THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA
NATIONAL INSTITUTE OF BUILDING SCIENCES

agcXML

AGCXML COMMON DEFINITIONS

VERSION 1.0

MARCH 4, 2009

The agcXML Project

The Associated General Contractors of America

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March 2009

1 . AECXML COMMON DEFINITIONS

The individual XML schemas for the various document types in scope of agcXML all use elements defined at two levels within the common definitions:

- All abstract elements that form part of a general resource of AEC specific elements for the building construction domain are defined within the aecXML COS (common object schema). Many are adopted from ifcXML, document meta data is adopted from ISO-IEC_82045-5_(E).
- All elements that are shared among AGC document types are defined within the agcXML Common schema. Most of them are non-abstract and reused to be sub-elements under the root element within the document specific XML schemas.

1.1.1 Name space considerations

The following name spaces are assigned:

- ifcXML – not part of the XML schema, will be handled by XSLT based mapping, when required
- aecXMLCOS:
  - xmlns:cos="http://www.aecXML.org/aecXML/cos"
- agcXMLCommon:
  - xmlns:agcxml="http://www.aecXML.org/agcXML/agcXMLCommon"

2 . AGCXML COMMON DEFINITIONS

Once commonly used XML elements are described here, the other agcXML documents would then refer to the common definitions.

All elements in agcXML inherit the attributes **id**, **ref**, **urn**, **href**. The **id** / **ref** pair is used to define elements referenced within a single XML document, whereas **urn** allows assigning a global unique id, using **urn:uuid** protocol that is identical with the GUID protocol used in IFC. **href** allows referring to an element within an external XML document.

2.1 Document Transaction

The **DocumentTransaction** element is defined as the supertype of all agcXML schema root elements for the actual transaction. Within all document type specific XML schemas, a single element is declared as a **substitutionGroup** of **DocumentTransaction**.

> E.g. the **ApplicationForPayment** element is the root element within the **ApplicationForPayment** schema; it is a **substitutionGroup** of **DocumentTransaction**. It then adds all application for payment specific definitions to the general definition of a document transaction.

The **DocumentTransaction** element inherits from **Document** all metadata for documents that had been adopted from ISO-IEC_82045-5. It includes: **documentId**, **versionId**, **revisionId**, **language** as attributes, and **Name**, **Description**, **Status** and **PreparationDate** as elements.

The **GoverningForm** identifies optionally the template upon which the document is based. A standard template would be the original AGC document type template that is used for the exchange. It is particularly important, since only the variables, but not the boiler plate text, is included in the exchange. The exact **Name** and **Edition** needs to be agreed upon in an actual exchange.

The **DocumentTransaction** adds transaction specific information, i.e. the data, person, organization and creating application that have initiated the transaction, as well as an optional reference to earlier versions (i.e. previous transactions). The earlier transactions are provided by **LastTransactions** a zero-to-many link to **DocumentTransactionReference**. Therefore a history of transactions can be kept.

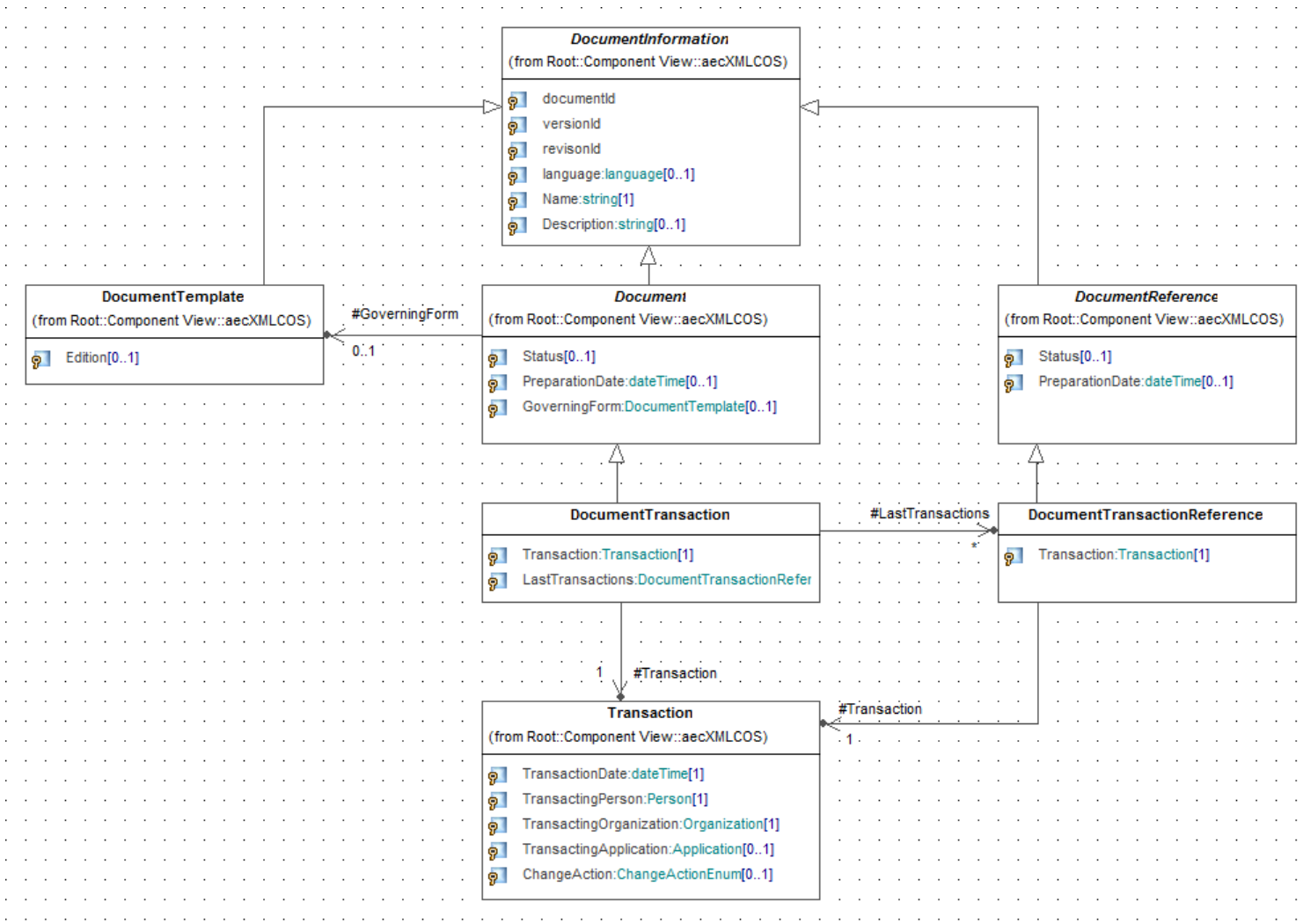


Figure 1: Document Transaction Element

2.2 Document References

Any document reference refers to a document external to the document transaction. It is referenced and may contain document metadata. The content of the referenced document is however not part of the exchange.

The following specializations of **DocumentReference** are part of the **agcXML Common** definitions:

- **DocumentSubmittal**
- **ContractDocument**
- **Exhibit**
- **Attachment**

For each **DocumentSubmittal** the following information can be provided:

- The dates of the submittal process, being
  - **DateReceived**, **DateSent**, **DateReturned**, and **DateForwarded**
- The status of the submittal item
  - The **Status** as provided at the supertype **DocumentReference** for user defined values. The following suggested values could be agreed upon: Reviewed; Reviewed as Noted; Review Not Required; OR Revise and Resubmit.
- The document (drawing, sample, specification section) with
  - The unique number of the document as **documentId**
  - The name or title of the document as **Name**
  - Any additional textual explanation as **Description**
  - The **href** attribute providing the URL of the document (optional)

For each attachment the following information can be provided:

- The **href** attribute providing the URL of the attachment
- The name or title of the attachment as **Name**
- Any additional textual explanation as **Description**
- The attachment id as **documentId**
- The date of the attachment (last edition) as **PreparationDate**

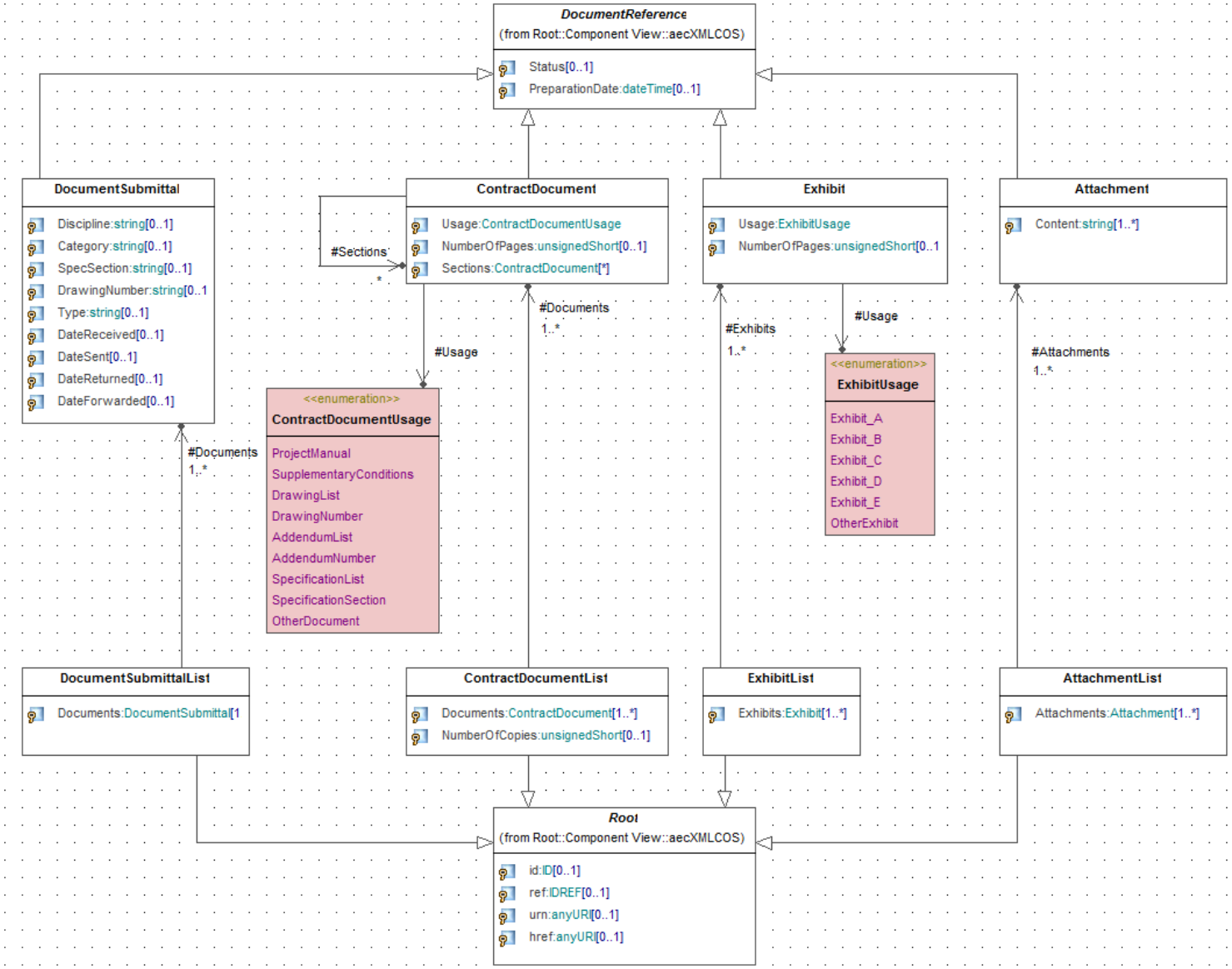


Figure 2: Document Reference Element

2.3 Person and Organization

The elements for persons and organizations are provided in the aecXMLCOS schema, adopted from the relevant ifcXML elements: **IfcOrganization** and **IfcPerson** (including **IfcAddress**).

The information provided for all organizations is **Name**, **Description**, address (either **PostalAddress** and/or **TelecomAddress**), **Role**, a **ProjectNumber** and a **License**. The information about the representative of the organization is given as a **Person** with **Representative.FamilyName**, **.GivenName**, **.MiddleName**, optional separate address (either **PostalAddress** and/or **TelecomAddress**, **.RepresentativeTitle)**.

The **Person** information can be extended by adding a **Signature** element with **Signature.SignatoryName**, **.SignatureDate**. Also a witness of the signature can be added.

The **Organization** information can be extended by adding the **License** (or Commission) with **Number**, **JurisdictionTown**, **JurisdictionCounty**, **JurisdictionState** and **ExpirationDate**.

The following specialization of **Person** and **Organization** are defined:

2.3.1 Owner

The information about the owner of the project is given by the **Owner**. The **Owner** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **OwnerRepresentative** is a specialization of **Person** and assigned to **Owner**.

2.3.2 Contractor

The information about the contractor of the project is given by the **Contractor**. The **Contractor** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **ContractorRepresentative** is a specialization of **Person** and assigned to **Contractor**.

2.3.3 Subcontractor

The information about the subcontractor of the project is given by the **Subcontractor**. The **Subontractor** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **SubcontractorRepresentative** is a specialization of **Person** and assigned to **Subcontractor**.

2.3.4 Architect

The information about the architect of the project is given by the **Architect**. The **Architect** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **ArchitectRepresentative** is a specialization of **Person** and assigned to **Architect**.

2.3.5 Engineer

The information about the architect of the project is given by the **Engineer**. The **Engineer** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **EngineerRepresentative** is a specialization of **Person** and assigned to **Engineer**.

2.3.6 Construction Manager

There are two types of construction managers: construction manager at risk (CMc), and construction manager/adviser. Each has a distinct functional role, and so each must be identified as an independent actor. The Construction Manager/Adviser is identified as **ConstructionManagerAdviser**. The Construction Manager at Risk is identified as **ConstructionManagerConstructor**.

2.3.6.1 Construction Manager Adviser

The information about the construction manager adviser of the project is given by the **ConstructionManagerAdviser**. The **ConstructionManagerAdviser** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **ConstructionManagerAdviserRepresentative** is a specialization of **Person** and assigned to **ConstructionManagerAdviser**.

2.3.6.2 Construction Manager at Risk

The information about the construction manager at risk of the project is given by the **ConstructionManagerConstructor**. The **ConstructionManagerConstructor** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **ConstructionManagerConstructorRepresentative** is a specialization of **Person** and assigned to **ConstructionManagerConstructor**.

2.3.7 Notary

The information of the notary is given by the **Notary**. The **Notary** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **NotaryRepresentative** is a specialization of **Person** and assigned to **Notary**.

2.3.8 Broker

The information of the broker is given by the **Broker**. The **Broker** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **BrokerRepresentative** is a specialization of **Person** and assigned to **Broker**.

2.3.9 Surety

The information of the surety is given by the **Surety**. The **Surety** element is based on a specialization of the **Organization** element within the **aecXMLCOS** name space. The **SuretyRepresentative** is a specialization of **Person** and assigned to **Surety**.

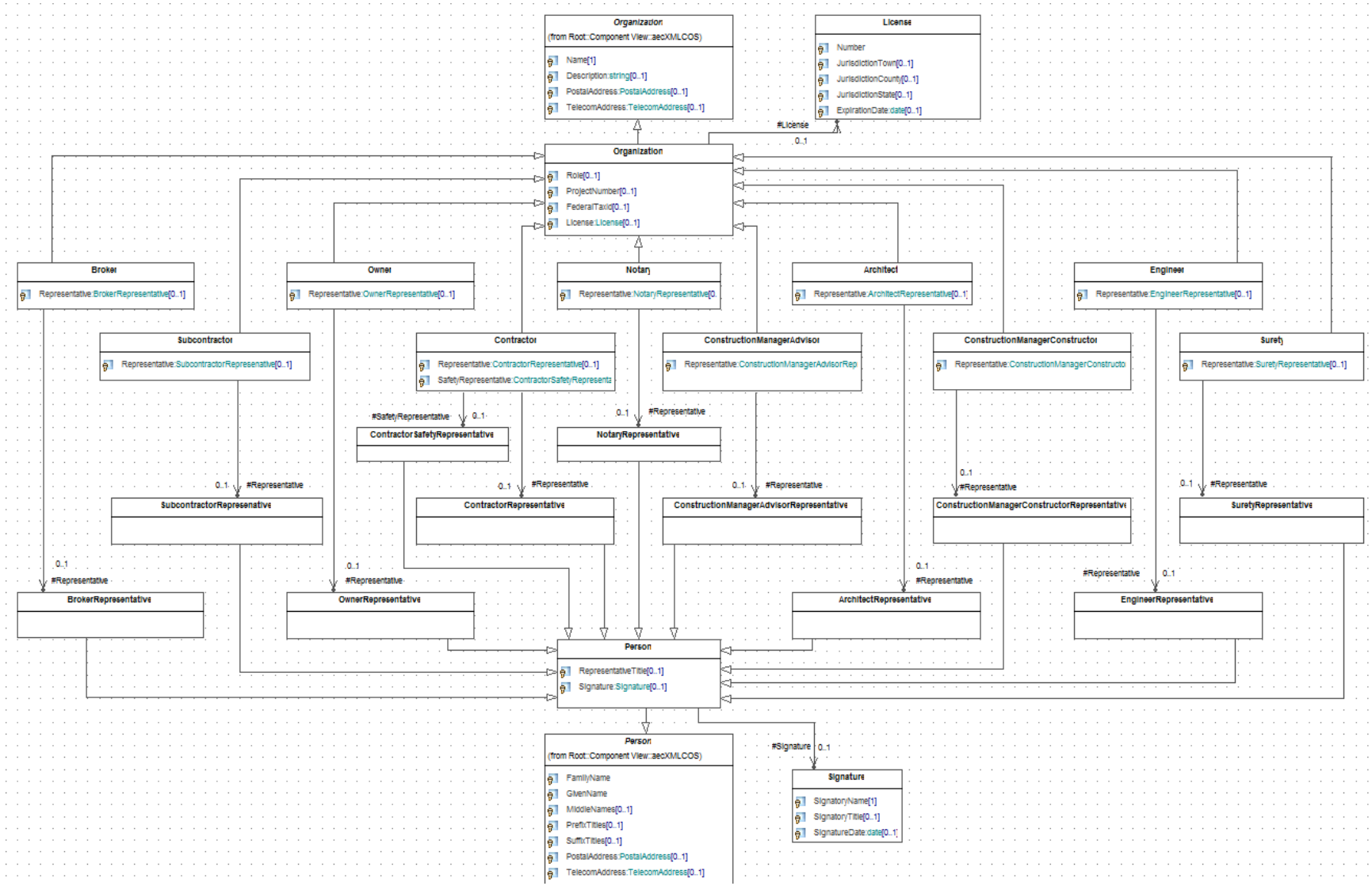


Figure 3: Specializations of Person and Organization

2.4 Project

The project information is given by **Project** element defined in **agcXMLCommon** name space. It is a specialization of **Project** within **aecXMLCOS** name space and derived from **IfcProject** of ifcXML with restrictions. The GUID of an IFC project object may be included by the **urn** attribute, and an external project definition can be referenced using the **href** attribute.

A **Project** has an address based on **PostalAddress** in **aecXMLCOS** name space derived from **IfcPostalAddress** in ifcXML. It includes a **ProjectId** (the commonly agreed number of the project of all participants), a **Name** and **Description**.

It is defined by a **ContractDate** for the project and a **ContractType**, the detailed meaning of **ContractType** is determined in the document type specific XML schemas.

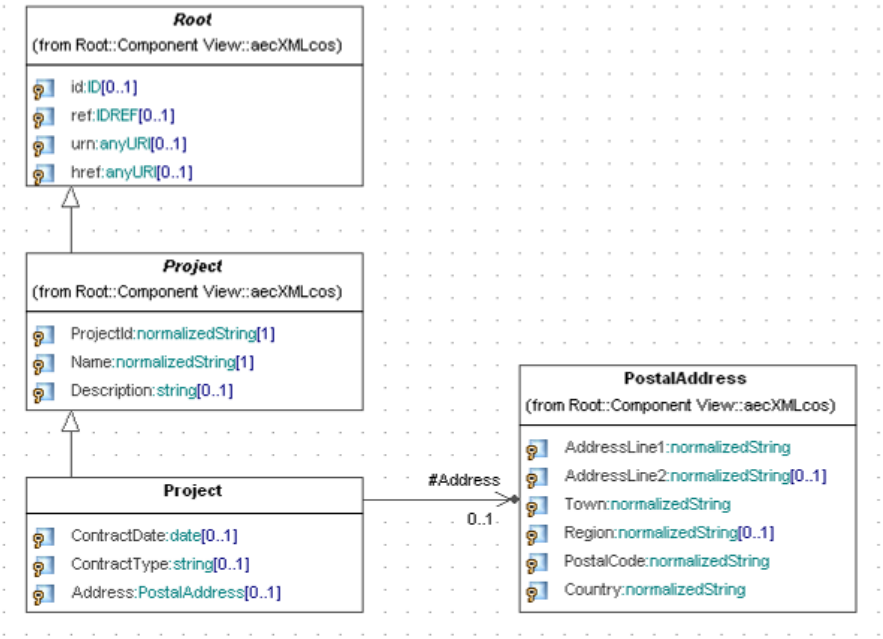


Figure 4: the project element

2.5 Schedule

The change in the project schedule is provided by the element **ProjectScheduleChange**, defined in the **agcXMLCommon** name space.

The **ProjectScheduleChange** contains:

- The **ScheduleChange** being a duration in time with the following usage: (delay = positive value of duration; acceleration = negative value of duration)
- The **NewSubstantialCompletionDate** being the new date for completion

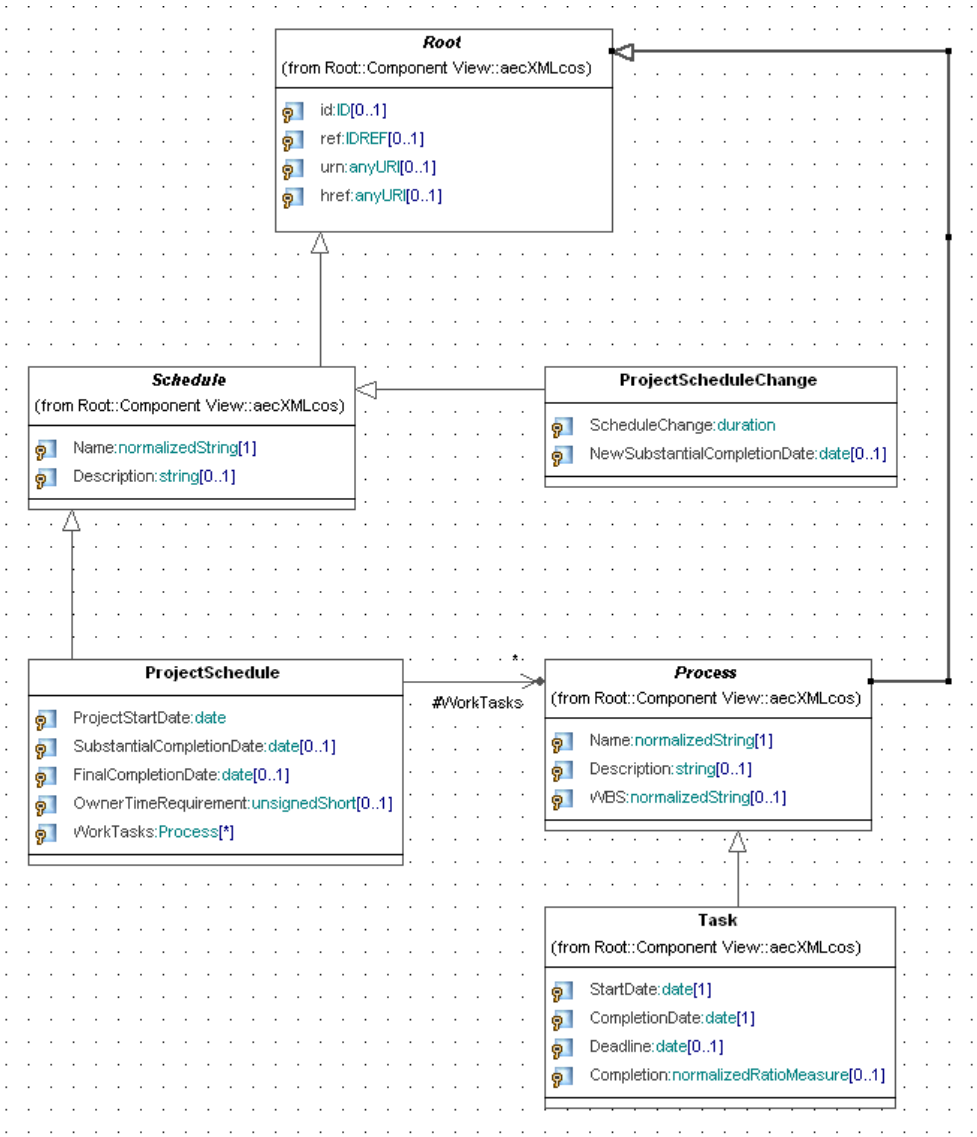


Figure 5: Schedule and Project Schedule

2.6 Change order

A **ChangeOrder** is defined as an abstract element having a **currency**. The same currency is applied to all values of type **monetaryAmount** provided by the specializations of **Changeorder**.

Note: A **currency** has to be given in any exchange, there is no default value.

The **ChangeOrderSingle** (referring to a single change order versus its summary) provides:

- **ContractSumOriginal** – original contract sum according to the contract
- **NetChangePreviously** – sum of any previously agreed change orders
- **ContractSumPreviously –** optional: calculation of the above should not be exchanged, if both values **ContractSumOriginal** and **NetChangePreviously** are available.
- **NetChangeCurrent** – sum of the current changed agreed upon in this change order
- **ContractSumCurrent -** optional: calculation of the above should not be exchanged, if all values **ContractSumOriginal**, **NetChangePreviously** and **NetChangeCurrent** are available

A change order summary element is included, accessible by **ChangeOrderSummaryInformation**. It is defined in the **agcXMLCommon** name space and contains the following fields:

- **TotalAddition**
- **TotalDeduction**
- **TotalAdditionPreviously**
- **TotalDeductionPreviously**

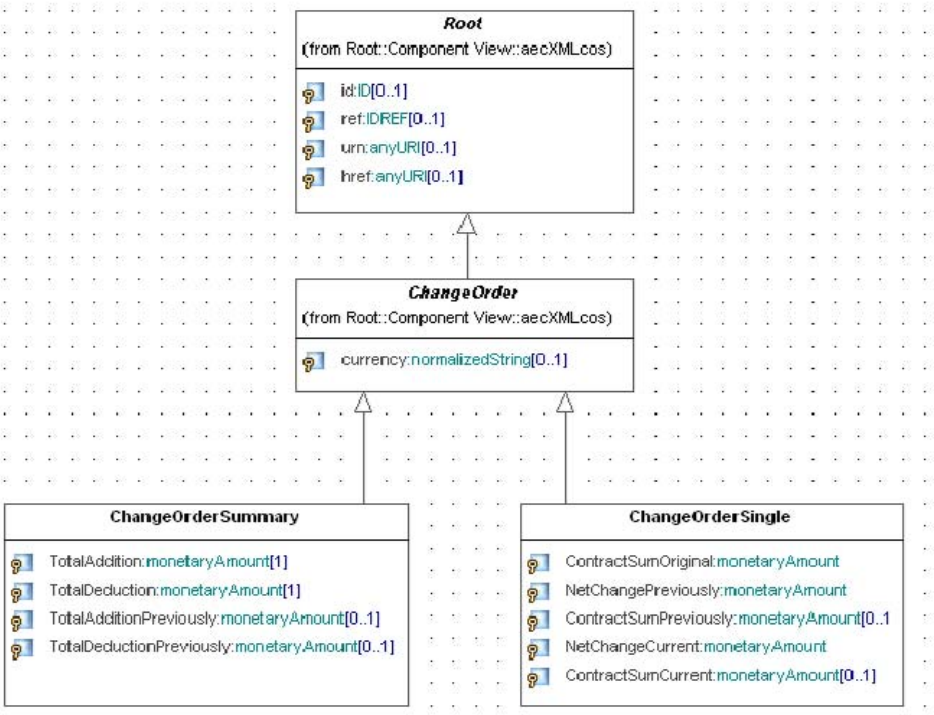


Figure 6: Change order

2.7 Work items and work item schedule

A **WorkItem** is defined as an abstract element having a **currency** within the **aecXMLCOS** name space. The same currency is applied to all values of type **monetaryAmount** provided by the specializations of **Changeorder**.

Work items and a work item schedule, referring to many work items are provided within the **agcXMLCommon** name space. It is realized as:

- **WorkItem**
- **WorkItemSchedule**

The **WorkItemSchedule** groups the individual items of the schedule. The total schedule is given by a name or number, an optional description and the:

- **TotalScheduleValue**
- **TotalMaterialValueStored**
- the two additional elements are available as **WorkItemScheduleCompleted** for completed work item schedules**:**
  - **TotalCompletedValue**
  - **TotalCompletedValuePreviously** (from the previous schedule of value)

If individual Items are provided for the schedule of value, they are included as a list of **`Items`**. Each of the **`Items`** has:

- The **`Name`** (or Id) of the item
- The **`Description`** to optionally capture any remarks
- The **`ScheduledValue`** of the item
- Any **`Retainage`** (only given, if variable rate)
- And an included information about the rate of completion by **`WorkItemCompleted`**:
  - The **`CompletedValue`** within this period of the application for payment,
  - The **`CompletedValuePreviously`** showing the work completed from previous applications
  - The **`MaterialValueStored`**

Note:

The fields in a paper form, such as "Total value of work completed and materials stored to date", or "Percent of work complete", or "Value of work remaining to be completed" are based on simple numerical calculations. Those should not be exchanged as values, but recalculated at the receiving end.

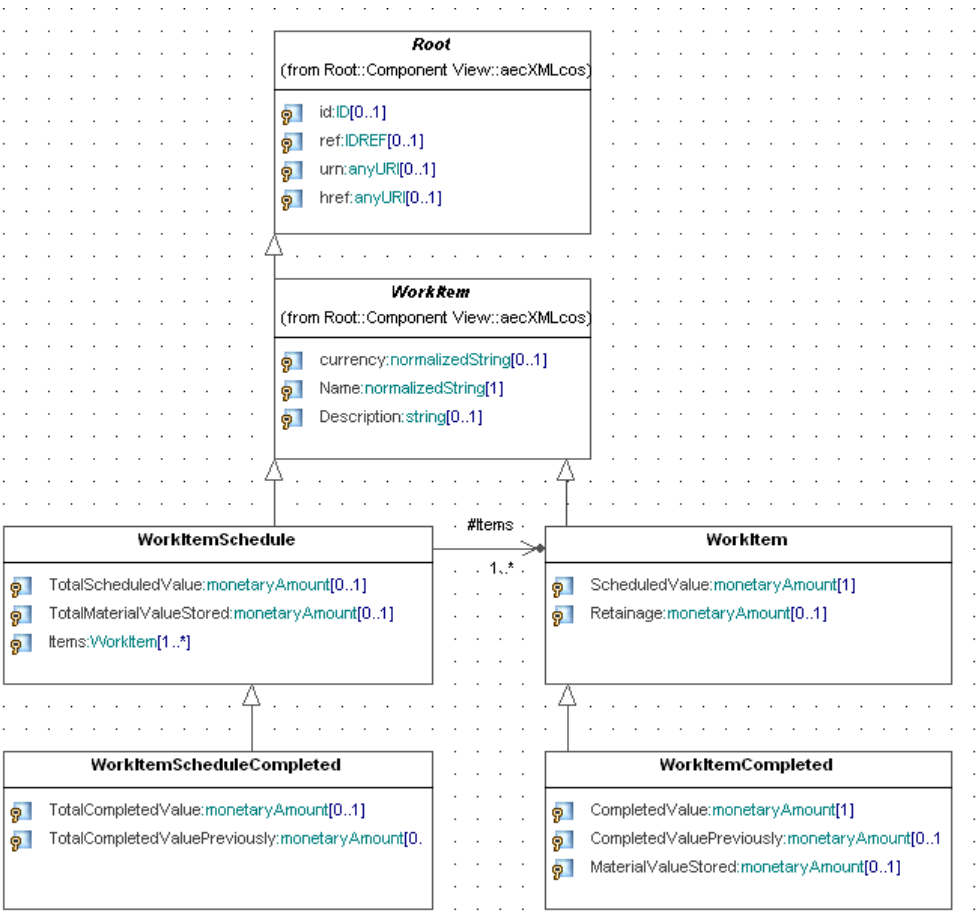


Figure 7: Work item and work item schedule

2.8 Cost item

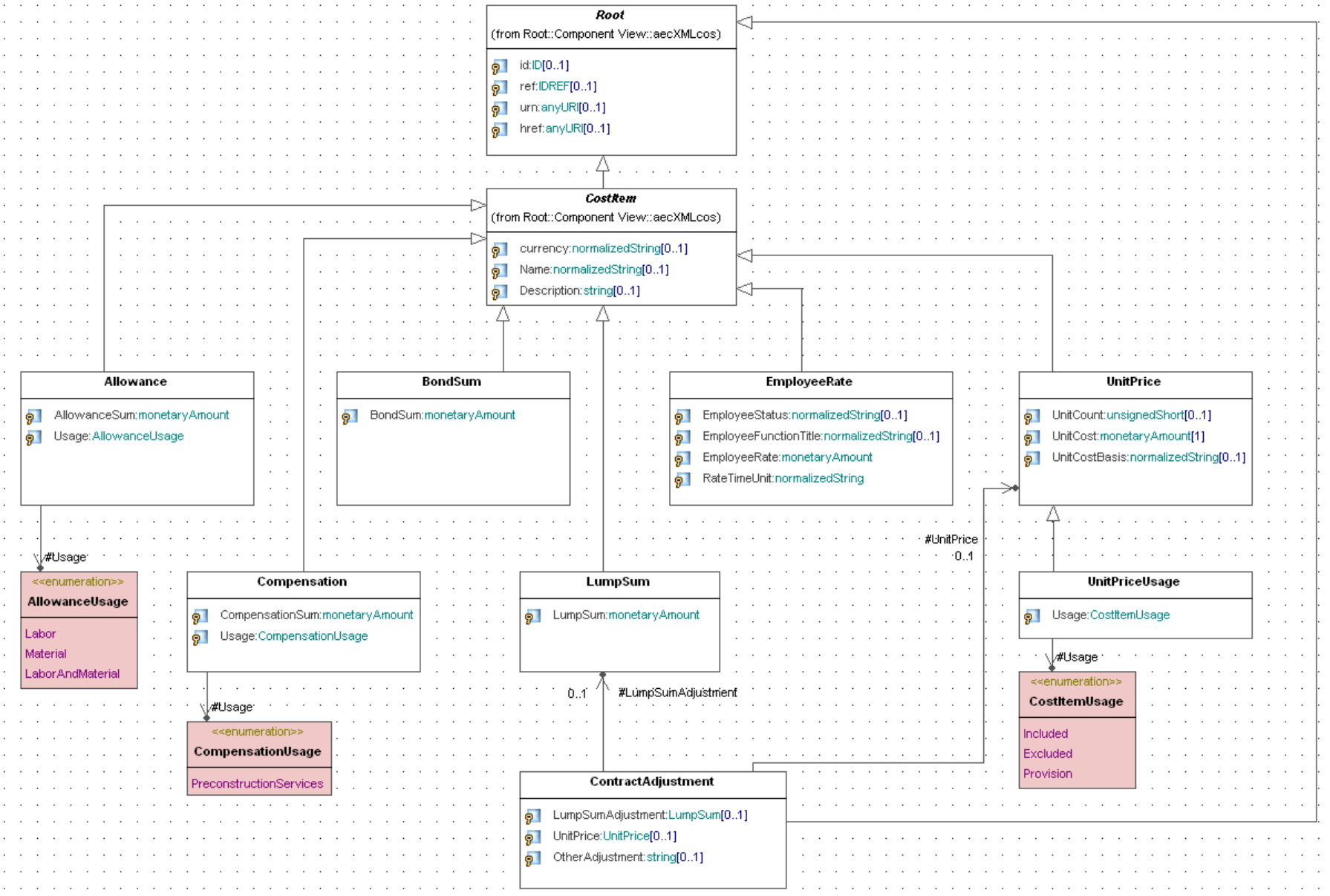
The **`CostItem`** is an abstract definition within the aecXMLCOS name space that has a **`currency`** attribute. The same currency is applied to all values of type **`monetaryAmount`** provided by the specializations of **`Changeorder`**.

Several specializations of cost items are currently included:

- **Allowance**
- **BondSum**
- **Compensation**
- **LumpSum**
- **EmployeeRate**
- **UnitPrice**

The element **ContractAdjustment** combines information about how the change in contract sum will be calculated. The **ContractAdjustment** provides either:

- **LumpSumAdjustment** – increase or degrees of the lump sum
- **UnitPrice** – new **UnitCost** on a **UnitCostBasis**
- **OtherAdjustment –** textual description of another adjustment method specified.

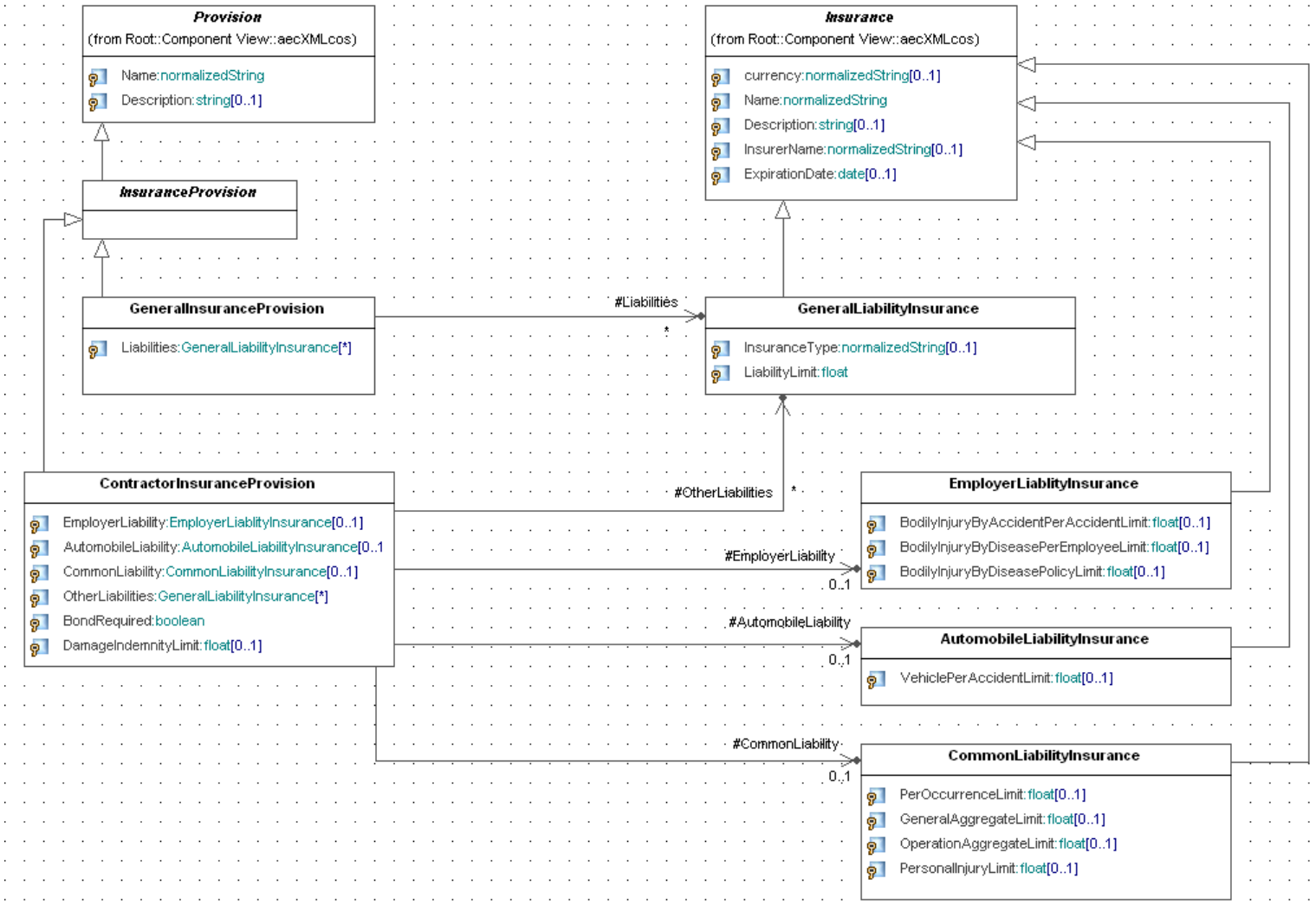

Root
(from Root::Component View::aecXMLcos)
id:ID[0..1]
ref:IDREF[0..1]
urn:anyURI[0..1]
href:anyURI[0..1]
CostItem
(from Root::Component View::aecXMLcos)
currency:normalizedString[0..1]
Name:normalizedString[0..1]
Description:string[0..1]
Allowance
AllowanceSum:monetaryAmount
Usage:AllowanceUsage
BondSum
BondSum:monetaryAmount
EmployeeRate
EmployeeStatus:normalizedString[0..1]
EmployeeFunctionTitle:normalizedString[0..1]
EmployeeRate:monetaryAmount
RateTimeUnit:normalizedString
UnitPrice
UnitCount:unsignedShort[0..1]
UnitCost:monetaryAmount[1]
UnitCostBasis:normalizedString[0..1]
#Usage
<<enumeration>>
AllowanceUsage
Labor
Material
LaborAndMaterial
Compensation
CompensationSum:monetaryAmount
Usage:CompensationUsage
LumpSum
LumpSum:monetaryAmount
#UnitPrice
0..1
UnitPriceUsage
Usage:CostItemUsage
#Usage
<<enumeration>>
CostItemUsage
Included
Excluded
Provision
#Usage
<<enumeration>>
CompensationUsage
PreconstructionServices
0..1
#LumpSumAdjustment
ContractAdjustment
LumpSumAdjustment:LumpSum[0..1]
UnitPrice:UnitPrice[0..1]
OtherAdjustment:string[0..1]

2.9 Insurance

Both, **InsuranceProvision** and **Insurance** is provided as general abstract elements.

- **InsuranceProvision**
  - **GeneralInsuranceProvision**
  - **ContractorInsuranceProvision**
- **Insurance**
  - **GeneralLiabilityInsurance**
  - **EmployerLiablityInsurance**
  - **AutomobileLiabilityInsurance**
  - **CommonLiabilityInsurance**

The **GeneralInsuranceProvision** has a list of general insurances, each **GeneralLiabilityInsurance** having the following elements: **Name**, **Description**, **InsurerName**, **ExpirationDate**, **InsuranceType** and **LiabilityLimit**.


Provision
(from Root::Component View::aecXMLcos)
Name:normalizedString
Description:string[0..1]
Insurance
(from Root::Component View::aecXMLcos)
currency:normalizedString[0..1]
Name:normalizedString
Description:string[0..1]
InsurerName:normalizedString[0..1]
ExpirationDate:date[0..1]
InsuranceProvision
GeneralInsuranceProvision
Liabilities:GeneralLiabilityInsurance[*]
#Liabilities
*
GeneralLiabilityInsurance
InsuranceType:normalizedString[0..1]
LiabilityLimit:float
ContractorInsuranceProvision
EmployerLiability:EmployerLiablityInsurance[0..1]
AutomobileLiability:AutomobileLiabilityInsurance[0..1
CommonLiability:CommonLiabilityInsurance[0..1]
OtherLiabilities:GeneralLiabilityInsurance[*]
BondRequired:boolean
DamageIndemnityLimit:float[0..1]
#OtherLiabilities
*
#EmployerLiability
0..1
EmployerLiablityInsurance
BodilyInjuryByAccidentPerAccidentLimit:float[0..1]
BodilyInjuryByDiseasePerEmployeeLimit:float[0..1]
BodilyInjuryByDiseasePolicyLimit:float[0..1]
#AutomobileLiability
0..1
AutomobileLiabilityInsurance
VehiclePerAccidentLimit:float[0..1]
#CommonLiability
0..1
CommonLiabilityInsurance
PerOccurrenceLimit:float[0..1]
GeneralAggregateLimit:float[0..1]
OperationAggregateLimit:float[0..1]
PersonalInjuryLimit:float[0..1]

2.10 Payment Application

The **PaymentApplication** combines all agcXML definitions for various components of applications for payment. It includes provisions for:

- application for single payment
- application for a recurring payment
- contractual information in addition to the payment application

The **PaymentAplicationSingle** (referring to a single application versus recurring application) provides:

- **Name** (or Id) of the application for payment
- **Description** for any optional remarks
- **PaymentTerm**
- **PaymentPeriod**
- **Payment** and
- **PaymentDate**

The payment application information can be further enhanced by the two specializations:

- **PaymentApplicationContract** and
- **PaymentApplicationContractCertified**.

The **OriginalSum** is the total sum, depending on the type of contract and document form (provided by **GoverningForm** element) it provides either the total sum or the guaranteed maximum price (if contract is by guaranteed maximum price). The **ChangeByChangeOrder** is the addition or reduction agreed upon in a change order. All money related data fields have a type **monetaryAmount**, i.e. it gets the currency assigned by **currency** attribute.

The fields **WorkCompleted** and **MaterialStored** provide the values for this payment period, an optionally attached **ScheduleOfValueInformation** may show the details. The total of both, the “Total Work Completed and Material & Equipment Stored to Date” can be calculated from these figures.

The **RetainageWorkCompleted** and **RetainageMaterialStored** fields provide optional values for retainage of work completed and material stored. The total of both, the “Total Retainage applied to work completed and materials & equipment stored to date” can be calculated from these figures and is not explicitly exchanged.

The **PaidPreviously** field holds the already paid amount. With this information and the information above the following line items can be calculated, they are therefore not explicitly included in the exchange:

- Total completed and stored to date less retainage,
- Current payment due
- Balance to complete, including retainage

See also the notes above.

The element **PaymentApplicationContractCertified** provides two additional fields used to transport the information about the certified amount and optionally any clarification. **CertifiedAmount** for the total amount certified for payment and **Explanation** for any descriptive text provided with the certificate.

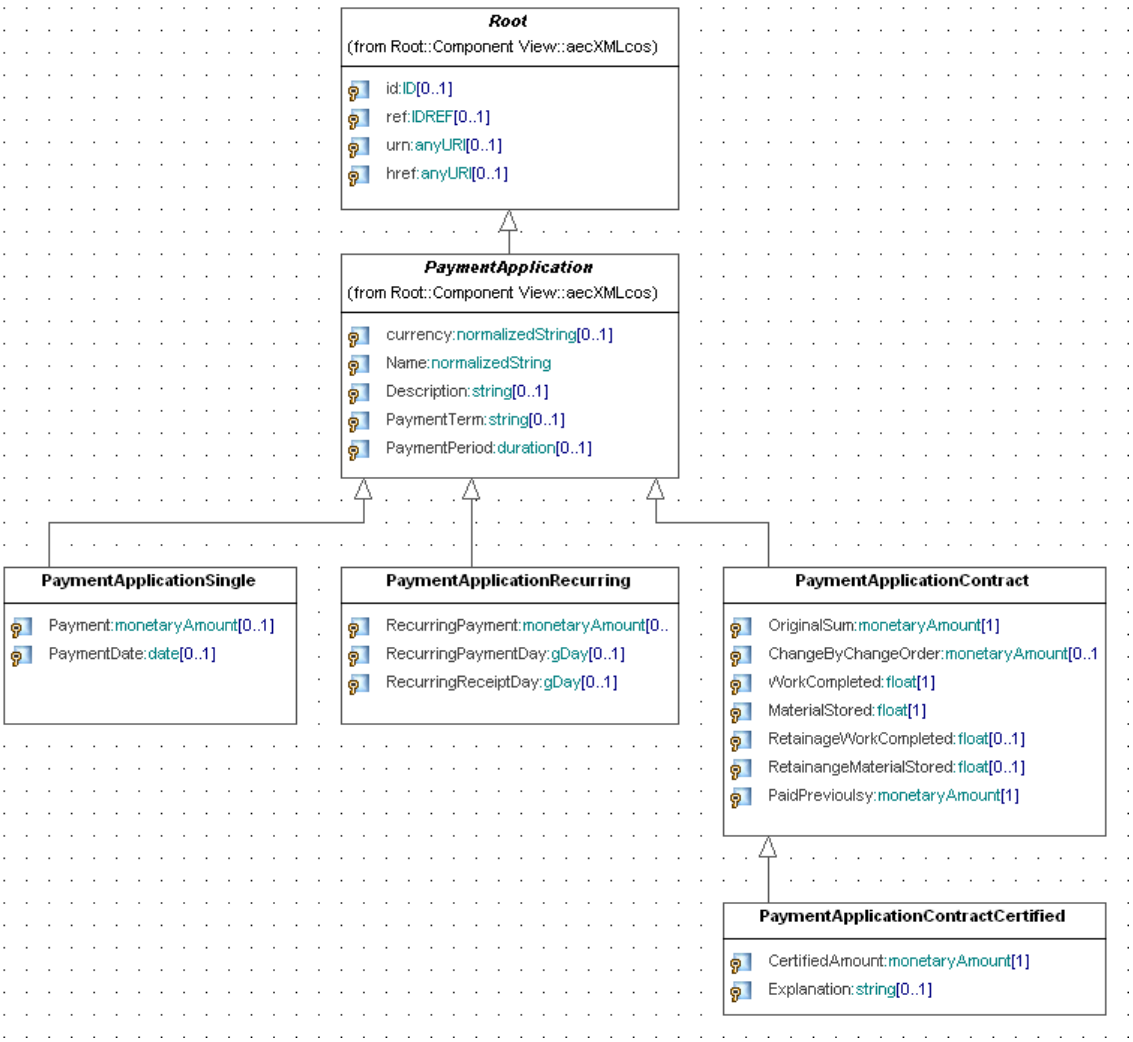


Figure 8: the payment application element