UN/CEFACT United Nations Centre for Trade Facilitation and Electronic Business

Techniques and Methodologies Group (TMG)

UN/CEFACT's Modeling Methodology (UMM):

UMM Meta Model – Foundation Module Version 1.0
Technical Specification
2006-10-06

Table of Contents

1 About this Document

1.1 Status of this Document

This document has completed the Open Development Process (ODP) of UN/CEFACT on 2006-10-06. It is a UN/CEFACT Technical Specification.

1.2 Revision History

Version	Release	Date	Comment
Candidate for 1.0	First Working Draft	2005-08-11	
Candidate for 1.0	Second Working Draft	2006-03-17	
Candidate for 1.0	Final Working Draft	2006-06-20	
Version 1.0	Technical Specification	2006-10-06	

1.3 Document Context

The UMM meta model is divided in a set of meta modules. This means the UMM meta model is partitioned into functional levels, ranging from core, minimal functionality to complete functionality. The following partitions levels have been defined for meta modules:

- **Base:** Covers the fundamental principles that are shared across all the other modules.
- **Foundation:** Includes the core concepts of the UMM. Defines all the concepts that are used as part of the minimal methodology to produce a UMM compliant business collaboration model
- **Specialization:** Multiple specialization modules might define add-on concepts to the foundation. Each specialization module addresses a specialized type of analysis that extends the foundation module at a well-defined extension point for a certain topic. Specialization modules might become candidates for later inclusion into the foundation module.
- **Extension:** Extension modules serve the same purpose as specialization modules. Whereas specialization modules are developed and maintained by UN/CEFACT, extension modules are adding features that are created and maintained by external organization.

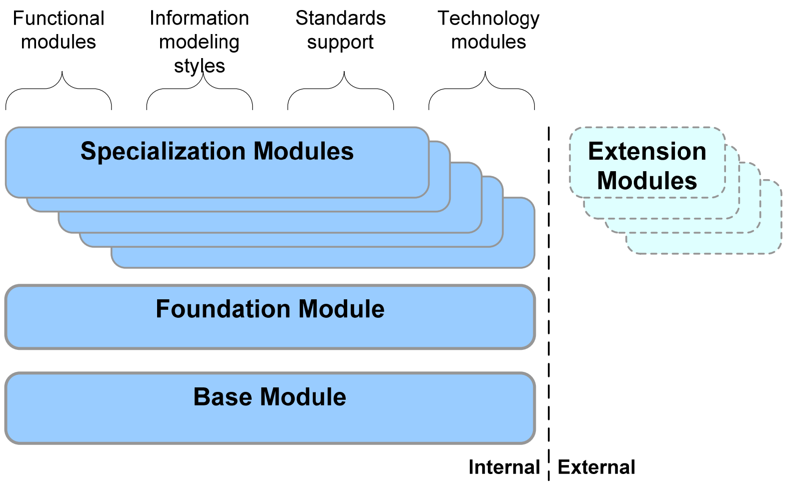

Figure 1 Module structure of the UMM meta model

This specification defines the foundation module of UMM.

2 Project Team

2.1 Disclaimer

The views and specification expressed in this document are those of the authors and are not necessarily those of their employers. The authors and their employers specifically disclaim responsibility for any problems arising from correct or incorrect implementation or use of this technical specification.

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The Editing Team of this UMM foundation module likes to thank former members of TMG’s Business Process Working Group (BPWG) who have spent enormous efforts in putting the UMM into a stage that we were able to build upon in order to create this foundation module:

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3 Introduction

3.1 Audience

A reader of the document MUST have a deep understanding of UML 1.4. She or he MUST be able to understand meta models denoted as UML class diagrams. She or he SHOULD be familiar with the UML 1.4. meta model, at least she or he MUST be able to check back with the UML 1.4. meta model. The reader SHOULD be familiar with OCL 2.0 in order to understand the OCL constraints of this UMM profile – those who are not familiar with OCL are provided with a plain text description of the constraint.

The information described in this manual is aimed at

- advanced business process modelers who check a UML model for UMM compliance (if not supported by a tool)
- advanced business process modelers who train other business process modelers and business process analysts
- software designers who want to produce UML tools providing support for this UMM foundation module
- software designers who want to produce tools to transform UMM compliant business collaboration models into specifications of the IT-layer (ebXML, Web Services, UN/EDIFACT, etc.).
- software designers who want to produce repositories to register UMM compliant business collaboration models

3.2 Related Documents

- **UN/CEFACT**
  - UN/CEFACT Open Development Process
    http://www.unece.org/cefact/cf_plenary/plenary05/cf_05_05e.pdf
  - BCSS: A UML Profile for Core Components
    BCSS LINK
  - Core Component Technical Specification
    http://www.unece.org/cefact/ebxml/CCTS_V2-01_Final.pdf
- **International Organization for Standardization (ISO)**
  - Open-edi Reference Model. ISO/IEC 14662
    http://standards.iso.org/ittf/PubliclyAvailableStandards/c037354_ISO_IEC_14662_2004(E).zip
- **Object Management Group (OMG)**
  - Unified Modeling Language Specification (UML), Version1.4.2
    http://www.omg.org/docs/formal/05-04-01.pdf

3.3 UN/CEFACT's Modeling Methodology (UMM): Overview

UN/CEFACT's Modeling Methodology (UMM) is a UML modeling approach to design the business services that each partner must provide in order to collaborate. It provides the business justification for the services to be implemented in a service-oriented collaboration architecture. Thus, a primary vision of UN/CEFACT is to capture the business knowledge that enables the development of low cost software based on service-oriented architectures (SOA) helping the small and medium size companies (SMEs), and emerging economies to engage in e-Business practices. UMM focuses on developing a global choreography of inter-organizational business processes and their information exchanges. UMM models are notated in UML syntax and are platform independent models. The platform independent UMM models identify which services have to be realized in a service-oriented architecture implementing the business collaboration. This approach provides insurance against technical obsolescence.

The UMM, as described in this document is the formal description technique for describing any Open-edi scenario as defined in ISO/IEC 14662 Open-edi reference model. An Open-edi scenario is a formal means to specify a class of business transactions having the same business goal, such as, purchasing or inventory management. The primary scope of UMM is the Business Operations View (BOV) and not the Functional Service View (FSV) as defined in ISO/IEC IS 14662. The BOV is defined as "a perspective of business transactions limited to those aspects regarding the making of business decisions and commitments among organizations", while the FSV is focused on implementation specific, technological aspects of Open-edi. The commitments of the BOV layer are reflected in the choreography of the inter-organizational business process and its information exchanges. At the FSV layer this choreography must be implemented by a set of composite services. It follows, that UMM on the BOV layer defines what the business is about and technologies on the FSV layer define how to implement the business by a service-oriented architecture.

This version of the UMM consists of three views each covering a set of well defined artifacts:

- Business Domain View (BDV)
- Business Requirements View (BRV)
- Business Transaction View (BTV)

Business Domain View (BDV): The BDV is used to gather existing knowledge. It identifies the business processes in the domain and the business problems that are important to stakeholders. It is important at this stage that business processes are not constructed, but discovered. Stakeholders might describe intra-organizational as well as inter-organizational business processes. All of this takes place in the language of the business experts and stakeholders. The business domain view results in a categorization of the business domain (manifested as a hierarchical structure of packages) and a set of relevant business processes (manifested as use cases). The result may be depicted in use case diagrams.

Business Requirements View (BRV): The goal of the BRV is identifying collaborative business processes between different business partner types and describing the requirements regarding these collaborative business processes. In order to identify collaborative business processes the static descriptions of the internal business processes discovered in the BDV are described in more detail and are analyzed regarding their dynamic behavior and their relationship to each other. Based on this analysis the relevant "real-world"-concepts in the domain of the collaboration are identified. This is done by focusing on business entities, which are "real-word" things having business significance and a shared among the business partners involved in the collaboration. The requirements of aligning the states of these business entities between the business partners are documented by business collaboration use cases and by business transaction use cases.
Business Transaction View (BTV): The BTV represents the view of the business process analyst who transforms the requirements into a choreography of information exchanges. Currently, the overall

choreography of a business collaboration is defined by an activity graph called business collaboration protocol. In a future version other alternatives may be developed. The business collaboration protocol choreographs the flow among business interactions. This flow depends on the states of business entities. Currently, a business interaction is always defined by a business transaction. Other alternatives may be developed in future versions. A business transaction defines a simple choreography of exchanging business information between two authorized roles and an optional response. A business transaction identifies the business actions of each partner responsible for sending and receiving the business information. These actions correspond to the services that must be implemented on each business partner's side in a service-oriented collaboration architectur. The business information exchanged corresponds to the input/output of these services. The choreography among the business transactions – described by the business collaboration protocol in UMM – is easily mapped to machine-readable choreography languages (such as BPEL, WS-CDL, BPSS).

An execution of a business transaction usually results in the change of state of one or more business entities. Thus, the information exchanged in a transaction should be limited to the minimum information needed to change the state of a business entity. Nevertheless, UMM allows the definition of an information exchange in a document-centric approach – even if this is not recommended. A business transaction leads to synchronized states of the business objects at both partners participating in a business transaction. Inasmuch, a business transaction is a unit of work that allows roll-back. A business transaction has a number of quality of service (QoS) parameters that represent security and timing requirements. These are specifed in tagged values.

3.4 Objectives

3.4.1 Goals of the Technical Specification

The goals of this specification are:

- To define the semantics of well-formed UMM business collaboration models.
- To define the validation rules for UMM compliant business collaboration models.
- To clarify the basic concepts that a UMM-compliant business collaboration model is based on.
- To provide an unambiguous definition for UMM business collaboration models that allows a unambigiuous mapping to artifacts for deployment in a service-oriented architecture. Note, that the mapping itself is not part of UMM.
- To define a UML profile for the UMM foundation module that allows UML tool vendors to customize their tools to be UMM compliant. Better tool support will lead to a growing UMM user base.

3.4.2 Requirements

This specification is guided by the following key requirements derived from the above goals:

- The UMM foundation module defines only those modeling concepts that are considered as fundamental to deliver a UMM compliant model. This means it delivers concepts to structure the domain (in the business domain view), to gather requirements for collaborative business processes (in the business requirements view) and to provide a choreography of business information exchanges (in the business transaction view). Additional advanced modeling concepts shall be covered in specialization and extension modules.
- The UMM foundation module is directed towards the business operational view of Open-edi. This means it is independent of certain implementation technologies used in SOAs like Web Services and ebXML or whatever comes up in the future. However, the UMM compliant business collaboration models must be defined in a way that allows a mapping to an implementation technology of choice. Such a mapping is not part of the UMM foundation module. It is a candidate for a specialization/extension module.

- Today, the UML is the most commonly supported modeling language by modeling tools. In order to use the broad range of tools, a UMM business collaboration model must be a special kind of UML model. Thus, the UMM foundation module is based on the UML meta model. In fact, it provides a UML Profile consisting of stereotypes, tagged definitions and constraints.
- In order to support a broad adoption of the UMM-modeling approach the formal descriptions of the UMM shall be supplemented by a set of examples that show UMM compliant artifacts.

3.4.3 Caveats and Assumptions

This specification makes the following assumptions:

- This UML profile is based on the UML meta-model version 1.4.2. This version is the current ISO version. Using another UML meta-model as a basis for the development of a UMM compliant business collaboration model will not deliver correct results.
- The basic concepts of the UMM and the way they relate to each other shall be described and explained by means of a meta model (to be found in the non-normative “conceptual description” sections of this document)
- Most modeling tools do not evaluate OCL constraints against model data. Accordingly, validation of UMM semantics as defined by the OCL constraints in this specification will normally only be possible using either an external validation service or a custom plug-in.
- Different specialization and extension modules might extend the foundation module in order to define additional semantics to the minimum semantics required to create a UMM compliant business collaboration model.

3.5 Structure of the UMM Foundation Module

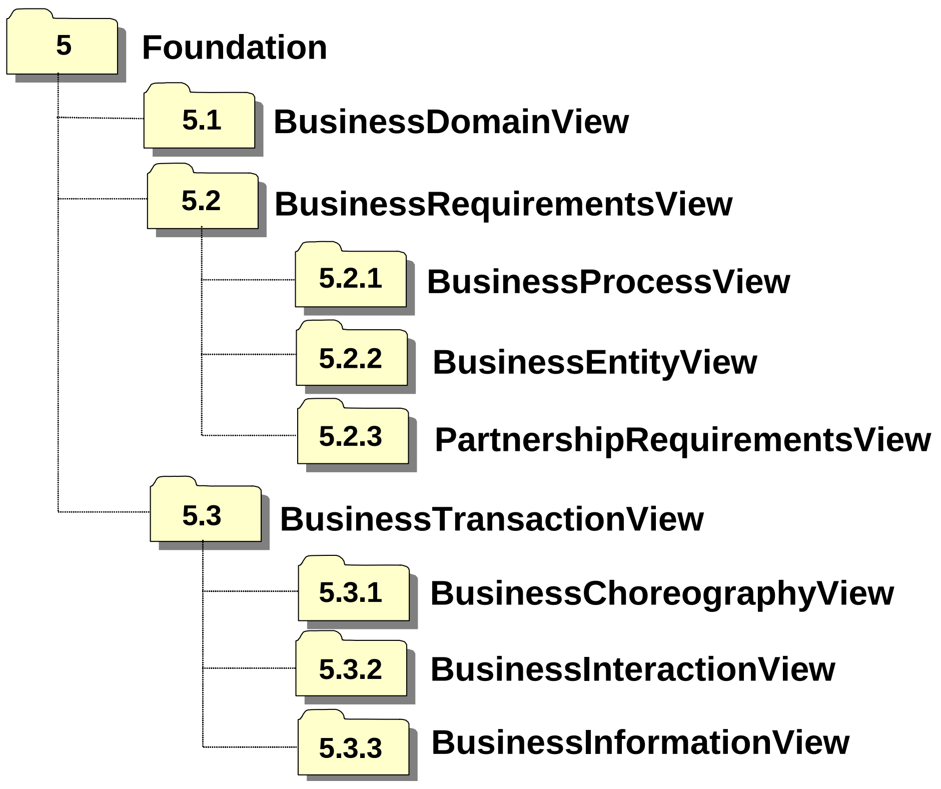

Figure 2 Package overview of UMM Foundation Module meta model

Section 5 defines the UML profile of the foundation module of the UMM meta model. The figure below shows the package structure of the foundation module of the UMM meta model. The number depicted in

the folders of this figure refers to the subsection which defines the stereotypes, tag definitions and constraints of the corresponding package. The first level packages of the foundation module conform to the three views of the current UMM version: Business Domain View (5.1), Business Requirements View (5.2), and Business Transaction View (5.3). Since the Business Domain View (5.1) does not include different types of artefacts, it is not split into sub-packages. The Business Requirements View (5.2) covers three different types of artefacts: activity graphs of business processes, business entity life cycles and collaboration requirements defined in use cases. Accordingly, it consists of the sub-packages Business Process View (5.2.1), Business Entity View (5.2.2), and Partnership Requirements View (5.2.3). Similarly, the Business Transaction View (5.3) is built by three different types of artefacts: choreography of a business collaboration, choreography of business interactions (currently i.e. business transactions) leading to synchronized states, and business information exchanged in the interactions. Consequently, it includes the sub-packages Business Choreography View (5.3.1), Business Interaction View (5.3.2), and Business Information View (5.3.3).
Each section describing a package is structured in the same way. The first subsection is informative. It describes the conceptual model of the artefact that is addressed by the package. The second subsection is normative and defines all the stereotypes and associated tag definitions that are defined in the package. The third subsection is normative and includes all the constraints both in plain text and in OCL that apply to the respective package. The fourth subsection is informative and depicts an example instance of the artefact type addressed by the package.

4 Dependency on other UMM modules (normative)

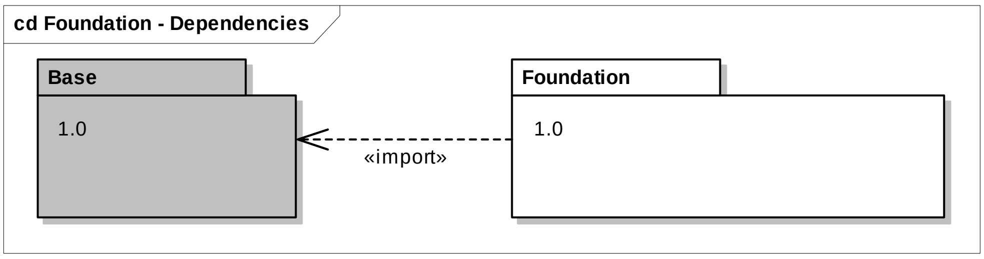

Figure 3 UMM Foundation Dependencies

The UMM foundation module 1.0 is built on top of the UMM base module 1.0. This means that all stereotypes and tag definitions defined in the UMM base module 1.0 are imported into the UMM foundation module 1.0. The figure below shows the stereotypes defined in the UMM base module also used in the foundation module. Note, the stereotypes of the base module are depicted in grey background in all figures of this specification. The formal definition of the stereotypes *RegistryObject* and *BusinessLibraryPackage* is given in the UMM base module 1.0 specification. In the foundation module, packages - that are containers of stereotypes realizing main UMM artefacts - are defined as specializations of the base stereotype *BusinessLibraryPackage*. This means that such packages and their contents are candidates for registration in a registry. In the UMM foundation module 1.0 we do not define any stereotype that directly inherits from *RegistryObject*. As a consequence, only packages are candidates for registration.

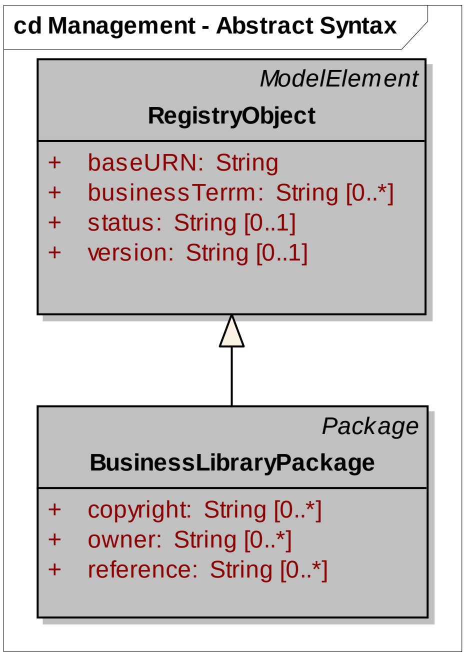

Figure 4 UMM Base Abstract Syntax

5 UMM Foundation Module

5.0 Foundation Module Management

5.0.1 Conceptual Description (informative)

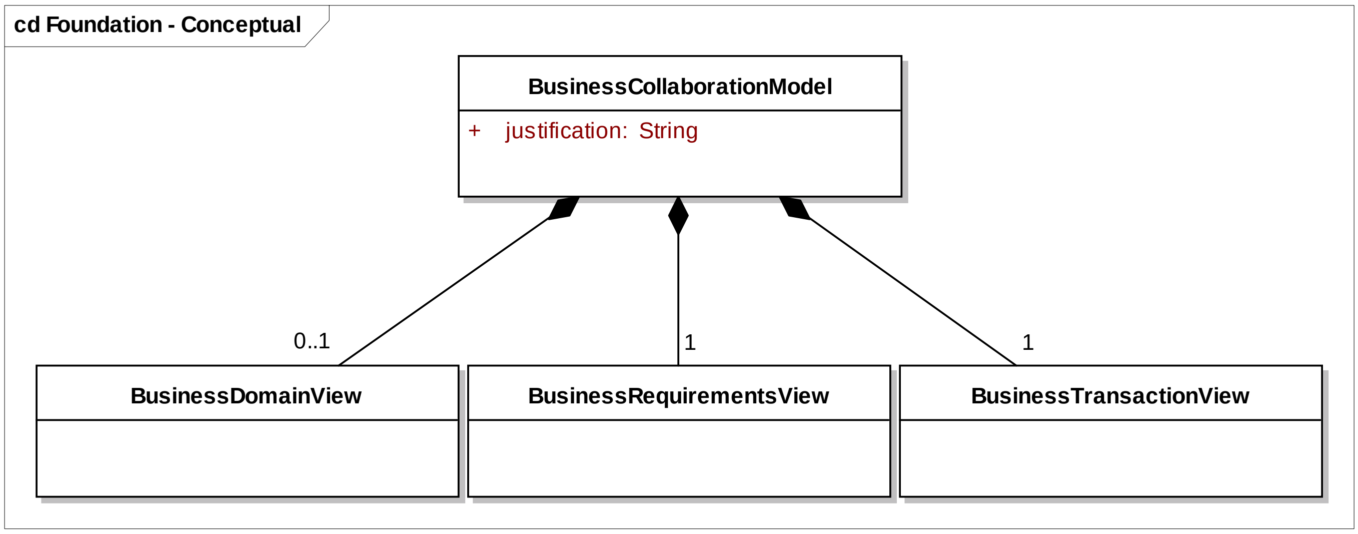

Figure 5 UMM Foundation Module Management - Conceptual Overview

A project that follows the UMM approach leads to a business collaboration model. A business collaboration model that is UMM compliant is stereotyped as *BusinessCollaborationModel*. As described above the UMM is built by three views. The business domain view focuses on understanding the business domain under consideration. Although this view is considered as important, the results may be captured in non-UML compliant artefacts and/or may not be included in the model and referenced instead. Since the business domain view is optional, the *BusinessCollaborationModel* is composed of zero or one *BusinessDomainView*. The business requirements view and the business transaction view are mandatory parts of a business collaboration model. Thus a *BusinessCollaborationModel* is composed of exactly one *BusinessRequirementsView*. Similarly, a *BusinessCollaborationModel* is composed of exactly one *BusinessTransactionView*.

5.0.2 Stereotypes and Tag Definitions (normative)

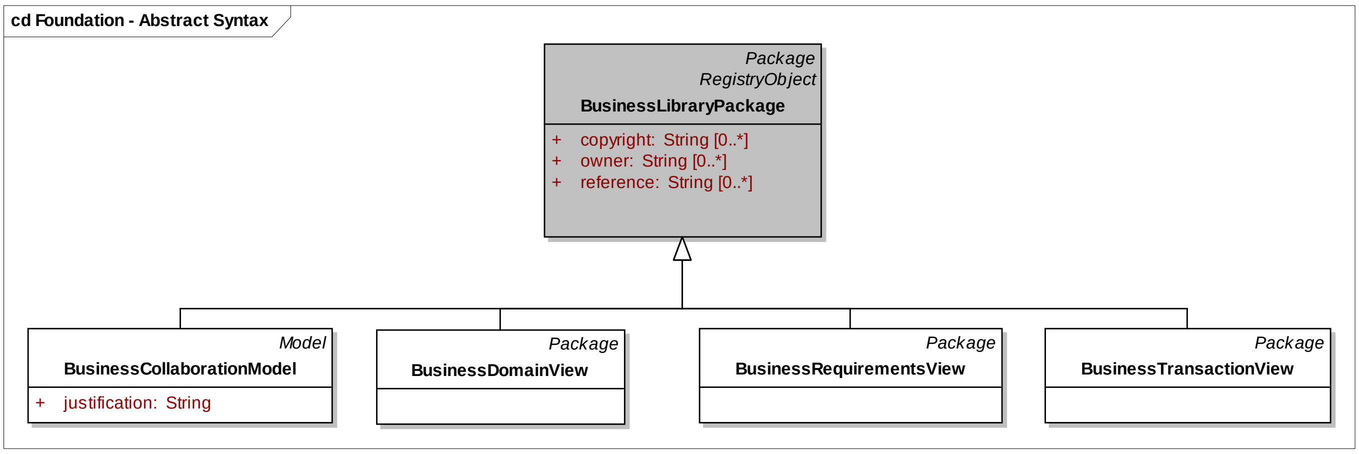

Figure 6 UMM Foundation Module Management - Abstract Syntax

Stereotype	**BusinessCollaborationModel**
Base Class	Model
Parent	BusinessLibraryPackage (from Base Module)
Description	A business collaboration model is a model that is compliant to the UMM meta model. It MUST be compliant to the base and foundation module, and it MAY be compliant to one or more specialisation and/or extension modules.
Tag Definition	**justification** **Type**: String **Multiplicity**: 1 **Description**: Explains the reason from a business perspective why the given business collaboration is considered for possible business collaborations. **Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm

Stereotype	**BusinessDomainView**
Base Class	Package
Parent	BusinessLibraryPackage (from Base Module)
Description	A business domain is a framework for identification and understanding of business processes as well as categorizing them according to a classification schema. The business domain view is a container capturing the categorization scheme and categorized business processes.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm

Stereotype	**BusinessRequirementsView**
Base Class	Package
Parent	BusinessLibraryPackage (from Base Module)
Description	The business requirements view is a container for all elements needed to identify and describe the requirements on a collaboration between business partner types playing certain authorized roles.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm

Stereotype	**BusinessTransactionView**
Base Class	Package
Parent	BusinessLibraryPackage (from Base Module)
Description	The business transaction view is a container for all elements needed to describe the choreography of a business collaboration at various levels and the information exchanged in each step of the choreography.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm

5.0.3 Constraints (normative)

A *BusinessCollaborationModel* MUST NOT contain more than one *BusinessDomainView* package (but it MAY contain no *BusinessDomainView* package at all)

```
package Model_Management
context Model

inv zeroToOneBusinessDomainView:
  self.isBusinessCollaborationModel() implies
  self.ownedElement->select(isBusinessDomainView())->size()<=1
```

A *BusinessCollaborationModel* MUST contain exactly one *BusinessRequirementsView* package.

```
package Model_Management
context Model

inv oneBusinessRequirementsView:
  self.isBusinessCollaborationModel() implies
   self.ownedElement->one(isBusinessRequirementsView())
```

A *BusinessCollaborationModel* MUST contain exactly one *BusinessTransactionView* package

```
package Model_Management
context Model

inv oneBusinessTransactionView:
  self.isBusinessCollaborationModel() implies
  self.ownedElement->one(isBusinessTransactionView())
```

A *BusinessDomainView*, the *BusinessRequirementsView*, and the *BusinessTransactionView* MUST be directly located under the root of the *BusinessCollaborationModel*.

```
package Model_Management
context Package

inv rootLevelPackages
  (self.isBusinessDomainView() or self.isBusinessRequirementsView() or
  self.isBusinessTransactionView()) implies
  self.namespace.isBusinessCollaborationModel()
```

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OCL-Methods

```
package Foundation::Core
context ModelElement

--Predefined  method which evaluates, if the given Modelelement
--has a stereotype equal to the passed name
def:
let hasStereotype (st : String) : Boolean =
  self.stereotype->select(cst | cst.name = st)->notEmpty()

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessCollaborationModel'
def:
let isBusinessCollaborationModel() : Boolean =
  self.oclIsKindOf(Model) and
  self.hasStereotype('BusinessCollaborationModel')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessDomainView'
def :
let isBusinessDomainView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessDomainView')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessRequirementsView'
def :
let isBusinessRequirementsView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessRequirementsView')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessTransactionView'
def :
let isBusinessTransactionView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessTransactionView')
```

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5.1 Business Domain View

5.1.1 Conceptual Description (informative)

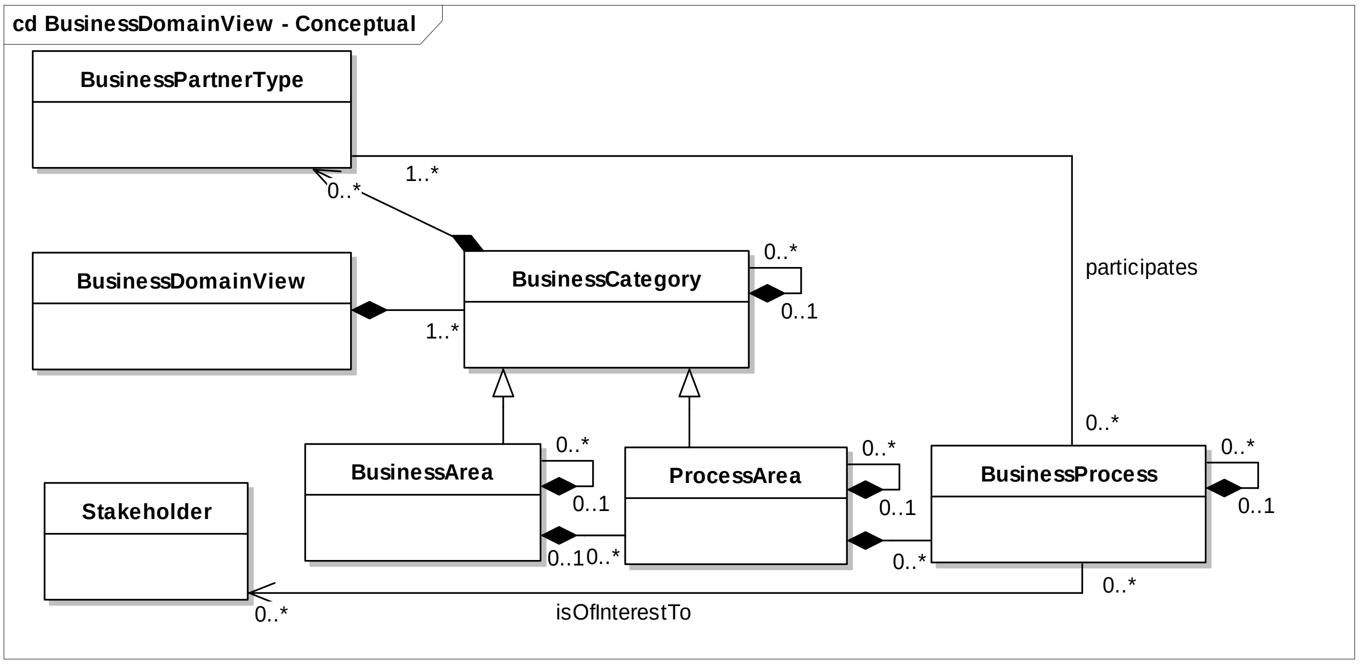

Figure 7 BusinessDomainView Conceptual Overview

The business domain view is used to discover business processes that are of relevance in a project. A business process is executed by at least one (but possibly more) business partner types. A business partner type might execute multiple business processes. Thus, the *participates* association between *BusinessPartnerType* and *BusinessProcess* is a (1..n) to (0..n) association. A business partner type has a vested interest in the business process. This is the characteristic of a stakeholder. Thus, a *BusinessPartnerType* is a specialization of a *Stakeholder*. In general, a stakeholder does not need to participate in a business process. A stakeholder might have interest in multiple business processes and a business process might be of interest to multiple stakeholders. The relationship between a *BusinessProcess* and a *Stakeholder* is described by the *isOfInterestTo* dependency in UMM. A business process can be decomposed into sub-processes using the «include» and «extends» association stereotypes. This is denoted by the unary (0..1) to (0..*) composition of *BusinessProcess*.

To enable users to readily identify business processes, these business processes should be classified into business categories. Thus, the *BusinessDomainView* is composed of one or many (1..n) *BusinessCategories*. A business category might be recursively composed of other business categories. This means business categories might build a hierarchy. Hence, a unary (0..1) to (0..n) composition is defined for *BusinessCategory*. A business process is assigned to exactly one business category. A business category on the lowest level of a business category hierarchy includes one or more processes, whereas a business category on a higher level does not include any business process. Accordingly, the composition between *BusinessCategory* and *BusinessProcess* is 1 to (0..n).

UN/CEFACT suggests - but does not mandate - the use of specializations of the stereotype of *BusinessCategory*. These specializations are *BusinessArea* and *ProcessArea*. A business area corresponds to a division of an organization and a process area corresponds to a set of common operations within the business area. Similarly to business category, business area as well as process area may form a hierarchy. Thus, *BusinessArea* and *ProcessArea* inherit the unary composition from *BusinessCategory*. However, it is important that business areas include only business areas except the lowest level of a business area hierarchy which is composed of one or more process areas. Therefore, we have a (0..1) to (0..n) composition between *BusinessArea* and *ProcessArea*. Business areas must not include business processes. The lowest level of a process area hierarchy includes one or more business processes. Whereas process areas in a higher level of the hierarchy do not include any business process. Accordingly, the composition between *ProcessArea* and *BusinessProcess* is 1 to (0..n).

The stereotype *BusinessCategory* and the combination of the stereotypes *BusinessArea* and *ProcessArea* are considered as alternatives. A UMM model must not use both alternatives.

5.1.2 Stereotypes and Tag Definitions (normative)

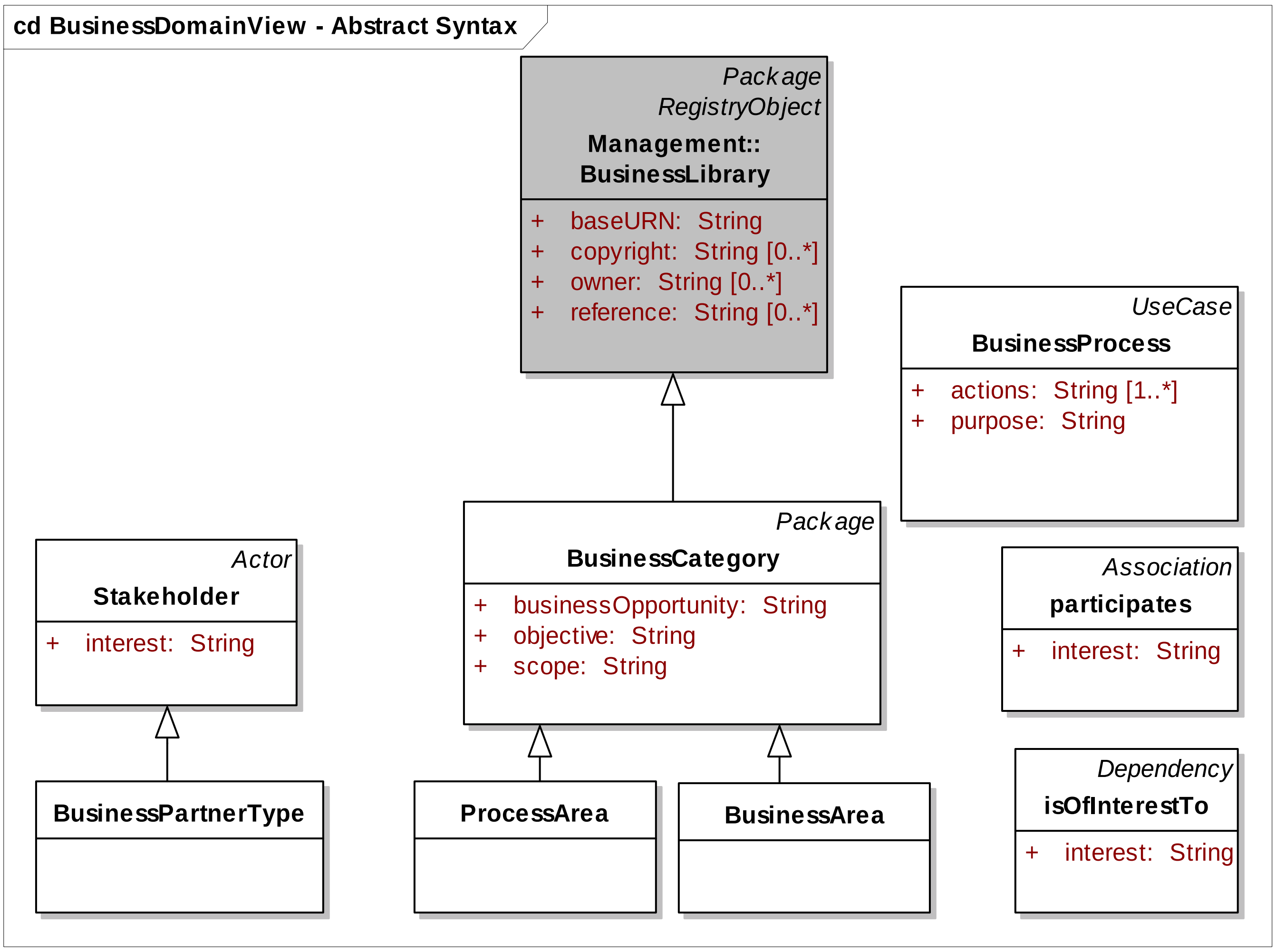

Figure 8 BusinessDomainView Abstract Syntax

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Stereotype	**BusinessCategory**
Base Class	Package
Parent	BusinessLibraryPackage (from Base Module)
Description	Business categories are used to classify the business processes in the Business Domain View. The prime purpose of classifying the business processes is to enable potential users to readily identify processes that have been defined in the business category under consideration. Consequently a business category is used to group either other business categories or business processes that belong to the respective business category. The Business Domain View is structured either by this stereotype *BusinessCategory* or by its specializations *BusinessArea* and *Process Area* (see below for these stereotype definitions).
Tag Definition	**objective** **Type**: String **Multiplicity**: 1 **Description**: The purpose to be achieved by the business process within the business category under consideration. **scope** **Type**: String **Multiplicity**: 1 **Description**: Defines the boundaries of the business category under consideration. **businessOpportunity** **Type**: String **Multiplicity**: 1 **Description**: The strategic interest from a business perspective in order to address the business category under consideration. **Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm

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Stereotype	BusinessArea
Base Class	Package
Parent	BusinessCategory
Description	A business area usually corresponds to a division of an enterprise. Business areas might be structured recursively. A business area (in case of a recursive structure only a business area on the lowest level) is a category of decomposable business process areas. This means a business area collates either other business areas or process areas. The UMM does not mandate a specific classification schema. A classification schema that might be used is the Porter Value Chain. Based on the Porter Value Chain the UN/CEFACT Common Business Process Catalog recommends a list of eight flat (i.e. non-recursive) categories: Procurement/Sales, Design, Manufacture, Logistics, Recruitment/Training, Financial Services, Regulation, Health Care. This list of business areas is considered as non exhaustive.
Tag Definition	**Inherited tagged values:** – objective – scope – businessOpportunity – baseURN – owner – copyright – reference – version – status – businessTerm

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Stereotype	ProcessArea
Base Class	Package
Parent	BusinessCategory
Description	A process area corresponds to a set of common operations within a business area. Process areas might be structured recursively. A process area (in case of a recursive structure only a process area on the lowest level) is a category of common business processes. This means a process area collates either other process areas or business processes. The UMM does not mandate a specific classification schema. The UN/CEFACT Common Business Process Catalog recommends a list of five flat (i.e. non-recursive) categories that correspond to the five successive phases of business collaborations as defined by the ISO Open-edi model: Planning, Identification, Negotiation, Actualization, Post-Actualization.
Tag Definition	**Inherited tagged values:** – objective – scope – businessOpportunity – baseURN – owner – copyright – reference – version – status – businessTerm

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Stereotype	Stakeholder
Base Class	Actor
Parent	N/A
Description	A stakeholder is a person or representative of an organization who has a stake – a vested interest – in a certain business category or in the outcome of a business process. A stakeholder does not necessarily participate in the execution of a business process.
Tag Definition	**interest** **Type**: String **Multiplicity**: 1 **Description**: Describes the vested interest of the stakeholder in the business category it is defined within.

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Stereotype	BusinessPartnerType
Base Class	Actor
Parent	Stakeholder
Description	A business partner type is an organization type, an organizational unit type or a person type that participates in a business process. Business partner types typically provide input to and/or receive output from a business process. Due to the fact that a business partner type participates in a business process she or he has by default a vested interest in the business process. It follows that a business partner type is a special kind of stakeholder.
Tag Definition	**Inherited tagged values:** - interest

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Stereotype	BusinessProcess
Base Class	UseCase
Parent	N/A
Description	A business process is a set of related activities that together create value for a business partner. A business process might be performed by a single business partner type or by multiple business partner types crossing organizational boundaries. In case organizations collaborate in a business process, the business process should create value for all its participants. A business process can be decomposed into sub-processes using the «include» and «extends» association stereotypes defined in UML.

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Tag Definition	**definition**	
	Type	String
	Multiplicity	1
	Description	Gives a definition of the business process. This definition must describe the customer value to be created by the business process. In case of a business process executed by multiple paries it describes the value to be created to all participants.
	beginsWhen	
	Type	String
	Multiplicity	1
	Description	Specifies a business event that triggers the initiation of the business process.
	preCondition	
	Type	String
	Multiplicity	1
	Description	Specifies conditions that have to be fulfilled in order to execute a business process. This condition SHOULD refer to states in a business entity life cycle. A pre-condition statement MAY use Boolean operators specifying a combination of multiple business entity states.
	endsWhen	
	Type	String
	Multiplicity	1
	Description	Specifies a business event that leads to the termination of the business process.
	postCondition	
	Type	String
	Multiplicity	1
	Description	Specifies a condition that will be reached after executing the business process. Usually, this condition SHOULD refer to states in a business entity life cycle. A post-condition statement MAY use Boolean operators specifying a combination of multiple business entity states.
	exceptions	
	Type	String
	Multiplicity	1..*
	Description	Identifies situations leading to a deviation of the regular execution of the business process.
	actions	
	Type	String
	Multiplicity	1..*
	Description	Lists the tasks that together make up a business process. In case of a business process executed by multiple parties a special emphasis on interface tasks is needed. An interface task is a business process step that requires communication with another business partner type.

385

Stereotype	**participates**

Base Class	Association		
Parent	N/A		
Description	Describes the association between a business partner type and a business process. This stereotype defines that the business partner type provides input to and/or output from the associated business process.		
Tag Definition	**interest**		
	Type	String	
	Multiplicity	1	
	Description	Describes the vested interest of the business partner type in the business process associated by this participates-association.	

Stereotype	**isOfInterestTo**	
Base Class	Dependency	
Parent	N/A	
Description	Describes a dependency from a business process to a stakeholder. This stereotype defines that a business process depends on the interest of the connected stakeholder.	
Tag Definition	**interest**	
	Type	String
	Multiplicity	1
	Description	Describes the vested interest of the stakeholder in the business process linked by this participates-dependency.

5.1.3 Constraints (normative)

The *BusinessDomainView* package MUST include at least one *BusinessCategory* package or at least one *BusinessArea* package. Furthermore the *BusinessDomainView* may contain *Stakeholders* and *BusinessPartnerTypes*. The *BusinessDomainView* MUST NOT include a combination of *BusinessCategory* and *BusinessArea* packages.

```
package Model_Management
context Package

inv isBusinessDomainViewPackage:
  self.isBusinessDomainView() implies
  self.contents->notEmpty() and (
  self.contents->forAll(isJustBusinessCategory() or
  isStakeholderOrBusinessPartnerType()) or
  self.contents->forAll(isBusinessArea() or
  isStakeholderOrBusinessPartnerType()))
```

391

A *BusinessArea* package MUST include one or more *BusinessArea* packages or one or more *ProcessArea* packages. It MUST NOT include combinations of *BusinessArea* and *ProcessArea* packages. It MAY contain *BusinessPartnerTypes* and *Stakeholders*.

```
package Model_Management
context Package

inv contentsOfBusinessArea:
  self.isBusinessArea() implies
  self.contents->notEmpty() and (
  self.contents->forAll(isProcessArea()
  or isStakeholderOrBusinessPartnerType())
  or self.contents->forAll(isBusinessArea() or
  isStakeholderOrBusinessPartnerType()))
```

392

Either a *ProcessArea* contains one or more other *ProcessAreas* and zero or more *BusinessPartnerTypes* and *Stakeholders* or it MUST contain at least one *BusinessProcess* and MAY include *BusinessPartnerTypes*, *Stakeholders* and well as stereotyped associations *participates* and stereotyped dependencies *isOfInterestTo*.

```
package Model_Management
context Package

inv contentsOfProcessArea:
  self.isProcessArea() implies
  self.contents->notEmpty and
  (self.contents->forAll(isProcessArea() or
  isStakeholderOrBusinessPartnerType()) or
  (self.contents->forAll(isBusinessProcess() or isBusinessPartnerType() or
  isStakeholder() or isParticipates() or isIsOfInterestTo()) and
  self.contents->select(isBusinessProcess())->size()>= 1))
```

393

Either a *BusinessCategory* contains one or more *BusinessCategories* and zero or more BusinessPartnerTypes and Stakeholders or it MUST contain at least one *BusinessProcess* and MAY include *BusinessPartnerTypes*, *Stakeholders* as well as stereotyped associations *participates* and stereotyped dependencies *isOfInterestTo*.

```
package Model_Management
context Package

inv contentsOfBusinessCategory:
  self.isBusinessCategory() implies
  self.contents->notEmpty and
  (self.contents->forAll(isBusinessCategory() or
  isStakeholderOrBusinessPartnerType()) or
  (self.contents->forAll(isBusinessProcess()
  or isBusinessPartnerType() or
  isStakeholder() or isParticipates() or isIsOfInterestTo()) and
  self.contents->select(isBusinessProcess())->size()>= 1))
```

394

A *participates* association that is part of a *BusinessCategory* (or its specialization ProcessArea) MUST always connect a *BusinessPartnerType* and a *BusinessProcess*.

```
package Foundation::Core
context Association

inv isParticipatesConnector:
  (self.isParticipates() and self.namespace.isBusinessCategory())implies
  self.allConnections->size() = 2 and
  self.allConnections->one(isBusinessProcess()) and
  self.allConnections->one(isBusinessPartnerType())
```

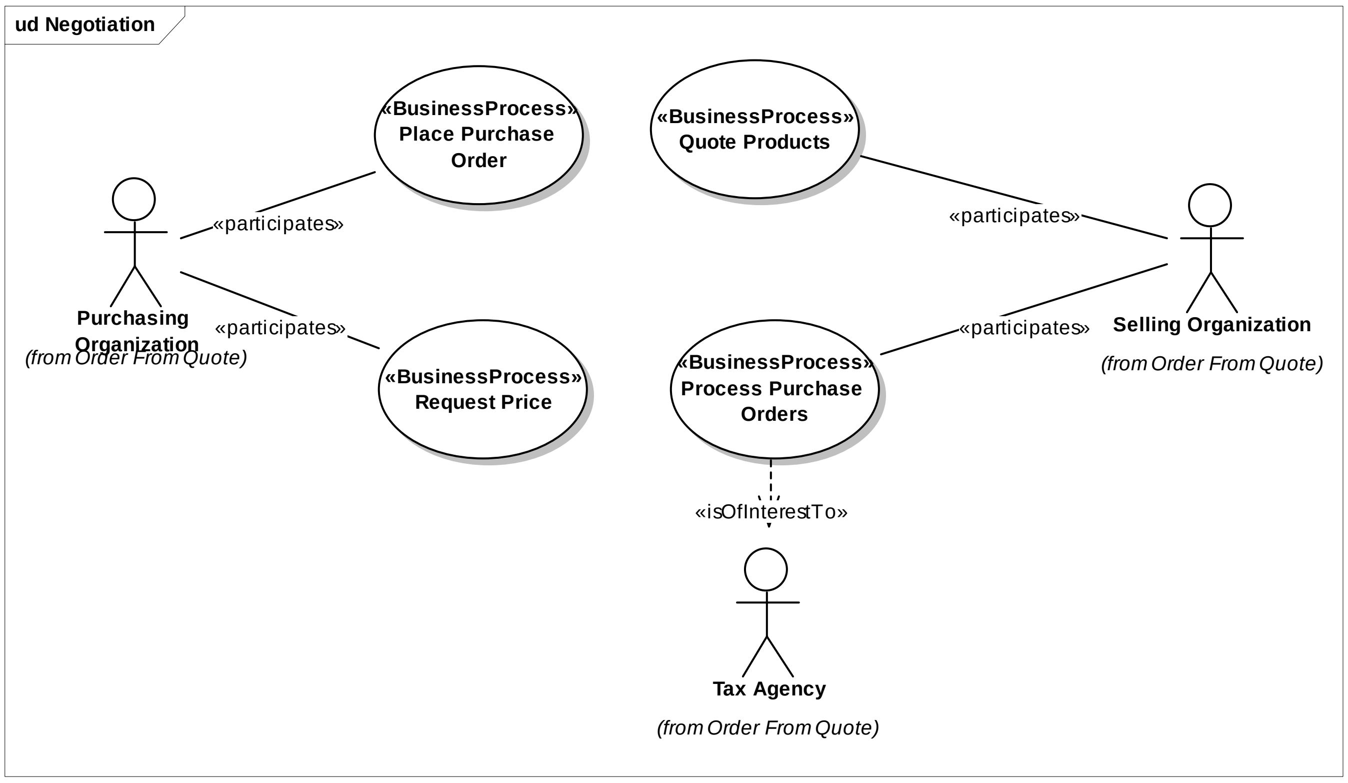
395

An *isOfInterestTo* dependency MUST always be established from a *BusinessProcess* to a *Stakeholder*.

```
package Foundation::Core
context Dependency

inv isIsOfInterestTo:
  self.isIsOfInterestTo() implies
  self.client->one(isBusinessProcess()) and
  self.supplier->one(isStakeholder()) and
  self.client->size() = 1 and
  self.supplier->size() = 1
```

396

397 ### 5.1.4 Example (informative)



398

399 **Figure 9 BusinessDomainView Example: Negotiation (Order from Quote)**

400 **5.1.5 OCL methods used in all packages of the BDV (normative)**

401

OCL-Methods

```
package Foundation::Core
context ModelElement

-- checks if a model element has a certain stereotype
def:
let hasStereotype (st : String) : Boolean =
  self.stereotype->select(self.name = st)->notEmpty()

-- checks if a Package is stereotyped as
-- BusinessDomainView
def:
let isBusinessDomainView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessDomainView')

-- checks if a Package is a BusinessCategory. This includes
-- also BusinessAreas and ProcessAreas due to the inheritance hierachy
-- in the metamodel
def :
let isBusinessCategory() : Boolean =
  self.oclIsKindOf(Package) and (
  self.hasStereotype('BusinessCategory') or
  isBusinessArea() or
  isProcessArea()
  )

-- checks if an Association is stereotyped as participates
def:
let isParticipates() : Boolean =
  self.oclIsKindOf(Association) and
  self.hasStereotype('participates')

-- checks if an Association is stereotyped as isInterestOf
def:
let isIsOfInterestTo() : Boolean =
  self.oclIsKindOf(Dependency) and
  self.hasStereotype('isOfInterestTo')

-- checks if a package is a ProcessArea
def:
let isProcessArea() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('ProcessArea')

-- checks if a package is a BusinessArea
def:
let isBusinessArea() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessArea')
```

```
-- checks if an Actor is a BusinessPartnerType
def :
let isBusinessPartnerType() : Boolean =
  self.oclIsTypeOf(Actor) and
  self.hasStereotype('BusinessPartnerType')

-- checks if an Actor is a Stakeholder
def :
let isStakeholder() : Boolean =
  self.oclIsTypeOf(Actor) and (
  self.hasStereotype('Stakeholder') or
  isBusinessPartnerType()
)

--checks if an Actor is a BusinessPartnerType or a Stakeholder
def :
let isStakeholderOrBusinessPartnerType() : Boolean =
  self.isStakeholder() or self.isBusinessPartnerType()

-- checks if a UseCase is stereotyped as BusinessProcess
def :
let isBusinessProcess() : Boolean =
  self.oclIsTypeOf(UseCase) and
  self.hasStereotype('BusinessProcess')
```

402

5.2 Business Requirements View

5.2.0 Sub-Views in the Requirements View

5.2.0.1 Conceptual Description (informative)

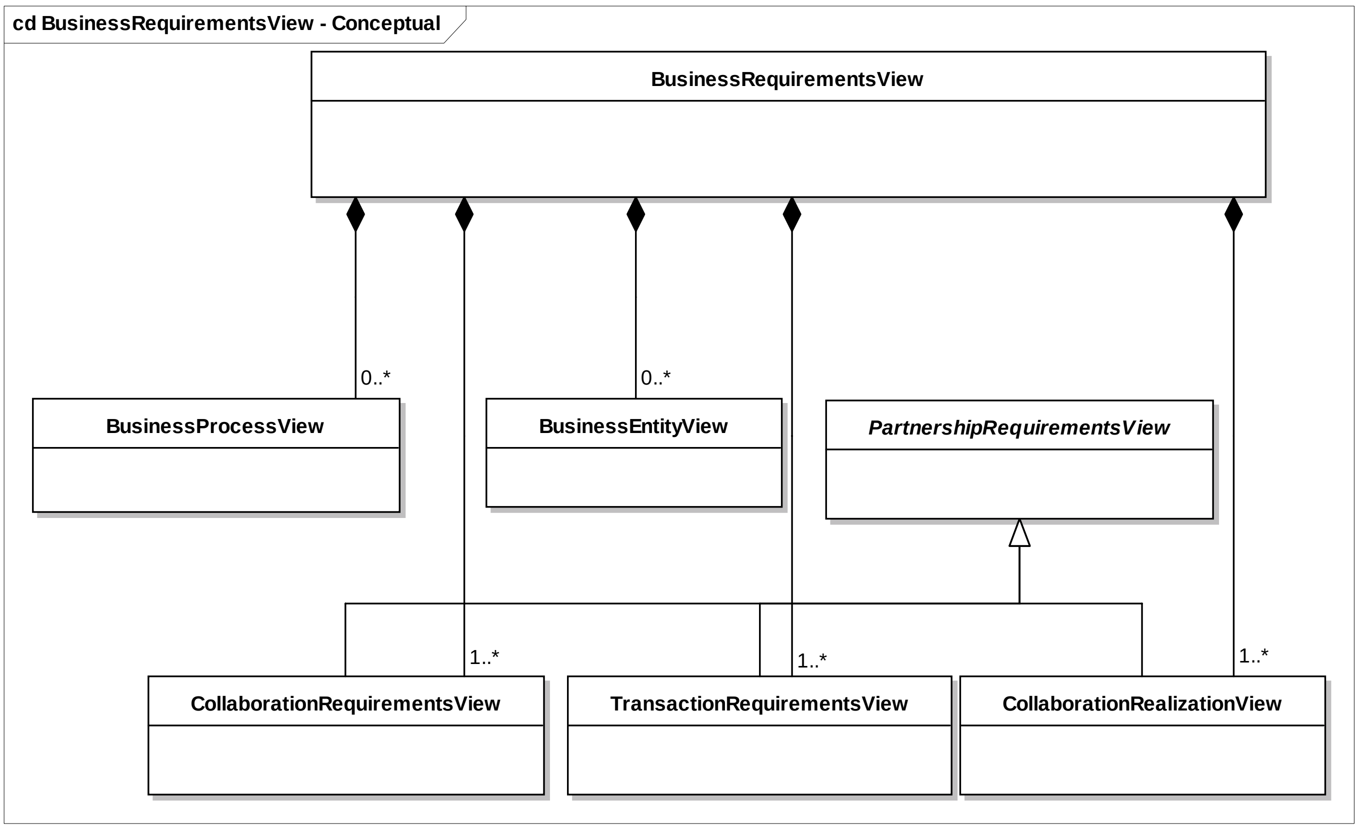

cd BusinessRequirementsView - Conceptual
BusinessRequirementsView
0..*
0..*
BusinessProcessView
BusinessEntityView
PartnershipRequirementsView
1..*
1..*
1..*
CollaborationRequirementsView
TransactionRequirementsView
CollaborationRealizationView

Figure 10 BusinessRequirementsView Conceptual Overview

The business requirements view is the second out of the 3 views of a UMM compliant business collaboration model. The goal of the BRV is to identify collaborative business processes between different business partner types and to describe the requirements regarding these collaborative business processes. The *BusinessRequirementsView* packages serves a container for three different artifacts that help to capture the requirements of a collaborative business process:

A business process view describes the flow of activities and states of business processes discovered before in the business domain view. A business process view is not mandatory, but a business requirements view may consist of multiple business process views. Thus, the *BusinessRequirementsView* is composed of zero to many *BusinessProcessViews*. A business entity view describes the life cycles of business entities that are manipulated in a collaborative business process. The business entity view is also an optional part that may be repeated. Thus, the *BusinessRequirementsView* is composed of zero to many *BusinessEntityViews*.

Finally, the business requirements view covers the partnership requirements view describing the requirements on a partnership between business partner types. A partnership on the lowest level of granularity is a business transaction (see further below). Business collaborations are partnerships that are built by business transactions and/or other business collaborations. Accordingly, a transaction requirement view describes the requirements of a business transaction and a collaboration requirements view describes the requirements of a business collaboration. The same business collaboration may be executed between multiple different sets of business partner types. A collaboration realization view describes the requirements of a realization of a business collaboration use case for a specific set of business partner types. A *PartnershipRequirementsView* is an abstract concept that is either realized by a *TransactionRequirementsView*, *a CollaborationRequirementsView*, *or a CollaborationRealizationView*. The goal of a project (for which a model is developed) is to describe at least one business collaboration and a business collaboration consists of at least one business transaction. At least one of the business collaborations must be executed by a set of business partner types. It follows that the *BusinessRequirementsView* is composed of one to many *CollaborationRequirementsViews*, of one or many *TransactionRequirementsViews*, and of one to many *CollaborationRealizationViews*.

5.2.0.2 Stereotypes and Tag Definitions (normative)

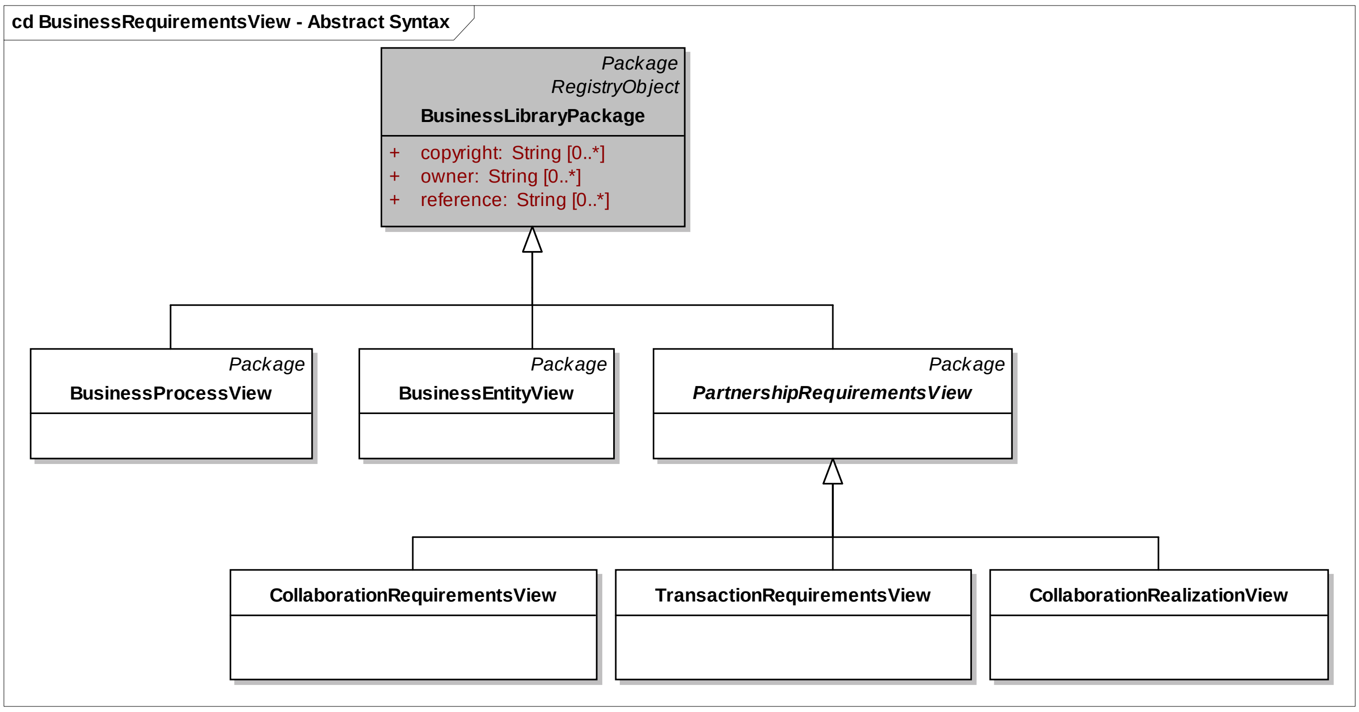

cd BusinessRequirementsView - Abstract Syntax
Package
RegistryObject
BusinessLibraryPackage
+ copyright: String [0..*]
+ owner: String [0..*]
+ reference: String [0..*]
Package
BusinessProcessView
Package
BusinessEntityView
Package
PartnershipRequirementsView
CollaborationRequirementsView
TransactionRequirementsView
CollaborationRealizationView

Figure 11 BusinessRequirementsView Abstract Syntax

Stereotype	**BusinessProcessView**
Base Class	Package
Parent	BusinessLibraryPackage (from Base Module)
Description	The *business process view* is a container for elements describing the behavior of an internal business process of a business partner type or the behavior of a business process that connects the internal processes of business partner types.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

443

Stereotype	BusinessEntityView
Base Class	Package
Parent	BusinessLibraryPackage (from Base Module)
Description	The business entity view is a container to describe a business entity having business significance in the modelled domain including its business entity lifecycle and business entity states.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

444

Stereotype	PartnershipRequirementsView (abstract)
Base Class	Package
Parent	BusinessLibraryPackage (from Base Module)
Description	The partnership requirements view is a container for all elements describing the requirements on a partnership between business partner types. These requirements do either apply to a business collaboration, a business transaction or the realization of a business collaboration. Due to this fact the partnership requirements view is spit into three specializations the collaboration requirements view, the transaction requirements view, and the collaboration realization view. Since the partnership requirements view is an abstract stereotype one of its specializations must be used.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

445

Stereotype	CollaborationRequirementsView
Base Class	Package
Parent	PartnershipRequirementsView
Description	The collaboration requirements view is a container for all elements describing the requirements on a business collaboration between authorized roles.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

446

447

Stereotype	TransactionRequirementsView
Base Class	Package
Parent	PartnershipRequirementsView
Description	The transaction requirements view is a container for all elements describing the requirements on a business transaction between authorized roles.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

448

Stereotype	CollaborationRealizationView
Base Class	Package
Parent	PartnershipRequirementsView
Description	The collaboration realization view is a container for all elements describing the requirements on a realization of a business collaboration use case by business partner types.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

449

450 ### 5.2.0.3 Constraints (normative)

A *BusinessRequirementsView* MUST contain at least one *CollaborationRequirementsView* package. It MUST contain at least one *TransactionRequirementsView* package. It MUST contain at least one *CollaborationRealizationView*. It MAY contain BusinessProcessView packages and BusinessEntityView packages. It MUST NOT contain any other elements.

```
package Model_Management
context Package

inv packagesAllowedInBRV:
  self.isBusinessRequirementsView() implies
  self.contents->forAll(isBusinessProcessView() or
  isBusinessEntityView() or
  isCollaborationRequirementsView() or
  isTransactionRequirementsView() or
  isCollaborationRealizationView()) and
  self.contents->exists(isCollaborationRequirementsView) and
  self.contents->exists(isTransactionRequirementsView) and
  self.contents->exists(isCollaborationRealizationView)
```

5.2.1 Business Process View

5.2.1.1 Conceptual Description (informative)

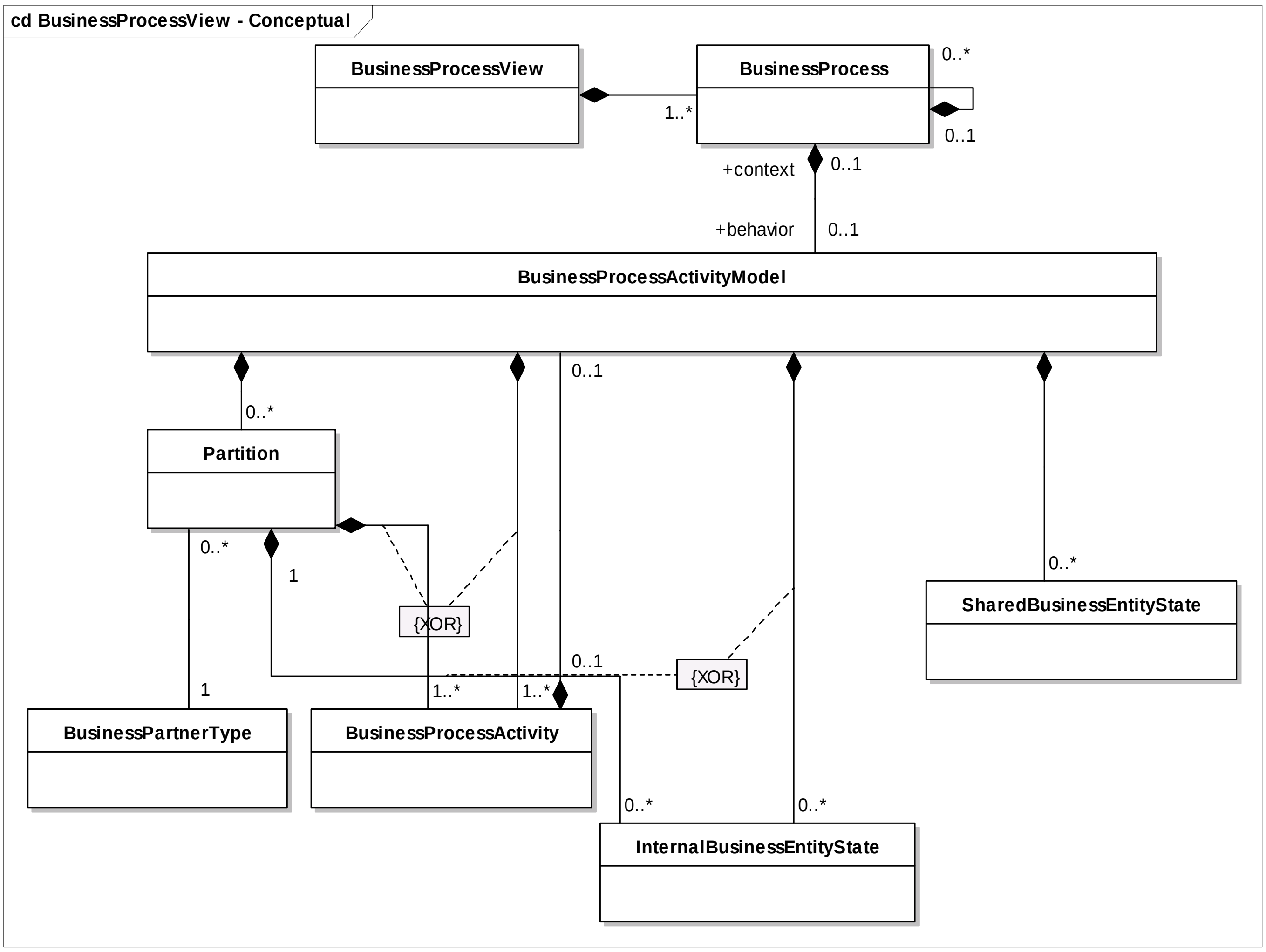


Figure 12 BusinessProcessView (BusinessRequirementsView) Conceptual Overview

The business process *view* gives an overview about the business processes, their activities and the business partner types that execute these activities. A business process view package includes one or more business processes. If more than one business process is included, the business processes should relate to each other. Accordingly, the *BusinessProcessView* is composed of one to many *BusinessProcesses.* Business Processes might include or extend other business processes. This is denoted by the unary composition assigned to *BusinessProcess.*

The business process activity model represents the dynamic behavior of a business process. It depends on the relevance of a business process whether its flow is described by a business process activity model or not. Thus, a *BusinessProcess* is composed of 0 or 1 *BusinessProcessActivityModel*. A business process activity model describes a flow of activities performed by one participant or even by more participants. If two or more business partner types collaborate, a business process activity model is divided into partitions – one for each business partner type. In case of an internal business process, which is executed by one partner only, a single partition for that partner is optional. Consequently, a *BusinessProcessActivityModel* is composed of zero or more *Partitions* (UML standard element). A partition is assigned to one business partner type, a business partner type is assigned to one partition in one activity model. However, a business partner type may be assigned to multiple partitions – each one in a different activity model. Hence, there is a 1 to (0..n) association between *BusinessPartnerType* and *Partition*.

A business process activity model is described as a flow of business process activities. In case that no partition is used, the business process activities are directly included in the business process activity model. In case of partitions, a business process activity is assigned to the partition of the business partner type executing the activity. The need for a collaborative business process is identified whenever a transition connecting two *business process activities* crosses between partitions. It follows, that either a *BusinessProcessActivityModel* is composed of one or more *BusinessProcessActivities* or a *Partition* (which is part of a business process activity model) is composed of one or more *BusinessProcessActivities*. A business process activity might be refined by another business process activity model. Thus a *BusinessProcessActivity* is composed of zero or one *BusinessProcessActivityModels* which in turn is a composite of zero or one *BusinessProcessActivity*.

A business process activity model may also denote important states of business entities that are manipulated during the execution of a business process. A business entity state is the output from one business activity and input to another business activity. There is a transition from a business process activity to a business entity state signaling an output as well as a transition from a business entity state to a business process activity signaling an input. Some business entity states are meaningful to one business partner type only. These are internal business entity states. Business entity states that must be communicated to a business partner type are shared business entity states. A business process activity model may include both internal and shared business entity states. Hence, a *BusinessProcessActivity* model is composed of zero to many *InternalBusinessEntityStates* and of zero to many *SharedBusinessEntityStates*. If a business process activity model uses partititions, the two business process activities creating and consuming an internal business entity state are in the same partition. In contrast, the two business process activities creating and consuming a shared business entity state are in different partitions.A shared business entity state signals the need for a collaborative business process.

5.2.1.2 Stereotypes and Tag Definitions (normative)

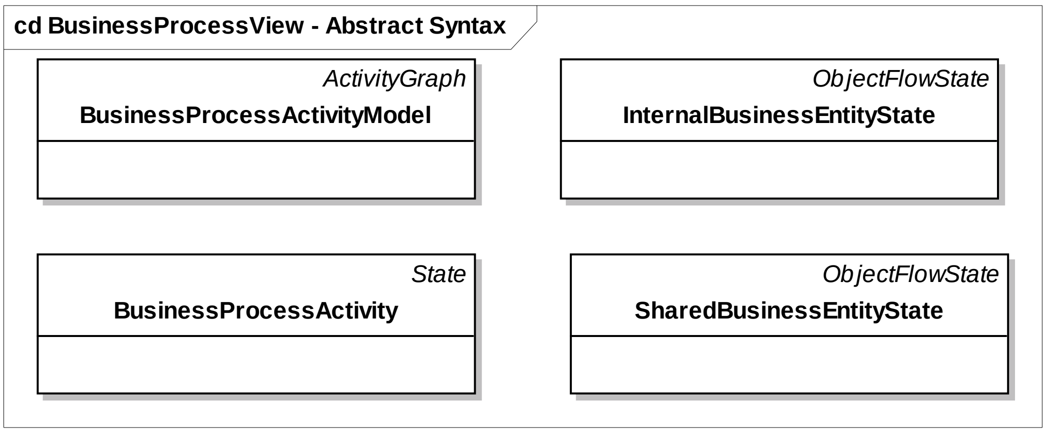

cd BusinessProcessView - Abstract Syntax
ActivityGraph
BusinessProcessActivityModel
ObjectFlowState
InternalBusinessEntityState
State
BusinessProcessActivity
ObjectFlowState
SharedBusinessEntityState

Figure 13 BusinessProcessView (BusinessRequirementsView) Abstract Syntax

505

Stereotype	BusinessProcessActivityModel
Base Class	ActivityGraph
Parent	N/A
Description	The BusinessProcessActivityModel describes the behavior of the business processes of the involved BusinessPartnerTypes. It is a tool to identify requirements to collaborate between two or more BusinessPartnerTypes. A BusinessProcessActivityModel is linked to a BusinessProcess identified in the BusinessDomainView and describes the dynamic behavior of that BusinessProcess.
Tag Definition	No tagged values.

506

Stereotype	BusinessProcessActivity
Base Class	State
Parent	N/A
Description	A business process activity corresponds to a step in the execution of a business process activity model. A business activity might be refined by another business process activity model. Thus, the UML base class of business process activity is not an atomic action state, but a state – which is a generalization of action state and composite state.
Tag Definition	No tagged values.

507

Stereotype	InternalBusinessEntityState
Base Class	ObjectFlowState
Parent	N/A
Description	The InternalBusinessEntityState represents a state of a BusinessEntity that is internal to the business process of a certain BusinessPartnerType.
Tag Definition	No tagged values.

508

Stereotype	SharedBusinessEntityState
Base Class	ObjectFlowState
Parent	N/A
Description	The SharedlBusinessEntityState represents a state of a BusinessEntity that is shared between the business processes of two involved BusinessPartnerTypes.
Tag Definition	No tagged values.

509

5.2.1.3 Constraints (normative)

The *BusinessProcessView* MUST contain nothing else, but *BusinessProcessActivityModels*, *BusinessPartnerTypes* and *BusinessProcesses* and it must be empty

```
package Model_Management
context Package

inv AllowedElementsInBusinessProcessView:
  self.isBusinessProcessView() implies
  self.contents->forAll(isBusinessProcessActivityModel() or
  isBusinessPartnerType() or
  isBusinessProcess()) and
  self.contents->notEmpty()
```

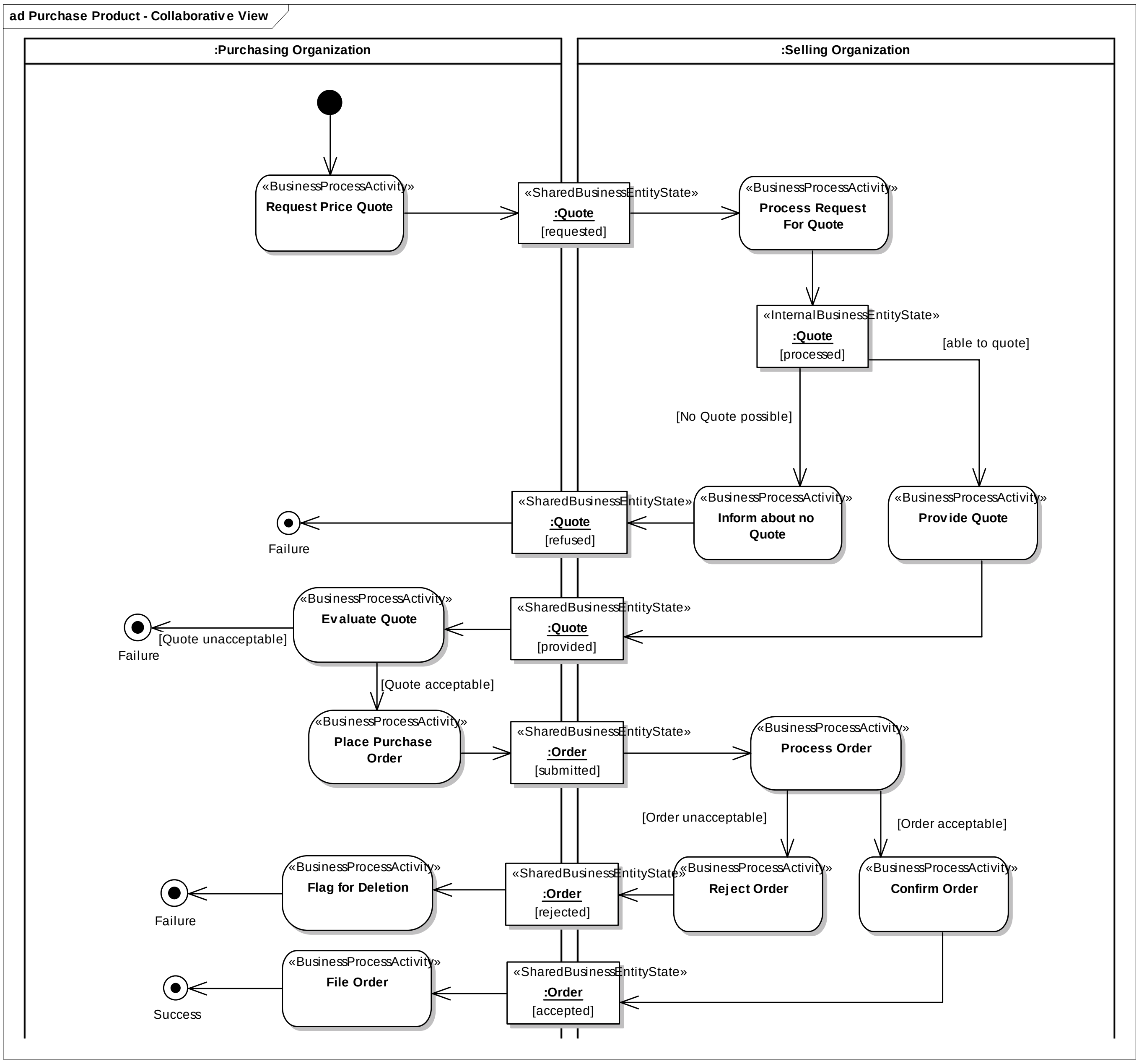
A *BusinessProcessActivityModel*, which has no partitions, MUST contain one or more *BusinessProcessActivities* and MAY contain *InternalBusinessEntityStates*, *SharedBusinessEntityStates*, pseudo states, final states and transitions

```
package Behavioral_Elements::State_Machines
context CompositeState

inv AllowedElementsInBusinessProcessActivityModelWithoutPartition:
  (self.stateMachine.isBusinessProcessActivityModel() and
  self.stateMachine.oclAsType(ActivityGraph).partition->isEmpty()) implies
  self.subvertex->notEmpty() and
  self.subvertex->exists(isBusinessProcessActivity()) and
  self.subvertex->forAll(isBusinessProcessActivity() or
  isInternalBusinessEntityState() or
  isSharedBusinessEntityState() or
  isPseudoStateOrFinalStateOrTransition())
```

A partition in a *BusinessProcessActivityModel* MUST contain one or more *BusinessProcessActivities* and MAY contain *InternalBusinessEntityStates*, *PseudoStates*, *FinalStates* and *Transitions*

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv AllowedModelElementsInBusinessProcessActivityModelPartition:
self.isPartition() implies
  self.contents->forAll(isBusinessProcessActivity()
  or isInternalBusinessEntityState()
  or isPseudoStateOrFinalStateOrTransition()
  ) and
  self.contents->exists(isBusinessProcessActivity())
```

515 ### 5.2.1.4 Example (informative)


ad Purchase Product - Collaborative View
:Purchasing Organization
:Selling Organization
«BusinessProcessActivity» Request Price Quote
«SharedBusinessEntityState» :Quote [requested]
«BusinessProcessActivity» Process Request For Quote
«InternalBusinessEntityState» :Quote [processed]
[able to quote]
[No Quote possible]
«SharedBusinessEntityState» :Quote [refused]
«BusinessProcessActivity» Inform about no Quote
«BusinessProcessActivity» Provide Quote
Failure
«BusinessProcessActivity» Evaluate Quote
[Quote unacceptable]
Failure
«SharedBusinessEntityState» :Quote [provided]
[Quote acceptable]
«BusinessProcessActivity» Place Purchase Order
«SharedBusinessEntityState» :Order [submitted]
«BusinessProcessActivity» Process Order
[Order unacceptable]
[Order acceptable]
«BusinessProcessActivity» Flag for Deletion
«SharedBusinessEntityState» :Order [rejected]
«BusinessProcessActivity» Reject Order
«BusinessProcessActivity» Confirm Order
Failure
«BusinessProcessActivity» File Order
«SharedBusinessEntityState» :Order [accepted]
Success

516

517 **Figure 14 BusinessProcessView (BusinessRequirementsView) Example: Purchase Product – Collaborative View**
518 **BusinessProcessActivityModel (ActivityGraph)**

5.2.2 Business Entity View

5.2.2.1 Conceptual Description (informative)

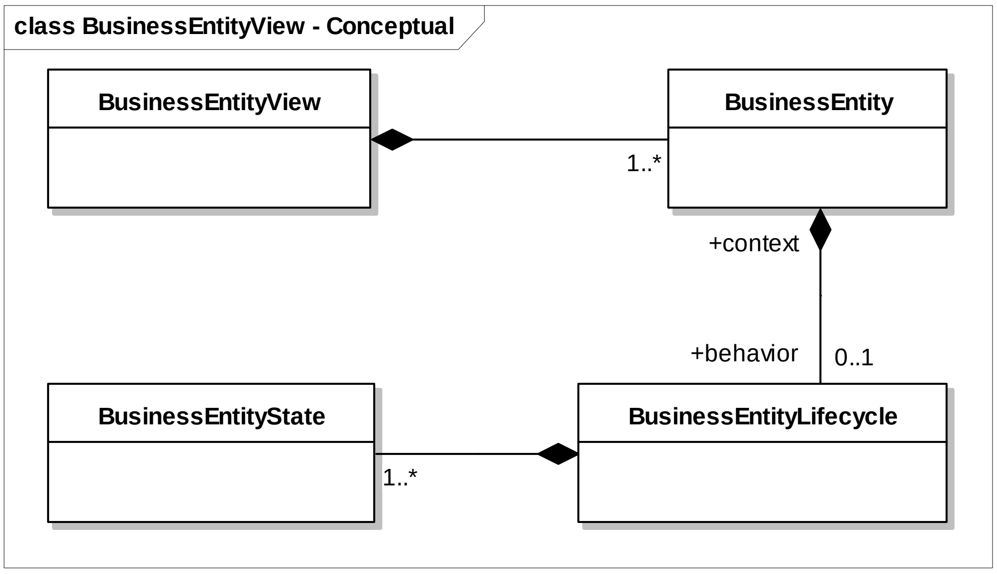


Figure 15 BusinessEntityView (BusinessRequirementsView) Conceptual Overview

A b*usiness entity* is a real-world thing having business significance that is shared among two or more b*usiness partner types* in a collaborative business process (e.g. “order”, “account”, etc.). Within the business domain view at least one, but possibly more business entities are described. Thus, the *BusinessEntityView* is composed of one to many *BusinessEntities*. It depends on the importance of the business entity lifecycle, whether its life cycle is included or not. Hence, a *BusinessEntity* is composed of zero to one *BusinessEntityLifecycles*. A business entity lifecycle represents the different business entity states a business entity can exist in. A business entity lifecycle consist of at least one business entity state. Inasmuch, the *BusinessEntityLifecycle* is composed of one or more *BusinessEntityStates*. Like any other UML state machine the business entity life cycle includes events and transitions including optional guards that lead from one business entity state to another one.

5.2.2.2 Stereotypes and Tag Definitions (normative)

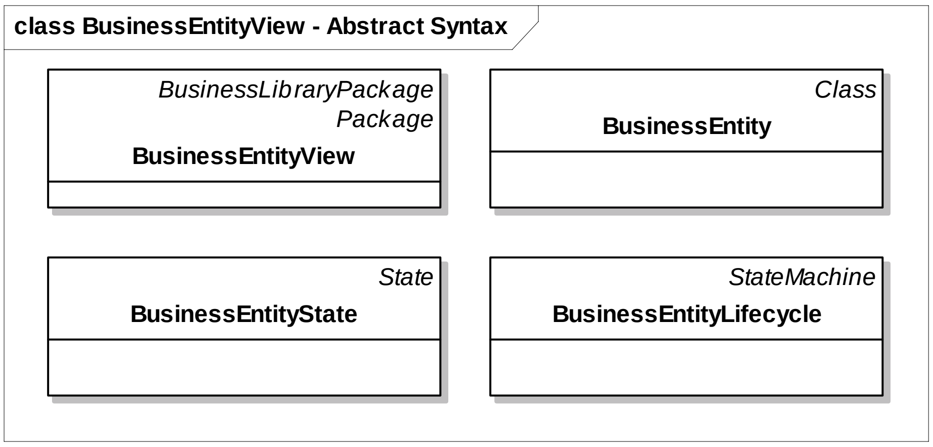


Figure 16 BusinessEntityView (BusinessRequirementsView) Abstract Syntax

538

Stereotype	BusinessEntity
Base Class	Class
Parent	N/A
Description	A business entity is a real-world thing having business significance that is shared among two or more business partner types in a collaborative business process (e.g. order, account, etc.).
Tag Definition	No tagged values.

539

Stereotype	BusinessEntityLifecycle
Base Class	StateMachine
Parent	N/A
Description	A business entity lifecycle represents the different business entity states a business entity can exist in and the events and transitions that lead from one business entity state to another business entity state of the same business entity.
Tag Definition	No tagged values.

540

Stereotype	BusinessEntityState
Base Class	State
Parent	N/A
Description	A business entity state represents a certain state a business entity can exists in during its lifecycle (an “order” can exist in the states “issued”, “rejected”, “confirmed”, etc.)
Tag Definition	No tagged values.

541

542 ### 5.2.2.3 Constraints (normative)

543

The *BusinessEntityView* MUST contain nothing else than *BusinessEntities*

```
package Model_Management
context Package

inv AllowedElementsInBusinessEntityView:
  self.isBusinessEntityView() implies
  self.contents->notEmpty() and
  self.contents->forAll(isBusinessEntity())
```

544

A *BusinessEntity* has zero or one *BusinessEntityLifecycle* that expresses its behavior

```
package Foundation::Core
context Class

inv LifecyclesOfBusinessEntity:
  self.isBusinessEntity() implies
  self.behavior->select(isBusinessEntityLifecycle())->size()<=1
```

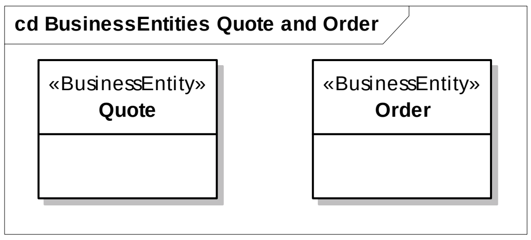
545

A *BusinessEntityLifecycle* MUST only contain *BusinessEntityStates*, *PseudoStates*, *FinalStates* or *Transitions*

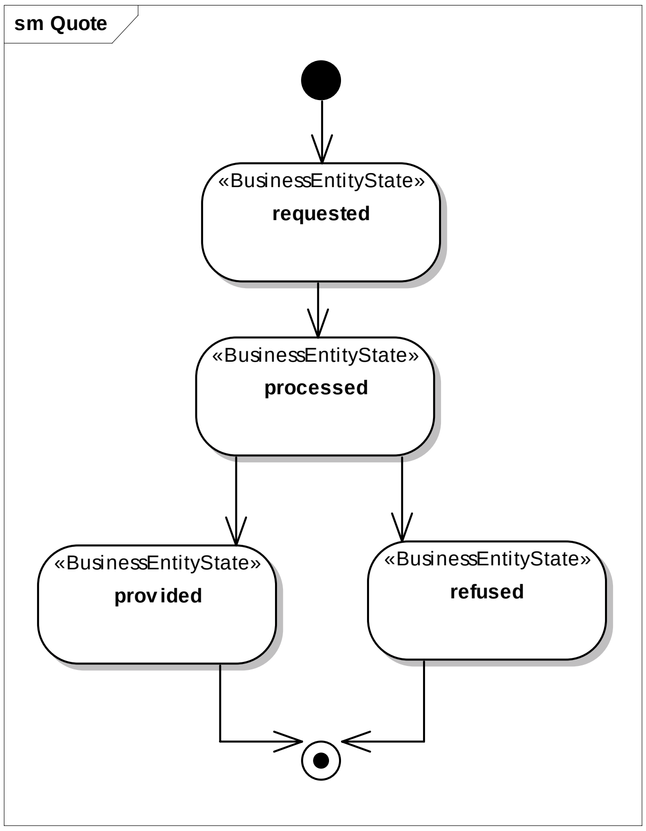
```
package Behavioral_Elements::State_Machines
context CompositeState

inv ContainsOnlyBusinessEntityStates:
  self.stateMachine.isBusinessEntityLifecycle() implies
  self.subvertex->forAll(isBusinessEntityState() or
  isPseudoStateOrFinalStateOrTransition())
  and self.subvertex->exists(isBusinessEntityState())
```

546

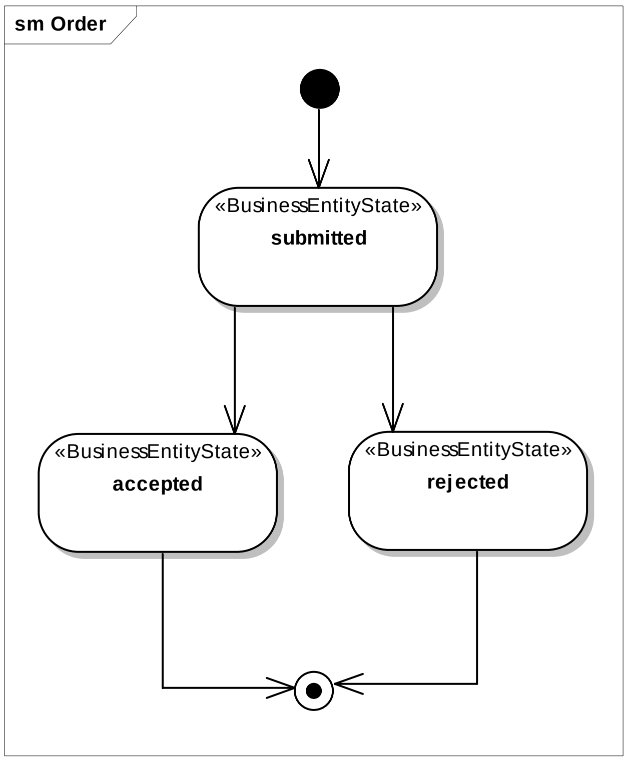
547 5.2.2.4 Example (informative)



548
549 **Figure 17 BusinessEntityView (BusinessRequirementsView) Example: BusinessEntities Quote and Order (ClassDiagram)**



550
551 **Figure 18 BusinessEntityView (BusinessRequirementsView) Example: Quote BusinessEntityLifecycle (State Machine)**



552

553 **Figure 19 BusinessEntityView (BusinessRequirementsView) Example: Order BusinessEntityLifecycle (StateMachine)**

5.2.3 Partnership Requirements View

5.2.3.1 Conceptual Description (informative)

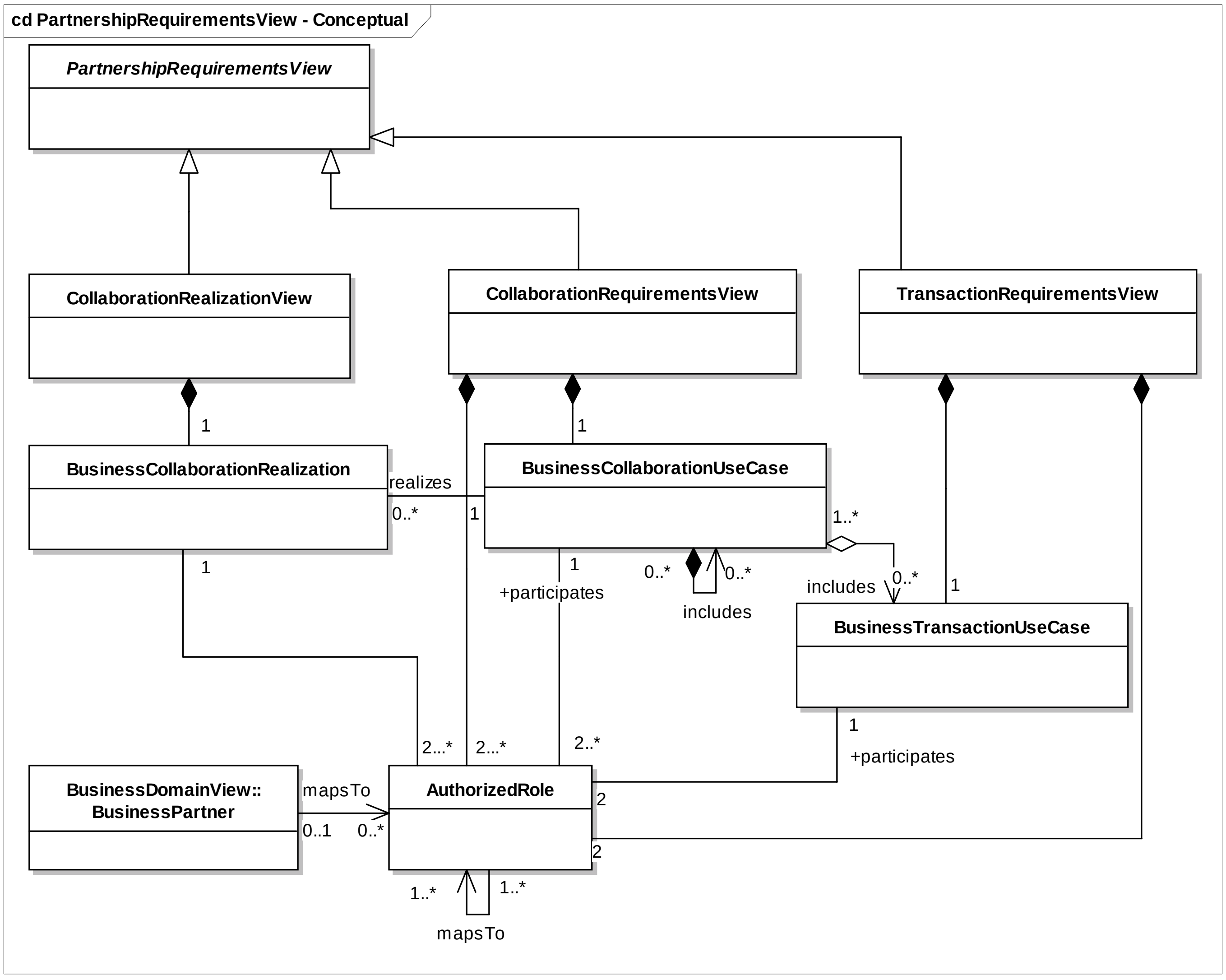

cd PartnershipRequirementsView - Conceptual
PartnershipRequirementsView
CollaborationRealizationView
CollaborationRequirementsView
TransactionRequirementsView
BusinessCollaborationRealization
BusinessCollaborationUseCase
BusinessTransactionUseCase
BusinessDomainView::
BusinessPartner
AuthorizedRole
realizes
includes
+participates
mapsTo
1
0..*
1..*
2...*
2..*
0..1
2

Figure 20 CollaborationRequirementsView (BusinessRequirementsView) Conceptual Overview

The previous views helped to identify the need for a collaboration. The business partnership view describes the requirements of an identified collaboration between business partner types by the means of use cases. In this use case analysis we distinguish between business collaboration use cases, business transaction use cases, and business collaboration realizations. A business transaction use case describes the requirements of a transaction that is a special interaction between two authorized roles that is limited to an initiating information exchange and an optional response. A business collaboration use case describes the requirements of a business collaboration that is executed between two or more authorized roles, and that is composed of one or more business transactions or nested business collaborations. A business collaboration use case must be executed by a set of business partner types. Different sets of business partner types may realize the same business collaboration use case. A business collaboration realization is a realization of a business collaboration by a specific set of business partner types.

A partnership requirements view is an abstract concept. It is either a collaboration requirements view to capturing the requirements of a business collaboration, a transaction requirements view capturing the requirements of a business transaction, or a collaboration realization view capturing the requirements of a business collaboration realization. Thus, the *CollaborationRequirementsView*, the *TransactionRequirementsView,* and the *CollaborationRealizationView* are specializations of the abstract *PartnershipRequirementsView*.

Each business collaboration use case is defined in its own collaboration requirements view. Accordingly, the *CollaborationRequirementsView* is composed of exactly one *BusinessCollaborationUseCase*. Two or more authorized roles participate in a business collaboration use case. These authorized roles (e.g. seller, payee) must be defined in the same collaboration requirements view package as the corresponding business collaboration use case. Accordingly, a *CollaborationRequirementsView* is composed of two or more *AuthorizedRoles*. This means, if a certain role (e.g. seller, payee) participates in multiple business collaborations, it requires a different authorized role for each business collaboration use case. Each authorized role of the same role is in a different namespace of a corresponding collaboration requirements view. Therefore, an authorized role participates in only one business collaboration use case– it is the one in the same collaboration requirements view. Accordingly, *BusinessCollaborationUseCase* and *AuthorizedRole* are related by an 1 to (2..n) association. It is important, that the same authorized role must not be associated twice or more times to the same business collaboration use case.

Each business transaction use case is defined in its own transaction requirements view. Accordingly, the *TransactionRequirementsView* is composed of exactly one *BusinessTransactionUseCase*. Two authorized roles participate in a business transaction use case. These authorized roles (e.g. seller, payee) must be defined in the same transaction requirements view package as the corresponding business transaction use case. Accordingly, a *TransactionRequirementsView* is composed of exactly two *AuthorizedRoles*. . This means, if a certain role (e.g. seller, payee) participates in multiple business transactions, it requires a different authorized role for each business collaboration use case. Each authorized role of the same role is in a different namespace of a corresponding transaction requirements view. Therefore, an authorized role participates in only one business transaction use case– it is the one in the same transaction requirements view. Accordingly, *BusinessTransactionUseCase* and *AuthorizedRole* are related by an 1 to 2 association. It is important to note, that the same authorized role is not associated twice to the same business transaction use case.

A business collaboration use case may include nested business collaboration use cases. A business collaboration use case may be optionally nested in multiple parent business collaboration use cases. Hence, *BusinesCollaborationUseCase* has a unary (0..n) to (0..n) include-composition. A business collaboration use case may include multiple business transaction use cases. A business transaction use case must be included in at least one business collaboration use case. Consequently, an (1..n) to (0..n) aggregation between *BusinessCollaborationUseCase* and *BusinessTransactionUseCase* exists. It is important that a business collaboration use case includes at minimum one use case – no matter whether this is a nested business collaboration use case or a business transaction use case. A hierarchy of business collaboration use cases built by include-compositions must not include any cycles. A business transaction uses case cannot be further decomposed by an include-association. UMM does not use any extend-associations between business collaboration/transaction use cases.

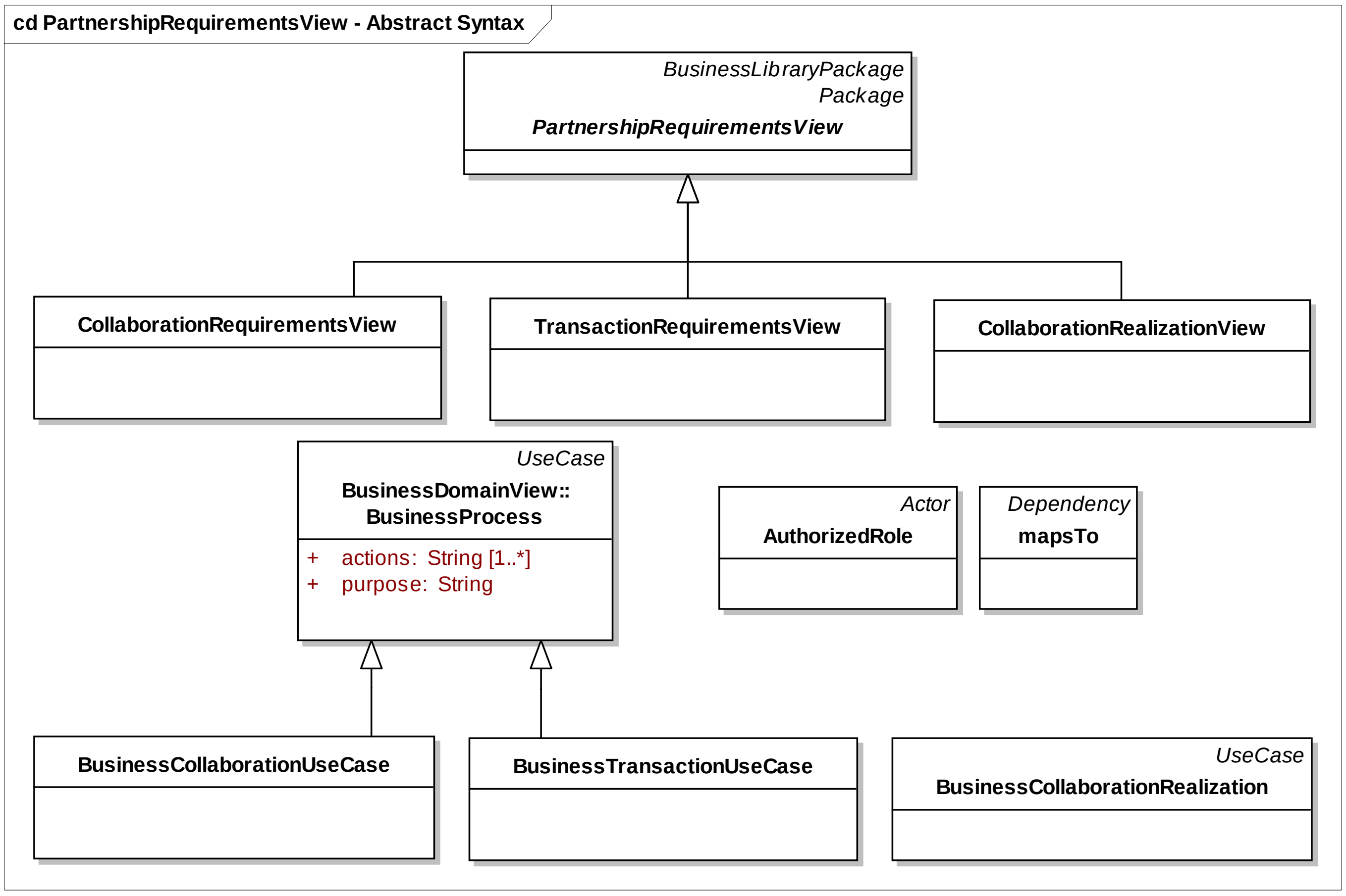
For each include-relationship either between a business collaboration use case and a business transaction use case or between two collaboration use cases, a mapping of the authorized role of the source use case to the authorized roles of the target use case is necessary. Accordingly, the *AuthorizedRole* has a unary *mapsTo*-relationship of (1..n) to (1..n). It is required that each authorized role of the target use case is the target of a mapping from an authorized role of the source use case. Each authorized role of the source use case may be mapped maximal once to an authorized role of the same target use case, but it may be mapped to different authorized roles of different target use cases.

Business partner types identified in the previous UMM steps must not directly be associated with the business collaboration use cases and business transaction use cases. In order to specify that a specific set of business partner types collaborate, we use the concept of a business collaboration realization.Each business collaboration realization is defined in its own collaboration realization view. Accordingly, the *CollaborationRealizationView* is composed of exactly one *BusinessCollaborationRealization*. A business collaboration realization realizes exactly one business collaboration use case. Each business collaboration use case may be realized by multiple business collaboration realizations. Not each business collaboration use case (e.g. one that is nested within another one) needs to have a corresponding business collaboration realization. As a consequence, the *realize*-association between a *BusinessCollaborationUseCase* and *BusinessCollaborationRealization* is a 1 to (0..n).

Two or more authorized roles participate in a business collaboration realization. These authorized roles (e.g. seller, payee) must be defined in the same collaboration realization view package as the corresponding business collaboration realization. Accordingly, a *CollaborationRealizationView* is composed of two or more *AuthorizedRoles*. Usually, the names of the authorized roles participating in the business collaboration use case (e.g. payer and payee) will be the names of the authorized roles in the business collaboration realization (e.g. payer and payee) realizing it. However, the authorized roles participating in the business collaboration use case and in the business collaboration realization will be defined in different namespaces – each in the package of the corresponding view. Similar to the BusinessCollaborationUseCase, the *BusinessCollaborationRealization* and *AuthorizedRole* are related by an 1 to (2..n) association. Furthermore, the number of actors participating in a business collaborations use case must be the same as the number of actors participating in the business collaboration realization realizing it.

In order to bind a business collaboration realization to the business partner types executing it, business partner types are mapped to the authorized roles participating in the business collaboration realization. It is required that each authorized role of a business collaboration realization (but not an authorized role in general) is target of exactly one *mapsTo*-association from a business partner type. A business partner type may play multiple authorized roles of a business collaboration realization. Consequently, there is a (0..1) to (0..n) *mapsTo*-association between *BusinessPartnerType* and *AuthorizedRole*.

655 5.2.3.2 Stereotypes and Tag Definitions (normative)


cd PartnershipRequirementsView - Abstract Syntax
BusinessLibraryPackage
Package
PartnershipRequirementsView
CollaborationRequirementsView
TransactionRequirementsView
CollaborationRealizationView
UseCase
BusinessDomainView::
BusinessProcess
+ actions: String [1..*]
+ purpose: String
Actor
AuthorizedRole
Dependency
mapsTo
BusinessCollaborationUseCase
BusinessTransactionUseCase
UseCase
BusinessCollaborationRealization

656

657 **Figure 21 CollaborationRequirementsView (BusinessRequirementsView) Abstract Syntax**

658

Stereotype	**BusinessCollaborationUseCase**
Base Class	UseCase
Parent	BusinessProcess
Description	A business collaboration use case describes in detail the requirements on a collaboration between two or more involved partners. Business partner types take part in a business collaboration use case by playing an authorized role in it. A business collaboration use case can be broken down into further business collaboration use cases and business transaction use cases.
Tag Definition	**Inherited tagged values:** - definition - beginsWhen - preCondition - endsWhen - postCondition - exceptions - actions

659

660

Stereotype	BusinessTransactionUseCase
Base Class	UseCase
Parent	BusinessProcess
Description	A business transaction use case describes in detail the requirements on a collaboration between exactly two involved partners. A business transaction use case can not be further refined and describes the requirements on a one-way or two-way information exchange. Business partner types take part in a business transaction use case by playing an authorized role in it.
Tag Definition	**Inherited tagged values:** - definition - beginsWhen - preCondition - endsWhen - postCondition - exceptions - actions

661

Stereotype	BusinessCollaborationRealization
Base Class	Collaboration
Parent	N/A
Description	A business collaboration realization realizes a business collaboration use case between a specific set of business partner types. The requirements of the business collaboration realization are the ones defined in the tags of the corresponding business collaboration use case. Thus, the business collaboration realization does not include any tag definitions for capturing requirements.
Tag Definition	No tagged values

662

Stereotype	AuthorizedRole
Base Class	Actor
Parent	N/A
Description	An authorized role (e.g. a “buyer”) is a concept which is more generic than a business partner type (e.g. a “broker”) and allows the reuse of collaborations by mapping an *AuthorizedRole* to a business partner type within a given scenario. Since business collaboration use case and business transaction use case are defined as occurring between authorized roles, they might be reused by different business partner types (a “broker” or a “custodian”) in different scenarios of the same domain or even in different domains.
Tag Definition	No tagged values.

663

Stereotype	mapsTo
Base Class	Dependency
Parent	N/A
Description	A maps to dependency represents (1) the fact, that a business partner type plays a certain authorized role in a business collaboration realization and (2) the fact, that an authorized role of a source business collaboration use case takes on a certain authorized role in a target business transaction use case or business collaboration use case.
Tag Definition	No tagged values.

664

5.2.3.3 Constraints (normative)

The *CollaborationRequirementsView* MUST contain exactly one *BusinessCollaborationUseCase,* at least two *AuthorizedRoles*, and at least two *participates* associations.

```
package Model_Management
context Package

inv AllowedElementsInCollaborationRequirementsView:
  self.isCollaborationRequirementsView() implies
  self.contents->notEmpty() and
  self.contents->select(isAuthorizedRole())->size()>=2 and
  self.contents->one(isBusinessCollaborationUseCase()) and
  self.contents->select(isParticipates())->size()>=2 and
  self.contents->forAll(isAuthorizedRole() or
  isBusinessCollaborationUseCase()
  or isParticipates())
```

The *TransactionRequirementsView* MUST contain exactly one *BusinessTransactionUseCase* , exactly two *AuthorizedRoles*, and exactly two *participates* associations

```
package Model_Management
context Package

inv AllowedElementsInTransactionRequirementsView:
  self.isTransactionRequirementsView() implies
  self.contents->notEmpty() and
  self.contents->select(isAuthorizedRole())->size()=2 and
  self.contents->one(isBusinessTransactionUseCase()) and
  self.contents->select(isParticipates())->size()=2 and
  self.contents->forAll(isAuthorizedRole() or
  isBusinessTransactionUseCase()
  or isParticipates())
```

The *CollaborationRealizationView* MUST contain exactly one *BusinessCollaborationRealization,* at least two *AuthorizedRoles*, and at least two *participates* associations

```
package Model_Management
context Package

inv AllowedElementsInRealizationView:
  self.isCollaborationRealizationView() implies
  self.contents->notEmpty() and
  self.contents->select(isAuthorizedRole())->size()>=2 and
  self.contents->one(isBusinessCollaborationRealization()) and
  self.contents->select(isParticipates())->size()>=2 and
  self.contents->forAll(isBusinessCollaborationRealization() or
  isParticipates() or isAuthorizedRole())
```

A *BusinessCollaborationUseCase* MUST be associated with two or more *AuthorizedRoles* via stereotyped binary *participate* associations

```
package Behavioral_Elements::Use_Cases
context UseCase

inv BusinessCollaborationUCAssociatedWith2AuthorizedRoles:
  self.isBusinessCollaborationUseCase() implies
  self.associations->size() >= 2 and
  self.associations->forAll(a | a.isParticipates() and
  a.allConnections->exists(isAuthorizedRole())
  and a.connection->size=2)
```

670

A *BusinessTransactionUseCase* MUST be associated with exactly two *AuthorizedRoles* via stereotyped binary *participate* associations

```
package Behavioral_Elements::Use_Cases
context UseCase

inv BusinessTransactionUCAssociatedWith2AuthorizedRoles:
  self.isBusinessTransactionUseCase() implies
  self.associations->size() = 2 and
  self.associations->forAll(a | a.isParticipates() and
  a.allConnections->exists(isAuthorizedRole())
  and a.connection->size=2)
```

671

A *BusinessCollaborationRealization* MUST be associated with two or more *AuthorizedRoles* via stereotyped binary *participate* associations

```
package Behavioral_Elements::Use_Cases
context UseCase

inv BusinessCollaborationRealizationAssociatedWith2AuthorizedRoles:
  self.isBusinessCollaborationRealization() implies
  self.associations->size() >= 2 and
  self.associations->forAll(a | a.isParticipates() and
  a.allConnections->exists(isAuthorizedRole())
  and a.connection->size=2)
```

672

673

A *BusinessCollaborationRealization* MUST be the client of exactly one realization dependency to a *BusinessCollaborationUseCase*

```
package Behavioral_Elements::Use_Cases
context UseCase

inv BusinessCollaborationRealizationRealizesOneBusinessCollaborationUseCase:
  self.isBusinessCollaborationRealization() implies
  self.clientDependency->size()=1 and
  self.clientDependency->forAll(d | d.isRealization() and
  d.supplier->size()=1 and
  d.supplier->forAll(isBusinessCollaborationUseCase()))
```

674

A *BusinessCollaborationUseCase* MUST include one or more other *BusinessCollaborationUseCases* or one or more *BusinessTransactionUseCases*, but at least one of them.

```
package Behavioral_Elements::Use_Cases
context UseCase

inv AllowedIncludesOfBCUC:
  self.isBusinessCollaborationUseCase() implies
  self.include->notEmpty() and
  self.include->forAll(i | i.addition.isBusinessCollaborationUseCase() or
  i.addition.isBusinessTransactionUseCase())
```

675

A *BusinessTransactionUseCase* MUST not include further *UseCases*.

```
package Behavioral_Elements::Use_Cases
context UseCase

inv NoIncludesOfBTUC:
  self.isBusinessTransactionUseCase() implies
  self.include->collect(addition)->isEmpty()
```

676

A *BusinessTransactionUseCase* MUST be included in at least one *BusinessCollaborationUseCase*

```
package Behavioral_Elements::Use_Cases
context UseCase

inv BTUCIncludedAtLeastOnce:
  self.isBusinessTransactionUseCase() implies
  self.include->forAll(base.isBusinessCollaborationUseCase()) and
  self.include->collect(base)->notEmpty()
```

677

678

A *BusinessCollaborationUseCase* and a *BusinessTransactionUseCase* MUST not be source or target of an extend association

```
package Behavioral_Elements::Use_Cases
context UseCase

inv BTUC_BCUC_IsNoExtendTarget:
  (self.isBusinessTransactionUseCase() or
  self.isBusinessCollaborationUseCase()) implies
  self.extend->isEmpty()
```

679

A *BusinessCollaborationRealization* MUST not be source or target of an include or extends association

```
package Behavioral_Elements::Use_Cases
context UseCase

inv BusinessCollaborationRealizationNoIncludesAndExtends:
  self.isBusinessCollaborationRealization() implies
  self.extend->isEmpty() and
  self.include->isEmpty()
```

680

All dependencies from/to an *AuthorizedRole* must be *mapsTo* dependencies.

```
package Behavioral_Elements::Use_Cases
context Actor

inv AllDependenciesToAndFromAuthorizedRoleMustBeMapsTo:
  self.isAuthorizedRole() implies
  self.clientDependency->forAll(d |  d.isMapsToDependency()) and
  self.supplierDependency->forAll(s | s.isMapsToDependency())
```

681

682

An *AuthorizedRole*, which participates in a *BusinessCollaborationRealization*, must be the supplier of exactly one *mapsTo* dependency to a *BusinessPartnerType*. Furthermore the *AuthorizedRole*, which participates in the *BusinessCollaborationRealization* must be the client of exactly one *mapsTo* dependency to an *AuthorizedRole* participating in a *BusinessCollaborationUseCase*.

```
package Behavioral_Elements::Use_Cases
context Actor

inv BCRAuthorizedRoleIsMappedByOnlyOneBusinessPartnerType:
  (self.isAuthorizedRole() and
  self.namespace.isCollaborationRealizationView()) implies
  self.supplierDependency->size()=1 and (
  self.supplierDependency->forAll(c | c.client->size()=1 and
  self.supplierDependency->forAll(c.client->
 forAll(isBusinessPartnerType())))) 
  and self.clientDependency->size()=1 and (
  self.clientDependency->forAll(s | s.supplier->size()=1 and
  self.clientDependency->forAll(s | s.supplier->forAll(isAuthorizedRole()
  and s.namespace.isCollaborationRequirementsView())))
```

683

A source *BusinessCollaborationUseCase* includes target *BusinessTransactionUseCases* and/or *BusinessCollaborationUseCases*. Each authorized role of the source use case must be mapped maximal once to an authorized role of the same target use case (but it may be mapped to different *AuthorizedRoles* of different target use cases). Each authorized role of the target use case is the supplier of a *mapsTo* dependency from an authorized role of the source use case.

```
package Behavioral_Elements::Use_Cases
context UseCase

inv AuthorizedRoleofBTUCisSupplierOfOnlyOneAuthorizedRoleOfBCUC:
  (self.isBusinessTransactionUseCase() or
  self.isBusinessCollaborationUseCase()) implies
  self.include->select(a | a.base <> self)->collect(base)->collect(x |
  x.associations)->
  collect(y | y.allConnections)->select(isAuthorizedRole)->forAll(x |
  self.associations->collect(allConnections)->
  select(isAuthorizedRole)->collect(supplierDependency)->collect(client)
  ->isUnique(x))
```

684

685

A *BusinessCollaborationUseCase* MUST have the same count of participating *AuthorizedRoles*, as each *BusinessCollaborationRealization*, realizing it.

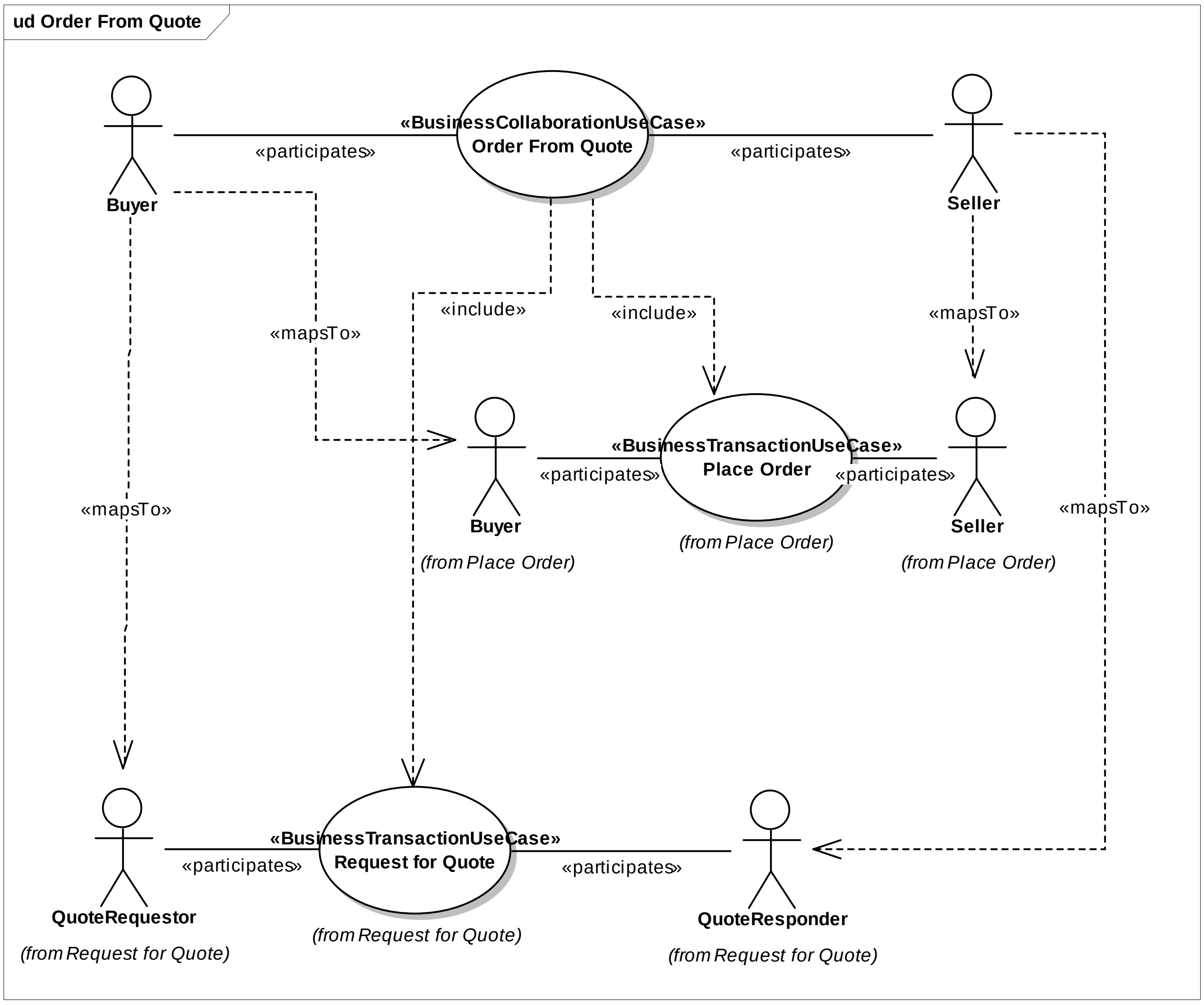
```
package Behavioral_Elements::Use_Cases
context UseCase

inv AuthorizedRoleCountSameForBCUCandRealizingBCR:
  self.isBusinessCollaborationRealization() implies
  self.associations->collect(allConnections)->select(isAuthorizedRole)
  ->size() =
  (self.clientDependency->collect(supplier)->collect(associations)
  ->collect(allConnections)->
  select(isAuthorizedRole)->size())
```

686

AuthorizedRoles in a *TransactionRequirementsView*, *CollaborationRequirementsView* or *CollaborationRealizationView* must have a unique name within the scope of the package, they are located in.

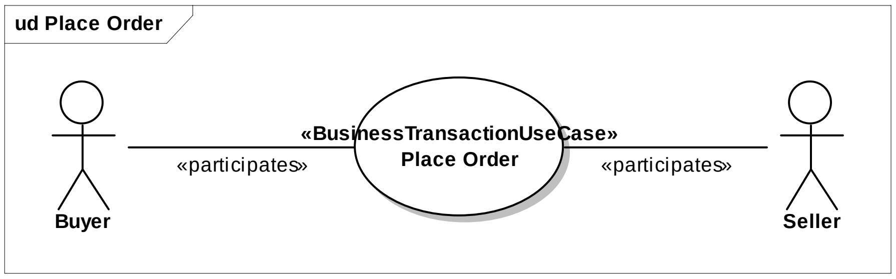
```
package Model_Management
context Package

inv AuthorizedRolesMustHaveUniqueName:
  self.isTransactionRequirementsView() or
  self.isCollaborationRequirementsView() or
  self.isCollaborationRealizationView() implies
  self.contents->select(isAuthorizedRole())
  ->isUnique(element | element.name)
```

687 5.2.3.4 Example (informative)



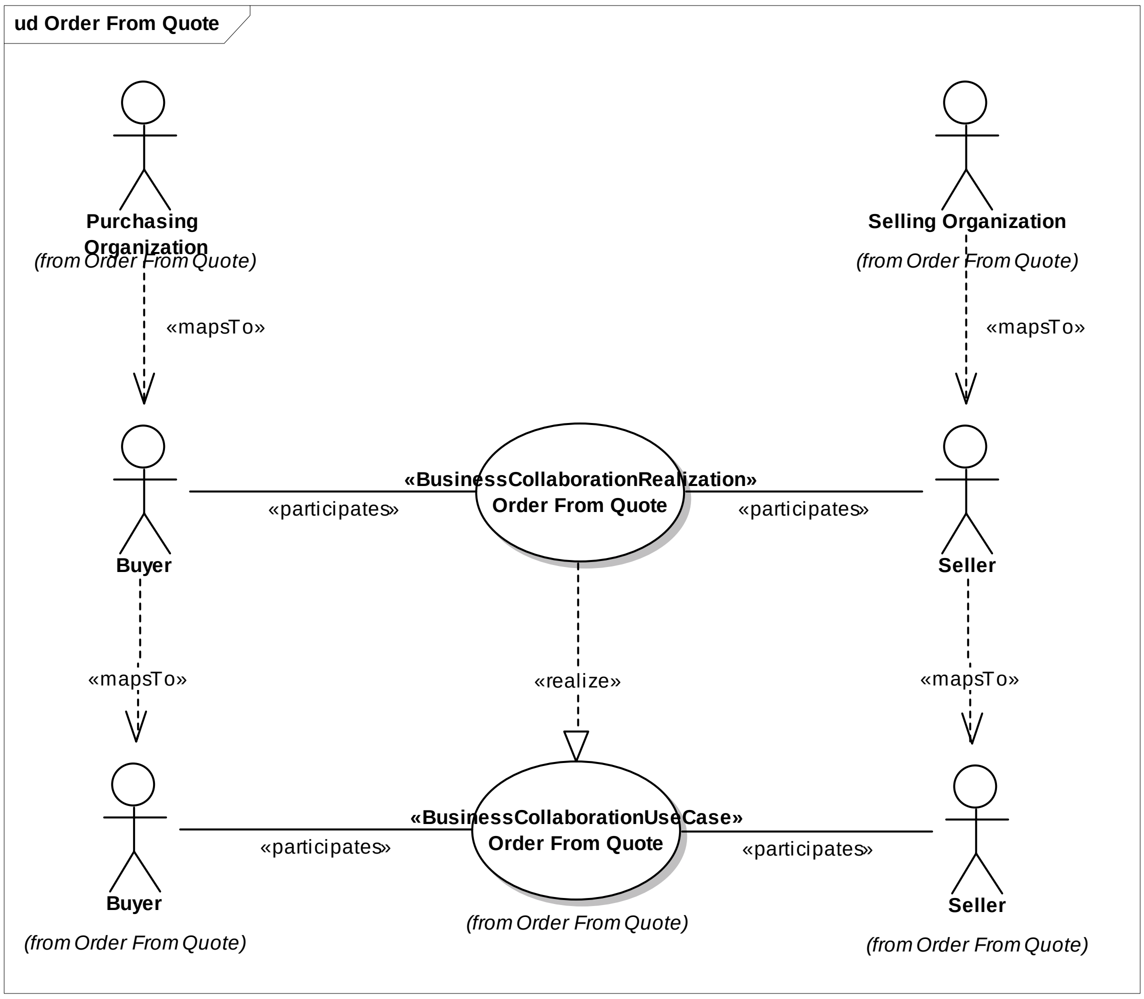
688

689 **Figure 22 CollaborationRequirementsView (BusinessRequirementsView) Example: OrderFromQuote (UseCase Diagram)**



690

691 **Figure 23 TransactionRequirementsView (BusinessRequirementsView) Example: PlaceOrder Transaction**



692

693 **Figure 24 CollaborationRealizationView (BusinessRequirementsView) Example: Realization of the OrderFromQuote Collaboration**
694 **between Purchasing Organization and SellingOrganization**

695 5.2.4 OCL methods used in all packages of the BRV (normative)

OCL-Methods

```
package Foundation::Core
context ModelElement

--Predefined  method which evaluates, if the given Modelelement
--has a stereotype equal to the passed name
def:
let hasStereotype (st : String) : Boolean =
  self.stereotype->select(cst | cst.name = st)->notEmpty()

--Predefined method which evaluates, if the given element
--has the stereotype 'InternalBusinessEntityState'
def:
let isInternalBusinessEntityState() : Boolean =
  self.oclIsKindOf(ObjectFlowState) and
  self.hasStereotype('InternalBusinessEntityState')
```

```
--Predefined method which evaluates, if the given element
--has the stereotype 'ShardedBusinessEntityState'
def:
let isSharedBusinessEntityState() : Boolean =
  self.oclIsKindOf(ObjectFlowState) and
  self.hasStereotype('SharedBusinessEntityState')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessProcessActivity'
def:
let isBusinessProcessActivity() : Boolean =
  self.oclIsKindOf(ObjectFlowState) and
  self.hasStereotype('BusinessProcessActivity')

-- Returns true if the type of the element or one of the
-- supertypes is 'PseudoKindState' and its Pseudostatekind
-- is initial
def:
let isInitialState() : Boolean =
  self.oclAsType(Pseudostate).kind = PseudostateKind::initial and
  self.oclIsKindOf(Pseudostate)

-- Returns true if the type of the element or one of the
-- supertypes is 'PseudoKindState' and its Pseudostatekind
-- is choice
def:
let isChoice() : Boolean =
  self.oclAsType(Pseudostate).kind = PseudostateKind::choice and
  self.oclIsKindOf(Pseudostate)

-- Returns true if the type of the element or one of the
-- supertypes is 'PseudoKindState' and its Pseudostatekind
-- is fork
def:
let isFork() : Boolean =
  self.oclAsType(Pseudostate).kind = PseudostateKind::fork and
  self.oclIsKindOf(Pseudostate)

-- Returns true if the type of the element or one of the
-- supertypes is 'PseudoKindState' and its Pseudostatekind
-- is join
def:
let isJoin() : Boolean =
  self.oclAsType(Pseudostate).kind = PseudostateKind::join and
  self.oclIsKindOf(Pseudostate)

-- Returns true if the type of the element or is 'FinalState'
def:
let isFinalState() : Boolean =
  self.oclIsKindOf(FinalState)

-- Returns true if the type of the element 'Transition'
def:
let isTransition() : Boolean =
  self.oclIsKindOf(Transition)

--Returns true if the element is a standard-element of an ActivityGraph
def:
let isPseudoStateOrFinalStateOrTransition() : Boolean =
  isInitialState() or isChoice() or isFork() or isJoin() or isTransition()
  or isFinalState()

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessProcessView'
def :
let isBusinessProcessView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessProcessView')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessEntityView'
def :
let isBusinessEntityView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessEntityView')


--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessRequirementsView'
def :
let isBusinessRequirementsView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('BusinessRequirementsView')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessProcessActivityModel'
def:
let isBusinessProcessActivityModel() : Boolean =
  self.oclIsKindOf(ActivityGraph) and
  self.hasStereotype('BusinessProcessActivityModel')

--return true if the given element is a partition
def:
let isPartition() : Boolean =
  self.oclIsKindOf(Partition)

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessEntity'
def :
let isBusinessEntity() : Boolean =
  self.oclIsKindOf(Class) and
  self.hasStereotype('BusinessEntity')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessEntityState'
def :
let isBusinessEntityState() : Boolean =
  self.oclIsKindOf(State) and
  self.hasStereotype('BusinessEntityState')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessEntityLifecycle'
def :
let isBusinessEntityLifecycle() : Boolean =
  self.oclIsKindOf(StateMachine) and
  self.hasStereotype('BusinessEntityLifecycle')

--return true if the given element is a package
def :
let isPackage() : Boolean =
  self.oclIsKindOf(Package)

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessCollaborationUseCase'
def :
let isBusinessCollaborationUseCase() : Boolean =
  self.oclIsKindOf(UseCase) and
  self.hasStereotype('BusinessCollaborationUseCase')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessTransactionUseCase'
def :
let isBusinessTransactionUseCase() : Boolean =
  self.oclIsKindOf(UseCase) and
  self.hasStereotype('BusinessTransactionUseCase')

--Predefined method wich evaluates, if the given element
--has the stereotype 'BusinesCollaborationRealization'
def:
let isBusinessCollaborationRealization() : Boolean =
  self.oclIsKindOf(Collaboration) and
  self.hasStereotype('BusinessCollaborationRealization')

--Predefined method which evaluates, if the given element
--has the stereotype 'AuthorizedRole'
def :
let isAuthorizedRole() : Boolean =
  self.oclIsKindOf(Actor) and
  self.hasStereotype('AuthorizedRole')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessPartnerType'
def :
let isBusinessPartnerType() : Boolean =
  self.oclIsKindOf(Actor) and
  self.hasStereotype('BusinessPartnerType')

--Predefined method which evaluates, if the given element
--has the stereotype 'mapsTo'
def :
let isMapsToDependency() : Boolean =
  self.oclIsKindOf(Dependency) and
  self.hasStereotype('mapsTo')

--Predefined method which evaluates, if the given element
--is a Realization dependency
def :
let isRealization() : Boolean =
  self.oclIsKindOf(Abstraction) and
  self.hasStereotype('realize')

-- checks if an Association is stereotyped as participates
def:
let isParticipates() : Boolean =
  self.oclIsKindOf(Association) and
  self.hasStereotype('participates')

--Predefined method which evaluates, if the given element
--is an Association
def:
let isAssociation() : Boolean =
  self.oclIsKindOf(Association)


--Predefined method which evaluates, if the given element
--has the stereotype 'CollaborationRequirementsView'
def :
let isCollaborationRequirementsView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('CollaborationRequirementsView')

--Predefined method which evaluates, if the given element
--has the stereotype 'TransactionRequirementsView'
def :
let isTransactionRequirementsView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('TransactionRequirementsView')

--Predefined method which evaluates, if the given element
--has the stereotype 'CollaborationRealizationView'
def :
let isCollaborationRealizationView() : Boolean =
  self.oclIsKindOf(Package) and
  self.hasStereotype('CollaborationRealizationView')

-- checks if a UseCase is stereotyped a BusinessProcess
def :
let isBusinessProcess() : Boolean =
  self.oclIsTypeOf(UseCase) and
  self.hasStereotype('BusinessProcess')
```

5.3 Business Transaction View

5.3.0 Views in the Transaction View

5.3.0.1 Conceptual Description (informative)

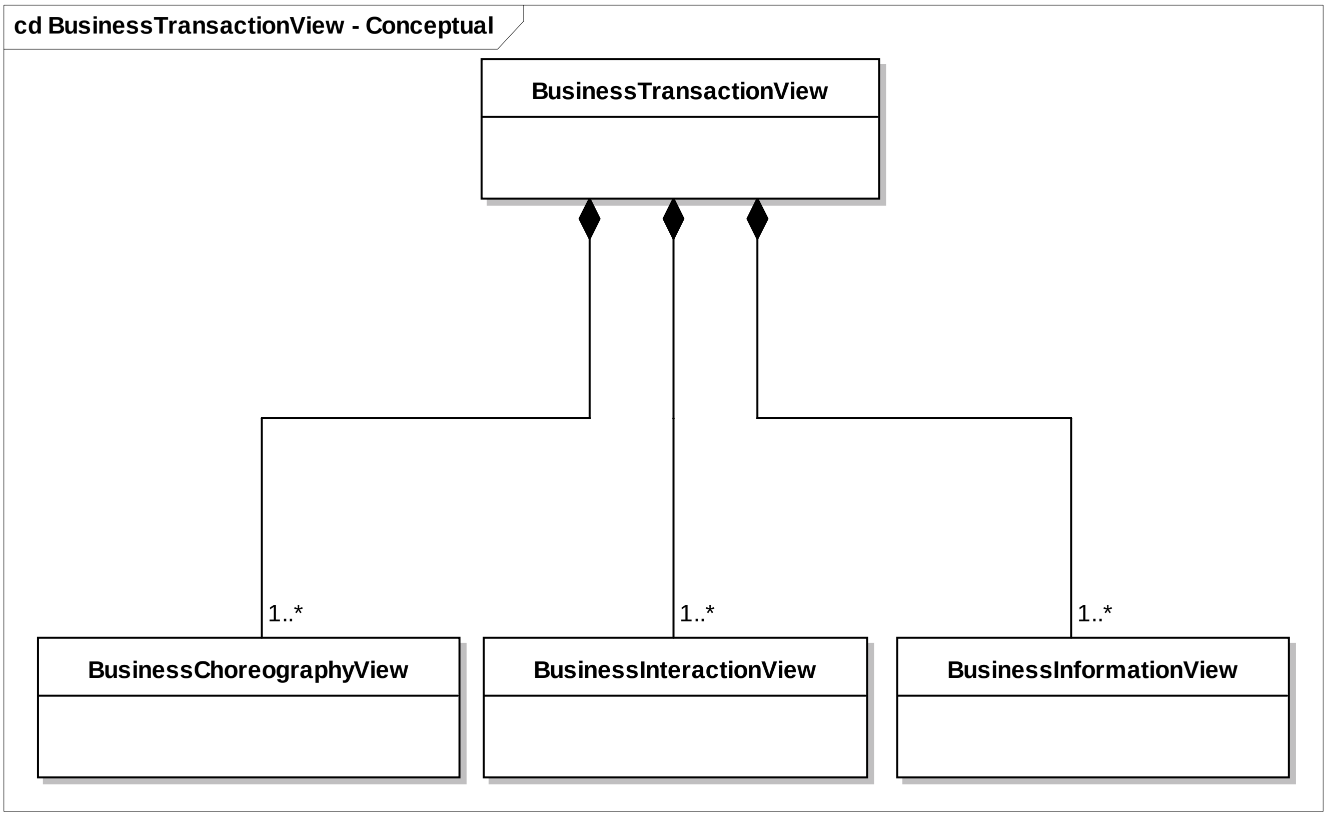


Figure 25 BusinessTransactionView Conceptual Overview

The Business Transaction View (BTV) is an elaboration on the business requirements view by the business analyst and is how the business analyst sees the process to be modeled. According to these requirements the BTV defines a choreography of information exchanges. The business transaction view package is a container for three different artifacts that together describe the overall choreography of information exchanges. The business choreography view is a container for artifacts describing the flow of a complex business collaboration between business partner types that may involve many steps. In fact, a business choreography view captures artifacts that define a flow in accordance to the requirements of a corresponding collaboration requirements view of the BRV. A business interaction view is a container for artifacts that define a choreography leading to synchronized states of business entities at both sides of the interaction. In fact, a business interaction view captures artifacts that define a flow in accordance to the requirements of a corresponding transaction requirements view of the BRV. A business information view is a container of artifacts that describe the information exchanged in an interaction. Accordingly, the business choreography view and the business interaction view deal with artifacts describing the dynamic aspects of a collaboration and the business information view deals with artifacts describing the structural aspects of a collaboration. Each of the three views must occur at least once in the business transaction view. Thus the *BusinessTransactionView* is composed of one to many *BusinessChoreographyViews*, of one to many *BusinessInteractionViews*, and of one to many *BusinessInformationViews*.

5.3.0.2 Stereotypes and Tag Definitions (normative)

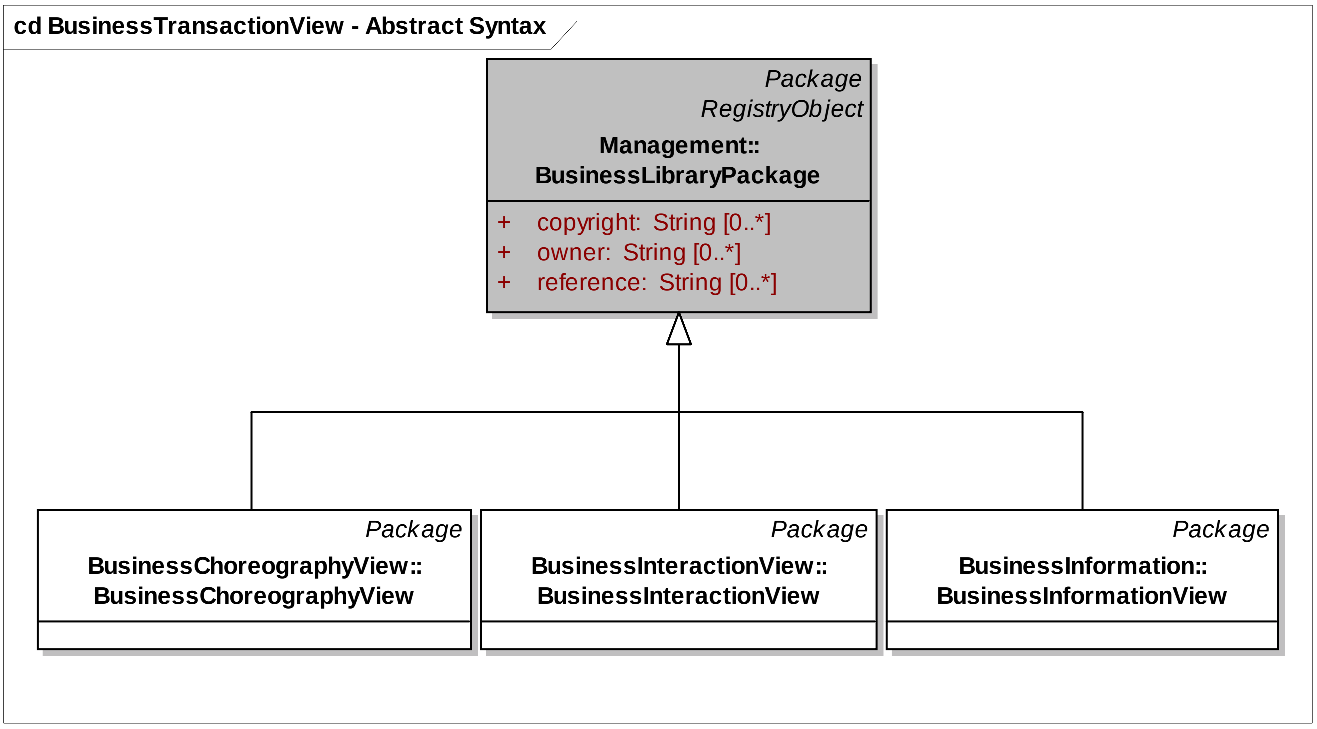


Figure 26 BusinessTransactionView Abstract Syntax

Stereotype	**BusinessChoreographyView**
Base Class	Package
Parent	BusinessLibraryPackage (from BaseModule)
Description	The business choreography view is a container for artifacts describing the flow of a complex business collaboration between business partner types that may involve many steps.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

728

Stereotype	BusinessInteractionView
Base Class	Package
Parent	BusinessLibraryPackage (from BaseModule)
Description	A business interaction view is a container for artifacts that define a choreography leading to synchronized states of business entities at both sides of the interaction.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

729

Stereotype	BusinessInformationView
Base Class	Package
Parent	BusinessLibraryPackage (from BaseModule)
Description	A business information view is a container of artifacts that describe the information exchanged in an interaction.
Tag Definition	**Inherited tagged values:** – baseURN – owner – copyright – reference – version – status – businessTerm.

730

731 ### 5.3.0.3 Constraints (normative)

A BusinessTransaction*View* MUST contain at least one *BusinessChoreographyView* package, at least one *BusinessInteractionView* package, and at least one *BusinessInformationView* package. .

```
package Model_Management
context Package

inv packagesAllowedInBTV:
  self.isBusinessTransactionView() implies
  self.contents->exists(isBusinessChoreographyView()) and
  self.contents->exists(isBusinessInteractionView()) and
  self.contents->exists(isBusinessInformationView())
```

732

5.3.1 Business Choreography View

5.3.1.1 Conceptual Description (informative)

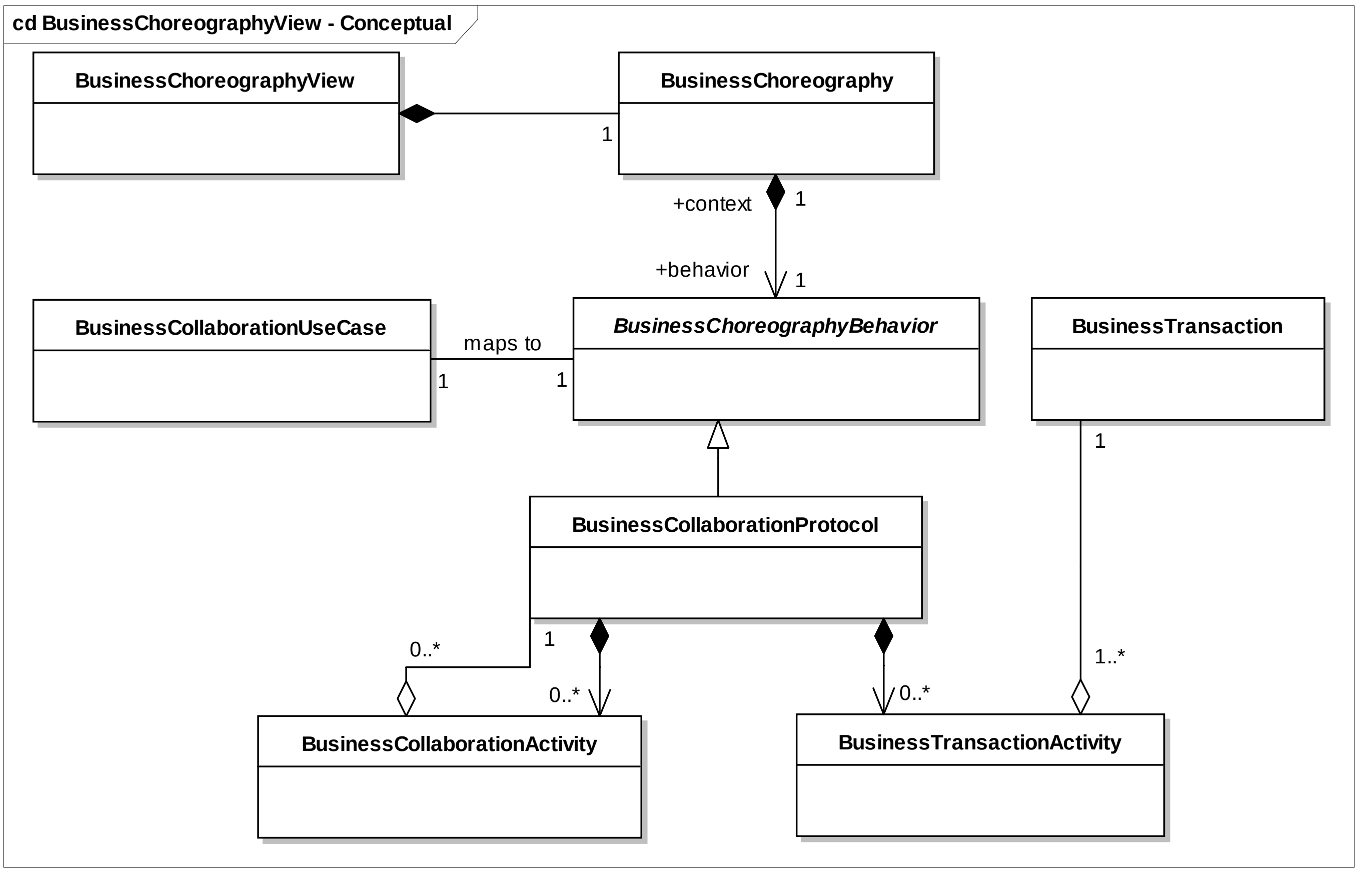

cd BusinessChoreographyView - Conceptual
BusinessChoreographyView
BusinessChoreography
1
+context
1
+behavior
1
BusinessCollaborationUseCase
maps to
1
1
BusinessChoreographyBehavior
BusinessTransaction
1
BusinessCollaborationProtocol
0..*
1
1..*
0..*
0..*
BusinessCollaborationActivity
BusinessTransactionActivity

Figure 27 BusinessChoreographyView (BusinessTransactionView) Conceptual Overview

A business choreography view is used to define the business choreography of exactly one business collaboration. Therefore, the *BusinessChoreographyView* is composed of exactly one *BusinessChoreography*. A business choreography is a persistent representation of the execution of a business collaboration. The execution order of a business collaboration, i.e. the choreography of the business collaboration, is defined by the business choreography behavior. Each *BusinessChoreography* is composed of exactly one *BusinessChoreographyBehavior*. The business choreography behavior follows exactly the requirements defined in a corresponding business collaboration use case of the BRV. Each business collaboration use case of the BRV is mapped to exactly one business choreography behavior. Hence, a *BusinessCollaborationUseCase* and the *BusinessChoreographyBehaviour* have a 1 to 1 *mapsTo* relationship.

Business choreography behavior is an abstract concept. In a future version there might exist different approaches to describe the choreography of a business collaboration. In this version, the only valid specialization of a *BusinessChoreographyBehavior* is the *BusinessCollaborationProtocol*. Thus, a business choreography is currently always defined by a business collaboration protocol. The activities of a business collaboration protocol are business collaboration activities and/or business transaction activities. Hence, a *BusinessCollaborationProtocol* is composed of zero to many *BusinessCollaborationActivities* and of zero to many *BusinessTransactionActivities*. However, at least one business collaboration activity or a business transaction activity must be present in a business collaboration protocol. Transitions defining the flow among the business collaboration activities and/or business transaction activities may be guarded by the states of business entities.

A business collaboration activity is characterized by the fact that it is refined by another business collaboration protocol. Not each business collaboration is a refined business collaboration activity – only the nested business collaboration protocols. A business collaboration protocol may be nested in different business collaboration activities. Thus, the aggregation relationship between *BusinessCollabortionActivity* and *BusinessCollaborationProtocol* is (0..n) to 1.

A business transaction activity is characterized by the fact that it is refined by a business transaction. Since the business transaction is a concept of the business interaction view it is described in more detail further below. Each business transaction must be at least once used to refine a business transaction activity. A business transaction may be nested in different business transaction activities. Hence, the aggregation relationship between *BusinessTransactionActivity* and *BusinessTransaction* is (1..n) to 1.

5.3.1.2 Stereotypes and Tag Definitions (normative)

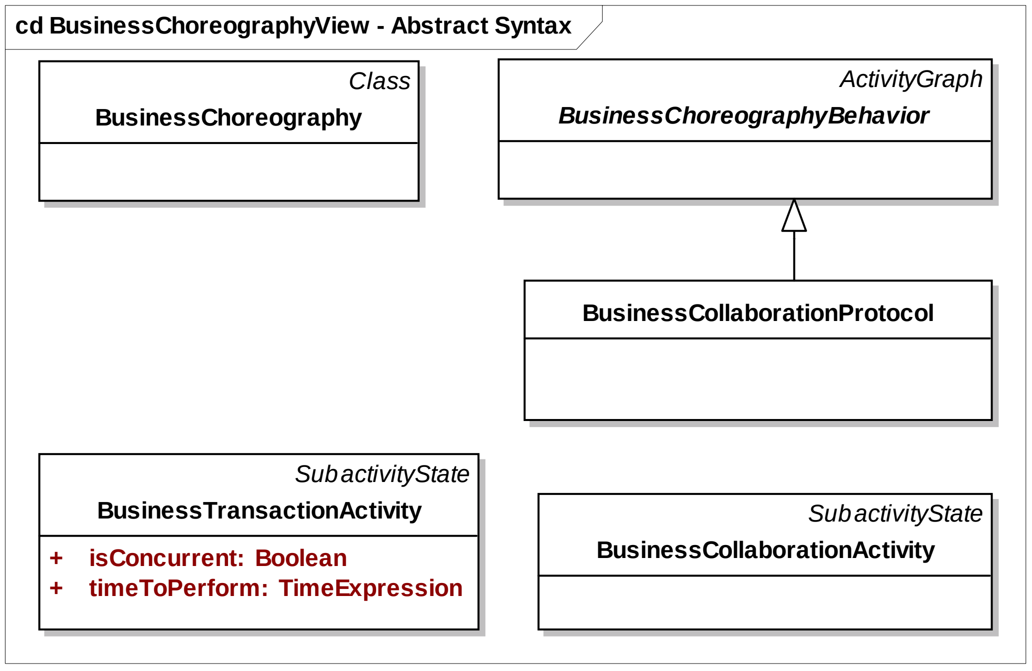

cd BusinessChoreographyView - Abstract Syntax
Class
BusinessChoreography
ActivityGraph
BusinessChoreographyBehavior
BusinessCollaborationProtocol
SubactivityState
BusinessTransactionActivity
+ isConcurrent: Boolean
+ timeToPerform: TimeExpression
SubactivityState
BusinessCollaborationActivity

Figure 28 BusinessChoreographyView (BusinessTransactionView) Abstract Syntax

Stereotype	**BusinessChoreography**
Base Class	Class
Parent	N/A
Description	A business choreography is a persistent representation of the execution of a business collaboration.
Tag Definition	**No Tagged Values**

777

Stereotype	BusinessChoreographyBehavior (abstract)
Base Class	ActivityGraph
Parent	N/A
Description	The business choreography behavior defines the dynamic behavior of a business collaboration, i.e. the choreography of a business collaboration.
Tag Definition	**No Tagged Values**

778

Stereotype	BusinessCollaborationProtocol
Base Class	ActivityGraph
Parent	BusinessChoreographyBehavior
Description	A business collaboration protocol is a specialization of a business choreography behaviour. It choreographs business transaction activities and/or business collaboration activities. At least one activity of either one must be present. A business collaboration protocol is a long running transaction that does not meet the atomic principle of transactions. It should be used in cases where transaction rollback is inappropriate.
Tag Definition	**No Tagged Values**

779

Stereotype	BusinessTransactionActivity	
Base Class	ActionState	
Parent	N/A	
Description	A business transaction activity is an activity within a business collaboration protocol. It is an action state which is refined by a nested business transaction. The business transaction activity executes the nested business transaction. The business transaction activity can be executed more than once if the "isConcurrent" property is true.	
Tag Definition	**timeToPerform**	
	Type	TimeExpression
	Multiplicity	1
	Description	A business transaction activity has to be executed within a specific duration. The initiating partner must send a failure notification to a responding partner on timeout. A responding partner simple terminates its activity. The time to perform is the maximum duration between the moment the requesting authorized role initiates the business transaction activity, i.e. sending the requesting business information, and the moment the requesting authorized role receives a substantive response. The substantive response is the responding business information if there is any. In case not, it is the acknowledgement of processing, if any. If not it is the acknowledgement of receipt, if any.
	isConcurrent	
	Type	Boolean
	Multiplicity	1
	Description	If the business transaction activity is concurrent then more than one business transaction activity of the same underlying business transaction can be open at one time in executing the same business collaboration with the same business partner type. If the business transaction activity is not concurrent then only one business transaction activity of the same underlying business transaction can be open at one time.

780

781

Stereotype	BusinessCollaborationActivity
Base Class	ActionState
Parent	N/A
Description	A business collaboration activity is an activity within a business collaboration protocol. It is an action-state which is refined by the activity graph of a nested business collaboration protocol. It follows, that business collaboration protocols might be recursively nested. The business collaboration activity executes the nested business collaboration protocol exactly once.
Tag Definition	**No Tagged Values**

782 ### 5.3.1.3 Constraints (normative)

783

A *BusinessChorographyBehavior* MUST be the client of exactly one *mapsTo* dependency to a *BusinessCollaborationUseCase*

```
package Behavioral_Elements::Activity_Graphs
context ActivityGraph

inv BCBmapsToBCUseCase:
  self.isBusinessChoreographyBehavior() implies
  self.clientDependency->size()=1 and
  self.clientDependency->forAll(d |  d.isMapsToDependency() and
  d.supplier->forAll(isBusinessCollaborationUseCase()) and
  d.supplier->size=1)
```

784

A *BusinessChoreographyView* package MUST contain exactly one *BusinessChoreography* and no other elements.

```
package Model_Management
context Package

inv BCVcontainsExactlyOneBC:
  self.isBusinessChoreographyView() implies
  self.contents->one(isBusinessChoreography()) and
  self.contents->size()=1
```

785

The behavior of a *BusinessChoreography* MUST be described by exactly one *BusinessChoreographyBehaviour*

```
package Foundation::Core
context Class

inv BCdescribedByOneBusinessChoreographyBehavior:
  self.isBusinessChoreography() implies
  self.behavior->one(isBusinessChoreographyBehavior()) and
  self.behavior->size()=1
```

786

787

A *BusinessCollaborationProtocol* MUST contain at least one *BusinessTransactionActivity* or *BusinessCollaborationActivity* and MAY contain *PseudoStates*, *FinalStates* and *Transitions*.

```
package  Behavioral_Elements::State_Machines
context CompositeState

inv AllowedModelElementsInBCP:
  self.stateMachine.isBusinessCollaborationProtocol() implies
  self.subvertex->forAll(isBusinessTransactionActivity()
  or isBusinessCollaborationActivity()
  or isPseudoStateOrFinalStateOrTransition()
  or isTransition()
  )
  and (self.subvertex->exists(isBusinessTransactionActivity()) or
  self.subvertex->exists(isBusinessCollaborationActivity()))
```

788

A *BusinessCollaborationActivity* MUST be refined by exactly one *BusinessCollaborationProtocol* via a dependency with the stereotype *mapsTo*.

```
package Behavioral_Elements::Activity_Graphs
context ActionState

inv BCArefinedByExactlyOneBCP:
  self.isBusinessCollaborationActivity() implies
  self.clientDependency->size() = 1 and
  self.clientDependency->forAll(d | d.isMapsToDependency() and
  d.supplier->forAll(isBusinessCollaborationProtocol()) and
  d.supplier->size=1)
```

789

A *BusinessTransactionActivity* MUST be refined by exactly one *BusinessTransaction* via a dependency with the stereotype *mapsTo*.

```
package Behavioral_Elements::Activity_Graphs
context ActionState

inv BTArefinedByExactlyOneBT:
  self.isBusinessTransactionActivity() implies
  self.clientDependency->size() = 1 and
  self.clientDependency->forAll(d | d.isMapsToDependency() and
  d.supplier->forAll(isBusinessTransaction()) and d.supplier->size=1)
```

790

5.3.1.4 Example (informative)

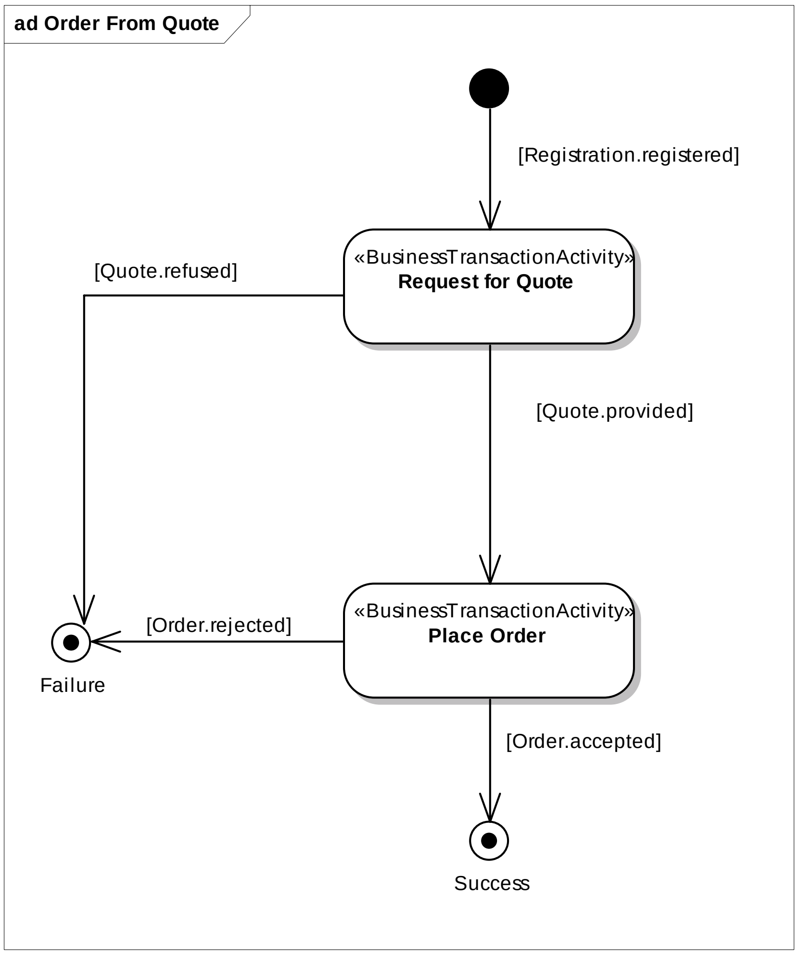


Figure 29 BusinessChoreographyView (BusinessTransactionView) Example: OrderFromQuote BusinessCollaborationProtocol (ActivityGraph)

5.3.2 Business Interaction View

5.3.2.1 Conceptual Description (informative)

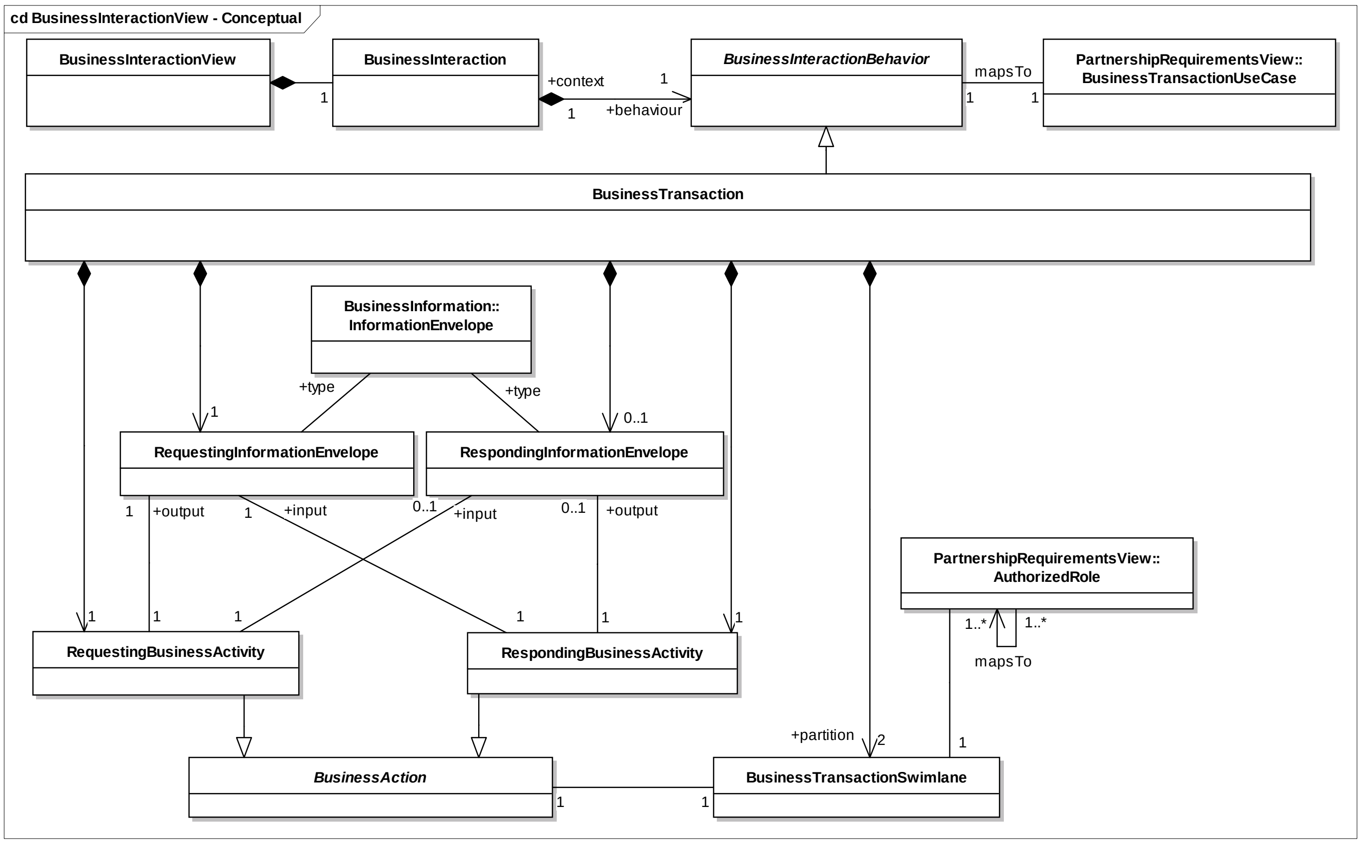

cd BusinessInteractionView - Conceptual
BusinessInteractionView
BusinessInteraction
BusinessInteractionBehavior
PartnershipRequirementsView:: BusinessTransactionUseCase
+context
+behaviour
mapsTo
BusinessTransaction
BusinessInformation:: InformationEnvelope
+type
RequestingInformationEnvelope
RespondingInformationEnvelope
+output
+input
PartnershipRequirementsView:: AuthorizedRole
RequestingBusinessActivity
RespondingBusinessActivity
+partition
BusinessAction
BusinessTransactionSwimlane

Figure 30 BusinessInteractionView (BusinessTransactionView) Conceptual Overview

A business interaction view is used to define exactly one business interaction that leads to a synchronized business state between the two authorized roles executing it. Thus, the *BusinessInteractionView* is composed of exactly one *BusinessInteraction*. A business interaction is a persistent representation of a synchronization of business states between authorized roles. The choreography of this synchronization and the required information exchanges are defined by the business interaction behavior. Each *BusinessInteraction* is composed of exactly one *BusinessInteractionBehavior*. The business interaction behavior follows exactly the requirements defined in a corresponding business transaction use case of the BRV. Each *BusinessTransactionUseCase* of the BRV is mapped to exactly one *BusinessInteractionBehavior*, and each *BusinessInteractionBehavior* is mapped from exactly one *BusinessTransactionUseCase*.

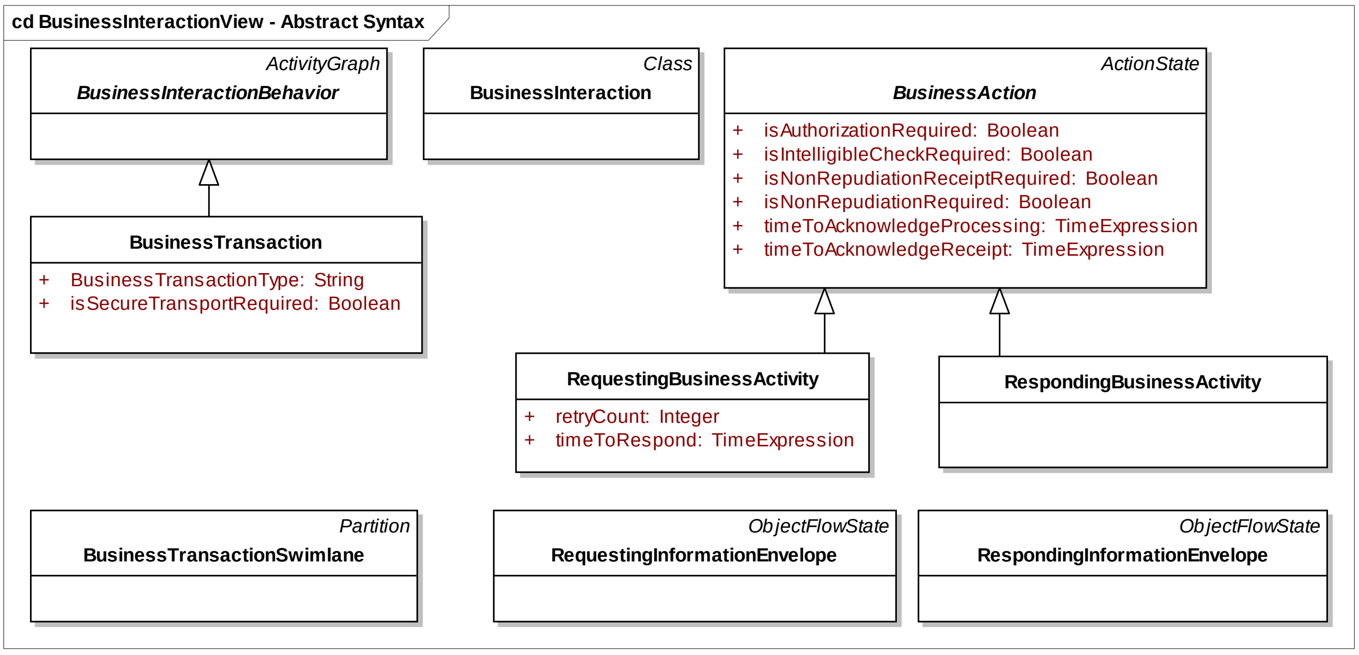
BusinessInteractionBehavior is an abstract concept. In a future version there may exist different approaches to describe the choreography and information exchanges in a business interaction. In this version, the only valid specialization of a *BusinessInteractionBehavior* is the *BusinessTransaction*. A business transaction is an atomic business process between two authorized roles, which involves sending business information from one authorized role to the other and an optional reply. The business transaction is built by two partitions - one for each authorized role. Hence, a *BusinessTransaction* is composed of exactly two *BusinessTransactionSwimlanes*. Each *BusinessTransactionSwimlane* relates to one *AuthorizedRole*. An *Authorized Role* is assigned to exactly one *BusinessTransactionSwimlane*. It follows, that the two swimlanes of a business transaction must be assigned to different authorized roles.

Within a business transaction each authorized role performs exactly one business action – the requesting authorized role performs a requesting business activity and the responding authorized role performs a responding business activity. Each business action – no matter whether requesting or responding business activity – is assigned to a swimlane, and each swimlane comprises exactly one business action. It follows that a *BusinessTransaction* is composed of exactly one *RequestingBusinessActivity* and exactly one *RespondingBusinessActivity*. Both *RequestingBusinessActivity* and *RespondingBusinessActivity* are specializations of *BusinessAction*. A *BusinessAction* is assigned to one *BusinessTransactionSwimlane*, and a *BusinessTransactionSwimlane* comprises one *BusinessAction*. Since a swimlane is dedicated to exactly one authorized role, it follows that the business action is executed by this authorized role. Furthermore an authorized role executes just one business action, because only one business action sits within a swimlane.

The requesting business activity outputs the requesting information envelope that is input to the responding business activity. Business information created by the responding business activity and returned to the requesting business activity is optional. It follows, that a *BusinessTransaction* is composed of exactly one *RequestingInformationEnvelope* and zero or one *RespondingInformationEnvelope*. Both *RequestingInformationEnvelope* and *RespondingInformationEnvelope* are instances of the type *InformationEnvelope*. A *RequestingBusinessActivity* outputs exactly one *RequestingInformationEnvelope* and a *RequestingInformationEnvelope* is created by exactly one *RequestingBusinessActivity*. A *RequestingBusinessActivity* receives zero or one *RespondingInformationEnvelope* as input and a *RespondingInformatinEnvelope* is input to exactly one *RequestingBusinessActivity*.
A *RespondingBusinessActivity* outputs zero or one *RespondingInformationEnvelope* and a *RespondingInformationEnvelope* is created by exactly one *RespondingBusinessActivity*. A *RespondingBusinessActivity* receives exactly one *RequestingInformationEnvelope* as input and a *RequestingInformationEnvelope* is input to exactly one *RespondingBusinessActivity*.

Note, that a *RequestingInformationEnvelope* (or a *RespondingInformationEnvelope*) is a stereotype of the base class *ObjectFlowState*. The type of the *ObjectFlowState* is defined by the *InformationEnvelope* that is a stereotype of base class *Class*. According to UML, multiple *ObjectFlowStates* might be instances of the same *Class*. It follows that different requesting or responding information envelopes might be instances of the same information envelope. In other words, an information envelope might be reused in different business transactions.

853 ## 5.3.2.2 Stereotypes and Tag Definitions (normative)


cd BusinessInteractionView - Abstract Syntax
ActivityGraph
BusinessInteractionBehavior
Class
BusinessInteraction
ActionState
BusinessAction
+ isAuthorizationRequired: Boolean
+ isIntelligibleCheckRequired: Boolean
+ isNonRepudiationReceiptRequired: Boolean
+ isNonRepudiationRequired: Boolean
+ timeToAcknowledgeProcessing: TimeExpression
+ timeToAcknowledgeReceipt: TimeExpression
BusinessTransaction
+ BusinessTransactionType: String
+ isSecureTransportRequired: Boolean
RequestingBusinessActivity
+ retryCount: Integer
+ timeToRespond: TimeExpression
RespondingBusinessActivity
Partition
BusinessTransactionSwimlane
ObjectFlowState
RequestingInformationEnvelope
ObjectFlowState
RespondingInformationEnvelope

854

855 **Figure 31 BusinessInteractionView (BusinessTransactionView) Abstract Syntax**

856

Stereotype	**BusinessInteraction**
Base Class	Class
Parent	N/A
Description	A business interaction is a persistent representation of a synchronization of business states between authorized roles. It is a unit of work that allows roll-back.
Tag Definition	**No Tagged Values**

857

Stereotype	**BusinessInteractionBehavior (abstract)**
Base Class	ActivityGraph
Parent	N/A
Description	A business interaction behavior defines the choreography of actions as well as involved business information and business signal exchanges that lead to synchronized business states between two authorized roles executing it.
Tag Definition	**No Tagged Values**

858

Stereotype	BusinessTransaction
Base Class	Activity Graph
Parent	BusinessInteractionBehavior
Description	A business transaction is the basic building block to define choreography between authorized roles. If an authorized role recognizes an event that changes the state of a business object, it initiates a business transaction to synchronize with the collaborating authorized role. It follows that a business transaction is an atomic unit that leads to a synchronized state in both information systems. We distinguish one-way and two-way business transaction: In the former case, the initiating authorized role reports an already effective and irreversible state change that the reacting authorized role has to accept. Examples are the notification of shipment or the update of a product in a catalog. It is a one-way business transaction, because business information (not including business signals for acknowledgments) flows only from the initiating to the reacting authorized role. In the other case, the initiating partner sets the business object(s) into an interim state and the final state is decided by the reacting authorized role. Examples include request for registration, search for products, etc. It is a two-way transaction, because business information flows from the initiator to the responder to set the interim state and backwards to set the final and irreversible state change. In a business context irreversible means that returning to an original state requires another business transaction. E.g., once a purchase order is agreed upon in a business transaction a rollback is not allowed anymore, but requires the execution of a cancel order business transaction. We distinguish 2 one-way business transactions and four two-way business transactions. The type of transaction is indicated in the tagged value of business transaction type. The other tagged values provide quality of service parameters. A business transaction follows always the same pattern: A business transaction is performed between two authorized roles that are assigned to exactly one swimlane each. Each authorized role performs exactly one activity. An object flow between the requesting and the responding business activity is mandatory. An object flow in the reverse direction is optional. According to the business transaction semantics, the requesting business activity does not end after sending the envelope - it is still alive. The responding business activity may output the response which is returned to the still living requesting business activity.

Tag Definition

businessTransactionType	
Type	String Enumeration: “Commercial Transaction” “Request/Confirm” “Query/Response” “Request/Response” “Notification” “Information Distribution”
Multiplicity	1
Description	The business transaction type determines a corresponding business transaction pattern. A business transaction pattern provides a language and grammar for constructing business transactions. The business transaction type follows one of the following six property-value conventions: (1) Commercial Transaction - used to model the “offer and acceptance” business transaction process that results in a residual obligation between both parties to fulfill the terms of the contract (2) Query/Response – used to query for information that a responding partner already has e.g. against a fixed data set that resides in a database (3) Request/Response - used for business contracts when an initiating partner requests information that a responding partner already has and when the request for business information requires a complex interdependent set of results (4) Request/Confirm - used if an initiating partner asks for information that requires only confirmation with respect to previously established contracts or with respect to a responding partner’s business rules (5) Information Distribution - used to model an informal information exchange business transaction that therefore has no non-repudiation requirements (6) Notification - used to model a formal information exchange business transaction that therefore has non-repudiation requirements

	isSecureTransportRequired	
	Type	Boolean
	Multiplicity	1
	Description	Both partners must agree to exchange business information using a secure transport channel. The following security controls ensure that business document content is protected against unauthorized disclosure or modification and that business services are protected against unauthorized access. This is a point-to-point security requirement. Note that this requirement does not protect business information once it is off the network and inside an enterprise. The following are requirements for secure transport channels. Authenticate sender identity – Verify the identity of the sender (employee or organization) that is initiating the interaction (authenticate). For example, a driver's license or passport document with a picture is used to verify an individual's identity by comparing the individual against the picture. Authenticate receiver identity – Verify the identity of the receiver (employee or organization) that is receiving the interaction. Verify content integrity – Verify the integrity of the content exchanged during the interaction i.e. check that the content has not been altered by a 3rd party. Maintain content confidentiality – Confidentiality ensures that only the intended, receiver can read the content of the interaction. Information exchanged during the interaction must be encrypted when sent and decrypted when received. For example, you seal envelopes so that only the recipient can read the content.

859

Stereotype	BusinessTransactionSwimlane
Base Class	Partition
Parent	N/A
Description	A business transaction swimlane is used to define an area of responsibility. An authorized role is appointed to the partition of a business transaction swimlane. This authorized role takes on the responsibility for the business action that is allocated within that area of responsibility.
Tag Definition	**No Tagged Values**

860

Stereotype	**BusinessAction (abstract)**	
Base Class	ActionState	
Parent	N/A	
Description	The business action is executed by an authorized role during a business transaction. Business action is an abstract stereotype. This means a business action is either a requesting business activity or a responding business activity.	
Tag Definition	**IsAuthorizationRequired**	
	Type	**Boolean**
	Multiplicity	**1**
	Description	If an authorized role needs authorization to request a business action or to respond to a business action then the sender must sign the business document exchanged and the receiver must validate this business control and approve the authorizer. A receiver must signal an authorization exception if the sender is not authorized to perform the business activity. A sender must send notification of failed authorization if a receiver is not authorized to perform the responding business activity.
	isNonRepudiationRequired	
	Type	**Boolean**
	Multiplicity	**1**
	Description	The *isNonRepudiationRequired* tag is used to indicate that an involved party must not be able to repudiate the execution of the business action that input/outputs business information.
	isNonRepudiationReceiptRequired	
	Type	**Boolean**
	Multiplicity	**1**
	Description	The *isNonRepudiationOfReceiptRequired* tag requires the receiver of an information envelope to send a signed receipt. The isNonRepudiationOfReceiptRequired tag indicates that an involved party must not be able to repudiate the execution of sending the signed receipt.
	timeToAcknowledge Receipt	
	Type	**TimeExpression**
	Multiplicity	**1**
	Description	Both partners may agree to mutually verify receipt of business information within a specific time duration. Acknowledgements of receipt may be sent for both the requesting business information and the responding business information. This means the sender of the business information may be the requesting authorized role as well as the responding authorized role – it depends on whether a requesting or a responding business information is acknowledged. Similarly, the affirmant may be the requesting authorized role as well as the responding authorized role – again depending of which business information is acknowledged. Inasmuch we use the terms sender and affirmant in the explanation of acknowledgement of receipt semantics. An affirmant must exit the transaction if they are not able to verify the proper receipt of a business information within the agree timeout period. A sender must retry a business transaction if necessary or must send notification of failed business control (possibly revoking a contractual offer) if an affirmant does not verify properly receipt of a business information within the agreed time period. The time to acknowledge receipt is the maximum duration from the time a business information

	is sent by a sender until the time a verification of receipt is “properly received” by the sender (of the business information). This verification of receipt is an audit-able business signal and is instrumental in contractual obligation transfer during a contract formation process (e.g. offer/accept).
timeToAcknowledgeProcessing	
Type	**TimeExpression**
Multiplicity	**1**
Description	Similarly to the *timeToAcknowledgeReceipt*, the sender of a business information might be the requesting authorized role as well as the responding authorized role – depending whether a requesting or a responding business information is acknowledged. Also the affirmant may be one of the two authorized roles. Thus, we use again the terms sender and affirmant in the explanation of the acknowledgment of processing semantics. Both partners may agree to the need for an acknowledgment of processing to be returned by a responding partner after the requesting business information passes a set of business rules and is handed over to the application for processing. The time to acknowledge processing of a business information is the duration from the time a sender sends a business information until the time an acknowledgement of processing is “properly received” by the sender (of the business information). An affirmant must exit the transaction if they are not able to acknowledge processing of business information within the maximum timeout period. A sender must retry a business transaction if necessary or must send notification of failed business control (possibly revoking a contractual offer) if an affirmant does not acknowledge processing of business information within the agreed time period.
isIntelligibleCheckRequired	
Type	**Boolean**
Multiplicity	**1**
Description	In order to define the *isIntelligibleCheckRequired* semantics, we use again the terms sender and affirmant as introduced for the last two tag definitions. Both partners may agree that an affirmant must check that business information is not garbled (unreadable, unintelligible) before verification of proper receipt is returned to the sender (of the business information). Verification of receipt must be returned when a document is “accessible” but it is preferable to also check for garbled transmissions at the same time in a point-to-point synchronous business network where partners interact without going through an asynchronous service provider.

862

863

Stereotype	RequestingBusinessActivity
Base Class	ActionState
Parent	BusinessAction
Description	A requesting business activity is a business action that is performed by an authorized role requesting business service from another authorized role.
Tag Definition	**timeToRespond**
	Type: TimeExpression
	Multiplicity: 1
	Description: Both partners may agree in case of a two-way business transaction that the responding authorized role must return the responding information business information within a specific duration. A responding authorized role must exit the transaction if they are not able to return the responding business information within the agreed timeout period. A requesting authorized role must retry a business transaction if necessary or must send notification of failed business control (possibly revoking a contractual offer) if a responding authorized role does not deliver the responding business information within the agreed time period. The time to perform is the maximum duration from the time a requesting business information is sent by a requesting authorized role until the time a responding business information is "properly received" by the requesting authorized role in return.
	retryCount
	Type: Integer
	Multiplicity: 1
	Description: The requesting authorized role must re-initiate the business transaction so many times as specified by the retry count in case that a time-out-exception – by exceeding the time to acknowledge receipt, or the time to acknowledge processing, or the time to respond – is signaled. This parameter only applies to time-out signals and not document content exceptions or sequence validation exceptions.
	Inherited tagged values: - isAuthorizationRequired - isNonRepudiationRequired - isNonRepudiationReceiptRequired - timeToAcknowledgeReceipt - timeToAcknowledgeAcceptance - isIntelligibleCheckRequired

864

865

Stereotype	RespondingBusinessActivity
Base Class	ActionState
Parent	Business Action
Description	A responding business activity is a business action that is performed by an authorized role responding to another authorized role's request for business service.
Tag Definition	**Inherited tagged values:** - isAuthorizationRequired - isNonRepudiationRequired - isNonRepudiationReceiptRequired - timeToAcknowledgeReceipt - timeToAcknowledgeAcceptance - isIntelligibleCheckRequired

866

Stereotype	RequestingInformationEnvelope
Base Class	ObjectFlowState
Parent	N/A
Description	The requesting information envelope is a container of business information that is sent from the requesting authorized role to the responding authorized role to indicate a state change in one or more business entities. This business state change might be irreversible in the case of a one-way business transaction or an interim state of a two-way business transaction. It is important to note that the term requesting information envelope does not mean that the business information refers to a request in a business sense. The term requesting information envelope indicates that the execution of a transaction is requested from the requesting authorized role to the responding authorized role – no matter whether this is an information distribution, a notification, a request, or the offer in a commercial transaction.
Tag Definition	**No Tagged Values**

867

Stereotype	RespondingInformationEnvelope
Base Class	ObjectFlowState
Parent	N/A
Description	The responding information envelope is a container of business information that is sent in case of a two-way business transaction from the responding authorized role to the requesting authorized role in order to set one or more business entities in a final state (which were in an interim state before).
Tag Definition	**No Tagged Values**

868

869 5.3.2.3 Constraints (normative)

870

A *BusinessInteractionView* package MUST contain exactly one *BusinessInteraction* and no other elements

```
package Model_Management
context Package

inv BIVcontainsExactlyOneBI:
  self.isBusinessInteractionView() implies
  self.contents->one(isBusinessInteraction())
  and self.contents->size()=1
```

871

A *BusinessInteractionBehavior* MUST be connected with exactly one *BusinessTransactionUseCase* via a dependency with the stereotype *mapsTo*

```
package Behavioral_Elements::Activity_Graphs
context ActivityGraph

inv BIBmapsToExactlyOneBusinessTransactionUseCase:
  self.isBusinessInteractionBehavior() implies
  self.clientDependency->size() = 1 and
  self.clientDependency->forAll(d |  d.isMapsToDependency() and
  d.supplier->forAll(isBusinessTransactionUseCase()) and
  d.supplier->size=1)
```

872

The behaviour of a *BusinessInteraction* must be described by exactly one *BusinessInteractionBehavior*.

```
package Foundation::Core
context Class

inv BehaviorOfBIdescribedByExactlyOneBusinessInteractionBehavior:
  self.isBusinessInteraction() implies
  self.behavior->one(isBusinessInteractionBehavior()) and
  self.behavior->size()=1
```

873

A *BusinessTransaction* MUST have exactly two partitions, which MUST be stereotyped as *BusinessTransactionSwimlanes*. One partition MUST contain the *RequestingBusinessActivity* and one MUST contain the *RespondingBusinessActivity*

```
package Behavioral_Elements::Activity_Graphs
context ActivityGraph

inv BusinessTransactionHasExactlyTwoBTSwimlanes:
  self.isBusinessTransaction() implies
  self.oclAsType(ActivityGraph).partition->size() = 2
  and self.oclAsType(ActivityGraph).partition->forAll(part |
  part.isUMMTransactionSwimlane()
  and (part.contents->one(isRequestingBusinessActivity()) xor part.contents
  ->one(isRespondingBusinessActivity())))
  and self.oclAsType(ActivityGraph).partition->collect(part |
  part.contents)->one(isRequestingBusinessActivity())
  and self.oclAsType(ActivityGraph).partition->collect(part |
  part.contents)->one(isRespondingBusinessActivity())
```

874

875

A *BusinessTransactionSwimlane* MUST have a classifier, which MUST be one of the associated *AuthorizedRoles* of the corresponding *BusinessTransactionUseCase*

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv BusinessTransactionSwimlaneClassifier:
  self.isUMMTransactionSwimlane() implies
  self.classifierRole.base->size()=1 and
  self.activityGraph.clientDependency->
  collect(s | s.supplier)->collect(a | a.oclAsType(UseCase).associations)->
  collect(allConnections)
  ->select(isAuthorizedRole())->one(x | x = (self.classifierRole.base->
  asSequence->first()))
```

876

The partition of the requesting authorized role must contain exactly one RequestingBusinessActivity, one RequestingInformationEnveleope and one InitialState. Furthermore there MUST be at least two FinalStates in this BusinessTransactionSwimlane

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv ContentsOfRequestingPartition:
  self.isUMMTransactionSwimlane() implies
  self.contents->one(isRequestingBusinessActivity()) implies
  self.contents->forAll(isRequestingBusinessActivity()
  or isRequestingInformationEnvelope()
  or isInitialState()
  or isFinalState()
  or isTransition()
  )
  and
  self.contents->one(isRequestingInformationEnvelope()) and
  self.contents->select(isFinalState())->size()>1 and
     self.contents->one(isInitialState())
```

877

878

The partition of the responding authorized role MUST exactly contain one *RespondingBusinessActivity*. Furthermore if the transaction is a two way business transaction, then the partition must contain a *RespondingInformationEnvelope* as well. If the transaction is a one way business transaction, then the responder partition must not contain a *RespondingInformationEnvelope*.

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv ContentsOfResponderPartition :
  self.isUMMTransactionSwimlane() implies
  self.contents->one(isRespondingBusinessActivity()) implies
  self.contents->forAll(isRespondingBusinessActivity()
  or isRespondingInformationEnvelope()
  or isTransition()
  )
  and if
  self.activityGraph.isTwoWayTransaction()
  then
  self.contents->one(isRespondingInformationEnvelope())
  else
  not self.contents->exists(isRespondingInformationEnvelope())
  endif
```

879

Exactly one *Transition* MUST lead from the *InitialState* to the *RequestingBusinessActivity*

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv TrInitialState2RequestingBusinessActivity:
  self.isUMMTransactionSwimlane() implies
  self.contents->one(isRequestingBusinessActivity()) implies
  self.contents->select(isInitialState())->
  forAll(oclAsType(Pseudostate).outgoing->size()=1 and
  oclAsType(Pseudostate).outgoing->asSequence()
  ->first().target.isRequestingBusinessActivity())
```

880

Exactly one *Transition* MUST lead from a *RequestingBusinessActivity* to the *RequestingInformationEnvelope*

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv TrRequestingBusinessActivity2RequInfEnvelope:
  self.isUMMTransactionSwimlane() implies
  self.contents->one(isRequestingBusinessActivity()) implies
  self.contents->select(isRequestingBusinessActivity())->
  forAll(oclAsType(ActionState).outgoing->size()=1 and
  oclAsType(ActionState).outgoing->asSequence()
  ->first().target.isRequestingInformationEnvelope())
```

881

Exactly one *Transition* MUST lead from the *RequestingInformationEnvelope* to the *RespondingBusinessActivity*

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv TrRequestingInformationEnvelope2RespondingBusinessActivity:
  self.isUMMTransactionSwimlane() implies
  self.contents->one(isRequestingBusinessActivity()) implies
  self.contents->select(isRequestingInformationEnvelope())->
  forAll(oclAsType(ObjectFlowState).outgoing->size()=1 and
  oclAsType(ObjectFlowState).outgoing->asSequence
  ->first().target.isRespondingBusinessActivity())
```

882

Exactly one *Transition* MUST lead from the *RespondingBusinessActivity* to the *RespondingInformationEnvelope* (only two way business transactions)

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv TrRespondingBusinessActivity2RespondingInformationEnvelope:
  self.activityGraph.isTwoWayTransaction() implies
  self.contents->one(isRespondingBusinessActivity()) implies
  self.contents->select(isRespondingBusinessActivity())->
  forAll(oclAsType(ActionState).outgoing->size()=1 and
  oclAsType(ActionState).outgoing->asSequence
  ->first().target.isRespondingInformationEnvelope())
```

883

Exactly one *Transition* MUST lead from the *RespondingInformationEnvelope* to the *RequestingBusinessActivity* (only two way business transactions)

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv TrRespondingInformationEnvelope2RequestingBusinessActivity:
  self.activityGraph.isTwoWayTransaction() implies
  self.contents->one(isRespondingBusinessActivity()) implies
  self.contents->select(isRespondingInformationEnvelope())->
  forAll(oclAsType(ObjectFlowState).outgoing->size()=1 and
  oclAsType(ObjectFlowState).outgoing->asSequence
  ->first().target.isRequestingBusinessActivity())
```

884

885

There MAY be a *Transition* from *RespondingBusinessActivity* to *RequestingBusinessActivity* (only for one way business transactions)

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv TrPossibleRespondingInformationEnvelope2RequestingBusinessActivity:
  self.activityGraph.isOneWayTransaction() implies
  self.contents->one(isRespondingBusinessActivity()) implies
  self.contents->select(isRespondingBusinessActivity())->
  forAll(oclAsType(ActionState).outgoing->size()=1 and
  (oclAsType(ActionState).outgoing->asSequence
  ->first().target.isRequestingBusinessActivity() or
  oclAsType(ActionState).outgoing->isEmpty()))
```

886

One *Transition* MUST lead from the *RequestingBusinessActivity* to each *FinalState*.

```
package Behavioral_Elements::Activity_Graphs
context Partition

inv TrRequestingBusinessActivity2FinalState:
  self.isUMMTransactionSwimlane() implies
  self.contents->one(isRequestingBusinessActivity()) implies
  self.contents->select(isRequestingBusinessActivity())->
  forAll(oclAsType(ActionState).outgoing->size()=1 and
  oclAsType(ActionState).outgoing->asSequence
  ->first().target.isFinalState())
```

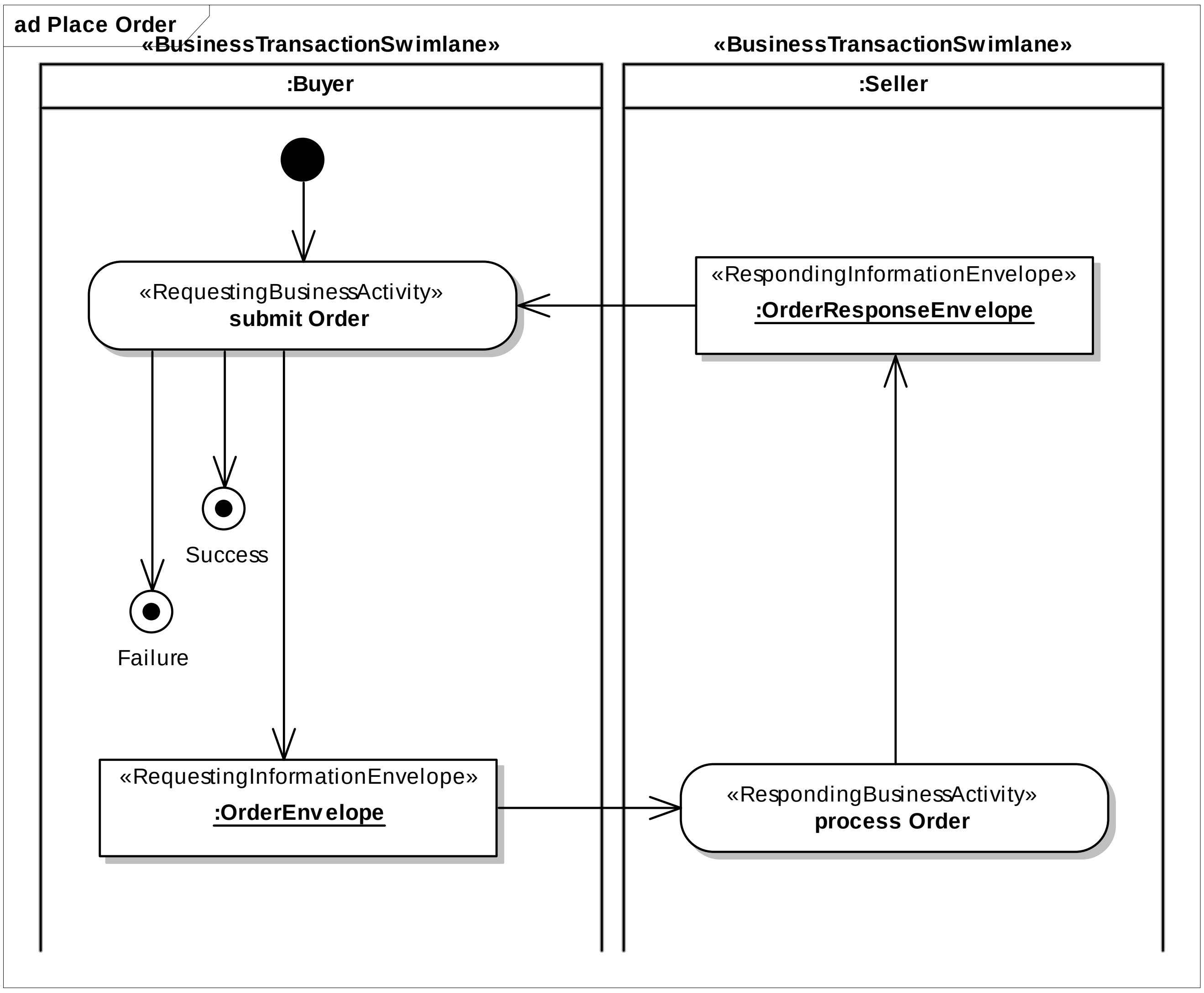
887

Each *RequestingInformationEnvelope* and each *RespondingInformationEnvelope* MUST have a classifier, which MUST itself be a class and stereotyped as *InformationEnvelope*

```
package Behavioral_Elements::Activity_Graphs
context ObjectFlowState

inv ObjectFlowStateHasClassifier:
  (self.isRequestingInformationEnvelope() or
  self.isRespondingInformationEnvelope()) implies
  self.type.oclAsType(ClassifierInState).type.isInformationEnvelope()
```

888

889 5.3.2.4 Example (informative)


ad Place Order
«BusinessTransactionSwimlane»
:Buyer
«BusinessTransactionSwimlane»
:Seller
«RequestingBusinessActivity»
submit Order
«RespondingInformationEnvelope»
:OrderResponseEnvelope
Success
Failure
«RequestingInformationEnvelope»
:OrderEnvelope
«RespondingBusinessActivity»
process Order

890

891 **Figure 32 BusinessInteractionView (BusinessTransactionView) Example: PlaceOrder BusinessTransaction (ActivityGraph)**

5.3.3 Business Information View

5.3.3.1 Conceptual Description (informative)

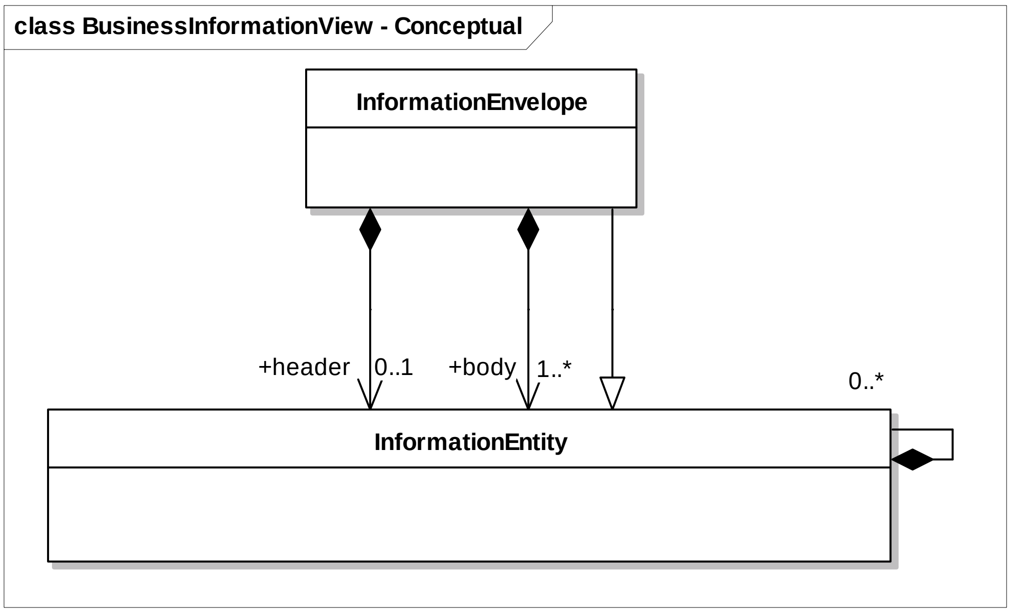


Figure 33 BusinessInformationView (BusinessTransactionView) Conceptual Overview

A business information view is a container of artifacts that describe the information exchanged in an interaction. We already mentioned before that *RequestingInformationEnvelope* and *RespondingInformationEnvelope* are of type *InformationEnvelope*. An information envelope serves as a cover for all the information exchanged between the requesting business activity and the responding business activity or vice versa, respectively. The information included in the envelope is structure by classes that are stereotyped as *InformationEntity*. Information entities might be recursively nested. Thus there is a unary composition hierarchy added to *InformationEntity*. An information envelope is built by zero or one header and one or more bodies. Both header and body are presented as information entities. It follows, that an *InformationEnvelope* is composed of exactly zero or one *InformationEntity* with the rolename *header* and of one or more *InformationEntities* with the rolename *body*. An *InformationEnvelope* is a specialization of an *InformationEntity* that fulfills all the rules mentioned for the information envelope as well.

The current UMM foundation module does not define any rules on how to build information entities. All methodologies and rules to build good quality class diagrams do also apply to model an information envelope and its contents. Modelers who want to use UN/CEFACT’s Core Components might do so as well - it is only important that all resulting classes no matter what type of Core Component are stereotyped as *InformationEntity*. However, there is a specialization module – the Core Component UML Profile – on the way in order to better support the modeling of business information by Core Components.

5.3.3.2 Stereotypes and Tag Definitions (normative)

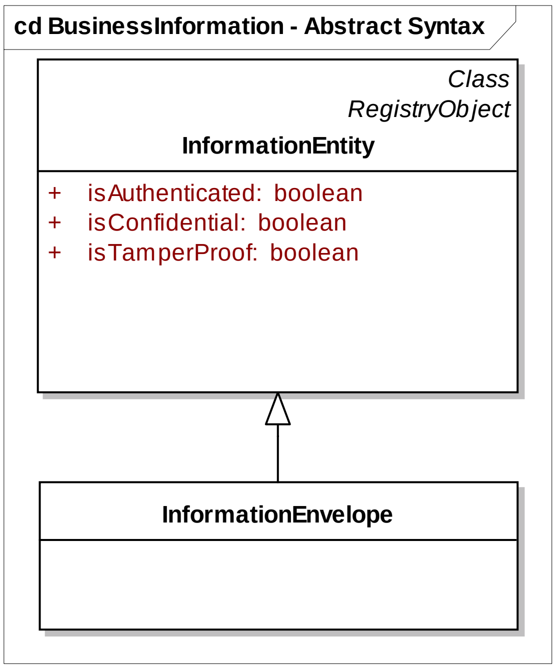

cd BusinessInformation - Abstract Syntax
Class
RegistryObject
InformationEntity
+ isAuthenticated: boolean
+ isConfidential: boolean
+ isTamperProof: boolean
InformationEnvelope

Figure 34 BusinessInformationView (BusinessTransactionView) Abstract Syntax

Stereotype	**InformationEntity**	
Base Class	Class	
Parent	N/A	
Description	An information entity realizes structured business information that is exchanged between authorized roles performing activities in a business transaction. Information entities include or reference other information entities through associations.	
Tag Definition	**isConfidential**	
	Type	Boolean
	Multiplicity	1
	Description	If the flag is set, the information entity is encrypted so that unauthorized parties cannot view the information**.**
	isTamperProof	
	Type	Boolean
	Multiplicity	1
	Description	If the flag is set, the information entity has an encrypted message digest that can be used to check if the message has been tampered with. This requires a digital signature (sender's digital certificate and encrypted message digest) associated with the document entity.
	isAuthenticated	
	Type	Boolean
	Multiplicity	1
	Description	If the flag is set, there is a digital certificate associated with the document entity. This provides proof of the signer's identity.

921

Stereotype	InformationEnvelope
Base Class	Class
Parent	InformationEntity
Description	An information envelope is a container for information entities. The information envelope is a specizalization of the information entity. It extends the concept of the information entity by the fact that it includes exactly one information entity that takes on the role of a header and at least one information entity that takes on the role of a body. Furthermore the information exchanged in a business transaction, i.e. a requesting business information and a responding business information is always of type information envelope.
Tag Definition	**Inherited tagged values:** - isConfidential - isTamperProof - isAuthenticated

922

923 5.3.3.3 Constraints (normative)

A *BusinessInformationView* package must contain only *InformationEntities* and *InformationEnvelopes* and no other elements.

```
package Foundation::Core
context Class

inv AllowedElementsInBusinessInformationView:
  self.isBusinessInformationView() implies
  self.contents->forAll(a | a.isInformationEntity() or
  a.isInformationEnvelope())
```

924

An *InformationEnvelope* MUST have zero or one association to an *InformationEntity* with role name header

```
package Foundation::Core
context Class

inv InformationEnvelopeHasHeader:
  self.isInformationEnvelope() implies
  self.associations->size() < 1  and
  self.associations->forAll(a | a.connection->size() = 2 and
  a.allConnections->one(participant.isInformationEntity() and
  AssociationEndRole.name = 'header'))
```

An *InformationEnvelope* MUST have at least one associated *InformationEntity* with role name body

```
package Foundation::Core
context Class

inv InformationEnvelopeHasBodies:
  self.isInformationEnvelope() implies
  self.associations->forAll(a | a.connection->size() = 2 and
  a.allConnections->exists(participant.isInformationEntity() and
  AssociationEndRole.name = 'body'))
```

An *InformationEntity* MAY be composed of other *InformationEntities*

```
package Foundation::Core
context Class

inv contentsOfInformationEntitiy:
  self.isInformationEntity() implies
  self.associations->
  forAll(a | a.allConnections->exists(isAggregate()) and
  a.allConnections->exists(participant.isInformationEntity()))
```

5.3.3.4 Example (informative)

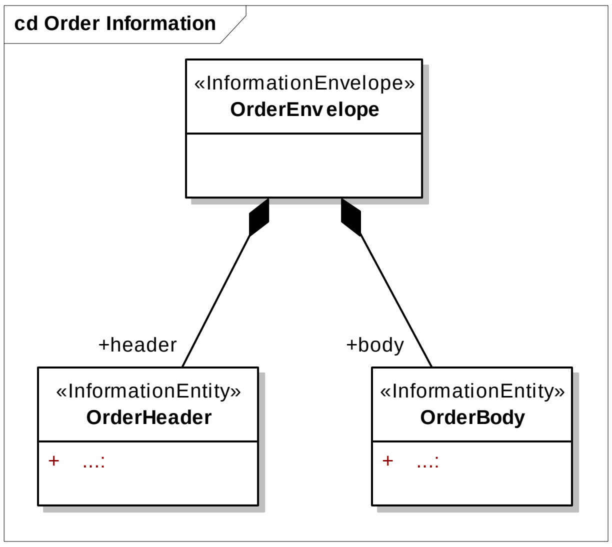


Figure 35 BusinessInformationView (BusinessTransactionView) Example: OrderEnvelope (ClassDiagram) - conceptual

931 **5.3.4 OCL methods used in all packages of the BTV (normative)**

932

OCL-Methods

```
package Foundation::Core
context ModelElement

--Predefined  method whichs evaluates, if the given Modelelement
--has a stereotype equal to the passed name
def :
let hasStereotype (st : String) : Boolean =
  self.stereotype->select(self.name = st)->notEmpty()

--Predefined method whichs evaluates, if the given element
--has the stereotype 'BusinessTransaction'
def :
let isBusinessTransaction() : Boolean =
  self.oclIsKindOf(ActivityGraph) and
  self.hasStereotype('BusinessTransaction')

--Predefined method whichs evalutes, if the given element
--has the stereotype 'BusinessInteraction'
def :
let isBusinessInteraction() : Boolean =
  self.oclIsKindOf(Class) and
  self.hasStereotype('BusinessInteraction')

--Predefined method whichs evaluates, if the given element
--is a subtype of 'BusinessInteractionBehavior'
def :
let isBusinessInteractionBehavior() : Boolean =
  self.oclIsKindOf(ActivityGraph) and
  self.hasStereotype('BusinessTransaction')

--Predefined method whichs evaluates, if the given element
--is a  'BusinessChoreography'
def :
let isBusinessChoreography() : Boolean =
  self.oclIsKindOf(Class) and
  self.hasStereotype('BusinessChoreography')

--Predefined method which evaluates, if the
--ActivityGraph is a BusinessCollaborationProtocol
def:
let isBusinessCollaborationProtocol() : Boolean =
  self.oclIsKindOf(ActivityGraph) and
  self.hasStereotype('BusinessCollaborationProtocol')

--Predefined method which evaluates, if the
--ActivityGraph is a subtype of
--BusinessChoreographyBehavior
def:
```

```
let isBusinessChoreographyBehavior() : Boolean =
  self.oclIsKindOf(ActivityGraph) and
  self.hasStereotype('BusinessCollaborationProtocol')

--Predefined method which evaluates, if the given element
--has the stereotype 'RequestingBusinessActivity' and
--if its type is ActionState
def :
let isRequestingBusinessActivity() : Boolean =
  self.oclIsKindOf(ActionState) and
  self.hasStereotype('RequestingBusinessActivity')

--Predefined method which evaluates, if the given element
--has the stereotype 'RespondingBusinessActivity' and
--if its type is ActionState
def :
let isRespondingBusinessActivity() : Boolean =
  self.oclIsKindOf(ActionState) and
  self.hasStereotype('RespondingBusinessActivity')

-- Returns true if the element is located in a partition and
-- its stereotype is 'BusinessTransactionSwimlane'
def :
let isBusinessTransactionSwimlane() : Boolean =
  self.hasStereotype('BusinessTransactionSwimlane')
  and self.oclIsKindOf(Partition)

-- Returns true if the type of the element
-- is 'PseudoKindState' and its Pseudostatekind is pk_initial
def :
let isInitialState() : Boolean =
  self.oclIsKindOf(Pseudostate) and
  self.oclAsType(Pseudostate).kind = PseudostateKind::initial

-- Returns true if the type of the element is 'FinalState'
def:
let isFinalState() : Boolean =
  self.oclIsKindOf(FinalState)

-- Returns true if the type of the element
-- is 'PseudoKindState' and its Pseudostatekind
-- is pk_choice
def:
let isChoice() : Boolean =
  self.oclIsKindOf(Pseudostate) and
  self.oclAsType(Pseudostate).kind = PseudostateKind::choice

-- Returns true if the type of the element
-- is 'PseudoState' and its Pseudostatekind
-- is pk_fork
def:
let isFork() : Boolean =
  self.oclIsKindOf(Pseudostate) and
  self.oclAsType(Pseudostate).kind = PseudostateKind::fork
```

```
-- Returns true if the type of the element
-- is 'PseudokindState' and its Pseudostatekind
-- is pk_choice
def:
let isJoin() : Boolean =
  self.oclIsKindOf(Pseudostate) and
  self.oclAsType(Pseudostate).kind = PseudostateKind::join

--Returns true if the given element has a tagged value named 'tag' with
--a value 'value'
def :
let hasTaggedValue (tag : String, value : String) : Boolean =
  self.taggedValue->select(name = tag)->select(dataValue = value)-
>notEmpty()

--Returns true if the element has a tagged value named 'BusinessTransaction'
--with a value 'NotificationActivity' or 'InformationDistributionActivity'
def :
let isOneWayTransaction() : Boolean =
  self.hasTaggedValue('BusinessTransactionType','NotificationActivity')
  or
  self.hasTaggedValue('BusinessTransactionType','InformationDistributionActi
vity')

--Returns true if the element has a tagged value name 'BusinessTransaction'
--with a value 'QueryResponseActivity' or 'RequestResponseActivity' or
--'CommercialTransactionActivity' or 'RequestConfirmActivity'
def :
let isTwoWayTransaction() : Boolean =
  self.hasTaggedValue('BusinessTransactionType','QueryResponseActivity')
  or
  self.hasTaggedValue('BusinessTransactionType','RequestResponseActivity')
  or
  self.hasTaggedValue('BusinessTransactionType','CommercialTransactionActivi
ty')
  or
  self.hasTaggedValue('BusinessTransactionType','RequestConfirmActivity')

-- Returns true if the stereotype of the given element is
--'BusinessCollaborationActivity'
-- and if the type of the element is ActionState
def:
let isBusinessCollaborationActivity() : Boolean =
  self.hasStereotype('BusinessCollaborationActivity') and
  self.oclIsKindOf(ActionState)

-- Returns true if the stereotype of the given element is
--'BusinessTransactionActivity'
-- and if the type of the element is ActionState
def:
let isBusinessTransactionActivity() : Boolean =
  self.hasStereotype('BusinessTransactionActivity') and
  self.oclIsKindOf(ActionState)
```

```
-- Returns true if the type of the element is Transition
def:
let isTransition() : Boolean =
  self.oclIsKindOf(Transition)

-- Returns true if the given element is an element of an Acitivity Graph
-- (InitialState, Choice, Fork, Join, Transition or FinalState)
def:
let isPseudoStateOrFinalStateOrTransition() : Boolean =
  isInitialState() or
  isChoice() or
  isFork() or
  isJoin() or
  isFinalState()



--Returns true if a package is stereotyped as BusinessTransactionView
def:
let isBusinessTransactionView() : Boolean =
  self.hasStereotype('BusinessTransactionView') and
  oclIsKindOf(Package)

--Returns true if a package is stereotyped as BusinessChoroeographyView
def:
let isBusinessChoreographyView() : Boolean =
  self.hasStereotype('BusinessChoreographyView') and
  oclIsKindOf(Package)

-- Returns true if the stereotype of the given element is
--'BusinessInformationView'
-- and if the type of the element is Package
def :
let isBusinessInformationView() : Boolean =
  self.hasStereotype('BusinessInformationView') and
  self.oclIsKindOf(Package)

-- Returns true if the stereotype of the given element is
--'BusinessInteractionView'
-- and if the type of the element is Package
def :
let isBusinessInteractionView() : Boolean =
  self.hasStereotype('BusinessInteractionView') and
  self.oclIsKindOf(Package)

-- Returns true if the stereotype of the given element is
'InformationEntitiy'
-- and if the type of the element is Class
def :
let isInformationEntity() : Boolean =
  self.hasStereotype('InformationEntity') and
  self.oclIsKindOf(Class)
```

```
-- Returns true if the association type of an association end is composite
def:
let isComposition() : Boolean =
  self.oclIsKindOf(AssociationEnd) and
  self.oclAsType(AssociationEnd).aggregation = AggregationKind::composite

-- Returns true if the association type of an association end is aggregation
def:
let isAggregate() : Boolean =
  self.oclIsKindOf(AssociationEnd) and
  self.oclAsType(AssociationEnd).aggregation = AggregationKind::aggregate

-- Returns true if the element is a partition
--and stereotyped as BusinessTransactionSwimlane
def :
let isUMMTransactionSwimlane() : Boolean =
  self.oclIsKindOf(Partition) and
  self.hasStereotype('BusinessTransactionSwimlane')

--Returns true if the stereotype of the element is
--'InformationEnvelope' and its type is Class
def :
let isInformationEnvelope() : Boolean =
  self.hasStereotype('InformationEnvelope') and
  oclIsKindOf(Class)

--Returns true if the stereotype of the element
-- is 'RequestingInformationEnvelope'
def :
let isRequestingInformationEnvelope() : Boolean =
  self.hasStereotype('RequestingInformationEnvelope') and
  oclIsKindOf(ObjectFlowState)

--Returns true if the stereotype of the element
-- is 'RespondingInformationEnvelope'
def :
let isRespondingInformationEnvelope() : Boolean =
  self.hasStereotype('RespondingInformationEnvelope') and
  oclIsKindOf(ObjectFlowState)


--Predefined method which evaluates, if the given element
--has the stereotype 'mapsTo'
def :
let isMapsToDependency() : Boolean =
  self.oclIsKindOf(Dependency) and
  self.hasStereotype('mapsTo')

--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessCollaborationUseCase'
def :
let isBusinessCollaborationUseCase() : Boolean =
  self.oclIsKindOf(UseCase) and
  self.hasStereotype('BusinessCollaborationUseCase')
```

```
--Predefined method which evaluates, if the given element
--has the stereotype 'BusinessTransactionUseCase'
def :
let isBusinessTransactionUseCase() : Boolean =
  self.oclIsKindOf(UseCase) and
  self.hasStereotype('BusinessTransactionUseCase')

--Predefined method which evaluates, if the given element
--has the stereotype 'AuthorizedRole'
def :
let isAuthorizedRole() : Boolean =
  self.oclIsKindOf(Actor) and
  self.hasStereotype('AuthorizedRole')
```

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