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4 Analysis

4.1 Workflow

4.1.1 Purpose

The purpose of the Analysis workflow is to translate the requirements identified in Business Requirements workflow into a specification that enables software developers and message designers to design and implement electronic business solutions**.**

Analysis goals are:

- To build a set of business objects from the Requirements workflow,
- To transform the requirements into a precise, object oriented specification,
- To provide a foundation for the design of electronic information exchange,
- To provide system integrators interfaces to hook into their existing information systems,
- To explicitly specify the dynamics of the business system.

4.1.2 Analysis Methodology

Activity diagrams at the collaboration and business transaction levels are created to represent the business process requirements at the collaboration and business transaction levels. As needed, sequence diagrams are created to illustrate the dynamics of information exchange, primarily for verification with business experts. Conceptual class diagrams capture the information bundles associated with the information

exchanges. The Analysis Workflow reflects the business knowledge contained in a Lexicon, utilizing common business processes and common information entities.

4.1.3 Analysis workflow Use Case

The Analysis Workflow use case diagram is shown in Figure 4-1. The Analyze the Requirements use case that transforms the business requirements, as elicited from the business domain expert, into a modelling representation involves the business process analyst and technical modeller. Activity diagrams are developed for the business collaboration as well as for each utilized business transaction modelling pattern. In addition, business information objects contained in the Lexicon are used to build a conceptual class diagram, or free structured data diagram. The Analysis Workflow is the first workflow that does not directly involve the business domain expert.

The primary activity is to specialize the business transaction modelling patterns for each business transaction in the business-to-business project and to create the conceptual class diagram from business knowledge contained in the Lexicon.

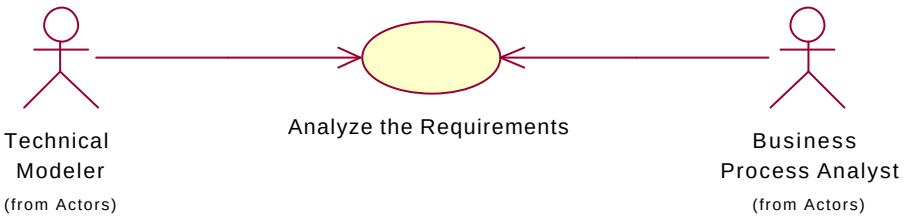

Figure 4-1. Analysis Workflow Use Case Diagram

4.1.4 UMM Framework: Analysis Workflow

Figure 4-2 highlights the methodology steps and the artifacts created in the Analysis Workflow.

Workflow	Methodology	Pattern	Model Artifacts [UML]
Analysis	• Process Analysis • Activity Modelling • Conceptual Class Modeling	• Business Transaction Modelling Patterns	BTV • Business Collaboration Protocol [Activity Graph] • Business Transactions [Activity Graph] • Business Documents (conceptual) [Class Diagram]

Figure 4-2. Extract from the UMM

4.1.5 Process Analysis

A business collaboration activity graph is prepared for each business collaboration use case to illustrate the dynamic interactions of the use case activities. It shows the sequence of the activities within the use case. Activities that can be performed

simultaneously are discovered. Figure 4-3 provides an example of a business collaboration activity graph for the “Order from Catalog” use case.

Note that this formal specification of an activity diagram references UN/CEFACT business transaction modelling patterns for each activity, i.e.,

1. Commercial Transaction
2. Request / Confirm
3. Query / Response
4. Request / Response
5. Notification
6. Information Distribution

These business transaction modelling patterns are described in Section 4.4.

4.1.6 Activity Modelling

Each business transaction modelling pattern identified in the business collaboration activity diagram is labeled for the specific activity, e.g., Obtain Buyer ID application of Business Transaction Pattern. Figure 4-4 through Figure 4-10 illustrate the various catalogue order business transaction activity diagrams.

4.1.7 Conceptual Class Modelling

Business information objects contained in the Lexicon are used to discover candidates for classes and attributes in the conceptual class diagram. Figure ____ illustrates a conceptual class diagram for Obtain Buyer ID. A business information entity captures information about a real world (business) concept, and relationships between that concept and other business concepts. An information entity can be either an individual piece of business information, or a natural “go-together” family of business information pieces. An information entity may contain another information entity in combination with one or more information entities.

If, in the process of creating the conceptual class diagram, required business information entities are not as yet contained in the Lexicon, they become candidates for being added to the Lexicon. Methodologies developed for admitting Lexicon additions, such as extension rules, context analysis and naming conventions will be followed in extending the Lexicon.

Note: conceptual class diagrams are in pdf file

4.1.8 Review/validate deliverables

The purpose of this step is to verify if the analysis and deliverables are consistent and meet the functional requirements of the system. Furthermore, verify whether the traceability identifiers have been applied for all deliverables (see Annex 2).

Check-points for each analysis class

- Are the classes reasonable?

- Does the name of each class clearly reflect the role it plays?
- Does the class represent a single well-defined abstraction? If not, consider splitting it.
- Does a class define any attributes and responsibilities that are not functionally coupled to the other attributes or responsibilities defined by that class?
- Do the classes offer the behaviour the use case realisation and other classes require?

4.2 Artifacts

The Business Transaction View is comprised of the following key modelling elements or artefacts.

BusinessTransaction

A business transaction is a set of business information and business signal exchanges between two business partners that must occur in an agreed format, sequence and time period.

BusinessCollaborationProtocol

A business collaboration protocol choreographs one or more business transaction activities. A business collaboration protocol is not a transaction and should be used in cases where transaction rollback is inappropriate

BusinessPartner

The business partners that participate in business collaborations are enumerated for each business collaboration protocol. Partners provide the initiating and responding roles in the protocol.

BusinessTransactionActivity

A business transaction activity is a business collaboration protocol activity that executes a specified business transaction.

Business Transaction Activity Model Elements & Patterns

Business Transaction Activity elements are specialized elements derived from a RequestingBusinessActivity element. Each element defines as a stereotype, the default value for each required tags in support of each Business Transaction pattern. The definitions and tag values for each pattern are found in chapter 9.

4.3 Guidelines

4.3.1 Business Transactions and Authorized Roles

Goals

The goal of this worksheet is to identify the individual transactions that implement the operations of a Business Collaboration. A transaction is made up of several *activities* and each activity has an *authorized role* that the signaler must have in order to initiate that activity.

The modeling artifacts generated as a result of this worksheet is the BusinessTransaction Activity Diagram. Fill out one worksheet for each transaction in the collaborations

4.3.2 Use Transaction Patterns

The UMM has defined several transaction patterns that should be used to define business transactions. By the use of these patterns one can be assured that the transaction is legally binding in accordance with current global and regional legal writings.

These patterns have intrinsic semantics (e.g. property-values such as non-repudiation and authorization) associated with them. If you choose to base the transaction on one of these patterns you do not have to repeat the property values here (although you may wish to do so that all information is specified in one place). However if you do not base the transaction on an UMM pattern, described the property values in the Business Transaction Property Values form. Note that if you do not follow a prescribed pattern, the business transaction may not comply with generally acceptable legally binding transaction semantics. If you wish to "override" the semantic property-values, use the Business Transaction Property Values form and keep in mind that when you change the property values, the pattern may no longer be applicable. In this case, you should not specify a pattern name. Do not provide values for Non-Repudiation Of Receipt and Recurrence for Responding Business Activity (this is specified by the UMM).

4.3.3 Detail Transaction Activities Only If Necessary

The transaction patterns defined in the UMM should be sufficient to cover most business cases. However, it may be necessary or desirable to describe the business transaction activity in terms of the allowable transitions between the activities. An UMM compliant activity diagram (UML) can be created or a Business Transaction Transition Table can be used to convey the same information.

Business Transaction	
Description	[Provide a descriptive overview of this transaction.]
Pattern	[If you have chosen to follow one of the canonical transaction patterns in the UMM[1] (or elsewhere) denote it here. If not and you have special semantics (as mentioned above), describe them here.]
Business activities and associated authorized roles	[List each activity (along with its initiator) and the role required to perform that activity]
Constraints	[Any constraints should be listed here.]
Initiating/Requesting Partner Type	[Partner type from collaboration.] Customer

[1] See chapter 4 in [UMM].

Initiating/Requesting Activity Role	[These are the roles that a partner must be authorized to play to issue specific transitions in the transaction (by sending certain signals).] Buying Customer
Initiating/Requesting Activity Document	[Document initiating the transaction. Might reference a standard document (e.g. an X12 document).] Sales Order
Responding Partner Type	[See above.] On-line Retailer
Responding Activity Role	[See above.] Customer Service
Responding Activity Document	[See above.] Confirmation email

Complete the following property-values for requesting business activities and responding business activities if they differ from the default values defined in the UMM transaction patterns. You should copy the values from the UMM as a convenience to the readers.

Business Transaction Property Values							
	Time to Acknowledge Receipt	**Time to Acknowledge Acceptance**	**Time to Perform**	**Authorization Required**	**Non-repudiation of Origin and Content**	**Non-Repudiation of Receipt**	**Recurrence**
Requesting Business Activity	[time]	[time]	[time]	[true or false]	[true or false]	[true or false]	[whole number]
Responding Business Activity	[time]	[time]	[time]	[true or false]	[true or false]	NOT-APPLICABLE	NOT-APPLICABLE

Provide a Business Transaction Transition Table if needed. See guidelines section "Detail Transaction Activities Only If Necessary."

Business Transaction Transition Table					
From Activity	**From Role**	**Document**	**To Activity**	**To Role**	**Guard Condition**
[Name of the "from" activity. The keyword START shall be used for the first activity.]	[A Requesting/Initiating Activity Role or NOT-APPLICABLE. NOT-APPLICABLE is to be used when the	[Document name or NONE.]	[Name of the destination activity or keyword END or keyword CONTROL-FAILED.]	[A Responding Activity Role or NOT-APPLICABLE.]	[A boolean expression defining or describing the condition for the transition or NONE.]

	From Activity is START.]				
[Name of the last activity before the END state]	[Appropriate role name.]	NONE	END	NOT-APPLICABLE	[Expression of the guard condition.]
[Name of the last activity before the CONTROL-FAILED state.]	[Appropriate role name.]	NONE	CONTROL-FAILED	NOT-APPLICABLE	[Expression of the guard condition.]

4.3.4 Business Information Description

Goals

The goal of this set of worksheets is to identify the information requirements for the business documents specified in the business transactions.

The first step in specifying business documents in a business process and information model, is to attempt to reuse business information objects in a Business Library. If an existing business document cannot be found then, domain components from Domain Libraries and core components from the Core Library can be used. Until the Business Library is built up, or imported from a creditable source, core components are likely to be referred to frequently, to first add to the repertoire of business information objects in the Business Library, and second, to create business documents.

The steps for completing these worksheets are as follows:

1. See what attributes are available in business information objects in the available Business Libraries that can be used in a business document.
2. If business information objects with appropriate attributes as required for business documents are not available, new business information objects must be created.
3. Look for re-usable information components in the business library and the Core Library as candidates for business information object attributes. Take context into account, as specified in the business process and information models. Extend existing business information objects, domain components, and core components as required.
4. Add the new attributes to existing business information objects, or introduce new business information objects through a registration process that manages changes to the Business Library.
5. Use the new attributes, now in the Business Library, as needed in creating the business documents.

4.3.5 Business Information Context

The Business Information Context guidelines re provided as convenience for aggregating contextual values that effect the analysis of business information. It is intended that this

information be obtained from other sources. For example, Industry Segment is specified in the Business Reference Model. If there is no value for an entry, enter NOT-APPLICABLE or NONE which ever is appropriate.

Business Information Context	
Industry Segment	
Business Process	
Product	
Physical Geography /Conditions /Region	
Geo-Political Legislative/ Regulatory/ Cultural	
Application Processing	
Business Purpose /Domain	
Partner Role	
Service Level (profiles – not preferences.)	
Contracts/Agreements	

4.3.6 Document Content Description

Describe each element or group of elements in the document. Logically related elements can be placed in separate forms (For example, a document may have logically three parts, a header, body, and summary. The body may have further logical partitioning.). Possible values for Occurs include: 1 (one instance), 0..1 (zero on one instance), 0..* (zero or more instances), 1..* (one or more instances), or n..m (n to m instances where n is less than m). Information "looping" is specified through appropriate occurs values. Possible values for Data Type include primitive data types – such as integer, string, date-type – or a Form Id of another Content Description Form. Referencing another Content Description Form Id represents information hierarchy and nesting. If you happen to know the name of a reusable component from an domain library or the Catalog of Core Components, then you MAY reference it. The Semantic Description SHALL be stated in business terms and SHALL be unambiguous.

Content Description					
Element/Component Name	**Occurs**	**Data Type**	**Field Width**	**Semantic Description**	**Notes**
[Provide a name for the element/component. For example, "Order Summary" or "Issued Date."]					

4.3.7 Content Mapping

These models SHOULD be completed. This information is very important as it shows that the documents have a basis in existing standards. Furthermore, the information will be used to create document transformations. Standards to map to include EDIFACT, X12, xCBL, RosettaNet, and other standards such as OBI. Use XPATH and XSLT notation for referencing XML elements and describing the mappings. If a new document schema is created to fulfil the content requirements specified in the Document Content Description forms, then a set of Content Mapping forms should be completed for that schema (the component names in the forms are simply requirements for information)

For each Content Description form, complete a Document Content Mapping form for each standard to be cross-referenced.

Content Mapping	
Standard	[Name of the standard. For example, UN/EDIFACT]

Version	[Standard version number. For example, D.01A]	
Element/Component Name	**Mapping/Transformation**	**Note**
[Enter element/component name from corresponding Content Description form]	[Mapping or transformation. If the element/component is a complex structure, this entry should reference the appropriate Content Mapping form.]	[Any useful mapping notes.]

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4.4 Example

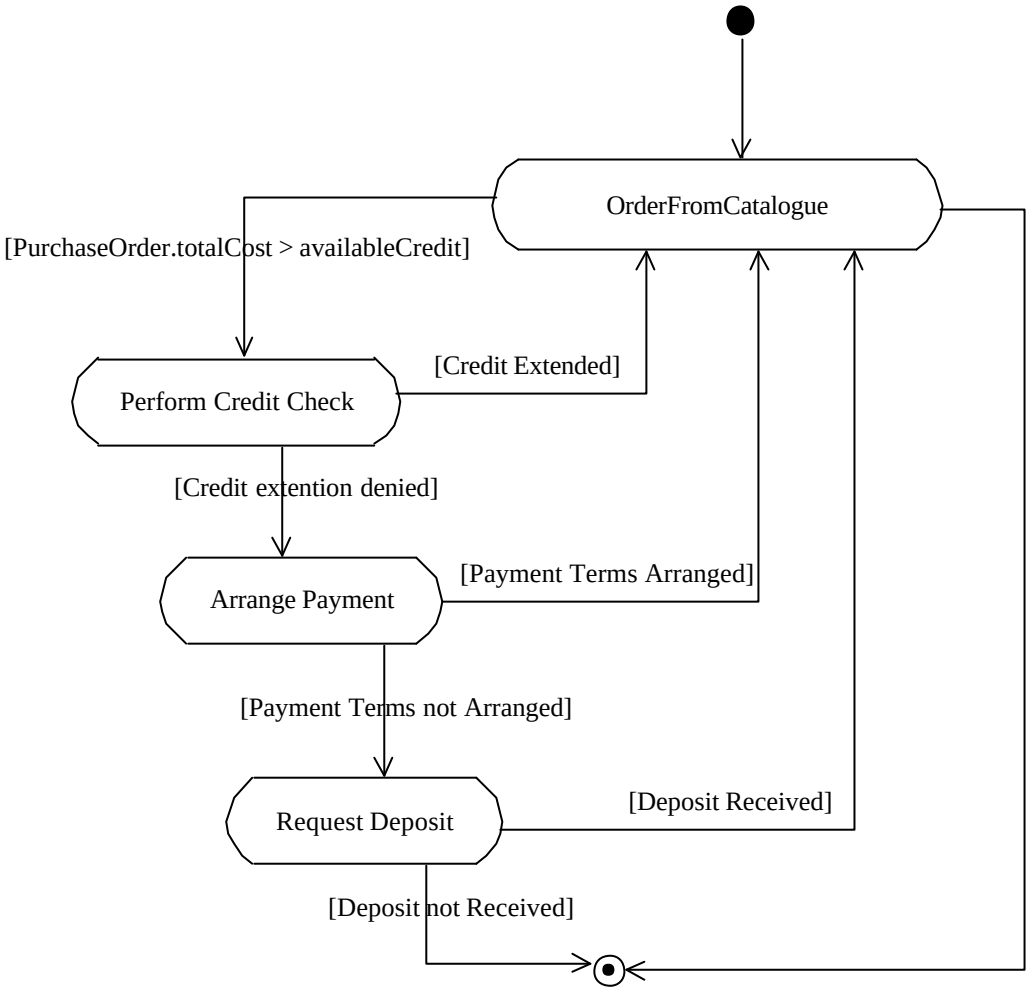

Figure 4-3. Business collaboration activity graph

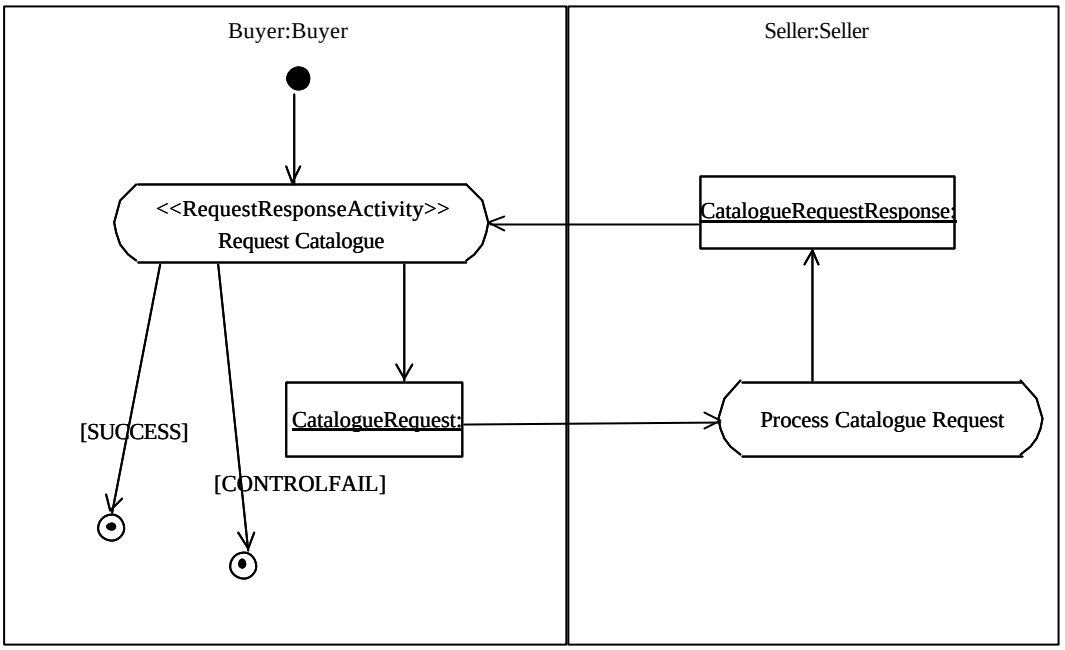

Figure 4-4. Obtain catalog Business Transaction Activity Graph

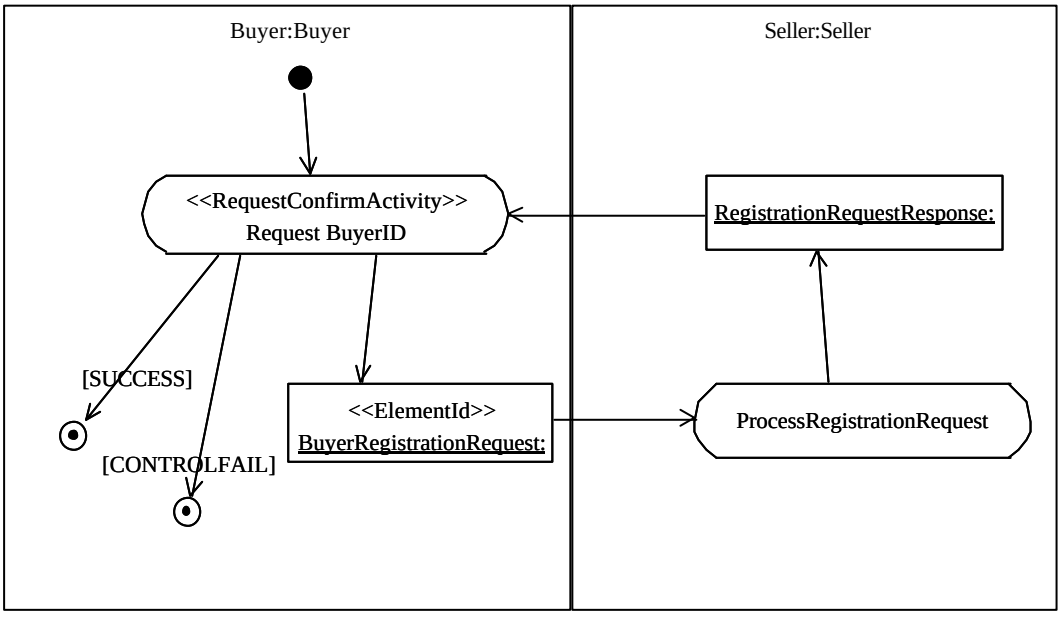

Figure 4-5. Obtain Buyer ID Business Transaction Activity Graph

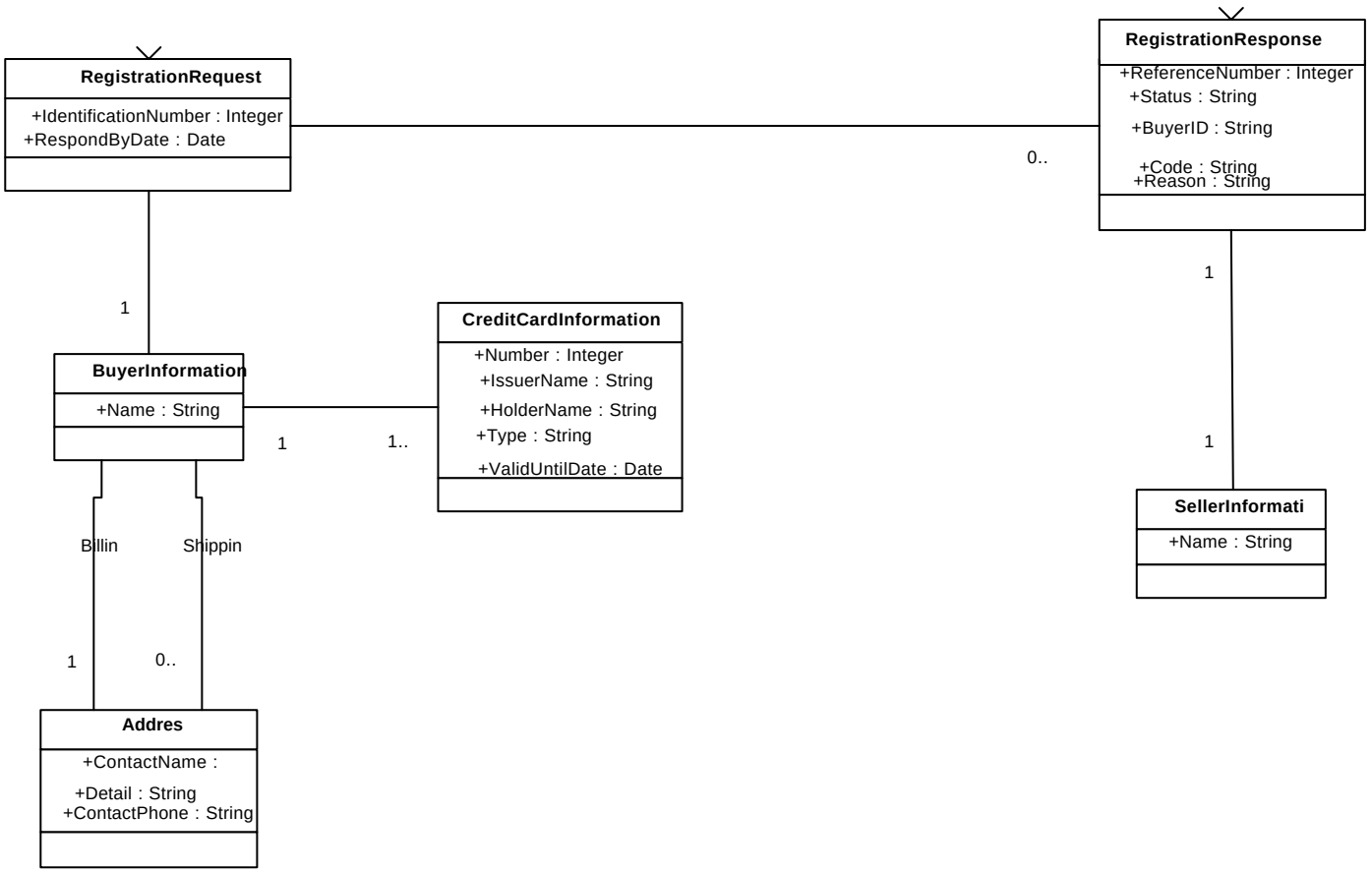

Figure 4-6. Registration Request Class Diagram

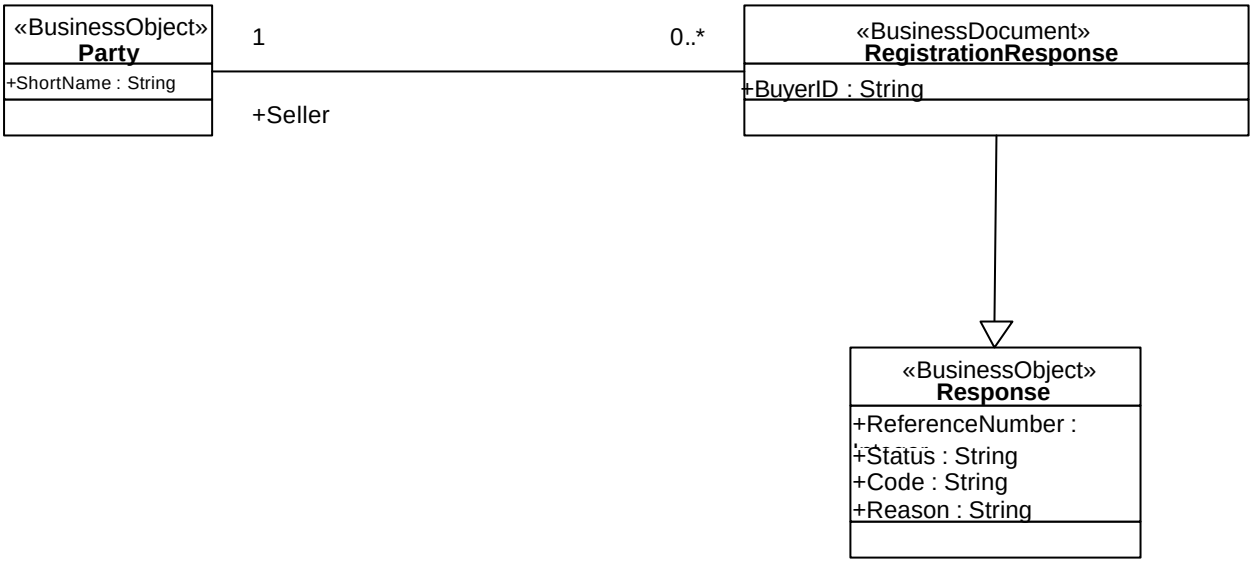

Figure 4-7. Registration Response Class Diagram

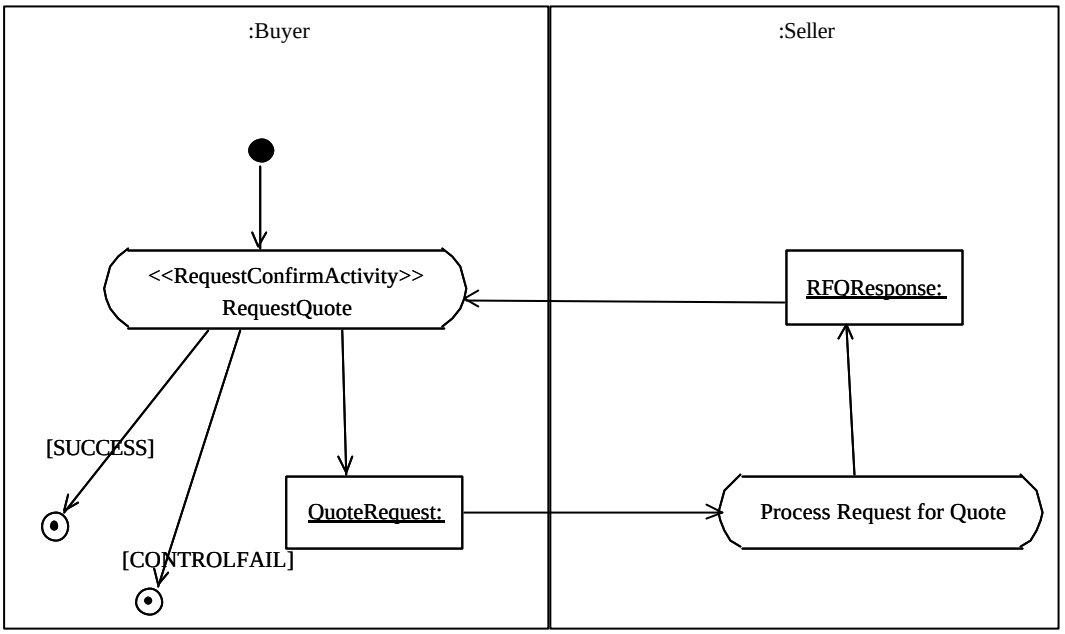

Figure 4-8. Obtain Quote Business Transaction Activity Graph

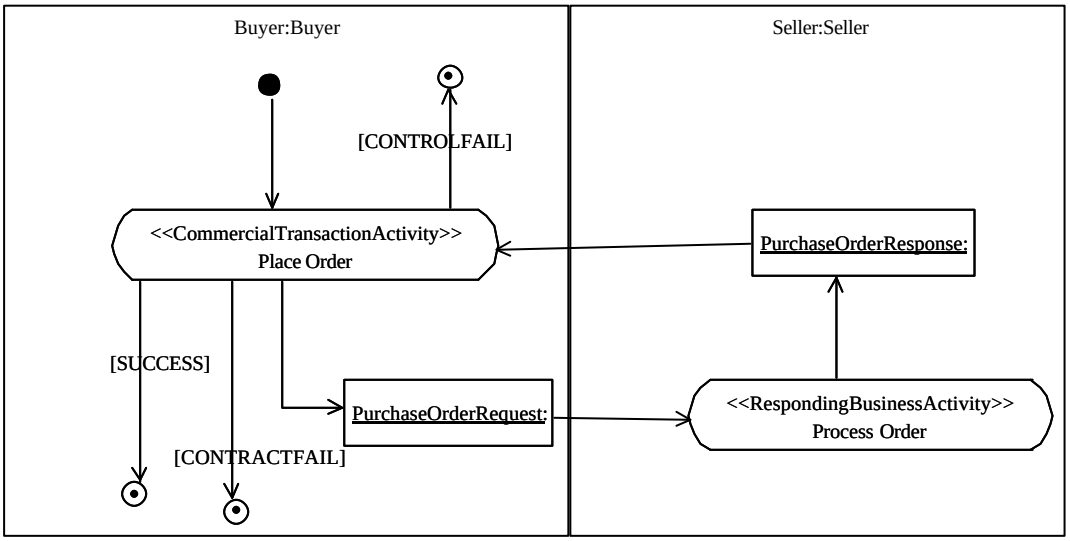

Figure 4-9. Place order Business Transaction Activity Graph

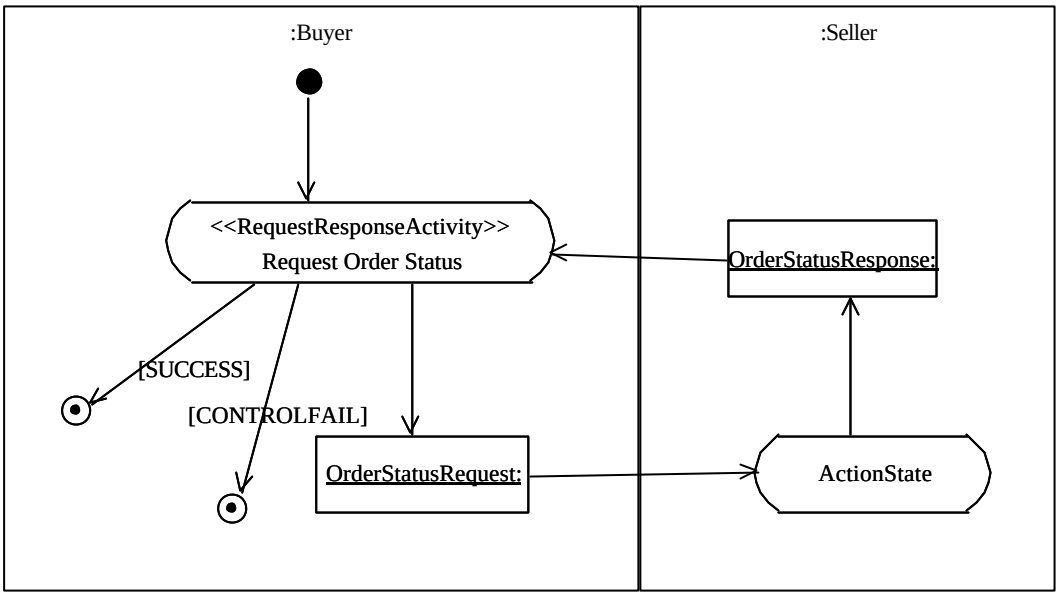

Figure 4-10. Obtain order status Business Transaction Activity Graph