UN/CEFACT

United Nations Centre for Trade Facilitation and Electronic Business

UN/CEFACT Modeling Methodology (UMM) User Guide

CEFACT/TMG/N093

V20030922

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1.0 About this Document

1.1 Development Status

This user guide is approved after completion of the *TMG* review process which ended 9/21/2003. See 2.3 for a high level description of the UMM.

1.2 Caveats and Assumptions

Applicable UMM-MM Version:

Examples and descriptions provided were developed from the *UMM Meta-Model* (see Normative References).

Library Support

Use of the UMM assumes the availability of supporting Business Content Libraries:

- Business Entity Types Library
- Business Collaboration Patterns Library
- Core Components Library
- Business Object Library

In the event libraries such as those listed are not available, or the contents of such libraries do not adequately support a business collaboration to be modeled with reusable models, this user guide provides the procedures necessary to develop all required business process and information models.

Normative

The *UMM User Guide* is a non-normative document, which means that it does not provide a definitive (from the *UN/CEFACT TMG* point of view) specification of the UMM. The user guide may not always provide definitive answers or go into the detail required. In such cases, you will need to refer to the *UN/CEFACT TMG* specifications (see Normative References), links, and references included in the user guide.

The examples and other explanatory material in this document are provided to assist in the understanding of the UMM, but they may not always provide definitive answers. Additional reference to the various specifications listed in the Normative References may be required.

Required Tools and Syntax

A Business Expert will use worksheets to capture relevant information, according to the *UMM Meta-Model*. Technical Modelers will transform the information in the worksheets into UMM compliant models, using a UML tool and the (graphical) syntax of UML.

1.3 Basics about the *UMM USER GUIDE*

Level of Understanding

The UMM is targeted to the Modelers and Facilitators working with the business experts to extract their business knowledge. They need a high-level understanding of the concepts behind OO modeling, business process modeling, and some rudimentary knowledge of UML in order to utilize the UMM. See Normative References - Fowler.

The *UMM User Guide* provides a high level description of the UMM. Readers of the user guide should have an understanding of these basic UML diagrams:

- Use Case Diagrams
- Activity Diagrams showing Object Flows
- Class Diagrams.

Modeling Approach

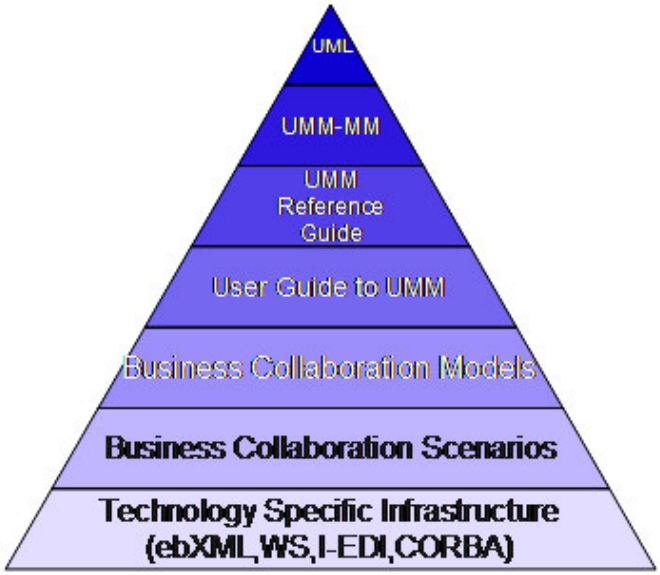

Figure 1 Coupling of Modeling Artifacts to UMM

The *UMM User Guide* employs a "step by step" approach, through the use of worksheets, to capture the business knowledge from business experts in non-technical terms, independent of any specific modeling tool. At the same time, the *UMM User Guide* provides an easily approachable description of the UMM using these same basic steps. The user guide presents a top-down approach. The user guide should be used alongside the formal descriptions of the UMM and its supporting specifications (see Normative References).

Document Structure

Each major section of the *UMM User Guide* outlines the process of using the UMM to develop Business Collaboration Framework worksheets and models.

Section 2.0 is a brief overview of the major concepts needed to understand the UMM and the role of participants involved in using this methodology. It describes the worksheet methodology, which employs a "top-down" approach to capture and organize the information needed to produce the UMM models. In addition, it provides a brief overview of who is involved in the UMM processes at various points in the exercise.

Sections 3.0 through 6.0 cover the step by step approach to working through the UMM to derive the information that will be used in each subsequent step and ultimately models that can be used to implement systems and services.

The **Appendix A, REA Overview,** provides supplemental information to understand concepts in regard to completing the REA Worksheet.

The **Appendix B, UMM Worksheet Example,** provides a very simple example, "Order from Catalog".

The **Appendix C, Data Types and Notation,** provides supplemental information to understand concepts discussed in this document.

2.0 Overview of the UMM

2.1 UMM Objectives

United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) has developed the UMM which:

- Has a comprehensive business process and business information meta-model as well as a comprehensive process analysis methodology.
- Retains business acumen that is reusable over generations of implemented technology
- Provides a methodology and supporting components to capture business process knowledge, independent of the underlying implemented technology
- Helps discover and define a set of reusable process and information descriptions. Patterns help enforce consistent, reproducible results from the UMM-MM across business domains and their business domain experts and analysts
- Implements processes that help insure predictable results from a software project
  - Facilitates the specification of reusable/reproducible process models, in objects and interface-specific object behavior descriptions that are technology and protocol insensitive.
  - Focuses on technology and protocol independent steps of a software engineering process.
- Is an extension of UML
  - Is a UML profile used to describe the UMM components to specify the business domain specific stereotyping that supports a complete business process and information definition to describe and analyze individual business processes.
- Structures the Business Operational View (BOV) of the Open-edi Reference Model into layers of “views”.

The UMM can be employed by business analysts to define external and internal Business Collaboration Frameworks. The UMM can be used to define the Business Collaboration Framework implemented between two or more parties. The UMM can be employed from the top-down or bottom-up or using both approaches simultaneously. The end result of an integrated use of the UMM would be a defined Business Collaboration Framework.

2.2 Basic Concepts

A business environment may be large and complex. Any basic understanding of this environment begins with information and documentation. The UMM is an incremental business process and information model construction methodology that provides levels of specification granularity suitable for communicating the model to business practitioners, business application integrators, and network application solution providers. The UMM provides the conceptual framework to communicate common concepts.

The following are basic UMM concepts that one should become familiar with before proceeding further. These and other concepts and terms are defined in the official UN/CEFACT Electronic Business Glossary (UEB).

Industry Expert

Business Expert

Business Stakeholder

Business Domain

Business Process

Business Collaboration

Business Process Activity

Business Collaboration Activity

Business Interaction Activity

Business Information

Business Collaboration Domain

Business Collaboration Model composed of:

- **Business Process Model**
- **Information Model**
- **Business Collaboration Pattern**
- **Business Entity**
- **State**
- **State Transition**
- **Event**
- **Life Cycle**
- **Business Transactions**
- **Business Information**
- **Business Object**

Open-edi Scenario

2.3 UMM Layers the BOV

The UMM is the formal methodology for describing any Open-edi scenario as defined in ISO/IEC 14662, Open-edi Reference Model. The Open-edi Reference Model is depicted in Figure 2. Examples of an Open-edi scenario are purchasing and inventory management. The primary scope of the UMM is to provide "a perspective of business transactions limited to those aspects regarding the making of business decisions and commitments among Persons, which are needed for the description of a business transaction". The UMM provides a procedure for specifying (modelling) collaborative business processes (= business collaborations) involving information exchange in a technology-neutral, implementation-independent manner.

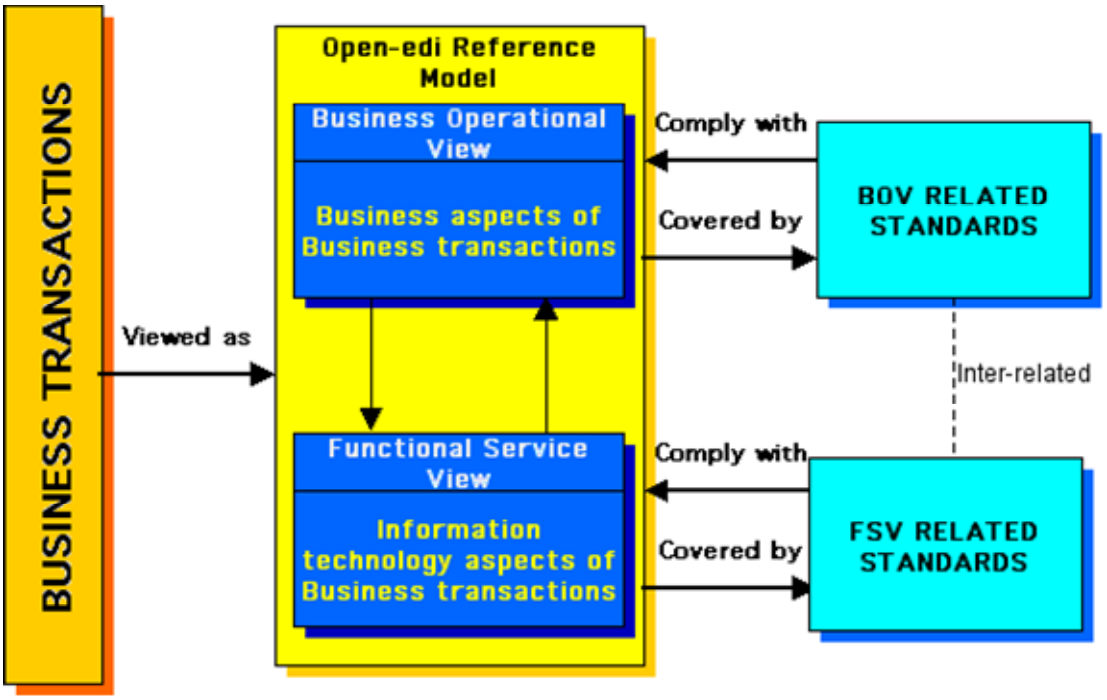

Figure 2 Open-edi Reference Model

Specifications related to the Open-edi Functional Service View are mostly outside the scope of the UMM. Hence, the BOV of a process defines the requirements placed on the information technology products and services chosen to implement the process described by the Open-edi scenario.

The UMM uses four (4) primary views for structuring modeling activities, all of which are contained within the BOV. The UMM is organized into the following views so that each business process and information model can be viewed from a number of perspectives. Each view is briefly described as follows:

- The Business Domain View (BDV) - the partitioning of business domain into business areas, process areas, and business processes. This view establishes the business context of the process which is a precursor to evaluating the likelihood of finding reusable, previously defined, process descriptions or terminology in the UMM libraries.
- The Business Requirements View (BRV) - the view of a business process model that captures the business scenarios, inputs, outputs, constraints and boundaries for business processes and their interrelationships within business process collaborations. This view is how the business domain expert sees and describes the process to be modelled. The BRV is expressed in the language and concepts of the business domain expert.
- The Business Transaction View (BTV) - the view of a business process model that captures the semantics of business information entities and their flow of exchange between roles as they perform business activities. This view is an elaboration on the business requirements view by the business analyst and is how the business analyst sees the process to be modelled. This view uses the language and concepts of the business analyst to convey requirements to the software designer and the business domain expert.
- The Business Service View (BSV) - the view of a business process model that specifies the component services and agents and their message (information) exchange as interactions necessary to execute and validate a business collaboration. The BSV is expressed in the language and technical concepts of the software developer.

The modeler sees all the views and is responsible for documenting each view in UML and preparing the output from one view for input to the next. Each UMM view produces a set of UMM models (deliverables) that are used as input to subsequent workflows.

The participants in the four UMM views are identified in the following. Depending upon the view, the roles could be played by different participants

1. Business Domain View (BDV) Modelling:
    a. *Business stakeholders*: Executive Management, Business Owners
    b. *UMM modelers*: Business Analysts, Business Architects
2. Business Requirements View (BRV) Modeling:
    a. *Business stakeholders*: Executive Management, Business Owners, Information Modelers, Process Modelers
    b. *UMM modelers*: Business Analysts, Business Modelers
3. Business Transaction View (BTV) Modeling:
    a. *Business stakeholders*: Business Analysts, Systems Architects, Implementers
    b. *UMM modelers*: Information Modelers, Process Modelers
4. Business Service View (BSV) Modeling:
    a. *UMM modelers*: derived from BTV UMM models

2.4 Business Modeling using UMM

The UMM specifies all information that needs to be captured during the analysis of an electronic commerce based business process. The UMM defines the modelling methodology and resulting artefacts for use when analysing and defining a business process.

Within this user guide, Business Process and Business Information Analysis Worksheets are used as simple business process aids to capture business process and business information requirements. The worksheets and corresponding usage methodology are derived from the UMM. The worksheets can be extended for specific vertical industry needs.

3.0 Modeling using the UMM

The *UMM User Guide* illustrates a simplified overview of the use of the UMM. This overview is provided through the definition of 3 major work areas corresponding to the first 3 UMM views, i.e., Business Domain View (BDV), Business Requirements View (BRV) and Business Transaction View (BTV). Procedures within each of these work areas describe how to populate the worksheets. The worksheets help collect and organize the information needed to produce the minimum UMM models for that work area.

The 4th UMM view, the Business Service View (BSV) models are not defined in the *UMM User Guide* as a work area, as these can be determined as a result of completing the procedures outlined in each of the preceding work areas.

Each *UMM User Guide work area* is composed of a set of procedures which build on each other to define the minimum required UMM models for these 3 views. These procedures are based on use of the worksheets that are used to create UMM models. A high-level overview of these worksheets and models can be seen in Figure 3.

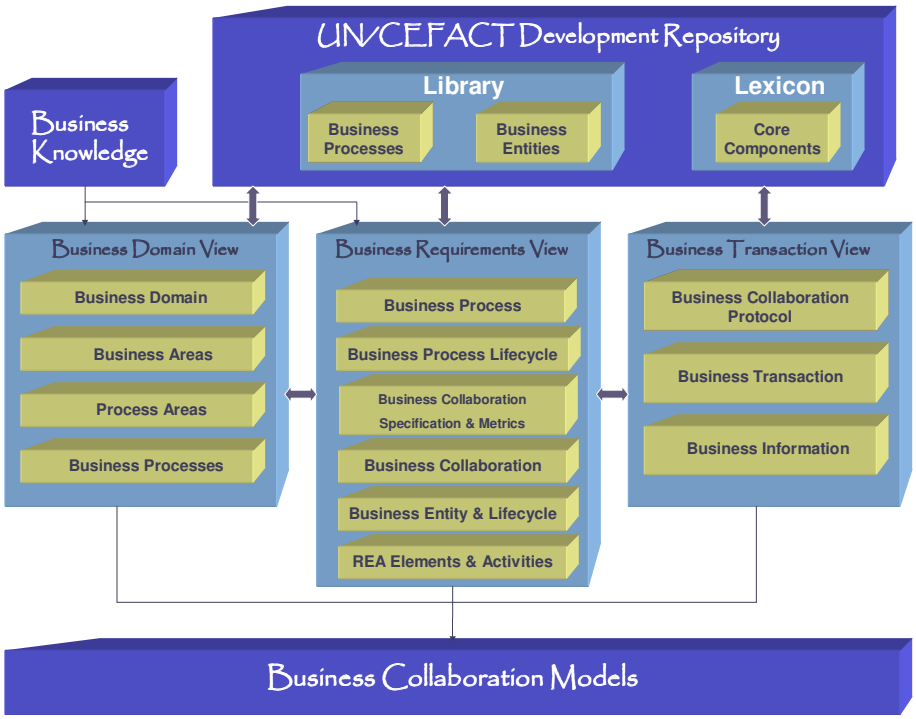

Figure 3 Overview of *UMM* Worksheets and Models

Refer to the *UMM Implementation Guide* (to be developed) for the necessary guidance to provide the production rules that transform UMM models to:

- Executable application software for the Business Service Interface
- Business document payloads in the required specific messaging technology syntax.

3.1 *UMM* Modeling Approach

Top-Down

Building a UMM compliant business model is a top-down modeling activity. The *UMM User Guide* takes this approach.

It starts off with a clear understanding of the specific domain of business activities within which the entire model exists. It de-emphasizes the use of business documents and transactions to model this view as that approach may have captured only one part of the required model. An emphasis is placed on the definition of Business Entities, their state management, and state lifecycle identification to produce a model that encompasses all instances and can evolve as new business requirements emerge.

Bottom-up modeling can be used as a starting point to fill in parts of the worksheets through use of existing business documents and transactions. It can help identify some model elements. However, the top-down approach must ultimately be applied in order to produce evolvable and maintainable models that support reuse and manage loosely coupled business processes between trading partners on the Internet.

Business Information Dependencies, not Document Exchange

The goal of the UMM is to understand and formalize the dependencies between partner processes for a problem domain. Historically business partner communication methodologies (such as EDI) have focused on modeling the business documents being exchanged while the

UMM instead focuses on modeling the business actions and objects that create and consume business information.

Measurability / Traceability

The UMM top-down approach drives out the identification of measurable business objectives and requirements, which can be verified by stakeholders. The UMM and the production rules in the *UMM Reference Guide* ensure the reification of these objectives as they are elaborated down to their technical realization. Traceability of these objectives is the basis for ultimate 'success' or 'failure' of the business model when in operation.

The other benefit from the top-down modeling activity is that it expresses the common semantics that will be used to describe a public business collaborative process. Previously defined business processes registered in the *UMM Business Component Libraries* (Registries) will provide definitions of business entities and other elements in business collaboration models. These definitions can be used to validate and categorize the semantics used in the model under construction. A common vocabulary will emerge which will increase the re-use and integration of the components stored in the *UMM Business Component Libraries*.

This top-down approach also emphasizes re-usability as the UMM artifacts. This approach emphasizes use of the UMM Business Component Libraries (Registries) to reuse previously defined components.

The libraries contain components captured in modeling public, versus private (or enterprise), collaborative business processes and adhere to the UMM and the production rules outlined in the *UML Reference Guide*. Components will be categorized and labeled with appropriate metadata to support ease of search and location of reusable components. New components must follow the procedures outlined by the UN/CEFACT for inclusion in this Library.

Model Production Approach

The UMM has adopted the usage of worksheets as a simple tool to collect and organize the information needed to produce the minimum UMM models for each work area. UMM models can be generated through a variety of methods. The worksheets can be used to manually generate these UMM models. A UML modeler or a Business Process Editor (BPE) tool can be used to generate these in a more indirect and automated fashion. The process of gathering information for the various work areas is iterative. As one works through the various views new information will be discovered and previous worksheets may need to be updated to reflect any changes.

In gathering the information from business stakeholders to be entered on the worksheets for the BDV, BRV or BTV work areas, the facilitator may learn information that is required for worksheets that would be covered at a later time. Vital information should be captured at the time it is discovered so as not to be lost. Worksheet facilitators should be prepared to keep track of such information on a notepad, for later transfer to the appropriate worksheets. An example of key modeling information that could be discovered in any work area is the identity of business entities and associated parameters such as lifecycles and states. For example, business entity information discovered in the BDV work area would be noted and entered at a later time in the Business Entity and Business Entity Lifecycle worksheets in the BRV work area.

3.2 Administrative Worksheet

A generic Administrative Worksheet applies to all work areas, i.e., BDV, BRV and BTV, as a means of capturing information about the source of a model and contact information.

Worksheet: Business Model Administration Information	
Model name	[Provide a representative name for the total model.]

Analysts/Modelers	[Provide a list of names of people who are participating in the business process analysis effort. Specify email addresses between angle brackets such as for John Doe <john@company.com>]
Model Owner	[Name of the organization sponsoring the analysis activities or that will own the resultant model. For example, UN/CEFACT.]
Identifier Information	
Agency Id	[The identifier of the organization that owns the business process model (or some subset there of). This is used in conjunction with the Agency field. This information is case sensitive; lower case is recommended. Examples are EAN identifiers and internet domain names.]
Agency	[The name of the agency, which owns or controls the Agency Id values. This information is used to create the BPINs identifiers. This information is case sensitive; lower case is recommended. For example, icann (for ICANN internet domain names) or eann (for EAN identifiers).]

4.0 BDV Work Area

4.1 Describe purpose of the BDV work area

The BDV is a framework for understanding business area sub-process interrelationships.

Often times a Business Domain Model is useful to define an overall “frame of reference” for the business processes being identified. It is advised that you use a predefined Industry Reference Model to help:

Consistently define the business process area boundaries

Achieve business process interoperability with future trading partners also following the same business reference model for their operating practices.

Also define basic terms accepted by the given industry segment. For example the Supply Chain Operations Reference (SCOR) model defines a frame of reference for supply chain. The Telemanagement Forum (TMForum) enhances the Telecom Operations Map. There also might be a more horizontal view such as the Porter Value Chain (PVC).

The BDV work area worksheets help the user begin to formalize the domain they are trying to model. The first stage is to identify the “top level parts” (entities) of the business domain and generally organize the main concepts in the domain. One defines the business terminology and identifies the business participants as well as which business processes those participants/players interact with. At this stage, i.e., BDV, the goal of the UMM is to:

- Understand the structure and dynamics of the business domain,
- Ensure that all users, standards developers and software providers have a common understanding of the business domain,
- Capture the BDV justification,
- Identify the stakeholders concerned with the modeled domain, some who will be independent of the processes within the domain.
- Understand the daily business in the business domain independent of any technical solution,
- Create categories to help partition the business domain that enables an iteration plan to complete the model,

A business environment may be large and complex; understanding of this environment starts from information and documentation provided by business experts. Business experts provide a categorization and decomposition of the business environment into business areas, process areas, and business processes. Later on, in the BRV workflow, business processes are further decomposed into business process activities in order to understand how the stakeholders in this business environment view the discreet units of work done within their organization. Business process activities are either one-partner activities or multi-partner activities.

Business process activities that are multi-partner activities are by definition business collaboration activities. Business process activities that are collaborative extend outside the organization. Business collaboration activities define the scope for business requirements gathering and specification. Since the business environment includes identification of requirements placed by one-partner activities on multi-partner activities, the interaction of one-partner activities with multi-partner activities needs to be taken into account as well. All of this takes place in the language of the business environment experts and stakeholders.

The UN/CEFACT standard Business Domain Model is the BPAWG International Supply Chain Model.

According to the UMM the following guidelines are to be used in defining (the boundaries of) a business area.

The stakeholders that have direct or immediate indirect influence on the business domain can define the business area. A stakeholder is defined as someone or something that is materially affected by the outcome of the system but may or may not be an actor. Actors are stakeholders that are involved in the business process and are thus part of the business model.

The business area can be defined by the information passing into or out of the business domain. Where possible, the domain boundaries should be chosen so that a business process is logically or organizationally initiated and concluded within them.

Key business entity classes can help define the business area. (i.e., things that are accessed, inspected, manipulated, processed, exchanged, and so on, in the business process).

Business processes identified in the BDV are either business processes within an enterprise, i.e., enterprise business processes (that are candidates for B2B collaboration), or collaborative business processes, depending on the starting point for the BDV workflow and the business domain experts on hand to work with the business analyst in developing the BDV.

A collaborative business process may derive its requirements from two or more enterprise business processes (from each participating trading partner).

The level of definition is driven by the value to the trading partners, so that they understand the business requirements and objectives, and how each business process fits into a larger value chain.

4.2 Define BDV work area steps and worksheet(s)

Steps	Artifacts	
	Section / Worksheet Name	Diagrams
1. Identify and Describe Business Area	4.2.1 / Describe Business Domain Model 4.2.2 / Describe Business Area	
2. Identify and Describe Process Area(s)	4.2.3 / Describe Process Area(s)	Business Area/Process Area Package Diagram
3. Identify Business Process(es)	4.2.4 / Identify Business Process(es)	Package diagram identifying and categorizing Business Processes within Business and Process Areas currently available in a Li-brary(Repository)
4. Identify Business Processes from the Business Process Library		BDV Use Case Diagrams for Library supported Business Processes
5. Identify and Finalize Business Processes and Partners		Final BDV Use Case Diagram Using Processes from Library (Processes and Partners Identified)

Table 1 - Business Domain View (BDV) Work Area

4.2.1 Identify and Describe Business Area

A Business Domain Model is a common business process framework, typically provided by an industry as a result of an effort to describe processes and their points of interconnection that make up the end-to-end customer operations process flows. The enhanced Telecom Operations Map™ (eTOM) of the TeleManagement Forum represents an excellent example of such a framework that focuses on processes that are specific to information and communications services and technologies management. A Business Domain Model for a business environment is the optimum starting point for finding candidate business processes that require or provide an opportunity for B2B collaboration .

Form: Describe Business Domain Model	
Business Domain Model Name	[Provide a name for the reference model. You can use an existing reference model such as the Supply Chain Council or the Porter's Value Chain or create your own name.]

™ TeleManagement Forum

Description	[A brief summary of this domain.]
Industry	[Provide the name of the industry that this business applies to. Search the business process library for a list of possible industrys. If the industry does not exist, then provide an appropriate name/label for the industry.]
Business Areas	[List the business areas within the scope. A business area is a collection of process areas. A process area is a collection of business processes. You may wish to refer to the ebXML Catalog of Business Processes that provides a list of normative categories that may be used as business areas.]
Business Justification	[Provide the business justification for the collection of business processes]
Category Schema	[Provide the name of the categorization schema used to categorize business processes in the industry.]
Stakeholders	[Identify the practitioners that care about the definition of this business domain. At this level, this is likely to be some participants in an industry group (perhaps a standards body or an enterprise). These are the people who will define the BRV.]
References	[Any external supporting documentation.]

458
459
460

461 4.2.2 Describe Business Area

462 The first level of decomposition of a Business Domain Model is a Business Area, e.g., market
463 segments of an enterprise or major operational areas such as Assurance processes within
464 Customer Relationship Management in the eTOM. (A business area might consist of sub-
465 business areas). Annex B shows example Business Areas as manufacturing, financial, retail,
466 transportation and services. However, the Business Area categories of a Business Domain
467 Model should reflect the business at hand, e.g., structure of the enterprise or common business
468 process framework of the industry.

469

Form: Describe Business Area

Business Area Name	[Provide a name for the business area. This should be listed in the Business Areas section of the Business Domain Model.]
Description	[A brief summary of this functional area.]
Scope	[Provide a high level statement that encapsulates the scope of this business area.]
Process Areas	[List the process areas within the scope. A process area is a collection of business processes.]
Objective	[Describe the objective of this business area.]
Business Opportunity	[Describe the business opportunity addressed by this business area.]
Category	[Provide the category identifier used to reference a business area set of business processes. This should be within the category schema.]
Business Areas	[List any other business areas that may be within the scope this business area.]

4.2.3 Describe Process Area

A Process Area may be another first level decomposition of a Business Domain Model, in a manner that is orthogonal to the categories chosen for the Business Areas. For example, when market segments are chosen for Business Areas, Process Areas may be end-to-end processes within the Business Domain for each Business Area, i.e., five fundamental activities of a business transaction as presented in ISO/IEC 15944-1: planning, identification, negotiation, actualization and post-actualization. Annex B shows example Process Areas as marketing, ordering, distribution, settlement and regulatory. Alternatively a Process Area may be a second level decomposition of a Business Domain Model, e.g.,Problem Handling within the Customer Relationship Management – Assurance cell of the eTOM. (A process area might consist of sub-process areas).

Form: Describe Process Area	
Process Area Name	[Provide a name for the process area. This should be listed in the Process Areas section of at least one Business Area.]

Description	[A brief summary of this functional area.]
Objective	[Describe the objective of this process area.]
Scope	[Provide a high level statement that encapsulates the scope of this process area. The scope of this process area must be within the scope of the encompassing business area. Typically the scope of the process area will be more constrained or limited than the scope of the corresponding business area.]
Business Opportunity	[Describe the business opportunity addressed by this process area.]
Category	[Provide the category identifier used to reference a business area or process area set of business processes.]
Business Processes	[List the business processes within the scope of this process area.]
Process Areas	[List any other process areas that may be within the scope this process area.]

4.2.4 Identify Business Process

Identification of Business Processes that require B2B collaboration, or are candidates for B2B collaborations is a primary objective of the BDV. A Business Process description is specified for each Business Process identified by this worksheet, using the Business Process worksheet of the BRV. Thus this worksheet provides a link to the Business Process worksheet. High level requirements, such as interdependencies with other Business Processes are noted here. Detailed requirements are left to the Business Process worksheet in the BRV.

Form: Identify Business Process	
Business Process Name	[Name of the business process as identified in the above Process Area.]
Description	[A plain text explanation of the purpose and behavior of the

	Business Process]
Business Processes	[List any business processes that depend upon, are associated with, or contained within this business process.]
Business Requirements	[High level requirements, such as interdependencies with other Business Processes are noted here.]

5.0 BRV Work Area

5.1 Describe purpose of the BRV work area

The BRV is important to show how a business collaboration type of business process fits into the enterprise views of the participating trading partners

Business requirements are expressed with reference to business entities that are affected by a business collaboration activity, e.g., order, goods transfer. Preconditions and post-conditions of the atomic business processes and of the business collaboration itself are best expressed by states of affected business entities, e.g., for order line - pending and order line - fulfilled. In support of this, business entities must be understood as to the states in which they may exist and the permitted state transitions in one or more life cycles. Business requirements are also expressed in terms of events that trigger the state transitions of business entities and of the business collaboration, e.g., delivery of goods triggers the transition of order line status from pending to fulfilled.

A business collaboration activity is a predefined set of activities and/or processes of partners that is initiated by a partner to accomplish an explicitly shared business goal and terminated upon recognition of one of the agreed conclusions by all the involved partners. Business information is gathered for the purpose of specifying business collaboration activities in terms of goals, requirements, and constraints. These are then expressed in formal representations that can be understood and confirmed by the business environment experts. Business collaboration activities are specified by a business analyst as business processes, requirements and business object flow graphs that define the choreography of atomic business processes, referred to as Business Transactions. The selection of a business collaboration pattern that fits the requirements of a business collaboration activity, if one is available, optimizes business process and information model reusability. However, in the absence of a suitable business collaboration pattern, the selection of pre-specified Business Transaction patterns simplifies and prescribes reusable components in a business collaboration activity.

Business requirements are expressed with reference to business objects that are affected by a business collaboration activity, e.g., order, goods transfer. Preconditions and post-conditions of the atomic business processes and of the business collaboration itself are best expressed by states of affected business objects, e.g., order line - pending and order line - fulfilled. In support of this, business objects must be understood as to the states in which they may exist and the permitted state transitions in one or more life cycles. Business requirements are also expressed in terms of events that trigger the state transitions of business objects and of the business

collaboration, e.g., delivery of goods triggers the transition of order line status from pending to fulfilled.

5.2 Define BRV work area steps and worksheet(s)

Steps	Artifacts	
	Section / Worksheet Name	**Diagrams**
1. Describe REA Elements and Activities of the Business Process Phases	5.2.1 / REA Worksheet	
2. Describe each Business Process (from BDV) in more detail	5.2.2 / Business Process	BRV Use Case Diagram with all identified business processes and partners
3. Identify and describe Business Collaborations starting with a large collaboration and breaking it down to smaller business collaborations use cases which need to be further described until business transactions are identified and described	5.2.3 / Business Collaboration Specification 5.2.4 / Business Process Metric	
4. Define Business Collaborations	5.2.5 / Business Collaboration 5.2.6 / Business Proc-ess/Collaboration Lifecycle (Activity Model)	Business Process Activity Model Conceptual Business Information Model Business Process Use Case Business Collaboration Use Case
5. Identify and Describe Business Entities	5.2.7 / Business Entity 5.2.8 / Business Entity Lifecycle	

Table 2 - Business Requirements View (BRV) Work Area

5.2.1 Business Collaboration with REA

An ontology for a business collaboration or for a business process would list the types of 'things' or objects that one would expect to see in a normal occurrence of a collaboration. The collaboration ontology used for UMM is called REA[1], and is explained in simple overview terms in Appendix A. Readers unfamiliar with REA terms may want to review this section.

[1] REA stands for Resource-Event-Agent, as explained in Appendix A.

Most straightforwardly, this ontology gives an analyst a candidate set of top-down objects, in the form of a UML class diagram, to consider for use in the Business Requirements View phase of the UMM. The worksheet associated with REA analysis assumes that the collaboration being studied progresses through five phases from start to finish. These phases are illustrated in Figure 4 and explained below as they are adapted from the ISO Open-edi model.

5.2.1.1 ISO Phases of a Business Process[2]

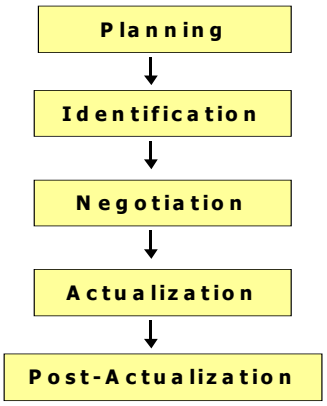

Figure 4 Phases of a Business Collaboration from the ISO Open-edi Model

- Planning: In the Planning Phase, both the buyer and seller are engaged in activities to decide what action to take for acquiring or selling a good, service, and/or right.
- Identification: The Identification Phase pertains to all those actions or events whereby data is interchanged among potential buyers and sellers in order to establish a one-to-one linkage.
- Negotiation: The Negotiation Phase pertains to all those actions and events involving the exchange of information following the Identification Phase where a potential buyer and seller have (1) identified the nature of good(s) and/or service(s) to be provided; and, (2) identified each other at a level of certainty. The process of negotiation is directed at achieving an explicit, mutually understood, and agreed upon goal of a business collaboration and associated terms and conditions. This may include such things as the detailed specification of the good, service, and/or right, quantity, pricing, after sales servicing, delivery requirements, financing, use of agents and/or third parties, etc.
- Actualization: The Actualization Phase pertains to all activities or events necessary for the execution of the results of the negotiation for an actual business transaction. Normally the seller produces or assembles the goods, starts providing the services, prepares and completes the delivery of good, service, and/or right, etc., to the buyer as agreed according to the terms and conditions agreed upon at the termination of the Negotiation Phase. Likewise, the buyer begins the transfer of acceptable equivalent value, usually in money, to the seller providing the good, service, and/or right.
- Post-Actualization: The Post-Actualization Phase includes all of the activities or events and associated exchanges of information that occur between the buyer and the seller after the agreed upon good, service, and/or right is deemed to have been delivered. These can be activities pertaining to warranty coverage, service after sales, post-sales

financing such as monthly payments or other financial arrangements, consumer complaint handling and redress or some general post-actualization relationships between buyer and seller.

5.2.1.2 The REA Worksheet

The REA worksheet that follows is patterned on the ISO description phases enumerated above. For parsimony, the elements of the planning and identification phase have been combined, as have the elements of the actualization and the post actualization phase. The analysis and requirements dialogue elicited from filling this worksheet out will clarify much of the work to be done in the remainder of the BRV (such as the Business Collaboration Worksheets and the Business Entity Worksheets). Users are expected to find themselves going back and reiterating through all of the worksheets as their requirements analysis becomes clearer and more amplified.

The **Overall Business Process REA Elements** part of the worksheet includes a description of the following:

- **Business Process Name --** Name the overall business process being modeled from the BDV analysis above. For example: Order From Catalog or Service Acquisition.
- **Resources** -- Identify in general terms the requited resource flows for this collaboration or business process. For example: Products for Cash, or Services for Credit Card Charge.
- **Partners** -- Identify the proposed business partners for this business process. For example: Seller, Buyer, and Shipper.

The **ISO Business Process Phases** row headings divide the remainder of the worksheet into three columns: **Planning/Identification**, **Negotiation**, and **Actualization/Post-Actualization.**

The **Activities Performed** row asks for a preliminary list of the tasks needed to complete each of the ISO process phases. Eventually these may prove to be candidate Business Processes.

- **Planning/Identification** -- Identify the activities involved in preliminary planning and the subsequent 1-to-1 matching of the reciprocal business partners. For example:
  - Request catalog or product list
  - Send catalog
  - Send availability request
- **Negotiation** -- Identify the activities involved in the normal negotiation and contracting process among the trading partners. For example:
  - Send offer
  - Send counter-offer
  - Buyer sends contract acceptance
- **Actualization/Post-Actualization --** Identify the activities involved in the requited transfers of economic resources between the identified trading partners. For example:
  - Send an shipping notice
  - Send receiving report
  - Send invoice
  - Send remittance advice
  - Send warranty invocation (post-actualization activity).

The Business Entities section of the REA worksheet identifies Business Entity candidates and shows how the identification of these entities flows through the ISO process phases.

- **Collaborative Business Partners:**
  - In the **Planning/Identification** phase -- Provide a name for the parties who are potential business partners in this proposed business process. These candidates should be identifiable as potential buyers (consumer) or sellers (producer) of resources identified in the cell just below this one in the worksheet.
  - In the **Negotiation** phase -- Provide additional party names if negotiations and contracting expand scope of collaboration. For example, the proposed use of a drop-shipper or monetary agent.
  - In the **Actualization/Post-Actualization** phase – Provide additional party names if the actualization activities involve expanding the list of partners. For example, if an agent for the buyer or seller might be used on a non-planned (not in the contract) basis.
- **Types of Identified Resources:**
  - In the **Planning/Identification** phase -- Provide a name for the types of economic resources to be exchanged in the business process. One of these will almost certainly be monetary in nature. Examples might be materials for cash, digital resources for cash, financial services for credit card charge, etc.
  - In the **Negotiation** phase -- Provide additional information if negotiation and contracting leads to more specific identification of resource types. For example, materials may be further classified into product groups.
- **Types of Events, Locations, or Partners To Be Specified (**Negotiation phase only) -- If the proposed exchange of resources from one partner to another has specialized constraints on the types of events or on the types of location or on the types of partner (often expressed as roles or specialized skills) needed to fulfill contracted commitments in the exchange, then list them here. For example:
  - **Event Types**: retail vs. wholesale types of purchases or hazardous vs. non-hazardous shipments.
  - **Location Types**: an approved receiving facility or a warehouse dock of a certain width and strength.
  - **Partner Types**: approved buyers, bonded cashiers, or appropriately designated customs authorities.
- **Specific Commitments** (Negotiation phase only) – Negotiations for resource exchanges normally result in the trading partners making specific commitments to each other to perform in the future. These commitments identify the terms of trade to be adhered to in the form of specifications for the resource types, event types, location types, and partner types enumerated in the cells above this row in the worksheet. A common example of a commitment is an order-line item. Commitments should occur in reciprocal pairs. For example, a commitment to deliver 100 cookies of type chocolate at wholesale pricing to any approved local store is reciprocated by a commitment to pay from a credit account two days later.
- **Specific Contract or Agreement** (Negotiation phase only) – A contract bundles reciprocal commitments. For example, a shipment schedule or a purchase order could a aggregate a commitment to ship with a commitment to pay. It is also possible here to specify an **Agreement Type** if the agreement is an example of a generalized type like a short-term purchase order or a year-long agreement with periodic releases.

- **Exchanged Resources** (Actualization phase only) – Identify the actual transferred economic resources in the exchange. For example, a specific car or a specific piece of furniture. In many cases, the actualization tagging of resources stops at the type-level of granularity, in which case the business entity here – **Resource** – will be congruent with the **Resource Type** business entity recognized in the negotiation phase above. This makes one of the two business entities redundant, so they should be combined.
- **Exchange Events** (Actualization phase only) -- Identify the names of actual economic events whose completion effects transfer of the identified economic resources from one partner to the other. For example, a completed shipment transfers products, and it is compensated by a later cash payment.
- **Actual Location** (Actualization phase, although it may apply to negotiation phase on occasion) – If it is important to note where an economic event occurred, location becomes a candidate business entity. On less frequent occasions, it is sometimes necessary to specify locations for commitments as they are negotiated in that phase.
- **Materialized Claim** (Actualization phase) -- If the contract or normal business practice entails specific identification of a partially fulfilled commitment with a materialized claim, identify that claim as a candidate business entity. For example, an invoice or a receivable.

The **Possible Exception Conditions** row of the worksheets allows enumeration of exception conditions that could interrupt the normal process flow from collaboration start to collaboration finish through the ISO phases. For example:

- In **Planning/Identification**, an exception can occur when an identified business partner is unable to respond to an availability request. This causes a need for re-identification.
- In **Negotiation**, an exception can occur in complete rejection of proposals. This causes suspension or abandonment of the proposed collaboration.
- In **Actualization,** an exception can occur when a shipped product proves faulty. This causes a need for warranty invocation.

The **Phase Completion Criteria** row of the worksheets specifies the state conditions for completeness of the appropriate ISO business process phase. For example, here are some state conditions that may apply in most cases.

- The **Identification** phase may be signaled as complete when the **Partners** are all in state “identified” and the **Resource Types** are also all in state “identified.”
- The **Negotiation** phase may be signaled as complete when the **Contract** and its bundled **Commitments** are all in state “in-force.” This requires as a precondition that the **Resource Types** (and possibly **Event Type**, **Location Type**, and **Partner Type** as well) be in state “specified.”
- The **Actualization** phase may be signaled as complete when the **Economic Events** are in state “complete,” the **Economic Resources** are in state “transferred,” the **Economic Claim** is in state “settled,” and the **Commitments** are in state “fulfilled.”

When the REA worksheet has been completed, a UMM user analyst may consolidate his or her analysis by preparing a preliminary UML class diagram that illustrates how the identified set of candidate business entities fit together. Again, guidance in preparing that diagram can be obtained with a quick scan of the text in the REA overview of Appendix A.

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Form: REA Worksheet			
Overall Business Process REA Elements	**Business Process Name**		
	Resources		
	Proposed Business Partners		
ISO Business Phases	**Planning/Identification**	**Negotiation**	**Actualization/ Post-Actualization**
Activities Performed			
Business Entities (candidates)			
Collaborative Business Partners			
Types of Identified Resources			
Types of Events, Locations, or Partners To Be Specified			
Specific Commitments (two min.)			
Specific Contract or Agreement			
Exchanged Resources (two min.)			
Exchanged Events (two min.)			
Actual Location (if needed)			
Materialized Claim (if needed)			
Possible			

Exception Conditions			
Phase Completion Criteria (expressed as entity states if possible)			

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722 5.2.2 Business Process

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724 The business process worksheet is the primary vehicle for gathering detailed requirements.
725 Business requirements are specified as single concept sentences in five categories:

726 1) Describe static relationships that must exist between entities, e.g., a Buyer must have a credit
727 rating,

728 2) Describe normal dynamic relationships that must exist between activities, e.g., the company
729 has the option of doing a credit check on any query made from any Buyer before responding
730 to a query, Note that the Process Lifecycle worksheet captures dynamic requirements of a
731 business process or business collaboration, and would suffice for this category.

732 3) Describe "exception" conditions, e.g., any time that a Buyer's credit rating changes, their
733 product reservations may be deleted,

734 4) System exceptions, e.g., a specific customer account number does not exist,

735 5) System administration requirements, e.g., security staff should be able to add/delete partner
736 and Buyer names while the system is "up."

737 A business process lifecycle is a set of conditions that can be identified for the business process,
738 i.e., Begins When, Ends When, intermediate points that can be monitored, and points where
739 exception processing could begin that result in an outcome other than normal completion. The
740 Lifecycle entry on this worksheet is a link to the Process Lifecycle worksheet where detailed
741 information would be specified.

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Form: Business Process	
Business Process Name	[Provide a name for the business process. This should be a name identified on the form "Identify Business Process" and on a "Describe Process Area" form.]
Description	[A plain text explanation of the purpose and behavior of the Business Process]
Business Requirements	[The list of business requirements that apply to this business

	process. The format of requirement definition is covered (as shown in Annex 4, Business process Specification Template, in the UMM).]
Definition	[A set of simple sentences that state actions may be performed as part of the business process.]
Participants	[List the type of partners involved in the business process. E.g. manufacturer, supplier, customer]
Preconditions	[Preconditions are the rules defining the conditions that must be true for the context that this process is conducted within. These rules are constraints that must be satisfied before instantiating or initializing the business process thus ensuring that the proper context for the process has been established.]
Begins When	[Identifies the event(s) from that start this business process.]
Ends When	[[List all the event(s) that causes normal completion of the business process.]
Exceptions	[List all exception conditions (events) that will cause the business process to terminate before its normal completion.]
Post-conditions	[Post-conditions are the rules defining the conditions that must be true for the localized context that exists after the business process completes. These rules are constraints that must be satisfied after the business process thus ensuring that the proper update to context of the parent process has been occurred.]
Supporting Business Collaborations and/or Business Processes	[List the business collaborations and business processes that support (are part of) this business process.]
Lifecycle(s)	[Identify the Lifecycle(s) (Activity Model) that formalizes the definition of this Business Process.]

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5.2.3 Business Collaboration Specification

Specify a business collaboration use case description with this worksheet when there are two or more actors. The Business Collaboration Specification worksheet is an extension of the Business Process Worksheet, thus many aspects of the description of the Business Process worksheet in 5.2.1 pertain to this worksheet as well. As for the Business Collaboration Specification Type, whenever there are two or more actors, a business process is a candidate for one of two types of business collaborations. A business collaboration protocol is a business collaboration at a low enough level that it can be represented by an activity graph, comprised of business transactions, each with object states specified as preconditions and post-conditions. Business transactions are the atomic level business collaborations according to the six BTV patterns. The same Business Collaboration Specification worksheet is used for these two types of business collaborations.

Realization is a link to the Business Collaboration worksheet (where additional detail would be specified) that corresponds to the Business Collaboration Specification worksheet. Supporting business collaborations are links to other instances of this worksheet for business collaboration protocols, or business transactions. Metrics is a link to the business process metric worksheet, which requests detailed information. Business transaction service functions that are prescribed as part of the BSV are identified here as trigger events for a business transaction.

Form: Business Collaboration Specification	
Business Collaboration Specification Name	[Provide a name for the Business Collaboration]
Business Collaboration Specification Type	[Choice between **Business Collaboration Protocol or Business Transaction Specification.**]
Description	[A plain text explanation of the purpose and behavior of the **Business Collaboration Specification**]
Definition	[A set of simple sentences that state the actions performed as part of the business process.]
Participants	[List the type of partners involved in the Business Collaboration, e.g. manufacturer, supplier, customer.]
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this process is conducted within. These rules are constraints that must be satisfied before instantiating or initializing the Business Collaboration thus ensuring that the proper context for the process has been established.]
Begins When	[Identifies the event(s) from that start this Business Collaboration.]

Ends When	[List all the event(s) that causes normal completion of the Business Collaboration.]
Exceptions	[List all exception conditions (events) that will cause the Business Collaboration to terminate before its normal completion.]
Post-conditions	[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the Business Collaboration completes. These rules are constraints that must be satisfied after the business process thus ensuring that the proper update to context of the parent process has been occurred.]
Realization	What Business Collaboration is use to realize or instantiate this Business Collaboration Specification
Business Requirements	[The list of business requirements that apply to this Business Collaboration. The format of requirement definition is covered (as shown in Annex 4, Business process Specification Template, in the UMM).]
Supporting Business Collaborations (including Business Transactions and Collaboration Protocols)	[List the business transactions and business collaboration protocols that support (are part of) this business collaboration.]
Lifecycle(s)	Identification of the Lifecycle(s) (Activity Model) that formalizes this Business Collaboration.
Metrics	[List of Metrics to be recorded for this business process/collaboration]
	Initiating:
	Responding:

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769 5.2.4 Business Process Metric

770 Business process metrics are operational or structural measurements that track how a business
771 process is performing over time. Operational metrics deal directly with dynamic properties of
772 business while structural metrics deal with static properties. For example, quantity measurements
773 are a performance count or a measure of the amount of product produced by a single process
774 case performance. Quality measurements are a determination of the value of the particular
775 product in relation to some pre-determined quality norm. Time of performance is a measure of

776 elapsed time between inception based on preconditions and completion based on post-conditions
777 being in place.

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Form: Business Process Metric	
Business Process Metric	[Provide a name for identification of a Metric or KPI. Metrics are the rules for defining the conditions for evaluating the localized context that exists during the Business Collaboration execution. They may define Key Performance Indicators (KPI) that reflect the achievement of particular business goals and/or objectives. These KPI's may also be the trigger certain events that are used as input to this and other processes.]
Description	[A plain text explanation of the purpose and behavior of the **Business Process Metric**]
Metric	[Provide the business rule that defines this metric. These rules must be computational in format, e.g. OCL or other formal notation.]
Start Trigger	[Identifies the event that start the measurement of the metric. This event may be computational in format, e.g. OCL or other formal notation.]
End Trigger	[Identifies the event that stops the measurement of the metric. This event may be computational in format. E.g.: OCL or other formal notation.]

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782 5.2.5 Business Collaboration

783 A business collaboration is the realization or instantiation of a business collaboration
784 specification. Thus, an instance of this worksheet is linked to an instance of the Business
785 Collaboration Specification worksheet. Realization of a business collaboration specification is
786 accomplished by introducing roles, resources, relationships of roles and resources to activities,
787 and defining the associations. (This would be done by applying a business collaboration or
788 business transaction pattern.) New information (over and above that in the Business
789 Collaboration Specification worksheet) is requested for partner roles and business entities
790 associated with the business collaboration.

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<table>
<tr><th colspan="2">Form: Business Collaboration</th></tr>
<tr><td>Business Collaboration Name</td><td>[Provide a name for the Business Collaboration. Normally this should be the same as the BCS that it instantiates, however due to possible contextual constraints or business rules it may be necessary to differentiate this collaboration.]</td></tr>
<tr><td>Business Collaboration Specification</td><td>[What Business Collaboration Specification does this Business Collaboration realize/instantiate?]</td></tr>
<tr><td>Description</td><td>[A plain text explanation of the purpose and behavior of the Business Collaboration Specification]</td></tr>
<tr><td>Participants</td><td>[List the type of partners involved in the Business Collaboration. E.g. manufacturer, supplier, customer]</td></tr>
<tr><td>Preconditions</td><td>From BRV Business Collaboration Specification Worksheet</td></tr>
<tr><td>Begins When</td><td>From BRV Business Collaboration Specification Worksheet</td></tr>
<tr><td>Ends When</td><td>From BRV Business Collaboration Specification Worksheet</td></tr>
<tr><td>Exceptions</td><td>From BRV Business Collaboration Specification Worksheet</td></tr>
<tr><td>Post-conditions</td><td>From BRV Business Collaboration Specification Worksheet</td></tr>
<tr><td>Partner Roles</td><td>[Identify the roles played by each partner.]<table><tr><th>Partner</th><th>Roles</th></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td></tr>
<tr><td>Business Entities</td><td>[Identify the Business Entities associated with this collaboration.]</td></tr>
<tr><td>Supporting Business Transactions or Business Collaborations</td><td>[List the business transactions or business collaborations that support (are part of) this business collaboration.]</td></tr>
</table>

5.2.6 Business Process Lifecycle

This worksheet is used to capture the dynamic requirements, i.e., activity model, for a business process or business collaboration. Activities indicated here are internal to a business process or business collaboration.

Form: Business Process/Collaboration Lifecycle (Activity Model)	
Process Lifecycle Name	[Provide a name for this Lifecycle. This name is used to identify the lifecycle that a Business Process or Business Collaboration is formally defined by.]
Description	[A plain text explanation of the purpose and behavior of the Lifecycle.]
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this process lifecycle is executed within. These rules are constraints that must be satisfied before instantiating or initializing the process lifecycle thus ensuring that the proper context for the process has been established. These conditions must be a subset of the preconditions defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.]
Begins When	[Identifies the event(s) that start this process lifecycle. For any lifecycle there is only one starting point, known as a start state. This list of events is the only one which will instantiate the lifecycle and cause it to enter into a start state. These event(s) must be a subset of the event(s) defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.]
States	The following section defines the states or conditions that the process lifecycle can be in.
Start State	The Start State is a pseudo state in which the initialization and instantiation of lifecycle artifacts and context occurs.].
State Transition Table (Start State)	**Event**: [Identifies the event(s) that start this process lifecycle. For any lifecycle there is only one starting point, known as a start state. This list of events is the only one which will instantiate the lifecycle

	and cause it to enter into a condition or state as determined by the processing of a defined event.] These event(s) must be a subset of the event(s) defined by the process that this lifecycle is defining and *may* be computational in format. E.g.: OCL or other formal notation.] **Source**: [For each event listed above identify the source of the event as defined by the current lifecycle context]. **Rule**: [For each event, define the constraint or guard that indicates the resultant condition or state. If there are multiple states for a given event there should be a rule for each. This rule should be computational in format. E.g.: OCL or other formal notation.]. **Transition to**: [For each event identify the resulting condition (state) of the lifecycle. If a particular event can result in more than one condition or state define the rule that indicates which condition will be the actual resultant.].

Event	Source	Rule	Transition to

For each state or condition of the lifecycle, repeat the following entries.

State	**Name**: [Identify a state or condition of this lifecycle.] **Description**: [Provide a textual description of this condition/state] **Definition**: [Definitions are the rules for defining the localized conditions that must be true within the context of this process lifecycle that asserts that this condition has been achieved. If these rules are not true for this condition, then an invalid or unknown state has been achieved. These rules must be computational in format. E.g.: OCL or other formal notation.] **Actions**: [Identify the set of actions that may be performed while in this state. Define the constraint (rule) that controls the performance of each action. In the case where no constraint is defined, the action is always performed.] **Name**: **Description**: **Definition**:

	Actions:
Transitions	Event / Source / Rule / Transition to
State	**Name:** **Description:** **Definition:** **Actions:**
Transitions	Event / Source / Rule / Transition to
Post-conditions	[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the process lifecycle completes. These rules are constraints that must be satisfied after the lifecycle thus ensuring that the proper update to context of the parent process has occurred. These constraint(s) must be a subset of the constraint(s) defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.]

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804 5.2.7 Business Entity

805 The entries in this worksheet are self explanatory.

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Form: Business Entity				
Business Entity Name:	[Provide the name that this Business Entity is identified by.]			
Description:	[A plain text explanation of the purpose and behavior of the Business Entity.]			
Business Entity Characteristics	Define the set of characteristics or attributes that define the structural aspects of the Business Entities.			
		Name	Type	Constraints
Business Entity Behavior	Define the set of operations that affect the behavioral aspects of the Business Entity.			
Name:	[Enter the name of the operation.]			
Lifecycle:	[Enter the name of the lifecycle that defines this behavior.]			

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810 5.2.8 Business Entity Lifecycle

811 The entries in this worksheet are self explanatory.

Form: Business Entity Lifecycle	
Business Entity Lifecycle Name	[Name the State Model. Below, in the States section of this worksheet, you can mention all of the state values and their information requirements]
Business Entity Name	[Provide a name for the Business Entity]
Description	[A plain text explanation of the purpose and behavior of the lifecycle defined here.]
States	The following section defines the states or condition that the lifecycle can occur.
Start State	The Start State is a pseudo state in which the initialization and

	instantiation of lifecycle artifacts and context occurs.
Transitions (Start State)	**Event**: [Identifies the event(s) from the start state of this lifecycle. For any lifecycle there is only one starting point, known as the start state. This list of events are the only ones that would instantiate the lifecycle and cause the business entity to enter into a condition or state as determined by the processing of the defined event. These event(s) may be computational in format. E.g.: OCL or other formal notation.] **Source**: [For each event listed above identify the source of the event as defined by the current lifecycle context]. **Rule**: [For each event, define the constraint or guard that indicates the resultant condition or state. If there are multiple states for a given event there should be a rule for each. This rule should be computational in format. E.g.: OCL or other formal notation.]. **Transition to**: [For each event identify the resulting condition (state) of the lifecycle. If a particular event can result in more than one condition or state define the rule that indicates which condition will be the actual resultant.].

Event	Source	Rule	Transition to

For each state or condition of the lifecycle, repeat the following entries.	
State	**Name**: [Identify a state or condition of this lifecycle.] **Description**: [Provide a textual description of this condition/state] **Definition**: [Definitions are the rules for defining the localized conditions that must be true within the context of this lifecycle that assert that this condition has been achieved. If these rules are not true for this condition, then an invalid or unknown state has been achieved. These rules must be computational in format. E.g.: OCL or other formal notation.] **Actions**: [Identify the set of actions that may be performed while in this state. Defined the constraint that controls the performance of each action. In the case where no constraint is defined, the action is always performed.] **Name**: **Description:** **Definition**: **Actions**:

<table>
<tr><td>Transitions</td><td>[For each event listed above identify the resulting condition (state) of the lifecycle. If a particular event can result in more than one condition or state, define the constraint (rule), that indicates which condition would be the actual resultant. This constraint should be computational in format. E.g.: OCL or other formal notation.].
<table>
<tr><th>Event</th><th>Source</th><th>Rule</th><th>Transition to</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>State:</td><td>Name:
Description:
Definition:
Actions:</td></tr>
<tr><td>Transitions</td><td>
<table>
<tr><th>Event</th><th>Source</th><th>Rule</th><th>Transition to</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Post-conditions</td><td>[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the process lifecycle completes. These rules are constraints that must be satisfied after the lifecycle, thus ensuring that the proper update to context of the parent process has occurred.
These constraint(s) must be a subset of the constraint(s) defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.]</td></tr>
</table>

6.0 BTV Work Area

6.1 Describe purpose of the BTV work area

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. In the BRV use case descriptions for the business collaboration and all included business transactions have been provided. According to these descriptions a choreography of the business transactions within the business collaboration must be defined. An activity graph, the so-called business collaboration protocol, choreographs the business transaction activities. Note, no other activities are allowed in a business collaboration protocol. Furthermore, the business collaboration protocol defines the transitions between business transaction activities based on business entity states. Accordingly, the business collaboration protocol defines the overall choreography of the business collaboration. The business collaboration protocol worksheet helps to define this step.

Each activity of the business collaboration protocol is a business transaction activity, which is further detailed by a business transaction which is by itself an activity graph. There is a 1-to-1 relationship between business transaction activity and business transaction. Thus, the terms business transaction activity and business transaction are synonyms from a business viewpoint, but refer to different notations in UML.

A business transaction is an atomic business process between two business partners, which involves sending business information from one partner to the other and an optional reply. A business transaction is made up of a requesting (initiating) business activity performed by the initiating partner and a responding business activity performed by the responding business partner. The requesting business activity outputs business information (represented by a object flow state) that is input to the responding business activity. Business information created by the responding business activity and returned to the initiating business activity is optional. A business transaction follows one out of six different business transaction patterns. A worksheet supports the definition of the corresponding business transaction.

The purpose of a business transaction is triggering a state transition of a business entity according to the business requirements. In a collaborative environment both business partners must align the states of the business entities. Thus, they have to share the views of the business entities by exchanging business information. It follows that the goal of exchanging business information is changing the state of a business entity.

What makes up the business information to satisfy this goal? It seems to be straight forward that the business information must reference all the business entities changing state as a result of the exchange. For each of these business entities the minimum information required to change the state must be identified. Note, here is the big difference to traditional EDI which was based on business documents carrying a lot of overhead. Additionally, the business information includes some general information, something like header information that is independent of the business entities.

Information about business entities (as well as the general information) is manifested by business objects. A business objects is a reusable class or a set of associated classes representing a specific business concept in order to build business information structures. Reusable means that business objects are not specific to a single business transaction. Therefore, this approach assumes the existence of a library of business objects. When modeling business information structures, one will select suitable business objects from this library and customize them to the needs of the business transaction. Customizing means setting the business objects into the context of the business transaction.

Customizing business objects consists of two major tasks. The first task is establishing relationships, mostly associations, between the selected business objects. The context in which a business object is associated to another one is notated by an association role. For example: A party registers its party details including a shipping address and an optional billing address. Two associations between party and address are established, one with the association role “shipping” and one with the association role “billing” on the address end of the association. It follows that the UMM approach of setting business objects in context is based on association roles. Customization based on generalization (e.g. defining subclasses shipping address and billing address of the superclass address) and enumerated type attributes (e.g. adding an attribute called “type” to the class address that takes on an enumerated value of billing, shipping, etc.) are not used in UMM.

The second task during customization focuses on the attributes of business objects. A re-usable business object lists a number of attributes that are meaningful in general. However, not all of these attributes might be valid in a given context. Since the business information exchanged is always modeled in context, the business information presents a view on the business objects. This means, one has to select the attributes that apply in the given context, i.e. that are necessary to change the state of a business entity. Note, if a business object is built by associated classes, the second task does also apply to the associations between these classes.

What is the relationship between business objects and core components? Both provide building blocks that are independent of the transfer syntax. These building blocks are used to structure information exchanged between business partners. Core components are the result of a bottom-up approach. This means that they provide building blocks for business documents as they were used in traditional EDI. Business Objects follow an object-oriented approach and cover business logic that is used for business entity changes. This means business objects are the object-oriented representation of core components that follow a top-down approach. It follows that there will be a lot of business objects and core components that represent the same business concept and have a considerable overlap in their anatomy. Thus, core components provide an excellent source in building business objects. Conceptually, business objects refer to core components, and their customization within a business information refers to a business information entity. This means, business information entities are not a source for building business objects.

Annex C defines all the data types for UMM. The data type of any attribute of a business object must be one out of this list. Furthermore, the annex shows some very basic business objects.

The Business Information worksheet is provided for documenting the key informational elements that are important to a transaction. This worksheet is very helpful in achieving document element level interoperability (particularly in cases where document schemas are used in different business transactions). Key elements include, but are not limited to, the following:

- Information that is necessary or helpful in correlating the exchanged business documents within the same transaction or across multiple transactions
- Information that is critical or has proven to be problematic in the past for integration and interoperability of the services participating in the business transaction
- Specification of enumerated data types (code lists) and subsets thereof
- Constraints on the values in the business information exchanged

6.2 Define BTV work area steps and worksheet(s)

Steps	Artifacts	
	Section / Worksheet Name	**Diagrams**
1. Define a Business Collaboration Protocol (object state flow diagram) for each business collaboration use case (built by business transaction activities)	6.2.1 / Business Collaboration Protocol (Activity Model)	Business Collaboration Object Flow Diagram
2. For each Business Transaction activity define a business transaction activity graph. Identify requesting information and optional responding information	6.2.2 / Business Transaction	Use Case Diagram Business Transaction Object Flow Diagram
3. Create class diagrams by re-using existing information structure	6.2.3 / Business Information	Final Business Information Models

Table 3 - Business Transaction View (BTV) Work Area

910

911 6.2.1 Business Collaboration Protocol (Activity Model)

912 This worksheet is self explanatory.

Form: Business Collaboration Protocol (Activity Model)	
Business Collaboration Protocol	[Provide a name for the Business Collaboration Protocol.]
Description	[A plain text explanation of the purpose and behavior of the Business Collaboration Protocol]
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this BCP is executed within. These rules are constraints that must be satisfied before instantiating or initializing the BCP thus ensuring that the proper context for the BCP has been established. These conditions must be computational in format. E.g.: OCL or other formal notation.]
Begins When	[Identifies the event(s) from that start this BCP. For any BCP there is only one starting point, known as a start state. This list of events are the only ones which will instantiate the BCP and cause it to enter into a condition or state as determined by the processing of the defined event. These event(s) may be computational in format. E.g.: OCL or other formal notation.]
Business Transaction Activities	The following section defines the states that the Business Collaboration Protocol can occur. These states define which Business Transactions are performed.
Start State	The Start State is a pseudo state in which the initialization and instantiation of Business Collaboration Protocol artifacts and context occurs.].
Recognized Events (Start State)	[Identifies the event(s) from that start this Business Collaboration Protocol. For any Business Collaboration Protocol there is only one starting point, known as a start state. This list of events are the only ones which will instantiate the BCP and cause it to enter into a condition or state as determined by the processing of a defined event. These event(s) may be computational in format. E.g.: OCL or other formal notation.]

Transitions (Start State)	[For each event listed above identify the resulting Business Transaction Activity of the Business Collaboration Protocol. If a particular event can result in more than one Business Transaction Activity, define the constraint, which indicates which condition will be the actual resultant. If more than one constraint qualifies for a particular event, then the Business Collaboration Protocol process path will fork. This constraint should be computational in format. E.g.: OCL or other formal notation.].
State:	
Transitions	Event | Source | Rule | Transition to
State	
Transitions	Event | Source | Rule | Transition to

For each Business Transaction Activity of the lifecycle, repeat the following entries.

Business Transaction Activity	**Name**: [Identify a Business Transaction Activity of this Business Collaboration Protocol.] **Description**: [Provide a textual description of this Business Transaction Activity] **Definition**: [Definitions are the rules for defining the localized conditions that must be true within the context of this Business Collaboration Protocol that asserts that this condition has been achieved. If these rules are not true for this condition, then an invalid or unknown state has been achieved. These rules must be computational in format. E.g.: OCL or other formal notation.] **Action**: [Identify the Business Transaction that is performed while in this Business Transaction Activity.]
Recognized Events	[Identifies the event(s) that are recognized by the Business Transaction Activity. These event(s) may be computational in format. E.g.: OCL or other formal notation.]

Transitions	**Event:**	[For each event listed above identify the resulting Business Transaction Activity of the Business Collaboration Protocol. If a particular event can result in more than one Business Transaction Activity, define the constraint, which indicates which condition will be the actual resultant. If more than one constraint qualifies for a particular event, then the Business Collaboration Protocol process path will fork. This constraint should be computational in format. E.g.: OCL or other formal notation.]
	Associated Business Entity:	[Identify any Business Entities that are affected by this transition and their defined state.]
Business Transaction Activity	**Name**: **Description:** **Definition:** **Action:**	
Recognized Events		
Transitions:	**Event:**	
	Associated Business Entity:	
Post-conditions	[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the Business Collaboration Protocol completes. These rules are constraints that	

	must be satisfied after the Business Collaboration Protocol thus ensuring that the proper update to context of the parent process has occurred. These constraint(s) must be a subset of the constraint(s) defined by the process that this Business Collaboration Protocol is defining and be computational in format. E.g.: OCL or other formal notation.]

6.2.2 Business Transaction

The follow figure provides simple decision criteria for selection of business transaction patterns.

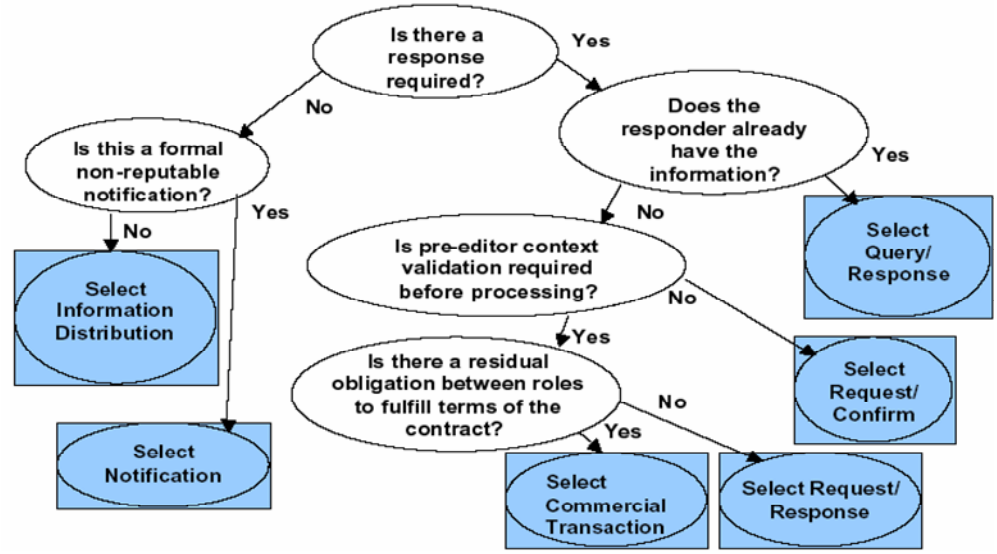


Figure 5 Business Transaction Pattern Decision Tree

Form: Business Transaction	
Business Transaction Name	[Provide a name for the Business Transaction.]
Description	[A plain text explanation of the purpose and behavior of the Business Transaction.]
Select Business Transaction Pattern:	Select one of: 1) Commercial Transaction 2) Request Confirm 3) Request Response 4) Query Response 5) Information Distribution 6) Notification

Secure Transport:		[True or False,]	
Non Repudiation Required:		[True or False]	
Authorization Required:		[True or False]	
Time to Perform:		[Specify the time period that this transaction must be completed within.]	
Time to Acknowledge Receipt:		[Specify the time period that a Receipt Acknowledgement must be returned by the responding role.]	
Time to Acknowledge Acceptance:		[Specify the time period that a of an Acceptance Acknowledgement must be returned by the responding role.]	
Partner Roles			
Initiating/Requesting Partner Type		[Partner type from collaboration.]	
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).]	
Responding Partner Type		[See above.]	
Responding Partner Role		[See above.]	
Requesting Business Activity			
Activity:			
Pre-Conditions		[Business rules performed before activity is performed]	
Post-Conditions		[Business rules performed after activity is performed]	
Number of Retries:			
Information Envelope:			
	Information Type:		
	Information State:	[Identify the Information Envelope allowed state(s).]	
	Information Security:	Are Contents Confidential?	[True or False]
		Is the Envelope Tamperproof?	[True or False]

		Authentication Required?	[True or False]	
	Business Information Manifest	[Enter the name(s) of the **Business Information** contained in envelope.]		
		Business Information Name	[Enter name]	
		Information Type:	[Enter type]	
		Information State:	[Identify the Business Information allowed state(s).]	
		Information Security:	Are Contents Confidential?	[True or False]
			Is the Envelope Tamperproof?	[True or False]
			Authentication Required?	[True or False]
Responding Business Activity				
Activity:				
Pre-Conditions		[Business rules performed before action is executed]		
Post-Conditions		[Business rules performed after action is executed]		
Validation of Request Required:		[True or False]		
Information Envelope:		[Enter Name]		
	Information Type:	[Enter Type]		
	Information State:	[Identify the Information Envelope allowed state(s).]		
	Information Security:	Are Contents Confidential?	[True or False]	
		Is the Envelope Tamperproof?	[True or False]	
		Authentication Required?	[True or False]	
	Business Information Manifest List:	[Enter the name of the **Business Information** contained in envelope]		

		Business Information Name	[Enter name]	
		Information Type:	[Enter Type]	
		Information State:	[Identify the Business Information allowed state(s).]	
		Information Security:	Are Contents Confidential?	[True or False]
			Is the Envelope Tamperproof?	[True or False]
			Authentication Required?	[True or False]

6.2.3 Business Information

This worksheet is self explanatory.

Form: Business Information				
Business Information Name:	[Provide the name that this Business Information is identified by.]			
Description:	[A plain text explanation of the purpose and behavior of the Business Information.]			
Business Information Characteristics	Define the set of characteristics or attributes that define the structural aspects of the Business Information. **Name:** [Enter the name of the characteristic.] **Type:** [Enter the type of the characteristic. e.g. this is referred to business information.] **Constraints:** [The rules for defining the conditions that must be true for the inclusion and/or validation of this characteristic. These rules may be computational in format. e.g.: OCL or other formal notation.]			
	Characteristics or Attributes	Name	Type	Constraint
Business Information Behavior	Define the set of operations that affect the behavioral aspects of the Business Information.			
	Name:	[Enter the name of the operation.]		

	Lifecycle:	[Enter the name of the lifecycle that defines this behavior.]

Normative References

Specification	Version	URL:
Open-edi Reference Model Standard	ISO/IEC 14662:1997	ISO/IEC 14662:1997(English) ISO/CEI 14662:1997(Français)
Business agreement semantic descriptive techniques – Part 1: Operational aspects of Open-edi for implementation	ISO/IEC 15944-1:2002	ISO/IEC 15944-1:2002
Reference Guide: The New Generation of EDIFACT	TMWGN010 R12	The Next Generation of UN/EDIFACT R12
UMM Meta-Model	UN/CEFACT TMG N091	UMM Meta-Model
UN/CEFACT eBusiness Glossary (UeB Glossary)	TBD	UN/CEFACT Electronic Business Glossary (UEB)
Martin Fowler, UML Distilled: A Brief Guide to the Standard Object Modeling Language	2nd Edition	Books by Martin Fowler

Appendix A. REA Overview

A.1. REA (Resource-Event-Agent) Introduction

Ontology, according to the most generally accepted e-commerce definition of that word, is a "specification of a conceptualization." [2] The REA (Resource-Event-Agent) ontology is a specification of the declarative semantics involved in a business collaboration (or more generally in a business process). The theory behind REA comes from the field of microeconomics with specific ties in many instances to the use of economic definitions in the practice of building enterprise-wide information systems. In the UN/CEFACT work (including the BET and the BCP&MC specifications), all of the REA ontology definitions are applied to the collaborative space between enterprises where market exchanges occur in closely synchronized fashion among two or more trading partners.

In its most simple form without a high degree of precision, REA can be portrayed as a UML class diagram with associations and generalizations relating the object classes. The intent of this appendix is to display REA simply and to explain its basic rationale. To do so, the appendix will use a set of three figures labeled A-1, A-2, and A-3. The most advanced of the figures (A-3) is a good overall guide to the BRV semantics, given both here and in the Unified Modeling Methodology (UMM) of UN/CEFACT. This appendix will also list a series of archival publications that are freely available at the following website for readers who desire more detailed explanations (http://www.msu.edu/user/mccarth4/rea-ontology/index.htm).

A.2. The Basic REA Ontology

The Basic REA model was first published in the July 1982 issue of *The Accounting Review*[3], the most prominent, most reliable, and most tightly controlled outlet for theoretical-based accounting work in the world. Its basic premises have withstood all challenges in the 20 years since, and its components are used extensively in a variety of educational, practical, and theoretical contexts.

Figure A-6 illustrates the basic class structure of REA ontology. The left-to-right configuration of economic **R**esources, economic **E**vents, and economic **A**gents (renamed in **UMM** as "Partner") in a typical business collaboration pattern is the source of the model's REA name.

Figure A-6 Basic REA Ontology

[2] Thomas Gruber (1993) "A Translation Approach to Portable Ontologies," *Knowledge Acquisition*, pp. 199-220

[3] William E. McCarthy (1982.) "The REA Accounting Model: A Generalized Framework for Accounting Systems in A Shared Data Environment." *The Accounting Review* (July), pp. 554-578

A successful business collaboration involves first and foremost two types of *Economic Events*, each of which details the *Economic Resources* involved in an exchange between two Trading *Partners*. For example, a Supplier (Trading Partner) transfers ownership of an Automobile (Economic Resource) to a Customer (Trading Partner) in return for which (*duality* association) the Customer will provide Money (Economic Resource) to the Supplier. There are two mirror-image instantiations of the object pattern shown in Figure A-1 where one transfer represents the legal or economic consideration given for the other.

The declarative semantics shown here are central to all trading relationships. Economic Resources are objects that have value and are under the control of one of the two collaborative agents. Trading partners always expect requited transfers of resources when they engage in commerce. Hence, Figure A-6 is a pattern for all economic exchanges.[4]

A.3. Adding Commitments to the Basic Exchange Ontology

In electronic commerce, the actual trading phase of an exchange is accommodated well by the object structure shown above in Figure A-6. However, trading partners in long-term relationships need more trusted and predictable structures where both parties contract for their exchange behavior in advance. The REA ontology accommodates this expansion with the addition of the classes shown as *Economic Commitments*, *Economic Contract*, and *Agreement* in Figure A-7.

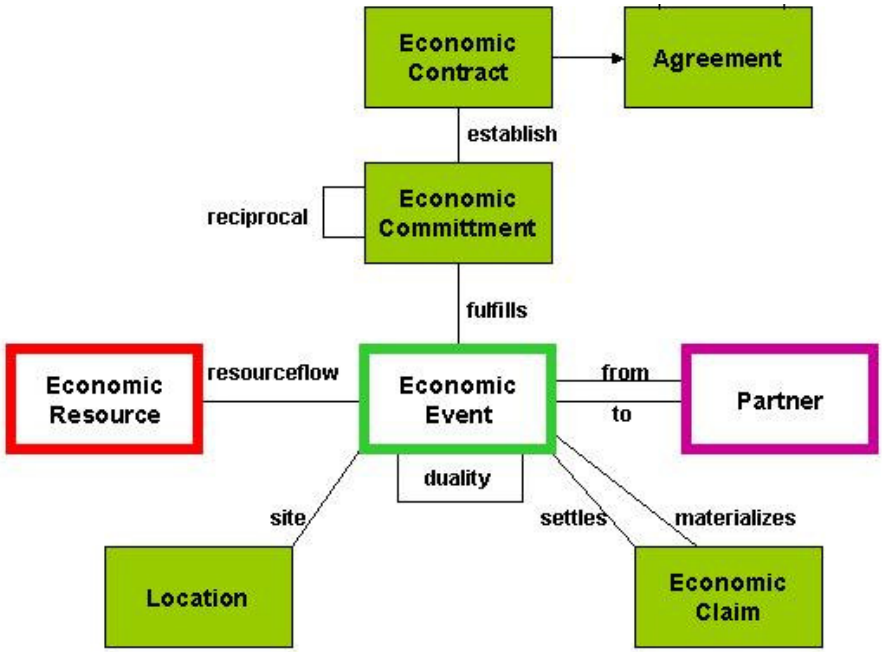


Figure A-7 REA Ontology with Commitments

A *Commitment* is a promise by a Trading Partner to initiate an Economic Event in the future. Performing the Economic Events *fulfills* that Commitment. Commitments should always be *reciprocated* by the other Trading Partner who commits to initiate another type of Economic Event in return. An *Economic Contract* is a bundle of reciprocating commitments between Trading Partners who bind themselves to one or more economic exchanges in the future. A contract is a subtype of the more general object class called *Agreement*, and Agreements can regulate other Agreements.

In the case of the automobile-for-money exchanges discussed in the prior section, Commitments

[4] G. Geerts and W.E. McCarthy (1999). "An Accounting Object Infrastructure For Knowledge-Based Enterprise Models." *IEEE Intelligent Systems & Their Applications* (July August 1999), pp. 89-94

would involve the Customer agreeing to accept delivery of an Automobile on a certain date in return for which he or she would be contractually obligated to making a series of Cash payments to the Supplier for that purchase.

In the bottom part of Figure A-7, two additional objects of the REA ontology are illustrated: *Claims* and *Locations*.

- Materialization of *Claims* is sometimes needed when Trading Partners insist on documentation of partially completed exchanges (for example, when a Customer takes possession of an Automobile before paying for it in full). If needed, Claims can be instantiated by documents like invoices or by accounting artifacts like accounts-receivable. Their inclusion here is more a matter of business custom than ontological completeness.
- A *Location* is another object that is sometimes needed to fill out the specification for a full economic transfer. Locations simply identify the place where Economic Events take place.

The economic and ontological foundations of commitments are explained more completely by Geerts and McCarthy.[5]

A.4. Adding Types to the Basic REA Exchange Ontology

The object pattern portrayed in Figure A-7 above is primarily *descriptive* in the sense that it illustrates what actually occurred in an economic exchange or what has been committed to. In the **UMM**, these *descriptive* components have been augmented by *prescriptive* components that allow the specification of control policies or collaboration patterns. These prescriptive components are enabled by the inclusion of type images of the basic descriptive objects[6]. The class diagram of Figure A-8 shows these additions.

[5] G. Geerts and W.E. McCarthy (2000) “The Ontological Foundation of REA Enterprise Information Systems, “ paper presented to the Annual Meeting of The American Accounting Association, August 2000.

[6] G. Geerts and W.E. McCarthy (2002) “An Ontological Analysis of the Primitives of the Extended-REA Enterprise Information Architecture,” *The International Journal of Accounting Information Systems* (Vol. 3), pp. 1-16.

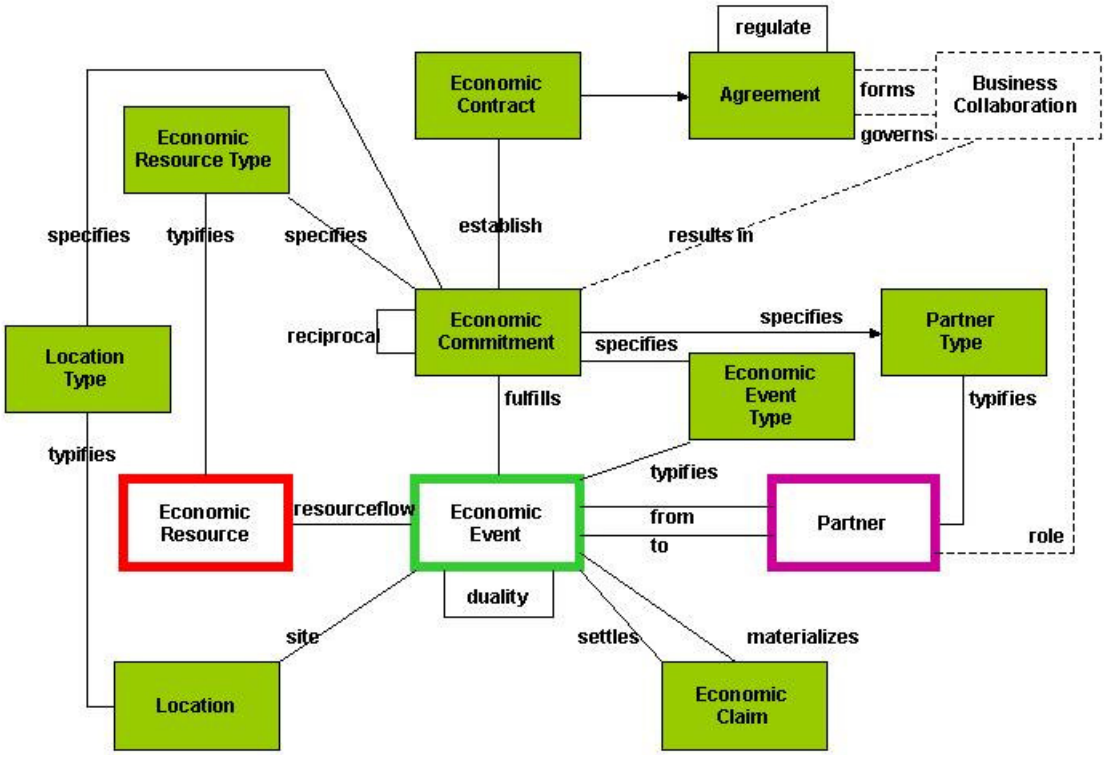


Figure A-8 REA Ontology with Types

The addition of Types to Figure A-8 proceeds in two stages:

- The three base descriptive classes – Economic Resource, Economic Event, and Partner (Economic Agent) – have classes added for their types. These new classes are connected to the descriptive objects by *typifies* associations. An example of a Resource Type could be different models of automobiles. An example of Economic Event Type could be the classes of retail transaction and wholesale transactions, each with different pricing structures. An example of Partner Type could be different classes of employees, each type with separate training requirements. Additionally, the class Location is also typified. An example of Location Type might be different types of loading docks with different sizes and stress capability levels.
- The full design of the Economic Commitment would necessitate associations with between the commitment and each of the new type-level objects. These are illustrated in the figure with *specifies* associations.

In addition to these two groups of additions, there are other REA associations in the **UMM** (and in the BET specification and the BCP&MC specification) that are not illustrated here in an effort to minimize diagram complexity. These include:

- Partner – *responsible* -- Contract
- Partner -- *participates* – Agreement
- Agreement Type – *typifies* - Agreement
- Partner – *participates* – Economic Commitment
- Economic Commitment – *reserves* – Economic Resource
- Economic Commitment – *destination* – Location

And finally with regard to Figure A-8, the partial integration of the elements of the REA ontology with the components of the UMM business collaboration framework is illustrated by showing the class for Business Collaboration (with dotted lines) and some of its associations with REA classes

(also illustrated with dotted lines). Outside of its use with the UMM and the attendant specifications, the REA ontology has a three-level architecture that is explained by Geerts and McCarthy.[7] In the UMM, this three-level architecture is effected by the integration of REA components within the business collaboration framework and by the connection of the Business Requirements View (BRV) to the to the Business Domain View (BDV) above it and the Business Transactions View (BTV) below it.

[7] G. Geerts and W.E. McCarthy (2001).“Using Object Templates from the REA Accounting Model to Engineer Business Processes and Tasks,” *The Review of Business Information Systems*, vol. 5, no. 4, pp. 89-108.

Appendix B. UMM Worksheet Example

Introduction to UMM Worksheet Example

This simple example deals with a start-up business that would like to sell products to the public using an electronic catalogue. The following is the information that may be gathered by business analysts and modelers after interviewing various management personnel:

Order From Catalog Business Case

To order from a Seller's catalogue the Buyer determines whether he has a current catalogue of the Seller or not. If not, the Buyer sends a request for the catalogue and the Seller returns the electronic version of the catalogue.

Having the catalogue, the Buyer decides whether he wants to order a product(s) from the catalogue. If not the transaction is completed.

If the Buyer decides to place an order, he must verify whether he is already registered with the Seller (since a Seller accepts only registered Buyers). If the Buyer is not already registered, he sends his Buyer information. After verification of the Buyer information and credit, the Seller returns a Buyer ID.

Before ordering, the Buyer verifies whether the current price of the product is available. If not, the Buyer will request a price quote and the Seller returns the price quote. Note that only a registered Buyer can request a price quote. Note also that a request for a price quote, as well as orders, may be reviewed and approved by regulatory authorities. On the basis of the price quote the Buyer decides to order the product(s) or not. If not, the transaction is completed.

If the Buyer wants to order the product(s) (according either to the already known price information or to the requested price quote) he sends an order to the Seller. Once the order is accepted and the product is shipped, the Seller will debit the Buyer's credit card and send the Buyer a shipment notice.

Until the Buyer has received the ordered product, he can decide to request the order status from the Seller. The Seller then returns the order status information. The cycle of requesting order status and sending order status information might be executed multiple times.

When the Buyer receives the ordered product the transaction will be successfully completed.

The whole workflow can be executed multiple times (whenever the product(s), a catalogue or a price request is needed).

This main workflow does not consider any exceptions in the business case.

It is assumed that the Buyer may not cancel or change an order once an order number has been issued.

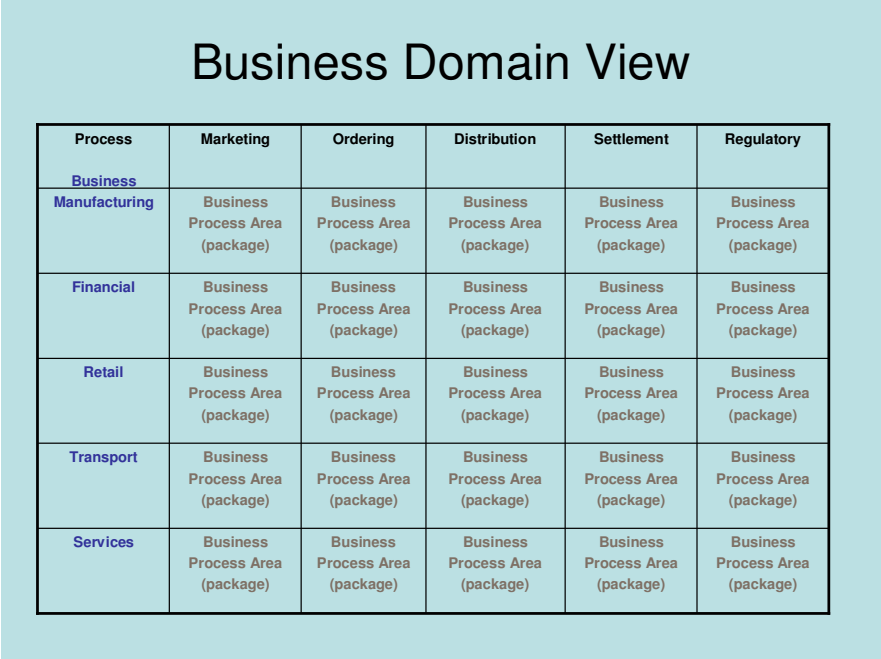
Note: As you work through this example, the process of gathering information for the various work areas is iterative. As one works through the various views new information will be discovered and previous worksheets may need to be updated to reflect any changes.

The first worksheet is for administrative purposes. A model name is chosen that reflects the overall purpose of this model so that others can easily determine if it's appropriate for their environment.

Worksheet: Business Model Administration Information	
Model name	[Provide a representative name for the total model.] **Order From Catalog**
Analysts/Modelers	[Provide a list of names of people who are participating in the business process analysis effort. Specify email addresses between angle brackets such as for John Doe <john@company.com>] **TMG User Guide Contributors**
Model Owner	[Name of the organization sponsoring the analysis activities or that will own the resultant model. For example, UN/CEFACT.] **UN/CEFACT**
Identifier Information	
Agency Id	[The identifier of the organization that owns the business process model (or some subset there of). This is used in conjunction with the Agency field. This information is case sensitive; lower case is recommended. Examples are EAN identifiers and internet domain names.] **NA**
Agency	[The name of the agency, which owns or controls the Agency Id values. This information is used to create the BPINs identifiers. This information is case sensitive; lower case is recommended. For example, icann (for ICANN internet domain names) or eann (for EAN identifiers).] **NA**

BDV Example Worksheets

The following Business Domain Ontology diagram shows the Business Areas and Process Areas in the Business Domain View. This is only an example to illustrate this model.



Step 1 - Identify and Describe Business Area(s)

Before focusing on the Business Areas, the entire Business Domain is described, using the previous diagram as a reference.

Form: Describe Business Domain Model	
Business Domain Model Name	[Provide a name for the reference model. You can use an existing reference model such as the Supply Chain Council or the Porter's Value Chain or create your own name.] **Simplified eBusiness Domain**
Description	[A brief summary of this domain.] **Business domain of an enterprise that produces products and services for Buyers**
Industry	[Provide the name of the industry that this business applies to. Search the business process library for a list of possible industrys. If the industry does not exist, then provide an appropriate name/label for the industry.] **eBusiness Retail**

Business Areas	[List the business areas within the scope. A business area is a collection of process areas. A process area is a collection of business processes. You may wish to refer to the ebXML Catalog of Business Processes that provides a list of normative categories that may be used as business areas.] **Manufacturing** **Retail** **Financial** **Transport** **Services**
Business Justification	[Provide the business justification for the collection of business processes] **Products and services are provided by the enterprise to Buyers for profit**
Category Schema	[Provide the name of the categorization schema used to categorize business processes in the industry.] **eBusiness Retail**
Stakeholders	[Identify the practitioners that care about the definition of this business domain. At this level, this is likely to be some participants in an industry group (perhaps a standards body or an enterprise). These are the people who will define the BRV.] **Seller** **Buyer** **Stockholders** **Enterprise officers who set policy** **Bank** **Government Agencies**
References	[Any external supporting documentation.] **Standard Operating Procedures** **Implementation Guide** **U.S. Tax Code**

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A worksheet is created for each Business Area that needs to be modeled in the business domain. The example involves a company that sells various products from a catalog so, in this case, the Business Area is Retailing. Within this Business Area all of the possible Process Areas are identified by using the Business Domain View diagram.

Form: Describe Business Area	
Business Area Name	[Provide a name for the business area. This should be listed in the Business Areas section of the Business Domain Model.] **Retail**
Description	[A brief summary of this functional area.] **Seller's provision of goods to Buyers.**
Scope	[Provide a high level statement that encapsulates the scope of this business area.] **Seller fulfills commitment to provide goods to a Buyer, and Buyer fulfills commitment to pay Seller for goods provided**
Process Areas	[List the process areas within the scope. A process area is a collection of business processes.] **Marketing** **Ordering** **Distribution** **Settlement** **Regulatory**
Objective	[Describe the objective of this business area.] **To enable a Buyer to procure a product from a Seller**
Business Opportunity	[Describe the business opportunity addressed by this business area.] **Products are provided by the Seller to a Buyer for profit**
Category	[Provide the category identifier used to reference a business area set of business processes. This should be within the category schema.] **Retail**
Business Areas	[List any other business areas that may be within the scope this business area.] **None**

Step 2 - Identify and Describe Process Area(s)

In this step, the Process Areas to be modeled are identified and a worksheet is created for each one. This example involves the ordering of products from a catalog and the payment of the order using a credit card. As result, the Ordering and Settlement Process Areas will be modeled.

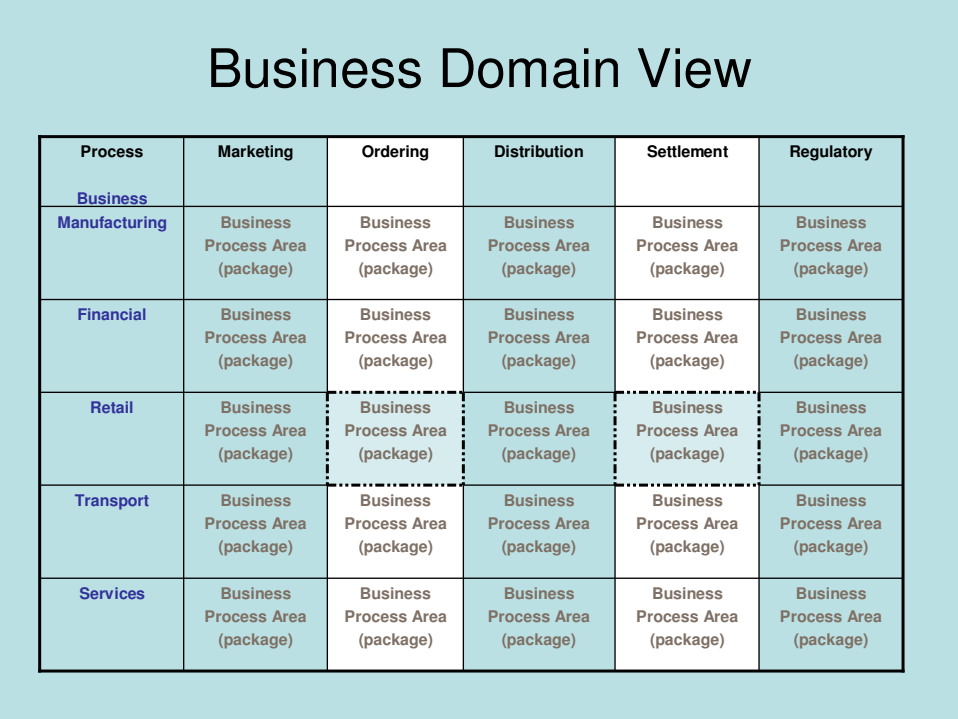
Form: Describe Process Area	
Process Area Name	[Provide a name for the process area. This should be listed in the Process Areas section of at least one Business Area.] **Ordering**
Description	[A brief summary of this functional area.] **The Buyer orders goods with reference to the Seller's catalogue, with or without a price quote.**
Objective	[Describe the objective of this process area.] **To enable a Buyer to order a product from a Seller's catalogue.**
Scope	[Provide a high level statement that encapsulates the scope of this process area. The scope of this process area must be within the scope of the encompassing business area. Typically the scope of the process area will be more constrained or limited than the scope of the corresponding business area.] **Seller fulfills commitment to deliver ordered goods to a Buyer, and Buyer fulfills commitment to pay Seller for ordered goods.**
Business Opportunity	[Describe the business opportunity addressed by this process area.] **The process of ordering products from catalogue is a common way of conducting business. The advantage of this way of doing business is that the Buyer can look through the Seller's products at his favorable place without any need to visit the store of the Seller. Ordering from catalogue is especially appropriate for standardized products as well as for products that can be exactly described by certain product characteristics. Furthermore, the catalogue itself serves as a marketing instrument for the Seller.**
Category	[Provide the category identifier used to reference a business area or process area set of business processes.] **Ordering within Retail**
Business Processes	[List the business processes within the scope of this process area.] **Obtain Customer ID** **Obtain Product List**

	Obtain Quote **Place Order** **Obtain Order Status**
Process Areas	[List any other process areas that may be within the scope this process area.] **None**

Note: Normally, a similar worksheet would also be created for the Settlement Process Area within this Business Area. This worksheet would contain a Debit Credit Card business process.

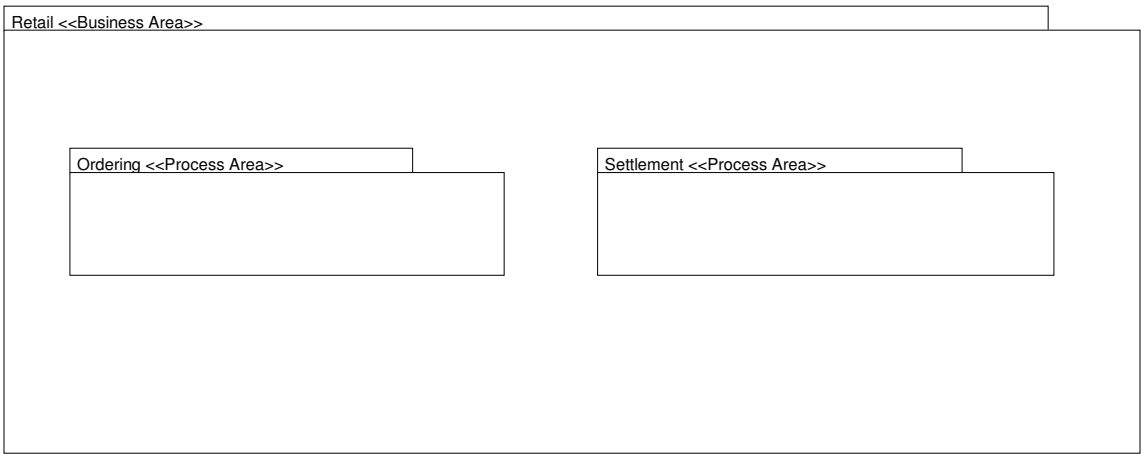
From the Business Domain View, Retail Ordering and Retail Settlement are the Business Process Areas that are relevant to the business case.

Simplified eCommerce Business Areas/Process Areas within Business Domain



The business domain structure is illustrated using a UML package diagram. A package diagram is used to emphasize the organizational structure of the business areas and the process areas within them.

Business Area/Process Area Packages



Step 3 - Identify Business Process(es)

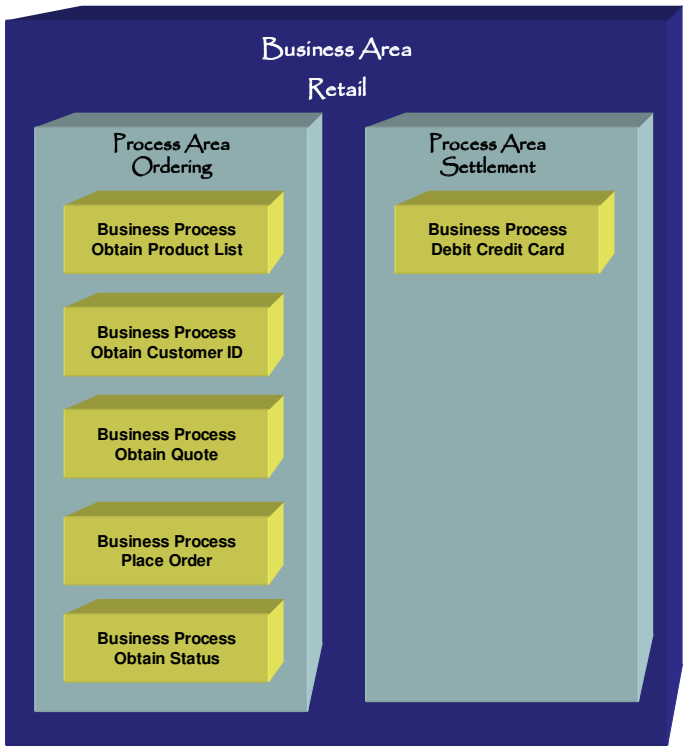
This worksheet provides a link to the Business Process worksheet in the BRV. High level requirements, such as interdependencies with other Business Processes are noted here. Detailed requirements are left to the Business Process worksheet.

Form: Identify Business Process	
Business Process Name	[Name of the business process as identified in the above Process Area.] **Obtain Customer ID**
Description	[A plain text explanation of the purpose and behavior of the Business Process] **The Buyer orders goods mentioned in the catalogue. The Buyer may request a price quote (e.g. when the unit price amount of a product is not specified in the catalogue) before actually placing the order. In this case, the Seller first returns the price quote. In both cases, the Seller returns an order confirmation.**

Business Processes	[List any business processes that depend upon, are associated with, or contained within this business process.] **none**
Business Requirements	[High level requirements, such as interdependencies with other Business Processes are noted here.] **none**

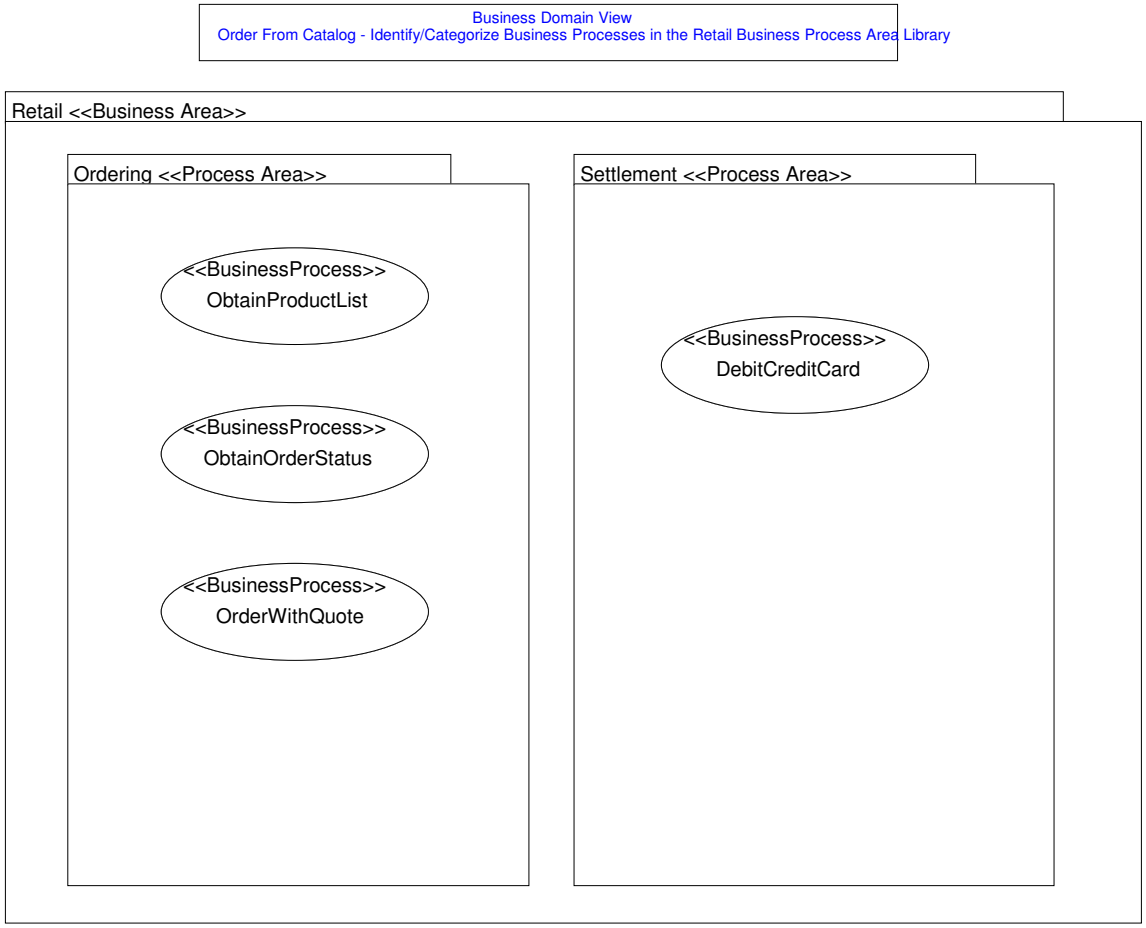
Note: This worksheet could be created for each business process within the Ordering and Settlement Process Areas. Keeping in mind that this will be done more specifically in the BRV, this example details just one of the business processes within the Ordering Process Area. .

The following is what we have identified as our model after completing the BDV worksheets.



The Business Process Area Library (Repository) is searched and business process models with similar Business and Process Areas, as well as Business Processes, are found as shown below.

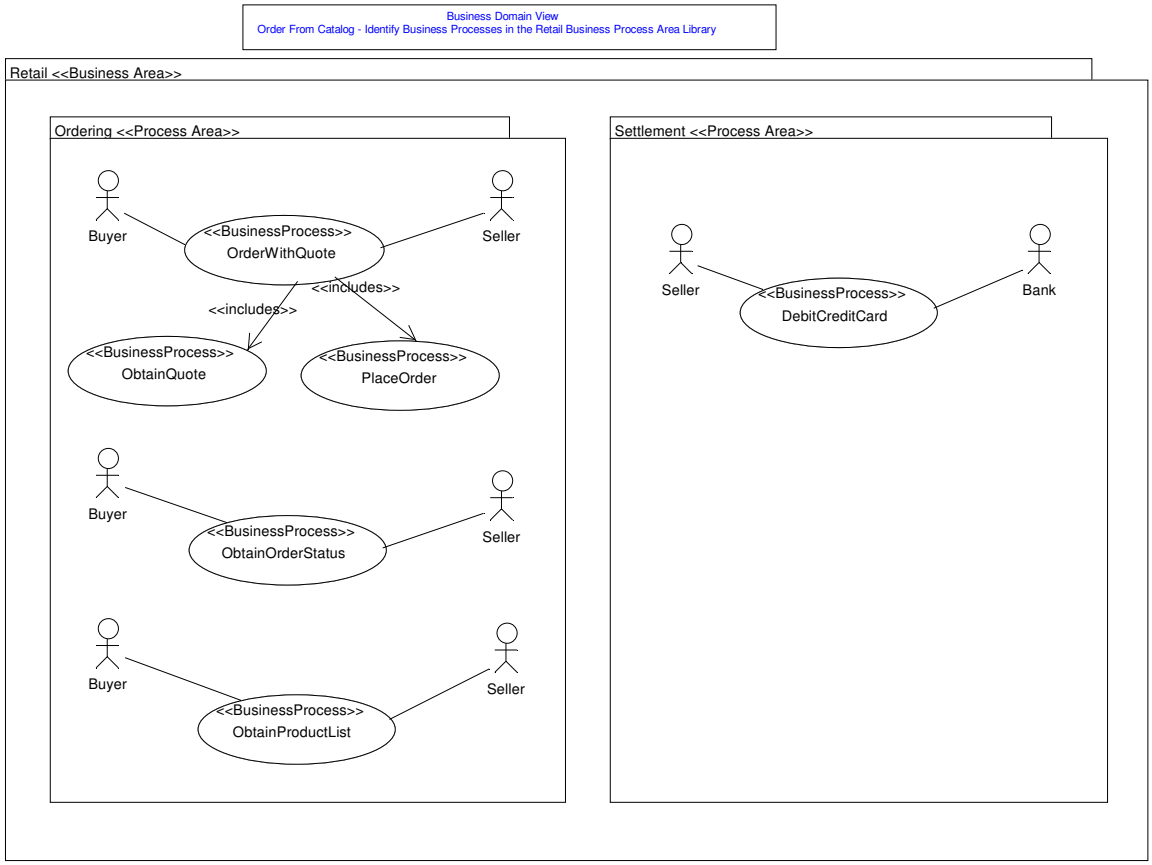
Identification/Categorization of Business Processes within Business and Process Areas currently available in a Library (Repository)



Step 5 - Identify Business Processes from the BP Library

Looking in more detail at the business process models from the library, the OrderWith-Quote business process model is comprised of two business process models which may be reused – ObtainQuote and PlaceOrder.

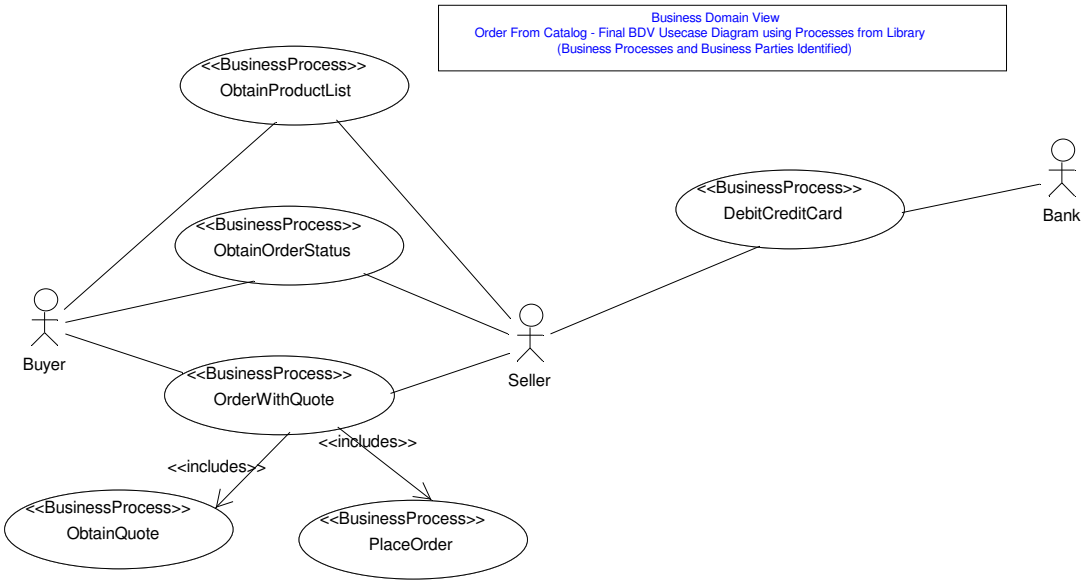
BDV Use Case Diagrams for Library supported Business Processes



Step 4 - Identify and Finalize Business Processes and Partners

The relationships between the Business Partners and Business Processes identified from the library are shown below. This UML Use Case diagram illustrates that the Seller not only collaborates with the Buyer but with the Bank as well.

Final BDV Use Case Diagram Using Processes from Library



BRV Example Worksheets

Step 1 - Describe REA Elements and Activities of the Business Process Phases

The generic business collaboration pattern of 'commitment – fulfillment' is determined at this point using the REA worksheets. Business requirements identified in completing the REA worksheets are used as input to the BRV work area.

There are three columns in the REA worksheet that correspond to the five ISO business process phases. The first column combines both the Planning and Identification phases. At this point in the business process, the buyer and seller are involved in deciding what needs to take place before acquiring or selling a good, service, and/or right as well as determining what data needs to be exchanged to establish their relationship. As in the case of our example, these would be any business processes which take place prior to those involving price or order commitments.

The Negotiation phase is directed at achieving an explicit, mutually understood, and agreed upon goal of a business collaboration and associated terms and conditions. This may include such things as the detailed specification of the good, service, and/or right, quantity, pricing, after sales servicing, delivery requirements, financing, use of agents and/or third parties, etc. .

In this example the pricing is agreed upon (or not) during the Obtain Price Quote business process and the Place Order business process contains information such as the product, quantity and agreed-upon price.

The third column combines the Actualization and Post Actualization Phases. It pertains to all activities or events necessary to insure that the agreed upon good, service, and/or right is deemed to have been delivered and reciprocated.

1220 In this example, once the order is placed the product is shipped, the product is paid for, and in the
1221 meantime the status of the order may be checked.

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Form: REA Worksheet			
Overall Business Process REA Elements	**Business Process Name**	Order From Catalog	
	Resources	Product for Credit Card Charge	
	Proposed Business Partners	Buyer, Seller, Banker, Shipper	
ISO Business Phases	**Planning/Identification**	**Negotiation**	**Actualization/ Post-Actualization**
Activities Performed	Obtain Product List Obtain Customer ID	Obtain Quote Place Order	Obtain Order Status Notify of Shipment Debit Credit Card
Business Entities (candidates)			
Collaborative Business Partners	Retailer, Customer, Banker	No additional partners	Shipper
Types of Identified Resources	Product List Credit Card Charge	Product ID with agreed price	
Types of Events, Locations, or Partners To Be Specified		Approved Express Shipper	
Specific Commitments (two min.)		Commitment to ship product in one delivery Commitment to pay upon notice of delivery	
Specific Contract or Agreement		Catalog Order	
Exchanged Resources (two min.)			Product for Credit Card Charge
Exchanged Events (two min.)			Shipment of Product Payment by Credit Card

Actual Location (if needed)			Not Needed
Materialized Claim (if needed)			Not Needed
Possible Exception Conditions	Rejection of Credit	Price not agreed upon	Product not Shipped
Phase Completion Criteria (expressed as entity states if possible)	Retailer, Customer and Banker are 'identified' Product and Credit Card are 'identified'	Catalog Order and commitments are 'in-force' Product and Credit Card are 'specified' Approved Shipper is 'specified'	Shipment and payment are 'complete' Credit Card charge and Product are 'transferred' Commitments are 'fulfilled'

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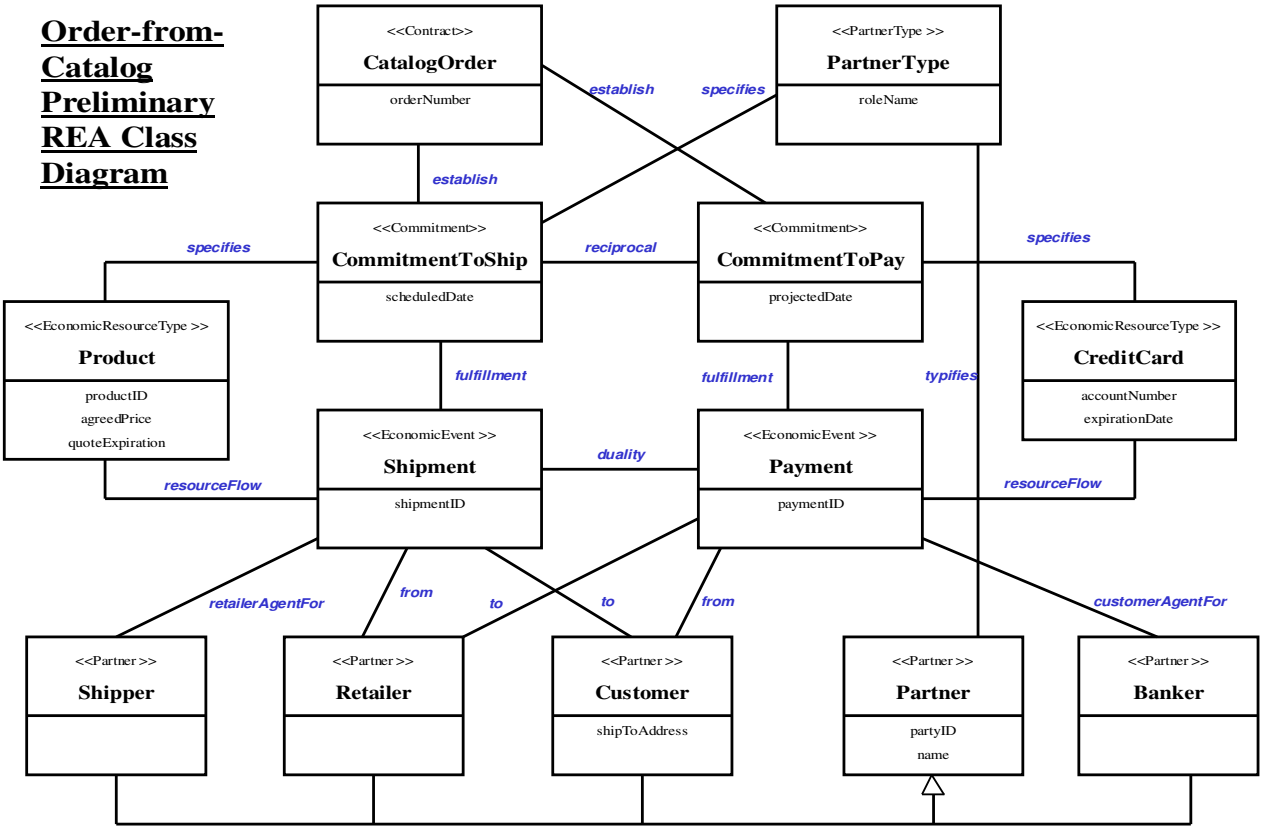
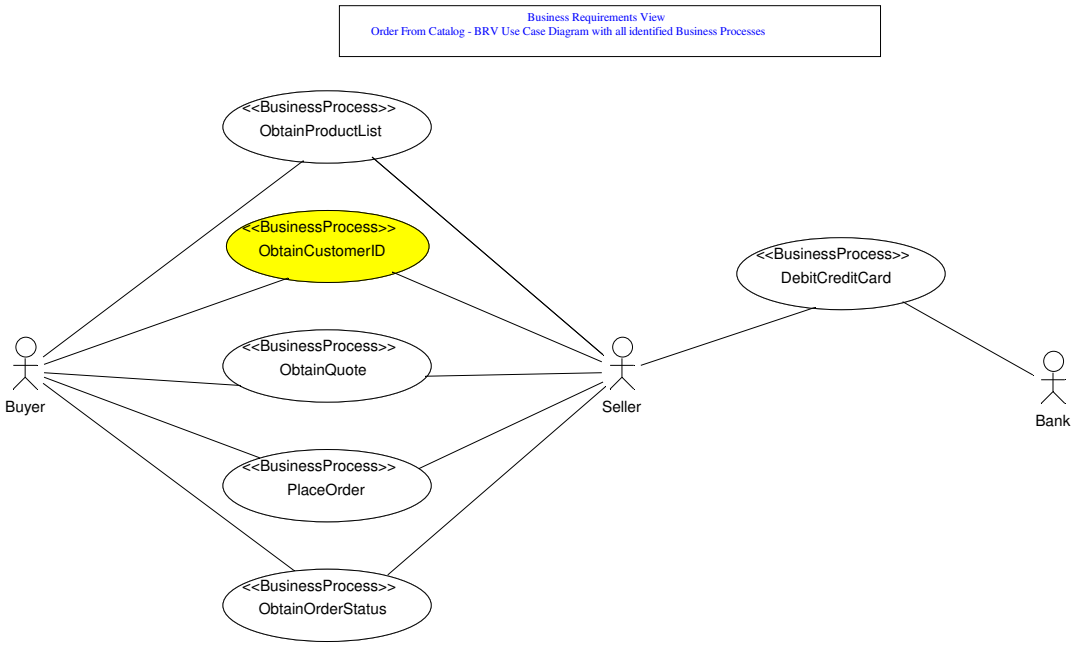
REA Class Diagram of Business Process (see appendix A for class descriptions)



Step 2 - Describe each business process (from BDV and REA) in more detail



This example will be reusing five business processes involving three business partners from the business process models found in the library. Since the library does not contain a business process model for Obtain Customer ID, it needs to be created.

Note: In the following worksheets there will be entries that are italicized in 'California Navel' orange. These are entries added later on in the BRV following the discovery of an additional business process in this example.

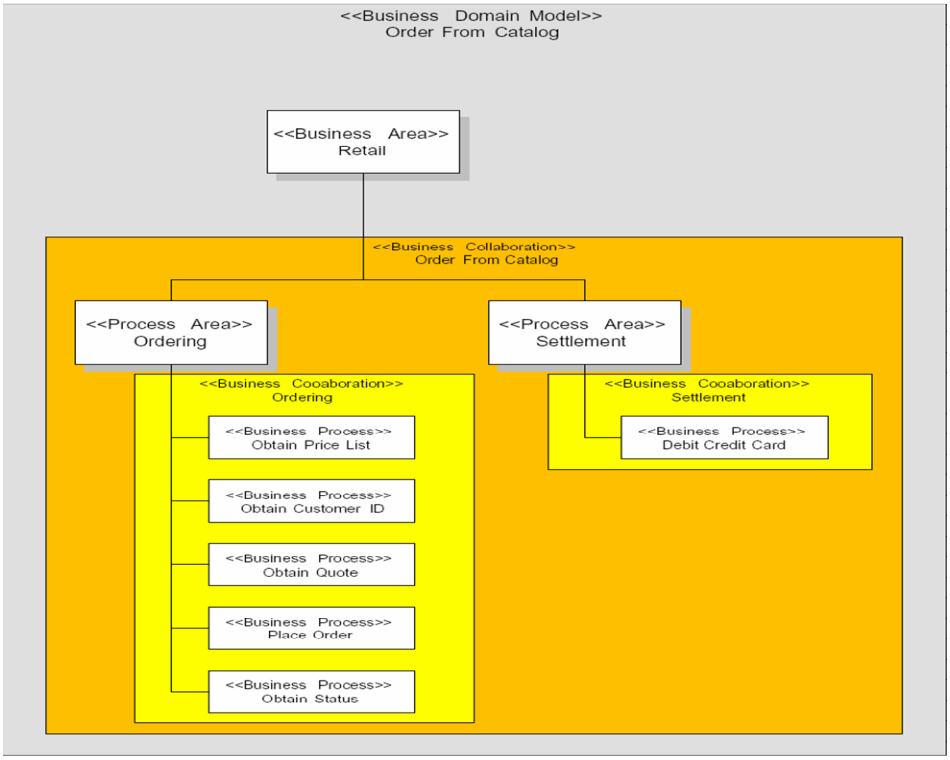
Form: Business Process	
Business Process Name	[Provide a name for the business process. This should be a name identified on the form "Identify Business Process" and on a "Describe Process Area" form.] ***Obtain Customer ID***
Description	[A plain text explanation of the purpose and behavior of the Business Process] **A Buyer finds one or more items in a Catalog that the Buyer needs. However, since the Buyer has never conducted business with the Seller before, the Seller requires buyer information before any catalog order can be placed. Upon**

	receiving the required buyer information, including verification of credit, the Seller assigns the Seller's Buyer ID. This identification can then be used to receive price quotes on products offered by the Seller, or to place a catalog order. The benefit of a Buyer having provided information about itself prior to ordering is that the amount of information to be exchanged and the number of steps required to subsequently request a price quote or place a catalog order are reduced. This results in saving both the Buyer and the Seller processing time, reducing the cost of doing business.
Business Requirements	[The list of business requirements that apply to this business process. The format of requirement definition is covered (as shown in Annex 4, Business process Specification Template, in the UMM).]
Definition	[A set of simple sentences that state actions may be performed as part of the business process.] **Obtain Customer ID**
Participants	[List the type of partners involved in the business process. E.g. manufacturer, supplier, customer] **Seller** **Buyer**
Preconditions	[Preconditions are the rules defining the conditions that must be true for the context that this process is conducted within. These rules are constraints that must be satisfied before instantiating or initializing the business process thus ensuring that the proper context for the process has been established.] **Valid Catalog on Hand** **No Valid Customer ID From This Seller**
Begins When	[Identifies the event(s) from that start this business process.] **ID Request**
Ends When	[[List all the event(s) that causes normal completion of the business process.] **Send Response**
Exceptions	[List all exception conditions (events) that will cause the business process to terminate before its normal completion.] **Response Date Exceeded**
Post-conditions	[Post-conditions are the rules defining the conditions that must be true for the localized context that exists after the business process completes. These rules are constraints that must be satisfied after

	the business process thus ensuring that the proper update to context of the parent process has been occurred.] **Buyer receives Customer ID or Rejection**
Supporting Business Collaborations and/or Business Processes	[List the business collaborations and business processes that support (are part of) this business process.] **None**
Lifecycle(s)	[Identify the Lifecycle(s) (Activity Model) that formalizes the definition of this Business Process.] **None**

Step 3 - Identify and Describe Business Collaborations

As the first part of this step, three Business Collaborations are identified from the business processes that have been described thus far. The Order From Catalog Business Collaboration is composed of the Ordering and Settlement Business Collaborations.



In next part of this step, starting with the largest of the three collaborations we have identified, it will be broken down into smaller business collaborations which need to be further described until business transactions are identified and described.

The Business Collaboration Specification worksheet is an extension of the Business Process Worksheet, thus many aspects of the description of the Business Process worksheet (above) pertain to this worksheet as well.

There are two types of business collaborations. A business collaboration protocol is a business collaboration at a low enough level that it can be represented by an activity graph, comprised of business transactions, each with object states specified as preconditions and post-conditions. Business transactions are the atomic level business collaborations according to the six business transaction patterns. The same Business Collaboration Specification worksheet is used for these two types of business collaborations.

The largest business process, Order From Catalog, involves two or more actors so it is considered a business collaboration. Since it can be further broken down into other business collaborations and/or transactions, it's a Business Protocol type of collaboration rather than a Business Transaction type.

The metrics field in this worksheet is a link to the business process metric worksheet, which requests detailed information.

There is also a Business Collaboration Specification worksheet for the Ordering Business Process and its six supporting business collaborations as well as the Settlement Business Process. To keep this document a reasonable size, the Order From Catalog, Ordering, and Obtain Customer ID business collaborations will be modeled.

Form: Business Collaboration Specification	
Business Collaboration Specification Name	[Provide a name for the Business Collaboration] **Order from Catalog Specification**
Business Collaboration Specification Type	[Choice between **Business Collaboration Protocol or Business Transaction Specification.**] **Business Collaboration Protocol**
Description	[A plain text explanation of the purpose and behavior of the **Business Collaboration Specification**] **The Buyer orders goods mentioned in the catalogue. The Buyer may request a price quote (e.g. when the unit price amount of a product is not specified in the catalogue) before actually placing the order. In this case, the Seller first returns the price quote. In both cases, the Seller returns an order confirmation. After processing the order the Seller contacts the Bank and debits the Sellers credit card. At anytime the Buyer can check the status of his order.**

Definition	[A set of simple sentences that state the actions performed as part of the business process.]
Participants	[List the type of partners involved in the Business Collaboration, e.g. manufacturer, supplier, customer.] **Buyer** **Seller** **Banker**
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this process is conducted within. These rules are constraints that must be satisfied before instantiating or initializing the Business Collaboration thus ensuring that the proper context for the process has been established.] **NA**
Begins When	[Identifies the event(s) from that start this Business Collaboration.] **NA**
Ends When	[List all the event(s) that causes normal completion of the Business Collaboration.] **Seller Paid** **Product Shipped**
Exceptions	[List all exception conditions (events) that will cause the Business Collaboration to terminate before its normal completion.] **Seller Not Paid** **Product not Shipped**
Post-conditions	[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the Business Collaboration completes. These rules are constraints that must be satisfied after the business process thus ensuring that the proper update to context of the parent process has been occurred.] ***Buyer Notified of Shipment*** **Seller is Paid** **Shipment Notice Received by Buyer**
Realization	What Business Collaboration is used to realize or instantiate this Business Collaboration Specification **Order from Catalog Collaboration**
Business Requirements	[The list of business requirements that apply to this Business Collaboration. The format of requirement definition is covered (as shown in Annex 4, Business process Specification Template, in the UMM).] **Process must support both domestic and international sales.**

	Price Quote Request against non-current catalogs is not valid.
Supporting Business Collaborations (including Business Transactions and Collaboration Protocols)	[List the business transactions and business collaboration protocols that support (are part of) this business collaboration.] **Order Collaboration** **Settlement Collaboration**
Lifecycle(s)	Identification of the Lifecycle(s) (Activity Model) that formalizes this Business Collaboration. **Order from Catalog Lifecycle**
Metrics	[List of Metrics to be recorded for this business process/collaboration]
	Initiating: **None**
	Responding: **None**

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Form: Business Collaboration Specification	
Business Collaboration Specification Name	[Provide a name for the Business Collaboration] **Ordering Specification**
Business Collaboration Specification Type	[Choice between **Business Collaboration Protocol or Business Transaction Specification.**] **Business Collaboration Protocol**
Description	[A plain text explanation of the purpose and behavior of the **Business Collaboration Specification**] **The Buyer orders goods mentioned in the catalogue. The Buyer may request a price quote (e.g. when the unit price amount of a product is not specified in the catalogue) before actually placing the order. In this case, the Seller first returns the price quote. In both cases, the Seller returns an order confirmation. At anytime the Buyer can check the status of his order.**
Definition	[A set of simple sentences that state the actions performed as part of the business process.]
Participants	[List the type of partners involved in the Business Collaboration, e.g. manufacturer, supplier, customer.] **Buyer** **Seller**

Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this process is conducted within. These rules are constraints that must be satisfied before instantiating or initializing the Business Collaboration thus ensuring that the proper context for the process has been established.] **NA**
Begins When	[Identifies the event(s) from that start this Business Collaboration.] **NA**
Ends When	[List all the event(s) that causes normal completion of the Business Collaboration.] **Product Shipped** ***Buyer Notified of Shipment***
Exceptions	[List all exception conditions (events) that will cause the Business Collaboration to terminate before its normal completion.] **Product not Shipped**
Post-conditions	[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the Business Collaboration completes. These rules are constraints that must be satisfied after the business process thus ensuring that the proper update to context of the parent process has been occurred.] **Product Shipped** ***Buyer Notified of Shipment*** ***Shipment Notice Received by Buyer***
Realization	What Business Collaboration is use to realize or instantiate this Business Collaboration Specification **Ordering Collaboration**
Business Requirements	[The list of business requirements that apply to this Business Collaboration. The format of requirement definition is covered (as shown in Annex 4, Business process Specification Template, in the UMM).] **Process must support both domestic and international sales.** **Price Quote Request against non-current catalogs is not valid.**
Supporting Business Collaborations (including Business Transactions and Collaboration Protocols)	[List the business transactions and business collaboration protocols that support (are part of) this business collaboration.] **Obtain Product List** **Obtain Customer ID** **Obtain Price Quote** **Place Order** **Obtain Status**

	Notify Buyer of Shipment
Lifecycle(s)	Identification of the Lifecycle(s) (Activity Model) that formalizes this Business Collaboration. **Ordering Lifecycle**
Metrics	[List of Metrics to be recorded for this business process/collaboration]
	Initiating: **None**
	Responding: **None**

The Obtain Customer ID business process is a business transaction type of collaboration since it can not be further broken down into other business collaborations and/or transactions.

Form: Business Collaboration Specification	
Business Collaboration Specification Name	[Provide a name for the Business Collaboration] **Obtain Customer ID Specification**
Business Collaboration Specification Type	[Choice between **Business Collaboration Protocol or Business Transaction Specification.**] **Business Transaction Specification**
Description	[A plain text explanation of the purpose and behavior of the **Business Collaboration Specification**] **A Buyer finds one or more items in a Catalog that the Buyer needs. However, since the Buyer has never conducted business with the Seller before, the Seller requires buyer information before any catalog order can be placed. Upon receiving the required buyer information, including verification of credit, the Seller assigns the Seller's Buyer ID. This identification can then be used to receive price quotes on products offered by the Seller, or to place a catalog order. The benefit of a Buyer having provided information about itself prior to ordering is that the amount of information to be exchanged and the number of steps required to subsequently request a price quote or place a catalog order are reduced. This results in saving both the Buyer and the Seller processing time, reducing the cost of doing business.**
Definition	[A set of simple sentences that state the actions performed as part of the business process.]
Participants	[List the type of partners involved in the Business Collaboration, e.g.

	manufacturer, supplier, customer.] **Buyer** **Seller**
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this process is conducted within. These rules are constraints that must be satisfied before instantiating or initializing the Business Collaboration thus ensuring that the proper context for the process has been established.] **Valid Catalog on Hand** **No Valid Customer ID From This Seller**
Begins When	[Identifies the event(s) from that start this Business Collaboration.] **ID Request**
Ends When	[List all the event(s) that causes normal completion of the Business Collaboration.] **Send Response**
Exceptions	[List all exception conditions (events) that will cause the Business Collaboration to terminate before its normal completion.] **Response Date Exceeded**
Post-conditions	[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the Business Collaboration completes. These rules are constraints that must be satisfied after the business process thus ensuring that the proper update to context of the parent process has been occurred.] **Buyer receives Customer ID or Rejection**
Realization	What Business Collaboration is use to realize or instantiate this Business Collaboration Specification **Obtain Customer ID Collaboration**
Business Requirements	[The list of business requirements that apply to this Business Collaboration. The format of requirement definition is covered (as shown in Annex 4, Business process Specification Template, in the UMM).]
Supporting Business Collaborations (including Business Transactions and Collaboration Protocols)	[List the business transactions and business collaboration protocols that support (are part of) this business collaboration.] **Obtain Customer ID**
Lifecycle(s)	Identification of the Lifecycle(s) (Activity Model) that formalizes this Business Collaboration. **Obtain Customer ID Lifecycle**

Metrics	[List of Metrics to be recorded for this business process/collaboration]
	Initiating: **None**
	Responding: **Respond by Date**

Business process metrics are operational or structural measurements that track how a business process is performing over time. The Obtain Customer ID Business Collaboration Specification (above) has a Respond by Date metric that needs that needs to be elaborated in this next worksheet.

Form: Business Process Metric	
Business Process Metric	[Provide a name for identification of a Metric or KPI. Metrics are the rules for defining the conditions for evaluating the localized context that exists during the Business Collaboration execution. They may define Key Performance Indicators (KPI) that reflect the achievement of particular business goals and/or objectives. These KPI's may also be the trigger certain events that are used as input to this and other processes.] **Respond by Date**
Description	[A plain text explanation of the purpose and behavior of the **Business Process Metric**] **Date by which the Buyer expects a response to his Request for a Customer ID.**
Metric	[Provide the business rule that defines this metric. These rules must be computational in format, e.g. OCL or other formal notation.] **ID Request Date + 5 Business Days**
Start Trigger	[Identifies the event that start the measurement of the metric. This event may be computational in format, e.g. OCL or other formal notation.] **ID Request**
End Trigger	[Identifies the event that stops the measurement of the metric. This event may be computational in format. E.g.: OCL or other formal notation.] **Buyer receives Customer ID or Rejection**

Step 4 - Define Business Collaborations

An instance of this worksheet is linked to an instance of the Business Collaboration Specification worksheet. New information (over and above that in the Business Collaboration Specification worksheet) is requested for partner roles and business entities associated with the business collaboration.

In this example, there should be a Business Collaboration worksheet for Order From Catalog, Ordering (as well as its six supporting business collaborations) and Settlement. To keep this document a reasonable size, the Settlement collaboration will be omitted because it is made up of just one business process, Debit Credit Card, which is simply a business transaction. Debit Credit Card was discovered in the library and has already been specified. The Order From Catalog, Ordering, and Obtain Customer ID business collaborations will be modeled.

Form: Business Collaboration	
Business Collaboration Name	[Provide a name for the Business Collaboration. Normally this should be the same as the BCS that it instantiates, however due to possible contextual constraints or business rules it may be necessary to differentiate this collaboration.] **Order from Catalog Collaboration**
Business Collaboration Specification	[What Business Collaboration Specification does this Business Collaboration realize/instantiate?] **Order from Catalog Specification**
Description	[A plain text explanation of the purpose and behavior of the **Business Collaboration Specification**] **The Buyer orders goods mentioned in the catalogue. The Buyer may request a price quote (e.g. when the unit price amount of a product is not specified in the catalogue) before actually placing the order. In this case, the Seller first returns the price quote. In both cases, the Seller returns an order confirmation.**
Participants	[List the type of partners involved in the Business Collaboration. E.g. manufacturer, supplier, customer] **Buyer** **Seller** **Banker**
Preconditions	From BRV Business Collaboration Specification Worksheet **NA**
Begins When	From BRV Business Collaboration Specification Worksheet **NA**

<table>
<tr><td>Ends When</td><td>From BRV Business Collaboration Specification Worksheet
Product Shipped
Seller is Paid</td></tr>
<tr><td>Exceptions</td><td>From BRV Business Collaboration Specification Worksheet
Seller Not Paid
Product not Shipped</td></tr>
<tr><td>Post-conditions</td><td>From BRV Business Collaboration Specification Worksheet
Buyer Notified of Shipment
Shipment Notice Received by Buyer
Seller is Paid</td></tr>
<tr><td>Partner Roles</td><td>[Identify the roles played by each partner.]
<table>
<tr><th>Partner</th><th>Roles</th></tr>
<tr><td>Buyer</td><td>Initiator</td></tr>
<tr><td>Seller</td><td>Responder
Initiator</td></tr>
<tr><td>Banker</td><td>Responder</td></tr>
</table></td></tr>
<tr><td>Business Entities</td><td>[Identify the Business Entities associated with this collaboration.]</td></tr>
<tr><td>Supporting Business Transactions or Business Collaborations</td><td>[List the business transactions or business collaborations that support (are part of) this business collaboration.]
Ordering Collaboration
Settlement Collaboration</td></tr>
</table>

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Form: Business Collaboration	
Business Collaboration Name	[Provide a name for the Business Collaboration. Normally this should be the same as the BCS that it instantiates, however due to possible contextual constraints or business rules it may be necessary to differentiate this collaboration.] **Ordering Collaboration**
Business Collaboration Specification	[What Business Collaboration Specification does this Business Collaboration realize/instantiate?] **Ordering Specification**
Description	[A plain text explanation of the purpose and behavior of the **Business**

<table>
<tr><td></td><td>Collaboration Specification]
The Buyer orders goods mentioned in the catalogue. The Buyer may request a price quote (e.g. when the unit price amount of a product is not specified in the catalogue) before actually placing the order. In this case, the Seller first returns the price quote. In both cases, the Seller returns an order confirmation.</td></tr>
<tr><td>Participants</td><td>[List the type of partners involved in the Business Collaboration. E.g. manufacturer, supplier, customer]
Buyer
Seller</td></tr>
<tr><td>Preconditions</td><td>From BRV Business Collaboration Specification Worksheet
NA</td></tr>
<tr><td>Begins When</td><td>From BRV Business Collaboration Specification Worksheet
NA</td></tr>
<tr><td>Ends When</td><td>From BRV Business Collaboration Specification Worksheet
Product Shipped</td></tr>
<tr><td>Exceptions</td><td>From BRV Business Collaboration Specification Worksheet
Product not Shipped</td></tr>
<tr><td>Post-conditions</td><td>From BRV Business Collaboration Specification Worksheet
Buyer Notified of Shipment
Shipment Notice Received by Buyer</td></tr>
<tr><td>Partner Roles</td><td>[Identify the roles played by each partner.]
<table>
<tr><th>Partner</th><th>Roles</th></tr>
<tr><td>Buyer</td><td>Initiator</td></tr>
<tr><td>Seller</td><td>Responder
Initiator</td></tr>
<tr><td></td><td></td></tr>
</table></td></tr>
<tr><td>Business Entities</td><td>[Identify the Business Entities associated with this collaboration.]</td></tr>
<tr><td>Supporting Business Transactions or Business Collaborations</td><td>[List the business transactions or business collaborations that support (are part of) this business collaboration.]
Obtain Customer ID
Obtain Product List
Obtain Quote</td></tr>
</table>

	Place Order **Obtain Order Status** ***Notify Buyer of Shipment***

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Form: Business Collaboration	
Business Collaboration Name	[Provide a name for the Business Collaboration. Normally this should be the same as the BCS that it instantiates, however due to possible contextual constraints or business rules it may be necessary to differentiate this collaboration.] **Obtain Customer ID Collaboration**
Business Collaboration Specification	[What Business Collaboration Specification does this Business Collaboration realize/instantiate?] **Obtain Customer ID Specification**
Description	[A plain text explanation of the purpose and behavior of the **Business Collaboration Specification**] **A Buyer finds one or more items in a Catalog that the Buyer needs. However, since the Buyer has never conducted business with the Seller before, the Seller requires buyer information before any catalog order can be placed. Upon receiving the required buyer information, including verification of credit, the Seller assigns the Seller's Buyer ID. This identification can then be used to receive price quotes on products offered by the Seller, or to place a catalog order. The benefit of a Buyer having provided information about itself prior to ordering is that the amount of information to be exchanged and the number of steps required to subsequently request a price quote or place a catalog order are reduced. This results in saving both the Buyer and the Seller processing time, reducing the cost of doing business.**
Participants	[List the type of partners involved in the Business Collaboration. E.g. manufacturer, supplier, customer] **Buyer** **Seller**
Preconditions	From BRV Business Collaboration Specification Worksheet **Valid Catalog on Hand** **No Valid Customer ID From This Seller**
Begins When	From BRV Business Collaboration Specification Worksheet **ID Request**

Ends When	From BRV Business Collaboration Specification Worksheet **Send Response**
Exceptions	From BRV Business Collaboration Specification Worksheet **Response Date Exceeded**
Post-conditions	From BRV Business Collaboration Specification Worksheet **Buyer receives Customer ID or Rejection**
Partner Roles	[Identify the roles played by each partner.]

Partner	Roles
Buyer	Initiator
Seller	Responder

Business Entities	[Identify the Business Entities associated with this collaboration.] **Customer Information**
Supporting Business Transactions or Business Collaborations	[List the business transactions or business collaborations that support (are part of) this business collaboration.] **NA**

A business process lifecycle is a set of conditions that can be identified for a business process for which a business collaboration protocol can be specified. Such conditions are Begins When, Ends When, intermediate points that can be monitored, and points where exception processing could begin that result in an outcome other than normal completion. This lifecycle was originally identified in the Business Process worksheet (BRV Step 1).

Again, to keep this document a manageable size, only the lifecycle for the overall Order From Catalog business collaboration will be shown.

Form: Business Process/Collaboration Lifecycle (Activity Model)	
Process Lifecycle Name	[Provide a name for this Lifecycle. This name is used to identify the lifecycle that a Business Process or Business Collaboration is formally defined by.] **Order from Catalog Lifecycle**
Description	[A plain text explanation of the purpose and behavior of the Lifecycle.]

	The Buyer orders goods mentioned in the catalogue. The Buyer may request a price quote (e.g. when the unit price amount of a product is not specified in the catalogue) before actually placing the order. In this case, the Seller first returns the price quote. In both cases, the Seller returns an order confirmation.
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this process lifecycle is executed within. These rules are constraints that must be satisfied before instantiating or initializing the process lifecycle thus ensuring that the proper context for the process has been established. These conditions must be a subset of the preconditions defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.] **None**
Begins When	[Identifies the event(s) that start this process lifecycle. For any lifecycle there is only one starting point, known as a start state. This list of events is the only one which will instantiate the lifecycle and cause it to enter into a start state. These event(s) must be a subset of the event(s) defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.] **NA**
States	The following section defines the states or conditions that the process lifecycle can be in.
Start State	The Start State is a pseudo state in which the initialization and instantiation of lifecycle artifacts and context occurs.].
State Transition Table (Start State)	**Event**: [Identifies the event(s) that start this process lifecycle. For any lifecycle there is only one starting point, known as a start state. This list of events is the only one which will instantiate the lifecycle and cause it to enter into a condition or state as determined by the processing of a defined event.] These event(s) must be a subset of the event(s) defined by the process that this lifecycle is defining and *may* be computational in format. E.g.: OCL or other formal notation.] **Source**: [For each event listed above identify the source of the event as defined by the current lifecycle context]. **Rule**: [For each event, define the constraint or guard that indicates the resultant condition or state. If there are multiple states for a given event there should be a rule for each. This rule should be computational in format. E.g.: OCL or other

formal notation.].

Transition to: [For each event identify the resulting condition (state) of the lifecycle. If a particular event can result in more than one condition or state define the rule that indicates which condition will be the actual resultant.].

Event	Source	Rule	Transition to
START	Buyer	No Valid Catalog On-Hand	Obtain Product List
START	Buyer	Valid Catalog On-Hand && No Valid Customer ID From This Seller	Obtain Customer ID
START	Buyer	Valid Catalog On-Hand && Valid Customer ID From This Seller && Quote Required	Obtain Quote
START	Buyer	Valid Catalog On-Hand && Valid Customer ID From This Seller && No Quote Required	Place Order

For each state or condition of the lifecycle, repeat the following entries.

State

Name: [Identify a state or condition of this lifecycle.]

Description: [Provide a textual description of this condition/state]

Definition: [Definitions are the rules for defining the localized conditions that must be true within the context of this process lifecycle that asserts that this condition has been achieved. If these rules are not true for this condition, then an invalid or unknown state has been achieved.

These rules must be computational in format. E.g.: OCL or other formal notation.]

Actions: [Identify the set of actions that may be performed while in this state. Define the constraint (rule) that controls the performance of each action. In the case where no constraint is defined, the action is always performed.]

Name: Obtain Product List

Description: Requests a Product Catalog

Definition: NA

Actions: Obtain Product List

Transitions

Event	Source	Rule	Transition to
Request List	Buyer	No Valid	Obtain

			Customer ID From This Seller	Customer ID
	Request List	Buyer	Valid Customer ID From This Seller && Quote Required	Obtain Quote
	Request List	Buyer	Valid Customer ID From This Seller && No Quote Required	Place Order

State

Name: Obtain Customer ID

Description: Request for a Customer ID for quotes and purchases

Definition: NA

Actions: NA

Transitions

Event	Source	Rule	Transition to
ID Request	Buyer	Quote Required	Obtain Quote
ID Request	Buyer	No Quote Required	Place Order

State

Name: Obtain Quote

Description: Obtains a Price Quote for subsequent order placement.

Definition: NA

Actions: Obtain Quote

Transitions

Event	Source	Rule	Transition to
Request Quote	Buyer	Quote Accepted	Place Order
Request Quote	Buyer	Quote Rejected && Re-quote Request	Obtain Quote
Request Quote	Buyer	Quote Rejected	Exit with no Order

State

Name: PlaceOrder

Description: Places an Order for one or more products.

Definition: NA

Actions: PlaceOrder

Transitions

Event	Source	Rule	Transition to
Send Order	Buyer	Shipment Notice Not Received	Obtain Order Status
Accept Order	Seller	Product Shipped	*Debit Credit Card & Notify Buyer of Shipment*

State

Name: ObtainOrderStatus

Description: Determine the Order status.

Definition: NA

Actions: Check Order Status

Transitions

Event	Source	Rule	Transition to
Check Order Status	Buyer	Receive Shipment Notification	END
Check Order Status	Buyer	No Shipment Notice Received && Need Order Status	Obtain Order Status

State

Name: DebitCreditCard

Description: Debit the Buyer's credit card.

Definition: NA

Actions: Debit Credit Card

Transitions

Event	Source	Rule	Transition to
Get Authorization from Bank	Seller	Seller is Paid	END

State

Name: *Notify Buyer of Shipment*

Description: *Issue shipping order.*

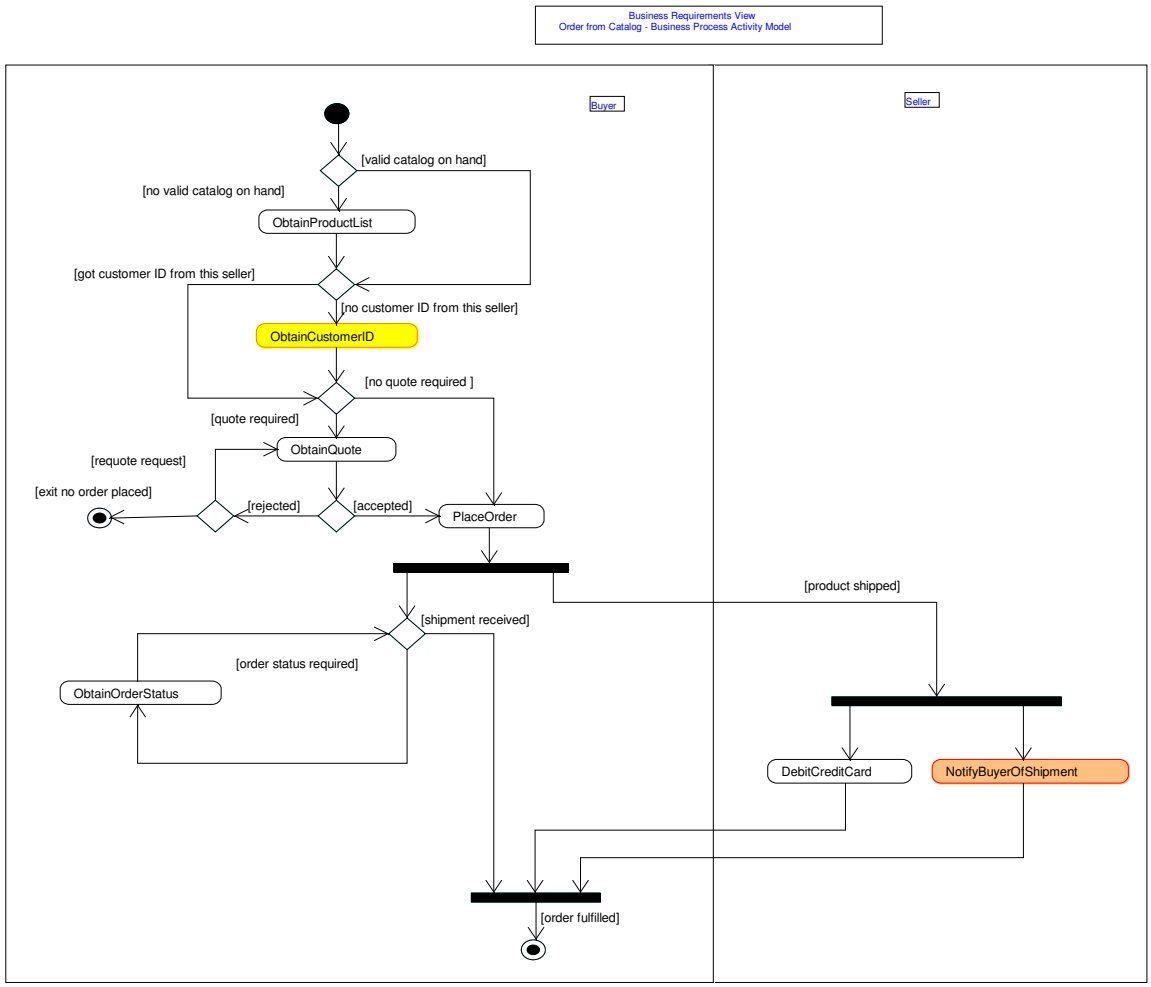
Definition: *NA*

<table>
<tr><td></td><td></td><td>Actions:
Ship Product
Shipment Notice Sent</td></tr>
<tr><td></td><td>Transitions</td><td>
<table>
<tr><th>Event</th><th>Source</th><th>Rule</th><th>Transition to</th></tr>
<tr><td>Send Shipment Notice</td><td>Seller</td><td>Shipment Notice Sent</td><td>END</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="2">Post-conditions</td><td>[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the process lifecycle completes. These rules are constraints that must be satisfied after the lifecycle thus ensuring that the proper update to context of the parent process has occurred.
These constraint(s) must be a subset of the constraint(s) defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.]
Buyer Notified of Shipment
Seller is Paid
Shipment Notice Received by Buyer</td></tr>
</table>

By using the OrderFromCatalog Business Process Lifecycle Worksheet it was also discovered that the Seller needs to notify the Buyer that the product has been shipped. This is shown in the following Activity Model for the Order From Catalog collaboration.

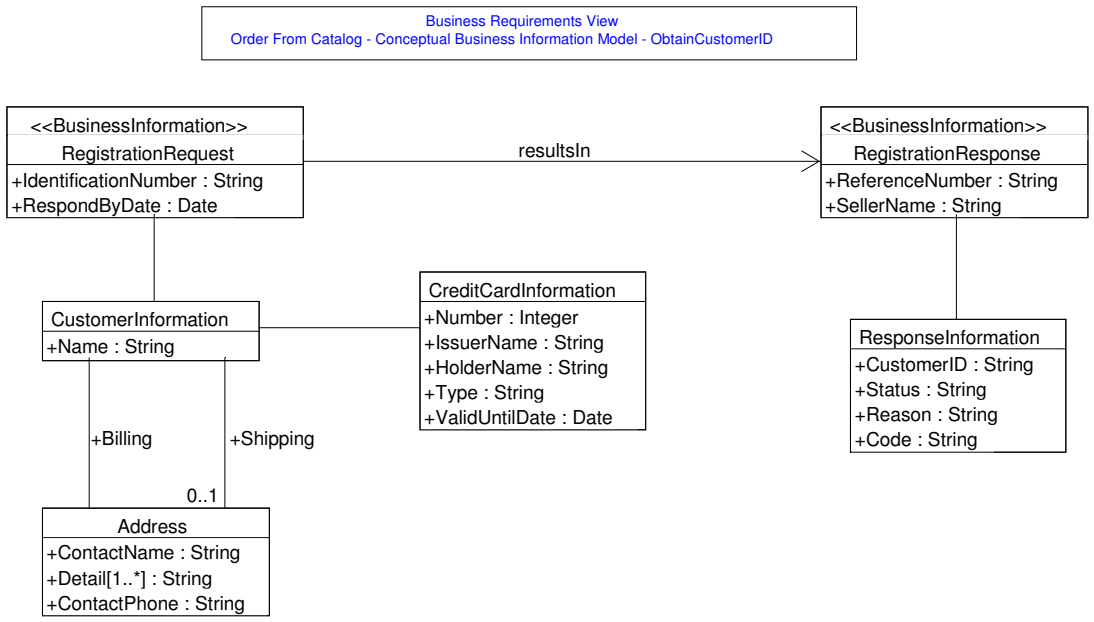
At this point one would iterate again through the BRV and add the Notify Buyer of Shipment business process and adjust the Order From Catalog and Ordering collaborations accordingly. The changes that should be made to these collaborations are italicized in 'California Navel' orange.

Business Process Activity Model



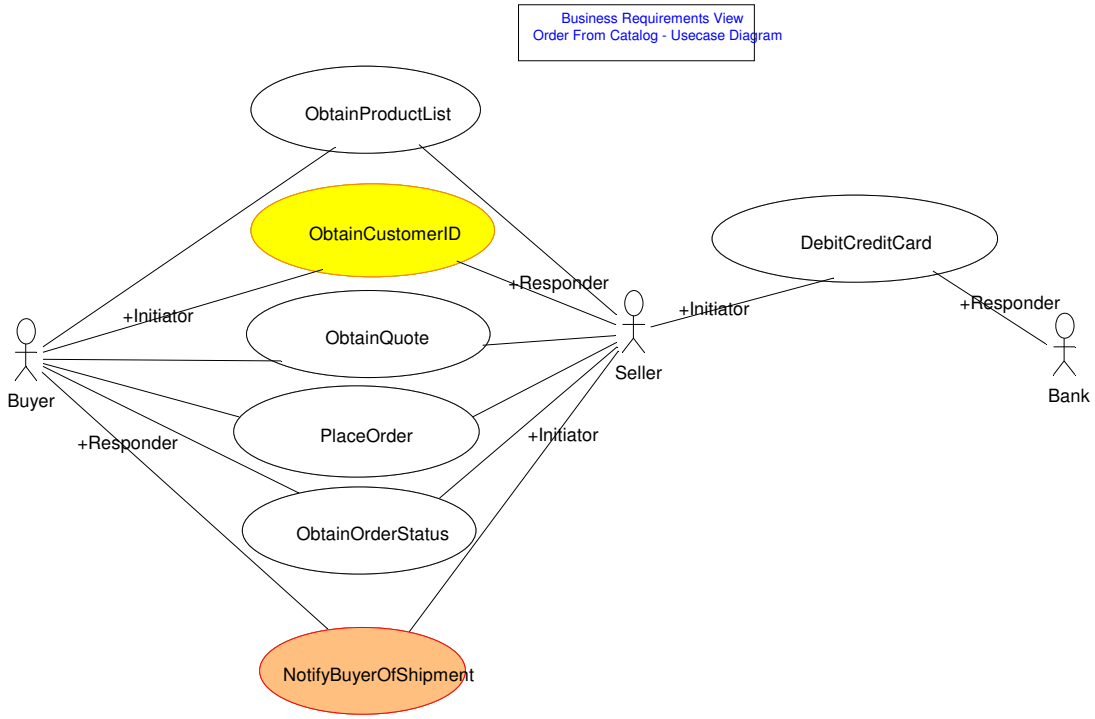
Conceptual Business Information Model

The supporting transactions/business collaborations from the Order from Catalog Collaboration worksheet and information captured in the Order from Catalog Lifecycle worksheet identify the lifecycle states and conditions required to transition from one business process state to another. Generally the conditions that are required to complete a supporting transaction/business collaboration and to transition to another state are successful exchanges of information between the trading partners. Looking in more detail at the Obtain Customer ID Collaboration worksheet, exchange of an ID request and response are identified as essential to the collaboration. Also the Customer Information business entity is identified as being affected in this collaboration. Thus, one would assume that information about the customer would be included in the ID request. The following conceptual business information model captures the business information and associated information entities that would be envisioned at this point as being included in the collaboration request and response. It also reflects business information requirements that would have been gathered from the business domain experts as part of Business Requirements of the Business Process worksheet.



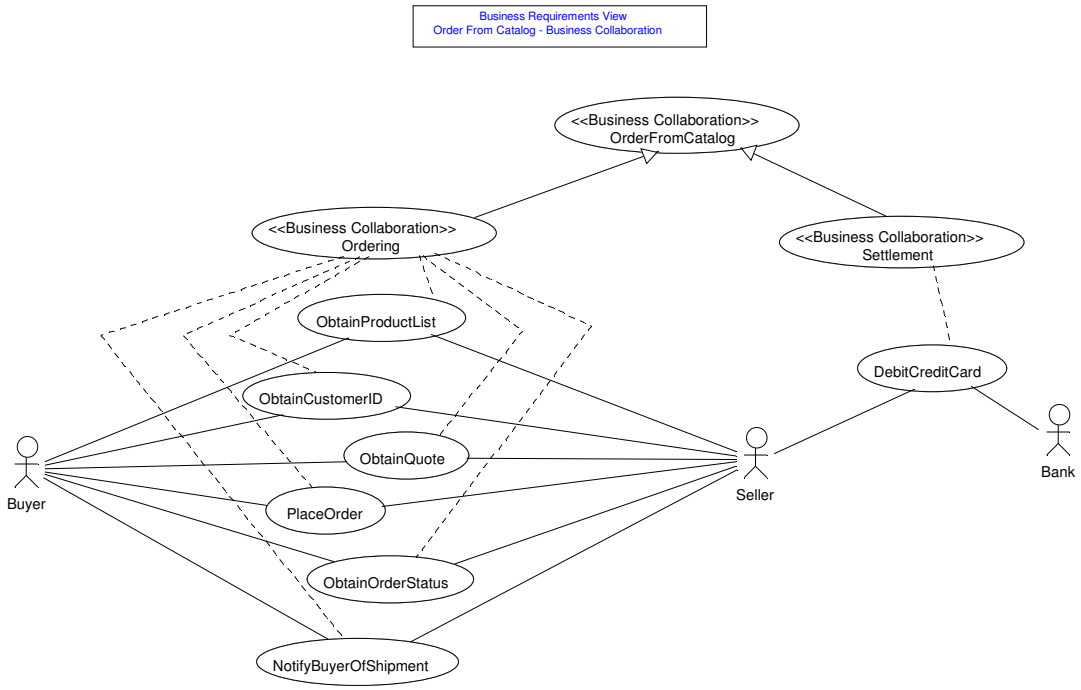
The Business Process Use Case now reflects the two new business processes.

Business Process Use Case



This Business Collaboration Use Case diagram illustrates that Order From Catalog has two collaborations – Ordering and Settlement – that use the two new business processes as well as the existing business processes.

Business Collaboration Use Case



Step 5 – Identify and Describe Business Entities

Business Entities are the subject of business collaboration activities. It's a real-world thing, concept, process or event having business significance that is shared among two or more trading partners, and which exists in two or more states of at least one lifecycle.

In the first of the next two worksheets, the business significance, attributes, and behavior of the Customer Information business entity are identified and described. The lifecycle of the business entity is associated with it's behavior – Obtain Customer ID.

The second worksheet goes into more detail by describing the entity's lifecycle. To avoid confusion, the lifecycle name Registration Lifecycle was chosen rather than Obtain Customer ID Lifecycle. The latter already exists as a business process lifecycle name.

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1422

Form: Business Entity	
Business Entity Name:	[Provide the name that this Business Entity is identified by.] **Customer Information**
Description:	[A plain text explanation of the purpose and behavior of the Business Entity.] **Information about a prospective Buyer that is required by the Seller in order for the Seller to register the Buyer and assign a Buyer ID**
Business Entity Characteristics	Define the set of characteristics or attributes that define the structural aspects of the Business Entities.

Name	Type	Constraints
Party	**Business Object**	**Mandatory**
Billing Address	**Business Object**	**Mandatory**
Shipping Address	**Business Object**	**Optional**
Account	**Business Object**	**Mandatory**

Business Entity Behavior	Define the set of operations that affect the behavioral aspects of the Business Entity.
Name:	[Enter the name of the operation.] **Obtain Customer ID**
Lifecycle:	[Enter the name of the lifecycle that defines this behavior.] **Registration Lifecycle**

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1424
1425
1426
1427

Form: Business Entity Lifecycle	
Business Entity Lifecycle Name	[Name the State Model. Below, in the States section of this worksheet, you can mention all of the state values and their information requirements] **Registration Lifecycle**
Business Entity Name	[Provide a name for the Business Entity] **Customer Information**

<table>
<tr><td colspan="2">Description</td><td>[A plain text explanation of the purpose and behavior of the lifecycle defined here.]

This lifecycle supports the creation of Customer Information by a Buyer and acceptance of the Customer Information by a Seller for the purpose of registering the Buyer with the Seller.</td></tr>
<tr><td colspan="2">States</td><td>The following section defines the states or condition that the lifecycle can occur.</td></tr>
<tr><td></td><td>Start State</td><td>The Start State is a pseudo state in which the initialization and instantiation of lifecycle artifacts and context occurs.</td></tr>
<tr><td></td><td>Transitions <u>(Start State)</u></td><td>Event: [Identifies the event(s) from the start state of this lifecycle. For any lifecycle there is only one starting point, known as the start state. This list of events are the only ones that would instantiate the lifecycle and cause the business entity to enter into a condition or state as determined by the processing of the defined event.

These event(s) may be computational in format. E.g.: OCL or other formal notation.]

Source: [For each event listed above identify the source of the event as defined by the current lifecycle context].

Rule: [For each event, define the constraint or guard that indicates the resultant condition or state. If there are multiple states for a given event there should be a rule for each. This rule should be computational in format. E.g.: OCL or other formal notation.].

Transition to: [For each event identify the resulting condition (state) of the lifecycle. If a particular event can result in more than one condition or state define the rule that indicates which condition will be the actual resultant.].
<table>
<tr><th>Event</th><th>Source</th><th>Rule</th><th>Transition to</th></tr>
<tr><td>Buyer determines to initiate a relationship with the Seller</td><td>Buyer</td><td>Buyer assembles Customer Information such that it contains required business entity characteristics</td><td>Pending</td></tr>
</table>
</td></tr>
<tr><td colspan="3">For each state or condition of the lifecycle, repeat the following entries.</td></tr>
<tr><td></td><td>State</td><td>Name: [Identify a state or condition of this lifecycle.]

Description: [Provide a textual description of this condition/state]

Definition: [Definitions are the rules for defining the localized conditions that must be true within the context of this lifecycle that assert that this condition has been achieved. If these rules are not true for this condition, then an invalid or unknown state has been</td></tr>
</table>

achieved.

These rules must be computational in format. E.g.: OCL or other formal notation.]

Actions: [Identify the set of actions that may be performed while in this state. Defined the constraint that controls the performance of each action. In the case where no constraint is defined, the action is always performed.]

Name: **Pending**

Description: **Customer Information is assembled as an information entity, ready for submission as a registration request to the Seller**

Definition: **All required characteristics of Customer Information are assembled**

Actions: **Customer Information may be submitted as a registration request to the Seller when all required characteristics are assembled and Customer Information Status = Pending**

Transitions

[For each event listed above identify the resulting condition (state) of the lifecycle. If a particular event can result in more than one condition or state, define the constraint (rule), that indicates which condition would be the actual resultant. This constraint should be computational in format. E.g.: OCL or other formal notation.].

Event	Source	Rule	Transition to
Registration request has been sent to the Seller	**Buyer**	**Buyer has confirmation from messaging service that the registration request has been sent to the Seller**	**Tendered**

State:

Name: Tendered

Description: Registration request has been submitted to the Seller

Definition: Buyer has confirmation from messaging service that the registration request has been sent to the Seller

Actions: Registration request may be received by the Seller when Customer Information Status = Tendered. Seller proceeds to evaluate the registration request

Transitions

Event	Source	Rule	Transition to
Registration Request accepted by the Seller	**Seller**	**Registration Request Is complete and valid and credit check is positive**	**Accepted**
Registration Request	**Seller**	**Registration Request**	**NonAc-**

	rejected by the Seller		**fails for some reason**	**cepted**

State:	**Name: Accepted** **Description: Buyer Information is complete, credit check is positive, and Seller's Buyer ID is assigned** **Definition: Buyer Information is complete (all required characteristics are present) and validated, and credit check with the bank of Buyer's credit is positive. Seller's Buyer ID assigned = yes** **Actions: Registration Response may be received by the Buyer when Customer Information Status = Accepted**

Transitions	Event	Source	Rule	Transition to
	Buyer receives Registration Response from the Seller	**Seller**	**Buyer receives Registration Response from the Seller before timeout**	**Confirmed**
	Timeout on Registration Request	**Seller**	**Buyer receives no response on Registration Request by Respond by Date**	**Start**

State	**Name: NotAccepted** **Description: Buyer Information is incomplete, or credit check is negative, Seller's Buyer ID is not assigned.** **Definition: Buyer Information is incomplete (required characteristics are missing or can not be validated,. Or, credit check with the bank of Buyer's credit is negative. Seller's Buyer ID assigned = no.** **Actions: Registration Response may be received by the Buyer when Customer Information Status = NotAccepted**

Transitions:	Event	Source	Rule	Transition to
	Buyer receives Registration Response from the Seller	**Seller**	**Buyer receives Registration Response from the Seller before timeout**	**Rejected**
	Timeout on Registration Request	**Seller**	**Buyer receives no response on Registration Request by Respond by Date**	**Start**

<table>
<tr><td>State:</td><td>Name: Confirmed
Description: Buyer receives a positive Registration Response from the Seller
Definition: A positive Registration Response is received, including an assigned Seller's Customer ID
Action: Buyer receives a Registration Response with Customer Information Status = Accepted and an assigned Seller's Customer ID</td></tr>
<tr><td>Transitions</td><td><table>
<tr><th>Event</th><th>Source</th><th>Rule</th><th>Transition to</th></tr>
<tr><td>Buyer receives a Registration Response with Customer Information Status = Accepted and an assigned Seller's Customer ID</td><td>Seller</td><td>Registration Response is positive</td><td>Success end</td></tr>
</table></td></tr>
<tr><td>State:</td><td>Name: Rejected
Description: Buyer receives a negative Registration Response from the Seller
Definition: A negative Registration Response is received with no assigned Seller's Customer ID
Action: Buyer receives a Registration Response with Customer Information Status = NotAccepted and no Seller's Customer ID</td></tr>
<tr><td>Transitions</td><td><table>
<tr><th>Event</th><th>Source</th><th>Rule</th><th>Transition to</th></tr>
<tr><td>Buyer receives a Registration Response with Customer Information Status = NotAccepted and no Seller's Customer ID</td><td>Seller</td><td>Registration response is negative</td><td>Success end</td></tr>
</table></td></tr>
<tr><td>Post-conditions</td><td>[Post-conditions are the rules for defining the conditions that must be</td></tr>
</table>

	true for the localized context that exists after the process lifecycle completes. These rules are constraints that must be satisfied after the lifecycle, thus ensuring that the proper update to context of the parent process has occurred. These constraint(s) must be a subset of the constraint(s) defined by the process that this lifecycle is defining and be computational in format. E.g.: OCL or other formal notation.] **If the Registration Response is positive, i.e., Seller's Buyer ID has been assigned) Buyer may proceed to ObtainQuote or PlaceOrder. If the Registration Response is negative, or if a Registration Response is not received by the Respond by Date, the Buyer may not proceed to ObtainQuote or PlaceOrder.**

BTV Example Worksheets

Step 1 - Define a Business Collaboration Protocol

The following worksheet specifies the choreography of the order from catalog business collaboration at the BTV level. The states of the collaboration are described through each business transaction activity in terms of recognized events, state transitions, and conditions, or rules, that must be satisfied for state transitions for occur. The object flow graph that follows illustrates the contents of this worksheet for the Obtain Customer ID business transaction activity.

Form: Business Collaboration Protocol (Activity Model)	
Business Collaboration Protocol	[Provide a name for the Business Collaboration Protocol.] **Order from Catalog**
Description	[A plain text explanation of the purpose and behavior of the Business Collaboration Protocol] **The Buyer orders goods mentioned in the catalogue. The Buyer may request a price quote (e.g. when the unit price amount of a product is not specified in the catalogue) before actually placing the order. In this case, the Seller first returns the price quote. In both cases, the Seller returns an order confirmation.**
Preconditions	[Preconditions are the rules for defining the conditions that must be true for the context that this BCP is executed within. These rules are constraints that must be satisfied before instantiating or initializing the BCP thus ensuring that the proper context for the BCP has been established. These conditions must be computational in format. E.g.: OCL or

	other formal notation.] **none**
Begins When	[Identifies the event(s) from that start this BCP. For any BCP there is only one starting point, known as a start state. This list of events are the only ones which will instantiate the BCP and cause it to enter into a condition or state as determined by the processing of the defined event. These event(s) may be computational in format. E.g.: OCL or other formal notation.] **Buyer indicates a need for a product**
Business Transaction Activities	The following section defines the states that the Business Collaboration Protocol can occur. These states define which Business Transactions are performed.
Start State	The Start State is a pseudo state in which the initialization and instantiation of Business Collaboration Protocol artifacts and context occurs.].
Recognized Events (Start State)	[Identifies the event(s) from that start this Business Collaboration Protocol. For any Business Collaboration Protocol there is only one starting point, known as a start state. This list of events are the only ones which will instantiate the BCP and cause it to enter into a condition or state as determined by the processing of a defined event. These event(s) may be computational in format. E.g.: OCL or other formal notation.] **Start with no valid catalog on-hand** **Start with valid catalog on-hand and no valid Seller's Customer ID** **Start with valid catalog on-hand and valid Seller's Customer ID and quote required** **Start with valid catalog on-hand and valid Seller's Customer ID and no quote required.**
Transitions (Start State)	[For each event listed above identify the resulting Business Transaction Activity of the Business Collaboration Protocol. If a particular event can result in more than one Business Transaction Activity, define the constraint, which indicates which condition will be the actual resultant. If more than one constraint qualifies for a particular event, then the Business Collaboration Protocol process path will fork. This constraint should be computational in format. E.g.: OCL or other formal notation.]. **Start with no valid catalog on-hand – Obtain Product List** **Start with valid catalog on-hand and no valid Seller's Customer**

	ID – Obtain Customer ID **Start with valid catalog on-hand and valid Seller's Customer ID and quote required – Obtain Quote** **Start with valid catalog on-hand and valid Seller's Customer ID and no quote required – Place Order**
State:	**Obtain Product List**
Transitions	

Event	Source	Rule	Transition to
Request List	**Buyer**	**no valid Seller's Customer ID**	**Obtain Customer ID**
Request List	**Buyer**	**valid Seller's Customer ID on-hand and quote required**	**Obtain Quote**
Request List	**Buyer**	**valid Seller's Customer ID on-hand and no quote required**	**Place Order**

State	**Obtain Customer ID**
Transitions	

Event	Source	Rule	Transition to
ID Request	Buyer	Quote Required	Obtain Quote
ID Request	Buyer	No Quote Required	Place Order

State	**Obtain Quote**
Transitions	

Event	Source	Rule	Transition to
Request Quote	Buyer	Quote Accepted	Place Order
Request Quote	Buyer	Quote Rejected && Re-quote Request	Obtain Quote
Request Quote	Buyer	Quote Rejected	Exit with no Order

State	**Place Order**
Transitions	

Event	Source	Rule	Transition to
Buyer	Buyer	Seller	END

	received Product		commitment fulfilled	
	Buyer Check for Shipment Notice	Buyer	Shipment Notice Not Received	Obtain Order Status
	Seller Accepts Order	Seller	Product Shipped	Debit Credit Card && Notify Buyer of Shipment

State	**Obtain Order Status**
Recognized events	**Buyer received Product** **Product not received by Buyer and Order Status needed**
Transitions	**Buyer received Product - Buyer End (Seller commitment fulfilled)** **Product not received by Buyer and Order Status needed – Obtain Order Status**

Event	Source	Rule	Transition to
Check Order Status	Buyer	Receive Shipment Notification	END
Check Order Status	Buyer	No Shipment Notice Received && Need Order Status	Obtain Order Status

State	**Debit Credit Card**
Transitions	

Event	Source	Rule	Transition to
Get Authorization from Bank	Seller	Seller is Paid	END

State	**Notify Buyer of Shipment**
Recognized events	**Messaging service acknowledgment that shipment notice sent**
Transitions	

Event	Source	Rule	Transition to
Send Shipment Notice	Seller	Shipment Notice Sent	END

For each Business Transaction Activity of the lifecycle, repeat the following entries.

	Business Transaction Activity	**Name**: [Identify a Business Transaction Activity of this Business Collaboration Protocol.] **Obtain Product List** **Description**: [Provide a textual description of this Business Transaction Activity] **To order from a Seller's catalogue the Buyer determines whether he has a current catalogue of the Seller or not. If not, the Buyer sends a request for the catalogue and the Seller returns the electronic version of the catalogue.** **Definition**: [Definitions are the rules for defining the localized conditions that must be true within the context of this Business Collaboration Protocol that asserts that this condition has been achieved. If these rules are not true for this condition, then an invalid or unknown state has been achieved. These rules must be computational in format. E.g.: OCL or other formal notation.] **No valid catalog on-hand** **Action**: [Identify the Business Transaction that is performed while in this Business Transaction Activity.] **Obtain Product List**
	Recognized Events	[Identifies the event(s) that are recognized by the Business Transaction Activity. These event(s) may be computational in format. E.g.: OCL or other formal notation.] **Seller returns electronic version of the catalog and no valid Seller's Customer ID** **Seller returns electronic version of the catalog and valid Seller's Customer ID, and require a Quote** **Seller returns electronic version of the catalog and valid Seller's Customer ID, and do not require a Quote**

	Transitions	**Event:** **Seller returns electronic version of the catalog and no valid Seller's Customer ID**	[For each event listed above identify the resulting Business Transaction Activity of the Business Collaboration Protocol. If a particular event can result in more than one Business Transaction Activity, define the constraint, which indicates which condition will be the actual resultant. If more than one constraint qualifies for a particular event, then the Business Collaboration Protocol process path will fork. This constraint should be computational in format. E.g.: OCL or other formal notation.] **Obtain Customer ID**
		Seller returns electronic version of the catalog and valid Seller's Customer ID, and require a Quote	**Obtain Quote**
		Seller returns electronic version of the catalog and valid Seller's Customer ID, and do not require a Quote	**Place Order**
		Associated Business Entity: **Product List**	[Identify any Business Entities that are affected by this transition and their defined state.] **Product List transitions from Request Tendered to Received or Request Rejected**
	Business Transaction Activity	**Name**: **Obtain Customer ID** **Description: If the Buyer decides to place an order, he must verify whether he is already registered with the Seller (since a Seller accepts only registered Buyers). If the Buyer is not already registered, he sends his Customer information. After verification of the Customer information and credit, the Seller returns a Customer ID.** **Definition: No valid Seller's Customer ID on-hand** **Action: Obtain Customer ID**	

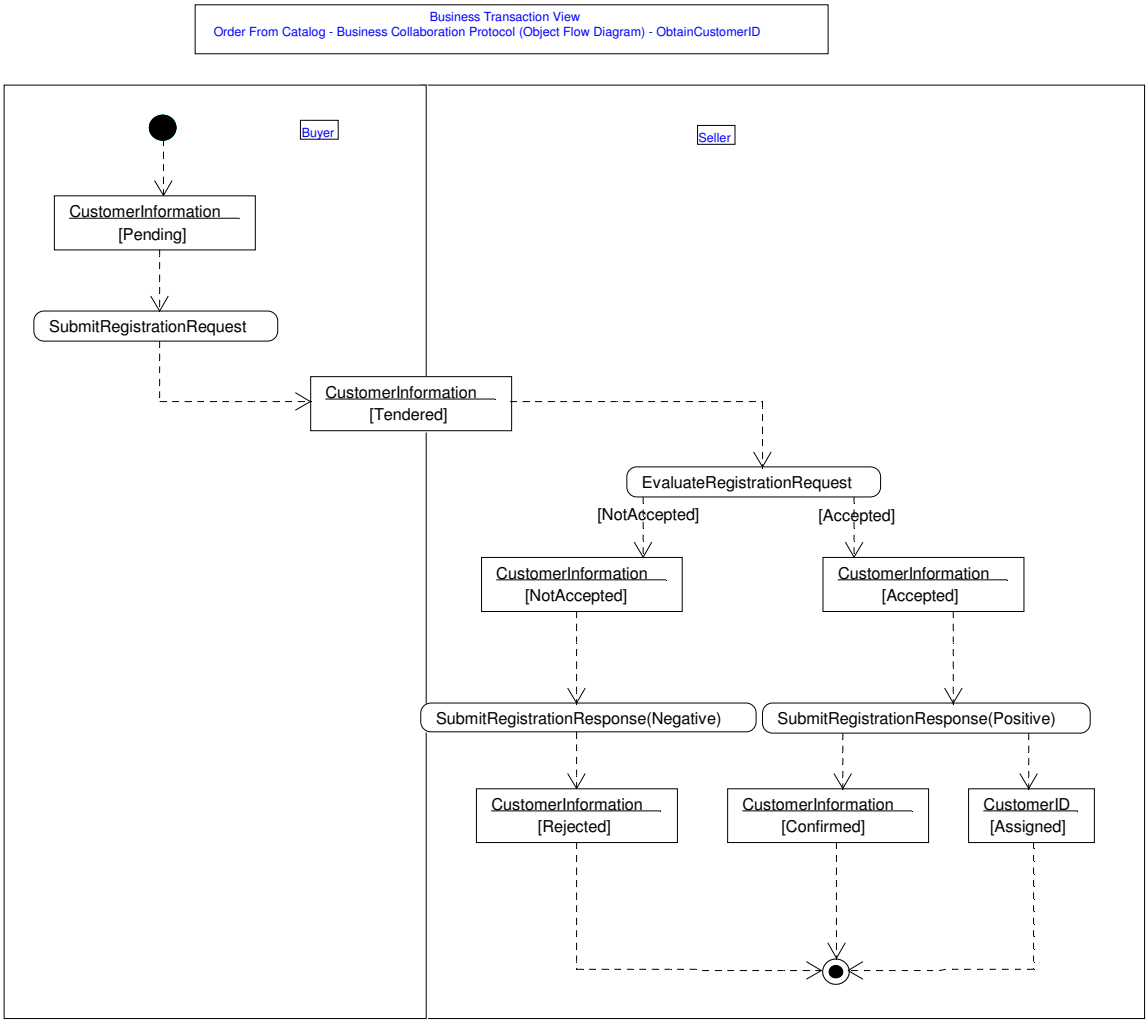
	Recognized Events	**Seller assigned a Seller's Customer ID and require a Quote** **Seller assigned a Seller's Customer ID and do not require a Quote**	
	Transitions	**Event:** **Seller assigned a Seller's Customer ID and require a Quote** **Seller assigned a Seller's Customer ID and do not require a Quote**	**Obtain Quote** **Place Order**
		Associated Business Entity: **Customer ID**	**Customer ID transitions from Request Tendered to Assigned or Request Rejected**
	Business Transaction Activity	**Name: Obtain Quote** **Description: Before ordering, the Buyer verifies whether the current price of the product is available. If not, the Buyer will request a price quote and the Seller returns the price quote. Note that only a registered Buyer can request a price quote.** **Definition: Buyer requires a Quote before ordering and has a valid Seller's Customer ID** **Action: Obtain Quote**	
	Recognized Events:	**Seller provides a Price Quote to the Buyer** **Seller rejects Buyer's request for a Price Quote and Buyer re-requests a Price Quote** **Seller rejects Buyer's request for a Price Quote and Buyer declines to order**	
	Transitions	**Event:** **Seller provides a Price Quote to the Buyer** **Seller rejects Buyer's request for a Price Quote and Buyer re-requests a Price Quote** **Seller rejects Buyer's request for a Price Quote and Buyer declines to order**	**Place Order** **Obtain Quote** **Exit with no order**

		Associated Business Entity **Price Quote**	**Price Quote transitions from Request Tendered to Received or Request Rejected**
	Business Transaction Activity	**Name: Place Order** **Description: If the Buyer wants to order the product(s) (according either to the already known price information or to the requested price quote) he sends an order to the Seller. The Seller returns an order confirmation** **Definition: Buyer determines to place an order and has a valid Seller's Customer ID** **Action: Place Order**	
	Recognized Events:	**Buyer receives product** **Buyer fails to receive product by Respond by Date** **Seller accepts order**	
	Transactions	**Event:** **Buyer receives product** **Buyer fails to receive product by Respond by Date** **Seller accepts order**	**Buyer end** **Obtain Order Status** **Notify Buyer of Shipment and Debit Credit Card**
		Associated Business Entity **Order**	**Order transitions from Tendered to Confirmed or Rejected**
	Business Transaction Activity	**Name: Obtain Order Status** **Description: Until the Buyer has received the product, he can decide to request the order status from the Seller. The Seller then returns the order status information. The cycle of requesting order status and sending order status information might be executed multiple times.** **Definition: Product not received by Buyer and Order Status needed** **Action: Obtain Order Status**	
	Recognized Events:	**Buyer receives product** **Product not received by Buyer and Order Status needed**	

	Transitions:	**Event:** **Buyer receives product** **Product not received by Buyer and Order Status needed**	**Buyer end** **Obtain Order Status**
		Associated Business Entity **Order**	**Order transitions from confirmed to fulfilled (product received)**
	Business Transaction Activity	**Name: Notify Buyer of Shipment** **Description: If the order is acceptable as confirmed, the Seller will ship the Product and notify the Buyer of Shipment** **Definition: Messaging service acknowledgment that shipment notice sent** **Action: Notify Buyer of Shipment**	
	Recognized Events;	**Messaging service acknowledgment that shipment notice sent**	
	Transitions:	**Event:** **Messaging service acknowledgment that shipment notice sent**	**Seller End**
		Associated Business Entity **Goods Transfer**	**Goods transfer transitions from pending to tendered to accepted to confirmed**
	Business Transaction Activity	**Name: Debit Credit Card** **Description: If the order is acceptable as confirmed, the Seller will debit the Buyer's credit card** **Definition: Messaging service acknowledgment that authorization for payment sent to the Bank** **Action: Debit Credit Card**	
	Recognized Events:	**Messaging service acknowledgment that authorization for payment sent to the Bank**	

	Transitions:	**Event:** **Transfer of funds from the Bank to the Seller**	**Seller End**
		Associated Business Entity **Account**	**Account transitions from funds available to authorized payment to payment**
Post-conditions		[Post-conditions are the rules for defining the conditions that must be true for the localized context that exists after the Business Collaboration Protocol completes. These rules are constraints that must be satisfied after the Business Collaboration Protocol thus ensuring that the proper update to context of the parent process has occurred. These constraint(s) must be a subset of the constraint(s) defined by the process that this Business Collaboration Protocol is defining and be computational in format. E.g.: OCL or other formal notation.] **Buyer has a valid Product List** **Seller's Customer ID is assigned** **Price Quote is received** **Buyer's order is fulfilled** **Seller is paid**	

Business Collaboration Object Flow Diagram



Step 2 - For each Business Transaction activity, define a business transaction activity graph.

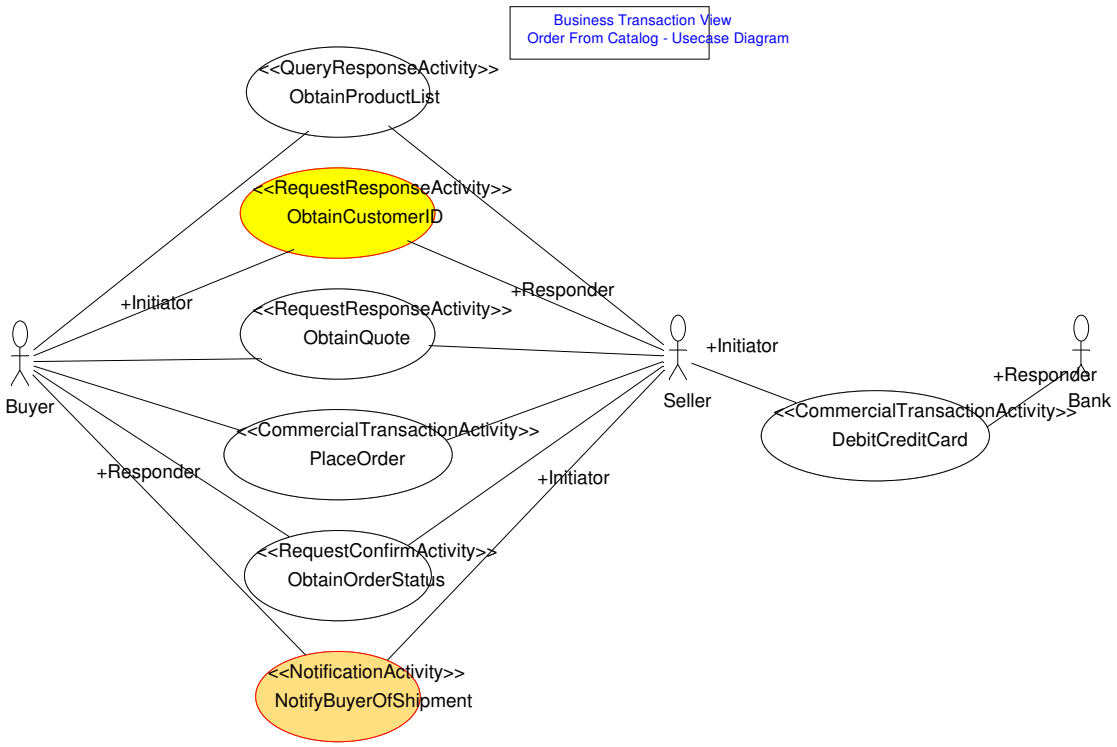
The Business Transaction worksheet that follows specifies the Obtain Customer ID business transaction activity. Most important is the selection of Request Response as the business transaction activity pattern to be used for Obtain Customer ID and the specification of values for critical parameters in the Request Response pattern. Request Response is chosen according to the criteria as illustrated in Figure 5: a response is required, the seller does not already have the requested information, i.e., Customer ID, validation of the request is required before processing, and there is no residual obligation between the roles to fulfill terms of the contract. A business transaction worksheet would normally be completed for each business transaction activity. The worksheet is shown only for Obtain Customer ID for illustrative purposes.

Form: Business Transaction	
Business Transaction Name	[Provide a name for the Business Transaction.] **Obtain Customer ID**
Description	[A plain text explanation of the purpose and behavior of the Business Transaction.] **If the Buyer decides to place an order, he must verify whether he is already registered with the Seller (since a Seller accepts only registered Buyers). If the Buyer is not already registered, he sends his Buyer information. After verification of the Buyer information and credit, the Seller returns a Customer ID.**
Select Business Transaction Pattern:	Select one of: 7) Commercial Transaction 8) Request Confirm 9) Request Response 10) Query Response 11) Information Distribution 12) Notification **Request Response**
Secure Transport:	[True or False,] **True**
Non Repudiation Required:	[True or False] **True**
Authorization Required:	[True or False] **True**
Time to Perform:	[Specify the time period that this transaction must be completed within.] **2 hours**
Time to Acknowledge Receipt:	[Specify the time period that a Receipt Acknowledgement must be returned by the responding role.] **10 minutes**
Time to Acknowledge Acceptance:	[Specify the time period that a of an Acceptance Acknowledgement must be returned by the responding role.] **20 minutes**
Partner Roles	
Initiating/Requesting Partner Type	[Partner type from collaboration.] **Buyer**
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).] **Customer**
Responding Partner Type	[See above.] **Seller**
Responding Partner Role	[See above.] **Retailer**

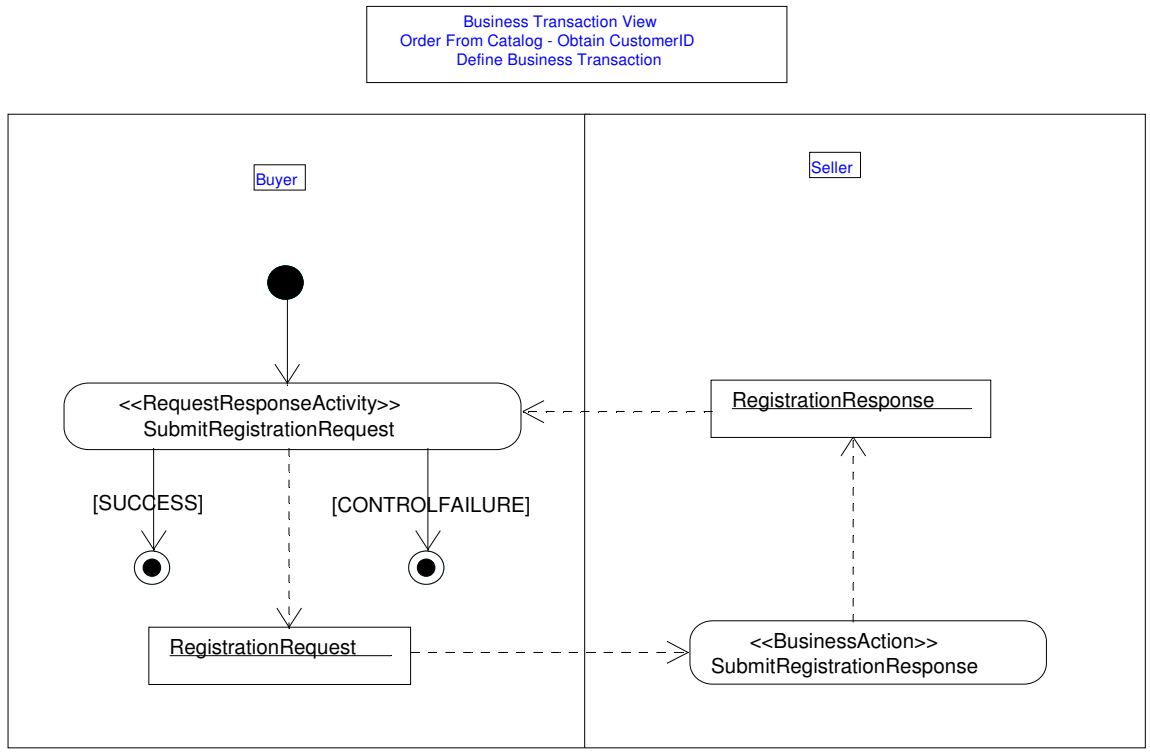
Requesting Business Activity				
Activity:		**Submit Registration Request**		
Pre-Conditions		[Business rules performed before activity is performed] **No valid Seller's Customer ID on-hand**		
Post-Conditions		[Business rules performed after activity is performed] **Buyer has a valid Seller's Customer ID**		
Number of Retries:		**3**		
Information Envelope:		**Registration Request**		
	Information Type:	**Structured Information**		
	Information State:	[Identify the Information Envelope allowed state(s).] **Pending** **Tendered** **Rejected** **Confirmed**		
	Information Security:	Are Contents Confidential?	[True or False] **True**	
		Is the Envelope Tamperproof?	[True or False] **True**	
		Authentication Required?	[True or False] **True**	
	Business Information Manifest	[Enter the name(s) of the **Business Information** contained in envelope.]		
		Business Information Name	[Enter name] **Registration Request**	
		Information Type:	[Enter type] **Structured Information**	
		Information State:	[Identify the Business Information allowed state(s).] **Mandatory**	
		Information Security:	Are Contents Confidential?	[True or False] **True**
			Is the Envelope Tamperproof?	[True or False] **True**
			Authentication Required?	[True or False] **True**
Responding Business Activity				

Activity:		**Submit Registration Response**		
Pre-Conditions		[Business rules performed before action is executed] **Registration Request received but not evaluated for complete and valid information nor credit verified**		
Post-Conditions		[Business rules performed after action is executed] **Seller's Buyer ID is assigned if Buyer Information is complete and credit check is positive**		
Validation of Request Required:		[True or False] **True**		
Information Envelope:		[Enter Name] **Registration Response**		
	Information Type:	[Enter Type] **Structured Information**		
	Information State:	[Identify the Information Envelope allowed state(s).] **Accepted** **Not Accepted**		
	Information Security:	Are Contents Confidential?	[True or False] **True**	
		Is the Envelope Tamperproof?	[True or False] **True**	
		Authentication Required?	[True or False] **True**	
	Business Information Manifest List:	[Enter the name of the **Business Information** contained in envelope]		
		Business Information Name	[Enter name] **Registration Response**	
		Information Type:	[Enter Type] **Structured Information**	
		Information State:	[Identify the Business Information allowed state(s).] **Mandatory**	
		Information Security:	Are Contents Confidential?	[True or False] **True**
			Is the Envelope Tamperproof?	[True or False] **True**
			Authentication Required?	[True or False] **True**

The BTV Use Case diagram that follows identifies the business transaction pattern selected for each business transaction activity in the order from catalog collaboration. In addition, the initiator and responder roles of the trading partners/actors are identified.



The Request Response business transaction pattern for Obtain Customer ID is illustrated to show how this business transaction pattern is instantiated for the example business transaction activity, in terms of authorized roles of Buyer and Seller, initiating and responding business activities of Submit Registration Request and Submit Registration Response, and Registration Request and Registration Response business information.



Step 3 - Create class diagrams by re-using existing information structure

Business Information worksheets are completed in this illustration for the Registration Request and Registration Response Business Information for the Obtain Customer ID business transaction activity. The Final Business Information Model class diagram that follows illustrates the contents of these worksheets. Only one set of Business Information is contained in the request and response Information Envelopes, i.e., Registration Request and Registration Response. Thus the same name is given to the Information Envelopes and contained Business Information. Information Entities include the Header Information and Body Information of the Business Information for both the Registration Request and Registration Response, in that they are structured messages. The Request Header Information is associated with the Customer Information Business Entity, in that it contains Information Entities that are required to transition the state of the Customer Information Business Entity. The Information Entities are shown as specified characteristics or attributes of Business Information in the worksheet, and are illustrated as attributes of reusable Information Objects in the Final Business Information Model.

Form: Business Information	
Business Information Name:	[Provide the name that this Business Information is identified by.] **Registration Request**
Description:	[A plain text explanation of the purpose and behavior of the Business Information.] **Information about a prospective Buyer that is required by the Seller in order for the seller to register the Buyer and assign a Seller's Customer ID**
Business Information Characteristics	Define the set of characteristics or attributes that define the structural aspects of the Business Information. **Name:** [Enter the name of the characteristic.] **Type:** [Enter the type of the characteristic. e.g. this is referred to business information.] **Constraints:** [The rules for defining the conditions that must be true for the inclusion and/or validation of this characteristic. These rules may be computational in format. e.g.: OCL or other formal notation.]

Characteristics or Attributes

Name	Type	Constraint
Reference Number – Registration Request Header Information	**String**	**Mandatory**
Respond by Date - Registration Request Header	**Date**	**Mandatory**
Legal Name - Party	**String**	**Mandatory**
Short Name - Party	**String**	**Optional**
Official Registration ID - Party	**String**	**Optional**
Registration Authority - Party	**String**	**Optional**
Bank Identification Number - Account	**Integer**	**Mandatory**
Account Type - Account	**String**	**Mandatory**
Account Identification Number - Account	**Integer**	**Mandatory**
Account Holder - Account	**String**	**Mandatory**
Balance - Account	**Currency**	**Mandatory**
Start Date - Account	**Date**	**Mandatory**
End Date - Account	**Date**	**Mandatory**
Addressee - Address	**String**	**Mandatory for Bill to Address; Optional for Ship to Address if same as Bill to Address**
Postal Code - Address	**String**	**Mandatory for Bill to Address; Optional for Ship to Address if same as Bill to Address**
Postal Code Location - Address	**String**	**Mandatory for Bill to Address; Optional for Ship to Address if same as Bill to Address**
Phone Number - Address	**String**	**Mandatory for Bill to Address;**

Business Information Behavior		Define the set of operations that affect the behavioral aspects of the Business Information.
	Name:	[Enter the name of the operation.] **Obtain Customer ID**
	Lifecycle:	[Enter the name of the lifecycle that defines this behavior.] **Registration Lifecycle**

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Form: Business Information	
Business Information Name:	[Provide the name that this Business Information is identified by.] **Registration Response**
Description:	[A plain text explanation of the purpose and behavior of the Business Information.] **After verification of the Customer information and credit, the Seller returns a Seller's Customer ID.**
Business Information Characteristics	Define the set of characteristics or attributes that define the structural aspects of the Business Information. **Name:** [Enter the name of the characteristic.] **Type:** [Enter the type of the characteristic. e.g. this is referred to business information.] **Constraints:** [The rules for defining the conditions that must be true for the inclusion and/or validation of this characteristic. These rules may be computational in format. e.g.: OCL or other formal notation.]

	Characteristics or Attributes	Name	Type	Constraint
		Reference Number – Registration Request Header Information	**String**	**Mandatory**
		Status – Registration Body Information	**String**	**Mandatory**
		Reason – Registration Body Information	**String**	**Mandatory**
		Code – Registration Body Information	**String**	**Mandatory**
		Customer ID – Registration Body Information	**String**	**Mandatory**
Business Information Behavior		Define the set of operations that affect the behavioral aspects of the Business Information.		
	Name:	[Enter the name of the operation.] **Obtain Customer ID**		
	Lifecycle:	[Enter the name of the lifecycle that defines this behavior.] **Registration Lifecycle**		

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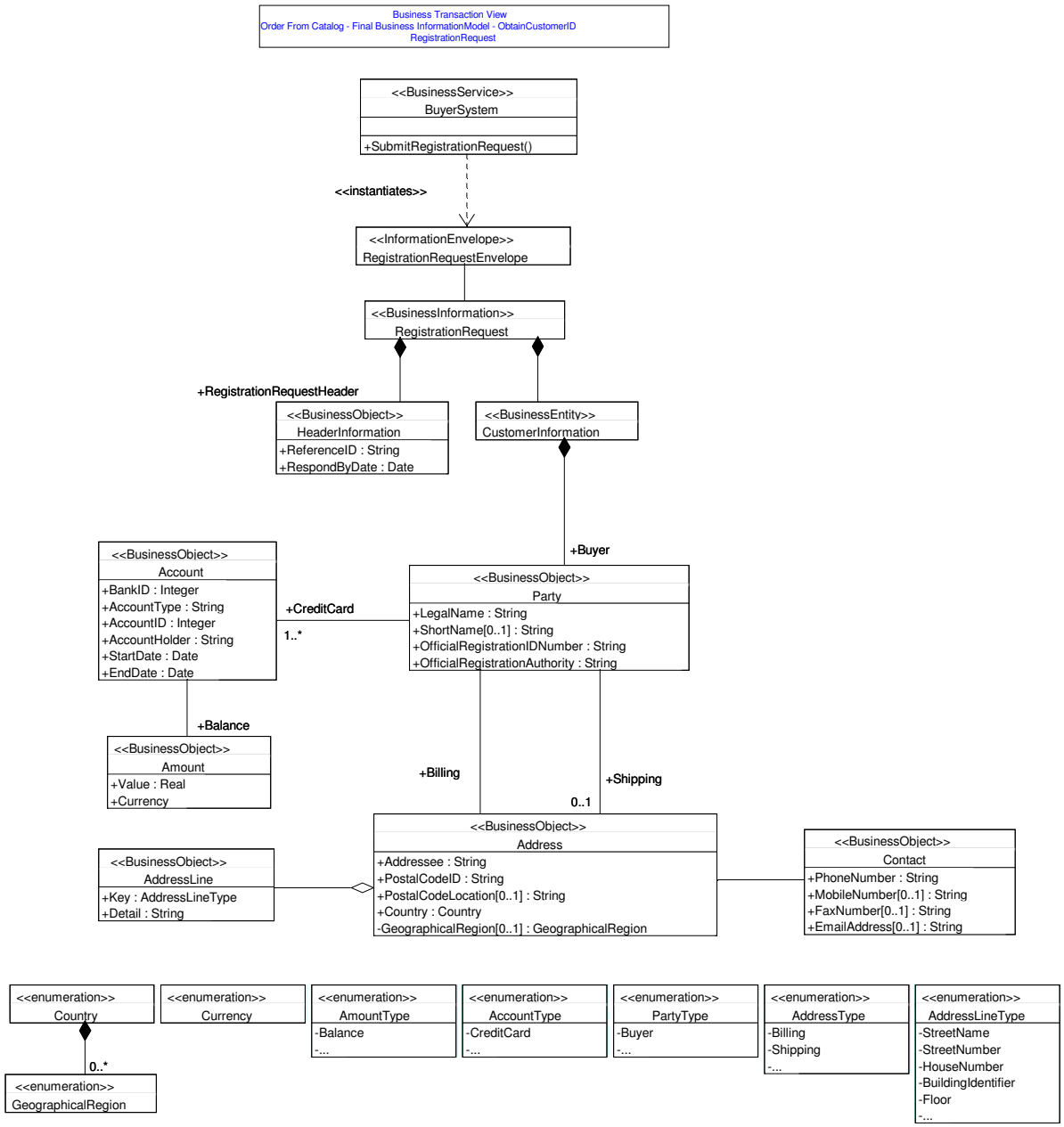
Final Business Information Models

Registration Request



1526 **Registration Response**

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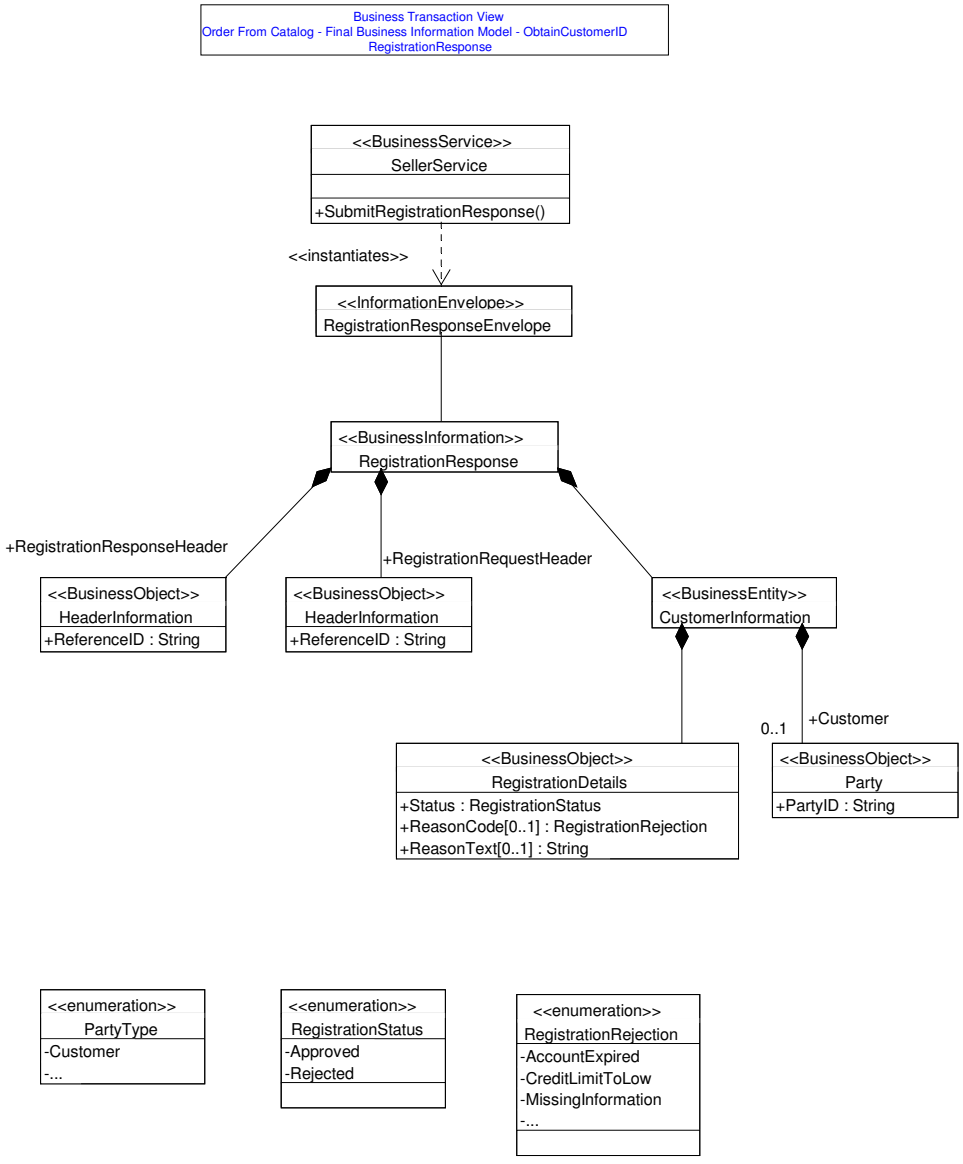

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Appendix C. UMM Data Types and Notation

UMM Data Types

In UML a data type is defined as “A descriptor of a set of values that lack identity and whose operations do not have side effects. Data types include primitive pre-defined types and user-definable types. Pre-defined types include numbers, string and time. User-definable types include enumerations. An enumeration is a user-defined data type whose instances are a set of user-specified named enumeration literals. The literals have a relative order but no algebra is defined on them.” UML avoids specifying the syntax for constructing type expressions because they are so language-dependent. It is assumed that the name of a class or simple data type will map into a simple Classifier reference. In the UML Meta-Model data type is defined as follows:

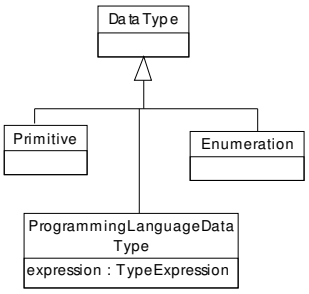

Fig. 1

Since UMM focuses on the Business Operational View, it is independent of any language used as transfer-syntax or as programming language to build B2B applications. As a consequence, UMM also avoids specifying syntax for constructing type expressions. The UMM set of data types is depicted in Fig. 2. These types must be used in UMM-compliant models. It is assumed that language-specific mappings will be defined to map UMM data types to transfer-syntaxes and programming languages. In addition to these data types UMM defines an additional set of enumerations that are relevant in a business environment. These data types are depicted in Fig. 3.

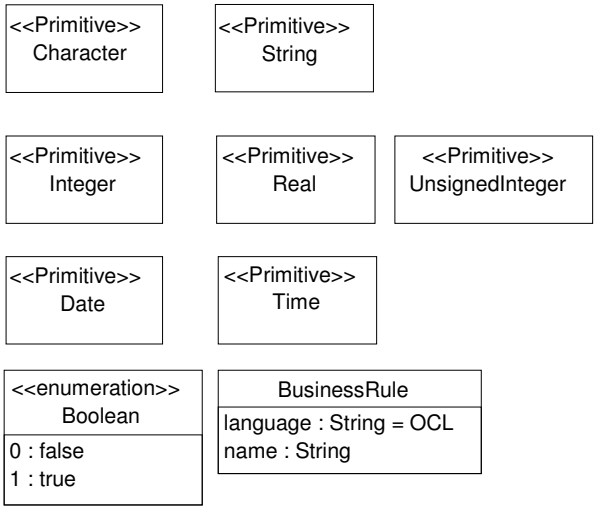

Fig. 2

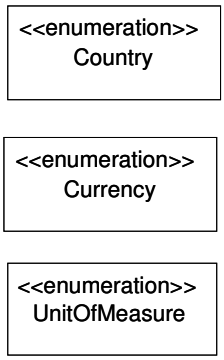

Fig. 3

Boolean

Boolean defines an enumeration that denotes a logical condition. Its enumeration literals are:

true The Boolean condition is satisfied.

false The Boolean condition is not satisfied.

Business Rule

A Business Rule is an expression that defines a statement that will evaluate to a (possibly empty) set of instances when executed in a context. An Expression does not modify the environment in which it is evaluated. An expression contains an expression string and the name of an interpretation language with which to evaluate the string.

Attributes:

language Names the language in which the business rule body is represented. In UMM the value of language is fixed to "OCL", since all business rules must be represented in the Object Constraint Language.

body The text of the business rule expressed in the Object Constraint Language.

Character

Character is a classifier element that is an instance of Primitive. An instance of Character defines a single character. Note, the data type String defines text consisting of multiple characters.

Date

Date is a classifier element that is an instance of Primitive, representing the predefined type of date. Note, the type of date is limited to Year, Month and Date and is not able to capture time aspects, which are handled by the data type Time. Instance of Date follow the format YYYY-MM-DD (Date Part in ISO 8601). However, a date is always subject to implementation considerations, and must be mapped to the date format of the FSV technology of choice.

Integer

Integer is a classifier element that is an instance of Primitive, representing the predefined type of integers. An instance of Integer is an element in the (infinite) set of integers (…-2, -1, 0, 1, 2…).

Real

Real is a classifier element that is an instance of Primitive, representing the predefined type of reals. An instance of Real is an element in either the set of rational numbers or the set of irrational numbers.

String

String is a classifier element that is an instance of Primitive. An instance of String defines a piece of text.

Time

Time is a classifier element that is an instance of Primitive, representing the predefined type of time. Note, the type of time is limited to Hours, Minutes, Seconds and the time off-set. It is not able to capture date aspects, which are handled by the data type Date. Instance of Time follow the format hh:mm:ss+hh:mm (Time Part in ISO 8601). However, a time is always subject to implementation considerations, and must be mapped to the time format of the FSV technology of choice.

UnsignedInteger

1595 UnsignedInteger is a classifier element that is an instance of Primitive. It defines a data type
1596 whose range is the non-negative integers.
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Business-related Enumerations

Country

Country defines an enumeration of all countries. Its enumeration literals refer to the set of ISO 3166 3-digit numeric codes.

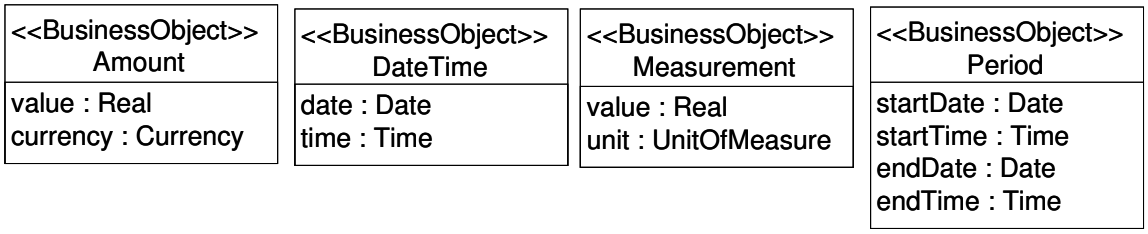
Currency

Currency defines an enumeration of all currencies. Its enumeration literals refer to the set of ISO 4217 3-digit numeric codes.

UnitOfMeasure

UnitOfMeasure defines an enumeration of units of measure used in international trade. Its enumeration literals refer to UN/ECE Recommendation 20.

The Business Objects – The basic ones



Amount

Amount is a business object used to define a number of monetary units specified in a currency where the unit of currency is explicit or implied.

Attributes:

value	**Real**	The number of monetary units as an instance of Real. Note, that the number of decimal places must be limited to two.
currency	**Currency**	The currency as an element of the enumeration of Currency (referencing ISO 4217)

DateTime

DateTime is a business object used to define both a date and a time.

Attributes:

date	**Date**	The date as an instance of Date.
time	**Time**	The time as an instance of Time.

Measurement

Measurement is a business object used to define the measurement of an object. The measurement contains a real number determined by measuring an object along with the specified unit of measure.

Attributes:

value	**Real**	The numeric value as an instance of real determined by measuring an object.

unit	**UnitOfMeasure**	The type of unit of measure as an element of the enumeration of UnitOfMeasure (referencing UN/ECE Rec. 20)

Period

Period is a business object used to define a period starting on a date or/time and ending on a date/or time.

Attributes:

startingDate	Date	The starting date of a period as an instance of Date.
startingTime	Time	The starting time of a period as an instance of Time.
endingDate	Date	The ending date of a period as an instance of Date.
EndingTime	Time	The ending time of a period as an instance of Time.

Business Transaction View Notation

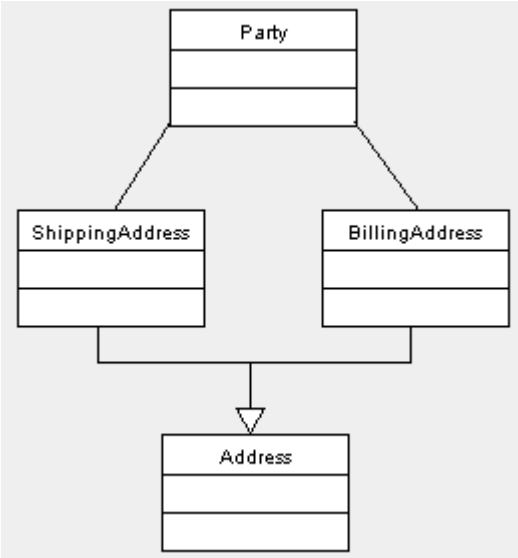
An information envelope includes the business information exchanged between partners in a business transaction.

The business information is composed of the business entities that change their state as a result of the exchange. The change in state of a business entity is based on information that affects the business entity. This information is modelled by assembling business objects. E.g. the business entity “CustomerInformation” is composed of a business object “Party” that assembles further business objects. Furthermore, the business information might include information that is independent of the exchanged business entities. This information is also modelled by business objects. Candidates for the latter case might be a business object “Document” that carries the attributes “DocumentID” and “DocumentCreationDate”.

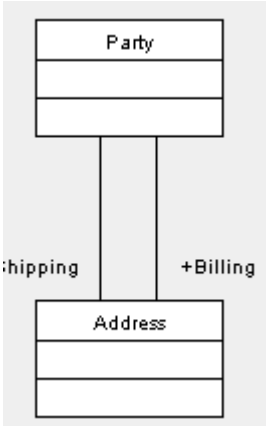
This approach assumes the existence of a library of re-usable business objects. A reference source to develop new reusable business objects is Core Components. These Core Components provide the business semantics that will be used to develop the business object attributes and relationships that apply in a given context. It should be noted that the class diagram associated with Core Components represent semantic relationships and most likely are not identical to the business object class diagram which follows strict UML object oriented modelling principles, concepts and rules.

How do we set a re-usable business object in context?

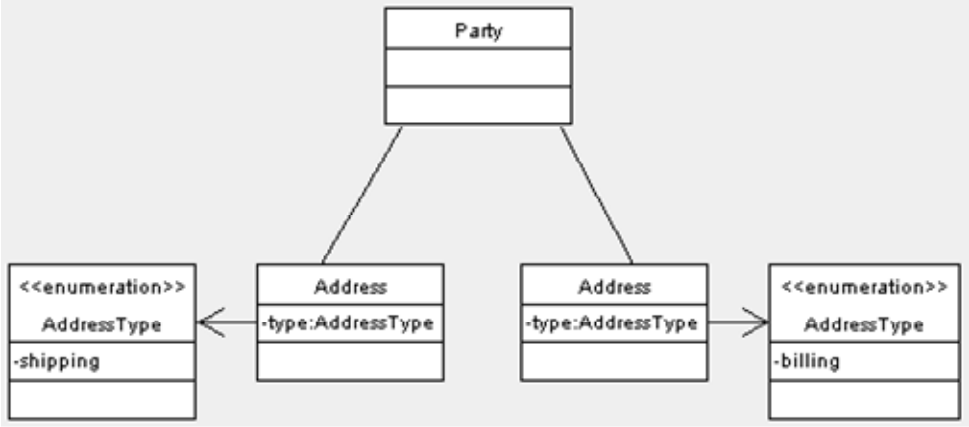
(a) Generalization



(b) Association role



(c) Enumeration

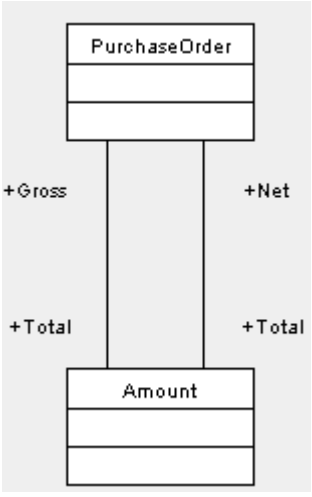


In order to re-use a given business object in a class diagram modelling business information and to set it in context the approach using association roles (b) is the preferred way.

We do not use the generalization approach (a) to set re-usable business objects in context. However, the generalization approach might be used to define new business objects in case of extending a more general one by adding new attributes. E.g. a general business object "ProductOrService" might have a sub-class (=new business object) "FlightProduct" extending the general one by flight specific attributes.

We do not use the approach based on enumerations (c), since it is a very bad modelling technique to intermix the schema level and the instance level, i.e. part of the schema information is expressed by an instance of an enumeration.

However one problem with the association role approach is that the following is not allowed:



There is a maximum of 1 association role per each end of an association. If two qualifiers that are orthogonal to each other define the context in which a business object is used, the approach using association roles (b) fails.

Appendix D. Administrative Information

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 design.

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