored in an ebXML RegRep.

A separate document, OASIS ebXML RegRep: Service and Protocols [ebRS], defines the services and protocols for an ebXML RegRep.

Status:

This document is a draft specification for review, revision and approval by the OASIS ebXML RegRep TC.

Technical Committee members should send comments on this specification to the Technical Committee's email list. Others should send comments to the Technical Committee by using the "Send A Comment" button on the Technical Committee's web page at http://www.oasis-open.org/committeees/regrep/.

For information on whether any patents have been disclosed that may be essential to implementing this specification, and any offers of patent licensing terms, please refer to the Intellectual Property Rights section of the Technical Committee web page (http://www.oasis-open.org/committees/regrep/ipr.php.

The non-normative errata page for this specification is located at http://docs.oasis-open.org/regrep/4.0-draft-1/specs/core/errata.pdf

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1 Introduction

All text is normative unless otherwise indicated.

1.1 Terminology

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this specification are to be interpreted as described in IETF RFC 2119 Error: Reference source not found.

1.2 Normative References

[RFC 2119] S. Bradner. *Key words for use in RFCs to Indicate Requirement Levels*. IETF RFC 2119, March 1997. http://www.ietf.org/rfc/rfc2119.txt.

[Reference] [reference citation]

1.3 Non-normative References

[Reference] [reference citation]

[Reference] [reference citation]

1.4 RepositoryItems and RegistryObjects

An ebXML Registry is capable of storing any type of electronic content such as XML documents, text documents, images, sound and video. Instances of such content are referred to as a RepositorytItems. RepositorytItems are stored in a content *repository* provided by the ebXML Registry.

In addition to the RepositoryItems, an ebXML Registry is also capable of storing standardized metadata that MUST be used to further describe RepositoryItems. Instances of such metadata are referred to as a RegistryObjects (or one of its sub-types, as described later in this document). RegistryObjects are stored in the *registry* provided by the ebXML Registry.

To illustrate these concepts consider this familiar metaphor:

- An ebXML Registry is like your local library.
- The repository is like the bookshelves in the library.
- The repository items in the repository are like book on the bookshelves. The repository items can contain any type of electronic content just like the books in the bookshelves can contain any type of information.
- The registry is like the card catalog. It is organized for finding things quickly.
- A RegistryObject is like a card in the card catalog. All RegistryObjects conform to a standard just like the cards in the card catalog conform to a standard.
- Every repository item MUST have a RegistryObject that describes it, just like every book must have a card in the card catalog.

To summarize, ebXML Registry stores any type of content as RepositoryItems in a repository and stores standardized metadata describing the content as RegistryObjects in a registry.

1.5 Canonical ClassificationSchemes

This specification uses several standard ClassificationSchemes as a mechanism to provides extensible enumeration types. These ClassificationSchemes are referred to as *canonical ClassificationSchemes*. The enumeration values within canonical ClassificationSchemes are defined using standard ClassificationNodes that are referred to as *canonical ClassificationNodes*.

This section lists the canonical ClassificationSchemes that are required to be present in all ebXML Registries. These Canonical ClassificationSchemes MAY be extended by adding additional ClassificationNodes. However, a ClassificationNode defined normatively in the links below MUST NOT be modified within a registry. In particular they MUST preserve their canonical id attributes in all registries.

Note that all files listed in the Location column are relative to the following URL:

http://www.oasis-open.org/committees/regrep/documents/4.0/xml/minDB

ClassificationScheme Name	Location / Description
AssociationType	SubmitObjectsRequest_AssociationTypeScheme.xml Defines the types of associations between RegistryObjects.
ContentManagementService	SubmitObjectsRequest_CMSScheme.xml Defines the types of content management services.
DataType	SubmitObjectsRequest_DataTypeScheme Defines the data types for attributes in classes defined by this document.
DeletionScopeType	SubmitObjectsRequest_DeletionScopeTypeScheme.xml Defines the values for the deletionScope attribute in RemoveObjectsRequest protocol message.
EmailType	SubmitObjectsRequest_EmailTypeScheme.xml Defines the types of email addresses.
ErrorHandlingModel	SubmitObjectsRequest_ErrorHandlingModelScheme.xml Defines the types of error handling models for content management services.
ErrorSeverityType	SubmitObjectsRequest_ErrorSeverityTypeScheme.xml Defines the different error severity types encountered by registry during processing of protocol messages.
EventType	SubmitObjectsRequest_EventTypeScheme.xml Defines the types of events that can occur in a registry.
InvocationModel	SubmitObjectsRequest_InvocationModelScheme.xml Defines the different ways that a content management service may be invoked by the registry.

ClassificationScheme Name	Location / Description
NodeType	SubmitObjectsRequest_NodeTypeScheme.xml Defines the different ways in which a ClassificationScheme may assign the value of the code attribute for its ClassificationNodes.
NotificationOptionType	SubmitObjectsRequest_NotificationOptionTypeScheme.xml Defines the different ways in which a client may wish to be notified by the registry of an event within a Subscription.
ObjectType	SubmitObjectsRequest_ObjectTypeScheme.xml Defines the different types of RegistryObjects a registry may support.
OrganizationRole	SubmitObjectsRequest_OrganizationRoleScheme Defines the roles that may be assigned to an Organization.
PhoneType	SubmitObjectsRequest_PhoneTypeScheme.xml Defines the types of telephone numbers.
QueryLanguage	SubmitObjectsRequest_QueryLangScheme Defines the query languages supported by a registry.
ResponseStatusType	SubmitObjectsRequest_ResponseStatusTypeScheme.xml Defines the different types of status for a RegistryResponse.
StatusType	SubmitObjectsRequest_StatusTypeScheme.xml Defines the different types of status for a RegistryObject.
SubjectGroup	SubmitObjectsRequest_SubjectGroupScheme Defines the groups that a User may belong to for access control purposes.
SubjectRole	SubmitObjectsRequest_SubjectRoleScheme Defines the roles that may be assigned to a ~~User~~subject (e.g. Person or Service) for access control purposes.

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2 Overview

The ebXML Registry Information Model is defined as an XML Schema in rim.xsd file. It defines the metadata types and their relationships within ebXML RegRep specifications.

2.1 Information Model Types: Inheritance View

The central type in the model is the RegistryObjectType type. An instance of RegistryObjectType represents an ebRIM metadata object.

Illustration 1 shows the inheritance or “Is-A” relationships between the various types derived from RegistryObjectType in the information model. Note that it does not show the other types of relationships, such as “Has-A” relationships, as they will be presented in subsequent diagram. The attributes and elements of each type are also not shown to conserve page space. Detailed description of attributes and elements of each type will be displayed in tabular form within the detailed description of each type.

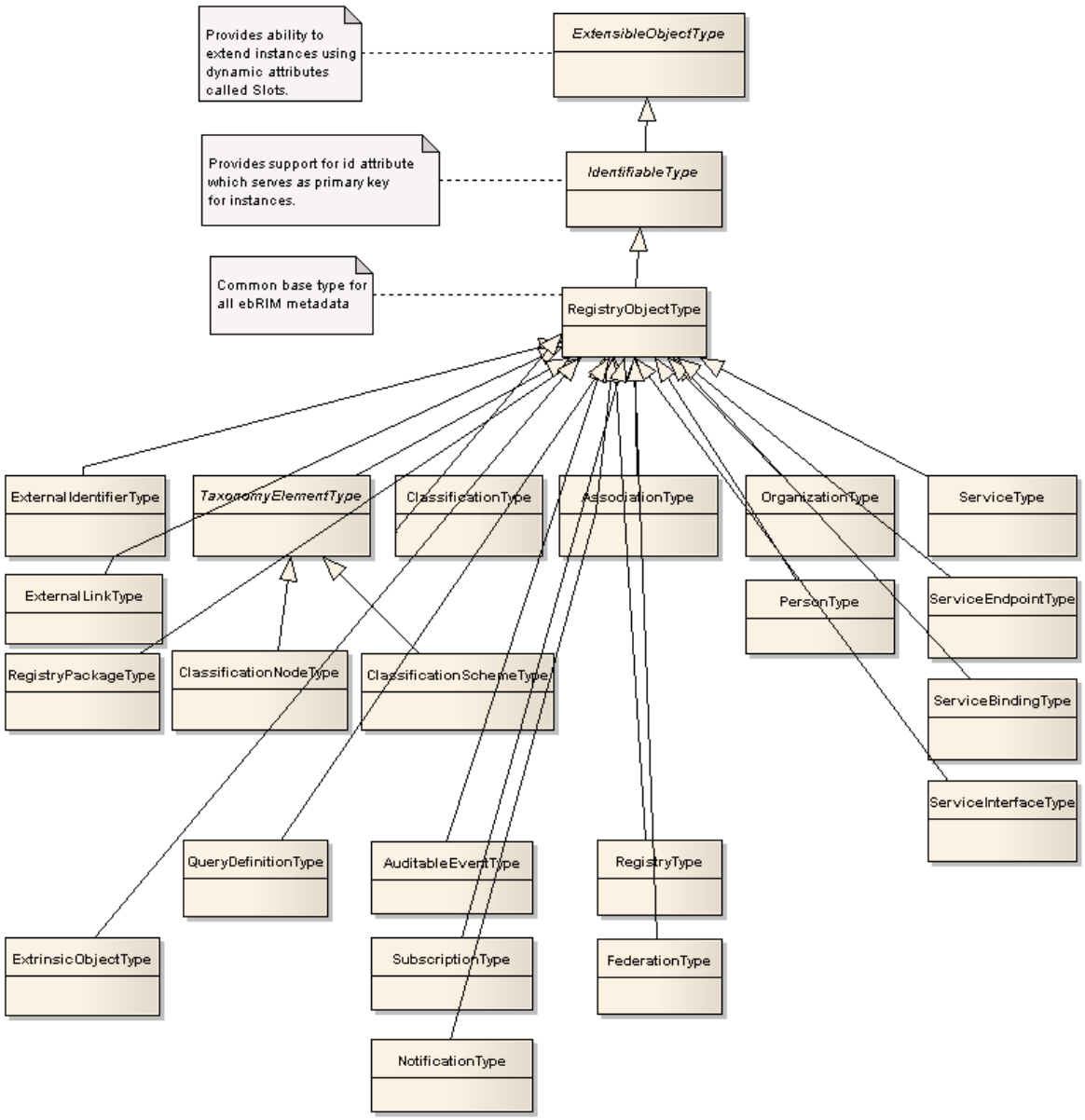

Illustration 1: Information Model Inheritance View

2.2 Extending ebRIM

The XML Schema for ebRIM uses XML Schema type substitution feature to allow use of schema type extensions.

A deployment or profile specification of ebXML RegRep MAY define new types that extend the types defined in this specification as long as the XML Schema for ebRIM supports such extension.

A server MAY support the schema type extensibility feature. The following requirements are defined for a server that supports the schema type extensibility feature:

- ~~A~~The server ~~SHOULD~~protocols as defined by [ebRS] MUST ~~accept~~support extended types ~~in place of the type that is extended~~ in a manner equivalent to pre-defined types. Specifically they

MUST support submit, update, versioning and removal of extended types derived directly or indirectly from RegistryObjectType

- The server MUST be able to faithfully persist instances of extended types including all extension attributes and elements without any information loss
- The server MUST be able to faithfully return instances of extension types including extension attributes and elements within a query response without any information loss
- This specification does not prescribe how a server provides addition of new extension types to the server

2.3 Document Organization

The types in the information model are presented in related groups as follows:

- Core Information Model: Defines core metadata types in the model including the common base types.
- Association Information Model: Defines types that enable objects to be associated with each other.
- Classification Information Model: Defines types that enable objects to be classified.
- Provenance Information Model: Defines types that enable the description of provenance or source information about an object.
- Service Information Model: Defines types that enable service description.
- Query Information Model: Defines types that enable definition and invocation of queries.
- Event Information Model: Defines types that enable the event subscription and notification feature defined in [ebRS].
- Federation Information Model: Defines types that enable the federated registries feature defined in [ebRS].
- Access Control Information Model: Defines types that enable access control and authorization for ebXML RegRep.

The remainder of this document will describe each of the above related group of information model types in a dedicated chapter named accordingly.

3 Core Information Model

The core information model is centered around the RegistryObjectType type as shown in figure below. Each type will be defined in detail in subsequent section.

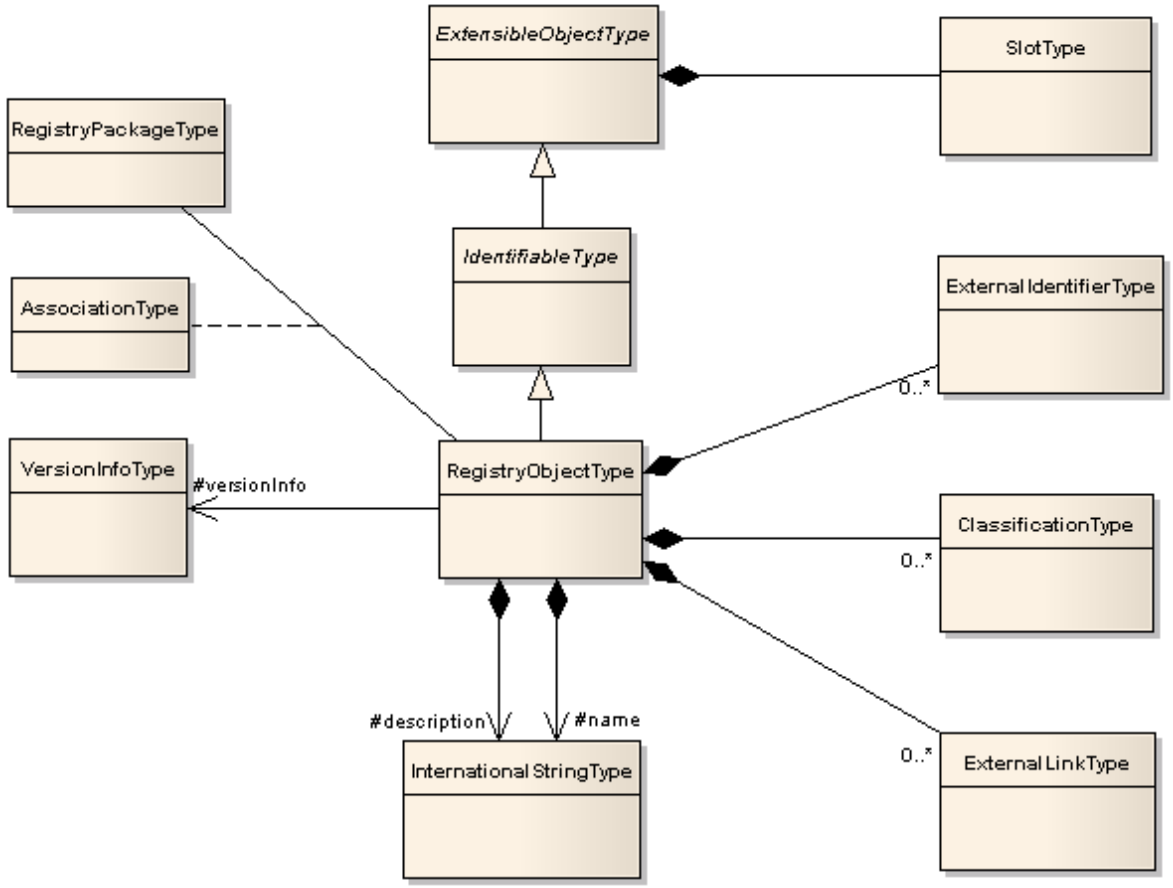

Illustration 2: Core Information Model

3.1 InternationalStringType

The InternationalStringType type is used throughout the schema whenever a textual value needs to be represented in one or more local languages.

The InternationalStringType has a sequence of LocalizedString instances, where each LocalizedString instance is specific to a particular locale.

3.1.1 Syntax

```
<complexType name="InternationalStringType">
  <sequence>
    <element name="LocalizedString" type="tns:LocalizedStringType"
      minOccurs="0" maxOccurs="unbounded" />
  </sequence>
</complexType>
```

3.1.2 Example

```
<rim:Name>
  <rim:LocalizedString
    xml:lang="en-US" charset="UTF-8" value="freebXMLRegistry"/>
</rim:Name>
```

3.1.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
LocalizedString	LocalizedStringType	0..*		Client	Yes

- Element LocalizedString - An InternationalStringType instance MAY have zero or more LocalizedString elements where each defines a string value within a specific local language

3.2 LocalizedStringType

This type allows the definition of a string value using the specified local language and character set. It is used within the InternationalStringType as the type of the LocalizedString sub-element.

3.2.1 Syntax

```
<complexType name="LocalizedStringType">
  <attribute ref="xml:lang" default="en-US" use="optional"/>
  <attribute name="charset" type="string" use="optional" default="UTF-8"/>
  <attribute name="value" type="tns:FreeFormText" use="required"/>
</complexType>
```

3.2.2 Example

```
  <rim:LocalizedString
    xml:lang="en-US" charset="UTF-8" value="freebXMLRegistry"/>
```

3.2.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
xml:lang	xs:language	0..1	en-US	Client	Yes
charset	xs:string	0..1	UTF-8	Client	Yes
value	rim:FreeFormText	1		Client	Yes

- Attribute xml:lang - Each LocalizedStringType instance MAY have a *xml:lang* attribute that specifies the language used by that LocalizedStringType instance
- Attribute charset - Each LocalizedStringType instance MAY have a *charset* attribute that specifies the name of the character set used by that LocalizedStringType instance. The value of this attribute SHOULD be registered with IANA at: http://www.iana.org/assignments/character-sets

- Attribute value - Each LocalizedStringType instance MUST have a *value* attribute that specifies the string value used by that LocalizedStringType instance

3.3 SlotType

This type is a container or wrapper that is capable of containing any type of information that may be represented in an XML document. It is an important extensibility mechanism with ebRIM.

A SlotType instance contains a ValueList element which contains one or more ValueListItems. It is the valueListItems that represent the values associated with the SlotType instance.

3.3.1 Syntax

```
<complexType name="SlotType">
  <sequence>
    <element name="ValueList" type="tns:ValueListType"
      minOccurs="1" maxOccurs="1"/>
  </sequence>
  <attribute name="name" type="tns:~~LongName~~LongText" use="required"/>
  <attribute name="dataType" type="tns:~~LongName~~LongText" use="optional"/>
  <attribute name="collectionType" type="tns:objectReferenceType"
use="optional"/>
</complexType>
```

3.3.2 Example

The following example shows how a GML geometry value may be specified as a Slot.

```
<rim:Slot
  name="spatialSlot1"
  dataType="urn:ogc:def:dataType:ISO-19107:GM_Envelope">
  <rim:ValueList>
    <rim:ValueListItem xsi:type="rim:AnyValueType">
      <gml:Envelope srsName="urn:ogc:def:crs:OGC:2:WGS84">
        <gml:lowerCorner>-122.35 19.31</gml:lowerCorner>
        <gml:upperCorner>-61.80 48.93</gml:upperCorner>
      </gml:Envelope>
    </rim:ValueListItem>
  </rim:ValueList>
</rim:Slot>
```

3.3.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
collectionType	objectReferenceType	0..1		Client	No
dataType	~~LongName~~LongText	0..1		Client	No
name	~~LongName~~LongText	1		Client	No
ValueList	ValueListType	1		Client	Yes

- Attribute collectionType – Defines the type of collection for the ValueList collection. Must be an objectReferenceType that references a ClassificationNode in the canonical ClassificationScheme CollectionTypeScheme. A server MUST enforce the following semantics associated with the following canonical collection types:
  - List – Server MUST maintain the order of the values in the collection
  - Set – Server MUST NOT allow duplicate values in the collection
  - Sorted Set – Server MUST NOT allow duplicate values in the collection and MUST maintain a sort order according to the alphanumeric ordering of its elements according to the default locale associated with the server
  - Bag – Server MUST allow duplicate values and MAY not maintain order of values
- Attribute dataType – A string that specifies the data type for the values in the ValueList
- Attribute name – The name of this SlotType instance
- Element ValueList – This element is the container for the actual values within a SlotType instance.

3.4 ValueListType

This type is a container for ValueListItem instances that represent the values associated with a SlotType instance.

3.4.1 Syntax

```
<complexType name="ValueListType">
  <sequence>
    <element name="ValueListItem"
      type="tns:ValueType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

3.4.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
ValueListItem	ValueType	0..*		Client	Yes

- Element ValueListItem – This element represents a value within the collection of values in a SlotType instance. The type of this element is ValueType. Since ValueType is abstract, the actual type of ValueListItem MUST be a sub-type of ValueType. The rim.xsd schema defines the following concrete sub-types of ValueType:
  - AnyValueType – This concrete sub-type of ValueType is used as a container for any well-formed XML element value in any namespace
  - BooleanValueType - This concrete sub-type of ValueType is used as a container for a boolean value
  - DateTimeValueType - This concrete sub-type of ValueType is used as a container for a dateTime value
  - DurationValueType - This concrete sub-type of ValueType is used as a container for a duration value

- FloatValueType - This concrete sub-type of ValueType is used as a container for a float value
- IntegerValueType - This concrete sub-type of ValueType is used as a container for an integer value
- InternationalStringValueType - This concrete sub-type of ValueType is used as a container for an InternationSringType value capable of holding strings in multiple locales
- ParameterValueType – This concrete sub-type of ValueType is used as a container for Parameter definitions for a QueryDefinition instance
- StringValueType – This concrete sub-type of ValueType is used as a container for a string value

3.5 ExtensibleObjectType

This type is the root type for most other types in rim.xsd. It allows any type of information to be added to instances of this type using Slot sub-elements. It is an important extensibility mechanism with ebRIM.

3.5.1 Syntax

```
<complexType name="ExtensibleObjectType" abstract="true">
  <sequence>
    <element name="Slot" type="tns:SlotType" minOccurs="0"
      maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

3.5.2 Example

The following example shows how a <rim:Organization> instance which is of type ExtensibleObjectType MAY use Slot sub-elements to define a tax payer id for the organization.

```
<rim:Organization
  id="urn:freebxml:registry:Organization:freebXMLRegistry" ...>

  <rim:Slot name="urn:foo:slot:taxPayerId">
    <rim:ValueList>
      <rim:ValueListItem xsi:type="rim:StringValueType">
        <rim:Value>1234567890</rim:Value>
      </rim:ValueListItem>
    </rim:ValueList>
  </rim:Slot>

  ...
</rim:Organization>
```

3.5.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
Slot	SlotType	0..*		Client	Yes

- Element Slot – Allows any type of information to be defined within it and may be added to any ExtensibleObjectType instance

3.6 IdentifiableObjectType

Base Type: ExtensibleObjectType

This type extends ExtensibleObjectType and allows its instances to be uniquely identifiable by a unique id.

3.6.1 Syntax

```
<complexType name="IdentifiableType" abstract="true">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="id" type="string" use="required"/>
    </extension>
  </complexContent>
</complexType>
```

3.6.2 Example

```
<rim:Organization
  id="urn:freebxml:registry:Organization:freebXMLRegistry" ...>
  ...
</rim:Organization>
```

3.6.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
id	xs:string	1		Client	Yes

- Attribute id – Specifies the unique identifier for an IdentifiableType instance. An IdentifiableType instance MUST have an id and that id MUST conform to the rules defined in section title “Unique ID Generation” in [ebRS]

3.7 RegistryObjectType

Base Type: IdentifiableType

This type extends IdentifiableObjectType and is the common base type for all query-able metadata elements in ebRIM.

3.7.1 Syntax

```
<complexType name="RegistryObjectType">
  <complexContent>
    <extension base="tns:IdentifiableType">
      <sequence>
        <element name="Name" type="tns:InternationalStringType"
          minOccurs="0" maxOccurs="1"/>
        <element name="Description" type="tns:InternationalStringType"
          minOccurs="0" maxOccurs="1"/>
```

```
        <element name="VersionInfo" type="tns:VersionInfoType" minOccurs="0"
maxOccurs="1"/>
        <element name="Classification" type="tns:ClassificationType"
          minOccurs="0" maxOccurs="unbounded"/>
        <element name="ExternalIdentifier" type="tns:ExternalIdentifierType"
          minOccurs="0" maxOccurs="unbounded" />
        <element name="ExternalLink" type="tns:ExternalLinkType"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="lid" type="anyURI" use="optional"/>
      <attribute name="objectType" type="tns:objectReferenceType"
use="optional"/>
      <attribute name="owner" type="string" use="optional"/>
      <attribute name="status" type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
```

3.7.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
Classification	ClassificationType	0..*		Client	Yes
Description	InternationalStringType	0..1		Client	Yes
ExternalIdentifer	ExternalIdentifierType	0..*		Client	Yes
ExternalLink	ExternalLinkType	0..*		Client	Yes
lid	string	0..1		Client or Server	No
Name	InternationalStringType	0..1		Client	Yes
objectType	objectReferenceType	0..1		Client or Server	No
owner	string	0..1		Server	Yes
status	objectReferenceType	0..1		Server	Yes
VersionInfo	VersionInfoType	0..1		Server	No

- Element Classification - A RegistryObjectType instance MAY have zero or more ClassificationType instances that are composed within the RegistryObject. A ClassificationType instance classify the RegistryObject using a value within a ClassificationScheme
- Element Description - A RegistryObjectType instance MAY have textual description in a human readable and user-friendly form. This element is of type InternationalStringType and therefor capable of containing textual values in multiple local languages and character sets.
- Element ExternalIdentifier - A RegistryObjectType instance MAY have zero or more ExternalIdentifier instances that are composed within the RegistryObject. A ExternalIdentifier instance represents an alternate identifier for the RegistryObject in addition to the identifier specified by its id attribute value.

- Attribute lid - A RegistryObjectType instance MUST have a lid (Logical Id) attribute . The lid is used to refer to a logical RegistryObject in a version independent manner.
    - All versions of a RegistryObject MUST have the same value for the lid attribute. Note that this is in contrast with the id attribute that MUST be unique for each version of the same logical RegistryObject.
    - The lid attribute MUST be specified by the client when creating the original version of a RegistryObject.
    - The lid attribute specified when submitting the original version of a RegistryObject MUST be globally unique and MUST NOT be already in use as lid by another object.
    - A server MUST honor and accept a client specified LID.
- Element Name - A RegistryObjectType instance MAY have a human readable name. The name does not need to be unique with respect to other RegistryObjectType instances. This element is of type InternationalStringType and therefor capable of containing textual values in multiple local languages and character sets.
- Attribute objectType - A RegistryObjectType instance has an *objectType* attribute.
    - The value of the objectType attribute MUST be a reference to a ClassificationNode in the canonical ObjectType ClassificationScheme.
    - A server MUST support the object types as defined by the canonical ObjectType ClassificationScheme. The canonical ObjectType ClassificationScheme may easily be extended by adding additional ClassificationNodes to the canonical ObjectType ClassificationScheme.
    - The *objectType* attribute MUST be assigned by the server for all RegistryObjectType instances that are not instances of ExtrinsicObjectType.
    - The *objectType* attribute MAY be assigned by the client for all RegistryObjectType instances that are instances of ExtrinsicObjectType. In such cases it represents the objectType associated with the repository item for the ExtrinsicObjectType instance.
    - A client SHOULD specify the objectType for an ExtrinsicObject during submission whenever possible.
    - If the client does not specify an objectType for an ExtrinsicObject then the server MUST set its value to the id of the ClassificationNode representing ExtrinsicObject within the canonical ObjectType ClassificationScheme.
    - A server MUST set the correct objectType on a RegistryObject when returning it as a response to a client request.
- Attribute owner – Specifies the identifier associated with the registered user that owns the RegistryObjectType instance. It is used for access control and may be referenced within custom access control policies.
- Attribute status - A RegistryObjectType instance MUST have a life cycle status indicator. The status is assigned by the server.
    - A server MUST set the correct status on a RegistryObject when returning it as a response to a client request.
    - A client SHOULD NOT set the status on a RegistryObject when submitting the object as this is the responsibility of the server.
    - A server MUST ignore the status on a RegistryObject when it is set by the client during submission or update of the object.

- The value of the status attribute MUST be a reference to a ClassificationNode in the canonical StatusType ClassificationScheme.
- A Registry MUST support the status types as defined by the StatusType ClassificationScheme. The canonical StatusType ClassificationScheme MAY easily be extended by adding additional ClassificationNodes to the canonical StatusType ClassificationScheme.

The following table lists pre-defined choices for the RegistryObject status attribute:

Name	Description
Approved	Indicates that the object has been approved after being submitted
Deprecated	Indicates that the object has been deprecated or marked as obsolete
Submitted	Indicates that the object has been submitted to the server.
Withdrawn	Indicates that the object has been withdrawn from the server. This SHOULD be used with ExtrinsicObjects when their repository item has been removed or withdrawn.

- Element VersionInfo - Provides information about the specific version of a RegistryObjectType instance. The VersionInfo element is set by the server.
  - A server MUST set a VersionInfo element for a RegistryObjectType instance. The VersionInfo element MUST contain a versionName attribute whose value MUST be unique for all versions of that logical RegistryObjectType.

3.8 VersionInfoType

This type represents information about a specific version of a RegistryObject or RepositoryItem. It is used as type for the RegistryObjectType/VersionInfo and ExtrinsicObjectType/ContentVersionInfo elements in the rim.xsd schema.

3.8.1 Syntax

```
<complexType name="VersionInfoType">
  <attribute name="versionName"
    type="tns:String16" use="optional" default="1.1"/>
  <attribute name="~~comment~~userVersionName" type="string" use="optional"/>
</complexType>
```

3.8.2 Example

```
<rim:Organization ...>
  ...
  <rim:VersionInfo versionName="1.1" ~~comment~~userVersionName="~~Initial version~~1.1"/>
  ...
</rim:Organization>
```

3.8.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
~~comment~~userVersionName	~~LongName~~ LongText	0..1		Client	Yes
versionName	String16	0..1		Server	No

- Attribute ~~comment~~userVersionName - Represents a client-specified ~~comment~~version name associated with the VersionInfo for a specific RegistryObject version~~. It is analogous to a commit comment in version control systems.~~
  - A client MAY directly provide ~~The~~a value ~~of~~for the ~~comment~~userVersionName attribute ~~MAY be indirectly provided by the client when the client specifies a value for the comment attribute of the <rim:Request> object when making a request to the server~~when ~~.~~submitting or updating an object
  -
  - ~~The value for this attribute MUST be set by the Registry implementation based upon the <rim:Request> comment attribute value provided by the client if any.~~ A server MUST persist any client specified userVersionName for an object without altering it in any form
- Attribute versionName - Represents the registry assigned version name identifying the VersionInfo for a specific RegistryObject version.
  - The value for this attribute SHOULD NOT be specified by the client
  - A server ~~MUST~~MAY silently ignore the value for this attribute if specified by the client
  - The value for this attribute MUST be automatically generated by the server and MUST be defined for RegistryObjectType instances returned by server responses. The server is free to choose any scheme for generating the value for this attribute as long as the value is uniquely identifies a version for objects that have the same lid attribute value.

3.9 objectReferenceType

Base Type: xs:string

A RegistryObjectType instance typically has several references to other RegistryObjectType instances. These references are represented by attributes of type rim:objectReferenceType within the XML Schema for ebXML RegRep.

The RegistryObjectType instance that has a reference to another RegistryObjectType instance is referred to as the *reference source* object. The RegistryObjectType instance that is being referenced is referred to as the *reference target* object.

3.9.1 Syntax

```
<simpleType name="objectReferenceType">
  <restriction base="string"/>
</simpleType>
```

3.9.2 Example

```
<rim:Organization primaryContact="urn:acme:person:Danyal" ...>
  ...
</rim:Organization>
```

3.9.3 Description

Local and Remote References

The reference source and target objects MAY be in different ebXML RegRep servers. In such cases the reference is referred to as a *remote reference*.

Static and Dynamic References

When a reference is fixed to a specific reference target it is referred to as a *static reference*. This specification also supports a *dynamic reference* where the reference target is determined dynamically by a query at the time the reference is resolved. Such a reference is referred to as a *dynamic reference*.

Both static and dynamic references may be to a local or remote object. Static references to local reference targets are the most typical form of reference.

Encoding of objectReferenceType

A client MUST specify values for reference attributes of type objectReferenceType to be encoded as described below:

- A static reference to a local reference target SHOULD be encoded as the value of the id attribute of the reference target.
  The following example shows the reference attribute named primaryContact within Organization element. Its value is the value of the id attribute of a Person element.

```
<rim:Organization primaryContact="urn:acme:person:Danyal" ...>
  ...
</rim:Organization>

<rim:Person id="urn:acme:person:Danyal" ...>
  ...
</rim:Person>
```

- A dynamic reference to a local reference target SHOULD be encoded to contain the id of a DynamicObjectRefType instance. The reference target is determined by the singleton result returned by the Query within the DynamicObjectRef instance.

  The following example shows the reference attribute named primaryContact within Organization element. Its value is the value of the *id* attribute of a DynamicObjectRefType instance. The DynamicObjectRefType instance has a *Query* that gets the latest version of object identified by the *lid* parameter of the Query. The query when invoked matches the latest version of the Person object representing Danyal.

```
<rim:Organization
```

```
  primaryContact="urn:acme:dynamicRef:LatestVersionOfDanyal" ...>
  ...
  ...
</rim:Organization>

<rim:DynamicObjectRef id="urn:acme:dynamicRef:LatestVersionOfDanyal">
  <rim:Query queryDefinition="urn:acme:QueryDefinition:FindLatestVersion">
    <rim:Slot name="lid">
      <rim:ValueList>
        <rim:ValueListItem xsi:type="rim:StringValueType">
          <rim:Value>urn:acme:person:Danyal</rim:Value>
        </rim:ValueListItem>
      </rim:ValueList>
    </rim:Slot>
  </rim:Query>
</rim:DynamicObjectRef>

<rim:Person lid="urn:acme:person:Danyal" id="urn:acme:person:Danyal:1.8"...>
  <!-- latest version of object with lid "urn:acme:person:Danyal" -->
  ...
</rim:Person>
```

- A static or dynamic reference to a local reference target MAY be encoded to contain a Canonical URL for the local object as defined by the REST binding in [ebRS].
- A static or dynamic reference to a remote reference target MUST be encoded to contain a Canonical URL for the local object as defined by the REST binding in [ebRS].

  The following example shows the reference attribute named primaryContact within Organization element. Its value is the HTTP GET URL for a remote PersonType instance. Note that the URL is not encoded to handle special characters for sake of clarity.

```
<!-- Following object is in local server -->
<rim:Organization
  primaryContact="http://www.remoteRegistry.com/query?
id=urn:remoteServer:person:Danyal" ...>
  ...
  ...
</rim:Organization>

<!-- Following object is in a remote server -->
<rim:Person id="urn:remoteServer:person:Danyal" ...>
  ...
</rim:Person>
```

3.10 ObjectRefType

Base Type: ExtensibleObjectType

This type represents an object reference as does the objectReferenceType. However, the two are used in different situations. The objectReferenceType is used as the type for all reference attributes in ebRIM. The ObjectRefType is used as type for elements rather than attributes. This type is used when there is a need

to have multiple object references within a schema type. An example of this is the ObjectRefList element which is used in several places in the schema where a list of references to RegistryObjectType instances are needed.

3.10.1 Syntax

```
<complexType name="ObjectRefType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="id" type="tns:objectReferenceType" use="required"/>
    </extension>
  </complexContent>
</complexType>

<complexType name="ObjectRefListType">
  <sequence>
    <element name="ObjectRef"
      type="tns:ObjectRefType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<element name="ObjectRefList" type="tns:ObjectRefListType"/>
```

3.10.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
id	objectReferenceType	1		Client	Yes

- Attribute *id* - Every ObjectRef instance MUST have an *id* attribute. The *id* attribute MUST contain the value of the *id* attribute of the RegistryObject being referenced.

3.11 DynamicObjectRefType

Base Type: ObjectRefType

This type represents a dynamic object reference. It extends the ObjectRefType and add a Query sub-element. This query is used to determine the reference target at the time the reference is resolved.

3.11.1 Syntax

```
<complexType name="DynamicObjectRefType">
  <complexContent>
    <extension base="tns:ObjectRefType">
      <sequence>
        <element name="Query" type="tns:QueryType"
          minOccurs="1" maxOccurs="1"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

3.11.2 Description

Node	Type	Cardinality	Default	Specified By	Mutable

			Value		
Query	QueryType	1		Client	Yes

- Element Query – Specifies the query that MUST be invoked in order to determine the reference target.
  - This query MUST match zero or one RegistryObjectType instances.
  - When the query matches zero RegistryObjectType instances, the dynamic object reference is considered to be unresolved.
  - A server MUST return a ConfigurationException fault message if the query matches more than 1 RegistryObjectType instances.

3.12 ExtrinsicObjectType

Extends: RegistryObjectType

This type is a common base type for new extended types defined by profiles of ebRIM or by clients. The ExtrinsicObjectType also allows arbitrary content to be associated with it. Such arbitrary content is referred to as a Repository Item.

3.12.1 Syntax

```
<complexType name="ExtrinsicObjectType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="ContentVersionInfo" type="tns:VersionInfoType"
          minOccurs="0" maxOccurs="1"/>
        <choice minOccurs="0" maxOccurs="1">
          <element name="RepositoryItemRef" type="tns:SimpleLinkType"/>
          <element name="RepositoryItem"
            xmime:expectedContentTypes="*/*" type="base64Binary">
        </choice>
      </sequence>
      <attribute name="mimeType" type="tns:~~LongName~~LongText" use="optional" />
    </extension>
  </complexContent>
</complexType>
<element name="ExtrinsicObject" type="tns:ExtrinsicObjectType"/>
```

3.12.2 Example

```
<ExtrinsicObject mimeType="text/xml"
  objectType="urn:freebxml:registry:sample:profile:cpp:objectType:cppa:CPP"
  lid="urn:freebxml:registry:sample:profile:cpp:instance:cpp1"
  id="urn:freebxml:registry:sample:profile:cpp:instance:cpp1" >
    <ContentVersionInfo versionName="311" ~~comment~~userVersionName="~~For release 2~~1.1"/>
    <RepositoryItem>...binary encoding of repository item</RepositoryItem>
</ExtrinsicObject>
```

3.12.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable

ContentVersionInfo	VersionInfoType	0..1		Server	No
mimeType	~~LongName~~Long Text	0..1	application/octet-stream	Client	No
RepositoryItem	xs:base64Binary	0..1		Client	Yes
RepositoryItemRef	SimpleLinkType	0..1		Client	No

- Element ContentVersionInfo - Provides information about the specific version of a RepositoryItem that is associated with an ExtrinsicObjectType instance. The ContentVersionInfo element is set by the server.
  - A server MUST NOT set a ContentVersionInfo element for an ExtrinsicObjectType instance that does not have a RepositoryItem.
  - A server MUST set a ContentVersionInfo element for an ExtrinsicObjectType instance that has a RepositoryItem. The ContentVersionInfo element MUST contain a versionName attribute whose value MUST be unique for all versions of that RepositoryItem.
- Attribute mimeType - An ExtrinsicObjectType instance MAY have a mimeType attribute defined. The mimeType provides information on the type of repository item cataloged by the ExtrinsicObject instance. The value of this attribute SHOULD be a registered MIME media type at http://www.iana.org/assignments/media-types.
- Element repositoryItem – Provides a base64 binary encoded representation of the repository item associated with the ExtrinsicObjectType instance (if any).
- Element repositoryItemRef – This element MAY be specified as an alternative to the repositoryItem element. Its type is SimpleLinkType. It uses Xlink to specify a reference to a file on the client's local file system. This provides client libraries an alternative way to specify local files as repository item. The client library MUST convert a repositoryItemRef element to a repositoryItem element prior to submitting it to the server.

3.13 CommentType

Extends: ExtrinsicObjectType

This type represents a comment that may be associated with a RegistryObjectType instance. A comment associated with a RegistryObject models the familiar yellow POST-IT note metaphor used in attaching comments to paper documents.

3.13.1 Syntax

```
<complexType name="CommentType">
  <complexContent>
    <extension base="tns:ExtrinsicObjectType">
    </extension>
  </complexContent>
</complexType>
<element name="Comment" type="tns:CommentType"/>
```

3.13.2 Example

```
<Comment
  lid="urn:freebxml:registry:sample:comment1"
  id="urn:freebxml:registry:sample:comment1" >
  <rim:Description>
```



```
    <rim:LocalizedString
      xml:lang="en-US" charset="UTF-8" value="This change request is rejected
because it is too complex a change."/>
  </rim:Description>
</Comment>
```

3.13.3 Description

No new attributes or elements are added by this type. The following requirements are defined for this type:

- An authorized client MAY attach one or more comments to any RegistryObjectType instance using an Association between the RegistryObjectType instance and the CommentType instance
  - Since a CommentType is itself a RegistryObjectType, a client MAY attach one or more comments to any CommentType instance
- The type of the Association MUST reference the canonical HasComment ClassificationNode within the Canonical AssociationType ClassificationScheme
- The sourceObject of the Association MUST be the RegistryObjectType instance
- The targetObject of the Association MUST be the CommentType instance

3.14 RegistryPackageType

Extends: RegistryObjectType

This type allows for grouping of related RegistryObjectType instances. It serves a similar role as a folder in the familiar file-folder metaphor available in most operating systems.

- A RegistyObjectType instance MAY be a member of multiple RegistryPackageType instances.
- A RegistryPackageType instance MAY have multiple RegistryObjectType instances as its members.
- Membership of a RegistryObjectType instance in a RegistryPackageType instance is established via an AssociationType instance where the type attribute references the canonical “HasMember” AssociationType within the canonical AssociationTypeScheme ClassificationScheme.
- As a convenience, the RegistryPackageType allows a RegistryObjectList to be specified by the client as a sub-element during submission of a RegistryPackage. The RegistryObjectList contains the set of RegistryObjectType instances that are members of the RegistryPackageType instance.

3.14.1 Syntax

```
<complexType name="RegistryPackageType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="RegistryObjectList" type="tns:RegistryObjectListType"
          minOccurs="0" maxOccurs="1"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="RegistryPackage" type="tns:RegistryPackageType"/>
```


3.14.2 Example

The following example shows the use of a RegistryObjectList to specify the members of a RegistryPackageType instance during submission.

```
<RegistryPackage id="urn:acme:RegistryPackage:photos" ...>
  ...
  <RegistryPackage id="urn:acme:RegistryPackage:photos:summer-2008">
    ...
    <RegistryObjectList>
      <RegistryObject xsi:type="rim:ExtrinsicObjectType" mimeType="image/jpeg"
        id="urn:acme:RegistryPackage:photos:summer-2008:wellfleet-beach.jpg"
        <repositoryItem>
          ...binary encoding of photo repository item
        </repositoryItem>
      </ExtrinsicObject>
    </RegistryObjectList>
  </RegistryPackage>
</RegistryPackage>
```

The following example shows the equivalent syntax for representing the membership relationship between a RegistryPackage and its members. This representation uses “HasMember” AssociationType instances to establish the membership relationship.

```
<RegistryPackage id="urn:acme:RegistryPackage:photos" .../>
<RegistryPackage id="urn:acme:RegistryPackage:photos:summer-2008" />

<Association
  sourceObject="urn:acme:RegistryPackage:photos"
  targetObject="urn:acme:RegistryPackage:photos:summer-2008"
  type="urn:oasis:names:tc:ebxml-regrep:AssociationType:HasMember"/>

<ExtrinsicObject mimeType="image/jpeg"
  id="urn:acme:RegistryPackage:photos:summer-2008:wellfleet-beach.jpg"
  <repositoryItem>
    ...binary encoding of photo repository item
  </repositoryItem>
</ExtrinsicObject>

<Association
  sourceObject="urn:acme:RegistryPackage:photos:summer-2008"
  targetObject="urn:acme:RegistryPackage:photos:summer-2008:wellfleet-
beach.jpg"
  type="urn:oasis:names:tc:ebxml-regrep:AssociationType:HasMember"/>
```

3.14.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
RegistryObjectList	RegistryObjectList Type	0..1		Client	Yes

- Element RegistryObjectList – This element allows clients to specify members of the RegistryPackage instance using a simpler alternative to “HasMember” AssociationType instances.

- A server MUST replace the RegistryObjectList to AssociationType instances such that each RegistryObjectType instance is replaced with an AssociationType instance with type "urn:oasis:names:tc:ebxml-regrep:AssociationType:HasMember", with sourceObject specifying the id of the RegistryPackage instance and with targetObject specifying the id of the RegistryObjectType instance

3.15 RegisterType

Base Type: RegistryPackageType

This type is a specialized extension of RegistryPackageType that supports governance of its member RegistryObjectType instances. A RegisterType instance has a set of governance policies and a set of designated steward organizations. The registration procedures feature set in [ebRS] defines how various roles within the steward organizations manage changes to the members of the RegisterType instance using the governance policies associated with it.

3.15.1 Syntax

```
<complexType name="RegisterType">
  <complexContent>
    <extension base="tns:RegistryPackageType">
    </extension>
  </complexContent>
</complexType>
<element name="Register" type="tns:RegisterType"/>
```

3.15.2 Example

The following example shows a Register of geographical feature types.

```
<Register id="urn:acme:Register:featureTypes"...>
  ...
</Register>
<Association ...
  sourceObject="urn:acme:Register:featureTypes"
  targetObject="urn:acme:featureType:Road"
  type="urn:oasis:names:tc:ebxml-regrep:AssociationType:HasMember"/>
<Association ...
  sourceObject="urn:acme:Register:featureTypes"
  targetObject="urn:acme:featureType:River"
  type="urn:oasis:names:tc:ebxml-regrep:AssociationType:HasMember"/>
```

3.15.3 Description

No new attributes or elements are defined by RegisterType beyond those described for RegistryPackageType. The following requirements are defined for RegisterType:

- A RegistryObjectType instance MUST NOT be a member of more than one Register. Note that a RegistryObjectType instance MAY be a member of more than one RegistryPackageType instance

3.16 ExternalIdentifierType

Base Type: RegistryObjectType

This type allows any number of additional identifiers to be specified for a RegistryObjectType instance. The identifier value is defined using the *value* attribute within the context of a ClassificationScheme referenced via the *identificationScheme* attribute.

3.16.1 Syntax

```
<complexType name="ExternalIdentifierType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <attribute name="registryObject"
        type="tns:objectReferenceType" use="optional"/>
      <attribute name="identificationScheme"
        type="tns:objectReferenceType" use="required"/>
      <attribute name="value" type="tns:~~LongName~~LongText" use="required"/>
    </extension>
  </complexContent>
</complexType>
<element name="ExternalIdentifier" type="tns:ExternalIdentifierType"/>
```

3.16.2 Example

The following examples shows an Organization instance with its tax payer id specified using an ExternalIdentifierType instance.

```
<Organization ...>
  ...
  <ExternalIdentifier ...
    identificationScheme="urn:acme:ClassificationScheme:TaxPayerId"
    value="1234567890"/>
  </ExternalIdentifier>
  ...
</Organization>
```

3.16.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
identificationScheme	objectReferenceType	1		Client	Yes
registryObject	objectReferenceType	0..1		Client	No
value	~~LongName~~LongText	1		Client	Yes

- Attribute identificationScheme - Each ExternalIdentifier instance MUST have an identificationScheme attribute that references a ClassificationScheme. This ClassificationScheme defines the namespace within which an identifier is defined using the value attribute for the RegistryObjectType instance referenced by the RegistryObject attribute.
- Attribute registryObject - Each ExternalIdentifier instance MAY have a *registryObject* attribute specified. This attribute references the parent RegistryObjectType instance for which this is an ExternalIdentifier.
  - This attribute MUST be specified when a client submits an ExternalIdentifier separately from its parent RegistryObjectType instance

- This attribute MAY be unspecified when a client submits an ExternalIdentifier as a sub-element of its parent RegistryObjectType instance. In such cases the server MUST set this attributes value to the value of the id attribute of the parent RegistryObjectType instance.

- Attribute value - Each ExternalIdentifier instance MUST have a *value* attribute that provides the identifier value for this ExternalIdentifier (e.g., the tax payer id in example above).

3.17 ExternalLinkType

Base Type: RegistryObjectType

This type allows a link to external content to be associated with a RegistryObjectType instance.

3.17.1 Syntax

```
<complexType name="ExternalLinkType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="ExternalRef"
          type="tns:SimpleLinkType" minOccurs="1" maxOccurs="1"/>
      </sequence>
      <attribute name="registryObject"
        type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="ExternalLink" type="tns:ExternalLinkType"/>
```

3.17.2 Example

The following examples shows an Organization instance with an ExternalLink that links to its web site URL via its ExternalRef sub-element.

```
<Organization ...>
  ...
  <ExternalLink ...
    objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:ExtrinsicObject:XML:WSDL"
    mimeType="text/xml"/>
    <ExternalRef xlink:href="http://www.acme.com"/>
  </ExternalLink>
  ...
</Organization>
```

3.17.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
ExternalRef	SimpleLinkType	1		Client	Yes
registryObject	objectReferenceType	0..1		Client or Server	No

- Element ExternalRef - Each ExternalLink instance MUST have an ExternalRef sub-element defined. This element provides a URI to the external resource pointed to by this ExternalLink instance.

- Attribute registryObject – references the parent RegistryObjectType instance within which the ExtrnalLinkType instance is composed. The value MUST be provided by client when an ExtrenalLink is submitted separate from its parent object. The value MUST be set by the server if the ExternalLink is submitted as part of the submission of its parent object.

4 Association Information Model

A RegistryObjectType instance MAY be associated or related with zero or more RegistryObjectType instances. The information model defines the AssociationType type, an instance of which MAY be used to associate any two RegistryObjectType instances. It also defines as Association element for that type.

In the example below, an AssociationType instance with type "...Supercedes" is used to indicate that the NAICS2001 ClassificationScheme supercedes the NAICS1997 ClassificationScheme.

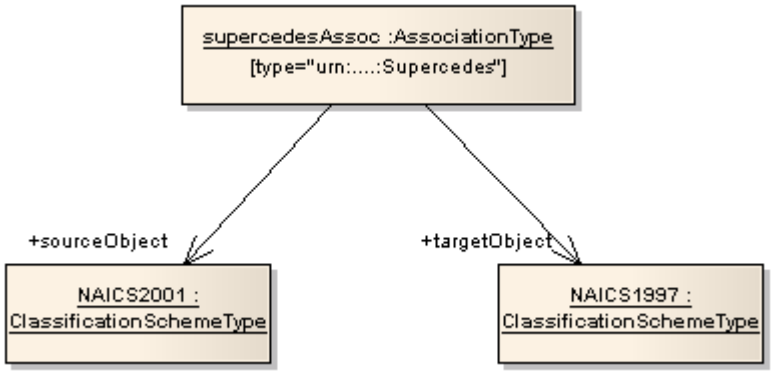

Illustration 3: Association Example

4.1 Source and Target Objects

An AssociationType instance represents an association between a source RegistryObjectType instance and a target RegistryObjectType instance. These are referred to as *sourceObject* and *targetObject* for the AssociationType instance. It is important which object is the sourceObject and which is the targetObject as it determines the directional semantics of an Association.

4.2 Type of an Association

An AssociationType instance MUST have a type attribute that identifies the type of that association. The value of this attribute ~~MUST be~~is typically the id of a ClassificationNode under the canonical AssociationType ClassificationScheme.

4.3 AssociationType

Base Type: RegistryObjectType

4.3.1 Syntax

```
<complexType name="AssociationType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <attribute name="type"
        type="tns:objectReferenceType" use="required"/>
      <attribute name="sourceObject"
        type="tns:objectReferenceType" use="required"/>
      <attribute name="targetObject"
        type="tns:objectReferenceType" use="required"/>
    </extension>
```

```
  </complexContent>
</complexType>
<element name="Association" type="tns:AssociationType"/>
```

4.3.2 Example

The following examples shows an Organization instance that has an “OffersService” association with a Service that it offers.

```
<Organization ... id="urn:acme:Organization:acme-inc" ... />
<Service ... id="urn:acme:Service:stock-quote" ... />
<Association id="urn:acme:Association:acme-example-relationship"
  sourceObject="urn:acme:Organization:acme-inc"
  targetObject="urn:acme:Service:stock-quote"
  type="urn:oasis:names:tc:ebxml-regrep:AssociationType:OffersService" .../>
```

4.3.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
sourceObject	objectReferenceType	1		Client	Yes
targetObject	objectReferenceType	1		Client	Yes
type	objectReferenceType	1		Client	Yes

- Attribute sourceObject - Each Association MUST have a *sourceObject* attribute that references the RegistryObjectType instance that is the source of that Association.
- Attribute targetObject - Each Association MUST have a *targetObject* attribute that references the RegistryObjectType instance that is the target of that Association.
- Attribute type - Each Association MUST have a t*ype* attribute that identifies the type of that association.
  - The value of the type attribute MUST be a reference to a ClassificationNode within the canonical AssociationType ClassificationScheme.
  - A server MUST support the canonical association types as defined by the canonical AssociationType ClassificationScheme. Deployments and profiles may extend the canonical AssociationType ClassificationScheme by adding additional ClassificationNodes to it.

4.4 Access Control

A client MAY create an AssociationType instance between *any* two RegistryObjectType instances assuming the access control policies associated with the source and target object permit the client to create a reference to them. The default access control policy permits any client to create a reference to an object.

5 Classification Information Model

The ebRIM information model supports classification of RegistryObjectType instances using values defined by a taxonomy or controlled vocabulary. A taxonomy is represented in ebRIM by the ClassificationSchemeType type. Values in a taxonomy are represented by the ClassificationNode type. A classification instance is represented in ebRIM by the ClassificationType type.

This specification specifies a set of canonical ClassificationSchemes. Deployments and profiles MAY extends these canonical ClassificationSchemes by adding additional ClassificationNodes to them. They MAY also define new ClassificationSchemes. A RegistryObjectType instance MAY be classified using *any* ClassificationNode in *any* ClassificationScheme supported by the server. A RegistryObjectType instance MAY have any number of classifications defined for it.

A general ClassificationScheme can be viewed as a tree structure where the ClassificationScheme is the root and ClassificationNodes are either intermediate or leaf nodes in the tree.

Illustration 4 below shows RegistryObjectType instances representing Organizations as grey boxes. Each Organization represents an automobile manufacturer. Organization is classified by the ClassificationNode named “Automotive” under the ClassificationScheme instance with name “IndustryScheme”. Furthermore, the US Automobile manufacturers are classified by the “US” ClassificationNode under the ClassificationScheme with name “GeographyScheme”. Similarly, a European automobile manufacturer is classified by the “Europe” ClassificationNode under the ClassificationScheme with name “GeographyScheme”.

The example shows how a RegistryObject may be classified by multiple ClassificationNodeType instances under multiple ClassificationScheme instances (e.g., IndustryScheme, GeographyScheme).

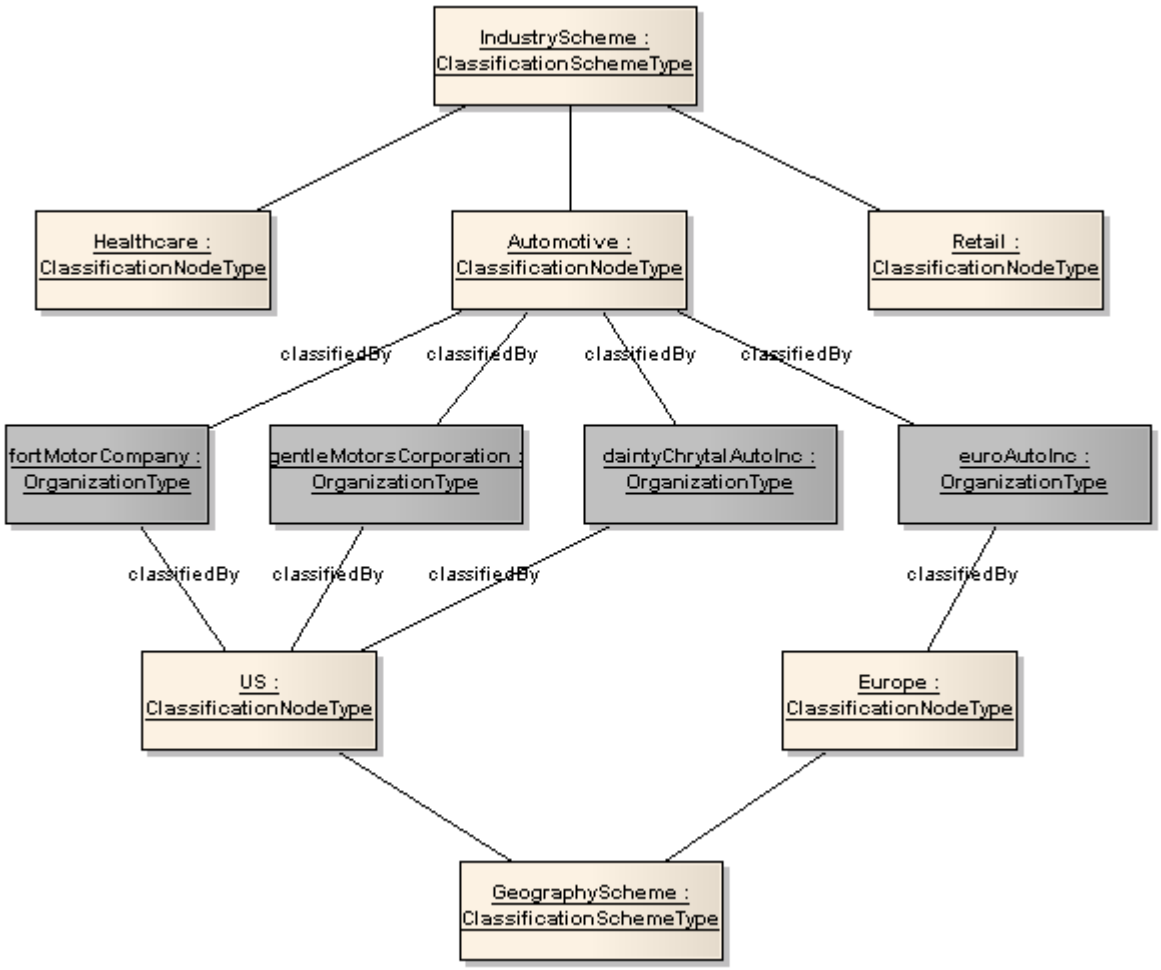

Illustration 4: Classification Example

Illustration 5 shows the Classification information model.

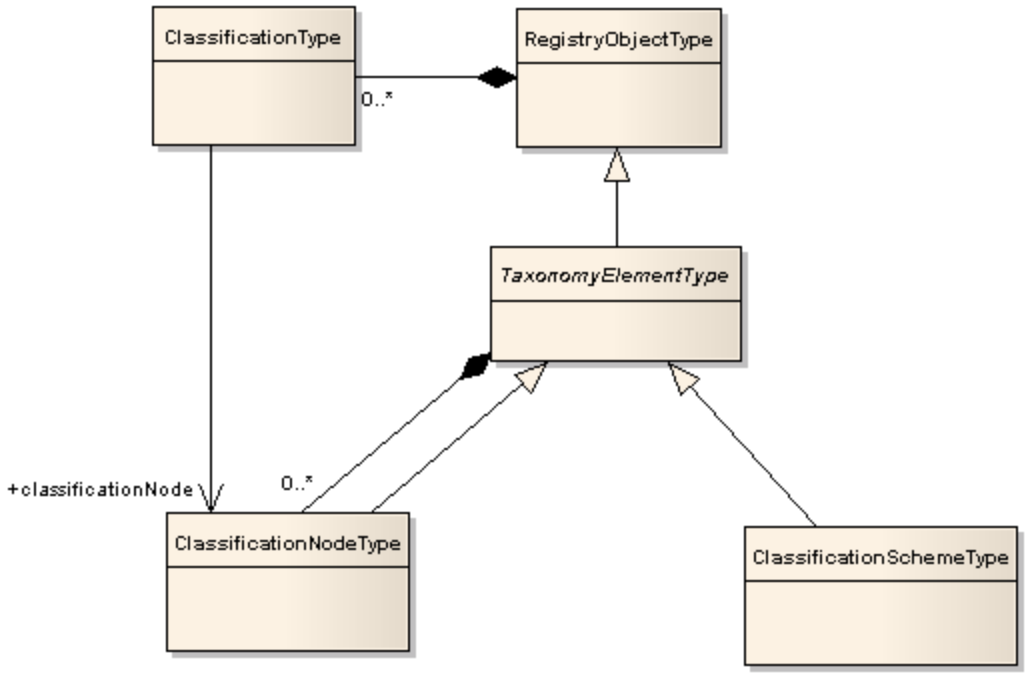

Illustration 5: Classification Information Model

5.1 TaxonomyElementType

Base Type: RegistryObjectType

This abstract type is the common base type for ClassificationSchemeType and ClassificationNodeType.

5.1.1 Syntax

```
<complexType name="TaxonomyElementType" abstract="true">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="ClassificationNode" type="tns:ClassificationNodeType"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

5.1.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
ClassificationNode	ClassificationNodeType	0..*		Client	Yes

- Element ClassificationNode – This element represents a ClassificationNode child of a parent TaxonomyElementType instance. A TaxonomyElementType instance MAY have any number of ClassificationNode child elements.

5.2 ClassificationSchemeType

Base Type: TaxonomyElementType

A ClassificationScheme instance represents a taxonomy.

The taxonomy hierarchy may be defined internally to the server using instances of ClassificationNodeType type, or it may be defined externally to the server, in which case the structure and values of the taxonomy elements are not known to the Registry.

In the first case the classification scheme is said to be *internal* and in the second case the classification scheme is said to be *external*.

5.2.1 Syntax

```
<complexType name="ClassificationSchemeType">
  <complexContent>
    <extension base="tns:TaxonomyElementType">
      <attribute name="isInternal" type="boolean" use="required"/>
      <attribute name="nodeType"
        type="tns:objectReferenceType" use="required"/>
    </extension>
  </complexContent>
</complexType>
<element name="ClassificationScheme" type="tns:ClassificationSchemeType"/>
```

5.2.2 Example

The following examples shows a ClassificationScheme representing gender values.

```
<ClassificationScheme id="urn:acme:GenderScheme" isInternal="true"
  nodeType="urn:oasis:names:tc:ebxml-regrep:NodeType:UniqueCode" ...>
  <Name>
    <LocalizedString charset="UTF-8" value="GenderScheme"/>
  </Name>
  <ClassificationNode id="urn:acme:Gender:Male" code="Male" .../>
  <ClassificationNode id="urn:acme:Gender:Female" code="Female" .../>
  <ClassificationNode id="urn:acme:Gender:Other" code="Other" .../>
</ClassificationScheme>
```

5.2.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
isInternal	xs:boolean	1		Client	No
nodeType	objectReferenceType	1		Client	No

- Attribute isInternal - When submitting a ClassificationSchemeType instance the client MUST declare whether the ClassificationSchemeType instance represents an internal or an external taxonomy. This allows the server to validate the subsequent submissions of ClassificationNodeType and ClassificationType instances in order to maintain the type of ClassificationScheme consistent throughout its lifecycle.
- Attribute nodeType - When submitting a ClassificationScheme instance the client MUST declare the structure of taxonomy nodes within the ClassificationScheme via the nodeType attribute. The value of the nodeType attribute MUST be a reference to a ClassificationNodeType instance within the canonical NodeType ClassificationScheme. A server MUST support the node types as defined

by the canonical NodeType ClassificationScheme. The canonical NodeType ClassificationScheme MAY easily be extended by adding additional ClassificationNodes to it.

The following table lists the canonical ClassificationNode defined as values for the NodeType ClassificationScheme:

Name	Description
UniqueCode	Indicates that the code for each ClassificationNode in the ClassificationScheme is unique within the scope of the ClassificationScheme
EmbeddedPath	Indicates that the code assigned to each node of the taxonomy also encodes its path.
NonUniqueCode	Indicates that the code for each ClassificationNode in the ClassificationScheme is not unique within the scope of the ClassificationScheme. For example, in a geography taxonomy Moscow could be under both Russia and the USA, where there are five cities of that name in different states.

5.3 ClassificationNodeType

Base Type: TaxonomyElementType

ClassificationNodeType instances are used to define values for a taxonomy represented by ClassificationSchemeType instance.

5.3.1 Syntax

```
<complexType name="ClassificationNodeType">
  <complexContent>
    <extension base="tns:TaxonomyElementType">
      <attribute name="parent" type="tns:objectReferenceType" use="optional"/>
      <attribute name="path" type="string" use="optional"/>
      <attribute name="code" type="tns:~~LongName~~LongText" use="required"/>
    </extension>
  </complexContent>
</complexType>
<element name="ClassificationNode" type="tns:ClassificationNodeType"/>
```

5.3.2 Example

The following examples shows a ClassificationScheme representing gender values.

```
<ClassificationScheme id="urn:acme:GenderScheme" ...>
  ...
  <ClassificationNode id="urn:acme:Gender:Male" code="Male" ...>
    <Name>
      <LocalizedString charset="UTF-8" value="Male"/>
    </Name>
  </ClassificationNode>
</ClassificationScheme>
```

5.3.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
code	~~LongName~~LongText	1		Client	No
parent	objectReferenceType	0..1		Client	No
path	xs:string	0..1		Registry	No

- Attribute code - A ClassificationNodeType instance MUST have a *code* attribute. The code attribute contains a code that represents a value within a ClassificationScheme.
  - The code attribute of a ClassificationNodeType instance MUST be unique with respect to all sibling ClassificationNodes that are immediate children of the same parent TaxonomyElementType instance.
- Attribute parent - A ClassificationNodeType instance MAY have a *parent* attribute. The parent attribute references the parent TaxonomyElementType instance. This is either another ClassificationNodeType instance or the ClassificationSchemeType instance.
- Attribute path - A ClassificationNodeType instance MAY have a *path* attribute. The path attribute represents a hierarchical path from the root ClassificationSchemeType to the ClassificationNodeType instance. The syntax of the path attribute value is defined in 5.3.4.
  - A server MUST set the path attribute for any ClassificationNodeType instance when it is submitted by a client.
  - The path attribute MUST be ignored by the server if it is specified by the client during the submission of the ClassificationNodeType instance.
  - The path attribute of a ClassificationNode MUST be unique within a server.

5.3.4 Canonical Path Syntax

The path attribute of the ClassificationNodeType instance contains an absolute path in a canonical representation that uniquely identifies the path leading from the root ClassificationSchemeType instance to that ClassificationNodeType instance.

The canonical path representation is defined by the following BNF grammar:

```
canonicalPath ::= '/' rootTaxonomyElementId nodePath
nodePath      ::=    '/' nodeCode
                |      '/' nodeCode ( nodePath )?
```

In the above grammar, rootTaxonomyElementId is the id attribute of the root ClassificationSchemeType or ClassificationNodeType instance, and nodeCode is defined by NCName production as defined by http://www.w3.org/TR/REC-xml-names/#NT-NCName.

Example of Canonical Path Representation

The following canonical path represents the *path* attribute value for the ClassificationNode with code "Male" in the sample Gender ClassificationScheme presented earlier.

```
/urn:acme:GenderScheme/Male
```

5.4 ClassificationType

Base Type: RegistryObjectType

A ClassificationType instance classifies a RegistryObjectType instance by using a value defined within a particular ClassificationScheme. An internal Classification specifies the value by referencing the ClassificationNodeType instance within a ClassificationSchemeType instance. An external Classification specifies the value using a string value that is defined in some external specification represented by an external ClassificationSchemeType instance.

5.4.1 Syntax

```
<complexType name="ClassificationType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <attribute name="classificationScheme"
        type="tns:objectReferenceType" use="optional"/>
      <attribute name="classifiedObject"
        type="tns:objectReferenceType" use="optional"/>
      <attribute name="classificationNode"
        type="tns:objectReferenceType" use="optional"/>
      <attribute name="nodeRepresentation"
        type="tns:~~LongName~~LongText" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="Classification" type="tns:ClassificationType"/>
```

5.4.2 Example

The following examples shows how a Person instance is classified using the sample Gender ClassificationScheme used in earlier examples.

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <Classification classifiedObject="urn:acme:person:Danyal"
    classificationNode="urn:acme:Gender:Male"
  ...
</Person>
```

5.4.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
classificationNode	objectReferenceType	0..1		Client	No
classifiedObject	objectReferenceType	0..1		Client	No
classificationScheme	objectReferenceType	0..1		Client	No
nodeRepresentation	~~LongName~~LongText	0..1		Client	No

- Attribute classificationNode - If the ClassificationType instance represents an internal classification, then the *classificationNode* attribute is required.
  - The *classificationNode* value MUST reference a ClassificationNodeType instance.
- Attribute classifiedObject - For both internal and external classifications, the *classifiedObject* attribute is required and it references the RegistryObjectType instance that is classified by this Classification.
- Attribute classificationScheme - If the ClassificationType instance represents an external classification, then the *classificationScheme* attribute is required.
  - The classificationScheme value MUST reference a ClassificationScheme instance.
- Attribute nodeRepresentation - If the ClassificationType instance represents an external classification, then the *nodeRepresentation* attribute is required. It is a representation of a taxonomy value from a classification scheme.

6 Provenance Information Model

The term provenance in the English language implies the origin and history of ownership and custodianship of things of value. When applied to the ebXML RegRep, provenance implies information about the origin, history of ownership, custodianship, and other relationships between entities such as people, organizations and information represented by RegistryObjectType instances.

The ebRIM information model supports types and relationships that MAY be used to represent the provenance of RegistryObjectType instances.

The following figure presents the significant types defined by the provenance information model.

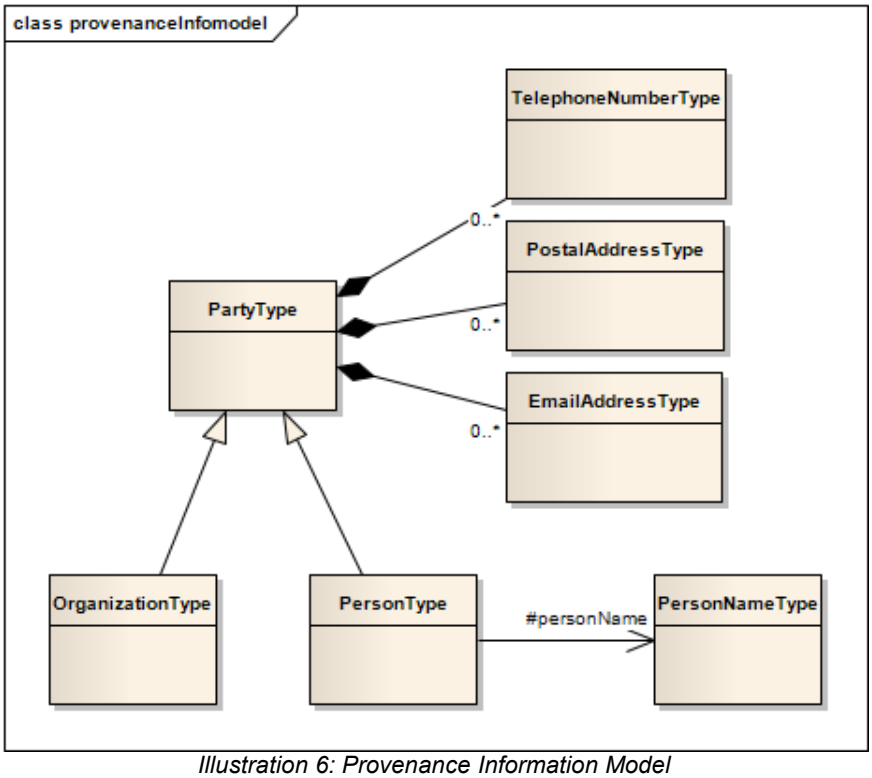

Illustration 6: Provenance Information Model

6.1 PostalAddressType

Base Type: ExtensibleObjectType

This type represents a postal or mailing address.

6.1.1 Syntax

```
<complexType name="PostalAddressType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="city" type="tns:ShortText" use="optional"/>
      <attribute name="country" type="tns:ShortText" use="optional"/>
      <attribute name="postalCode" type="tns:ShortText" use="optional"/>
      <attribute name="stateOrProvince" type="tns:ShortText" use="optional"/>
```

```
      <attribute name="street" type="tns:ShortText" use="optional"/>
      <attribute name="streetNumber" type="tns:String32" use="optional"/>
      <attribute name="type" type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="PostalAddress" type="tns:PostalAddressType"/>
```

6.1.2 Example

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <PostalAddress streetNumber="10" street="Street 1" city="Islamabad"
    stateOrProvince="Punjab" country="Pakistan" postalCode="12345"/>
  ...
</Person>
```

6.1.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
city	ShortText	No		Client	Yes
country	ShortText	No		Client	Yes
postalCode	ShortText	No		Client	Yes
stateOrProvince	ShortText	No		Client	Yes
street	ShortText	No		Client	Yes
streetNumber	String32	No		Client	Yes

- Attribute city - A PostalAddressType instance MAY have a *city* attribute identifying the city for that address.
- Attribute country - A PostalAddressType instance MAY have a *country* attribute identifying the country for that address.
- Attribute postalCode - A PostalAddressType instance MAY have a *postalCode* attribute identifying the postal code (e.g., zip code) for that address.
- Attribute stateOrProvince - A PostalAddressType instance MAY have a *stateOrProvince* attribute identifying the state, province or region for that address.
- Attribute street - A PostalAddressType instance MAY have a *street* attribute identifying the street name for that address.
- Attribute streetNumber - A PostalAddressType instance MAY have a *streetNumber* attribute identifying the street number (e.g., 65) for the street address.

6.2 TelephoneNumberType

Base Type: ExtensibleObjectType

This type defines attributes of a telephone number.

6.2.1 Syntax

```
<complexType name="TelephoneNumberType">
```

```
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="areaCode" type="tns:String8" use="optional"/>
      <attribute name="countryCode" type="tns:String8" use="optional"/>
      <attribute name="extension" type="tns:String8" use="optional"/>
      <attribute name="number" type="tns:String16" use="optional"/>
      <attribute name="type" type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="TelephoneNumber" type="tns:TelephoneNumberType"/>
```

6.2.2 Example

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <TelephoneNumber countryCode="92" areaCode="51" number="123-4567"
    type="urn:oasis:names:tc:ebxml-regrep:PhoneType:MobilePhone"/>
  ...
</Person>
```

6.2.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
areaCode	String8	0..1		Client	Yes
countryCode	String8	0..1		Client	Yes
extension	String8	0..1		Client	Yes
number	String16	0..1		Client	Yes
type	objectReferenceType	0..1		Client	Yes

- Attribute areaCode - A TelephoneNumberType instance MAY have an *areaCode* attribute that provides the area code for that telephone number.
- Attribute countryCode - A TelephoneNumberType instance MAY have a *countryCode* attribute that provides the country code for that telephone number.
- Attribute extension - A TelephoneNumberType instance MAY have an *extension* attribute that provides the extension number, if any, for that telephone number.
- Attribute number - A TelephoneNumberType instance MAY have a *number* attribute that provides the local number (without area code, country code and extension) for that telephone number.
- Attribute type - A TelephoneNumberType instance MAY have a *type* attribute that provides the type for the TelephoneNumber. The value of the phoneType attribute MUST be a reference to a ClassificationNode in the canonical PhoneType ClassificationScheme.

6.3 EmailAddressType

Base Type: ExtensibleObjectType

This type defines attributes of an email address.

6.3.1 Syntax

```
<complexType name="EmailAddressType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="address" type="tns:ShortText" use="required"/>
      <attribute name="type" type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="EmailAddress" type="tns:EmailAddressType"/>
```

6.3.2 Example

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <EmailAddress address="danyal@play.com"
    type="urn:oasis:names:tc:ebxml-regrep:EmailType:HomeEmail"/>
  ...
</Person>
```

6.3.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
address	ShortText	1		Client	Yes
type	objectReferenceType	0..1		Client	Yes

- Attribute address - An EmailAddressType instance MUST have an *address* attribute that provides the actual email address.
- Attribute type - An EmailAddressType instance MAY have a *type* attribute that provides the type for that email address. The value of the type attribute MUST be a reference to a ClassificationNode in the canonical EmailType ClassificationScheme.

6.4 PartyType

Base Type: RegistryObjectType

This abstract type represents a party that has contact information such as PostalAddress, EmailAddress, TelephphoneNumber etc. It is used as a common base type for PersonType and OrganizationType.

6.4.1 Syntax

```
<complexType name="PartyType" abstract="true">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="PostalAddress" type="tns:PostalAddressType"
          minOccurs="0" maxOccurs="unbounded"/>
        <element name="TelephoneNumber" type="tns:TelephoneNumberType"
          minOccurs="0" maxOccurs="unbounded"/>
        <element name="EmailAddress" type="tns:EmailAddressType"
```

```
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

6.4.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
EmailAddress	EmailAddressType	0..*		Client	Yes
PostalAddress	PostalAddressType	0..*		Client	Yes
TelephoneNumber	TelephoneNumberType	0..*		Client	Yes

- Element EmailAddress - A PartyType instance MAY have any number of EmailAddress sub-elements. Each EmailAddress provides an email address for that PartyType instance. A PartyType instance SHOULD have at least one EmailAddress.
- Element PostalAddress - A PartyType instance MAY have any number of PostalAddress sub-elements. Each PostalAddress element provides a postal address for that PartyType instance. A PartyType instance SHOULD have at least one PostalAddress.
- Element TelephoneNumber - A PartyType instance MAY have any number of T*elephoneNumber* sub-elements. Each TelephoneNumber element provides a TelephoneNumber for that PartyType instance. A PartyType instance SHOULD have at least one TelephoneNumber.

6.5 PersonType

Base Type: ~~RegistryObject~~Party**Type**

This type represent a person.

6.5.1 Syntax

```
<complexType name="PersonType">
  <complexContent>
    <extension base="tns:~~RegistryObject~~PartyType">
      <sequence>
        <element name="PersonName" type="tns:PersonNameType"
          minOccurs="0" maxOccurs="1"/>
        ~~<element name="PostalAddress" type="tns:PostalAddressType"~~
          ~~minOccurs="0" maxOccurs="unbounded"/>~~
        ~~<element name="TelephoneNumber" type="tns:TelephoneNumberType"~~
          ~~minOccurs="0" maxOccurs="unbounded"/>~~
        ~~<element name="EmailAddress" type="tns:EmailAddressType" minOccurs="0"~~
          ~~maxOccurs="unbounded"/>~~
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="Person" type="tns:PersonType"/>
```

6.5.2 Example

```
<Person id="urn:acme:person:Danyal" ...>
  <PersonName firstName="Danyal" middleName="Idris" lastName="Najmi"/>
  <PostalAddress streetNumber="10" street="Street 1" city="Islamabad"
    stateOrProvince="Punjab" country="Pakistan" postalCode="12345"/>
  <TelephoneNumber countryCode="92" areaCode="51" number="123-4567"
    type="urn:oasis:names:tc:ebxml-regrep:PhoneType:MobilePhone"/>
  <EmailAddress address="danyal@play.com"
    type="urn:oasis:names:tc:ebxml-regrep:EmailType:HomeEmail"/>
</Person>
```

6.5.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
PersonName	PersonNameType	0..1		Client	No

- ~~Element EmailAddress - A PersonType instance MAY have any number of EmailAddress sub-elements. Each EmailAddress provides an email address for that person. A Person SHOULD have at least one EmailAddress.~~
- Element PersonName – A PersonType instance SHOULD have a ~~*p*~~P*ersonName* sub-element that provides the name for that person.
- ~~Element PostalAddress - A PersonType instance MAY have any number of PostalAddress sub-elements. Each PostalAddress element provides a postal address for that person. A PersonType instance SHOULD have at least one PostalAddress.~~
- ~~Element TelephoneNumber - A PersonType instance MAY have any number of *TelephoneNumber* sub-elements. Each TelephoneNumber elementprovides a TelephoneNumber for that person. A Person SHOULD have at least one TelephoneNumber.~~

6.6 PersonNameType

Base Type: ExtensibleObjectType

This represents the name for a PersonType instance.

6.6.1 Syntax

```
<complexType name="PersonNameType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="firstName" type="tns:~~ShortName~~ShortText"
use="optional"/>
      <attribute name="middleName" type="tns:~~ShortName~~ShortText"
use="optional"/>
      <attribute name="lastName" type="tns:~~ShortName~~ShortText"
use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="PersonName" type="tns:PersonNameType"/>
```

6.6.2 Example

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <PersonName firstName="Danyal" middleName="Idris" lastName="Najmi"/>
  ...
</Person>
```

6.6.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
firstName	~~ShortName~~ShortText	0..1		Client	Yes
lastName	~~ShortName~~ShortText	0..1		Client	Yes
middleName	~~ShortName~~ShortText	0..1		Client	Yes

- Attribute firstName - A PersonName instance SHOULD have a *firstName* attribute that is the given name of the person.
- Attribute lastName - A PersonName instance SHOULD have a *lastName* attribute that is the family name of the person.
- Attribute middleName - A PersonName instance SHOULD have a *middleName* attribute that is the middle name of the person.

~~PostalAddressType~~

~~**Base Type:** ExtensibleObjectType~~

~~This type represents a postal or mailing address.~~

6.6.1 ~~Syntax~~

```
<complexType name="PostalAddressType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="city" type="tns:ShortName" use="optional"/>
      <attribute name="country" type="tns:ShortName" use="optional"/>
      <attribute name="postalCode" type="tns:ShortName" use="optional"/>
      <attribute name="stateOrProvince" type="tns:ShortName" use="optional"/>
      <attribute name="street" type="tns:ShortName" use="optional"/>
      <attribute name="streetNumber" type="tns:String32" use="optional"/>
      <attribute name="type" type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="PostalAddress" type="tns:PostalAddressType"/>
```

6.6.2 ~~Example~~

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <PostalAddress streetNumber="10" street="Street 1" city="Islamabad"
    stateOrProvince="Punjab" country="Pakistan" postalCode="12345"/>
```

```
    ...
</Person>
```

6.6.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
city	ShortName	No		Client	Yes
country	ShortName	No		Client	Yes
postalCode	ShortName	No		Client	Yes
stateOrProvince	ShortName	No		Client	Yes
street	ShortName	No		Client	Yes
streetNumber	String32	No		Client	Yes

- Attribute city - A PostalAddressType instance MAY have a *city* attribute identifying the city for that address.
- Attribute country - A PostalAddressType instance MAY have a *country* attribute identifying the country for that address.
- Attribute postalCode - A PostalAddressType instance MAY have a *postalCode* attribute identifying the postal code (e.g., zip code) for that address.
- Attribute stateOrProvince - A PostalAddressType instance MAY have a *stateOrProvince* attribute identifying the state, province or region for that address.
- Attribute street - A PostalAddressType instance MAY have a *street* attribute identifying the street name for that address.
- Attribute streetNumber - A PostalAddressType instance MAY have a *streetNumber* attribute identifying the street number (e.g., 65) for the street address.

6.7 TelephoneNumberType

Base Type: ExtensibleObjectType

This type defines attributes of a telephone number.

6.7.1 Syntax

```
<complexType name="TelephoneNumberType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="areaCode" type="tns:String8" use="optional"/>
      <attribute name="countryCode" type="tns:String8" use="optional"/>
      <attribute name="extension" type="tns:String8" use="optional"/>
      <attribute name="number" type="tns:String16" use="optional"/>
      <attribute name="type" type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="TelephoneNumber" type="tns:TelephoneNumberType"/>
```

6.7.2 Example

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <TelephoneNumber countryCode="92" areaCode="51" number="123-4567"
    type="urn:oasis:names:tc:ebxml-regrep:PhoneType:MobilePhone"/>
  ...
</Person>
```

6.7.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
areaCode	String8	0..1		Client	Yes
countryCode	String8	0..1		Client	Yes
extension	String8	0..1		Client	Yes
number	String16	0..1		Client	Yes
type	objectReferenceType	0..1		Client	Yes

- Attribute areaCode - A TelephoneNumberType instance MAY have an *areaCode* attribute that provides the area code for that telephone number.
- Attribute countryCode - A TelephoneNumberType instance MAY have a *countryCode* attribute that provides the country code for that telephone number.
- Attribute extension - A TelephoneNumberType instance MAY have an *extension* attribute that provides the extension number, if any, for that telephone number.
- Attribute number - A TelephoneNumberType instance MAY have a *number* attribute that provides the local number (without area code, country code and extension) for that telephone number.
- Attribute type - A TelephoneNumberType instance MAY have a *type* attribute that provides the type for the TelephoneNumber. The value of the phoneType attribute MUST be a reference to a ClassificationNode in the canonical PhoneType ClassificationScheme.

6.8 EmailAddressType

Base Type: ExtensibleObjectType

This type defines attributes of an email address.

6.8.1 Syntax

```
<complexType name="EmailAddressType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="address" type="tns:ShortName" use="required"/>
      <attribute name="type" type="tns:objectReferenceType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="EmailAddress" type="tns:EmailAddressType"/>
```

6.8.2 Example

```
<Person id="urn:acme:person:Danyal" ...>
  ...
  <EmailAddress address="danyal@play.com"
    type="urn:oasis:names:tc:ebxml-regrep:EmailType:HomeEmail"/>
  ...
</Person>
```

6.8.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
address	ShortName	1		Client	Yes
type	objectReferenceType	0..1		Client	Yes

- Attribute address - An EmailAddressType instance MUST have an *address* attribute that provides the actual email address.
- Attribute type - An EmailAddressType instance MAY have a *type* attribute that provides the type for that email address. The value of the type attribute MUST be a reference to a ClassificationNode in the canonical EmailType ClassificationScheme.

6.9 OrganizationType

Base Type: RegistryObjectType**Base Type:** PartyType

This type represents an organization or entity.

6.9.1 Syntax

```
<complexType name="OrganizationType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="PostalAddress" type="tns:PostalAddressType"
          minOccurs="0" maxOccurs="unbounded"/>
        <element name="TelephoneNumber" type="tns:TelephoneNumberType"
          minOccurs="0" maxOccurs="unbounded"/>
        <element name="EmailAddress" type="tns:EmailAddressType" minOccurs="0"
          maxOccurs="unbounded"/>
      </sequence>
      <attribute name="primaryContact" type="tns:objectReferenceType"
use="optional"/>
    </extension>
  </complexContent>
</complexType><complexType name="OrganizationType">
  <complexContent>
    <extension base="tns:PartyType">
      <sequence>
        <element name="Organization" type="tns:OrganizationType"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="primaryContact" type="tns:objectReferenceType"
```

```
        use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="Organization" type="tns:OrganizationType"/>
```

6.9.2 Example

```
<Organization id="urn:acme:Organization:acme"
  primaryContact="urn:acme:person:Danyal" ...>
  <PostalAddress streetNumber="1" street="Grand Trunk Rd." city="Hasan Abdal"
    stateOrProvince="Punjab" country="Pakistan" postalCode="12345"/>
  <TelephoneNumber countryCode="92" areaCode="52" number="123-4567"
    type="urn:oasis:names:tc:ebxml-regrep:PhoneType:OfficePhone"/>
  <EmailAddress address="info@acme.com"
    type="urn:oasis:names:tc:ebxml-regrep:EmailType:OfficeEmail"/>
</Organization>
```

6.9.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
~~primaryContact~~Organization	~~objectReferenceType~~OrganizationType	~~0..1~~0..*		~~Client~~Client	~~No~~Yes
primaryContact	objectReferenceType	0..1		Client	Yes

- Element Organization – This element allows clients to specify sub-organizations of the Organization instance using a simpler alternative to specifying “HasMember” AssociationType instances between the parent and child Organizations.
    - A server MUST replace any nested Organization elements within an OrganizationType instance with AssociationType instances such that each nested Organization element is replaced with an AssociationType instance with type “urn:oasis:names:tc:ebxml-regrep:AssociationType:HasMember”, with sourceObject specifying the id of the parent OrganizationType instance and with targetObject specifying the id of the nested Organization element
- ~~Element EmailAddress - An OrganizationType instance MAY have any number of EmailAddress sub-elements. Each EmailAddress provides an email address for that person. An OrganizationType instance SHOULD have at least one EmailAddress.~~
- ~~Element PostalAddress - An OrganizationType instance MAY have any number of PostalAddress sub-elements. Each PostalAddress element provides a postal address for that person. An OrganizationType instance SHOULD have at least one PostalAddress.~~
- Attribute primaryContact - An OrganizationType instance SHOULD have a *primaryContact* attribute that references the Person instance for the person that is the primary contact for that organization.~~Element TelephoneNumber - An OrganizationType instance MAY have any number of T*elephoneNumber* sub-elements. Each TelephoneNumber element provides a TelephoneNumber for that person. An Organization SHOULD have at least one TelephoneNumber.~~
-

6.10 Associating Organization With Persons

There are many situation where an person is related to an organization. Such relationship MAY be defined by AssociationType instances between an OrganizationType instance and a PersonType instance.

- The type attribute of the Association MAY reference the canonical ClassificationNode with id "urn:oasis:names:tc:ebxml-regrep:AssociationType:AffiliatedWith" or one of its descendants.
- The sourceObject SHOULD reference the PersonType instance.
- The targetObject SHOULD reference the OrganizationType instance.

6.11 Associating Organization With Organizations

There are many situation where an organization is related to another organization. Such relationship MAY be defined by AssociationType instances between an OrganizationType instance and another OrganizationType instance.

- To represent parent-child relationship between organizations the type attribute of the Association SHOULD reference the canonical ClassificationNode with id "urn:oasis:names:tc:ebxml-regrep:AssociationType:HasParent" or one of its descendants.
- The sourceObject SHOULD reference the child OrganizationType instance.
- The targetObject SHOULD reference the parent OrganizationType instance.

6.12 Associating Organizations With RegistryObjects

An organization MAY be associated with zero or more RegistryObjectType instances. Each such association is modeled in ebRIM using an Association instance between an Organization instance and a RegistryObjectType instance.

Associations between Organizations and RegistryObjectType instances do not entitle organizations to any special privileges with respect to those instances. Such privileges are defined by the Access Control Policies defined for the RegistryObjectType instances as described in the Access Control Information Model chapter.

6.12.1 ResponsibleFor Relationships

An organization that is the authoritative source for a RegistryObjectType instance is referred to as the *Responsible Organization* for that RegistryObjectType instance. The term *Responsible Organization* has its origins in [11179-6].

- A RegistryObjectType instance SHOULD be related to its responsible organization using the canonical AssociationType with id "urn:oasis:names:tc:ebxml-regrep:AssociationType:ResponsibleFor".
- The sourceObject SHOULD reference the OrganizationType instance for the Responsible Organization.
- The targetObject SHOULD reference the RegistryObjectType instance.

6.12.2 SubmitterOf Relationships

An organization that has submitted a RegistryObjectType instance on behalf of a Responsible Organization is referred to as the *Submitting Organization* for that RegistryObjectType instance. The term *Submitting Organization* has its origins in [11179-6].

- A RegistryObjectType instance SHOULD be related to its submitting organization using the canonical AssociationType with id “urn:oasis:names:tc:ebxml-regrep:AssociationType:SubmitterOf”.
- The sourceObject SHOULD reference the OrganizationType instance for the Submitting Organization.
- The targetObject SHOULD reference the RegistryObjectType instance.

Illustration 7 shows a UML instance diagram to illustrate how to assign SubmitterOf and ResponsibleFor Associations between OrganizationType instances and RegistryObjectType instances.

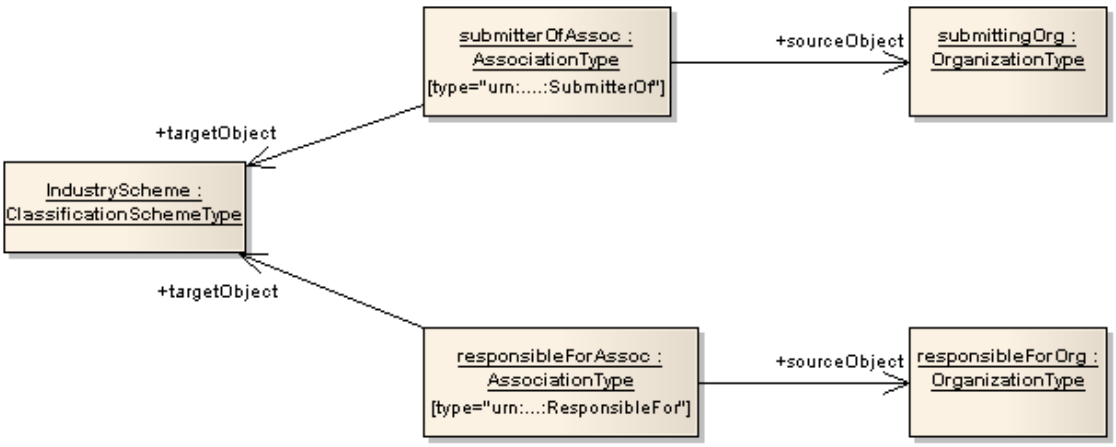

Illustration 7: Organization to RegistryObject Association

7 Service Information Model

This chapter describes the parts of the information model that support the description of services within an ebXML RegRep server. Although service information model aligns with [WSDL2] model, it may be used to describe any type of service in addition to web services.

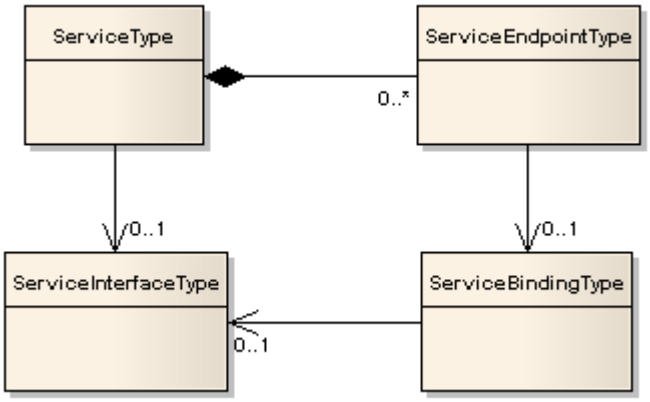

Illustration 8: Service Information Model

7.1 ServiceType

Base Type: RegistryObjectType

This type represent a logical service. Physical service endpoints are represented by the ServiceEndpointType type. A ServiceType instance typically contains ServiceEndpoint sub-elements where each ServiceEndpoint sub-element represents an alternate endpoint for a service.

7.1.1 Syntax

```
<complexType name="ServiceType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="ServiceEndpoint" type="tns:ServiceEndpointType"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="serviceInterface"
        type="tns:objectReferenceType" use="optional" />
    </extension>
  </complexContent>
</complexType>
<element name="Service" type="tns:ServiceType"/>
```

7.1.2 Example

```
<Service id="urn:acme:Service:StockQuoteService" ...>
  ...
  <ServiceEndpoint
    id="urn:acme:ServiceEndpoint:StockQuoteService:free" .../>
```

```
  <ServiceEndpoint
    id="urn:acme:ServiceEndpoint:StockQuoteService:premium" .../>
</Service>
```

7.1.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
ServiceEndpoint	ServiceEndpointType	0..*		Client	Yes
serviceInterface	objectReferenceType	0..1		Client	Yes

- Element ServiceEndpoint – Represents a physical endpoint for the service that MAY be used by clients to access the service
- Attribute serviceInterface – References the abstract interface description for the service
  - MUST reference a ServiceInterfaceType instance if specified

7.2 ServiceEndpointType

Base Type: RegistryObjectType

This type represents a physical endpoint for the service that MAY be used by clients to access a service.

7.2.1 Syntax

```
<complexType name="ServiceEndpointType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <attribute name="address" type="anyURI" use="optional" />
      <attribute name="serviceBinding"
        type="tns:objectReferenceType" use="optional" />
    </extension>
  </complexContent>
</complexType>
<element name="ServiceEndpoint" type="tns:ServiceEndpointType"/>
```

7.2.2 Example

```
<Service id="urn:acme:Service:StockQuoteService" ...>
  ...
  <ServiceEndpoint id="urn:acme:ServiceEndpoint:StockQuoteService:free"
    address="http://acme.com/StockQuoteService/free"
    serviceBinding="urn:acme:ServiceBinding:soap:StockQuoteService">
</Service>
```

7.2.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
address	xs:anyURI	0..1		Client	Yes
serviceBinding	objectReferenceType	0..1		Client	Yes

- Attribute address – Represents the endpoint address URI that a client of the service endpoint may use to access the service endpoint
- Attribute serviceBinding – References the ServiceBindingType instance that represents protocol-specific binding information for the ServiceEndpointType instance
    - MUST reference a ServiceBindingType instance

7.3 ServiceBindingType

Base Type: RegistryObjectType

This type represents protocol-specific binding information for a ServiceEndpointType instance. Example of a protocol-specific binding is a SOAP binding.

7.3.1 Syntax

```
<complexType name="ServiceBindingType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <attribute name="serviceInterface"
        type="tns:objectReferenceType" use="optional" />
    </extension>
  </complexContent>
</complexType>
<element name="ServiceBinding" type="tns:ServiceBindingType"/>
```

7.3.2 Example

```
<ServiceBinding id="urn:acme:ServiceBinding:soap:StockQuoteService"
  serviceInterface="urn:acme:ServiceInterface:StockQuoteService" .../>
  ...
</ServiceBinding>
```

7.3.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
serviceInterface	objectReferenceType	0..1		Client	Yes

- Attribute serviceInterface – References a ServiceInterfaceType instance which represents the abstract service interface for the service
    - MUST reference a ServiceInterfaceType instance if specified

7.4 ServiceInterfaceType

Base Type: RegistryObjectType

This type represents an abstract service interface for a service.

7.4.1 Syntax

```
<complexType name="ServiceInterfaceType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
    </extension>
  </complexContent>
</complexType>
<element name="ServiceInterface" type="tns:ServiceInterfaceType"/>
```

7.4.2 Example

```
<ServiceInterface id="urn:acme:ServiceInterface:StockQuoteService" .../>
  ...
</ServiceInterface>
```

7.4.3 Description

No attributes or elements beyond those inherited from RegistryObjectType are defined for this type.

8 Query Information Model

This chapter describes the information model for defining and invoking parameterized queries in ebXML RegRep. The following significant types are defined by the Query Information Model:

- QueryDefinitionType - Represents the definition of a parameterized query
- QueryType – Represents the invocation of a parameterized query

Several canonical QueryDefinitionType instances are defined by the ebRS specification. Profiles of ebXML RegRep MAY define additional QueryDefinitionType instances as canonical queries for that profile. Deployments MAY also define additional QueryDefinitionType instances. Finally, clients MAY submit additional QueryDefinitionType instances.

A QueryDefinitionType instance MAY be invoked using a QueryType instance. The ebRS Query protocol allows clients to invoke a QueryDefinitionType instance using a QueryType instance within the Query protocol.

The following figure presents the significant types defined by the Query information model.

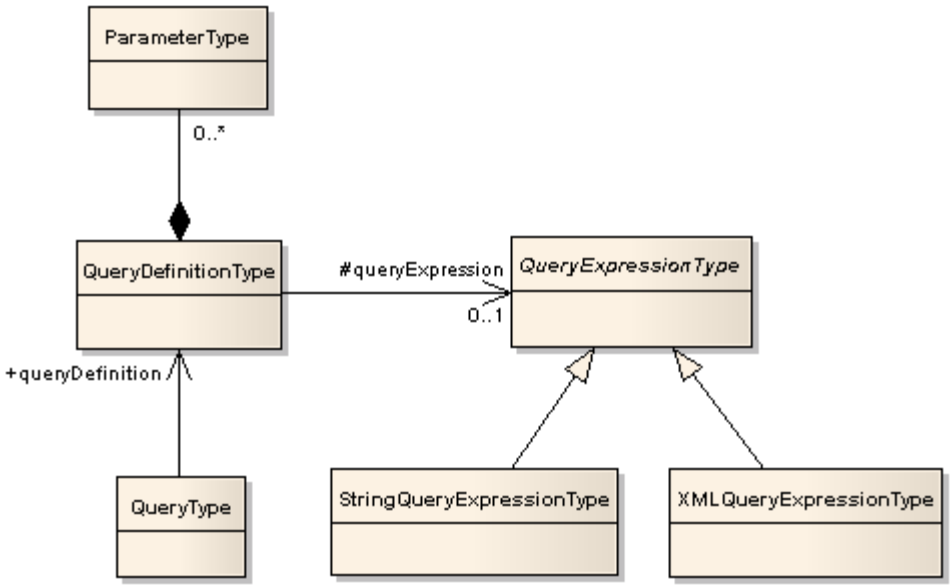

Illustration 9: Query Information Model

8.1 QueryDefinitionType

Base Type: RegistryObjectType

This type represents the definition of a parameterized query. The definition of a query includes the definition of its supported parameters and the definition of a parameterized query expression.

8.1.1 Syntax

```
<complexType name="QueryDefinitionType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
```

```
        <element name="Parameter"
          type="tns:ParameterType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="QueryExpression"
          type="tns:QueryExpressionType" minOccurs="0" maxOccurs="1"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<element name="QueryDefinition" type="tns:QueryDefinitionType"/>
```

8.1.2 Example

```
<QueryDefinition id="urn:oasis:names:tc:ebxml-regrep:query:GetObjectById">
  <Parameter parameterName="id" dataType="string" minOccurs="1"
    maxOccurs="1" defaultValue="%">
  </Parameter>
  <QueryExpression xsi:type="rim:StringQueryExpressionType"
    queryLanguage="urn:oasis:names:tc:ebxml-regrep:QueryLanguage:EJBQL">
    <Value>
    SELECT Object(ro) FROM ...
    </Value>
  </QueryExpression>
</QueryDefinition>
```

8.1.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
Parameter	ParameterType	0..*		Client	Yes
QueryExpression	QueryExpressionType	0..1		Client	Yes

- Element Parameter – Represents the definition of a query parameter for the QueryDefinitionType instance. A QueryDefinitionType instance MAY have any number of Parameter sub-elements
- Element QueryExpression – Represents a query expression for the parameterized query.
  - MAY be omitted if the query is implemented as a Query plugin as defined by ebRS

8.2 ParameterType

Base Type: ExtensibleObjectType

This type represents the definition of a parameter within a QueryDefinitionType.

8.2.1 Syntax

```
<complexType name="ParameterType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <sequence>
        <element name="Name" type="tns:InternationalStringType"
          minOccurs="1" maxOccurs="1"/>
        <element name="Description" type="tns:InternationalStringType"
          minOccurs="0" maxOccurs="1"/>
      </sequence>
```

```
      <attribute name="parameterName" type="string" use="required"/>
      <attribute name="dataType" type="string" use="required" />
      <attribute name="defaultValue" type="string" use="optional"/>
      <attribute name="minOccurs" type="nonNegativeInteger" default="1"/>
      <attribute name="maxOccurs" type="nonNegativeInteger" default="1"/>
    </extension>
  </complexContent>
</complexType>
```

8.2.2 Example

```
<QueryDefinition id="urn:oasis:names:tc:ebxml-regrep:query:GetObjectById">
  <Parameter parameterName="id" dataType="string" minOccurs="1"
    maxOccurs="1" defaultValue="%">
  </Parameter>
  ...
  <QueryExpression .../>
</QueryDefinition>
```

8.2.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
dataType	xs:string	1		Client	Yes
defaultValue	xs:string	0..1		Client	Yes
Description	InternationalStringType	0..1		Client	Yes
minOccurs	xs:nonNegativeInteger	0..1	1	Client	Yes
maxOccurs	xs:nonNegativeInteger	0..1	1	Client	Yes
Name	InternationalStringType	1		Client	Yes
parameterName	xs:string	1		Client	Yes

- Attribute dataType – Specifies the data type for the parameter.
  - The dataType MUST be “string” for parameters whose values are represented by a string value.
  - The dataType MUST be “boolean” for parameters whose values are represented by a boolean value.
  - The dataType MUST be “taxonomyElement” for parameters whose value is the id of a TaxonomyElement.
- Attribute defaultValue - Specifies the default value for the parameter. This value MUST be used as parameter value when the query is invoked if the client does not specify a value for this parameter.
- Element Description - Specifies a human-friendly description of the parameter that indicates what the parameter value represents and what kind of value is allowed. The description MAY be provided in multiple local languages and character sets.
- Attribute minOccurs – Specifies the minimum number of values allowed for the parameter.
- Attribute maxOccurs - Specifies the maximum number of values allowed for the parameter.

- Element Name - Specifies a human-friendly name for the parameter. The name MAY be provided in multiple local languages and character sets.
- Attribute parameterName – Specifies the canonical name of the parameter. The canonicalName identifies the parameter in a locale-insensitive manner
  - SHOULD match a declared parameter name within the query expression for the QueryDefinitionType instance

8.3 QueryExpressionType

Base Type: ExtensibleObjectType

This type represents a query expression in a specified query language that MAY be used by the server to invoke a query.

The QueryExpressionType is the abstract root of a type hierarchy for the following more specialized sub-types:

- StringQueryExpressionType – This type MAY be used to represent non-XML query syntaxes such as SQL-92 and EJBQL.
- XMLQueryExpressionType - This type MAY be used to represent XML query syntaxes such as OGC Filter Query.

This specification does not specify a specific query expression syntax that a server must support.

8.3.1 Syntax

```
<complexType name="QueryExpressionType" abstract="true">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="queryLanguage"
        type="tns:objectReferenceType" use="required"/>
    </extension>
  </complexContent>
</complexType>
```

8.3.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
queryLanguage	objectReferenceType	1		Client	Yes

- Attribute queryLanguage – Specifies the query language used by the QueryExpressionType instance.
  - MUST be a reference to a ClassificationNode in the canonical Query Language ClassificationScheme whose id is “urn:oasis:names:tc:ebxml-regrep:classificationScheme:QueryLanguage”.

8.4 StringQueryExpressionType

Base Type: QueryExpressionType

This type is used to represent non-XML query syntaxes such as SQL-92 and EJBQL.

8.4.1 Syntax

```
<complexType name="StringQueryExpressionType">
  <complexContent>
    <extension base="tns:QueryExpressionType">
      <sequence>
        <element name="Value" type="string" minOccurs="1" maxOccurs="1"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

8.4.2 Example

```
<QueryDefinition id="urn:oasis:names:tc:ebxml-regrep:query:GetObjectById">
  <Parameter ... />
  ...
  <QueryExpression xsi:type="rim:StringQueryExpressionType"
    queryLanguage="urn:oasis:names:tc:ebxml-regrep:QueryLanguage:EJBQL">
    <Value>
    SELECT Object(ro) FROM RegistryObjectType WHERE ...
    </Value>
  </QueryExpression>
</QueryDefinition>
```

8.4.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
Value	xs:string	1		Client	Yes

- Element Value – Specifies the string value representing the actual query expression within the query language specified by the queryLanguage attribute inherited from base type QueryExpressionType.

8.5 XMLQueryExpressionType

Base Type: QueryExpressionType

This type is used to represent XML query syntaxes such as OGC Filter Query.

8.5.1 Syntax

```
<complexType name="XMLQueryExpressionType">
  <complexContent>
    <extension base="tns:QueryExpressionType">
      <sequence>
        <any namespace="##other"
          processContents="lax" minOccurs="1" maxOccurs="1"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

8.5.2 Example

```
<QueryDefinition id="urn:oasis:names:tc:ebxml-regrep:query:GetObjectById">
  <Parameter ... />
  ...
  <QueryExpression xsi:type="rim:XMLQueryExpressionType"
    queryLanguage="urn:oasis:names:tc:ebxml-regrep:QueryLanguage:EJBQL">
    <ogc:Filter>
    ...
    </ogc:Filter>
  </QueryExpression>
</QueryDefinition>
```

8.5.3 Description

An XMLQueryExpressionType instance MAY contain any XML element from a namespace other than the name space for rim.xsd. In the example above we use an ogc:Filter element to represent an OGC Filter query.

8.6 QueryType

Base Type: ExtensibleObjectType

This type represents the invocation of a parameterized query.

8.6.1 Syntax

```
<complexType name="QueryType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <attribute name="queryDefinition"
        type="tns:objectReferenceType" use="required"/>
    </extension>
  </complexContent>
</complexType>
<element name="Query" type="tns:QueryType"/>
```

8.6.2 Example

```
<Query queryDefinition="urn:oasis:names:tc:ebxml-regrep:query:GetObjectById">
  <Slot name="id">
    <ValueList>
      <ValueListItem xsi:type="rim:StringValueType">
        <Value>urn:acme:person:Danyal</Value>
      </ValueListItem>
    </ValueList>
  </Slot>
</Query>
```

8.6.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
queryDefinition	objectReferenceType	1		Client	Yes

- Attribute queryDefinition – References the parameterized query to be invoked by the server.
  - The value of this attribute MUST be a reference to a QueryDefinitionType instance that is supported by the server.
- Element Slot (Inherited) - Each Slot element specifies a parameter value for a parameter supported by the QueryDefinitionType instance.
  - The slot name MUST match a parameterName attribute within a Parameter's definition within the QueryDefinitionType instance.
  - The slot value's type MUST match the dataType attribute for the Parameter's definition within the QueryDefinitionType instance.
  - A server MUST NOT treat the order of parameters as significant.

9 Event Information Model

This chapter defines the information model types that supports the Event Notification feature for ebXML RegRep. These types include the following:

- AuditableEventType – Represents a server event that is typically a consequence of a client request.
- SubscriptionType – Represents a client's subscription to receive notification of AuditableEventType instances based upon a specified selection criteria.
- QueryType – Represents a query invocation that is used to select events of interest within a SubscriptionType instance. This type has been specified previously in the Query Information Model.
- NotificationType – Represents a notification sent by the server to a client regarding an event that matches the criteria specified by the client within a SubscriptionType instance.

Illustration 10 shows how a Subscription may be defined that uses a QueryType instance as a selector query to select the AuditableEvents of interest to the subscriber. The Subscription MAY also have zero or more DeliveryInfoType elements that specify the subscriber's endpoint to deliver the selected events to. The endpoint may be a REST or SOAP service endpoint or it may be an email address endpoint in case notification is to be delivered via email.

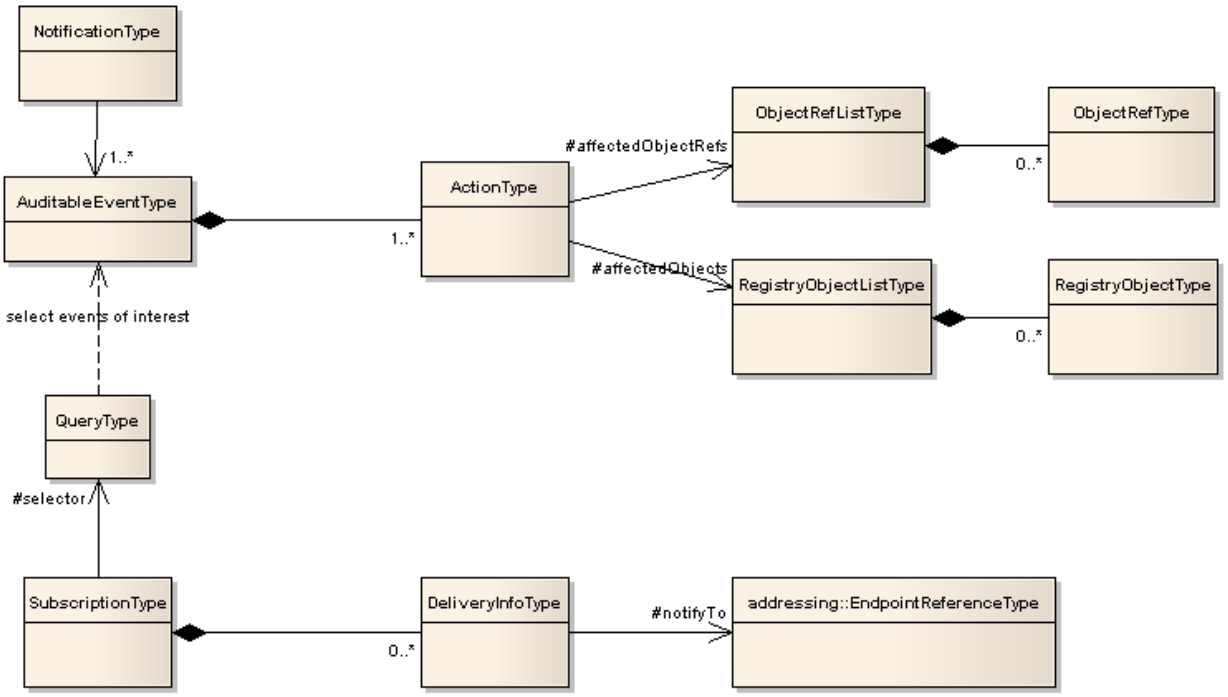

Illustration 10: Event Information Model

9.1 AuditableEventType

Base Type: RegistryObjectType

This type represents a server event. AuditableEventType instances provide a long-term record of events that effected changes in the state of a RegistryObjectType instance. AuditableEventType instances MUST be generated by the server and MUST NOT be submitted by clients.

AuditableEventType instances represent a change in the state of a RegistryObjectType instance. For example a client request could Create, Update, Deprecate or Delete a RegistryObjectType instance. An AuditableEventType instance is created when a request creates or alters the state of a RegistryObjectType instance. Read-only requests typically do not generate an AuditableEventType instance.

9.1.1 Syntax

```
<complexType name="AuditableEventType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="Action" type="tns:ActionType"
          minOccurs="1" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="timestamp" type="dateTime" use="required"/>
      <attribute name="user" type="string" use="required"/>
      <attribute name="requestId"
        type="string" use="required"/>
    </extension>
  </complexContent>
</complexType>
<element name="AuditableEvent" type="tns:AuditableEventType"/>
```

9.1.2 Example

The following example shows an AuditableEventType instance that logs the creation of an object within the context of a client request.

```
<AuditableEvent requestid="urn:uuid:24cee176-9098-4931-894f-fea5dab1732a"
  timestamp="2008-01-10T19:20:30+01:00" user="123456"
  ...>
  <Action eventType="urn:oasis:names:tc:ebxml-regrep:EventType:Created">
    <AffectedObjectRefs>
      <ObjectRef id="urn:acme:person:Danyal" />
    </AffectedObjectRefs>
  </Action>
</AuditableEvent>
```

9.1.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
Action	ActionType	1..*		Registry	No
requestId	xs:string	1		Registry	No
timestamp	xs:dateTime	1		Registry	No
user	xs:string	1		Registry	No

- Element Action – Represents an action taken by the server within the context of an AuditableEventType instance. An AuditableEventType instance MUST have one or more Action instances.

- Attribute requestId – Specifies the id of the request that generated the AuditableEventType instance.
- Attribute timestamp – Specifies the timestamp that represents the date and time the event occurred.
- Attribute user – Specifies the id of the registered user associated with the client that made the request to the server that generated the AuditableEventType instance~~.~~. Note that the inherited attribute owner SHOULD be set by a server to an internal system user since it is the server and not the user associated with the request that creates an AuditableEventType instance

9.2 ActionType

Base Type: ExtensibleObjectType

Represents an action taken by the server within the context of an AuditableEventType instance.

9.2.1 Syntax

```
<complexType name="ActionType">
  <sequence>
    <element name="AffectedObjects" type="tns:RegistryObjectListType"
      minOccurs="0" maxOccurs="1"/>
    <element name="AffectedObjectRefs" type="tns:ObjectRefListType"
      minOccurs="0" maxOccurs="1"/>
  </sequence>
  <attribute name="eventType" type="tns:objectReferenceType" use="required"/>
</complexType>
```

9.2.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
AffectedObjects	RegistryObjectListType	0..1		Registry	No
AffectedObjectRefs	ObjectRefListType	0..1		Registry	No
eventType	objectReferenceType	1		Registry	No

- Element AffectedObject – Identifies the RegistryObjectType instances that were affected by the event. The AffectedObject element contains any number of elements of type RegistryObjectType, each of which is a RegistryObjectType instance affected by the event. If this element is present then AffectedObjectRefs element MUST NOT be present.
- Element AffectedObjectRefs – Identifies the RegistryObjectType instances that were affected by the event. The AffectedObject element contains any number of ObjectRef elements each of which reference a RegistryObjectType instance that was affected by the event. If this element is present then AffectedObjects element MUST NOT be present.
- Attribute eventType – Specifies the type of event associated with the Action within an AuditableEventType instance.
  - The value of the eventType attribute MUST be a reference to a ClassificationNode in the canonical EventType ClassificationScheme.
  - A Registry MUST support the event types as defined by the EventType ClassificationScheme.
  - The canonical EventType ClassificationScheme MAY easily be extended by adding additional ClassificationNodes to it.

The following table lists pre-defined auditable event types:

Name	Description
Created	An Event that marks the creation of a RegistryObjectType instance.
Deleted	An Event that marks the deletion of a RegistryObjectType instance.
Updated	An Event that marks the updating of a RegistryObjectType instance.
Versioned	An Event that marks the creation of a new version of a RegistryObjectType instance.

9.3 SubscriptionType

Base Type: RegistryObjectType

This type represents a subscription on behalf of a client to receive notifications by the server of events that are of interest to the client.

9.3.1 Syntax

```
<complexType name="SubscriptionType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <sequence>
        <element name="DeliveryInfo"
          type="tns:DeliveryInfoType" minOccurs="0" maxOccurs="unbounded" />
        <element name="Selector"
          type="tns:QueryType" minOccurs="1" maxOccurs="1" />
      </sequence>
      <attribute name="startTime" type="dateTime" use="optional"/>
      <attribute name="endTime" type="dateTime" use="optional"/>
      <attribute name="notificationInterval"
        type="duration" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<element name="Subscription" type="tns:SubscriptionType"/>
```

9.3.2 Example

The following example shows a subscription to receive notification of changes to the object whose id value matches “urn:acme:person:Danyal”. The DeliveryInfo specifies the SOAP endpoint where the server should deliver the Notification.

```
<Subscription id="urn:acme:Subscription:subscribeToDanyal"
  startTime="2008-01-10T19:20:30+01:00" endTime="2009-01-10T19:20:30+01:00"
  ...>
  <DeliveryInfo>
    <NotifyTo>
      <wsa:Address rim:endpointType="urn:oasis:names:tc:ebxml-
regrep:endPointType:soap">http://www.acme.com/notificationListener</wsa:Addres
s>
    </NotifyTo>
```

```
  </DeliveryInfo>
  <Selector queryDefinition="urn:oasis:names:tc:ebxml-
regrep:query:GetObjectById">
    <Slot name="id">
      <ValueList>
        <ValueListItem xsi:type="rim:StringValueType">
          <Value>urn:acme:person:Danyal</Value>
        </ValueListItem>
      </ValueList>
    </Slot>
  </Selector>
</Subscription>
```

9.3.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
DeliverInfo	DeliveryInfoType	0..*		Client	Yes
endTime	xs:dateTime	0..1		Client	Yes
notificationInterval	xs:duration	0..1		Client	Yes
Selector	QueryType	1		Client	Yes
startTime	xs:dateTime	0..1	Time of submission	Client	Yes

- Attribute startTime, endTime – Define the time window within which the subscription is valid.
  - A server MUST use the current time at the time of submission of Subscription as value for the startTime attribute if it is unspecified.
  - The Subscription validity window MUST be inclusive of the startTime and endTime.
  - If endTime is unspecified then a server MUST assume the Subscription is valid at any time any time since startTime inclusively.
- Element DeliveryInfo – Specifies the information needed by the server to deliver notifications for the subscription. It includes the reference to the endpoint where notifications should be delivered.
  - A server MUST deliver notifications that match the Selector query for a valid SubscriptionType instance to the endpoint specified by each DeliveryInfo element of the SubscriptionType instance.
  - If no DeliveryInfo element is present then client MUST use the canonical query GetNotification via the Query protocol to “pull” the pending notification if any at a time of their choosing as defined in ebRS.
- Attribute notificationInterval – Specifies the duration that a server MUST wait between delivering successive notifications to the client. The client specifies this attribute in order to control the frequency of notification communication between server and client.
  - A server MUST deliver any pending notifications within the interval specified by this attribute.
  - A server MUST NOT deliver the same event more than once for the same subscription.
- Element Selector – Specifies the query that the server MUST invoke to determine whether an event matches a subscription or not. If the result of the query contains an object that is affected by an event that has not yet been delivered to the subscriber then the event matches the subscription.

9.4 DeliveryInfoType

Base Type: ExtensibleObjectType

This type provides the information needed by the server to *deliver* notifications for the subscription. It includes the reference to the endpoint where notifications should be delivered. The endpoint reference is typically one of the following types:

- SOAP service endpoint
- REST service endpoint
- E-mail address endpoint
- Software plugin endpoint that is configured within the same process as the registry server

9.4.1 Syntax

```
<complexType name="DeliveryInfoType">
  <complexContent>
    <extension base="tns:ExtensibleObjectType">
      <sequence>
        <element name="NotifyTo"
          type="wsa:EndpointReferenceType" minOccurs="1" maxOccurs="1" />
      </sequence>
      <attribute name="notificationOption" type="tns:objectReferenceType"
default="urn:oasis:names:tc:ebxml-regrep:NotificationOptionType:ObjectRefs"/>
    </extension>
  </complexContent>
</complexType>
```

9.4.2 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
notificationOption	objectReferenceType	0..1		Client	Yes
NotifyTo	wsa:EndpointReferenceType	1		Client	Yes

- Attribute notificationOption – Specifies the modality of how notifications are to be delivered to the subscriber. Its value MUST reference a ClassificationNode in the canonical NotificationOptionType ClassificationScheme.
  - urn:oasis:names:tc:ebxml-regrep:NotificationOptionType:Objects – Indicates that the server MUST provide complete RegistryObjectType instances in notifications delivered to the subscriber when this mode is specified.
  - urn:oasis:names:tc:ebxml-regrep:NotificationOptionType:ObjectRefs – Indicates that the server MUST provide ObjectRefType instances rather than complete RegistryObjectType instances in notifications delivered to the subscriber when this mode is specified. A client MAY pull the complete RegistryObjectType instances using Query protocol after receiving the notification.
- Element NotifyTo – Specifies the endpoint reference for the endpoint where the server should deliver notifications for the Subscription.
  - The type of this element is wsa:EndpointReferenceType as defined by [WSA-Core]

- The content of this element is a string representing the endpoint address which SHOULD be a URI
- The type of endpoint (SOAP, REST, email, ...) is indicated by an extension attribute rim:endpointType as follows:
  - If endpoint is a SOAP web service then the ~~endpoint reference MUST be a string consisting of the prefix "soap:" immediately followed by a URL~~ rim:endpointType attribute value MUST be “urn:oasis:names:tc:ebxml-regrep:endPointType:soap”
  - ~~. An example value is “soap:http://www.acme.com/notificationListener”.~~
  - ~~If endpoint is a REST web service then the endpoint reference MUST be a string consisting of the prefix "rest:" immediately followed by a URL. An example value is “rest:http://www.acme.com/notificationListener”.~~If endpoint is a REST web service then the rim:endpointType attribute value MUST be “urn:oasis:names:tc:ebxml-regrep:endPointType:rest”
  - If endpoint is a email address then the rim:endpointType attribute value MUST be “urn:oasis:names:tc:ebxml-regrep:endPointType:mail”
  - If endpoint is a software plugin then the rim:endpointType attribute value MUST be “urn:oasis:names:tc:ebxml-regrep:endPointType:plugin”

~~If endpoint is an email address then the endpoint reference MUST be a URL with protocol prefix of “mailto:” and specify the email address for the remainder of the URL. An example value is “mailto:danyal@home.com”.~~

9.5 NotificationType

Base Type: RegistryObjectType

This type represents a notification that is sent by the server to a client to notify it of server events that are of interest to the client.

9.5.1 Syntax

```
<complexType name="NotificationType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
        <sequence>
          <element name="Event" type="tns:AuditableEventType"
            minOccurs="1" maxOccurs="unbounded"/>
        </sequence>
      <attribute name="subscription"
        type="tns:objectReferenceType" use="required"/>
    </extension>
  </complexContent>
</complexType>
<element name="Notification" type="tns:NotificationType"/>
```

9.5.2 Example

The following example shows a Notification sent by the server for the subscription in earlier example. It notifies the subscriber that the object with id “urn:acme:person:Danyal” has changed.

```
<Notification subscription="urn:acme:Subscription:subscribeToDanyal" ...>
```

```
  <Event user="123456" timestamp="2008-10-17T15:44:29.637" ...>
    <Action eventType="urn:oasis:names:tc:ebxml-regrep:EventType:Created">
      <AffectedObjectRefs>
        <ObjectRef id="urn:acme:person:Danyal"/>
      </AffectedObjectRefs>
    </Action>
  </Event>
</Notification>
```

9.5.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
Event	AuditableEventType	1..*		Server	No
subscription	objectReferenceType	1		Server	No

- Element Event – Represents an Event that is of interest to the subscriber.
  - Unlike an AuditableEvent element that contains all objects affected by it, the Event element MUST only contain objects that match the selector query of the SubscriptionType instance. It has only a subset of affected objects compared to the actual AuditableEvent it represents. The subset of affected objects MUST be those that match the selector query for the subscription.
  - The Action elements within the Event element MUST contain a RegistryObjectList element if subscription's notificationOption is “Push”.
  - The Action elements within the Event element MUST contain a RegistryObjectRefList element if subscription's notificationOption is “Pull”.
- Attribute subscription – References the SubscriptionType instance for which this is a Notification.

10 Federation Information Model

This chapter describes the information model that support the definition of registry federations. A registry federation is a set of ebXML RegRep servers that have voluntarily agreed to form a loosely coupled union. Such a federation may be based on common business interests or membership in a community-of-interest. Registry federations enabled clients to query the content of their member servers using federated queries as if they are a single logical server.

10.1 Federation Configuration

A federation is created by the creation of a FederationType instance. Membership of a registry within a federation is established by creating an Association between the RegistryType instance for the registry seeking membership and the FederationType instance. The Association MUST have its associationType be the id of the canonical ClassificationNode “HasFederationMember”, the federation instance as its sourceObject and the Registry instance as its targetObject as shown in Illustration 11.

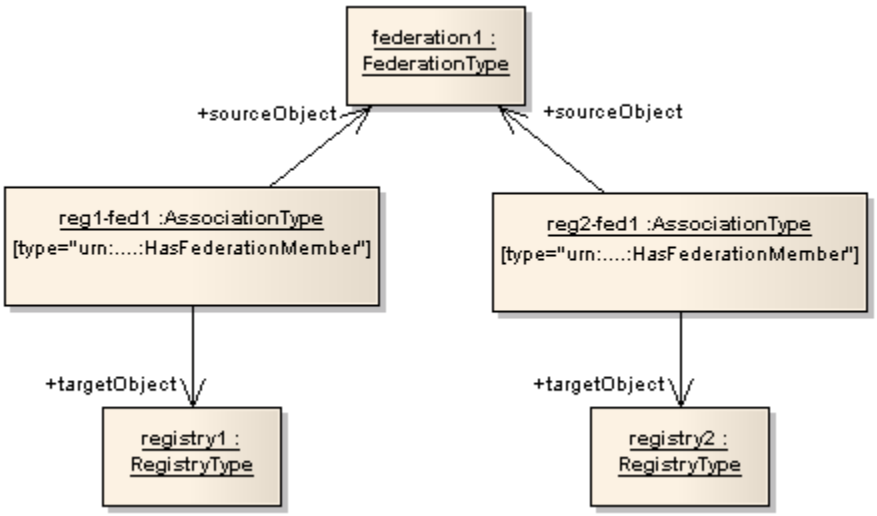

Illustration 11: Federation Information Model

10.2 RegistryType

Base Type: RegistryObjectType

RegistryType instances are used to represent a ebXML RegRep server. RegistryType instances are also used by a server to advertise the capabilities it supports. A client MAY read the RegistryType instance for a server to determine whether it is compatible with a server or not. Profiles of ebXML RegRep specifications MAY define canonical slots to represents support for the profile as well as optional features defined by the profile.

10.2.1 Syntax

```
<complexType name="RegistryType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
```

```
      <attribute name="operator"
        type="tns:objectReferenceType" use="required"/>
      <attribute name="specificationVersion"
        type="string" use="required"/>
      <attribute default="P1D" name="replicationSyncLatency"
        type="duration" use="optional"/>
      <attribute default="PT0S" name="catalogingLatency"
        type="duration" use="optional"/>
      <attribute name="conformanceProfile"
        use="optional" default="RegistryLite">
        <simpleType>
          <restriction base="NCName">
          <enumeration value="RegistryFull"/>
            <enumeration value="RegistryLite"/>
          </restriction>
        </simpleType>
      </attribute>
    </extension>
  </complexContent>
</complexType>
<element name="Registry" type="tns:RegistryType"/>
```

10.2.2 Example

The following example describes an ebXML RegRep server operated by organization with id "urn:acme:Organization:acme-inc", that implements the "RegistryFull" conformance level of version 4.0 of the ebXML RegRep specifications. The server performs replication synchronization once a day (P1D) and performs cataloging of submitted content immediately when content is submitted.

```
<Registry id="urn:acme:Registry:serviceRegistry"
  operator="urn:acme:Organization:acme-inc"
  specificationVersion="4.0"
  conformanceProfile="RegistryFull"
  replicationSyncLatency="P1D"
  catalogingLatency="PT0S"
  ...>
  ...
</Registry>
```

10.2.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
catalogingLatency	xs:duration	0..1	P1D (once a day)	Server	Yes
conformanceProfile	xs:string	0..1	RegistryLite	Server	Yes
operator	objectReferenceType	1		Server	Yes
replicationSyncLatency	xs:duration	0..1	PT0S (immediately)	Server	Yes
specificationversion	objectReferenceType	1		Server	Yes

- Attribute catalogingLatency - A RegistryType instance MAY have an attribute named *catalogingLatency* that specifies the maximum latency between the time a submission is made to the server and the time it gets cataloged by any cataloging services defined for the objects within

the submission. The default value of PT0S indicates a duration of 0 seconds which implies that cataloging happens immediately when request is submitted.

- Attribute conformanceProfile - A RegistryType instance MAY have an attribute named *conformanceProfile* that declares the conformance profile that the server supports. The conformance profiles choices are “RegistryLite” and “RegistryFull” as defined by [ebRS].
- Attribute operator - A RegistryType instance MUST have an attribute named *operator* that is a reference to the Organization instance representing the organization for the server’s operator. Since the same Organization MAY operate multiple registries, it is possible that the home registry for the Organization referenced by operator may not be the local registry.
- Attribute replicationSyncLatency - A RegistryType instance MAY have an attribute named *replicationSyncLatency* that specifies the maximum latency between the time when an original object changes and the time when its replica object within the local server gets updated to synchronize with the new state of the original object. The default value of P1D indicates a duration of once a day.
- Attribute specificationVersion - A RegistryType instance MUST have an attribute named *specificationVersion* that is the version of the ebXML RegReg Specifications it implements.

10.3 FederationType

Base Type: RegistryObjectType

Federation instances are used to represent a registry federation. A FederationType instance has a set of RegistryType instances as its members. The membership of a RegistryType instance in a federationType instance is represented by an AssociationType instance whose type is HasFederationMember.

10.3.1 Syntax

```
<complexType name="FederationType">
  <complexContent>
    <extension base="tns:RegistryObjectType">
      <attribute name="replicationSyncLatency"
        type="duration" use="optional" default="P1D" />
    </extension>
  </complexContent>
</complexType>
<element name="Federation" type="tns:FederationType"  />
```

10.3.2 Example

The following example shows a Federation with two independently-operated ebXML RegRep servers as members.

```
<Federation id="urn:acme:Federation:supplierFederation"
  replicationSyncLatency="P1D" ...>
  ...
</Federation>

<Association
  sourceObject="urn:acme:Federation:supplierFederation"
  targetObject="urn:widgetInc:Registry:widget-inc"
  type="urn:oasis:names:tc:ebxml-regrep:AssociationType:HasFederationMember"/>

<Association
  sourceObject="urn:acme:Federation:supplierFederation"
```

```
targetObject="urn:supplierInc:Registry:supplier-inc"
type="urn:oasis:names:tc:ebxml-regrep:AssociationType:HasFederationMember"/>
```

10.3.3 Description

Node	Type	Cardinality	Default Value	Specified By	Mutable
replicationSyncLatency	xs:duration	0..1	P1D (1 day)	Client	Yes

- Attribute replicationSyncLatency - A FederationType instance MAY specify a *replicationSyncLatency* attribute that describes the time duration that is the amount of time within which a member of this Federation MUST synchronize itself with the current state of the Federation. Members of the Federation MAY use this parameter to periodically synchronize the federation metadata they MUST cache locally about the state of the Federation and its members. Such synchronization MAY be based upon the registry event notification capability.

11 Access Control Information Model

This chapter defines the Information Model used to control access to RegistryObjects and RepositoryItems managed by it. It also defines a normative profile of [XACML] for ebXML RegRep.

It is assumed that the reader is already familiar with [XACML]. This specification does not provide any introduction to [XACML].

A server MUST support the roles of both Enforcement Point (PEP) and a Policy Decision Point (PDP) as defined in [XACML].

The Access Control Model attempts to reuse terms defined by [XACML] wherever possible. The definitions of some key terms are duplicated here from [XACML] for convenience of the reader:

Term	Description
Access	Performing an ***action***. An example is a user performing a *delete action* on a RegistryObject.
Access Control	Controlling ***access*** in accordance with a ***policy***. An example is preventing a user from performing a *delete action* on a RegistryObject that is not owned by that user.
Action	An operation on a ***resource***. An example is the *delete action* on a RegistryObject.
Attribute	Characteristic of a ***subject***, ***resource, action***. Some examples are: • *id attribute* of a subject • *role attribute* of a subject • *group attribute* of a subject • *id attribute* of a RegistryObject resource
Policy	A set of ***rules.*** May be a component of a ***policy set***
PolicySet	A set of ***policies,*** other ***policy sets.*** May be a component of another ***policy set***
Resource	Data, service or system component. Examples are: • A *RegistryObject resource* • A *RepositoryItem resource*
Subject	An actor whose ***attributes*** may be referenced by within a Policy definition. Examples of subject include: • The registered user associated with a client request • An ebXML RegRep server • A software service or agent

11.1 Defining an Access Control Policy

A RegistryObjectType instance is associated with exactly one Access Control Policy that governs "who" is authorized to perform "what" action on that RegistryObject. This Access Control Policy is expressed as an [XACML] document which is the repositoryItem for an ExtrinsicObjectType instance. The Access Control Policy is published to the server as an ExtrinsicObject and repositoryItem pair using the Submit protocol defined by [ebRS].

The objectType attribute of this ExtrinsicObject MUST reference a descendent of the "XACML" ClassificationNode (e.g. "Policy" or PolicySet") in the canonical ObjectType ClassificationScheme.

11.2 Assigning Access Control Policy to a RegistryObject

An Access Control Policy MAY be assigned to a RegistryObjectType instance using ~~a special Association with~~ the canonical ~~associationTypes~~slot ~~of~~ "urn:oasis:names:tc:ebxml-regrep:rim:RegistryObject:A~~a~~accessControlPolicy~~For~~" ~~as defined in the canonical AssociationTypeScheme ClassificationScheme~~. Thi~~s~~e value ~~associations~~slot references the ExtrinsicObject representing the Access Control Policy ~~via its sourceObject attribute and references the RegistryObjectType instance via its targetObject attribute~~and contains the id of that ExtrinsicObject.

If a RegistryObjectType instance does not have an Access Control Policy explicitly associated with it via the canonical slot with name "urn:oasis:names:tc:ebxml-regrep:rim:RegistryObject:accessControlPolicy", then it is implicitly associated with the default Access Control Policy defined for the server.

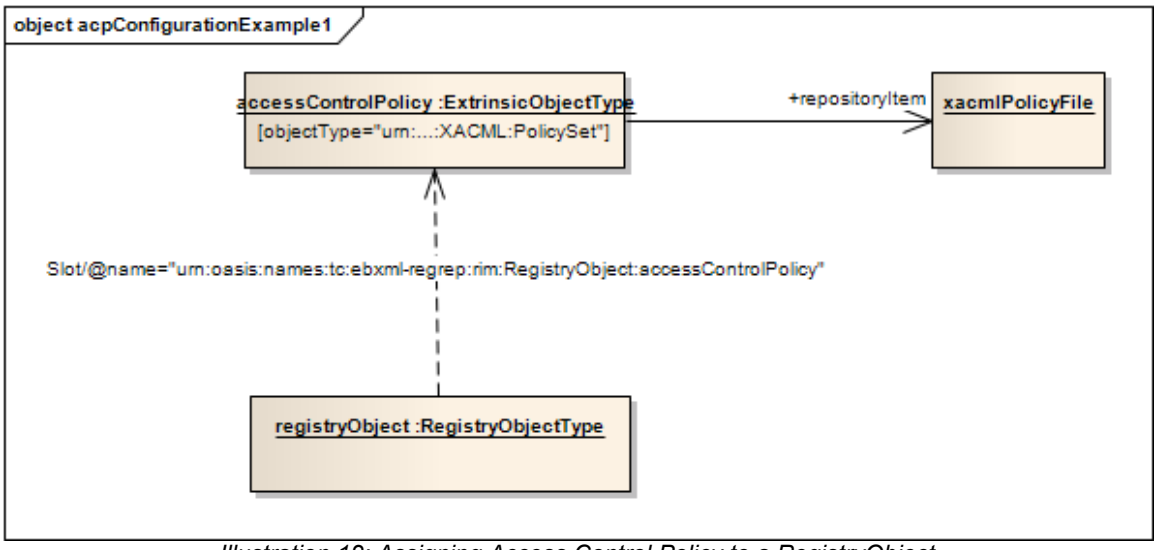

Illustration 12: Assigning Access Control Policy to a RegistryObject

Illustration 12 shows a UML instance diagram where an Organization instance *org* ~~is associated~~references ~~with~~ an ExtrinsicObject instance *accessControlPolicy* as its Access Control Policy object using ~~an Association of type "AccessControlPolicyFor"~~the canonical *accessControlPolicy* slot.

11.3 Default Access Control Policy for a RegistryObject

A server MUST support a default Access Control Policy. A server MAY implement any default access control policy. The default Access Control Policy applies to all RegistryObjectType instances that do not explicitly have an Access Control Policy assigned.

This following specify the semantics of a suggested default Access Control Policy that a server SHOULD implement:

- ~~Only a Registered user is granted access to actions that modify the state of any resource.~~
- An unauthenticated client is ~~granted access to~~permitted to perform ***read*** actions (that do not modify the state of ~~any~~ resource~~.~~ s) on any resource
- ~~A server MUST assign the default RegistryGuest role to the identity associated with an unauthenticated client.~~
- An authenticated client with authentication credentials of a registered user ~~has~~is permitted ~~access to~~ all actions on Registry Objects submitted by the user~~.~~
- ~~The Registry Administrator has access to all actions on all Registry Objects.~~A authenticated client with authentication credentials that are assigned the canonical subject role of RegistryAdministrator is permitted to perform any action on on any object

11.4 Root Access Control Policy

A server SHOULD have a root Access Control Policy that bootstraps the Access Control Model by controlling access to Access Control Policies.

As described in earlier, an access control policy is an ExtrinsicObject that contains a pointer to a repository item. The lifecycle of access control policies is managed using the standard protocols defined by the LifeCycleManager interface defined by [ebRS].

To define who may perform lifecycle management operations on access control policies pertaining to specified resources, it is necessary to have one or more administrative Access Control Policies. Such policies restrict clients from managing access control policies for resources they are not authorized for.

This version of the Registry specifications defines a single Root Access Control Policy that allows all actions on Access Control Policies for a resource if one of the following conditions is met:

- Subject is the owner of the resource
- Subject has a role of RegistryAdministrator

11.5 Performance Implications

Excessive use of custom Access Control Policies MAY result in slower processing of registry requests in some registry implementations. It is therefor suggested that, whenever possible, a submitter SHOULD reuse an existing Access Control Policy. Submitters SHOULD use good ~~judgement~~judgment on when to reuse or extend an existing Access Control Policy and when to create a new one.

11.6 Action Matching

An XACML Access Control Policy MAY use an action identifier associated with the action as action attributes within <xacml:ActionMatch> elements to match the action that is authorized for a subject on a resource.

The following table specifies the actions that a server MUST support as valid values for identifying an action within an XACML file. The supported values are listed in the “Action ID” column. A server MUST specify the action identifier in an <xacmlc:Request> using the standard action attribute named "urn:oasis:names:tc:xacml:1.0:action:action-id".

Action ID	Description
Create	A server MUST specify this as value for action-id attribute in an <xacmlc:Request> to a PDP if the resource is being newly created by a submitObjects operation.
Read	A server MUST specify this as value for action-id attribute in an <xacmlc:Request> to a PDP if the resource is being read by a executeQuery operation.
Update	A server MUST specify this as value for action-id attribute in an <xacmlc:Request> to a PDP if the resource is being updated by an updateObjects operation.
Delete	A server MUST specify this as value for action-id attribute in an <xacmlc:Request> to a PDP if the resource is being deleted by a removeObjects operation.
Reference	A server MUST specify this as value for action-id attribute in an <xacmlc:Request> to a PDP if the resource is being referenced by another resource within an submitObjects or updateObjects operation.

Issue: Should Action ID values in above table be references to canonical EventTypeScheme. Currently they are not URNs which creates potential for name conflicts in extensions?? Need to clarify the relationship between actions and Events

11.6.1 Action Attribute: *reference-source*

This attribute is only relevant to the “Reference” action. This attribute MAY be used to specify the object from which the reference is being made to the resource being protected. The AttributeId of this attribute MUST be “urn:oasis:names:tc:ebxml-regrep:rim:acp:subject:reference-source”. The value of this attribute MUST be the value of the id attribute for the object that is the source of the reference. A server MUST specify this attribute for a reference action.

11.6.2 Action Attribute: reference-source-attribute

This attribute is only relevant to the “Reference” action. This attribute MAY be used to specify the attribute name within the RegistryObjectype that the reference-source object is an instance of. A server MUST specify this attribute for a reference action. The AttributeId of this attribute MUST be “urn:oasis:names:tc:ebxml-regrep:rim:acp:subject: reference-source-attribute”. The value of this attribute MUST be the name of an attribute within the RIM type that is the type for the reference source object.

For example, if the reference source object is an Association instance then the reference-source-attribute MAY be used to specify the values “sourceObject” or “targetObject” to restrict the references to be allowed from only specific attributes of the source object. This enables, for example, a policy to only allow reference to objects under its protection only from the sourceObject attribute of an Association instance.

11.6.3 Example

The following example shows an Action that matches the “Read” action.

```
<Target>
  <Actions>
    <Action>
      <ActionMatch
```

```
        MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
        <AttributeValue
          DataType="http://www.w3.org/2001/XMLSchema#string">
          Read
        </AttributeValue>
        <ActionAttributeDesignator
          AttributeId="urn:oasis:names:tc:xacml:1.0:action:action-id"
          DataType="http://www.w3.org/2001/XMLSchema#string"/>
      </ActionMatch>
    </Action>
  </Actions>
</Target>
```

11.7 Subject Matching

An XACML Access Control Policy MAY use the identity and roles associated with the subject as subject attributes within <xacml:SubjectMatch> elements to match the subject that is authorized for an action on a resource.

A server MUST specify the subject identifier in an <xacmlc:Request> using the standard subject attribute named “urn:oasis:names:tc:xacml:1.0:subject:subject-id”.

A server MUST specify a subject role, if any, in an <xacmlc:Request> using the standard subject attribute named “urn:oasis:names:tc:xacml:2.0:subject:role”.

An Access Control Policy that uses Role Bases Access Control MUST specify a Permission PolicySet for each role as described in [XACML-RBAC].

This specification does not define how roles are defined or assigned to a subject. Implementations SHOULD provide that functionality in an implementation-specific manner.

11.7.1 Example

The following example shows a Subject that matches a registered user with id “urn:acme:person:Danyal”:

```
<Target>
  <Subjects>
    <Subject>
      <SubjectMatch
        MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
        <AttributeValue
          DataType="http://www.w3.org/2001/XMLSchema#string">
          urn:acme:person:Danyal
        </AttributeValue>
        <SubjectAttributeDesignator
          AttributeId="urn:oasis:names:tc:xacml:1.0:subject:subject-id"
          DataType="http://www.w3.org/2001/XMLSchema#string"/>
      </SubjectMatch>
    </Subject>
  </Subjects>
</Target>
```

The following example shows a Subject that matches a subject role “employee”:

```
<Target>
  <Subjects>
```

```
    <Subject>
      <SubjectMatch
        MatchId="urn:oasis:names:tc:xacml:1.0:function:anyURI-equal">
        <AttributeValue
          DataType="http://www.w3.org/2001/XMLSchema#anyURI">
          urn:oasis:names:tc:ebxml-regrep:rim:acp:subject:roles:employee
        </AttributeValue>
        <SubjectAttributeDesignator
          AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
          DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
      </SubjectMatch>
    </Subject>
  </Subjects>
</Target>
```

11.8 Resource Matching

A server MUST specify the following resource attributes in an <xacmlc:Request> as described in table below:

Attribute Name	Attribute Identifier	Description	Data Type
id	urn:oasis:names:tc:xacml:2.0:resource:resource-id	Value MUST be the value of the id attribute of the RegistryObject resource	http://www.w3.org/2001/XMLSchema#string
lid	urn:oasis:names:tc:ebxml-regrep:3.0:rim:acp:resource:lid	Value MUST be the value of the lid attribute of the RegistryObject resource	
objectType	urn:oasis:names:tc:ebxml-regrep:4.0:rim:acp:resource:objectType	Value MUST be the value of the objectType attribute the RegistryObject resource	http://www.w3.org/2001/XMLSchema#string
owner	urn:oasis:names:tc:ebxml-regrep:3.0:rim:acp:resource:owner	Value MUST be the value of the owner attribute of the RegistryObject resource	http://www.w3.org/2001/XMLSchema#string
status	urn:oasis:names:tc:ebxml-regrep:3.0:rim:acp:resource:status	Value MUST be the status of the owner attribute of the RegistryObject resource	http://www.w3.org/2001/XMLSchema#boolean

An XACML Access Control Policy MAY use resource attribute defined above within an <xacml:ResourceMatch> element.

In addition, an XACML Access Control Policy MAY use any node in the XML document representing a RegistryObjectType instance within an <xacml:ResourceMatch> element. In this case, the <xacml:ResourceMatch> element SHOULD use an XPATH expression to match any part of the XML element representing the RegistryObjectType instance.

11.8.1 Example

The following example uses XPATH expression to match resource if it has a Slot with name “someSlotName”.

```
<Resource>
  <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
    <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">
      urn:oasis:names:tc:ebxml-regrep:xsd:rim:4.0
    </AttributeValue>
    <ResourceAttributeDesignator
      AttributeId="urn:oasis:names:tc:xacml:2.0:resource:target-namespace"
      DataType="http://www.w3.org/2001/XMLSchema#string"/>
    </ResourceMatch>
  <ResourceMatch
    MatchId="urn:oasis:names:tc:xacml:1.0:function:xpath-node-match">
    <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">
      //<rim:Slot>/@name="someSlotName"
    </AttributeValue>
    <ResourceAttributeDesignator
      AttributeId="urn:oasis:names:tc:xacml:1.0:resource:xpath"
      DataType="http://www.w3.org/2001/XMLSchema#string"/>
  </ResourceMatch>
</Resource>
```

11.9 Canonical XACML Functions

Section A.3 of [XACML] defines a set of standard functions. This section defines addition XACML functions that MUST be supported by an ebXML RegRep server that supports XACML based custom access control policies. XACML specifies the following functions. If an argument of one of these functions were to evaluate to "Indeterminate", then the function MUST be set to "Indeterminate".

11.9.1 Function AssociationExists

Function ID: urn:oasis:names:tc:ebxml-regrep:rim:acp:function:AssociationExists

Parameter / Return	Name	Description	Data Type
Parameter 1	sourceObject	Specifies a value for the sourceObject attribute of AssociationType. MAY use '%' and '_' as wildcard to match multiple or single characters.	http://www.w3.org/2001/XMLSchema#string
Paremeter 2	targetObject	Specifies a value for the targetObject attribute of AssociationType. MAY use '%' and '_' as wildcard to match multiple or single characters.	http://www.w3.org/2001/XMLSchema#string
Parameter 3	type	Specifies the path attribute value for a ClassificationNode in the AssociationType ClassificationScheme. MAY use '%' and '_' as wildcard to match multiple or single characters. This attribute is used to match the type attribute of AssociationType. The type parameter MUST also match ClassificationNodes that are descendants of ClassificationNode specified by the type parameter. This parameter is optional and MAY be omitted.	http://www.w3.org/2001/XMLSchema#string
Returns		MUST return “True” if and only if an AssociationType instance exists that matches the specified	http://www.w3.org/2001/XMLSchema#boolean

		sourceObjectId, targetObjectId and type. MUST return “False” otherwise.	

2833

2834 11.9.2 Function ClassificationNodeCompare

2835 **Function ID:** urn:oasis:names:tc:ebxml-regrep:rim:acp:function:ClassificationNodeCompare

2836 A client MAY use this XACML function to test whether a resource's objectType attribute matches a
2837 specific objectType or its sub-types.

2838

Parameter / Return	Name	Description	Data Type
Parameter 1	node1	Specifies the id of a ClassificationNode.	http://www.w3.org/2001/XMLSchema#string
Paremeter 2	node2	Specifies the id of a ClassificationNode.	http://www.w3.org/2001/XMLSchema#string
Returns		MUST return “True” if and only if ClassificationNode with id matching node2 value is same as or descendent of if ClassificationNode with id matching node1. MUST return “False” otherwise.	http://www.w3.org/2001/XMLSchema#boolean

2839

2840

2841 11.9.3 Function HasClassification

2842 **Function ID:** urn:oasis:names:tc:ebxml-regrep:rim:acp:function:HasClassification

2843

Parameter / Return	Name	Description	Data Type
Parameter 1	classifiedObject	Specifies a value for the classifiedObject attribute of ClassificationType. MAY use '%' and '_' as wildcard to match multiple or single characters.	http://www.w3.org/2001/XMLSchema#string
Paremeter 2	classificationNode	Specifies the id of targetObject for ClassificationType. MAY use '%' and '_' as wildcard to match multiple or single characters.	http://www.w3.org/2001/XMLSchema#string
Returns		MUST return “True” if and only if an ClassificationType instance exists that matches the specified classifiedObject and classificationNode. The classificationNode parameter MUST also match ClassificationNodes that are descendants of ClassificationNode specified by the classificationNode parameter.	http://www.w3.org/2001/XMLSchema#boolean

		MUST return “False” otherwise.	

11.9.4 Function HasSlot

Function ID: urn:oasis:names:tc:ebxml-regrep:rim:acp:function:HasSlot

Parameter / Return	Name	Description	Data Type
Parameter 1	registryObject	Specifies the id of the parent RegistryObjectType instance for the Slot. MAY use '%' and '_' as wildcard to match multiple or single characters.	http://www.w3.org/2001/XMLSchema#string
Paremeter 2	slotName	Specifies a value for the name attribute of Slot. MAY use '%' and '_' as wildcard to match multiple or single characters.	http://www.w3.org/2001/XMLSchema#string
Parameter 3	slotValue	Specifies a value for the Slot. This parameter MAY be omitted.	
Returns		MUST return “True” if and only if a RegistryObjectType instance exists that has a Slot whose name matches the specified slotName and which has a value matches the specifies slotValue. MUST return “False” otherwise.	http://www.w3.org/2001/XMLSchema#boolean

11.10 Constraints on XACML Binding

This specification normatively defines the following constraints on the binding of the Access Control Model to [XACML]. These constraints MAY be relaxed in future versions of this specification.

- All Policy and PolicySet definitions MUST reside within an ebXML Registry as RepositoryItems.

11.11 Resolving Policy References

An XACML PolicySet MAY reference XACML Policy objects defined outside the repository item containing the XACML PolicySet. A server implementation MUST be able to resolve such references. To resolve such references efficiently a server SHOULD be able to find the repository item containing the referenced Policy without having to load and search all Access Control Policies in the repository. This section describes the normative behavior that enables a server to resolve policy references efficiently.

A server SHOULD define a Content Cataloging Service for the canonical XACML PolicySet objectType. The PolicySet cataloging service MUST automatically catalog every PolicySet upon submission to contain a special Slot with name ComposedPolicies. The value of this Slot MUST be a Set where each element in the Set is the id for a Policy object that is composed within the PolicySet.

Thus a server is able to use an ad hoc query to find the repositoryItem representing an XACML PolicySet that contains the Policy that is being referenced by another PolicySet.

Appendix A. Acknowledgments

The following individuals have contributed significantly towards the creation of this specification and are gratefully acknowledged

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Appendix B. Revision History

[optional; should not be included in OASIS standards]