

1	INTRODUCTION	1
1.1	PHASES AND WORKFLOWS	2
1.2	UN/CEFACT MODELING METHODOLOGY FRAMEWORK.....	6
1.3	UN/CEFACT MODELLING METHODOLOGY METAMODEL.....	7
1.4	UN/CEFACT MODELLING METHODOLOGY PATTERNS.....	8
1.5	REQUIREMENTS, GLOSSARY AND TRACEABILITY.....	8

1 Introduction

This document describes the UN/CEFACT Modelling methodology (UMM) that should be adopted by UN/CEFACT to model Business Processes and support the development of existing and "Next Generation" EDI for electronic business. It is based on configuring the Unified UN/CEFACT Process framework developed by the [Rational Corporation](#) so as to meet UN/CEFACT needs for modelling business processes.

The business process modelling methodology described in this document is based on the Unified Modelling Language (UML) as the formal description technique for describing an Open-edi scenario as defined in ISO/IEC IS 14662. [Open-edi scenario definition: a formal specification of a class of business transactions having the same business goal]. The scope of this methodology is focused on the Business Operations View (BOV) of IS 14662, defined as "a perspective of business transactions limited to those aspects regarding the making of business decisions and commitments among organisations, which are needed for the description of a business transaction." As such, this methodology provides a procedure for specifying/modelling, in a technology-neutral, implementation-independent manner, business processes involving information exchange.

With the exception of detailed message design, specifications related to the Functional Service View of IS 14662 are outside the scope of this methodology. [FSV definition: a perspective of business transactions limited to those information technology interoperability aspects of IT Systems needed to support the execution of Open-edi transactions]. BOV specifications of Open-edi scenarios are requirements placed on the IT products and services chosen to implement the Open-edi scenario. The BOV-related methodology provides business process and information exchange specifications that are sufficient for any FSV implementation, whether it uses distributed object technology, XML, UN/EDIFACT, proprietary data protocol, etc.

One primary vision of UN/CEFACT is to capture the business knowledge that enables the development of low cost software components by software vendors to help the small and medium size companies, and emerging economies engage in e-Business practices. By focusing on developing business process and information models in a protocol neutral manner, these new standards provide a "future-proof" insurance policy that allows a recasting of these models into new technologies such as eXtensible Markup Language (XML), or other technologies that may emerge ten to fifteen years from now.

This document is targeted primarily at personnel knowledgeable in modelling methodology who facilitate business domain analysis sessions and provide modelling support. It also serves as a checklist for standardized models when a previously

specified business process is contributed to UN/CEFACT for inclusion and incorporation as a standard business process model.

1.1 Phases and Workflows

The Rational Unified Process methodology recognises that all projects pass through a series of phases over the course of time. These phases are inception, elaboration, construction and transition, and are specifically focused on the software development process. Each of these phases has a specific role as related to the UN/CEFACT standards development process. Figure 1-1 shows that within each phase an iteration passes through each workflow in order to validate the deliverables.

One important workflow that is not detailed but is implied by the prescription of this methodology is the Project Management workflow. Project management involves assignment of resources to fulfil modelling roles, as well as development of an iteration plan. .

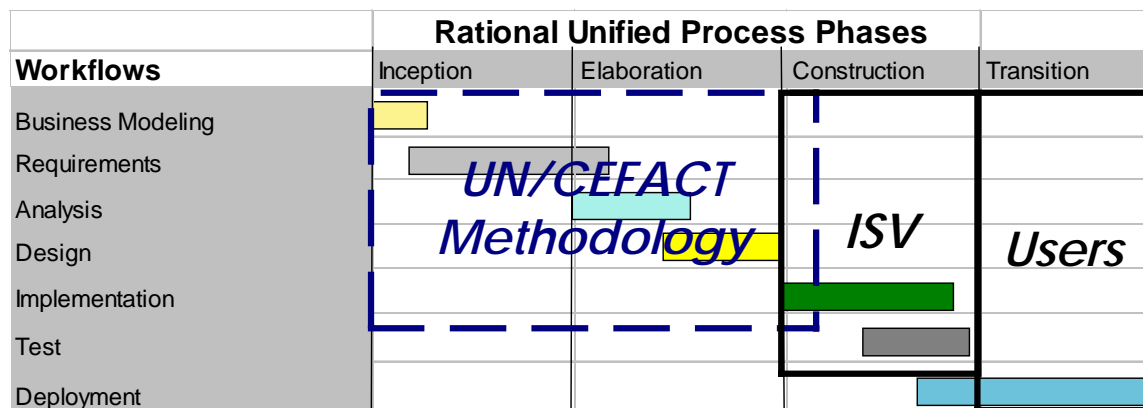


Figure 1-1 Phases and Workflows

As illustrated in Figure 1-1, UN/CEFACT's standards development process focuses primarily on technology neutral modelling as reflected with the Business Modelling through Analysis and Design workflows. UN/CEFACT message development (EDIFACT, XML) is carried out in the Implementation workflow. However, a majority of implementation software is carried out by Independent Software Vendors (ISV). The Test and Deployment workflows are independent of UN/CEFACT resources.

Figure 1-2 shows the high level activities associated with each phase.

Phase	High level activities
Inception	<ul style="list-style-type: none"> Idea is conceived, and initially documented using the UMM. Applicable workflow is: 1) Business Modelling 2) Requirements.
Elaboration	<ul style="list-style-type: none"> Idea is further refined and expanded Applicable workflows are 1) Analysis, and 2) Design The deliverables are compared with the existing repository

	contents. <ul style="list-style-type: none"> • New models or enhancements to existing models are incorporated into the repository
Construction	<ul style="list-style-type: none"> • EDIFACT messages/OO-EDI messages are developed • XML DTDs/schemas development • Software development is performed by ISV • Applicable workflows are 1) Implementation, and 2) Testing
Transition	<ul style="list-style-type: none"> • Testing is completed by ISV • Applicable workflow is Deployment

Figure 1-2 Activities in UN/CEFACT Phases

In the Inception and Elaboration phases the UMM concentrates on workflows needed to understand the business needs to produce business scenarios, business objects and areas of business collaboration. They are:

- i. Business Modelling:-during the **Business Modelling** workflow we illicit and organize business processes and information in the business-to-business domain. This includes the creation of packages to categorize key concepts
- ii. Requirements:-the **Requirements** workflow uses business models as an important input to understand the requirements of the business-to-business solution to be developed. This includes the creation of requirements use case diagrams and detailed descriptions of the requirements..
- iii. Analysis:-the **Analysis** workflow elaborates on the requirements use cases by detailing the activities that occur, collaborations between partners, and initial class diagrams.
- iv. Design:- the **Design** workflow precisely defines the dynamics of the collaboration, along with the structure of data exchanged between business partners. .

Within each of these workflows there is a set of artifacts and deliverables that shall be produced. This document contains templates to facilitate creation of these deliverables. The whole process is iterative so that additions and changes can be validated and incorporated into any of the workflows as they are discovered. Additions and changes should be a natural result of maintenance and enhancement. The Use Case for the UMM is described in Figure 1-3.

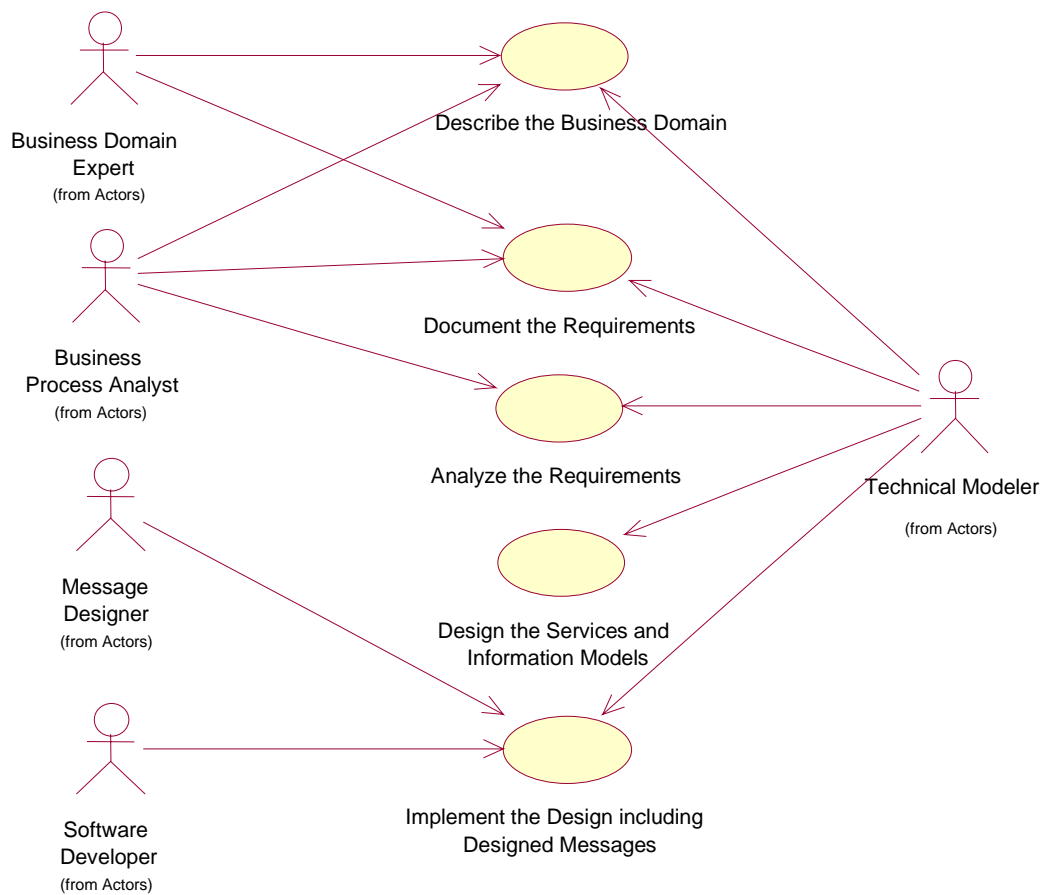


Figure 1-3 Use Case for UN/CEFACT Modelling Methodology

The process and deliverables are outlined below and presented in detail in the body of this document, illustrated with examples based on the “Order From Catalogue” business area. The deliverables of the above workflows are shown as artifacts in Figure 1-4.

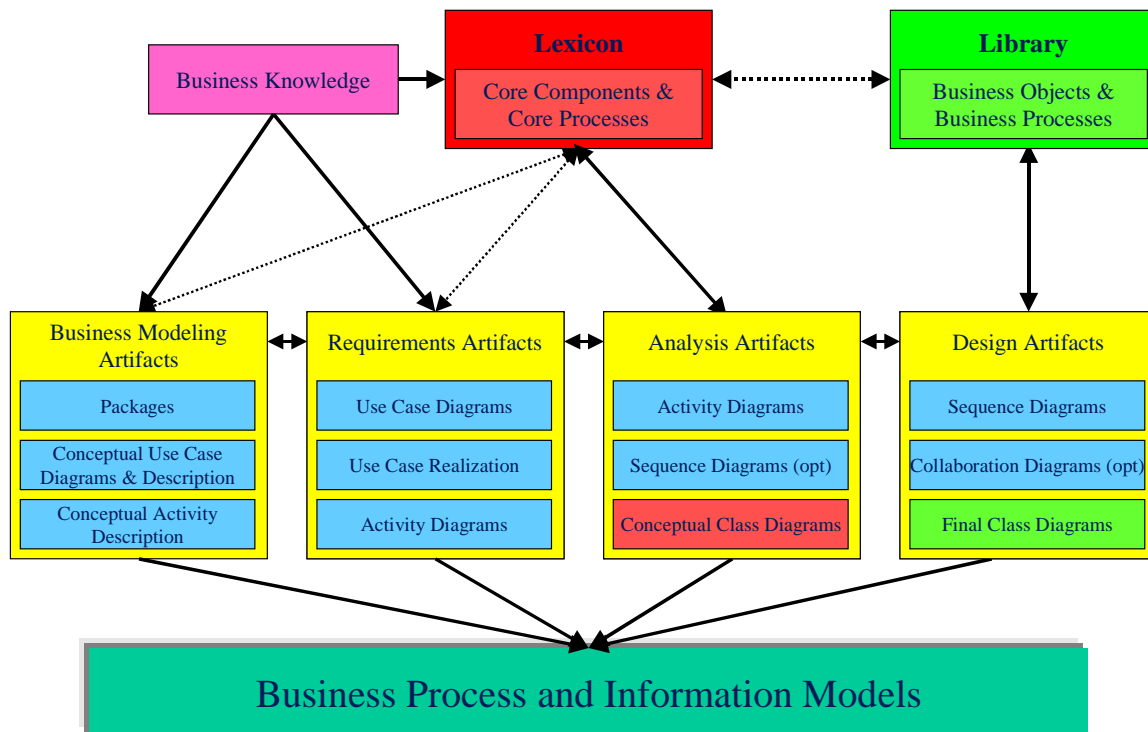


Figure 1-4 Overview of Workflows and Artifacts

The UN/CEFACT Modelling Methodology requires the use of a lexicon. This Lexicon contains data and process definitions including relationships and cross-references as expressed in business terminology and organized by industry domain. This knowledge is captured from business experts across multiple domains, and evolves over time. The Lexicon functionally is a bridge between the specific business or industry language and the UML models through the application of the UN/CEFACT Modelling Methodology. In addition to the Lexicon, models can reuse artifacts from a library of business information objects and processes.

The UN/CEFACT Modelling Methodology begins with business modeling and produces the Business Operations Map in the form of a model architecture expressed as UML packages and initial business use cases with descriptions. A business use case typically is expressed as a first cut business activity diagram.

The Requirements Workflow is the first time that stakeholder needs are elicited. Typically, the first cut activity diagram is reviewed, and more Use Cases are discovered. These use cases and the resultant activity diagrams are heavily influenced by the stakeholder needs and business requirements. In addition, there may be an opportunity to define new Lexicon entries.

The Analysis Workflow fundamentally looks at the collaborations between business roles, assigns business information transaction patterns, and begins to understand the information bundles (business documents) that flow between roles. These information bundles can be expressed as conceptual class diagrams. The artifacts produced in the analysis workflow draw upon information in the Lexicon, or may populate the Lexicon where relevant information is not available.

The Design Workflow primarily involves detailing the information model, applying *business information objects* across all class models, detailing service protocol syntax and semantics [comparable to EDIFACT, XML message design], and applying Business Service Interaction patterns. The content of the *business object library* is created by analyzing existing *business objects* as used by many industries today in conjunction with the Lexicon content. The information model should undergo harmonization to integrate it with other models in the same industry and across other industries.

1.2 UN/CEFACT Modeling Methodology Framework

The UN/CEFACT Modeling Methodology Framework provides the prescription and precision required for predictive results. The framework defines the use and relationships of the methods, patterns and model artifacts within each workflow phase. For each phase a method is applied to a pattern using modelling elements with well-defined semantics.

Figure 1-5 shows the relationship between the methods, patterns and the artifacts they produce for each workflow phase.

Workflow	Methodology	Pattern	Model Artifacts [UML]
Business Modelling	<ul style="list-style-type: none"> Domain Analysis Use Case Analysis Process Discovery Activity Modeling 	<ul style="list-style-type: none"> Business Patterns (TBD) 	<ul style="list-style-type: none"> Business Area [Package] Process Area [Package] Process(es) [Use Cases][Activity Diagrams]
Requirements	<ul style="list-style-type: none"> Requirements Gathering Use Case Analysis Process Analysis Activity Modeling 	<ul style="list-style-type: none"> Business Collaboration (TBD) 	<ul style="list-style-type: none"> Business Process(es) [Use Case] Business Collaboration Use Case Business Collaboration [Collaboration-Use Case Realization]
Analysis	<ul style="list-style-type: none"> Process Analysis Activity Modelling Conceptual Class Modeling 	<ul style="list-style-type: none"> Business Information Flow Patterns 	<ul style="list-style-type: none"> Business Collaboration Protocol [Activity Diagram] Business Transactions [Activity Diagram] Business Documents (conceptual) [Class Diagram]
Design	<ul style="list-style-type: none"> Process Analysis Collaboration Modelling Message Sequencing Information Modelling Message Modelling (protocol neutral) 	<ul style="list-style-type: none"> Business Service Interaction Patterns Information Modelling Patterns 	<ul style="list-style-type: none"> Service Collaboration [Object Collaboration] Network Component [Class Diagram] Business Service [Class Diagram] Service Transactions [Sequence Diagram] Business Documents (detail) [Class Diagram]
Implementation	<ul style="list-style-type: none"> Message Translation Software Development 	<ul style="list-style-type: none"> Message Design Rules UML to XML Mapping 	<ul style="list-style-type: none"> Component Diagrams Message Specifications Software Components

Figure 1-5 UMM Framework

1.3 UN/CEFACT Modelling Methodology MetaModel

Process models are expressed using the UN/CEFACT Modeling Language (UML) and the Object Constraint Language (OCL) both of which are standards maintained by the [Object Management Group](#). The UML is a language expressive enough to specify the structure and behavior of objects that interact in any conceptual domain of discourse. A process model, however, is a specification of the structure and behavior of objects interacting through business partner interfaces, a specialized domain of discourse. The UML metamodel (the model that defines the UML modeling language) is extended to include domain specific syntax and semantics using extension mechanisms known as *stereotyping*. A business process metamodel is thus defined as an extension of the UML metamodel by extending the UML stereotype syntax and semantics with the syntax and semantics of the business process domain. Process models are then constructed using the syntax of the metamodel. Tools and applications that support the syntax and semantics of the business process metamodel will be able to support the construction and execution of business processes.

The UMM is based on a precise definition of the UML metamodel extension that facilitates the expression of a business processes as an object-oriented model. This extended metamodel is termed the e-Business Process Metamodel, shown at a high level in Figure 1-6.

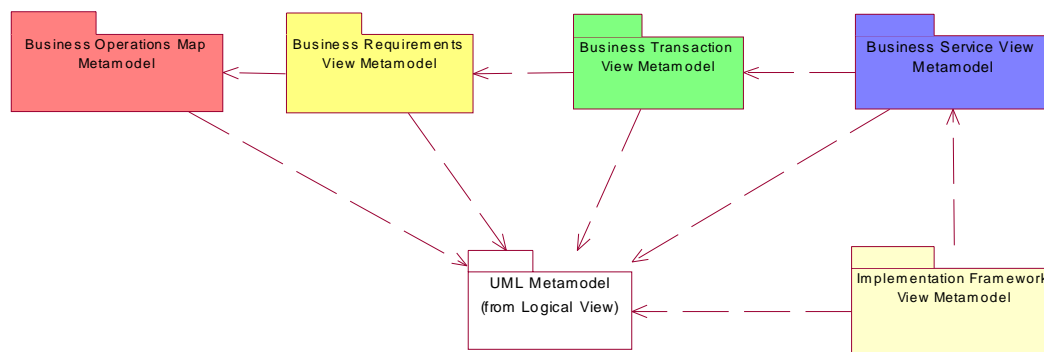


Figure 1-6 e-Business Process Metamodel

The metamodel is organized into the following views so that each process model can be viewed from a number of perspectives.

- **The Business Operations Map (BOM) metamodel** – the partitioning of business processes into business areas and business categories.
- **The Business Requirements View (BRV) metamodel** – the view of a business process model that captures the Use Case scenarios, inputs, outputs, constraints and system boundaries for commercial transactions and their interrelationships.
- **The Business Transaction View (BTV) metamodel** - 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.

- **The Business Service View (BSV) metamodel** - the view of a business process model that specifies the network component services and agents and their message (information) exchange as interactions necessary to execute and validate a business process.

These perspectives support an incremental model construction methodology and provide levels of specification granularity that are suitable for communicating the model to business practitioners, business application integrators and network application solution providers.

1.4 UN/CEFACT Modelling Methodology Patterns

Patterns are reusable, generalized business process abstractions that can be applied to many domains. A metamodel provides the syntax and grammar for expressing designs. Patterns are subjective constructions that meet the requirements of specific business process scenarios.

Patterns are applications of the metamodel to common business process representations. Common business process representations capture common structure and semantics applicable to specific business process domains.

1.5 Requirements, Glossary and Traceability

The Requirements List and the Glossary are two key cross-reference documents which are used throughout the process to ensure that all business requirements, terms, and definitions are recorded. (See Annex 3 for more information.) In order to enable traceability throughout the modelling process, the deliverables developed will be given a traceability indicator. (See Annex 2 for more information.) The modelling activity relies heavily on the use of modelling tools and a repository supported by appropriately skilled resources. The repository will hold the deliverables and can be accessed to check on the availability of suitable models created from earlier business requirements analysis to facilitate re-useability and consistency.

1.6 Document Structure

The Business Modelling, Requirements, Analysis and Design workflows are described in Sections 2, 3, 4, and 5, respectively. Following the workflow descriptions in each section are descriptions of the deliverables for each workflow, referred to as artifacts. Methodology procedures, i.e., guidelines, for stepping through the workflows are then provided, followed by an illustrative example.

Section 6 describes the extension of the Design workflow for protocol specific standards, e.g., eXtended Markup Language (XML), stopping short of standards required for the information exchange infrastructure such as for transport, routing and packaging protocols.

Section 7 provides requirements for expertise, resources and training for each of the workflows.

Section 8 provides a complete description of the modelling patterns used in the UMM. As discussed in Section 1.4, the key to repeatable business process and information model constructions is the application of patterns to specific business process scenarios. While patterns can be expressed for business processes at various levels, the UMM currently includes patterns for business transaction activities and their associated service collaborations. Predefined analysis patterns in Section 8.3 are described for the six types of business transaction activities that have been identified to date. These business transaction activity patterns comprehensively cover all the known legally binding collaborations at the lowest level of request/response interaction between two business applications (Decision Making Applications in ISO/IEC 14662). The specific business transaction activity pattern(s) used in a business collaboration is(are) based on extracting information from business domain experts via answers to questions asked according to a standard script in the Business Modelling and Requirements workflows.

Predefined design patterns in Section 8.4 are described for business service collaborations appropriate for each business transaction pattern. These business service collaboration patterns specify specific interaction sequences between two application systems (referred to as Information Processing Domains in ISO/IEC 14662), i.e., protocols, of message exchanges, according to the type of business transaction, type of role, security and timing parameters. The specific business service collaboration pattern is derived from information gathered in the Requirements workflow. Unless parameter default values are required to be overridden, the appropriate service collaboration pattern is derived according to the metamodel and instantiated in the business process specification.

Section 9 describes the modeling methodology metamodel for underlying the business modeling, requirements, analysis and design workflows as described in 1.3. Artifacts that represent the Business Operations Map, Business Requirements View and Business Transaction View are produced as a result of transforming business process requirements into an object-oriented business process model. Business service design patterns as described in Section 8.4 are Business Service View modeling artifacts that are, for the most part, predefined according to the Business Service View metamodel. Unless there are parameter overrides, this part of the metamodel is automatically reused as each service collaboration pattern is derived and instantiated.

Annexes are provided as follows:

- Annex 1: Modelling Methodology Glossary
- Annex 2: Traceability
- Annex 3: Glossary and Requirements List Template
- Annex 4: Use Case Specification Template
- Annex 5: Use Case Checklist
- Annex 6: Model Notation
- Annex 7: Naming & Style Guide
- Annex 8: Describing Addresses
- Annex 9: References
- Annex 10: Example Business Contract Formations
- Annex 11: Understanding Business Contracts Using X12/EDI