



Digital Business Ecosystem

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Work Package 15 DBE Business Modelling Language

Report

D15.1 Business Modelling Language 1.0

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Short Description:

The main purpose of BML is to enable creation (by “business people”) and easy interchange (between business modelling tools or metadata repositories in distributed heterogeneous environment) of business models.

This document aims at describing the BML language 1.0, in terms of requirements that BML has to satisfy and a Meta Object Facility 1.4 metamodel which defines the BML abstract syntax.

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Summary

This report is part of WP15 and defines the Business Modelling Language 1.0.

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Table of Contents

Summary	2
Revision History	3
Changes	3
Supervisors.....	3
Distributed to	3
1 Preface	8
1.1 Introduction.....	8
1.2 Status of this document.....	8
1.4 References	8
1.5 Glossary	9
2 Business Modelling Language definition	11
2.1 BML requirements from project statements and constraints.....	11
2.2 Requirements coming from long-term strategy of DBE.....	12
2.3 Describing BML through its requirements	14
3 Design Rationale	18
3.1 Design overview	18
3.2 Metamodelling	18
3.3 BML in MDA perspective.....	20
3.4 Use of UML notation.....	22
3.5 BML and other existing efforts in business modelling	22
4 Architecture of DBE CIM Framework.....	23
4.1 Overview.....	23
4.2 Generic Package.....	24
4.3 The role of SSL.....	25
4.4 Ontology reference through ODM	27
5 BML Metamodel.....	29
5.1 Core package	31
5.2 Business Organization package.....	32
5.3 Business Process package	37
5.4 Business Motivation package.....	41
5.5 Business Event package	43
5.6 Business Location package.....	45
5.7 Business Object package.....	46
5.8 BML metamodel and other existing standards.....	48
5.8.1 Architecture of Business Modeling	48
5.8.2 UMM and ebXML	49
5.8.3 REA Ontology	51
5.8.4 UML.....	52
6 Integrated CIM Editor.....	54
6.1 Introduction.....	54
6.2 Technical and Functional Specification.....	54
6.2.1 Technical Requirements.....	54
6.2.2 Functional Specification	55
6.2.3 BML Editor screenshots	73
7 BML towards a natural language approach	80
7.1 Motivations	80
7.2 Natural Language modelling	81
7.3 The Rule-based approach.....	81
7.3.1 Fact-orientation	84
7.4 BML and BSBR	85
7.5 Business Rules Team BSBR.....	86
7.5.1 Business vocabularies and rules.....	87
7.5.2 SBVR general overview	87
7.5.3 SBVR technical overview	89

7.6 SBVR Structured English notation	90
7.6.1 Expressions in SBVR Structured English	91
7.6.2 Key words and phrases for logical formulations	91
7.6.3 Vocabularies definition	93
7.6.4 Rules definition	95
7.7 SBVR interchange capabilities	96
7.8 Expressing the BML Metamodel using SBVR	99
7.9 Creating a BML business model	102
7.10 BML SBVR-based editor	103
Appendix A: The Generic Package	106
A.1 Generic Package	106
Appendix B: Related works in business modelling	111
B.1 Introduction	111
B.2 UN/CEFACT Modelling Methodology (UMM)	111
B.2.1 UMM Workflows	112
B.2.2 UMM Metamodel	114
B.2.3 UMM worksheets and patterns	116
B.3 ebXML	117
B.3.1 Messaging Services	119
B.3.2 Registries and Repositories	120
B.3.3 Collaborative Protocol Profile/Agreement	121
B.3.4 Business Process Model	122
B.3.5 Core Components	123
B.4 BPMI.org	124
B.4.1 Business Process Modelling Notation (BPMN)	125
B.4.2 Business Process Modelling Language (BPML)	126
B.5 OMG Standard	128
B.5.1 Model Driven Architecture (MDA)	128
B.5.2 Meta Object Facility (MOF)	131
B.5.3 Architecture of Business Modelling	134
B.5.3.1 Overall Structure of Business Modelling Metamodel	135
Appendix C: SMEs Use Cases	137
C.1 Introduction	137
C.2 Elicitation Techniques	137
C.2.1 Traditional – based on questions/dialogues	137
C.2.2 Model-based – based on tasks/goals	137
C.2.3 Exploratory – based on interaction	138
C.3 Part One: Leisure services	138
C.3.1 Requirement Analysis	138
C.3.2 Use Cases - Leisure services	157
C.3.3 Use case - Incentive travel	168
C.3.4 BML-Infrastructure	173
C.4 Part Two: Conference Organiser	201
C.4.1 Requirement Analysis	201
C.4.2 Use Cases - Organization Process	207
C.4.3 BML-Infrastructure	215
C.4.4 Communication Channels	222
Appendix D: Example of BML model	224
D.1 Hotel example	224
D.2 How to use the Generic Package	228

List of Figures

<i>European Network of Digital Business Ecosystem</i>	12
<i>Partners and Tasks in the DBE community</i>	13
<i>MDA Abstract layers. This picture is taken from [PF]</i>	19
<i>BML metamodeling</i>	19
<i>Model Taxonomy</i>	21
<i>DBE CIM Framework</i>	24
<i>Generic Package</i>	25
<i>BML and SSL</i>	27
<i>Reference mechanism through ODM</i>	28
<i>BML Metamodel Package View</i>	30
<i>Relationships between the BML Metamodel packages</i>	31
<i>Core package</i>	32
<i>BusinessOrganization package</i>	33
<i>BusinessEntities example</i>	34
<i>Resources example</i>	35
<i>Network example</i>	36
<i>Service and Product example</i>	37
<i>BusinessProcess package</i>	38
<i>Behaviour example</i>	40
<i>Agreement example</i>	41
<i>BusinessMotivation package</i>	42
<i>BusinessMotivation example</i>	43
<i>BusinessEvent package</i>	44
<i>BusinessEvent example</i>	44
<i>BusinessLocation package</i>	45
<i>BusinessLocation example</i>	46
<i>BusinessObject package</i>	47
<i>BusinessObject example</i>	48
<i>BML and ebXML process</i>	50
<i>UMM BusinessProcess</i>	50
<i>REA Class Diagram</i>	52
<i>UML DataTypes diagram of the Kernel package</i>	53
<i>BML Editor Interaction with KB Service through the FADA network</i>	55
<i>Overall picture</i>	57
<i>BML Editor main window</i>	74
<i>A Simple Service Profile</i>	74
<i>Creating Service Parameters elements</i>	75
<i>Creating Contact Information elements</i>	76
<i>Defining inputs/outputs of the "MakeReservation" functionality</i>	77
<i>Navigating into the defined models as well as into the elements of each model</i>	78
<i>Formulating a query for existing M1 models</i>	79
<i>Organization models [BRG]</i>	83
<i>BSBR in Model-Driven Architecture [SBVR]</i>	85
<i>SBVR Overview [SBVR]</i>	88
<i>Fact class example</i>	90
<i>The Essential SBVR package [SBVR]</i>	96
<i>SBVR Vocabulary + Rules in terms of SBVR MOF model [SBVR]</i>	97
<i>A business vocabulary and rules in terms of SBVR MOF model [SBVR]</i>	98
<i>Business facts in terms of the business MOF model and XML Schema [SBVR]</i>	98
<i>Composition of BusinessEntities in the BML metamodel</i>	100
<i>BML Editor</i>	104

<i>Hypothesis of user interface</i> [UNISYS]	105
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1 Preface

1.1 Introduction

DBE Business Modeling Language describes main characteristics of SMEs and of the business transactions they can support. The BML allows the representation of information as: service offered and requested, resources, processes, business model and motivation, policies and agreement, location and event related to business and so on.

The main purpose of BML is to enable creation (by “business people”) and easy interchange (between business modelling tools or metadata repositories in distributed heterogeneous environment) of business models.

This document aims at describing the BML 1.0 as a comprehensive solution for SMEs’ needs as preliminary result of Work Package 15 “Business Modelling Language”. In particular, it focuses on architectural choices, that led the entire development phase, and on the description of a MOF-compliant metamodel, representing the BML abstract syntax.

Furthermore, the document illustrates an integrated CIM editor, proposed by *TUC/MUSIC*, that allows BML models creation.

Another fundamental issue discussed in this document is the role of natural language within the BML framework as means of expression for business people. This study will provide the basic guidance for each future effort in BML development and improvement phases.

Finally, a very remarkable contribute is represented by the field analysis conducted by *FZI Research Centre for Information Technology*. Such a work, presented in Appendix C, strongly supported BML design and verification phases and led the creation of a consistent business example shown in Appendix D.

1.2 Status of this document

This document is the final version of the Business Modelling Language version 1.0.

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1.5 Glossary

BML – Business Modeling Language

CIM – Computation Independent Model

Con. – Constraint

DBE – Digital Business Ecosystem

ICT – Information Communication Technology

MDA – Model Driven Architecture, <http://www.omg.org/mda/>

MOF – Meta Object Facility, <http://www.omg.org/mof/>

M0 – MDA layer whose elements are Objects and data, i.e., instances of M1 model constructs (e.g. Customer “Joe Jones”)

M1 – MDA layer whose elements are Models. It consists of instances of M2 metamodel constructs (e.g. Class “Customer”)

M2 – MDA layer whose elements are Metamodels. It consists of instances of MOF constructs (e.g. UML Class)

M3 – MDA layer that references to MOF language, i.e. the set of constructs used to define metamodels (e.g. MOF Class)

ODM – Ontology Definition Metamodel

OMG – Object Management Group (<http://www.omg.org>), an open membership, not-for-profit consortium that produces and maintains computer industry specifications for interoperable enterprise applications.

OWL – Ontology Web Language, <http://www.w3.org/2004/OWL/>

PIM – Platform Independent Model

Req. – Requirement

SBVR – Semantics of Business Vocabulary and Business Rules, the final submission to OMG BSBR Request For Proposal.

SDL – Service Definition Language: a language for the definition of a Platform Independent Model (PIM) of the service interface

SSL – Semantic Service Language

UML – Unified modelling Language

UMM – UN/CEFACT Modeling Methodology, http://www.unece.org/cefact/umm/umm_index.htm

W3C – World Wide Web Consortium, <http://www.w3.org>

XMI – XML Meta Data Interchange

XML – Extensible Markup Language

2 Business Modelling Language definition

2.1 BML requirements from project statements and constraints

Scope of this paragraph is to derive the main Business Modelling Language requirements starting from general objectives of the Digital Business Ecosystem Project. In more details, general constraints emerging from the project objectives and strategies will be analysed and requirements on BML framework will be derived from those constraints.

The starting point for this discussion must be the project strategy as expressed in the technical annex; in this perspective it is important to remember that, according to the two fundamental strategic objectives of the project, DBE has to:

1. enable the competitiveness of small and medium enterprises, that work in a global market of software production;
2. give a software solution that is able to adapt to the local needs of SMEs, supporting the use of ICT in the local innovation point.

These two statements are fundamental since that they clearly show that also BML has to address its efforts on two fundamental different matters.

On one hand the BML effort has to sustain the effort of designing and developing an innovative service oriented architecture, with the specific task of delivering a mechanism to represent the business knowledge related to the actors involved in an e-business scenario; it means that it is necessary to develop a modelling language that should be enough expressive to be able to describe SME in a whatever e-business scenario, in terms of offered products or services description, agreement or contracts but also in terms of organisational structure, business processes and business models (Con. 1).

On the other hand the BML framework, to fulfil the second statement, should be a component of a more general software development framework. In this perspective the BML framework should be able to capture and represent enterprise business knowledge and make it available for the software engineer that has to develop software for that enterprise. More in details, the BML framework should allow the business analyst to capture information related to the business profile of a company in order to build a business knowledge repository, expressed in machine readable language, that is a source of fundamental information for the software requirements phase as much as for the design and implementation phase (Con. 2).

This business knowledge will be represented in a machine readable format in order to grant compatibility with future development in the model driven software development methodology. Integrating these set of information it results that BML framework should enable the business analyst to capture and represent in a machine readable form, the business knowledge and the requirements of a company as a starting point of a software development process; at the same time the BML framework should allow companies to create their own business description, in a machine readable format, allowing partners search activities in generic e-business scenario. Another key statement for the DBE project, fundamental for the project strategy and well explained in the technical annex is the involvement of open source communities and standardisation bodies. More in details the project aims at using existing standards and contributing, through an interaction with communities, consortia and standardization bodies, to their improvement; this strategy is particularly devoted to that modelling framework and languages related to software development or e-business scenario. Another key issue for the BML framework is that it should grant, as much as possible, the compatibility with the larger number of consolidated standard, with a specific regard to the e-business sector (Con. 3).

The last point that should be taken into account, although it isn't a statement and does not produce real constraints, is related to the high risk character of the DBE project. This is fundamental, since every decision that, although reduces the risks for the project, could be considered conservative or can move the project to a state of art approach, must be considered in hard contrast with the project vision.

2.2 Requirements coming from long-term strategy of DBE

Another main constraint that influences the BML framework design is related to DBE long term strategy.

DBE Project, being an integrated project, has to develop a complex and innovative platform enabling e-business for SMEs, but also strategies and policies enabling the diffusion of DBE platform in Europe and world wide. The long term objective of the digital ecosystem community is to foster local economic growth through new forms of dynamic business interactions and global co-operation among organisations, territories and business communities enabled by digital ecosystem technologies.

The DBE long term strategy stands on the capability of the DBE Project Partners to mobilise regions, territories and communities on its innovative vision. Regions, territories and distributed communities will adopt DBE vision and frameworks creating in the first stage isolated communities that simply move from territory based relations to virtual one. The following step, when the number of regions, territories and communities is large enough and a critical mass is reached, it is based on the emergence of regional nodes interacting in virtual mode with other territories and at the same time on the emergence of virtual companies using the DBE infrastructure to create business interaction among different territories and communities. The last step is the creation of a complex network of business relations that virtually connect every DBE territories, communities and companies. Such approach needs, as propulsive energy source the regions and communities capability of innovation which should be enabled and supported by correct policies.



Figure 1 European Network of Digital Business Ecosystem

Four main actors are involved in this strategy:

- **DBE project partners** that are responsible for DBE platform and frameworks developing,
- **Adopting Communities** (innovative territory, open source communities) that will sustain, adopt and evolve DBE platform and frameworks, creating specific DBE implementations,
- **SME Software Developer** responsible for developing software solutions compliant with specific DBE implementation,
- **SME Users** that will use specific DBE implementation for e-business.

In this perspective, the DBE Project Partners must work in different directions; in particular they:

- must develop a set of core technological components and a set of stable frameworks as starting points for the different regional implementations;
- should be able to provide a strong project vision, should design a set of policies supporting the adoption processes and a flexible adoption model adapting to different communities and organisations needs;
- must develop implementation of the DBE model in order to create a critical mass of DBE communities and to give a proof of concepts about the applicability of the DBE model;
- in order to grant the success of the project, should be able to create consensus and participation supporting the growth of a community where organisations, innovative territories, and open source communities interact.



Figure 2 Partners and Tasks in the DBE community

Adopting Community can decide how to develop its own DBE implementation and have to choose whether to borrow implementations from other existing communities or to build its own specific implementation of the DBE, starting from the basic platform. Adopting Community, if decides to develop its own implementation, is responsible to:

- adapt specifications proposed by the DBE Project Partners to the local needs and to adopt, modify and extend frameworks, components and general facilities;
- develop specific supporting tools;
- identify mechanisms and local policies to accelerate the adoption process
- produce its own specifications and requirements for Software SME.

It means that Adopting Community, in order to use the global potentiality of DBE and to become a growth node in the DBE European Network, should remain compatible as much as possible to the DBE specifications but could modify frameworks and core components, improving or reducing them in order to match local needs; the Software SMEs will produce

software for SMEs that want to belong to a digital ecosystem, following local specification identified by Adopting Community.

Adopting SME can decide to what community it is interested to be part and once made its choice, it has to look for Software SME able to implement its services respect to the chosen community specifications.

The discussed scenario has deep implication on BML framework definition; BML framework must grant a flexible mechanism through which territories and communities could derive their own languages and vocabularies tailored to their needs; at the same time this mechanism should grant coherence in time between the different domain models or vocabularies developed allowing interaction among different local ecosystems (Con. 4).

2.3 Describing BML through its requirements

These four macro constraints could be used to derive a set of specific requirements for the BML framework.

According to the first constraint identified (Con. 1), the Business Modelling Language has to be a general framework enabling business people to represent the business knowledge related to services and products offered and to the enterprises that stand behind such services or products, in order to allow trade mechanisms based on semantically rich information models.

The Business Modelling Language should be expressed in terms of business concepts that is, in terms of the actual concepts, actions and events that business people have to deal with as they run their businesses. BML should also be expressed in a language close to the one the business people actually use to communicate with each other. BML has to be independent of any technological aspects, with the exception of such issues commonly accepted by business people as part of the terminology and standards of practice in each business community. BML has to handle many different kinds of information, such as the parameters that define the services and the firm and those that describe the processes SMEs shall perform in order to conclude transactions, the information on contracts among firms, and the agreement characteristics. BML should be capable of describing information exchanges between enterprises about volume, discount policy, rules and parameters by which potential suppliers are admitted, payment methods, contract duration, warranty, import/export rules and limitations. That is, BML has to describe on the one hand processes and key information that allow trading of product and service, and on the other hand all the information describing the company that offer such product or service, in order to enrich and empower the search for e-business partners.

It should be observed that in a wide e-business scenario, in which a lot of companies offer services and products through a DBE platform, also an accurate and faithful description of the companies could not be enough to find the right partner that fulfil the searcher needs. In order to support users in the complex search for the right e-business partners to be engaged in an e-business transaction, it could be useful to allow automatic processes of search based on software agents and intelligent systems; It means that BML framework should impose that all the business knowledge should be also represented in a machine readable format.

So, if on one side BML has to allow business people to easily write and understand business concepts, it has to grant, at the same time, a rigorous mapping to formal logics to make business knowledge accessible to software, in order to support search processes. This means that BML needs to be on the one hand very simple in order to be written and understood by business people and, on the other hand, quite formal and expressive in order to represent complex knowledge in a machine-understandable format.

Another important issue concerns security and privacy of sensible information each enterprise has to publish and to share in the description of their DBE services. Privacy of information should be addressed through a mechanism that could allow each enterprise to define policy

and rules of data management for each service published in the DBE environment, in order to grant the right level of trusted interchange of information.

It is possible to resume the requirements derived from the first constraint as:

Req 1.1	The BML has to be expressed in terms of the actual concepts, actions and events that business people have to deal with as they run their businesses
Req 1.2	BML has to be expressed in a language close to the one the business people actually use to communicate with each other;
Req 1.3	BML has to be independent of any technological aspects;
Req 1.4	BML has to describe products, services and all the information describing the business models and the enterprise that stands behind such services in order to support the research of business partner;
Req 1.5	BML has to describe information exchanged during trade such as volume, discount policy, rules and parameters by which potential suppliers are admitted, payment methods, contract duration, warranty, import/export rules and limitations.
Req 1.6	BML needs to be quite formal and expressive in order to represent complex knowledge in a machine-understandable format, allowing in such a way reasoning and intelligent research mechanisms.
Req 1.7	Privacy of information should be addressed allowing each enterprise to define policy and rules of data management in order to grant the right level of trusted interchange of information.

The second constraint (Con. 2) is mainly related with the software production methodology and with the effort in developing mechanisms that allow the production of software starting from models.

What is asked to BML framework is to contribute to the software development process, allowing to the business analyst to express in a formal and well defined way all the knowledge necessary to represent a client company; the business analyst using BML framework will be able to represent every characteristics of the company from its organisational aspects to its motivation, its processes and its business model expressing them in a language that is the same that business people use. This set of knowledge should be clear and understandable from the software designer perspective and will represent the repository of knowledge regarding the client company, in all the processes of design and implementation of the software solution. This kind of description, completely focused on the business perspective of the company and absolutely independent from its technological aspects, are known in the MDA (Model Driven Architecture) framework as Computer Independent Model (CIM) [MDA] [FRENKEL]. One of the perspective software development is trying to address is the capability to develop software starting from description of the model (Model Driven Development). If BML wants to support a similar effort, that could represent a huge result for the SME software development company, it is necessary that BML is expressed through a machine readable language.

It is possible to resume the requirements derived from the second constraint as:

Req 2.1	BML framework has to be expressed in a language close to the one the business people actually use to communicate with each other;
Req 2.2	BML framework has to be formal and expressive in order to represent complex knowledge in a machine-understandable format;
Req 2.3	BML framework has to be independent of technological aspects;
Req 2.4	BML framework has to be able to represent the company in its main aspects such as its organisation, its motivation, its processes and its business model.

The third constraint (Con. 3) is less related to the DBE general objectives but helps to understand how the project wants to reach such objectives and what strategy it has to pursue in order to grant a sustainable effort in time. It is clear that the project has to deal with open source communities and with standardization bodies in order to be effective and to aggregate a critical mass of researchers, developers and users from open source communities, software developer communities or existing or emerging e-business communities.

According to the technical annex DBE should adopt existing and emerging standards, and should be able to contribute to these standards evolving and adapting them to the DBE needs. It needs to analyse the existing and the emerging standards in order to understand if they could be adopted or improved or simply if it should be granted compatibility, if such standards are largely diffused and used but do not match DBE needs.

It is possible to resume the requirements derived from the third constraint as:

Req 3.1	BML framework has to be able to adopt and to improve the main existing standards, related to business modelling, in the model driven development field;
Req 3.2	BML framework has to be able to adopt and to improve the main existing standards, related to business modelling, in the e-business field;
Req 3.3	BML framework has to be able to grant compatibility towards those standards that are largely used but don't match the DBE needs.

The fourth constraint (Con. 4) is related to the DBE adoption and diffusion strategy and provides strong requirements on BML framework definition since it needs that BML framework should be able to provide each DBE regional implementation with domain models and vocabularies¹; BML framework should allow, through a simple mechanism, to create new vocabularies and domain models tailored on community needs, every time a new territory, a region or a community, decides to develop a new DBE implementation.

Such mechanism should be also able to grant coherence among vocabularies and domain models developed in different regions and related to different business domains, in order to enable the widest vision of a global ecosystem as network of regional ecosystem. Such issue is fundamental to grant that SME belonging to different regional implementation can interact and trade. Only through this functionality it will be possible to overcome the barriers of the local community and to transform the e-business adoption from a saving money advantage into the great opportunity to accede to global market and to trade worldwide. It is possible to resume the requirements derived from the fourth constraint as:

Req 4.1	BML framework should be based on mechanisms that allow to create new vocabularies every time a new community decides to develop a new DBE implementation;
Req 4.2	BML framework should be able to grant coherence among vocabularies developed from different communities and related to different business domains;
Req 4.3	BML framework should sustain multilingual approach

The requirement expressed in Req 4.1 and Req 4.2 will be fulfilled, as decided since the project inception, using a meta model representation (Business Model Ontology in the technical annex). The meta model has to contain a wide set of high level business concepts that are the primitives of the BML framework (Con. 5).

¹ We use the expression "domain model" in order to indicate a description of a particular context by identifying its most relevant features, its elements and relationships between those elements.

Each vocabulary or model developed in a specific domain, will be developed starting from this core of business knowledge, since BML framework will contain mechanisms to create new vocabularies, rules and business models in specific business domains starting from the BML meta model. Separation of model from vocabulary is a fundamental key since generic model could enable multiple standards of business descriptions and specific industry sector domain description.

The meta model, in order to support this scenario, should be enough agile in order to provide a simple maintenance process; at the same time the meta model should be enough stable and contain enough abstract primitives in order to grant, starting from it, to develop whatever kind of business vocabulary or model. In this way we don't lock ourselves or our users to a single schema and at the same time, we will provide mechanisms for future standards to be linked in and application designers to map different standards as needed. It needs to design a stable meta model since changes to the domain model level should have much less impact on application software; It is necessary to grant a sharp division between the core DBE infrastructure delivery and any component provided by the DBE that would normally be provided by external partners. It is possible to resume the requirements derived from the fifth constraint as:

Req 5.1	The meta model should be enough agile in order to grant a simple maintenance process;
Req 5.2	The meta model should be enough stable since changes to the meta model could affect the coherence among different vocabularies;
Req 5.3	The meta model should contain enough abstract primitives in order to grant, starting from it, to develop whatever kind of business vocabulary or model.

3 Design Rationale

3.1 Design overview

As stated in the previous section, BML provides a language for SMEs to use to formally model their business. Therefore it is conceptualized optimally for business people and designed to be used for business purposes independent of information systems designs (see Req. 2.3). It is also intended to provide the semantics needed by the DBE recommendation processes.

Moreover, since business modelling corresponds to computational independent modelling (Business Model) in MDA, BML is intended to be a CIM language.

In this document the BML metamodel is defined using the Meta Object Facilities (MOF) Model, allowing XMI encoding to be used to transfer business models conforming to the BML metamodel as XML documents and to transform the BML metamodel itself into an XML document, based on the MOF-DTD, for interchange between MOF-compliant repositories.

In order to aid comprehension of the metamodel, the BML metamodel is split up into a set of packages.

Much attention has been taken to ensure that the BML metamodel has been made as generic as possible, and that only information that is shareable between different domains or business models has been included in the metamodel.

3.2 Metamodelling

A model is a

“description of (part of) a system written in a *well-defined* language. A well-defined language is a language with well-defined form (syntax) and meaning (semantics), which is suitable for automated interpretation by a computer” [KLEPPE].

In the past, well-defined languages (especially programming languages) were defined using a BNF² grammar. However, BNF is not good for languages that are not text-based, like modelling languages.

Therefore, defining BML in the MDA context needs a different mechanism. This mechanism is called *metamodelling*.

A metamodel is

“a precise definition of the constructs and rules needed for creating semantic models”³.

A model defines what elements can exist in a system. A language defines what elements can be used in a model. We can also describe a language or its abstract syntax⁴ by a model: the model of the language (or meta-model) describes the elements that can be used in the language. As a metamodel is also a model, it must be written in a well-defined language (meta-language).

²The Backus-Naur form (BNF) (also known as Backus normal form) is a meta-syntax used to express context-free grammars: that is, a formal way to describe formal languages.

³<http://www.metamodel.com>

⁴Abstract syntax is a representation of data which is independent of machine-oriented structures and encodings and also of the physical representation of the data (called “concrete syntax”).

A metamodel's abstract syntax tells tools how to construct abstract syntax trees⁵ to represent models of the kind defined by the metamodel.

In theory there is an infinite number of layers of model-language-metamodel-metalanguage relationships. As stated in [PF], the BML metamodel defined in this document refers to the standard defined by the OMG, that is the MOF architecture, that conceives of four metalevels:

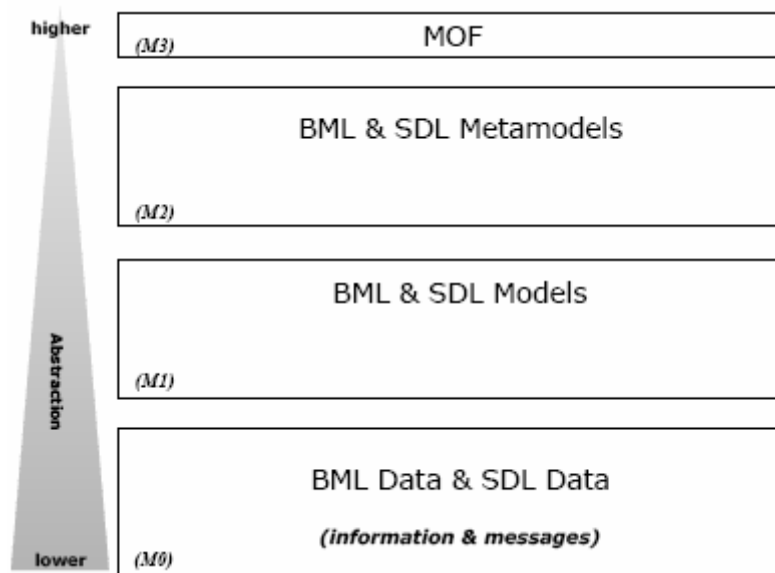


Figure 3 MDA Abstract layers. This picture is taken from [PF]

The following picture illustrates the approach followed in this document:

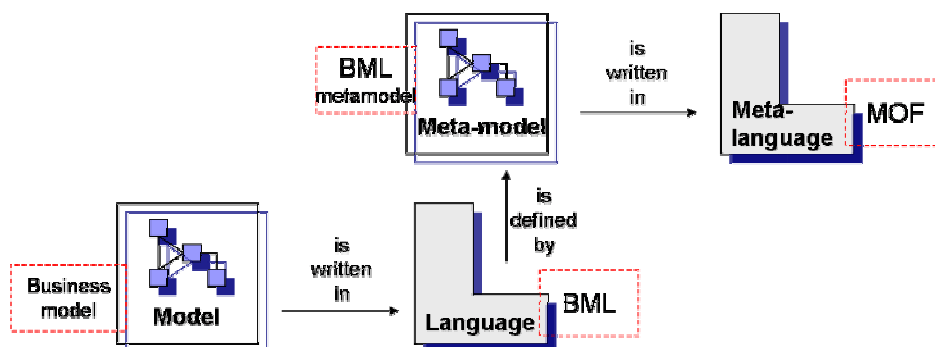


Figure 4 BML metamodeling

Note that the metamodel presented in this document is meant to be a formal (i.e. MOF-based) definition of the BML abstract syntax only. As regards the BML notation (i.e. the concrete syntax), it is out of the scope of this document to provide a concrete notation for representing

⁵ Abstract syntax tree (AST) is a data structure representing something which has been parsed, often used as a compiler or interpreter's internal representation of a computer program while it is being optimized and from which code generation is performed. The range of all possible such structures is described by the abstract syntax.

BML models. Such a notation will be defined using the BSBR⁶ (Business Semantics of Business Rules) language now being developed and maintained by OMG.

3.3 BML in MDA perspective

It has been estimated that more than 72% of software projects fail or fall short of their goals⁷ and the worldwide cost of these failures is on the order of US\$350 billion per year, of which about \$200 billion per year is attributable to inadequate consideration of the business concerns in the system design⁸.

The MDA mechanism for bridging the business-IT gap is the Computation Independent Business Model, or CIM.

As stated before, BML is focused on business modelling and, as such, it is a CIM language within the MDA framework:

“in compliance with the MDA approach, the BML has been conceived to be a Computational Independent model (CIM)” [PF]

The CIM

“represents the concerns of business owners, managers, agents and employees in the models. Anything business people have to say in the models goes in the CIM. ... Using a CIM a business can capture, manage, and better use some of its most valuable assets: knowledge of its resources, policies, rules, terminology and processes. Using a CIM a business can specify in detail, in business language what it requires of its systems, and can validate that the system design meets these requirements. ... Above all, CIM modeling must be easy for non-technical business people to understand and use. The salient feature of CIM languages is their reliance on and formal use of natural language. CIM models can use graphics, text, or tables. A natural language equivalent representation of a graphic is very important. The requirement for non-technical people rules out most kinds of UML 1 diagrams for CIM. The Activity Diagram is an exception that is believed will likely find acceptance among business users” [BMA].

In [MDA] a CIM is defined as follows:

“A *computation independent model* is a view of a system from the computation independent viewpoint. A CIM does not show details of the structure of systems. A CIM is sometimes called a domain model and a vocabulary that is familiar to the practitioners of the domain in question is used in its specification.

It is assumed that the primary user of the CIM, the domain practitioner, is not knowledgeable about the models or artifacts used to realize the functionality for which the requirements are articulated in the CIM. The CIM plays an important role in bridging the gap between those that are experts about the domain and its requirements on the one hand, and those that are experts of the design and construction of the artifacts that together satisfy the domain requirements, on the other.”

It is useful to refer to David Frankel’s definition of the different abstraction levels in a model driven development process [FRANKEL] as shown in the taxonomy below (see Figure 4).

⁶ The BSBR RFP can be found on the OMG Web site at www.omg.org/cgi-bin/doc?br/03-06-03

⁷ The Standish Group, CHAOS 2000

⁸ Tony Morgan, Brunel University, Presentation at *Business Rules Forum*, November 2002

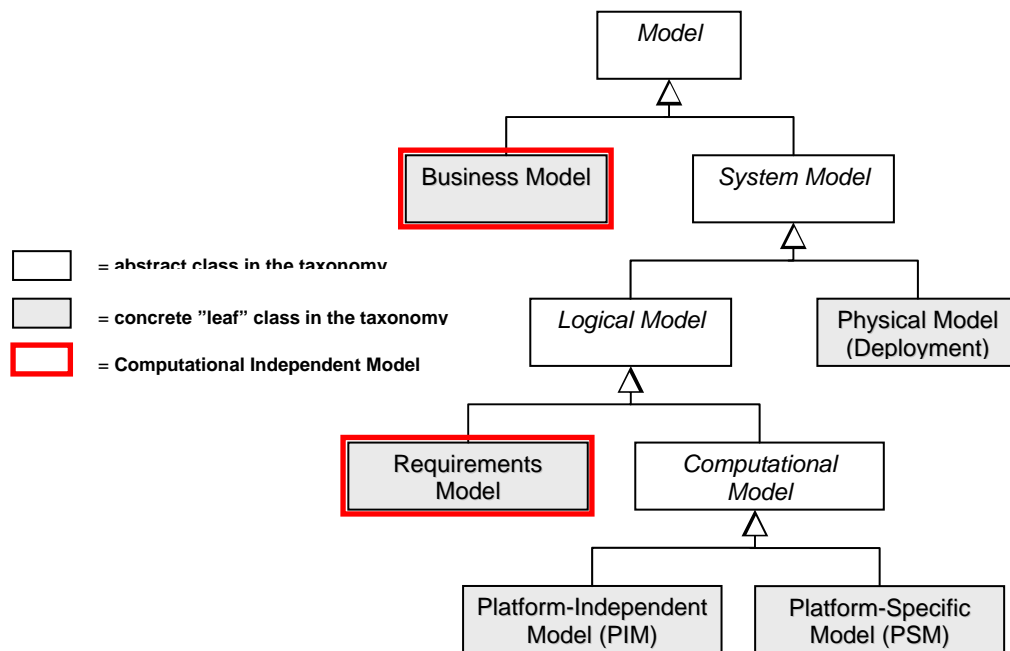


Figure 5 Model Taxonomy

The "leaf" classes in the taxonomy represent concrete models needed by MDA:

- Business models
- Requirements models
- Platform-independent models (PIMs)
- Platform-specific models (PSMs)
- Physical models

Of these, all but business models are system models (models that describe aspects of a computer system that automate elements of the business), each looking at the system from a different viewpoint.

As shown in the figure above, the CIM comprises two main subdivisions (the red boxes in the picture):

- Business Model
- Business Requirements for Systems

A *Business Model* is defined as a

"viewpoint on the business and its environment that focuses on the scope and goals of the business, and the terminology, resources, facts, roles, policies, rules, processes, organizations, locations, and events of concern to the business. The Business Model is a model of the business in its environment, by the business, in the language of business people, for business (not necessarily IT) purposes" [CIM].

Business Models may include parts of the business that are not subject to automation but that are interesting to those who design and build the IT system.

The *Business Requirements for Systems* is a

"viewpoint on the system and its environment that focuses on the purpose, scope and policies for the system. Business Requirements for Systems build on and refer to the Business Model. They are constrained only by the Business Model" [CIM].

BML focuses on Business Models, in that it enables the representation of business concerns, not system design. As a consequence, BML enables the description of business concepts without regarding to which parts of the business model are subject to automation in the underlying IT infrastructure.

3.4 Use of UML notation

As stated before, in order to define the BML language (in particular the BML abstract syntax) a metamodeling approach has been chosen. As a consequence, business models created by instantiating the business metamodels in the CIM framework are represented using the UML notation.

Since UML is a language for modelling IT systems and requires technical skills in order to be used, in a CIM context it is not appropriate for business people to describe business models.

As asserted in the previous paragraph one of the most important features of CIM languages is the formal use of natural language, graphics, text, and tables. The requirement for non-technical people rules out most kinds of UML diagrams for CIM (except for activity diagrams). This (and other requirements) led to introduce an alternative notation for representing BML models, that is the SBVR. For further details about motivation, benefit and drawback for a natural language oriented notation see section 7 "BML towards a natural language approach".

3.5 BML and other existing efforts in business modelling

In order to define the BML Architecture fulfilling the requirements 3.1, 3.2 and 3.3 we developed a benchmarking of the successful modelling strategies, analyzing existing and emerging standards both in the e-business field and in data modelling one. In particular UN/CEFACT UMM, ebXML, BPMI.org and OMG Architecture of Business Modelling have been analyzed.

This analysis examined existing enterprise modelling frameworks with the aim of identifying and suggesting typologies of information that could be useful in order to define and extend the BML information model and to allow new and richer descriptions of enterprise characteristics that seem necessary or useful. Many features peculiar to the aforementioned standards affected the BML 1.0 development process. Such characteristics will be underlined and showed during the description of the BML language in the next sections.

The results of such benchmark are reported in Appendix B.

4 Architecture of DBE CIM Framework

In this section the architecture of the CIM framework is presented. It introduces the main parts of the framework and their mutual relationships using a MOF 4-layered approach as asserted in section 3.2.

4.1 Overview

At the top level (M3) of the DBE CIM framework is MOF, i.e. the set of constructs used to define DBE CIM languages metamodels (e.g. MOF Class, MOF Attribute, ...).

At M2 layer there are the metamodels which define the abstract syntax of two languages used in the computation independent modelling context to define a complete business model for the DBE purposes:

- Business Modelling Language (BML): the main DBE CIM language for describing any business model in any of its aspects (business organization, products/services, process, motivation and so on);
- Semantic Service Language (SSL): a language which focuses on service descriptions useful for DBE advertisement and recommendation processes and acts as a bridge between BML and PIM Service Description Language (SDL). See section 4.3 for more details.

Both BML and SSL are created by instantiating MOF constructs.

A Business Description at M1 layer is created by instantiating both the BML metamodel and the SSL metamodel. In other terms a business description is composed by a BML M1 Model and an SSL M1 Model. Furthermore, a BML Model could be created also using and/or extending the M1 Generic Package which contains concepts that are domain independent (such as currency, price, address, unit of measure, and so forth, which could be the same in any particular business) thus avoiding to define them from scratch in every business model. For further details about the Generic Package see section 4.2 and Appendix A.

The following picture illustrates what said previously:

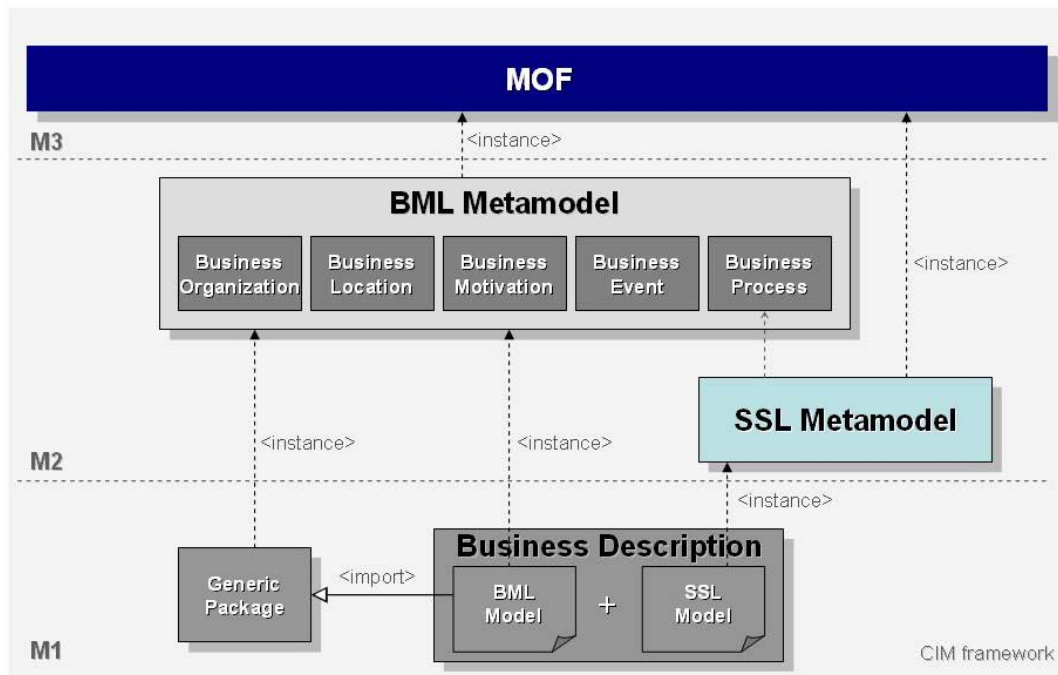


Figure 6 DBE CIM Framework

The architecture presented above is independent from any concrete notation used to represent Business Description. As underlined in section 3.4, the current implementation of the CIM framework uses UML as concrete syntax both for BML and SSL, but in a long term vision it will be based on SBVR standard and natural language approach.

4.2 Generic Package

In order to address possible difficulties in directly instantiating the BML Metamodel, due to its high level of abstraction, the BML framework has been enhanced providing its users (the business modellers) with a package (at M1 level, called *Generic Package*) which offers a great deal of similarities with their everyday language. The Generic Package provides a standard set of concepts and models domain independent, defined according to the main UMM Data Type, eXML Core Components and ISO definitions, which might be imported when creating a particular business model in a specific business domain.

Generic Package classes do not have the high level of abstraction that is peculiar to M2 level elements but like those they possess generality and independence from business domain. Hence, it has seemed a logical decision to include the classes into a M1 level package, not modifiable, that can be imported if necessary. In other words, like Business Models, the Generic Package contains instances of the Metamodel classes, shared within or between DBE communities, that can be extended (or used *as-is*) by the modeller to describe his own business.

Such component in the BML Architecture provides a high level business ontology which enhances the semantic interoperability between different business models.

Note that it is not mandatory to use the Generic Package in a business model, thus allowing the modeller, who does not agree with generic package definitions, to re-define those concepts accordingly to his own specific needs.

The reader will have a clearer idea after reading the Generic Package described in Appendix A and the examples of the Generic Package use mechanisms illustrated in Appendix D. The following figure illustrates an overview architecture of BML that includes the Generic Package.

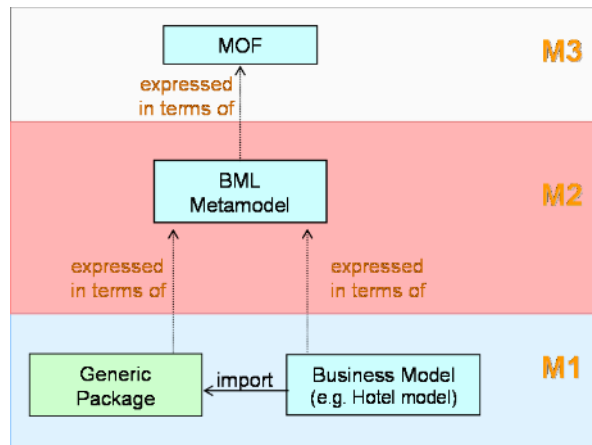


Figure 7 Generic Package

4.3 The role of SSL

As already asserted, BML focuses mainly on business description of what a company is (in terms of organization), what it does (in terms of Business processes) and what it offers (in terms of services/products). Such description, in accordance with CIM definition, is completely independent from any concern about the IT system (e.g. Recommender, Evolutionary Environment, Service Execution Environment, Service Composer and any other component in the DBE architecture which automates or executes processes/services described with BML). For example, a business description of a ski lesson service provided by a particular business concerns price, maximum number of participants, prerequisites (e.g. skills required), skills developed, duration and so forth. Moreover, a complete business description concerns also the modality of buying/consuming a product/service. Hence, a BML model concerns business processes and activities as well, describing, for example, how to buy a ski lesson (in terms of payment methods, customer information, and so forth). This second feature is more relevant from the point of view of the DBE architectural components which will enable automation and execution of applications (electronic services described through SDL from a technical point of view) implementing such processes.

What is called "business service" [PF] from the functional architecture point of view (buying a ski lesson, in our example) and described in SDL at system level (PIM) is a business activity (which will be supported by an IT infrastructure and automated through a DBE service) from the business/BML perspective.

Nevertheless, a BML business activity description is far from a functional DBE service description which focuses on functionalities, input, output, pre-conditions, post-conditions and so on. In order to fill this gap, which in a more general perspective is the gap between IT and business, the CIM framework has been provided with an additional language focused on business services from an IT point of view: SSL.

SSL aims at providing a description of DBE services derived from BML business process model in a computation independent fashion and represents an attempt to provide the business with a level of technical understanding.

SSL main focus is on:

“the specification of what functionality the service provides to the customers and the specification of the conditions that must be satisfied for a successful execution (consumption) of these functionalities.” [SSL]

The basic assumption on which SSL has been developed is that

“The easiest way to provide this level of understanding is by treating each available resource as a service. A service focuses first on what is being done, not how. By thinking in terms of services, the focus is on the business function, not the underlying technology.” [CONNELL]

In short, SSL describes three kinds of semantics:

- a) **The special features of a service** that it is believed they will be valuable to the candidate service consumer. Such features may refer to special business characteristics ranging from supported payment methods and applied charging schemes, to product or resource features, as well as to other related information that may be influencing to the decision of the candidate service consumer (e.g. description of the weather information in a resort booking service). It is possible that these special features of a service may have been modelled in the internal business model of the service provider. SSL will leverage the existence of such information in the business model of the service provider by referring to this information. Moreover, it can be used as a mechanism that integrates into a single advertisement various semantic characteristics related to a service and are spread in various parts of the business model description like business organization, business processes, business rules, etc. This operation of SSL will be particularly important in case of a composite service. In such a case, the semantic description of a composite service (that will be developed by the (automatic or manual) composer during the service composition process) can select and integrate the desirable features of the constituent services into a coherent description that has a specific meaning for the composite service. SSL is also integrated with the Ontology Definition Metamodel (ODM) in order to allow SSL models to make use of concepts defined in domain specific ontologies increasing this way the semantic interoperability among SMEs.
- b) **Business Level Interaction needed to Consume a Service.** In order for a service to be consumed, two business parties must have an interaction during which they will exchange resources and/or information. SSL allows the specification of this interaction in a high level of abstraction. That is, it does not specify what exactly the messages and the message formats will be; rather it describes what (information and resources) the consumer has to give to the provider, and what (information and resources) the service provider will give back to the consumer and under which conditions. To do so, SSL defines the notion of service functionality in order to describe logical units of business level interaction between provider and consumer. Finally, it can specify special conditions that must hold in order for such an interaction to be started. This information will be taken into account by the SDL compiler for the automatic creation of the service's technical interfaces
- c) **Contacts Responsible for the Provision of a Service.** An SSL description of a service may describe one or more information structures for referring to agents or individuals responsible for the service (or some aspect of the service). Contact information is a specific type of semantic information that most of the approaches to semantic service description (OWL-S, WSMF, etc.) have included.

Though SSL is a computation independent language, for what said above, it represents a bridge between CIM level and PIM one, that is between BML and SDL.

The following figure illustrates the relationship between BML and SSL emphasizing that SSL description is a service-oriented view from the outside to a BML business process/activity description.

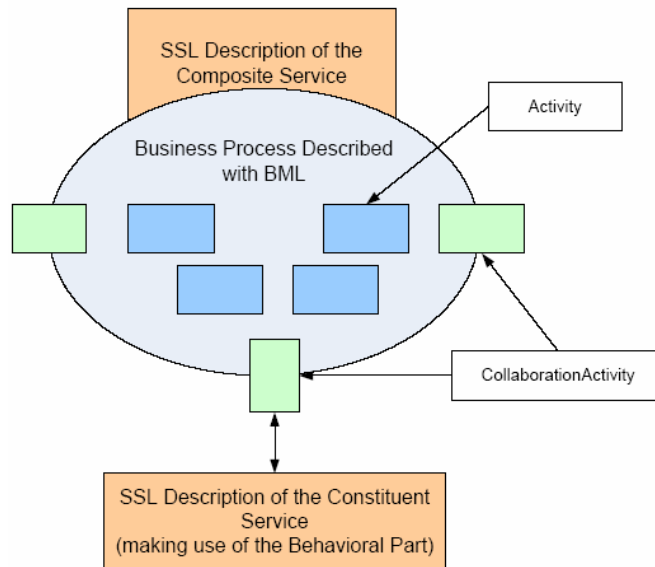


Figure 8 BML and SSL

For further details about SSL see [SSL].

4.4 Ontology reference through ODM

In order to enhance business descriptions with additional semantics the CIM framework is also provided with a mechanism which allows the CIM modeller to add further information, regarding a particular business domain, to business and service models. The mechanism to do such "semantic annotation" is the *reference* which means that any term used in the BML or SSL model is semantically defined in a domain ontology.

Such feature allows to import existing domain ontologies which describe a specific business domain in terms of taxonomical concepts and relationship between them, into the CIM framework and to link a particular term in the business description to a concept in the ontology. Nowadays the most widely accepted language for representing ontologies is the Ontology Web Language⁹ (OWL) which has been produced by the Semantic Web Community and is maintained by W3C¹⁰.

The need for interoperability with OWL ontologies has been addressed by OMG as well, which has issued a Request for Proposal (RFP) asking for metamodels that will be used for ontology definition (named Ontology Definition Metamodel - ODM [ODMRFP]).

The OMG ODM intends to provide a common MOF-based metamodel for a variety of knowledge representation techniques, to assist in defining and interchanging ontologies, with a key objective of supporting the semantic Web.

⁹ <http://www.w3.org/2004/OWL/>

¹⁰ <http://www.w3.org>

Due to the fact that OMG ODM is not a standard yet, in order to enable such annotation and to represent and store ontologies within the DBE Knowledge Base, a DBE Ontology Definition Metamodel (ODM) has been introduced.

“A first version of such a metamodel has been developed by TUC/MUSIC in the scope of the KB work package and it has been implemented in the KB. This metamodel will be used for representing Domain Specific Ontologies that are created by domain experts and are a reference specification of the conceptualization provided for each domain.” [ODM]

Any CIM modeller who wants to add further semantics to his business or service models could exploit this feature provided by the CIM framework.

The reference mechanism described above is depicted in Figure 9.

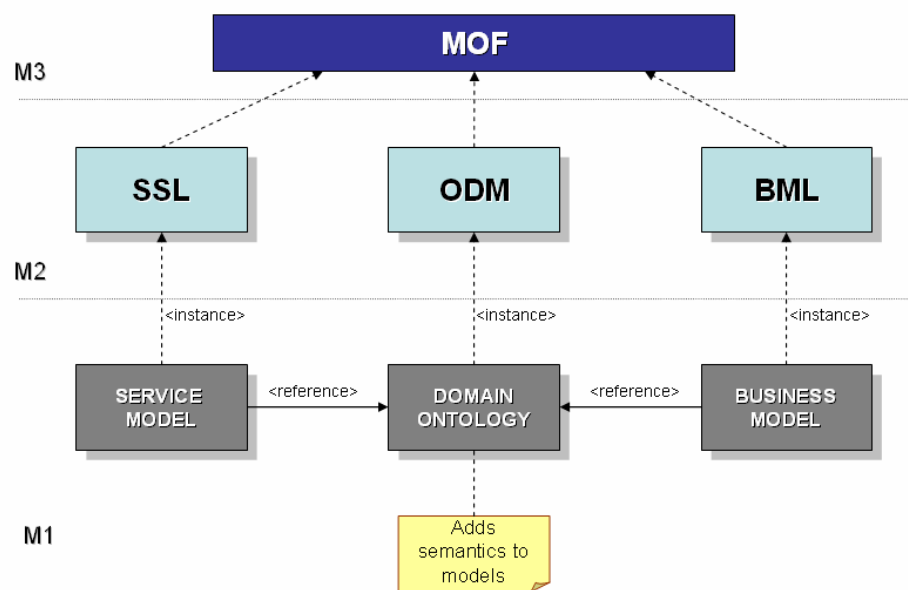


Figure 9 Reference mechanism through ODM

For further details about ODM see [ODM].

5 BML Metamodel

The BML Metamodel defines an abstract syntax for the BML language using the MOF v1.4 model. Its basis are the six interrogatives - What, How, Where, Who, When and Why - of the Zachman Framework for Enterprise Architecture [ZACHMAN]. For each interrogative of the Zachman Framework a corresponding package in the metamodel has been created. Moreover, an additional package containing the root meta-concepts inherited by the other packages has been created.

Consequently, the metamodel is split up into seven packages:

- *Core*, containing the basic elements used to describe other packages meta-concepts characteristics;
- *BusinessOrganization*, containing meta-concepts to model each business entity aspect, including its relationships, resources, products and services;
- *BusinessProcess*, describing behavioural aspects of a business organization, focusing on interaction with other organizations;
- *BusinessMotivation*, containing meta-concepts to describe the way in which an organization makes choices and defines its actions;
- *BusinessLocation*, containing the metamodel to define spatial references in a business model;
- *BusinessEvent*, describing the occurrences able to influence business behaviours;
- *BusinessObject*, containing meta-concepts to define primitive and user-defined data types, typically used for declaring the types of the class attributes.

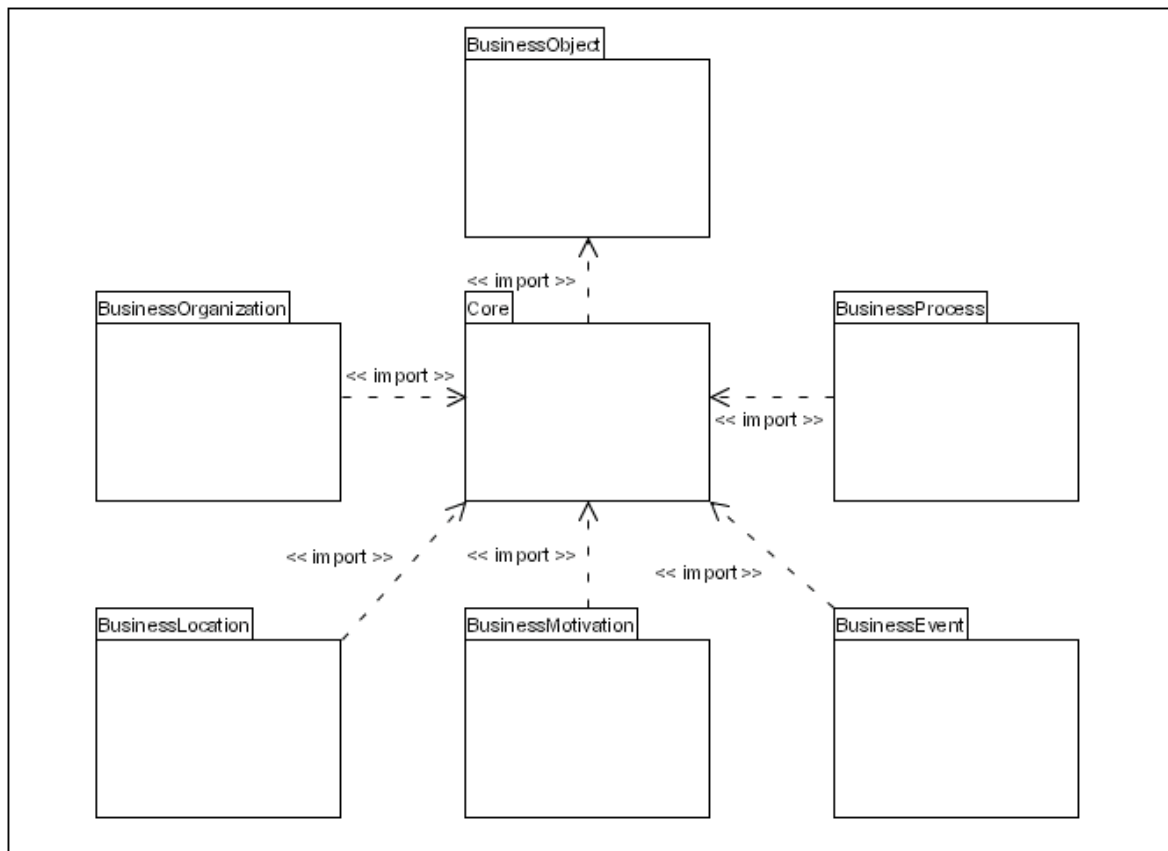


Figure 10 BML Metamodel Package View

The previous figure shows the relationships between Core and other BML packages. The former imports meta-concepts defined in BusinessObject package. As explained in the following section, this allows to define specific characteristics of basic elements. The other packages import the Core package, since they extend the Core classes in order to define their own meta-concepts.

The next figure depicts the “use” relationships between all BML packages, showing how these packages can interact.

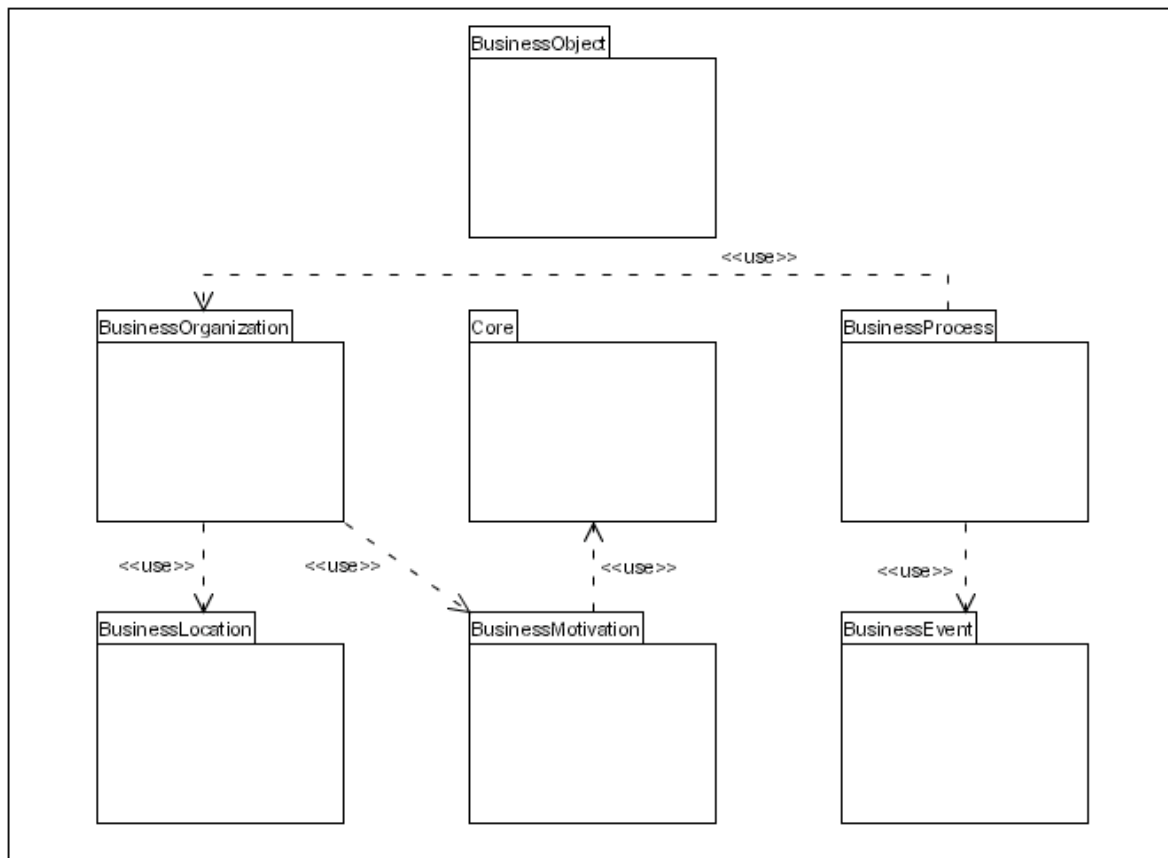


Figure 11 Relationships between the BML Metamodel packages

The BML package structure, including packages that are relatively independent of one another, can provide the needed range of expressivity and flexibility in order to reach BML purposes. BML packages will be widely described in the following sections, providing a great variety of examples. Note that these examples are presented in a simplified version; for a complete presentation, see Appendix D.

5.1 Core package

The *Core* package contains the basic classes extended by the other six packages. These elements are generic enough to be defined as a separate set within the BML metamodel. The package is depicted in the following figure.

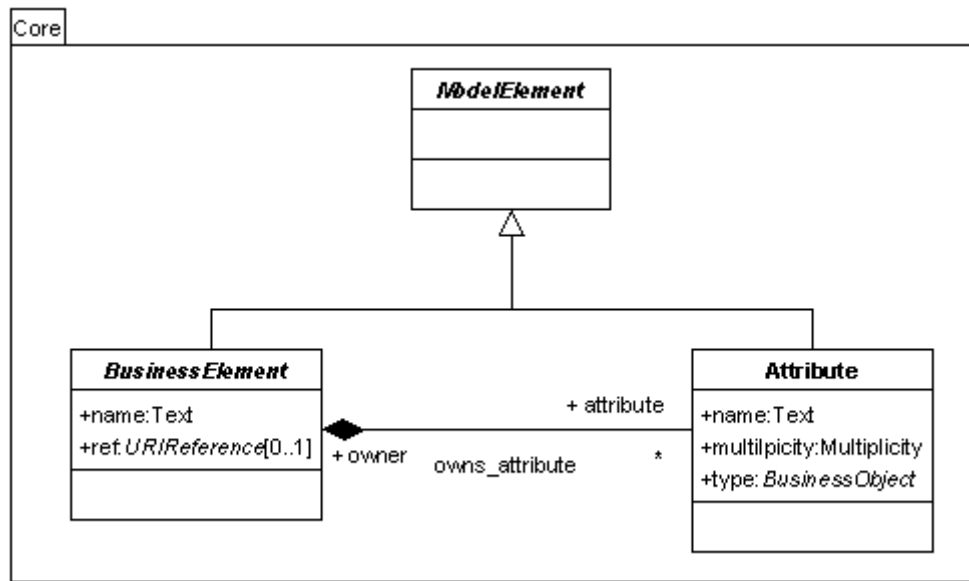


Figure 12 Core package

As we can see, the root concept is represented by the abstract class *ModelElement*. It can be defined as a generic element usable in order to create a model. It is extended by the *BusinessElement* and *Attribute* classes.

The *BusinessElement* abstract class is defined as a generic representation of an element involved in a business and it is characterized by a *name* (string value). It can also include a *ref* attribute in order to model a possible external reference for the business element being modelled; this mechanism allows to provide each model element with additional semantics using external ontologies. Each metamodel class (with a single exception) extends the *BusinessElement* class. This enables a greater level of abstraction in order to handle different elements in the same way and to obtain a lighter model structure.

A *BusinessElement* instance may have several *Attributes*, representing its specific features. Due to the strong relationship existing between these classes, an attribute can be associated only with one business element and its lifecycle is closely related to its owner.

The *Attribute* class is characterized by a name, a multiplicity and a type. The former has a string value, the second has a *BusinessObject* value, while multiplicity is a structured data type containing a lower bound and an (optional) upper bound (see 5.7 *BusinessObject* meta-concepts). For example, at M1 level we could instance an attribute named "HotelName", with a "1" multiplicity (obligatory attribute) and type equals to "Text". Obviously, we should relate it to an owner class instance.

5.2 Business Organization package

The *BusinessOrganization* package aims at describing the whole organization, specifying the entities involved in the business, their resources and how they can interact. The elements contained in the package are depicted in the following figure.

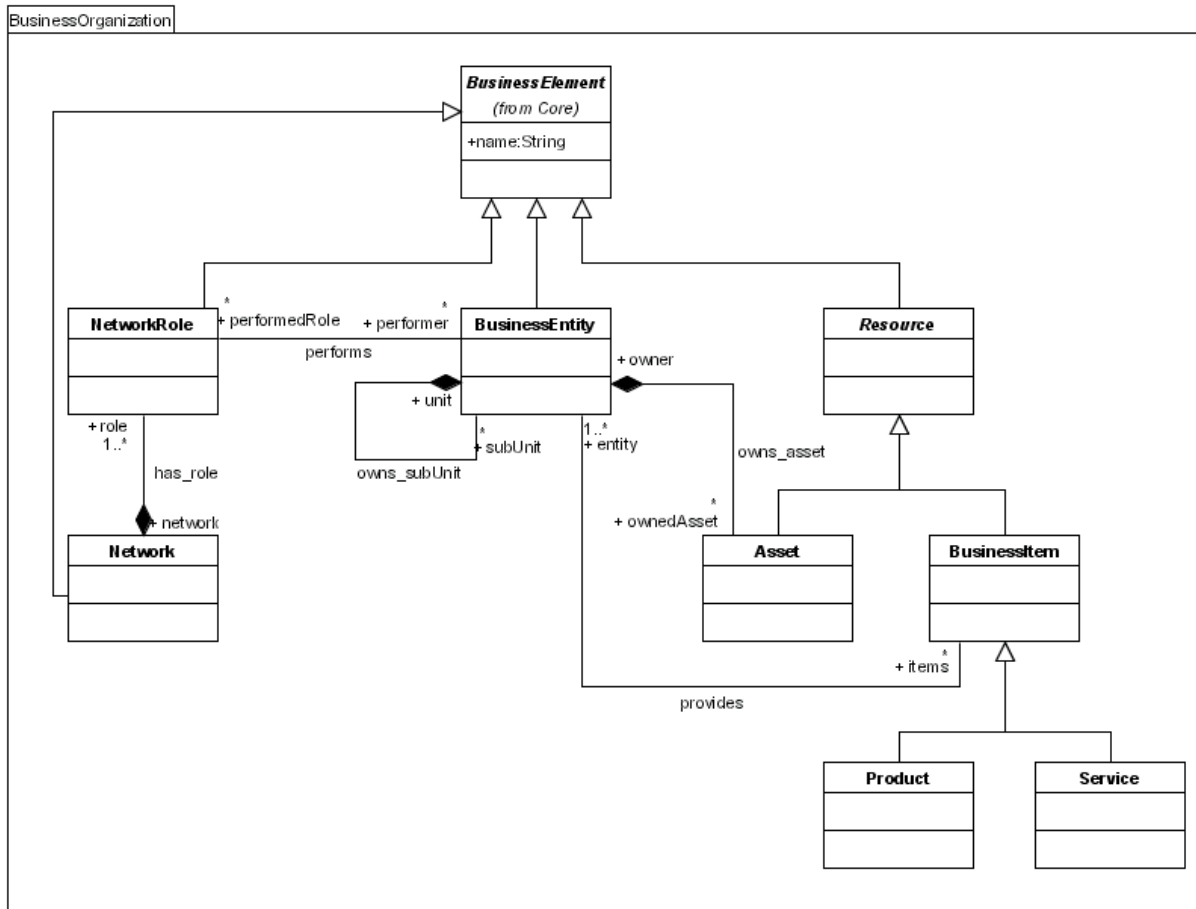


Figure 13 BusinessOrganization package

A *BusinessEntity* meta-concept represents something that has a real existence in a business context; it has an own existence independently from its functions, activities or relationships. It extends the *BusinessElement* concept.

Typical examples of *BusinessEntity* instances are "Hotel" and "Customer". The following figure shows these instances; note that an UML convention is used in order to represent an attribute instance.

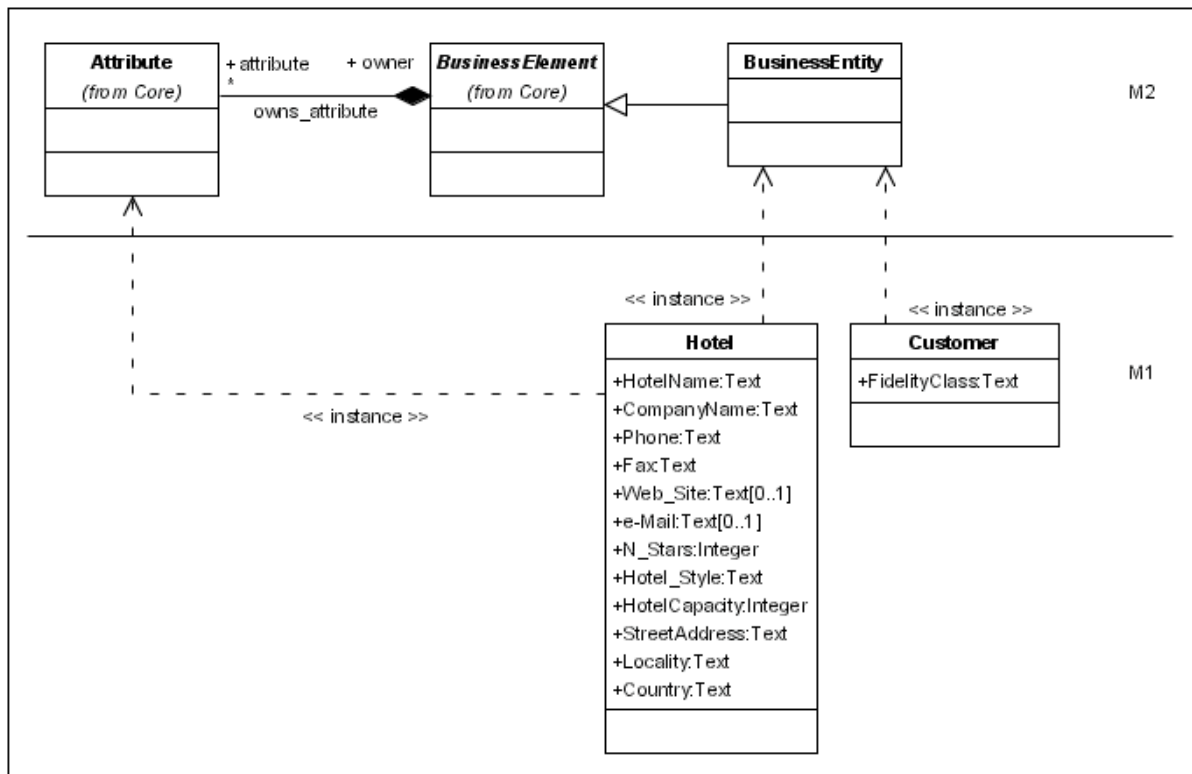


Figure 14 BusinessEntities example

A *BusinessEntity* may also be a composition of smaller entities (subunits); this relationship meets the need to represent complex organizational structure. For example, we can think that a "CarRental" (*BusinessEntity* instance) is composed by several "CarRentalAgencies" (*BusinessEntity* instances).

A *Resource* is an abstract class encompassing all the elements available for an entity to perform its business. It extends the *BusinessElement* class. We can distinguish between two different kind of *Resource*, i.e. *Assets* and *BusinessItems*, as represented in the Figure.

The *Asset* meta-concept represents what the *BusinessEntity* owns; it describes both tangible assets (commodities used directly or indirectly in a production process, factories or places where value is created, people involved in business activities, ...) and intangible assets (knowledge, brands, patents, ...). The *Asset* class is generalized by the *Resource* class. Concepts such as "Know-How", "Plant" or "People" represent an example of *Asset* instances.

The *BusinessItem* class extends the *Resource* concept; it describes the meta-concept to define the elements that an entity uses in its external relationships. Since it can be offered or exchanged by a *BusinessEntity* within a collaboration, a typical example of *BusinessItem* instance could be represented by "Document".

Two important subclasses of *BusinessItem* are *Product* and *Service* used for describing tangible or intangible things or substances produced by natural process or manufacturer and/or a provision or system of supplying a need. Since these classes allow describing what an organization offers to its customers and partners, their instances represent the core elements in a BML model. In other words, *Product* and *Service* are the primary means by which an organization exposes itself to the external environment, describing what it can do in order to satisfy a specific need. In a DBE context, offered services or products characteristics lead the process by which a user chooses an organization rather than another one. Consequently, finding the right way to describe products and services (i.e. finding a suitable characterizing set

of attributes) plays a decisive role for an organization in order to acquire new customers or to involve other organizations within a partnership.

The following figure depicts an example of hotel resources. In this case, an hotel owns the "Room" and the "TransportationFacility" assets and offers the "RoomRental" and the "RestaurantService" business items (i.e. services).

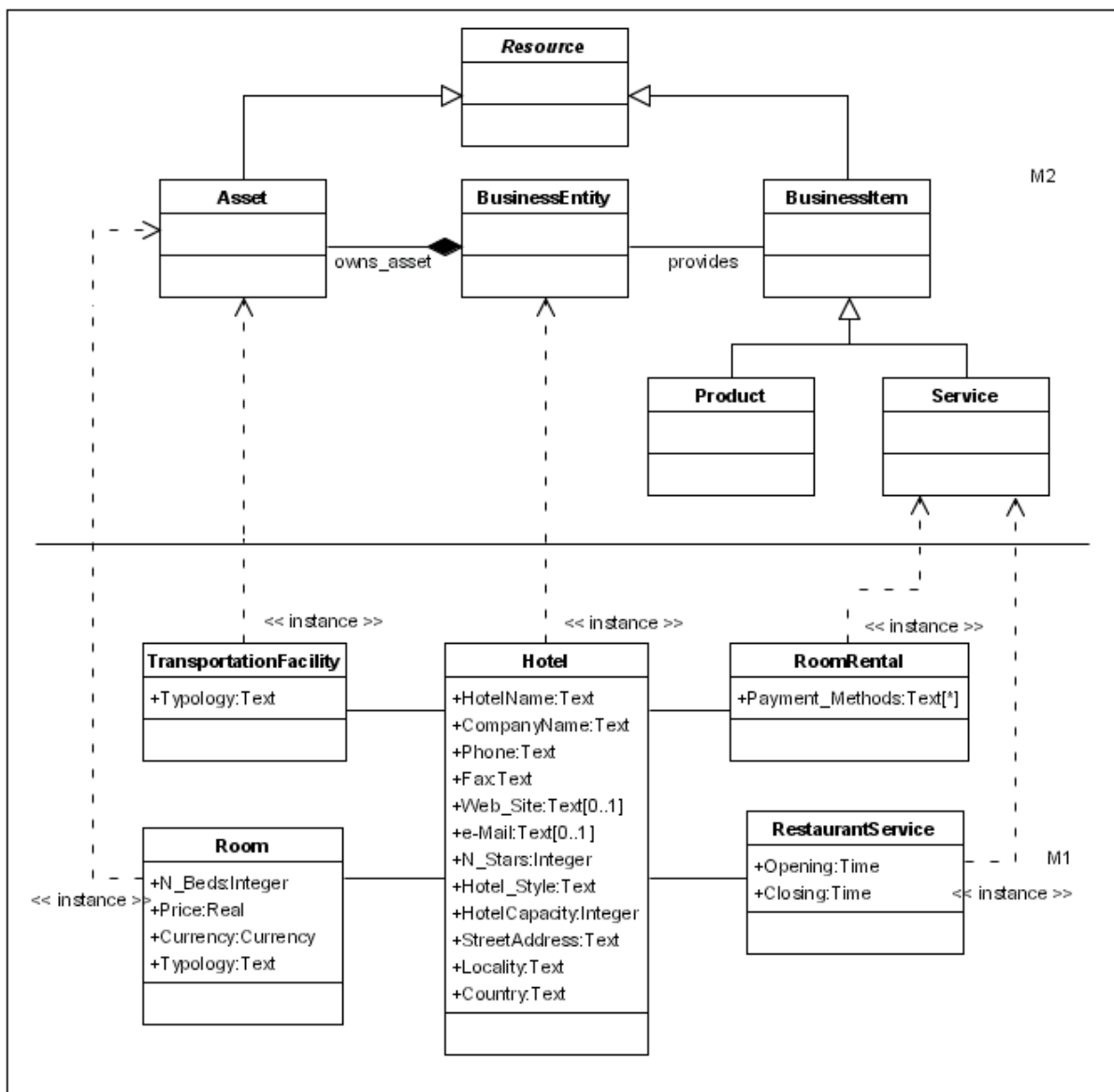


Figure 15 Resources example

The *Network* class, extending the *BusinessElement* class, represents the meta-concept to describe a form of collaboration between different entities. Describing these networks complements and amplifies the entities' own resources description and can provide more interesting results in terms of services retrieval.

The *NetworkRole* class extends the *BusinessElement* class and aims to describe the possible ways an entity may be involved in a given network. Defining a Network requires at least one

NetworkRole definition. In the following example, there are two different networks: a "Partnership" and a "HotelChain". The former involves a "ServiceProvider" role, performed by "SkiSchool", "SnowboardSchool" and "Hotel", and a "Aggregator" role, performed by "Hotel". The latter involves a sole role, "Member", performed by "Hotel", that can be either "Owner" or not (attribute with a boolean value).

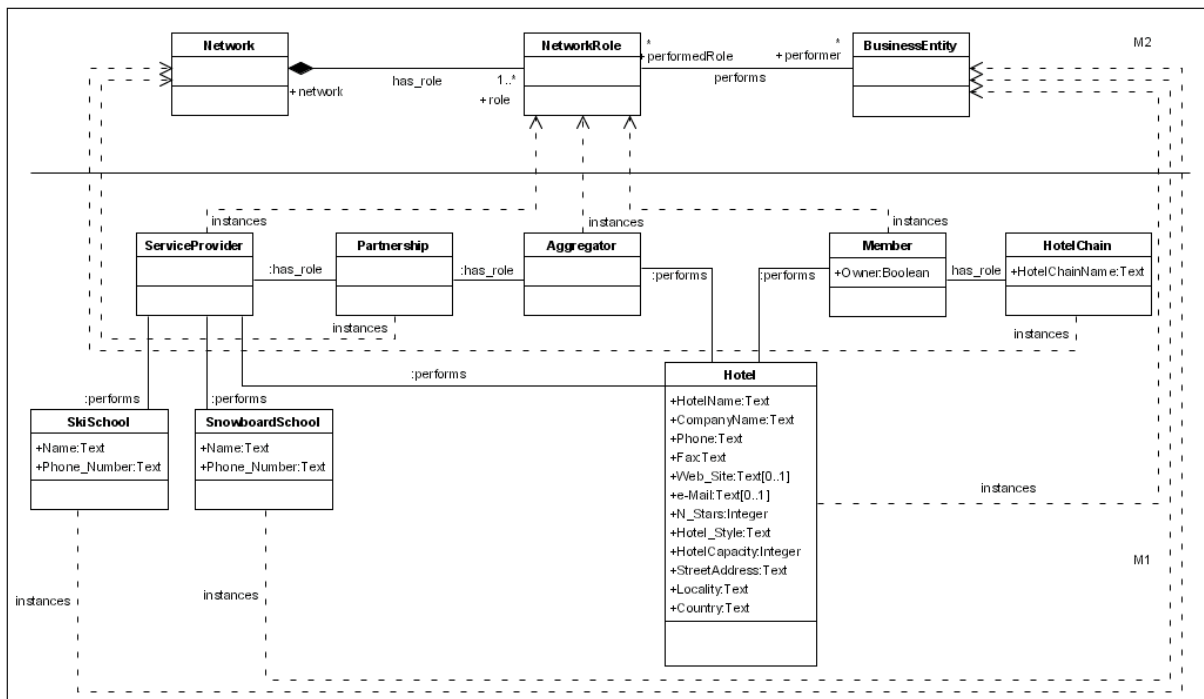


Figure 16 Network example

The following is an example of two products "Food" (provided by a BusinessEntity called "FoodProvider") and "Drinks" (provided by a BusinessEntity called "DrinksProvider") and a service "SkiLesson" provided by a "SkiSchool":

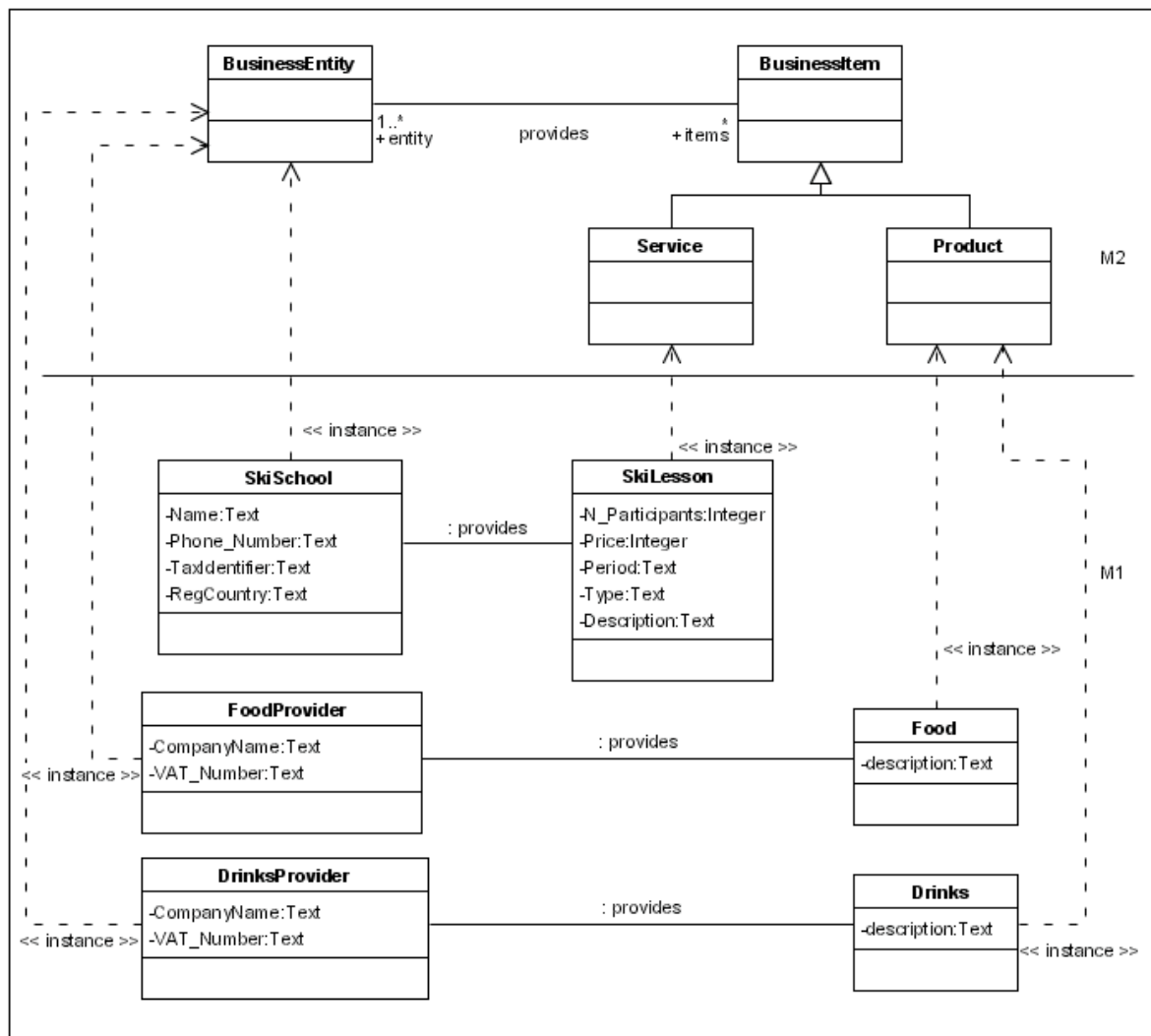


Figure 17 Service and Product example

5.3 Business Process package

The BusinessProcess package is used to define the behavioural elements of an organization. This means that it contains all the meta-concepts needed to describe how the organization actually performs its business. In other words, the package specifies all information that needs to be captured during the analysis of the definition of a business process.

One of the purpose of this package is the description of the dependencies existing between partner processes, modelling the business actions and objects that create, consume and exchange business information.

From a logical point of view, we can think the BusinessProcess package encompasses two main areas, closely related each other: an agreement area and a behavioural area. The former concerns the reciprocal engagements created between two different collaborative parties; the latter is related to the organizational working activities needed to perform a specific business.

All the classes included in the package represent an extension of the abstract class BusinessElement, defined in the Core package.

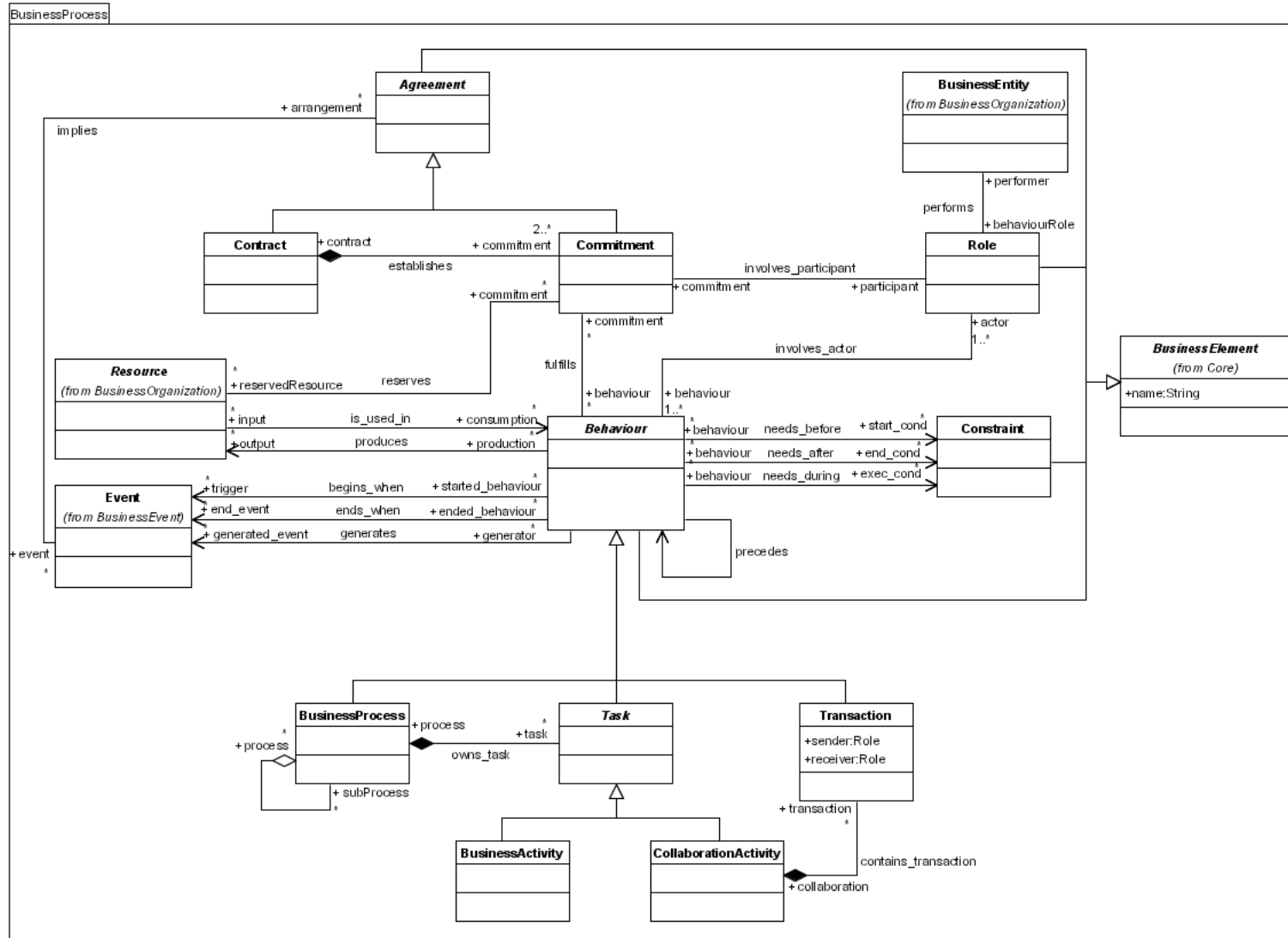


Figure 18 BusinessProcess package

The *Behaviour* meta-concept is defined as the manner in which a BusinessEntity acts under specified conditions or circumstances or in relation to other BusinessEntities; it is described through an abstract class that generalizes three different classes, i.e. BusinessProcess, Task and Transaction. This meta-concept is closely related to many other meta-concepts, both internal or external to the BusinessProcess package. It can be initiated by or generate an event, transforms information, materials or business commitments, and produces an output. Note that different Behaviours can be related each other through a relationship, describing the order in which they are performed.

A *Role* is the function or position that a BusinessEntity performs in a generic behaviour or in an arrangement with other entities. A Behaviour can involve several Roles.

A *Constraint* is a law that limits or restricts a Behaviour, derived from technical or environmental aspects. There are several ways in which a Constraint can impact on a Behaviour. It can represent a start-condition (the condition must be true before the behaviour is performed), an end-condition (the condition must be true after the behaviour is performed) or an execution-condition (the condition must be true while the behaviour is performed). For example, the modeller can use a Constraint to describe the necessity to have a valid credit card before concluding an economic transaction.

A *BusinessProcess* describes a co-ordinated set of actions that produce a business result, either within a single organization or across several. The OMG adopted this working definition of a business process: "business process category of business model that focuses on the transformative aspect of the business – that is, value chains or sequences of functions that take raw materials or other resources and transform them in such a way to add value for people inside and/or outside the business" [BMA]. It's possible to aggregate different processes into a macro-process.

Due to its complexity, a process can encompass a certain number of *Tasks*. This meta-concept is modelled through an abstract class; it can be defined as an atomic business process unit, which actually describes some step or function. These process tasks can be either one-partner activities or multi-partner activities; this implies a distinction between two meta-concept extending the Task class, BusinessActivity and CollaborationActivity classes.

The *BusinessActivity* class represents one-partner tasks. In other words, it describes an activity performed inside the organizational boundaries. This means there aren't any interactions with other entities in order to perform a BusinessActivity.

A *CollaborationActivity* is defined as a multi-partner task, that is a task extended outside the organizational boundaries. This meta-concept allows to describe how a business entity interacts with other entities. In this context, only binary collaborations are considered.

The CollaborationActivities include one or more *Transactions*. This class describes an exchange of business documents within a collaborative activity. It is characterized by a *sender* and a *receiver* (attributes with a Role value). The exchanged documents can be of various nature (paper documents, electronic documents, ...).

The following figure represents only an excerpt of a more detailed example, proposed in Appendix D. The "Booking" represented includes only a CollaborationActivity, i.e. "BookingActivity". It involves two Roles: a "Renter", performed by a "Hotel", and a "Booker", performed by a "Client", where Hotel and Client are BusinessEntity instances. The BookingActivity encompasses two Transactions: "CautionPayment" and "BookingConfirmation". The former requires the Booker sends a "CautionReceipt" (a BusinessItem instance) to the Renter; the latter requires the Renter sends a "Confirmation" (a BusinessItem instance) to the Booker. Note that the hotel modelled requires a caution payment before confirming the booking operation; this implies a "precedes" relationship between these transactions.

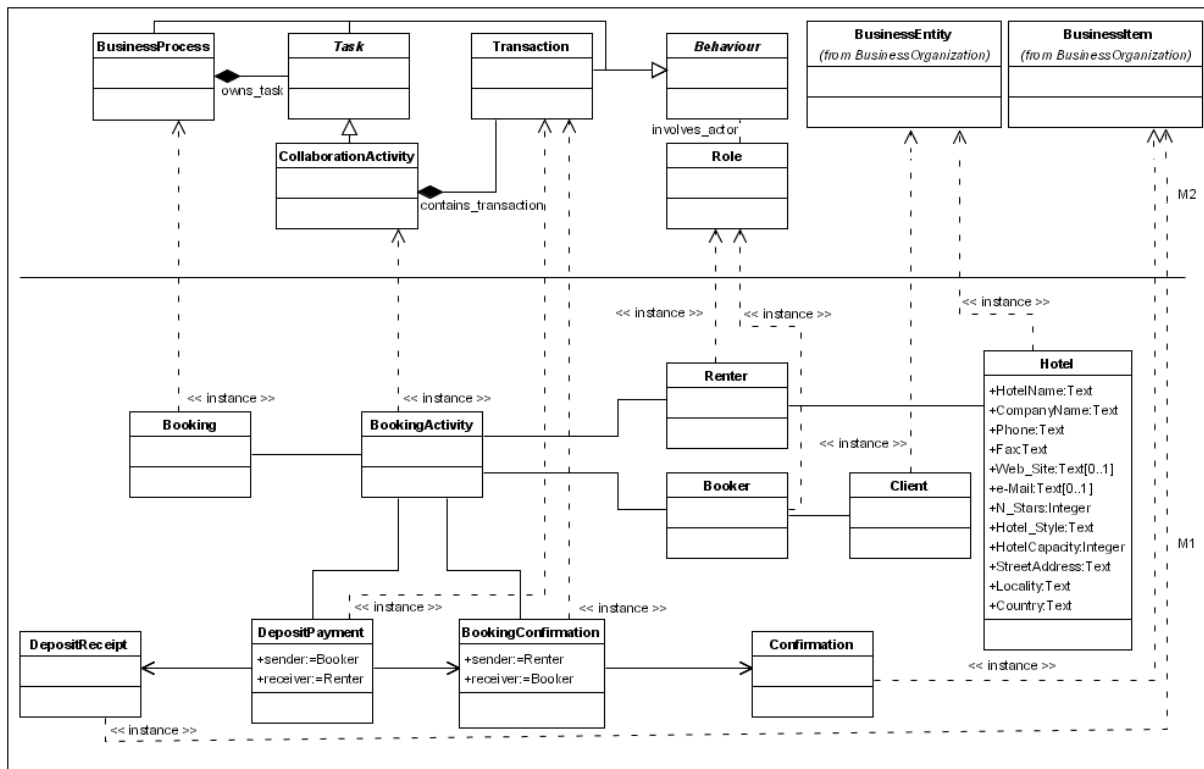


Figure 19 Behaviour example

As stated in the DBE Architecture Requirements document

"It is important for the BML to take the Agreement concept into account." [PF]

Therefore, the second logic area of the package is entirely centred around the *Agreement* meta-concept.

This abstract class models an arrangement between two or more partners that specify and regulate the conditions under which they will trade, e.g., terms of shipment, terms of payment and so on.

The *Commitment* class extends the Agreement meta-concept; it is defined as a promise to initiate a collaboration between partners in the future. Each commitment involves a participant, that performs a specific Role, and it can be fulfilled by a given Behaviour. Note that commitments should always be reciprocated by the other trading partner, who commits to initiate a collaboration in return. To formalize this reciprocity a Contract is introduced in the metamodel.

The *Contract* class, extending the Agreement meta-concept, describes a bundle of reciprocating commitments between trading partners, who bind themselves to one or more economic exchange in the future.

The following example describes a "BookingContract" in a hotel reservation, including the reciprocal commitments to pay a caution in advance, performed by a "Booker", and to reserve a room, performed by a "Renter"; these commitments are modelled through the "AdvancePayment" and "RoomReservation" Commitment instances. They are fulfilled by the "CautionPayment" and the "BookingConfirmation" Transaction instances respectively.

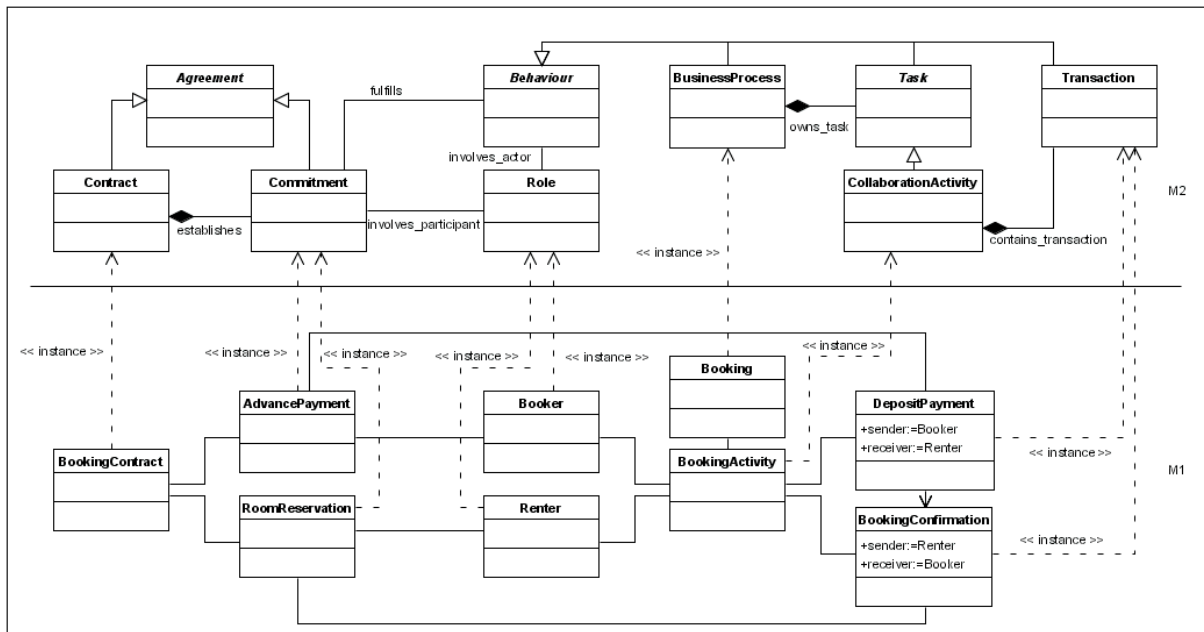


Figure 20 Agreement example

5.4 Business Motivation package

Motivation is the mental process that arouse, sustain and direct human behaviours; it reflects the change to physiological and psychological conditions as a result of previous and current experiences. In a BML context, motivation represents the set of elements characterizing and justifying the business choices and behaviours.

The *BusinessMotivation* package aims at describing the elements an organization analyses and settles in order to make choices and define its action. This means that the package allows defining and representing business plans in a structured way, highlighting what the organization wants to achieve and what it needs in order to do it. Nevertheless, the real carrying out of this kind of plans is beyond this metamodel purposes; therefore, the package contains all and only the elements able to describe why an organization performs a given action. This allows to describe the business motivation idea, without referring to detailed strategic management elements, since the motivation is not a central issue in the BML framework. In other words, this meets the need to realize a representation that is general enough to assure a good description of the business motivation, avoiding too detailed information, as mentioned above. To achieve this result, the package is modelled through a few of classes, able to capture the main aspects of the business motivation.

As depicted in the following figure, the Business Motivation package contains the metamodel elements for describing ends, means, assessments and influences used by an organization in order to justify and plan its behaviours. These generic terms summarize a great variety of concepts, such as vision, mission, strategy, goals and so on.

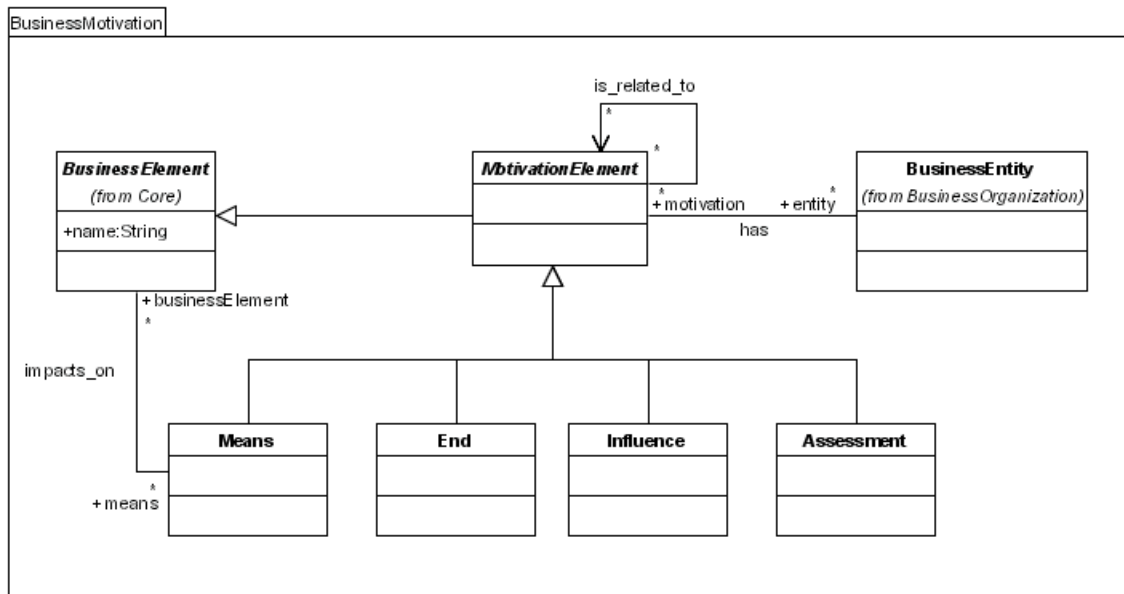


Figure 21 BusinessMotivation package

A *MotivationElement* can be seen as a base element representing an abstraction of different motivation units, i.e. Ends, Means, Influences and Assessments. The *MotivationElement* class extends the *BusinessElement* class. It can be related to a *BusinessEntity*, in order to indicate the organization that defines a given motivational element. Since all motivational elements can influence each other (for example, we could state that an end instance is supported or is achieved by a means instance), the metamodel allows to establish these relationships between different motivation elements.

The *End* class describes what an organization aims to achieve, without indicating how this will be reached. Analyzing this concept from different points of view or at different detail levels, we can identify three subtypes, such as "Vision", "Goal" and "Objective".

The *Means* class represents something (capability, technique, restriction, instrument, methodology, ...) used in a certain way to achieve a desired End. It does not indicate either the steps (workflow) necessary to exploit it, nor responsibility for such tasks, but it can deeply influence other business elements. We can distinguish among "Mission", "Strategy", "Tactic", "Policy" and "Rule".

The *Influence* class represents an act, a process or a power that produces an effect without an apparent exertion of tangible force or direct exercise of command, and often without deliberate effort or intent. Influences can impact the enterprise in the employment of its Means or in the achievement of its Ends.

We can distinguish between "External" and "Internal" Influences.

The *Assessment* class models a judgement about some Influence that impacts on the organization's ability to employ its Means or achieve its Ends. In other words, an Assessment expresses a logical connection between Influences and the Ends and Means of the business plans, indicating which Influences are relevant to which Ends and Means. We can distinguish the following Assessment typologies: "Strength", "Weakness", "Opportunity" and "Threat".

In the following example an "Hotel" defines a "DiscountPolicy" and a "FidelityRule" as Means to reach its "CustomerFidelity" End. Obviously, the FidelityRule impacts on the "Billing" BusinessActivity, changing the way in which the bill is produced by the BusinessEntity.

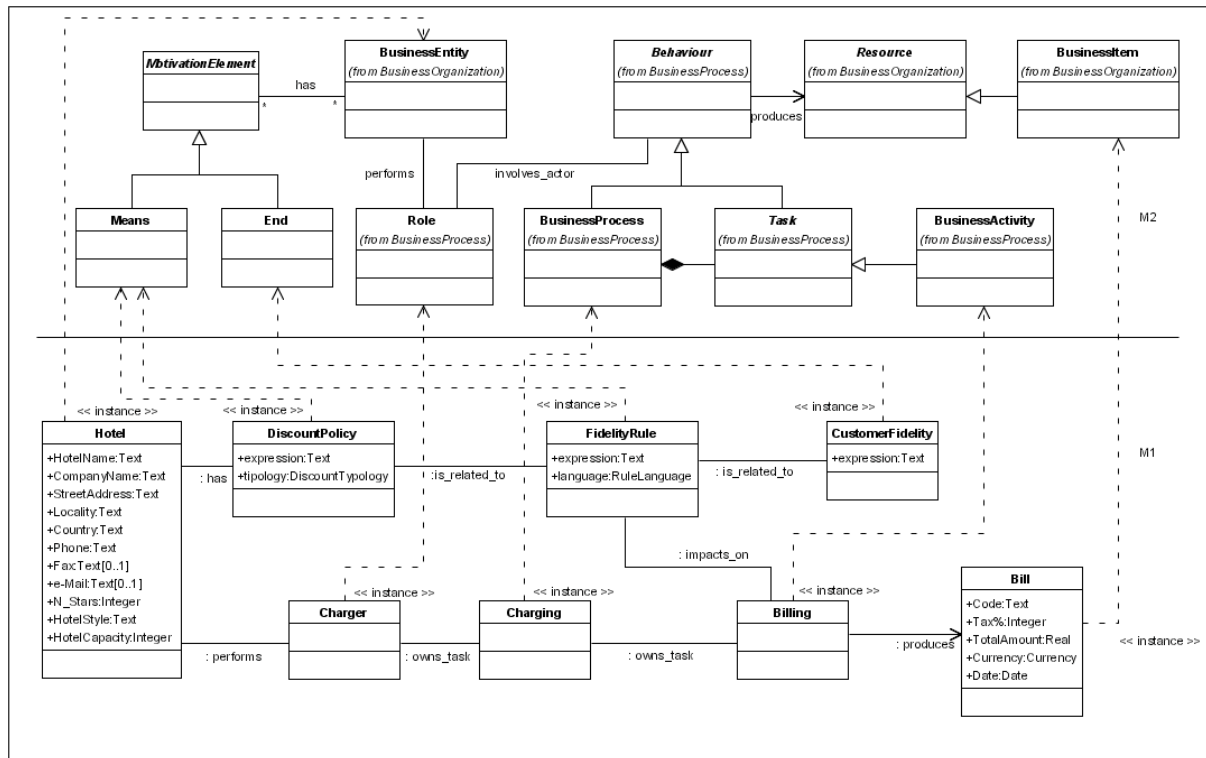


Figure 22 BusinessMotivation example

5.5 Business Event package

The *BusinessEvent* package contains the metamodel for describing the events able to influence the business behaviours, including rules about their temporal ordering or partial ordering in the business activity cycle. Due to its definition, the package is closely related to the *BusinessProcess* package, as the following picture highlights.

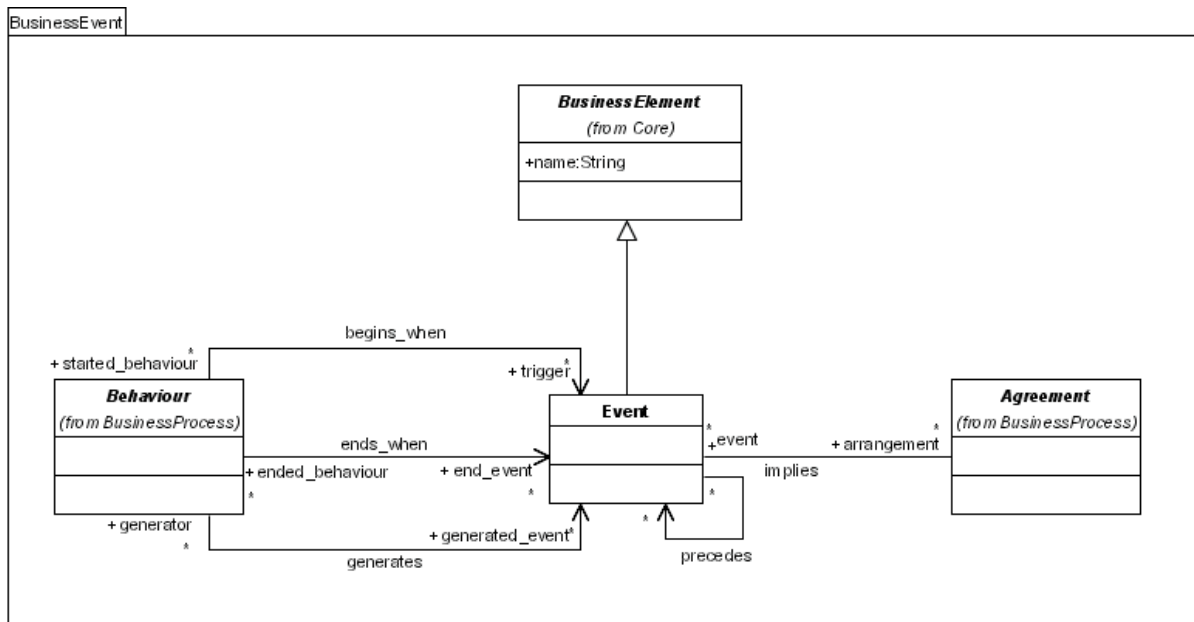


Figure 23 BusinessEvent package

The package has a very simple structure; it contains only the *Event* class, that extends the *BusinessElement* meta-concept. An Event is defined as an occurrence that impacts on organization behaviours in various ways: it can determine when a Behaviour starts or when it ends; an Event can also be generated by a given Behaviour. At the same time, an Event can imply an arrangement between two parties; in this case, it is related to an Agreement instance. The following example shows the way to use Event instances in order to model business behavioural aspects. In this case, an "AccountOpen" Event determines the beginning of the "AccountMaintaining" BusinessActivity. An "AccountClose" Event implies the beginning of the "Billing" BusinessActivity and, at the same time, the ending of "AccountMaintaining".

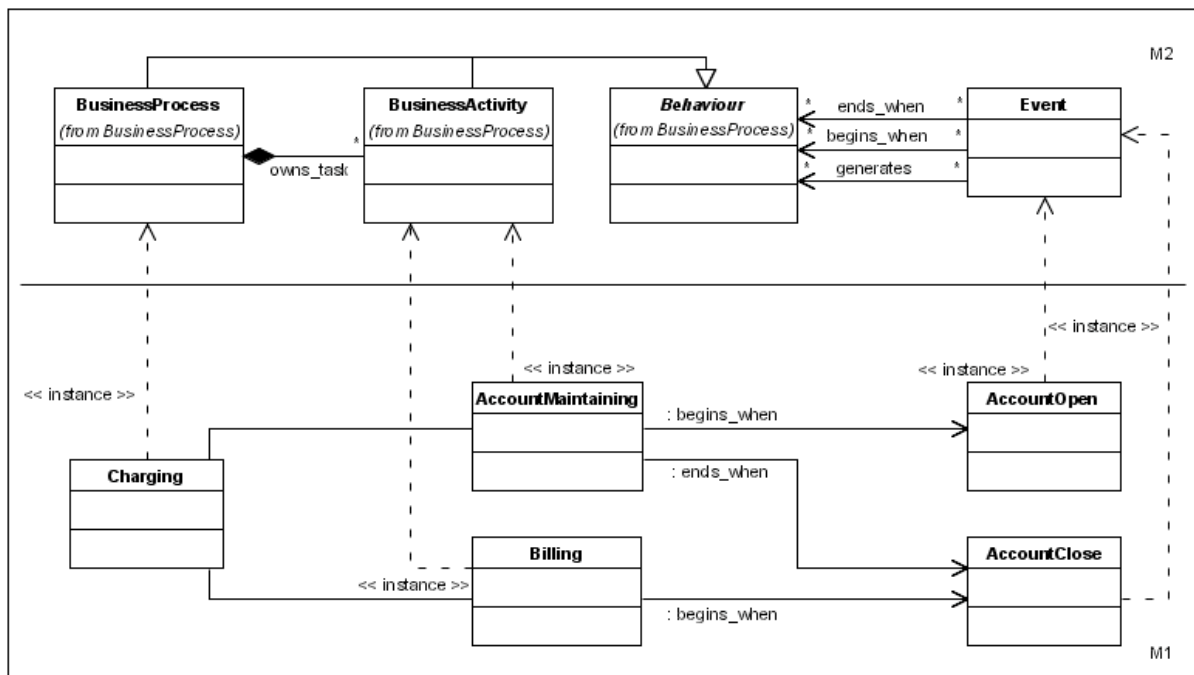


Figure 24 BusinessEvent example

5.6 Business Location package

The *BusinessLocation* package contains the metamodel for describing geographic locations, business sites, geographic areas, volumes, and perimeters, political subdivisions and boundaries, and logical connections between them.

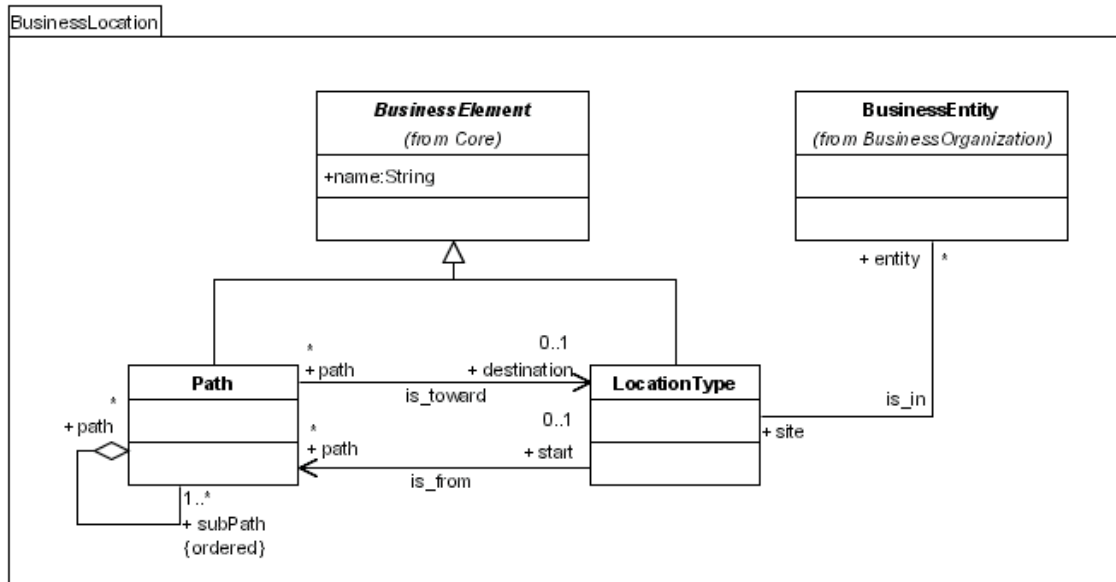


Figure 25 BusinessLocation package

The *Location* class represents the meta-concept to describe the position of something; in a BML context, it allows the ability to describe the particular site occupied by a BusinessEntity.

The *Path* class describes the way used to reach a place. It have a starting and a destination Locations. The metamodel allows to aggregate various paths in order to describe a more complex path and to combine in different ways sub-paths already defined.

Both these classes extend the BusinessElement class.

The following example shows an "Hotel" located in a given "HotelCity" (LocationType instance). A Path instance, i.e. "BusLine_N", is used to link this site to the "AirportName" (LocationType instance). In this way a modeller can shows the way to reach the hotel starting from a given airport.

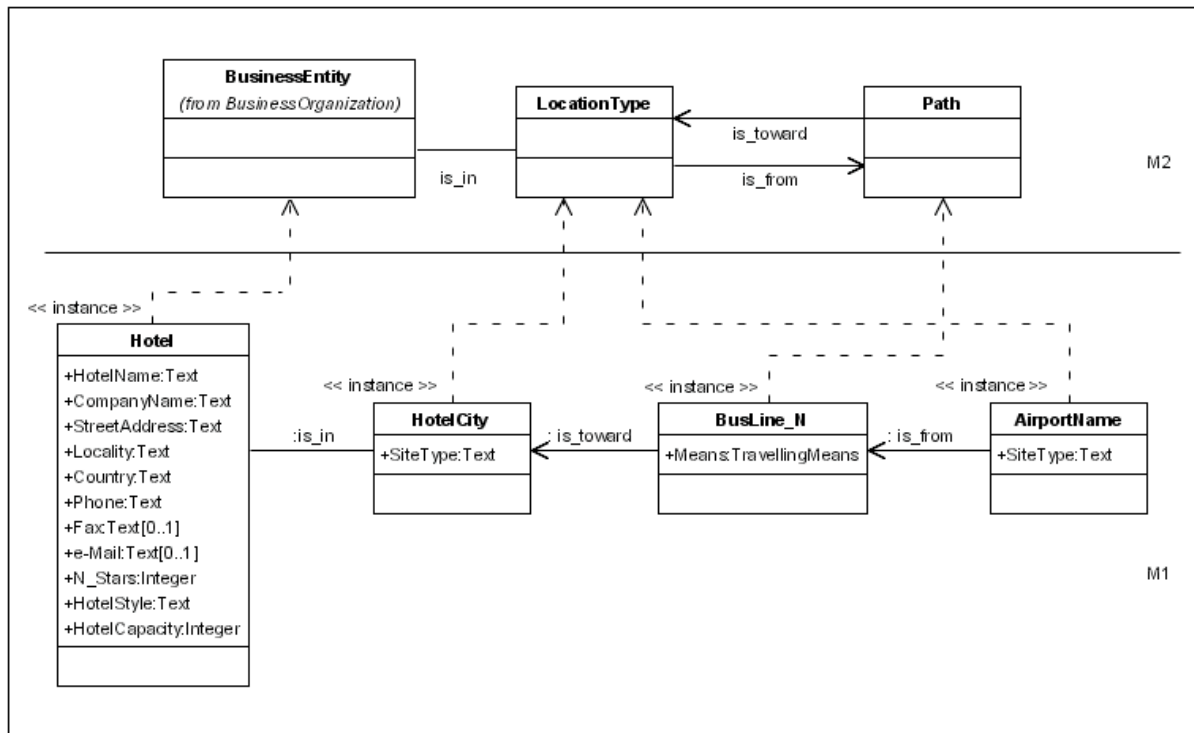


Figure 26 BusinessLocation example

5.7 Business Object package

The *BusinessObject* package contains the business data types constructors. It allows the modeller to create the types needed in order to model a particular domain or business. The package also contains the business data types used at M2 level, created as instances of primitive and structured MOF data types.

However, due to its purposes, BML metamodel doesn't allow to define the data types operational features. These aspects are typical of programming language, so they have no interest in a business-oriented context.

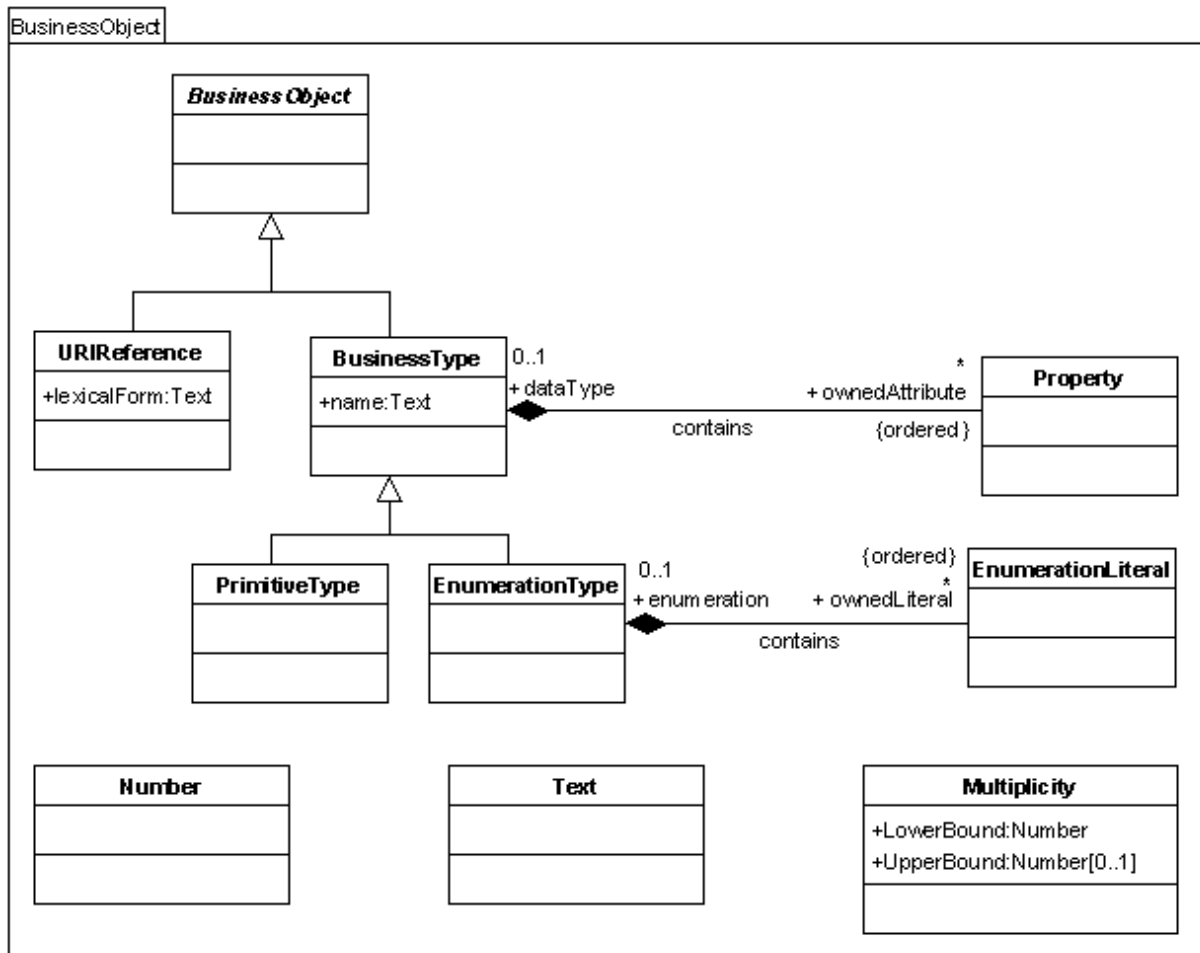


Figure 27 BusinessObject package

As mentioned above, the *Number* and *Text* classes are primitive types, while *Multiplicity* is a structured type. The latter contains two attribute, a *LowerBound* and an (optional) *UpperBound*, used to define an attribute multiplicity (see 5.1).

The *BusinessObject* class represents the root element of the package; it is an abstract class that is specialized allowing a modeller to define its own data types or to apply semantic annotation for its attributes.

The *URIReference* class extends the *BusinessObject* class; as stated above, it allows to use ontologies for providing additional semantics.

Another *BusinessObject* subclass is the *BusinessType* class; it represents a generic data type that a modeller can instance in order to define its specific attribute at M1 level. It can own some *Properties*.

The *Property* class represents a field owned by a *BusinessType*, in order to instance user-defined structured business object types.

The *Primitive* meta-concept extends the *BusinessType* meta-concept. It is defined as the basic building block for expressing an attribute state.

An *Enumeration* class extends the *BusinessType* class. It represents a business object whose values are the elements of a finite set of enumerators. The enumeration is specified by defining an ordered set of enumerator labels.

An *EnumerationLiteral* is an enumerator label used to define a specified value of an *Enumeration*. The following example shows some typical *BusinessType* instances. In particular, it defines "Date" and "Time" primitive business object, "Period" and "Amount" structured business object, with their properties (i.e. structure fields), and "Currency" and "TravellingMeans" enumerated

business objects, with their enumeration literal (i.e. possible values). All these instances can be used within an M1 model to declare an attribute type.

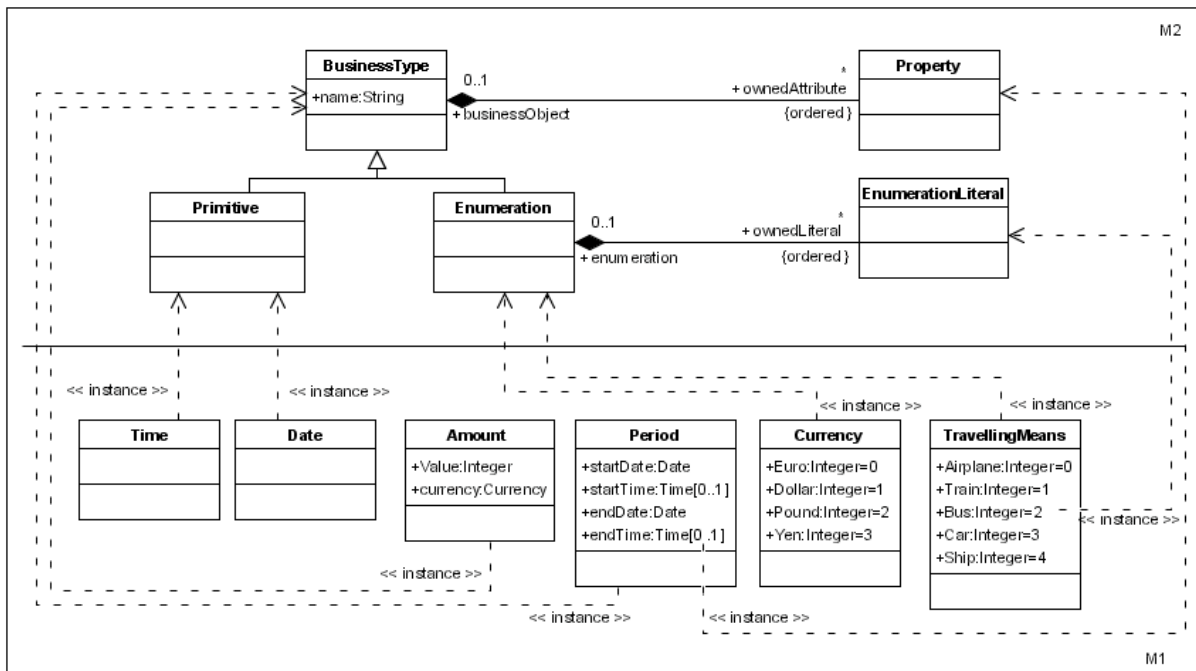


Figure 28 BusinessObject example

5.8 BML metamodel and other existing standards

Various interesting approaches in business modelling represented the basis for some important BML design choices (as expressed by the Req. 3.1 – 3.2 – 3.3). This careful study of the existing standards provided a valid support to identify the key elements for a complete business metamodel.

5.8.1 Architecture of Business Modeling

As mentioned in the previous sections, the metamodel package structure is designed to address the six interrogatives proposed by the Zachman Framework. This choice allows to realize a strong alignment with the *Architecture of Business Modeling* by the OMG BEI-DTF (Business enterprise Domain Task Force) . In this approach, “to achieve the desired generality and flexibility, a layered approach is taken. Packages (termed “basic models”) that are relatively independent of one another can together provide the needed range of expressivity and flexibility” [BMA]. The approach introduces the following packages: Business Domain, Business Process, Location, Business Organization, Event, Business Motivation and Constructs (the latter describes standard associations between the six basic models).

These packages are very near to BML packages, but there are some differences. First of all, the choice to create a Generic Package at M1 level (see Appendix A) implies that the Business Domain package is not in the BML metamodel. Moreover, the relationships between elements from different packages aren’t grouped in a specific package, but they are shown within meta-concepts description. Finally, BML introduces a core package to group generic elements common to all its packages.

Concerning the BusinessMotivation package, an interesting feature is its compliance with the *Business Rule Motivation Model* (BRMM), part of the *Architecture of Business Modeling*, that provides “a schema for developing, communicating, and managing business plans in an organized manner” [BRMM]. Even if the BRMM has a more complex and detailed structure, it represented a guide-line in the BusinessMotivation package modelling. In simplest words, the

package contains only the main concepts introduced by the BRMM that allows the user to model motivational aspects of a specific business. This choice allows to follow an OMG standard approach, accordingly with BML purposes.

5.8.2 UMM and ebXML

The most interesting approach, in business collaboration definition, is the *Business Collaboration Framework* (BCF) and in particular the *TMG UN/CEFACT's Modeling Methodology* (UMM). UN/CEFACT's Modeling Methodology (UMM) is a UML-based methodology that provides the business logic that supports the capture of the business knowledge in a business collaborations. Even if BML isn't completely aligned with this approach in terms of purposes (BML is focused on business description, while UMM focus is on collaboration description), there are many common issues between the two approaches. This implied that the BML BusinessProcess package encompasses many UMM concepts, included in the Business Requirement View (BRV).

BML business processes are seen as a composition of tasks; if a task is a multi-partner activity, it represents a collaboration. In the same way, a collaboration is composed by transactions, defined as documents exchange between different partners. This process structure is compliant with the UMM definitions and allows to have a good mapping with ebXML, that use the UMM metamodel to define the behavioural aspects of a business process.

This compliance isn't clearly visible comparing BML and UMM metamodels, for two main reasons. First of all, UMM is focused on collaboration description, as mentioned above; therefore it takes care of a great number of details, neglected by BML. Moreover, "UMM uses four primary views for structuring modeling activities [...], so that each business process and information model can be viewed from a number of perspectives" [UMM]. This implies a lack of structural coherence between the two approaches and makes hard a direct comparison.

Nevertheless, an operative example can demonstrate how a BML model can be used to describe processes modelled through ebXML. The following table is an excerpt from a list of common business process [CCBP]:

Business Process	Bynary Collaboration (protocol)	Business Transaction (activity)	Initiating/ Requesting Side		Responding Side	
Order Fulfillment	Manage	Create order	Partner type:	Document:	Partner type:	Document:
	Purchase	[Commercial Transaction]	Retailer	Purchase	DSVendor	PO
	Order		Auth Role: Buyer.Create order	Order	Auth Role: Seller.Create order	Acknowledgment
		Change order [Commercial Transaction]	Partner type: Retailer	Document: Purchase	Partner type: DSVendor	Document: PO
			Auth Role: Buyer.Change order	Order	Auth Role: Seller.Change order	Acknowledgment
	Notify of advance shipment	Notify of advance shipment [Notification]	Partner Type: DSVendor	Document: ASN	Partner Type: Retailer	No Document
			Auth Role: Shipper.Notify of advance Shipment		Auth Role: Receiver.Notify of advance shipment	

BML allows to create the model depicted in the following figure. Note that the responding side documents represent a technical aspect of the transaction (acknowledgement); this representation is beyond the BML metamodel purposes, therefore they aren't in BML model.

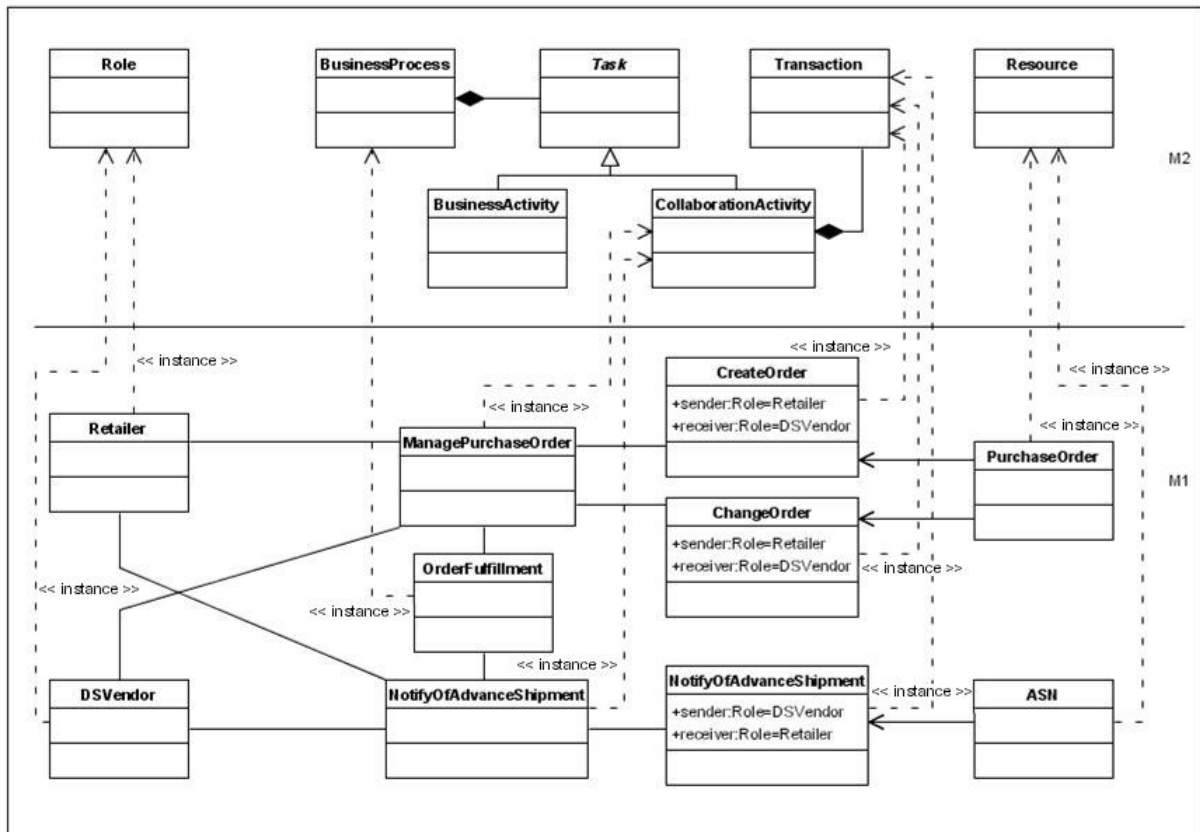


Figure 29 BML and ebXML process

UMM also impacted on modelling interactions between events and processes. In this case, the BML metamodel introduces some concepts coming from the BRV ("a behaviour starts when an event occurs", "a behaviour ends when an event occurs" and "a behaviour generates an event"). In the same way, BML introduces the constraint concept, to bind a behaviour to follow a specific law, and defines some specific relationships to model preconditions and postconditions, as depicted in the following figure¹¹:

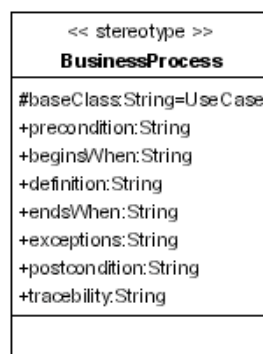


Figure 30 UMM BusinessProcess

Nevertheless, from this point of view, a great difference between BML and UMM exists. While the latter describes events and constraints as string elements, the former introduce some meta-

¹¹ UMM Technical Specification, Chapter 8, 9-2

concepts to describe them. This allows a greater reusability at model level and the possibility to relate these concepts to other concepts.

5.8.3 REA Ontology

Another concept common to BML and UMM is represented by the “agreement” concept. Both these approaches start from the *Resource-Event-Agent* (REA) *Ontology*. It presents “a conceptual accounting framework of the Resource-Event-Agent (REA) model of McCarthy (1982) as an enterprise domain ontology” [REA]. The REA Ontology definitions about agreement and other related concepts are part of both BML Business Process package and UMM Business Requirements View.

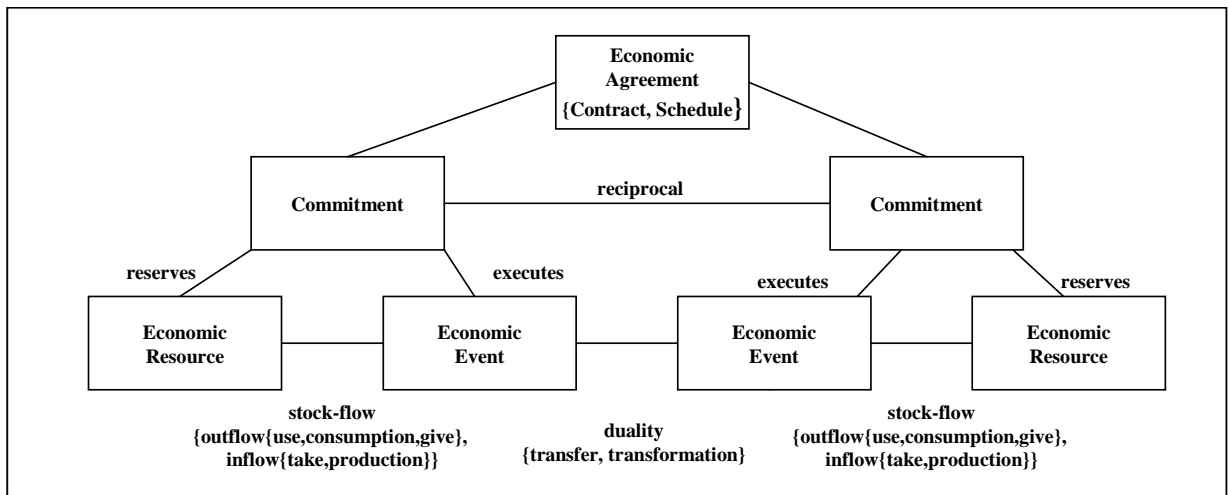


Figure REA agreement concepts

The following figure [UMM pag. 67] shows as UMM uses the REA ontology to model contracts and commitment. Comparing this diagram with a BML example (see 5.3 *Business Process package*) shows the great similarity between the two models.

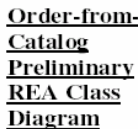


Figure 31 REA Class Diagram

5.8.4 UML

Another important standard involved in BML modelling choices is represented by the OMG *Unified Modelling Language* (UML), that “defines a graphical language for visualizing, specifying, constructing, and documenting the artifacts of distributed object systems”¹².

As shown in the following figure, BML BusinessObject package is compliant with the UML DataTypes diagram¹³.

Due to its purposes, BML metamodel doesn't allow the modeller to define data types operational features (see 5.7 *BusinessObject package*). This represents the main difference between UML and BML data types.

¹² OMG Unified Modeling Language, Specification, Version 1.4, September 2001

¹³ UML 2.0 Superstructure Specification, OMG, 2003

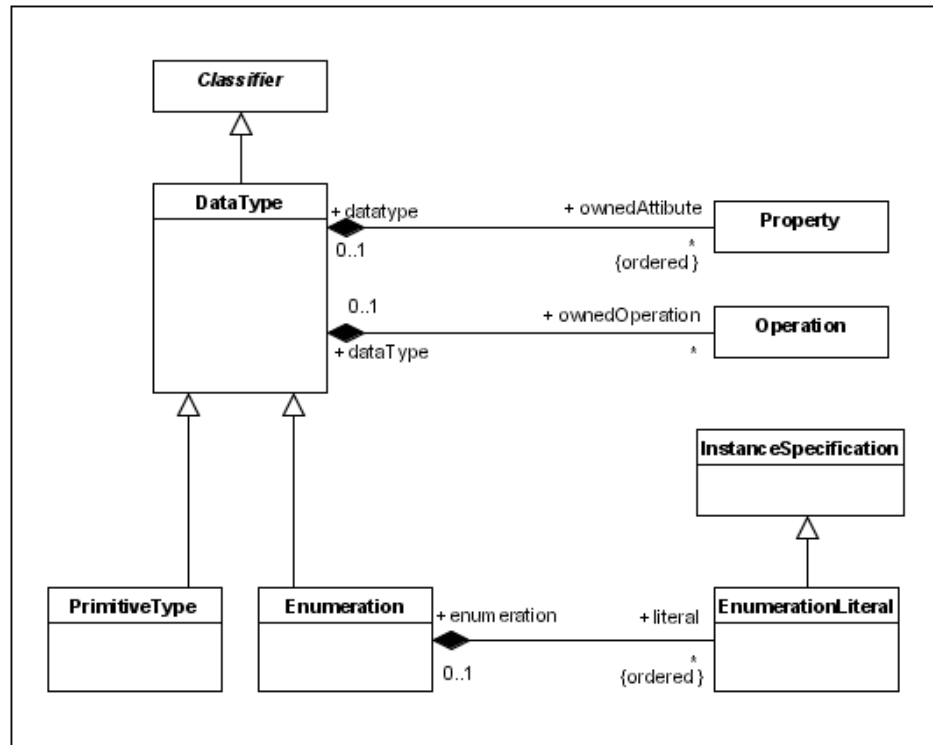


Figure 32 UML DataTypes diagram of the Kernel package

6 Integrated CIM Editor

6.1 Introduction

This section describes the First Version of the BML Editor for the DBE project. This editor will be used by business analysts on behalf of SMEs for defining business and service models according to the corresponding metamodels. The BML Editor as a visual modeling tool provides a UML-like Graphical User Interface (GUI), similar to that of well known UML editors, for supporting the modeling tasks and stores the created models in the DBE Knowledge Base. The current version of the editor supports a subset of the CIM languages and in particular the language that semantically describes the services offered by SMEs (i.e. SSL). During this process it takes into account domain specific ontologies that have been described using the Ontology Definition Metamodel (ODM) and stored into the DBE Knowledge Base. Future extensions of this editor will provide full support of the entire CIM framework in order to fulfill all the requirements that the DBE environment poses.

6.2 Technical and Functional Specification

In this section we briefly describe the adopted technologies for the development of the BML Editor as well as the functionalities that it provides.

6.2.1 Technical Requirements

The first version of the BML Editor was supposed to be a graphical, UML-Like Editor allowing for modeling business and service models. The adoption of eclipse as the main platform for the Service Factory Environment of DBE posed the technical requirement of developing the BML Editor as an eclipse plug-in that will be plugged as all other tools into the same platform (eclipse). As a consequence, the BML Editor is being developed as an Eclipse plug-in based on Eclipse 3.0, and exploiting of the GEF 3.0 and Draw 2D graphical frameworks that have been built for this platform. In the frame of the MDA approach that has been adopted by the DBE project, the BML Editor allows the creation of M1 models as direct instances of the M2 metamodels that have been defined in DBE under the BML umbrella with the use of MOF 1.4 (Meta-Metamodel).

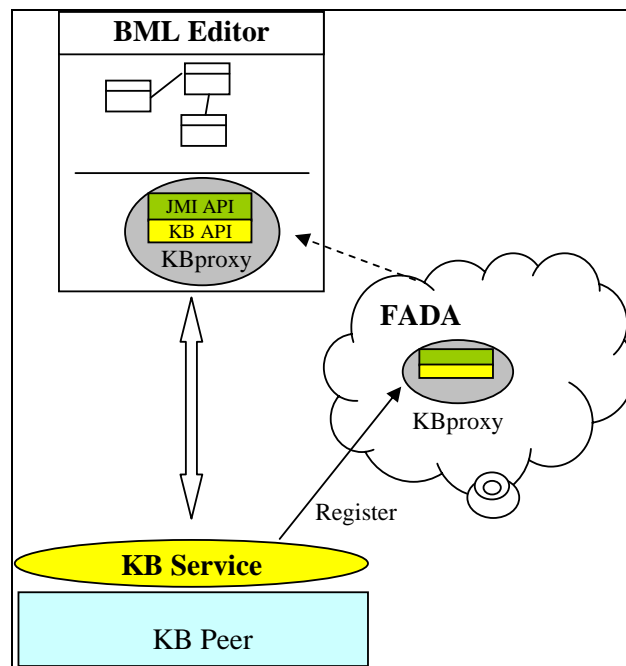


Figure 33 BML Editor Interaction with KB Service through the FADA network

The BML editor is used to define business and service models. From an architectural point of view, the BML Editor exploits the DBE Knowledge Base (KB) for its persistency requirements. Service-Oriented architecture is followed for integrating the BML Editor with the DBE Knowledge Base based on the FADA service platform. That is, the BML Editor looks up into the FADA network to find an appropriate Knowledge Base (KB) proxy. By downloading and using that proxy it connects to the JMI-compliant KB service and then acquires the BML metamodel. From this point forward, it exploits local (client side) JMI interfaces that are specific to the used BML metamodel (i.e. they provide functionality tailored to the specific metamodel which is used) and enables its instantiation (i.e. creation of M1 Models) as well as the storage/retrieval/update of the instance models into the KB. Figure 33 illustrates the described interaction between the KB service and the BML Editor.

6.2.2 Functional Specification

Using the BML editor a user is able to create a BML model that is an instance of the corresponding BML metamodel (abstract syntax) which has been defined with MOF 1.4. This first version of the BML Editor supports modeling with only one part of BML. In particular the SSL (Semantic Service Language) is supported allowing for defining M1 models for semantically describing DBE services.

The functional aspects of the BML Editor are described in terms of use-cases. Use cases is a software-engineering technology that gives human readable yet formal description of system functionality. The use case template that is used in this document is the well-known template defined by Alistair Cockburn in his book *"Writing Effective Use Cases"*.¹⁴

A use case captures a contract between the stakeholders of a system about its behavior. A use case describes the system's behavior under various conditions as the system responds to a request from one of the stakeholders, called the primary actor for the specific use case. The primary actor initiates an interaction with the system to accomplish some goal. The system responds, protecting the interests of all the stakeholders. Different sequences of behavior, or

¹⁴ Alistair Cockburn, *"Writing Effective Use Cases"*, Addison-Wesley Pub Co, 15 January, 2000. ISBN: 0201702258

scenarios, can unfold, depending on the particular requests made and the conditions surrounding the requests. The use case gathers those different scenarios together. Use cases are described in text form. They serve as a means of communication from one person to another, often among people with no special training.

The three main concepts used in describing a use case are the following:

- **Scope:** What is really the system under discussion?
- **Primary actor:** Who has the goal?
- **Level:** How high- or low-level is that goal?

To understand a use case in this document the following definitions are necessary:

- **Actor:** anyone or anything with behavior.
- **Stakeholder:** someone or something with a vested interest in the behavior of the system under discussion.
- **Primary actor:** the stakeholder who or which initiates an interaction with the system under discussion to achieve a goal.
- **Secondary actor:** a stakeholder that participates in the use case, not the one that initiates the interaction (i.e. not the primary actor).
- **Use case:** a contract for the behavior of the system under discussion.
- **Scope:** identifies the system that we are discussing.
- **Precondition and guarantees:** what must be true before and after the use case runs.
- **Trigger:** An event/situation that precedes and invokes the use case.
- **Main success scenario:** a case in which nothing goes wrong.
- **Extensions:** what can happen differently during that scenario. Numbers in the extensions refer to the step numbers in the main success scenario at which each different situation is detected (e.g. Steps 3a and 3b indicate two different conditions that can show up at step 3).
- **Due Date:** which release of the system will support this use case.
- When a use case references another use case, the referenced use case is underlined.

To signify that we are dealing with a goal to be achieved in a single sitting, we classify the corresponding use case as **primary-task or user-task level**. To signify more complex goals, which cannot be achieved in a single sitting, we use the terms **summary level or strategic**, which is a level higher than primary-task. Finally, the term **sub-function level** is used for use cases that deal with a detailed goal, usually a system function.

In order to present the overall picture of the set of use cases used in the functional specification three complementary tools have been used:

1. The **“Overall picture”** diagram which shows the use cases as boxes with links that represent the associations between them (which use case call which other).
2. The **“Summary Table”** that presents the use cases grouped by level, containing information about each use case which include: the id, the level, the primary actor, the goal and a brief textual description of the use case.
3. The **“Actors’ skills”** table which is used to express the specific skills assumed for each actor of the system.

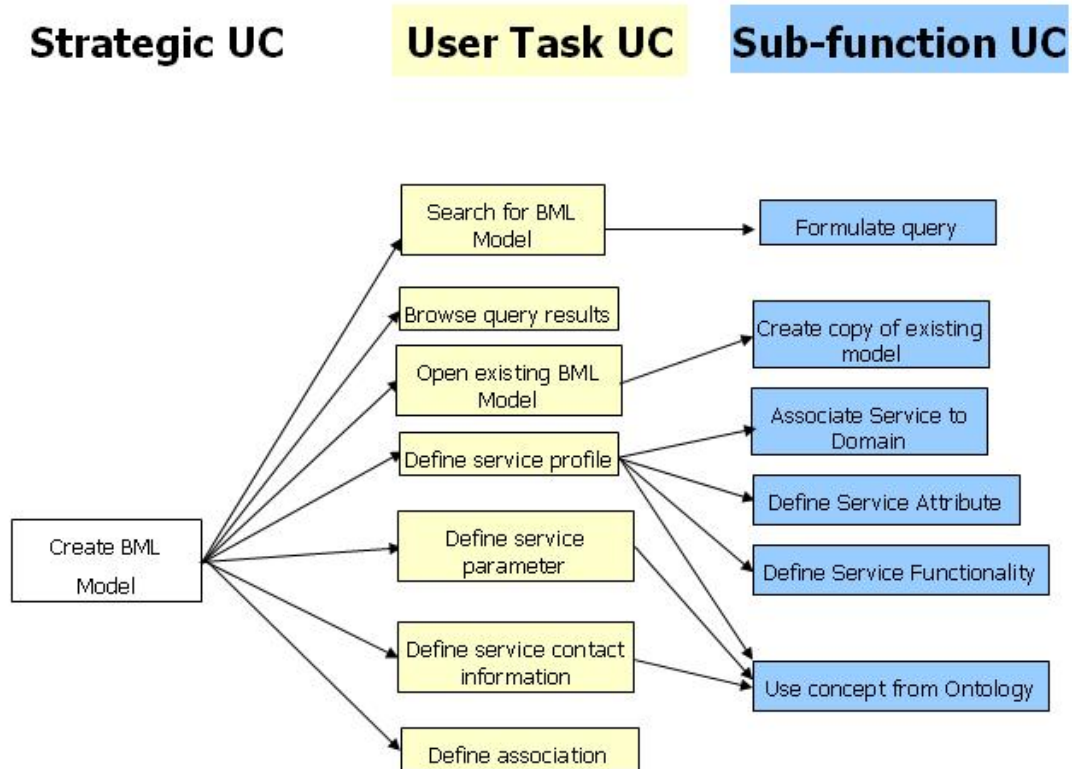


Figure 34 Overall picture

6.2.2.1 Interviews

The following table presents the use cases grouped by level, containing information about each use case including: the id, the level, the primary actor, the goal and a brief textual description of the use case. It should be noticed that the following use cases are referring to the current implementation of the BML Editor (Release 1.0). Further use cases will be defined and documented in order to support the complete functionality of the BML Editor taking into account the rest of the BML Metamodels.

#	Level	Primary Actor	Goal	Brief
UC 1	Summary	Business Analyst	Create a BML Model	The Business Analyst wants to create a BML model that describes its business and services
UC 2	Primary Task	Business Analyst	Search for a BML Model	The Business Analyst wants to search for an existing BML Model that he may use to describe his business and services
UC 3	Sub-function	BML Editor	Formulate a query request	BML Editor guides Business Analyst to formulate a query request that express his information needs regarding BML models
UC 4	Primary Task	Business Analyst	Browse query results	The Business Analyst browses the results of a query in order to find out a suitable model for describing his business and services
UC 5	Primary Task	BML Editor	Open an existing model in the BML Editor	The BML Editor opens an existing model for modifications

UC 6	Sub-function	BML Editor	Create copy of existing model	BML Editor creates a copy of an existing model
UC 7	Primary Task	Business Analyst	Define a service profile	The Business Analyst wants to create a model for semantically describing offered services.
UC 8	Sub-function	Business Analyst	Associate service profile to domain	Business Analyst has to associate a service profile he defines to a DBE domain.
UC 9	Sub-function	Business Analyst	Define attribute of service profile	Business Analyst can define a particular characteristic of a service profile via an attribute
UC 10	Sub-function	Business Analyst	Define Service Functionality	Business Analyst can describe logical functions that are performed by a service, described by a profile. These functions describe what is the behavior of the service provider during the interactions with a client in the scope of a specific service consumption. This description of the service behavior is irrelevant of whether it will be implemented by software components or by human beings. For each function the Business Analyst can specify the conditions that must be satisfied for a successful transaction as well what is the information required and returned (possibly under conditions) during this transaction.
UC 11	Primary Task	Business Analyst	Define a service parameter	The Business Analyst wants to describe concepts associated to a service profile whose instantiation will provide semantic information (semantic features) about a specific service.
UC 12	Primary Task	Business Analyst	Define a service contact information	The Business Analyst can define contact information slots for referring to humans or organization units responsible for (or operating) the service.
UC 13	Primary Task	Business Analyst	Define a service association	Business Analyst can associate the elements he defined creating associations. For each association, he defines the source and target element, the association name and its start/end role names as well as multiplicities. BML Editor check the validity of each association against the constraints imposed by the BML metamodel
UC 14	Sub-function	Business Analyst	Use concept from Ontology	The Business Analyst uses concepts from predefined Ontologies in order to enrich a BML model with concepts defined in some domain ontology.

6.2.2.2 Actors skills

Actor Name	Profile: Background, Skills
Business Analyst	Creates BML model Searches for BML model Browses query results Defines service profile Associates service profile to DBE domain Defines service profile attribute Defines service profile functionality Defines service parameter Defines contact information Use concept from Ontology Defines association
Domain expert	Creates BML model Searches for BML model Browses query results Defines service profile Associates service profile to DBE domain Defines service profile attribute Defines service profile functionality Defines service parameter Defines contact information Defines association
BML Editor	Provides GUI to the Business Analyst in order to support the creation of a BML model (see description above). Utilizes Query Module Opens an existing model Creates copy of existing model
Query Module	Formulates a query request in order to satisfy Business Analyst's search requests regarding existing BML Models
Browse Query Results Module	Presents to the user the results of each request and allows him to select which one he wants to re-use or extend.

Detailed Description

This sub-section presents the detailed description of the use cases. For each use case there is a corresponding table containing all the relevant information. The most important aspects of each use case are the main success scenario and the extensions which describe the functionality of each use case.

USE CASE 1	Create a BML Model
Goal in Context	Create a BML Model
Scope & Level	BML Editor, Summary
Preconditions	Business Analyst has downloaded the BML Editor from the DBE Portal
Success End Condition	Business Analyst creates the BML model
Failed End Condition	The system remains valid
Primary, Secondary Actors	Business Analyst Domain Expert DBE System
Trigger	Business Analyst attempts to describe its business and services using BML

MAIN SUCCESS SENARIO	Step	Action
	1	Business Analyst selects: steps 2-7
	2	To <u>search for BML Model</u> and then <u>browse query results</u> or
	3	To <u>open an existing BML model</u>
	4	To <u>define a service profile</u>
	5	To <u>define a service parameter</u>
	6	To <u>define contact information</u>
	7	Store the BML model created
EXTENSIONS	Step	Branching Action
	1a	Operation fails: 1a1. DBE system informs the Business Analyst about the cause of the failure
Due Date	Release 1.0	

USE CASE 2	Search for BML Model	
Goal in Context	Search for a BML Model	
Scope & Level	Query Module, Primary Task	
Preconditions	Domain experts or other SMEs have created and published BML models in the DBE ecosystem	
Success Condition	End	A model that satisfies SME needs has been found
Failed Condition	End	A suitable model has not been found
Primary, Secondary Actors	Business Analyst Domain expert	
Trigger	The Business Analyst attempts to find an existing BML Model that he may use to describe his business and services	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst starts BML editor in order to create BML model
	2	The Business Analyst wants to find existing BML Models
	3	The BML Editor activates the Query Module to allow the user to <u>formulate a query</u> request
	4	The Business Analyst submits his request
	5	BML models found are returned to the Business Analyst
EXTENSIONS	Step	Branching Action
	4a	Network connection is down 4a1. The Business Analyst is notified about the problem. 4a2. The Business Analyst is asked to try another time
	5a	No results found 6a1. The Business Analyst is notified 6a2. The Business Analyst is asked to modify its query request
Due Date	Release 1.0	

USE CASE 3	Formulate query request	
Goal in Context	To formulate a query request that express Business Analyst's information needs regarding BML models	
Scope & Level	BML Editor, sub-function	
Preconditions	There are available BML models	
Success End Condition	Query request has been formulated	
Failed End Condition	There are no available BML models	
Primary, Secondary Actors	Query Module BML Editor	
Trigger	Search module attempts to find BML models that satisfy Business Analyst's information needs	
MAIN SUCCESS SENARIO	Step	Action
	1	Query Module guides the Business Analyst to formulate his request
	1	The Business Analyst submits his request
EXTENSIONS	Step	Branching Action
	1a	Query Module can not guide Business Analyst because it has not access to the corresponding metamodels 1a1. The Business Analyst is notified about the problem
Due Date	Release 1.0	

USE CASE 4	Browse query results	
Goal in Context	Browse query results to find interesting BML models	
Scope & Level	BML Editor, Primary Task	
Preconditions	Query results have already been produced by the Query Module	
Success End Condition	BML models have been open by the BML Editor	
Failed End Condition	Query results remain unchanged	
Primary, Secondary Actors	Business Analyst Query Module	
Trigger	The Query Module makes available the answer to a submitted search request	
MAIN SUCCESS SENARIO	Step	Action
	1	Query Module presents the query results
	2	The Business Analyst selects BML models to be transferred in his local Knowledge Base
EXTENSIONS	Step	Branching Action
	2a	The BML models selected are not available 2a.1. The Business Analyst is notified about the problem
Due Date	Release 1.0	

USE CASE 5	Open existing BML model	
Goal in Context	Open an existing model in the BML Editor	
Scope & Level	BML Editor, Primary Task	
Preconditions	A BML Model has been found	
Success End Condition	BML model has been opened by the BML Editor	
Failed End Condition	The BML model can not be opened	
Primary, Secondary Actors	BML Editor Business Analyst	
Trigger	The Business Analyst attempts to open an existing BML model.	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst attempts to open an existing model
	2	If the BML model is owned by the Business Analyst go to step 4 otherwise go to step 3
	3	<u>Create a copy of the BML model</u>
	4	Open the BML model in the BML editor
EXTENSIONS	Step	Branching Action
	3a	The BML model selected can not be copied 3a.1. The Business Analyst is notified about the problem
	4a	The BML Model can not be opened 4a.1. The Business Analyst is notified about the problem
Due Date	Release 1.0	

USE CASE 6	Create a copy of existing BML model	
Goal in Context	Create a copy of an existing model	
Scope & Level	BML Editor, sub-function	
Preconditions	A BML Model has been found	
Success End Condition	A copy of a BML model has been created	
Failed End Condition	The BML model can not be copied	
Primary, Secondary Actors	BML Editor Business Analyst	
Trigger	The BML Editor attempts to create a copy of an existing BML model.	
MAIN SUCCESS SENARIO	Step	Action
	1	The BML Editor attempts to create a copy of an existing model
	2	The copy created is stored in the SME's local KB
EXTENSIONS	Step	Branching Action
	1a	The BML model selected can not be copied 1a.1. The Business Analyst is notified about the problem
	2a	The BML Model can not be stored in the KB 2a.1. The Business Analyst is notified about the problem
Due Date	Release 1.0	

USE CASE 7	Define service profile	
Goal in Context	Create a service profile	
Scope & Level	BML Editor, primary task	
Preconditions	The BML Editor is available to the Business Analyst	
Success End Condition	A service profile has been created	
Failed End Condition	The service profile can be created and the KB remains in valid state	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to create a service profile	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst select the service profile element from the BML Editor's palette
	2	The Business Analyst draws the service profile
	3	The Business Analyst <u>associates service to domain</u>
	4	The Business Analyst <u>defines service attribute</u>
	5	The Business Analyst <u>defines service functionality</u>
EXTENSIONS	Step	Branching Action
Due Date	Release 1.0	

USE CASE 8	Associate service to domain	
Goal in Context	Associate a service profile to domain	
Scope & Level	BML Editor, sub-function	
Preconditions	A service profile has been created	
Success End Condition	A service profile has been associated to domain	
Failed End Condition	The service profile can not be associated to domain and the BML Editor remains in valid state	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to associate a service profile to domain	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst selects the service profile that wants to associate to domain
	2	The Business Analyst selects the domain he wants from the list of available domains
EXTENSIONS	Step	Branching Action
	2a	The Business Analyst does not find a suitable domain for the service 2a.1 The Business Analyst request the creation of a new domain
Due Date	Release 1.0	

USE CASE 9	Define service attribute	
Goal in Context	Define attribute of service profile	
Scope & Level	BML Editor, sub-function	
Preconditions	A service profile has been created	
Success End Condition	A service attribute has been defined	
Failed End Condition	A service attribute has not been created and the BML Editor remains in valid state	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to define a service attribute	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst selects the service profile into which he wants to define an attribute
	2	The Business Analyst defines the attribute's name and type
	3	The Business Analyst <u>uses a concept from Ontology</u> as type
EXTENSIONS	Step	Branching Action
Due Date	Release 1.0	

USE CASE 10	Define service functionality	
Goal in Context	Define functionality of service profile	
Scope & Level	BML Editor, sub-function	
Preconditions	A service profile has been created	
Success End Condition	A service functionality has been defined	
Failed End Condition	A service functionality has not been created and the BML Editor remains in valid state	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to define a service functionality	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst selects the service profile into which he wants to define a functionality
	2	The Business Analyst defines the functionality's name
	3	The Business Analyst defines functionality's precondition
	4	The Business Analyst defines functionality's input parameters
	5	The Business Analyst defines functionality's output parameters
	6	The Business Analyst may define a condition for each output parameter
	7	The Business Analyst <u>uses a concept from Ontology</u> as type
EXTENSIONS	Step	Branching Action
Due Date	Release 1.0	

USE CASE 11	Define service parameter	
Goal in Context	Define a service parameter element	
Scope & Level	BML Editor, primary task	
Preconditions	A service profile has been created	
Success End Condition	A service parameter has been defined	
Failed End Condition	A service parameter has not been created and the BML Editor remains in valid state	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to define a service parameter	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst select the service parameter element from the BML Editor's palette
	2	The Business Analyst defines the parameter's name
	3	The Business Analyst defines the parameter's type
	4	The Business Analyst <u>uses a concept from Ontology</u> as type
EXTENSIONS	Step	Branching Action
Due Date	Release 1.0	

USE CASE 12	Define service contact information	
Goal in Context	Define a service contact information element	
Scope & Level	BML Editor, primary task	
Preconditions	A service profile has been created	
Success End Condition	A service contact information has been defined	
Failed End Condition	A service contact information has not been created and the BML Editor remains in valid state	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to define a service contact information	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst select the contact information element from the BML Editor's palette
	2	The Business Analyst defines the contact information name
	3	The Business Analyst defines the contact information type
	4	The Business Analyst <u>uses a concept from Ontology</u> as type
EXTENSIONS	Step	Branching Action
Due Date	Release 1.0	

USE CASE 13	Use concept from Ontology	
Goal in Context	Use an ontology concept	
Scope & Level	BML Editor, sub-function	
Preconditions	A modeling element that has a type has been defined	
Success End Condition	An Ontology concept has been used	
Failed End Condition	There is not available Ontology	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to define a type	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst selects an Ontology from the list of available Ontologies from the BML Editor's Ontology View
	2	The Business Analyst selects a concept from the Ontology
	3	The Business Analyst associates the selected Ontology Concept to the corresponding modeling element.
EXTENSIONS	Step	Branching Action
	1	There are no available Ontologies: 1a.1 BML Editor informs user that there are no available ontologies
Due Date	Release 1.0	

USE CASE 14	Define service association	
Goal in Context	Define a service association	
Scope & Level	BML Editor, primary task	
Preconditions	A service association	
Success End Condition	A service association has been defined	
Failed End Condition	A service association has not been created and the BML Editor remains in valid state	
Primary, Secondary Actors	Business Analyst BML Editor	
Trigger	The Business Analyst attempts to define a service association	
MAIN SUCCESS SENARIO	Step	Action
	1	The Business Analyst select the association element from the BML Editor's palette
	2	The Business Analyst defines the association selected the source and target elements
	3	BML Editor checks the association created against the existing constraints
	4	The Business Analyst defines association's name
	5	The Business Analyst defines association roles' names
	6	The Business Analyst defines association source/target multiplicities
EXTENSIONS	Step	Branching Action
	3a	Association violates a constraint 3a.1 The Business Analyst is notified for the constraint violated 3a.2 The association is erased
Due Date	Release 1.0	

6.2.3 BML Editor screenshots

A beta version of the BML Editor is already available. This section provides some basic screen shots of the BML editor GUI that reflect its existing state. When BML Editor plug-in is activated in the Eclipse environment the corresponding BML perspective is activated:

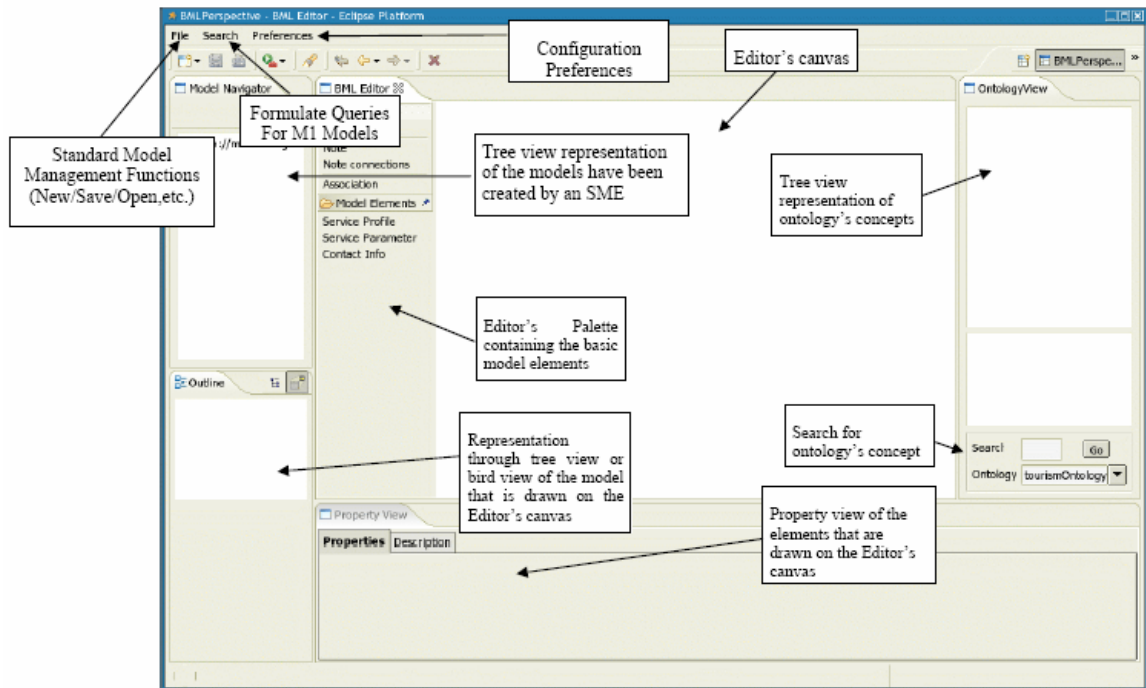


Figure 35 BML Editor main window

The user is able to create a Service Profile selecting from the Editor's palette the corresponding tool and clicking on the Editor's canvas.

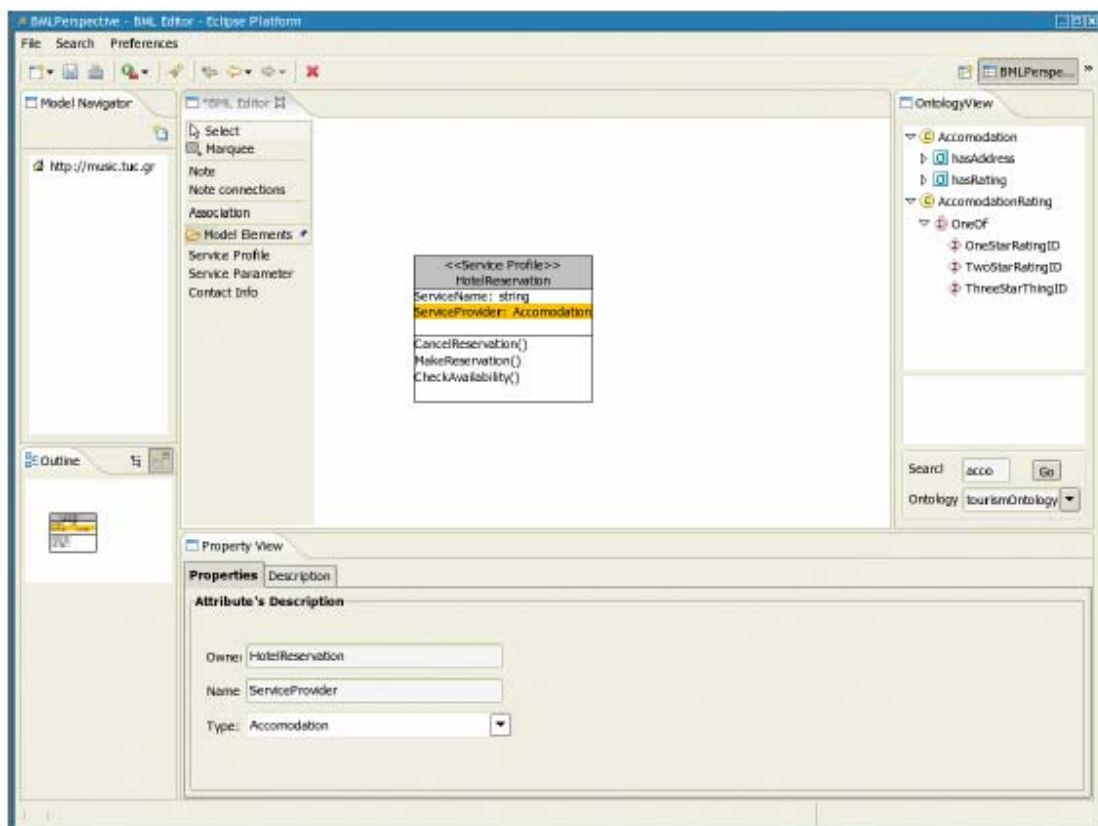


Figure 36 A Simple Service Profile

The user is able to create Service Parameter elements selecting from the Editor's palette the corresponding tools and clicking on the editor's canvas. He creates associations between a Service Profile and Service Parameters elements using the Association tool and provides the name of the association and cardinality constraints that prefers.

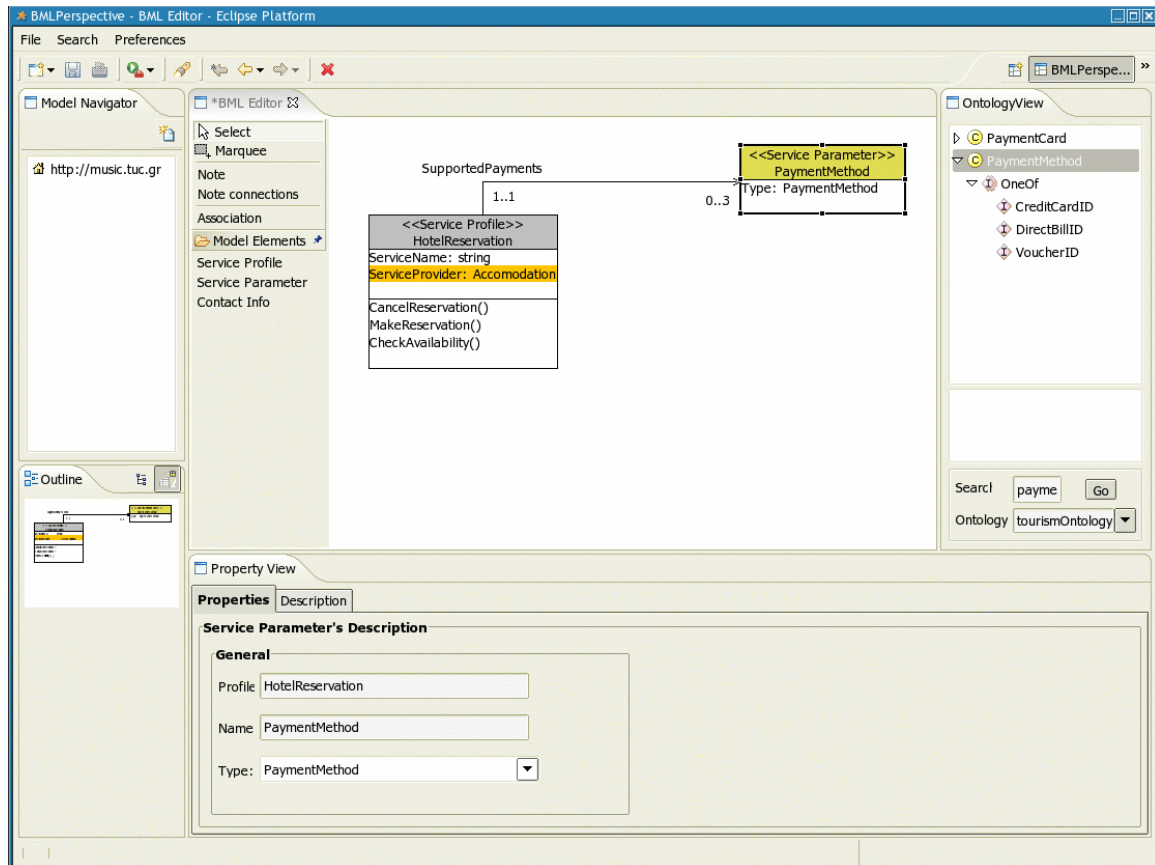


Figure 37 Creating Service Parameters elements.

The user is able to create Contact Information elements by selecting from the Editor's palette the corresponding tools and clicking on the editor's canvas. He creates associations between a Service Profile and Contact Information elements using the Association tool and provides the name of the association and cardinality constraints that prefers

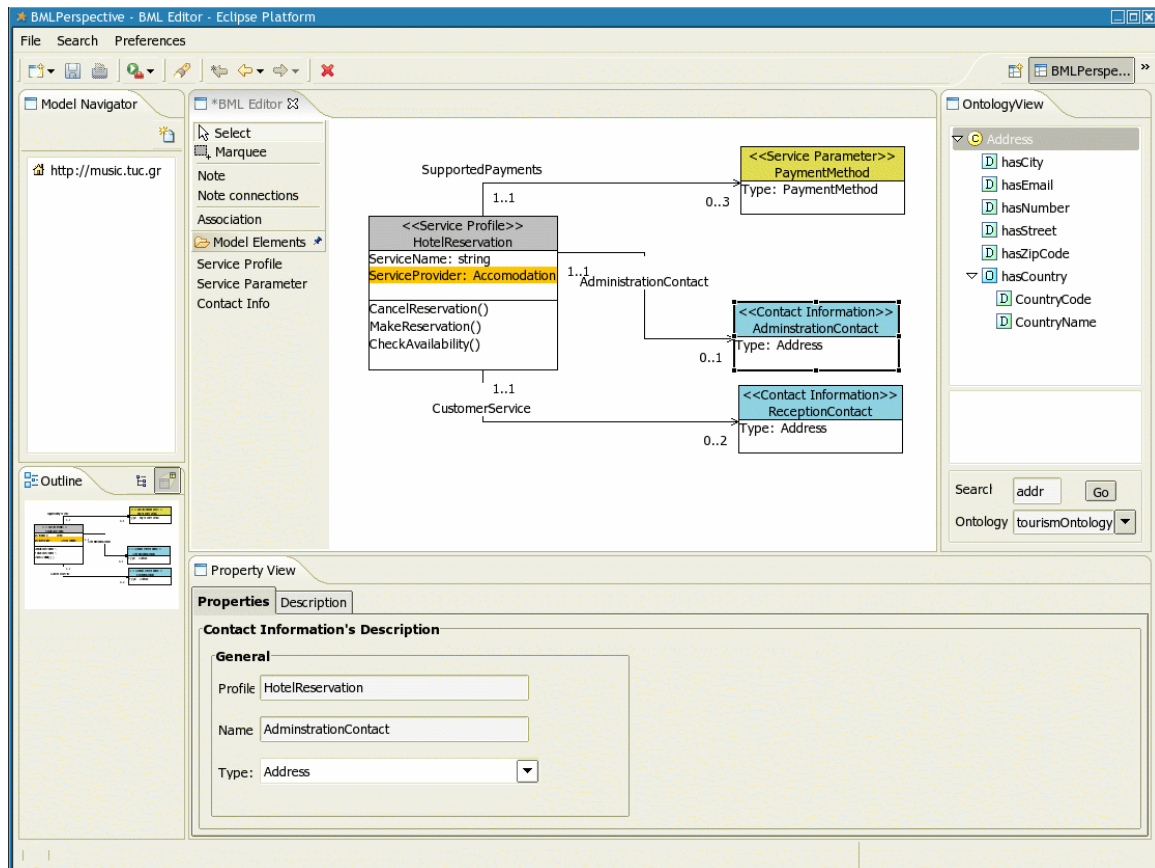


Figure 38 Creating Contact Information elements

The user is able to define the inputs/outputs of the service functionalities that has defined:

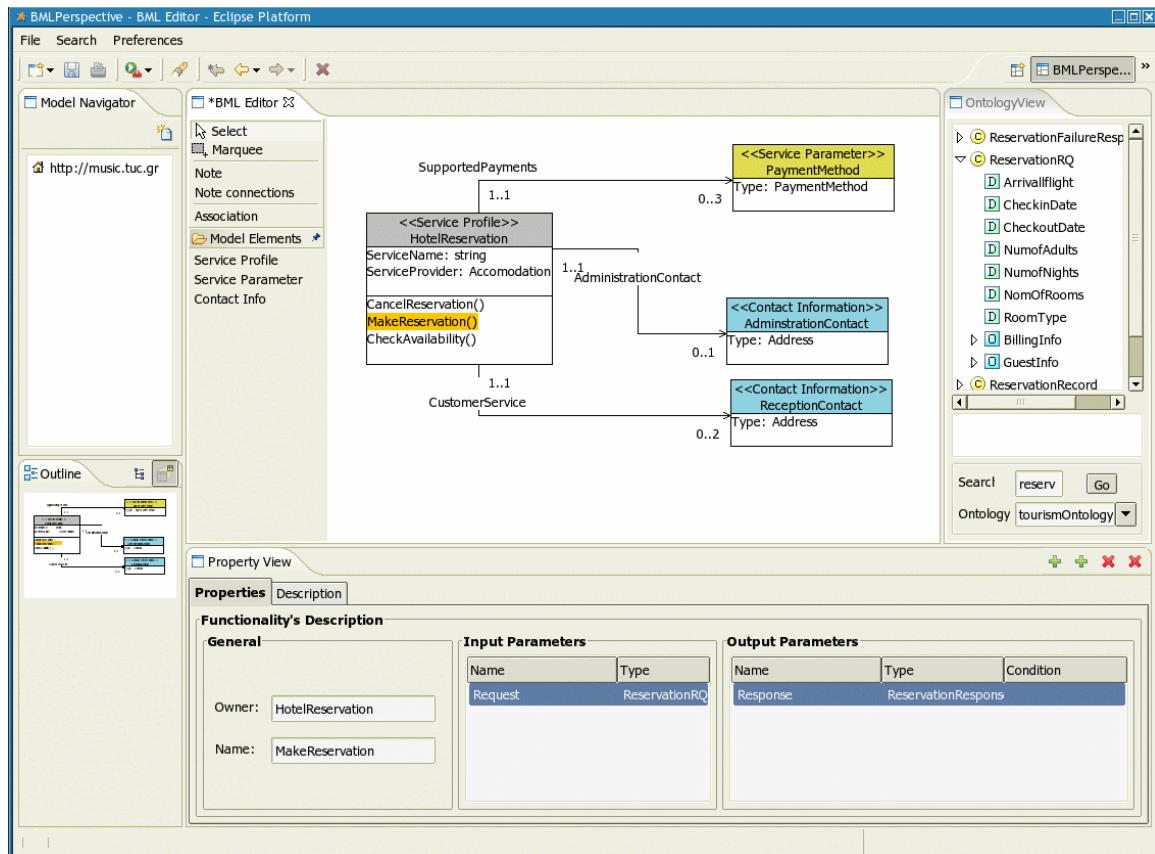


Figure 39 Defining inputs/outputs of the "MakeReservation" functionality

The user is able to navigate into the defined models as well as into the elements of each model:

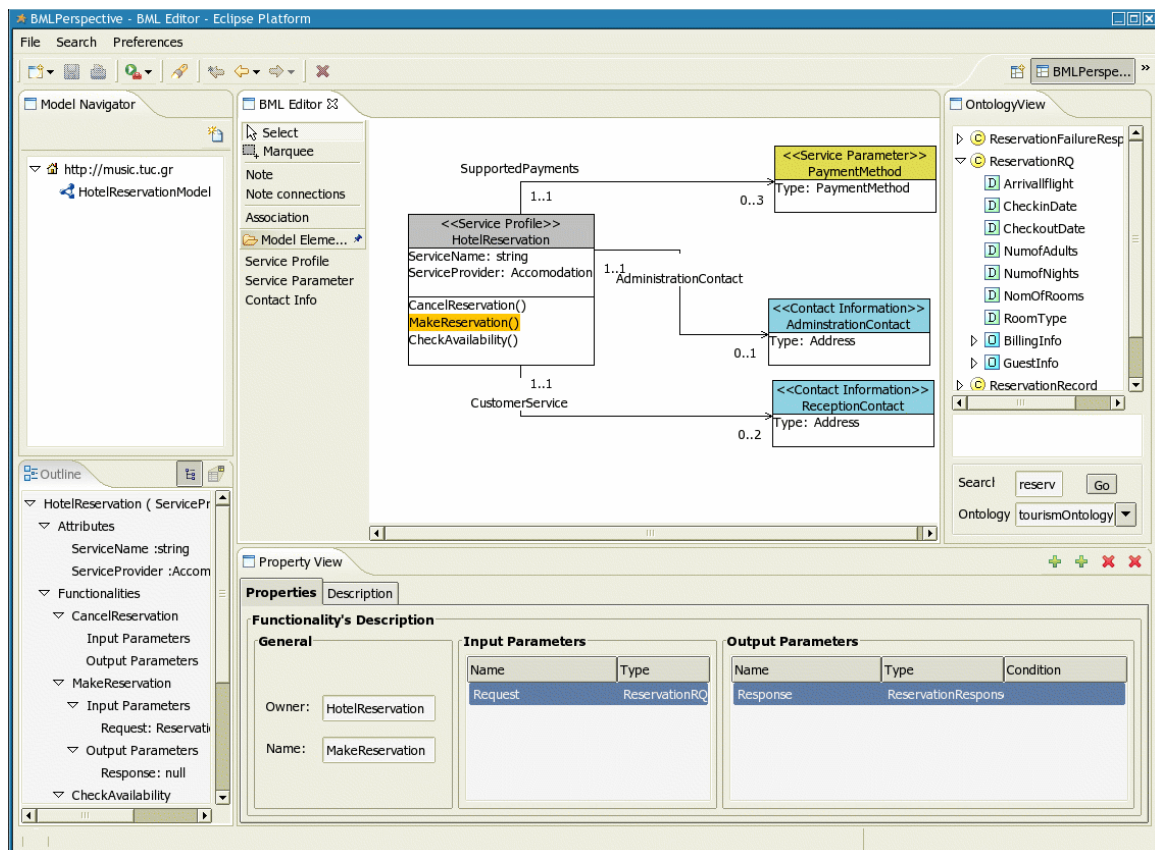


Figure 40 Navigating into the defined models as well as into the elements of each model

The user is able to formulate queries for existing M1 models by posing constraints on the attributes of primitives that the M2 metamodels provide. The user can define soft and hard constraints. The desired models may satisfy the soft constraints, but they have to satisfy the hard ones:

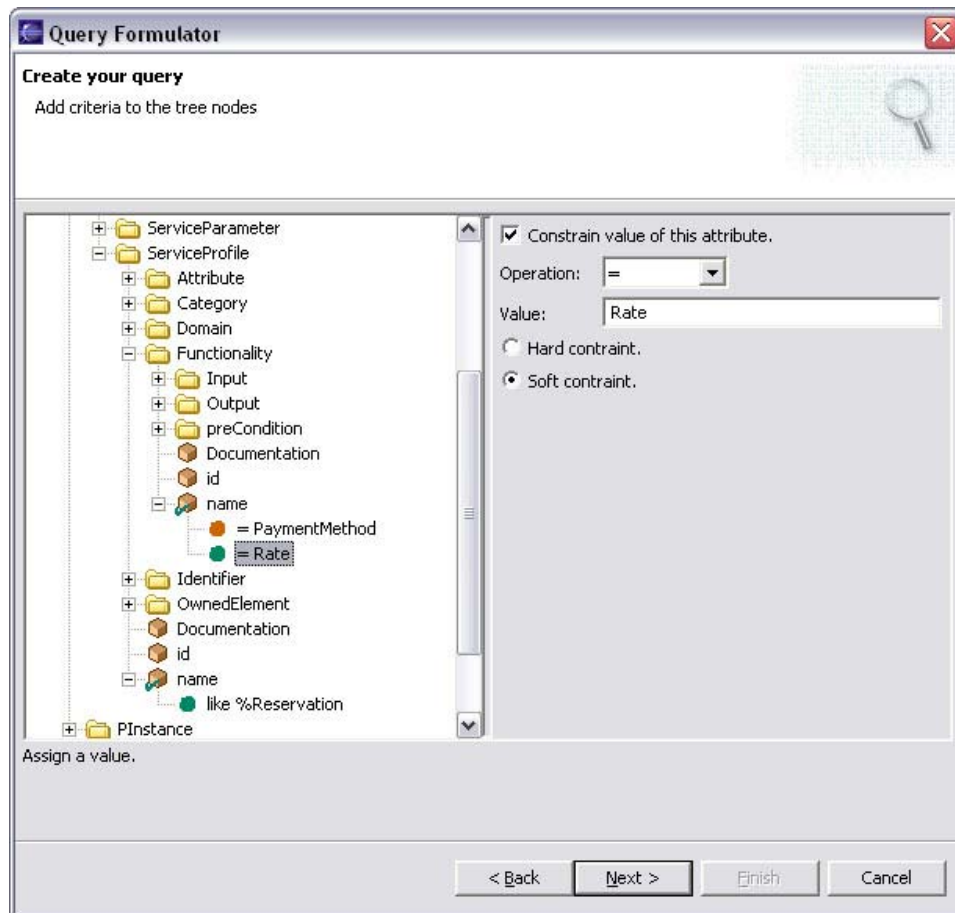


Figure 41 Formulating a query for existing M1 models

7 BML towards a natural language approach

This section aims at describing an interesting issue discovered during BML designing phase. Field analysis and more theoretical considerations showed the need for conducting a detailed study about the possible role of natural language modelling within the DBE project. Results coming from this analysis led to the idea that providing business men with capabilities for describing their business in a natural way could be the key element for the success of the whole project. At this regard, the adoption of an emergent OMG's standard, i.e. *Semantics of Business Vocabulary and Business Rules*, is proposed as solution.

7.1 Motivations

The high degree of changeability characterizing new markets context forces firms to transform themselves, becoming extremely reactive, flexible and focused on core competences. To obtain this result, during last years several organizations tended to adopt the *networked enterprise* model, that exploits new digital technologies in order to overcome organizational boundaries and focus on value creating activities. Hence, networked enterprises use synergies and collaborations with partners to combine in a different way several products and services within a single solution. Nevertheless, even if practice is demonstrating the actual effectiveness of this model, its adoption seems to be very slow and limited to those organizations able to strongly invest in IT systems. The main barriers limiting the diffusion of the networked enterprise model can be summarized as following.

1. The most methodologies supporting business transformation toward this new paradigm are essentially thought for large organizations and efforts to adapt them to SMEs' needs seems to be very limited and ineffective.
2. In order to reach positive results the technological infrastructure and the organizational structure of a firm have to be integrated and strictly related each other; the actual problem is represented by a wide gap between IT and methodologies/technologies to represent business knowledge. The latter are usually separated from models for software development and management or they are barely understandable and usable by business users.
3. There is not enough care about development of network-based technological frameworks, essential to enable virtual collaborations among globally spread partners, who use very different technologies.
4. To enable transformation of traditional enterprises into digital enterprises, core organizational processes and routines must be transformed into a digital form. Since this transformation needs a technological framework flexible enough to not alter these processes, on-the-shelf products cannot be a suitable choice; on the other side, ad hoc solutions are often inaccessible to SMEs.

As stated in previous sections, DBE project aims at overcoming these difficulties; in particular, BML is thought to capture and model business knowledge in an easy way, in order to make it available for software tools supporting the business. Nevertheless, architecture and tools (such as the BML editor) proposed within the BML framework are designed to be used by IT professionals. Currently, it is not imaginable that a business man, who usually does not own strong technological competences, can directly use this platform. In fact, this should imply that business people were able to create UML models on their own, instancing the BML metamodel. In other words, at the moment, models produced using BML framework are not actual CIMs, because they are not completely oriented toward business, although BML is thought to obtain this result.

Obviously, the advantages coming from the adoption of a DBE-based platform could be widely amplified thinking about a way to make these platforms more accessible to business people and, in particular, to those involved in SMEs. A direct action in business modelling by organizational

people could be the right way in order to obtain more flexible and effective solutions; in particular, this should allow:

- bridging the existing gap between technology and organization: business models could be designed in a business-oriented perspective, obtaining actual CIMs that preserve formality and rigorousness needed by technology;
- reducing costs related to ad hoc solutions development: if part of the development process is performed by business people IT professionals could focus on different activities or they can save time and effort overcoming communication problems.

The comments proposed above highlight the opportunity to enrich the designed infrastructure with an additional layer that could act as a sort of interface, aimed at supporting business people to directly use a BML platform. This kind of study represents an additional effort made during BML development. In particular, approaches based on natural language and business rules have been analyzed. Obtained results and choices made at this regard are described in the following sections.

7.2 Natural Language modelling

Methodologies used in software developing, such as object-oriented approaches, are typically applied only when a problem is already formulated and well described. Starting from this point, software developers transform requirements into code with a relatively mechanical process. Nevertheless, the actual difficulty lies in the previous step, that is describing problems and expected functionalities. Stakeholders involved in software development (such as customers, domain experts or system users) can express their ideas using a language very close to them, but they usually are not able to formalize these concepts in a clear and unambiguous way. Indeed, the richness of structures and meanings of a natural language can provide a great expressivity, but it determines a lack in terms of formalism. As a consequence, a very important role is played by requirements analysts that act as a sort of translator between stakeholders and software developers. Obviously, this implies a large effort in order to interpret and understand real meanings and concepts hidden among stakeholders words. Special constraints on syntax or predefined linguistic structures can be used in order to overcome this problem, enabling natural language to well represent and formally define problems and requirements. The main purpose of *natural language modelling* is hence to make natural language suitable for conceptual modelling. In other words, it aims at designing analytic processes able to produce a simple syntax and to reduce ambiguity and vagueness, preserving language completeness and essential meaning [BOYD]. The focus is on semantic aspects and shared meanings, while syntax is thought in a perspective based on formal logic mapping.

Problems previously described arise also focusing on business description. Natural language is generally used by business organizations in order to describe themselves and their rules. Nevertheless, even if complex constructs and ambiguous forms of expression provide a great communicative power, they usually make this description unclear and informal. This problem is largely amplified considering that involved people often do not share concepts and meanings. Conversely, as stated above, system requirements gathering and creation of machine-readable documents need a higher degree of precision and formality, with a consequent loss in richness of meaning and expressions. Bridging the existing gap between business people language and other formal languages, used for software development and document interchange capabilities, represents an additional issue for BML. In this perspective, a modelling approach based on natural language could be a very interesting choice in order to balance these opposite needs. Indeed, this approach can provide BML users with a powerful means allowing them to use their own language in order to create consistent, unambiguous and formal business models.

7.3 The Rule-based approach

Rules play a very important role in defining business semantics: they can influence or guide behaviours and support policies, responding to environmental situations and events. This means

that rules represent the primary means by which an organization can direct its business, defining the operative way to reach its objectives and perform its actions. A complete description of the rule-based approach starts from providing a clear definition, in a business perspective, about what the term rule refers to; for this purpose, the Business Rules Group¹⁵ definition is adopted:

“A *business rule* is a statement that defines or constrains some aspect of the business” [BRG]

A core principle, accepted and documented by foremost industry experts, is that “rules build on facts, and facts build on concepts as expressed by terms” [BRM]; the real meaning of this assertion will be clarified in the following sections, when the *fact-oriented approach* will be introduced. At the moment, highlighting this dependence from facts is enough to understand what a rule is.

Once provided this definition, it is possible to introduce the *rule-based approach*. It can be described as a way “for identifying and articulating the rules which define the structure and control the operation of an enterprise” [BRG].

This approach did not arise as a response to any emerging new class of software tools or as an academic conjecture. “Rather, the business rule approach is a real-world movement whose driving force is business success, not technology. It arose from the vision of dedicated professionals with many years of experience in the trials and challenges of business software”, whose goal is “to offer companies the best possible approach to developing business solutions involving automated systems” [ROSS].

Consequently, the rule-based approach aims to address two different kinds of users: from one side, it addresses business communities, in order to provide them with a structured approach, based on a clear set of concepts and used to access and manage business rules; from the other side, it addresses IT professionals, in order to provide them with a deep understanding about business rules and to help them in models creation. However, the rule-based approach aims to create enterprise models oriented toward business rules identification, formalization and management.

Over the years, a great number of analysing and modelling methodologies have been introduced in order to describe an enterprise in terms of data structure and performed activities. Even if these traditional approaches are able to describe the enterprise in terms of data flows and operative behaviours, they tend to neglect the constraints under which an organization operates. This implies that only those rules embedded in organizational structure and behaviours are documented, formalized and represented within the enterprise systems. Rules that prevent, cause, or suggest things to happen are not covered by these approaches. Moreover, business rules represented in this way can be understood only by technical experts and by automated systems; business experts are not able to review, correct and change them, in order to meet new needs and react to market changes.

For example, traditional methodologies should be able to define a rule describing that a *Department* is part of a *Section*, that is part of a *Division*, through the model represented in Figure 42 (a); in this case, introducing a new organizational unit implies a complete revision of the model. Consequently, this kind of models is not flexible enough to assure a good system maintaining.

What stated above implies that traditional approaches have some drawbacks: first of all, they lack of completeness, neglecting not structural or behavioural business rules; they are not able to assure the needed flexibility; moreover, rules are not fully understandable and manageable by business experts.

¹⁵ Independent organization (originally created as a project of GUIDE International, an IBM user group for the management of IT) aiming to formulate statements and supporting standards about business rules and systems' architectures.

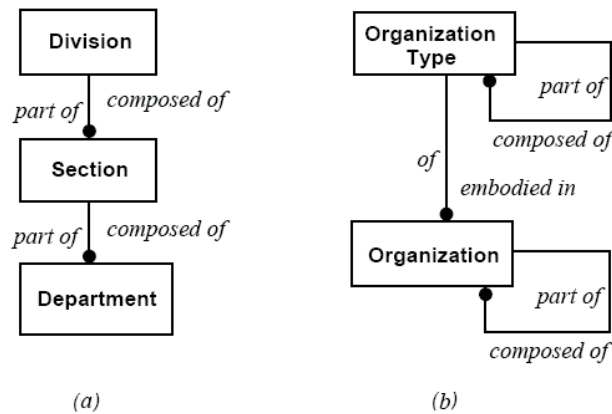


Figure 42 Organization models [BRG]

Shifting toward more general and abstract models allows to avoid this rigidity, but implies an additional effort. In the example depicted in Figure 42 (b), it is possible to assert the rule previously proposed (through the right classes instances), but it is also possible to define a rule such as "*Department* is part of *Division*", forbidden in the first model (a). While in a traditional approach there is no awareness about enterprise rules, in this case making them explicit becomes part of the analysis process; as a consequence, a way to add constraints is needed in order to realize a complete business model.

Due to these difficulties, a new way to think about enterprise and its rules is needed, in order to enable a complete business representation made by and for business people. The rule-based approach just meets this need.

The previous considerations allow to highlight some specific characteristics needed by rules describing business semantics: these constraints should be explicit, to be understood and directly managed by business people, and dynamic, to answer to the changeability of the external and internal environments. The rule-based approach aims at providing the means to formalize rules compliant with these purposes.

In this perspective, OMG issued *Business Semantics of Business Rules (BSBR) Request For Proposal*, in order to create a standard "to allow business people to define the policies and rules by which they run their business in their own language, in terms of the things they deal with in the business, and to capture those rules in a way that is clear, unambiguous and readily translatable into other representations" [BSBR].

This definition allows to elicit two main characteristics needed by the OMG rule-based approach: business people orientation and clearness of expression. From a more concrete point of view, to reach these objectives, BSBR has to enable:

- business vocabularies construction, whose definitions represent shared understanding among a community of business people and whose contents are univocally identified by this community;
- rules formalization, based on vocabularies; these rules should be expressed in a language close to natural (business) language but, at the same time, representable from an information technology point of view, in order to allow their sharing and transferring.

In other words, business semantics should be defined by business people in a natural language, using shared terms, in order to enable vocabularies and rules exchange among organizations. Moreover, this should support rigorous and unambiguous description of information systems requirements and their transformation into a system project.

Before analyzing the role of BSBR within the BML framework and its main features, it is necessary to spend some words about the fact-orientation proper to a rule-based approach.

7.3.1 Fact-orientation

The core principle of a rule-based approach is represented by its *fact-orientation*. As mentioned in the previous section, rules build on facts; in other words, facts make assertions about business concepts and rules constrain and support these assertions [BRM].

There are several reasons for choosing a fact-based approach [SBVR]. First of all, *people communicate facts*, that is the fact is the atomic unit of communication. Controlling what specific facts are expressed in a communication is important with regard to privacy and intellectual property; for example, it is possible to interchange only a cohesive and self-defining segment of the entire model.

An additional reason for using this approach is that fact is itself a kind of thing and can therefore be the subject of other facts. Business people often need to communicate *facts about facts* (for example, to determine facts confidentiality degree, to know when a fact become true or to enable versioning mechanisms); the fact-oriented approach lets them do this without creating non-standard extensions.

Moreover, the fact-oriented approach enables *multidimensional categorization* with no difficulty: when a thing is categorized in many different ways, each classification is a separate fact. Conversely, the most of other approaches encounter many problems to reach this objective.

The fact-oriented approach also supports *time changeability*. In a business environment things change with time, but in a fact-based perspective this implies no disruption: a new object is created to represent the new fact. Approaches not based on facts fail because MOF does not support an object of one class being transformed into an object of another class: it must be deleted and replaced by a new object, replicating all attributes, but also caring of all references to the old object. A simple change becomes a big change and change management becomes much more complicated. While in these approaches this problem can be solved by specific design choices, the fact-oriented approach provides a simple and standard way to manage these changes.

The same remarks can be made about *purposes changeability*. Object-oriented models tend to be designed for a particular purpose; it drives the design such that changes in purpose often lead to substantial redesign of the metamodel. The fact-oriented approach is vocabulary-driven. The words used to state a fact almost always remain valid from one version of a vocabulary to the next, so the fact-based metamodel remains the same. New purposes often lead to adding words to a vocabulary for saying things that could not previously be said; this implies only some additions to a generated metamodel, but no change. If a new meaning must be introduced, it requires a different vocabulary entry. The fact-oriented approach leads to a metamodel for business vocabulary and business rules well suited to multiple and unpredicted uses.

An additional important advantage related to the fact-oriented approach is represented by providing *semantic stability* in the face of changing business rules and expanding business vocabularies so that semantic loss is minimized over time. Documents based on the fact-oriented approach remain stable and readable as vocabularies. If a new term is added or deleted in a vocabulary, there is no problem in reading the related document that was based on that vocabulary. To enable this, it is essential to keep hold of a signifier (not re-use it for some other purpose) and classify it as "no longer in use" to avoid the need for "translation" of existing documents (knowledge about this translation is necessary if the signifier is re-used for a different purpose in the same vocabulary).

Finally, the fact-oriented approach enables *extensibility and reuse*. In object-oriented approaches a metamodel is extended by defining additional classes in a separate package. Those classes can specialize existing classes in the metamodel, but neither attributes nor superclasses can be added to existing classes. Unlike these approaches, the fact-oriented approach imposes no restrictions on extensibility because adding something new does not change anything already in a model: expansion of business vocabularies introduces new concepts or types of facts without any regard to their being more specific or more general than what is already defined.

7.4 BML and BSBR

This section aims to explain which are the motivations for introducing a rules-based approach such as BSBR within the DBE project and the main advantages coming from this choice. For this reason, the most interesting BSBR features, from a BML point of view, are analyzed and discussed below. In particular, this section addresses the following issues:

- how BSBR meets DBE and BML purposes and requirements;
- how SMEs can benefit from BSBR.

First of all, in an MDA perspective, BML is conceived to be a Computation Independent Model (CIM). From this point of view, using BSBR as expression means is a suitable choice, since it is entirely within the business model layer of the OMG's Model Driven Architecture (Figure 43). In fact, business vocabularies and related rules are conceptually a CIM: they allow business environment representation, avoiding technical details; moreover, they are thought by and for business people (i.e. domain practitioners).

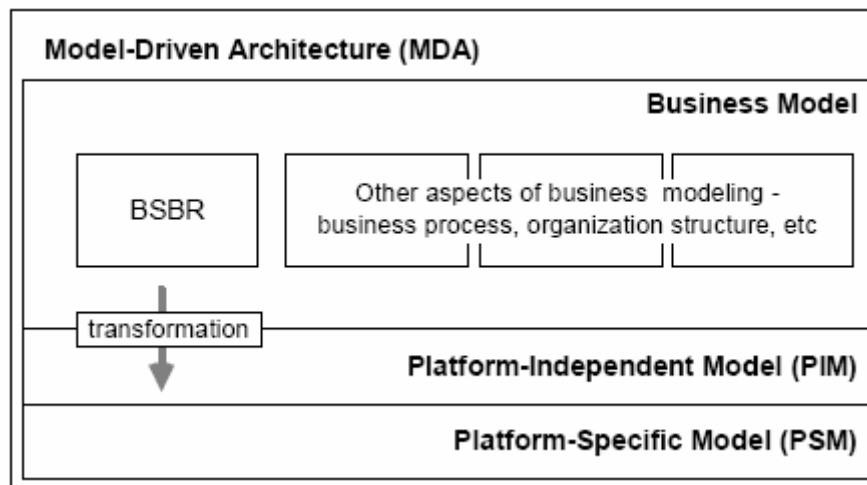


Figure 43 BSBR in Model-Driven Architecture [SBVR]

This implies that models based on BSBR can be used in order to generate models for IT systems (platform-independent and platform-specific models), even if providing guidance for this transformation is beyond the RFP purposes.

Another important remark is related to the compliance of the BSBR approach with MOF. BSBR specification defines a metamodel and allows to instance it, in order to create different vocabularies and to define the related business rules; it is also possible to complete these models with data suitable to describe a specific organization. Conceptually, this corresponds to place an artifact in each level of the traditional four level MOF architecture. As described in the following sections, creating BSBR models in natural language and placing them in such metadata architecture is actually a more complex process; a lot of comments will be proposed at this regard. However, it is possible to assert that BSBR is created to work involving models, document and linguistic structures placeable in each MOF level. Furthermore, the BSBR approach provides means (i.e. mapping rules) to translate natural language artifacts into MOF-compliant artifacts; this allows to exploit all the advantages related to MOF (repository facilities, interchangeability, tools, ...), satisfying BML requirements related to its use within a distributed environment.

Besides the previously described aspects, an important reason to chose BSBR as linguistic metamodel for BML is represented by the strong matching between their objectives. BML requirements explicitly assert that it should be a framework enabling business people to represent the business knowledge in a language close to the one the business people actually use to communicate with each other. Consequently, the primary BML focus is toward business people and their language, in order to allow them representing the business knowledge related to the offered services and products and to the enterprises that stand behind them. As stated

above, BSBR is thought in this perspective and it represents a framework aiming to provide linguistic support to business men in order to define the way by which “they run their business in their own language, in terms of the things they deal with in the business” [BSBR].

Another BML purpose is to enable easy interchange (between business modelling tools or metadata repositories in distributed heterogeneous environment) of business models. From this point of view, it is evident that introducing BSBR in the BML approach allows to reach this purpose with a low effort: as stated above, BSBR uses MOF in order to produce interchangeable artifacts, storable in MOF repositories.

In an enterprise perspective, choosing BSBR implies two main kind of benefits. First of all, using it allows organizations to describe themselves in a natural way. In other words, with BSBR business people play a central role in models creation: there is no need to involve IT practitioners in this process, since using natural language enables business men to choose what they want to represent and to create the suitable rules expressing this knowledge. Obviously, in order to reach this result, it is essential to provide them with the right tools. However, even if models creation is performed by IT modellers, communications problems can be easily overcome, since modellers and business people are forced to use the same language, based on a shared and accepted vocabulary. In this way, it is possible to avoid misunderstanding and different interpretations of the same terms and concepts. A vocabulary created by information system experts to specify business requirements could employ terms commonly used in the business anyway. Nevertheless, their meaning should be restricted to or influenced by the information systems concepts that are used to represent the corresponding business concepts. This vocabulary should not be a “business vocabulary” but rather an “information technology model of business concepts”.

The second benefit is related to using rules within information systems aimed at supporting business activities. As formerly stated, the main DBE project recipients are SMEs and, in particular, those involved in software development. The latter could realize reusable production patterns based on enterprise BML models and on Service DNA. BSBR can offer support in this perspective, since one of its design objectives is “to make the business rules accessible to software tools of several kinds, including [...] software tools that support the information technology experts in converting business rules into implementation rules for automated systems” [BSBR]. Consequently, BSBR allows to avoid mismatching between what an enterprise wants its system to do and what it really can do. Moreover, due to its compliance with the MDA approach, BSBR can offer support in automating software production: starting from BSBR models, it should be possible to create diagrams, classes and code in an automated way. This implies that BSBR could be very powerful in order to support SMEs producing software to exploit reuse and automation.

7.5 Business Rules Team BSBR

Among the different submissions answering the BSBR Request For Proposal, the most effective and well structured one seems to be the work of the Business Rules Team (BRT), that is *Semantics of Business Vocabulary and Business Rules* (SBVR). Its features, such as strong support to multilingualism, use of formal logic and compliance with MOF, make it very insightful.

This proposal defines a metamodel conceptualized for business people and designed to be used for business purposes, independently of information systems designs. Its first aim is to allow business vocabularies construction and business rules definitions, enabling their interchange among organizations, in accordance with RFP requirements.

It is important to highlight that BRT proposal for BSBR is *self-describing*: the foundation that makes up SBVR itself is represented through SBVR Vocabularies and their related rules. Since it allows talking about semantics, vocabulary and rules, this foundation is named as ‘Business Vocabulary+Rules’ for ‘Business Vocabulary+Rules’. The SBVR Vocabulary defined in BRT specification is extensible: since it is a vocabulary, it can be included in other vocabularies in order to create an ‘extended SBVR Vocabulary’. The latter can, for example, add new symbol for existing concepts or add new concepts along with symbols that represent them. In this way,

even if the SBVR Vocabulary is based on English language, it is possible to create an alternative SBVR Vocabulary based on a different language; it should provide symbols from the different language for the concepts represented in the SBVR Vocabulary.
Main features of this approach are described in the following sections.

7.5.1 Business vocabularies and rules

As stated above, one of SBVR key purposes is enabling business vocabularies construction. In order to fully understand what this implies, it is important to provide a definition for a business vocabulary and to analyse its main features in an SBVR perspective.

SBVR defines a business vocabulary as a set of “all the specialized terms and definitions of concepts that a given organization or community uses in their talking and writing in the course of doing business” [SBVR]. This means that an SBVR business vocabulary contains both terms defining business elements and expressions describing structural or behavioural aspects. Indeed, an SBVR-based vocabulary provides the capability to connect concepts that are of interest for the organization and to organize them, creating taxonomies or categorization schemes. For example, an user is able to create synonyms or abbreviates, but he can also define other kinds of relationships (i.e. fact types) in order to model its business environment. This mechanism allows to create a well-defined structure enabling navigation and search capabilities among different concepts.

Furthermore, SBVR allows to adopt other existing vocabularies and to integrate them within a business vocabulary. This adoption feature can be used to reach several objectives; for example, it allows to minimize the number of definitions an organization has to create or to encourage communication among different organizations.

Finally, an additional notable feature of an SBVR-based business vocabulary is represented by the possibility to use a rich set of templates. They facilitate capturing the full semantics of each concept and connections between concepts of interest to the business community owning the business vocabulary.

The second SBVR central objective is represented by business rules capturing. In order to adopt a clear definition for the term ‘rule’, BRT considered several interpretations, coming from both practices and theories. These definitions show how a rule is generally considered as a guide for conduct or action, encompassing the actual criteria for judging and guiding that conduct or action. In other words, in a business context, as well as in daily life, rules are defined as criteria for making decisions. To obtain this result, an SBVR rule is defined as “an element of guidance that introduces an obligation or a necessity” [SBVR]. This implies that two main categories of rules are defined:

- structural rules (necessities), referred to how the business organize the things it deals with; they represent supplement definitions;
- operative rules (obligations), which govern the conduct of business activities; this kind of rules can be willingly violated by people involved in the business.

This consistency with formal logics represents an additional issue to be considered as a key aspect of SBVR’s rules treatment.

As shown in the next sections, rules construction is based on business vocabularies and consists in applying modal operators to fact types; this means that rules can be specified independently of all processes and events. Additional characteristics of SBVR rules are separation from their own enforcement (not directly embedded in the rule) and actionability (people can observe a situation and decide if the business is complying with the rule). Note that the latter feature does not implies automatability, since SBVR focuses only on the business perspective; indeed, many business rules, especially operative business rules, are not automatable in IT systems.

7.5.2 SBVR general overview

The current section aims at providing a general description about the core concepts on which the SBVR approach is built. Figure 44 illustrates these aspects.

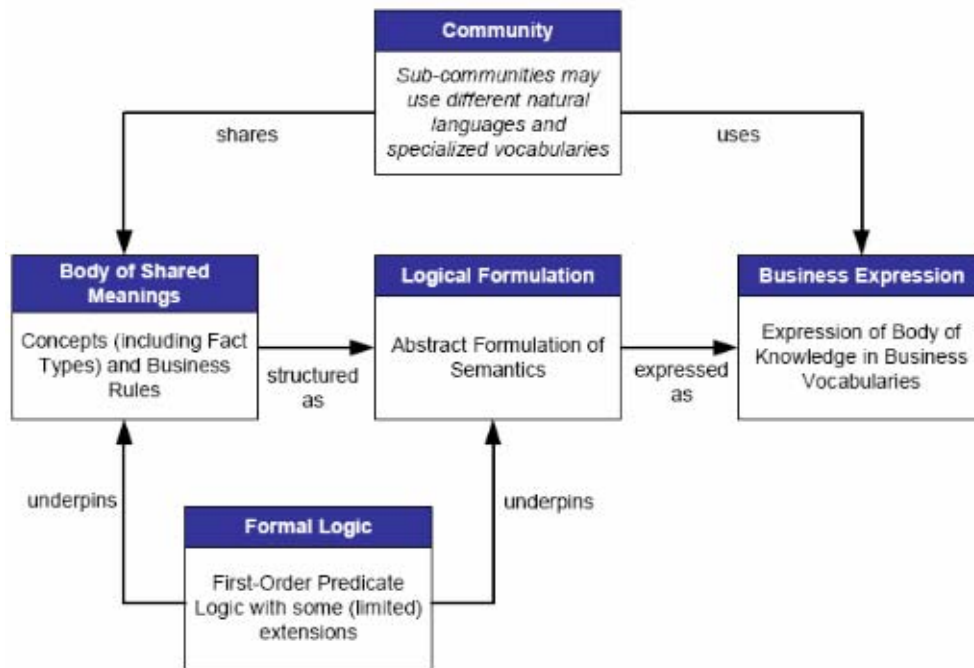


Figure 44 SBVR Overview [SBVR]

Communities play a central role in capturing business semantics. Each community involved within the business has a different impact in vocabulary construction and rules definition. For example, in multi-national organizations, there are sub-communities who share a common language for expressing concepts (Speech Communities). They are part of a larger semantic community, sharing the same understanding of the organization's concepts expressed in different ways (Semantic Community). SBVR supports managing a single meaning across multi-lingual communities. Moreover, other communities (e.g. the industry in which an enterprise operates, partner enterprises, standards groups, authorities) also need to be recognized.

As stated above, each community has a *Body of Shared Meanings*, encompassing concepts and business rules commonly used and understood by its members. What is shared is the meaning, not the form of expression. This separation of concepts from expressions represents a fundamental characteristic of SBVR. It enables business people to agree on what they mean and then on the way to express it; consequently, the management of meanings is separated from the management of expression means. The structure of the Body of Shared Meanings (i.e., which concepts play which roles in facts, which facts form the basis of which rules, ...) is based on association between abstract concepts, fact types and business rules, not on association between statements.

Logical Formulation represents a means to capture the semantics of a Body of Shared Meanings in a formal, abstract and language-independent way, using multiple forms of representation (e.g. nouns and verbs, reading of associations in both directions). Logical formulation enables mapping of a Body of Shared Meanings to Vocabularies used by Communities and mapping to XMI for interchange purposes.

Business Expression allows to describe shared meanings in a way acceptable and usable by Speech Communities. SBVR supports mapping of business meaning to concrete language (both natural or artificial) by associating elements of the Body of Shared Meanings with signifiers. Logical formulations provide the structure and signifiers are placed in logical formulations to provide the expression.

Finally, SBVR uses first-order predicate logic (even if higher-order logic is allowed) and some extensions into modal logic; this means that *Formal Logic* is used in order to underpin both Logical Formulation and the structures of Bodies of Shared Meanings.

7.5.3 SBVR technical overview

This section aims to briefly survey the key technical characteristics of the approach. For a more detailed description referring to [SBVR] is necessary.

As previously stated, in order to enable the use of SBVR artifacts in information systems design, SBVR is underpinned by First Order Predicate Logic, but it also provides an extended formalization for higher-order types, that uses a restricted version of higher-order logic. The formal semantics of SBVR is based on various formal approaches: typed predicate logic; arithmetic, set and bag theory, with some results from modal logic. Use of classical logic makes mapping to logic-based tools sufficiently straightforward.

Other remarkable characteristics related to formal logics are:

- SBVR treats all functions, including mathematical operations, as relations; n-ary relations are allowed.
- SBVR generally does not use artificial identifiers, so that all individuals are identified by definite descriptions; individual constants may be introduced by definition as a shorthand for definite descriptions.
- Unnamed structures are permitted (e.g. sets identified by their extensions or formulae identified by their structural composition). In this way business statements may be more easily understood and communicated between businesses.
- In order to allow definition of rules, some modal operators are introduced; in particular SBVR includes the alethic operators 'It is necessary that' and 'It is possible that' and the deontic operators 'It is obligatory that' and 'It is permissible that'. Other operators are defined at an interface level (such as 'It is forbidden that'), but they are internally translated into these more basic operators, with the help of negation.

The second consideration is related to the use of MOF/XMI within the SBVR approach. A business vocabulary provides a means of recording and communicating facts; following OMG's Model Driven Architecture, a business vocabulary developed as an information system independent model is used to drive the creation of a platform independent MOF model representing these facts. The MOF model is, in turn, used to drive generation of Java interfaces (based on JMI) and an XML schema (based on XMI). Detailed information about this issue will be provided in the following sections. Note that the use of MOF in the SBVR approach is actually limited to using *Essential MOF* (EMOF). It is a package part of the MOF 2.0 Core Common Concepts that provides the minimal set of elements required to model classes in an object-oriented system. This choice is justified by the following considerations:

- EMOF is more widely and more easily supported than full MOF (e.g. by the open source development tool 'Eclipse');
- MOF associations do not support fact types with more than two roles in a simple consistent way and therefore are not useful for SBVR vocabulary interchange purposes;
- XMI-based XML generated from EMOF is simpler and more straightforward than XMI-based XML generated from full MOF.

However, from a practical point of view, SBVR explicitly uses the fact-oriented approach in order to standardize business-level data interchange. This approach implies the creation of a separate class for each type of fact that can be expressed; in other words, each fact is represented by its own object, and not by an attribute of some other object. For example, if the vocabulary asserts that 'semantic community creates vocabulary', a class with this name is generated; it will contain the attributes to specify the involved concepts, i.e. 'semantic community' and 'vocabulary', as depicted in Figure 45 (a). Obviously, this approach is applied to the entire vocabulary, not only to fact types; this implies that all concepts of a vocabulary are also expressed in a fact-oriented way. As a consequence, classes like those represented in Figure 45 (b) are generated. Hence, two different types of facts are obtained:

- Facts that are classifications of things. Each of these classes has one attribute for referring to the thing being classified; they can be considered as unary relationships.
- Facts about relationships between things. Each of these classes has two or more attributes, one for each thing involved in the particular type of relationship.

Note that the fact-oriented approach depends on a general class called 'Referent'; an object of that class is a reference point for stating facts. A subclass of Referent is 'Thing', which is used to represent an individual thing that is a subject or object of a fact. These concepts will be better

explained in the following sections. However, these transformations are performed in order to create a MOF-compliant version of the vocabulary, allowing its conversion into an XMI document. As a consequence, it is possible to obtain an exchangeable vocabulary, preserving all the advantages related to using a fact-oriented approach.

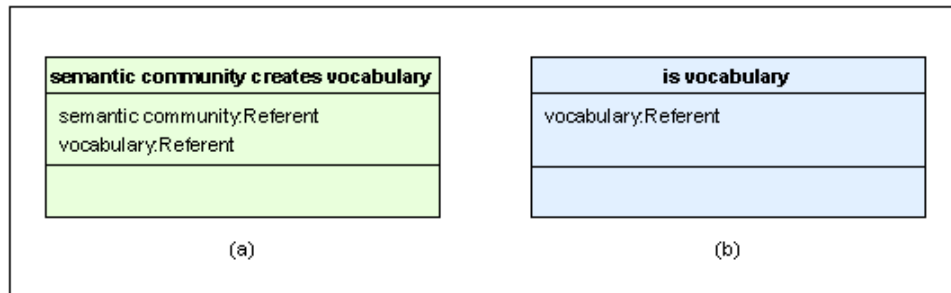


Figure 45 Fact class example

Finally, an additional remark is related to vocabularies creation. To permit rapid vocabulary development by business people, the core vocabulary of the BRT approach can be directly extended by simple application of concepts within the core vocabulary itself [SBVR]. In other words, creating a new vocabulary corresponds to extend an already existing vocabulary. This represents a deep difference between a MOF-based approach and SBVR. In fact, the former allows artefacts creation instancing concepts of an upper level in the metadata architecture. Conversely, the SBVR approach starts from a core vocabulary and allows models creation extending it; in the same way, each generated vocabulary can be extended. This approach is very insightful for two main reasons:

- creating a vocabulary may involves using of many other vocabularies: there is no limitations to the number of extensions made by an user. Conversely, MOF generally uses a limited number of levels in its metadata architecture (usually four levels); if this number is increased in order to realize a complex vocabulary, the most advantage related to the use of such architecture should be lost.
- business people are not aware of concepts such as 'instance'; they are able to read a concept and use it to make explicit something they want to assert. In this perspective, SBVR uses a natural approach providing the extension mechanism.

Even if this is an improper comparison (SBVR uses MOF only for interchangeability purposes), it should be possible to state that SBVR collapses many MOF-levels into one, in order to use a representation much closer to business people.

7.6 SBVR Structured English notation

The most common means to express definitions and business rules is through statements. Even if there are numberless ways to use a language in order to express them, BRT specification introduces a small number of English structures and common words in order to provide a simple and automatic mapping to SBVR concepts. In fact, since SBVR aims to be a powerful means to express and interchange business semantics, its primary focus is not toward a full language support, but rather to provide the means to express each possible statement in an unambiguous form. For this reason, BRT specification defines an *SBVR Structured English*. This means that each statement represented in terms of SBVR Vocabulary has a structured form and, in particular, can be represented through a logical formulation (i.e. the SBVR representation of formal logic). Consequently, all formal definitions and rules stated using the SBVR Structured English can be automatically interpreted in order to create MOF and/or XMI representations. However, it is important remembering that SBVR Structured English is just one of many possible notations that can map to the SBVR Metamodel.

The SBVR notation is characterized by some specific font styles and some keywords, each with its formal meaning. Moreover, it describes some structures to be used in order to define each vocabulary entry and rule. The following sections briefly describe the SBVR notation; for a complete description, see the BRT specification [SBVR].

7.6.1 Expressions in SBVR Structured English

As mentioned above, BRT specification introduces some styles used to assign a precise meaning to the elements embedded in each SBVR expression. In particular, SBVR syntax defines five font styles, described below.

<u>term</u>	The 'term' font is used for a designation of an object type or role, one that is part of a vocabulary being used or defined (e.g. <u>modality</u> , <u>modal formulation</u> , <u>fact type</u>). It refers to a symbol that is for a concept and that is a word or expression with a precise meaning in some uses. This style is applied to a term where it is defined and wherever it is used. Terms are usually defined using lower case letters, unless they include a proper noun; moreover, they are defined in singular form (plural forms are not used).
<i>concept</i>	The 'concept' font is applied to a term in the special case where the term is used to name the represented concept, rather than to refer to things denoted by the term. This is a reference to the concept itself, that is an abstract or generic idea generalized from particular instance. In this usage, a term acts as a name, so it is not preceded by an indefinite article or quantifier as would be the case in a typical use of a term.
<u>Name</u>	The 'name' font is used for a designation of an individual concept. Such names tend to be proper nouns (e.g., <u>Italy</u>). This style is applied to a name where it is defined and wherever it is used. Names defined using appropriate capitalization, which is usually the first letter of each word, but not necessarily. Names of numerical values in formal statements are also shown in this style (e.g., <u>25</u>).
verb	The 'verb' font is used for a designation of a fact type, usually a verb, preposition or combination thereof. This is a symbol that is defined in the context of a form of expression. This font is used both in the context of showing a form of expression (e.g., ' <u>modal formulation</u> <u>claims</u> <u>modality</u> ' and ' <u>modality</u> <u>is claimed by</u> <u>modal formulation</u> ') and in the context of using it in a statement (e.g., ' <u>Each modal formulation</u> <u>claims exactly one</u> <u>modality</u> ').
keyword	The 'keyword' font is used for linguistic symbols used to construct statements; these symbols can be combined with other designations to form statements and definitions (e.g., ' <u>each</u> ' and ' <u>it is required that</u> ').

The SBVR Structured English uses designations and forms of expressions exactly as they are defined in a vocabulary. Plural forms are not used. For example, a formal statement would say 'each concept' rather than 'all concepts'. Implicit transformations of verbs are not assumed, only defined fact symbols are used; for example, both the active form and the passive form of a verb need to be defined in a vocabulary if both are used.

7.6.2 Key words and phrases for logical formulations

As stated above, SBVR forces to use a limited number of constructs in order to create a formal statement. Key words and predefined phrases used to express these constructs and every kinds of logical formulation are listed below.

Note that the letters 'n' and 'm' represent use of a literal whole number; the letters 'p' and 'q' represent expressions of propositions.

Quantification: **each** ([universal quantification](#))
some ([existential quantification](#))
at least one ([existential quantification](#))
at least n ([at-least-n quantification](#))
at most one ([at-most-one quantification](#))
at most n ([at-most-n quantification](#))
exactly one ([exactly-one quantification](#))
exactly n ([exactly-n quantification](#))
at least n and at most m ([numeric range quantification](#))
more than one ([at-least-n quantification](#) with $n = 2$)

Logical Operations: **it is not the case that p** ([logical negation](#))
 p **and** q ([conjunction](#))
 p **or** q ([disjunction](#))
 p **or** q **but not both** ([exclusive disjunction](#))
if p then q ([implication](#))
 q **if p** ([implication](#))
 p **if and only if q** ([equivalence](#))
not both p and q ([nand formulation](#))
neither p nor q ([nor formulation](#))
 p **whether or not q** ([whether-or-not formulation](#))

Repetitions of subjects can be avoided using 'and' or 'or' (e.g. the statement 'An implication has an antecedent and the implication is embedded in a modal formulation' can be substituted with 'An implication has an antecedent and is embedded in a modal formulation'). In the same way, it is possible to elide a repeated subject and verb (e.g. the statement 'An implication has an antecedent and the implication has a consequent' can be substituted with 'An implication has an antecedent and a consequent').

To introduce a [logical negation](#), the keyword 'not' is used within an expression before the verb 'is'; similarly, the key words 'does not' are used before other verbs (modified to be infinitive).

Modal Operations: **it is obligatory that p** ([obligation claim](#))
it is prohibited that p ([obligation claim](#) embedding a [logical negation](#))
it is necessary that p ([necessity claim](#))
it is impossible that p ([necessity claim](#) embedding a [logical negation](#))
it is possible that p ([possibility claim](#))
it is permitted that p ([permissibility claim](#))
... **must** ... ([obligation claim](#))
... **must not** ... ([obligation claim](#) embedding a [logical negation](#))
... **always** ... ([necessity claim](#))
... **never** ... ([necessity claim](#) embedding a [logical negation](#))
... **may** ... ([permissibility claim](#))
... **may** ... **only if p** ([obligation claim](#) over an [implication](#))
it is permitted that q only if p ([obligation claim](#) over an [implication](#))
it is possible that q only if p ([necessity claim](#) over an [implication](#))
... **may** ... **only** ... ([obligation claim](#) over an [implication](#))

Other keywords: **the** (1. used with a designation to make a pronominal reference to a previous use of the same term; 2. introduction of a name of an individual thing or of a definite description)

a, an (universal or existential quantification, depending on context based on English rules)

a given (universal quantification used to represent one thing at a time, in order to avoid ambiguity where the 'a' by itself could otherwise be interpreted as an existential quantification)

that (1. when preceding a designation for an object type or role, this is a binding to a variable; 2. when after a designation for an object type or role and before a

designation for a fact type, this is used to introduce a restriction on things denoted by the previous designation based on facts about them; 3. when followed by a propositional statement, this is used to introduce nominalization of the proposition or objectification, depending on whether the expected result is a proposition or an actuality.)

who (the same as the second use of 'that' but used for a person)

is of (the common preposition 'of' is used as a shorthand for '**that is of**'; for any sentential form that takes the general form of '<placeholder 1> has <placeholder 2>' there is an implicit reversed form of '<placeholder 2> is of <placeholder 1>' that has the same meaning)

what (used to introduce a variable in a projection as well as indicate that a projection is being formulated to be considered by a question or answer nominalization)

7.6.3 Vocabularies definition

A vocabulary is introduced by a section that describes its name and several other details; this introduction is structured on the skeleton shown below.

<Vocabulary Name>

Description:
Source:
Speech Community:
Language:
Included Vocabulary:
Note:

First of all, the 'Name' font is used to represents the *Vocabulary Name*.

The *Description* caption allows to describe the scope and the purposes of the vocabulary.

The *Source* caption is used if the vocabulary is built on the basis of a formally defined external work (glossaries, documents, ...).

Speech Community identifies the community that controls and is responsible for the vocabulary, while the *Language* caption refers to the language used in the vocabulary (the default value is represented by [English](#)). At this regard, it is possible to use predefined list of languages, such as [ISO 639-2](#).

If other vocabularies are fully incorporated into the vocabulary being described, the *Included Vocabulary* caption is used; this allows to use designations and forms of expressions from these vocabularies without repeating them.

Finally, the *Note* caption labels explanatory notes that do not go under the other captions.

Once a vocabulary is introduced using the structure described above, numberless concepts can be added, inserting the corresponding entries within the vocabulary. This means inserting a designation or a form of expression for a concept, with additional captions to make explicit its relevant details.

The structure of a vocabulary entry is shown below, followed by an explanation of the use of each caption.

<designation or form of expression>

Definition:
Source:
Dictionary Basis:
General Concept:
Concept Type:
Symbol Type:
Necessity:
Possibility:
Reference Scheme:

Note:
 Example:
 Synonym:
 Synonymous Form:
 See:
 Qualifier:

As stated above, the entry symbol is a designation or a form of expression, that is the 'primary representation' for the entry. It can refer to any concept type, hence it is shown in its appropriate font style.

The *Definition* is an expression that can be substituted for the primary representation and that explains its meaning. A definition can be fully formal, partly formal or informal. In the first case, all needed vocabulary is available and no external concepts are necessary; in the second case, a more general concept is defined, but some details depend on external concepts; in the latter case, there are no formal reference to other concepts defined within the vocabulary.

The *Source* represents a reference to a source vocabulary or document. It is possible to make explicit that the provided definition is largely derived from the Source, but with some community modification, using the keyword **based on**. The keywords **shared with** precede a vocabulary name to indicate that the same concept is also represented in the named vocabulary.

The *Dictionary Basis* caption describes a definition coming from a common dictionary (referenced at the end of the quoted definition).

The *General Concept* indicates the concept that generalizes the entry concept. This caption is not necessary if the definition starts indicating the general concept, but it is helpful when this information is not provided elsewhere (for example, if a concept comes from an external source or if the symbol indicates an individual concept).

The *Concept Type* caption is used to refer to type of the concept being defined. This caption is not used if the concept has no particular type or if it is implicit in the definition (e.g. a name is implicitly for an individual concept; every term is implicitly for a general concept). More than one concept type can be mentioned. Concept types can also denote categories of a categorization scheme.

Symbol Type refers to a category of symbol being defined. This caption is not used if the symbol has no particular type or if it is implicit in the used font.

The *Necessity* and *Possibility* captions are usually supplemental to a definition. Even if definitions express characteristics that are necessary and sufficient to distinguish things denoted by a concept, sometimes there are necessities beyond what is sufficient. The *Necessity* caption is used to state these necessities (i.e. something that is necessarily true). Conversely, the *Possibility* caption explains that something is a possibility not prevented by definition.

The *Reference Scheme* defines the way of distinguishing among different things denoted by the same term. It is expressed by referring at least one fact type role of a binary fact type and indicating whether a reference involves a single instance of the role or whether it involves the extension of related instances.

The *Note* caption allows to label explanatory notes that could not be inserted within the other captions.

The *Example* caption is used to describe examples of using the entry concept.

A *Synonym* is a designation that can be substituted for the primary representation. The meaning of two designations being synonyms is that they represent the same concept.

A *Synonymous Form* is a form of expression referred to the same fact type as the entry symbol. The fact symbol of the synonymous form can appear as a separate entry, but this is not suitable if the synonymous form is simply a passive form of the entry symbol. The meaning of two forms of expression being synonymous is that the two represent the same fact type.

The *See* caption is used when the primary representation is not a preferred representation for the entry concept; it introduces the preferred representation. In this case there is no definition.

Finally, the *Qualifier* caption is useful if a signifier is not unique in a vocabulary and a qualification by a symbol context is needed.

7.6.4 Rules definition

Capturing business semantics using rules is one of the main SBVR purposes. To reach this objective, it provides the capability of defining rule sets. A *Rule Set* is a group of rules or clarifications, that is specified in a document section having several individual entries for rules and clarifications. To introduce a rule set, after specifying its name, it is possible to include other details, as shown in the skeleton below.

<Rule set name>

Description:

Vocabulary:

Note:

Source:

The Rule set name appears in the 'name' font.

The *Description* caption is used to describe the scope and purpose of the rules.

Vocabulary identifies the SBVR vocabulary used in order to express rules in the rule set.

The *Source* caption is used if the rules being described are based on a separately-defined work. It labels a reference to such a work.

Finally, the *Note* caption is used to label explanatory notes that are not included within the other captions.

Once created a rule set, it is possible to insert an entry, that includes the statement and other optional information, as shown below.

<Rule Statement or Clarification Statement>

Name:

Guidance Type:

Description:

Source:

Synonymous Form

Note:

Example:

Enforcement Level:

The *Rule Statement or Clarification Statement* caption expresses the business rule; it can be formal, when all necessary vocabulary is available, or informal, when external concepts are required. Such a statement can be represented as a logical formulation.

The *Name* caption is used to specify a name for the rule or clarification; in this case, the name is part of the formal vocabulary.

The *Guidance Type* caption indicates the kind of element of guidance (i.e. operative business rule, operative business rule clarification, structural business rule, structural business rule clarification, structural rule, structural rule clarification). The default value is operative business rule.

The element of guidance can also be represented in an informal way using the *Description* caption.

Source is used to reference possible external sources of the rule or clarification.

The *Synonymous Form* caption describes additional or equivalent statements for the same rule or clarification (both in a formal or in an informal way).

The *Note* caption allows to label explanatory notes that could not be inserted within the other captions.

The *Example* caption labels examples of application of the element of guidance.

The *Enforcement Level* caption specifies the severity of action imposed in order to put or keep an operative business rule.

7.7 SBVR interchange capabilities

BRT specification provides a set of capabilities useful in order to enable document interchangeability between tools. SBVR defines vocabularies and mapping rules to allow transformation of any SBVR vocabulary into a MOF/XML implementation that supports repository services and data interchange of facts in terms of atomic formulations. The MOF-based SBVR metamodel can define a repository as a point of interchange; moreover, the XMI-based XML Scheme derived from the metamodel can be used as an XML format for interchange between tools.

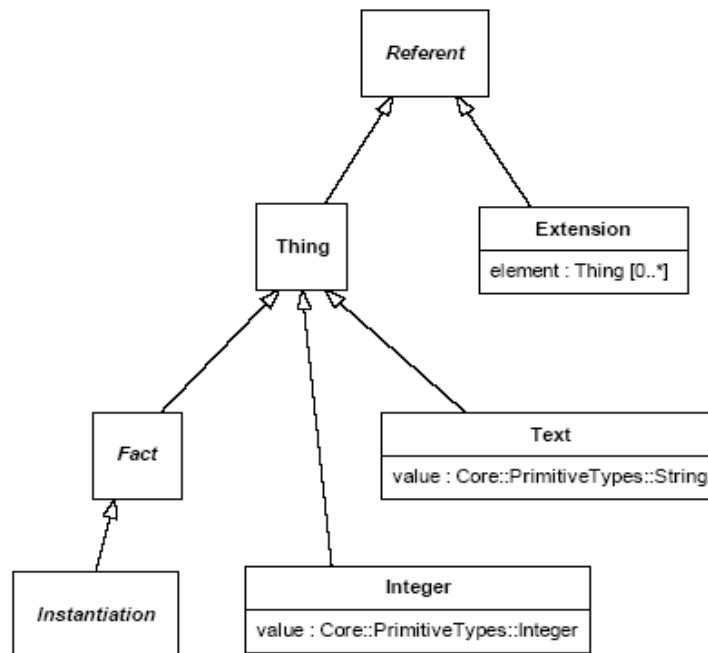


Figure 46 The Essential SBVR package [SBVR]

These interchange capabilities are built on an UML/MOF package, i.e. the *Essential SBVR* package (Figure 46), containing classes used within the *SBVR-to-MOF/XML Mapping Rules* and formalized by a specific vocabulary, i.e. the *Essential SBVR Vocabulary*, both provided by SBVR specification.

The *Referent* class is the root element of the package and it is used to represent what a fact can refer to; it has two subclasses, i.e. the *Thing* class and the *Extension* class. The latter is used to represent the entire set of things for which a fact is true; each of its instances has zero or more members that are instances of the *Thing* class. Conversely, the former represents general things that are subjects or objects of facts; it has subclasses for different kinds of representation of things: the *Fact* class, the *Text* class and the *Integer* class. Each sentential form in a vocabulary is mapped to MOF/XML creating a subclass of the *Fact* class; instances of these subclasses represent a fact of the fact type that has the sentential form. Each designation in a vocabulary is mapped creating a subclass of the *Instantiation* class; instances of these subclasses represent a fact that a thing is an instance of the concept denoted by the designation; this explains why it is a subclass of the *Fact* class. Finally, the *Text* and *Integer* classes provide convenient ways to use text and integers in representing facts.

Once introduced this basic package, it is possible to describe the mapping mechanism that leads the MOF model creation. In order to obtain the SBVR Metamodel, SBVR is mapped to MOF in two ways. First, the SBVR Vocabularies are mapped to a MOF model of repositories (Figure 47, step 1) that can hold representations of facts that can be meant by any atomic formulation expressible using the business vocabulary. This first mapping does not capture the full SBVR with all of its semantics. It only maps the related vocabulary, using MOF as a mode of representation. The creation of this model is guided by the mapping rules provided within the BRT specification;

such rules have as first aim the production of an UML package. In general, these rules should be strictly enforced, but deviation is permissible for rules that map symbols to UML and XMI names; obviously, all parties using the resulting MOF model or XML schema must be aware of the deviations.

The second way for mapping to MOF (Figure 47, step 2) allows capturing the full SBVR in terms of the MOF model created from the SBVR Vocabularies (the first mapping). This includes the definitions of concepts, terms, business rules and other facts of the SBVR Metamodel that are expressed in terms of the SBVR Vocabularies. In this way, all the SBVR semantics is captured and expressed as instance of SBVR MOF.

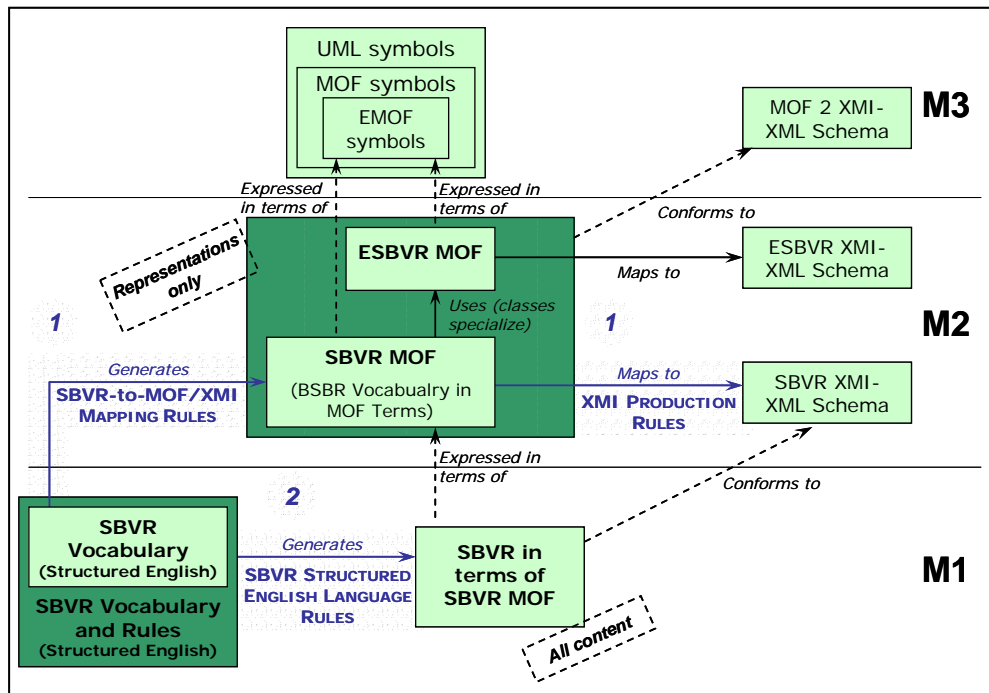


Figure 47 SBVR Vocabulary + Rules in terms of SBVR MOF model [SBVR]

Once the SBVR Metamodel is expressed in terms of EMOF symbols and the corresponding SBVR XMI Schema is generated, it is possible to use them in order to create MOF-compliant representations for any business vocabulary and rules. In fact, the rules that guide the first mapping are general enough to be used for any vocabulary defined in terms of SBVR. This means that mapping rules provided by BRT specification can be applied also when the input is represented by business concepts: starting from Structured English expressing the semantics of the business they allow to generate an UML package including these meanings and usable for interchange purposes.

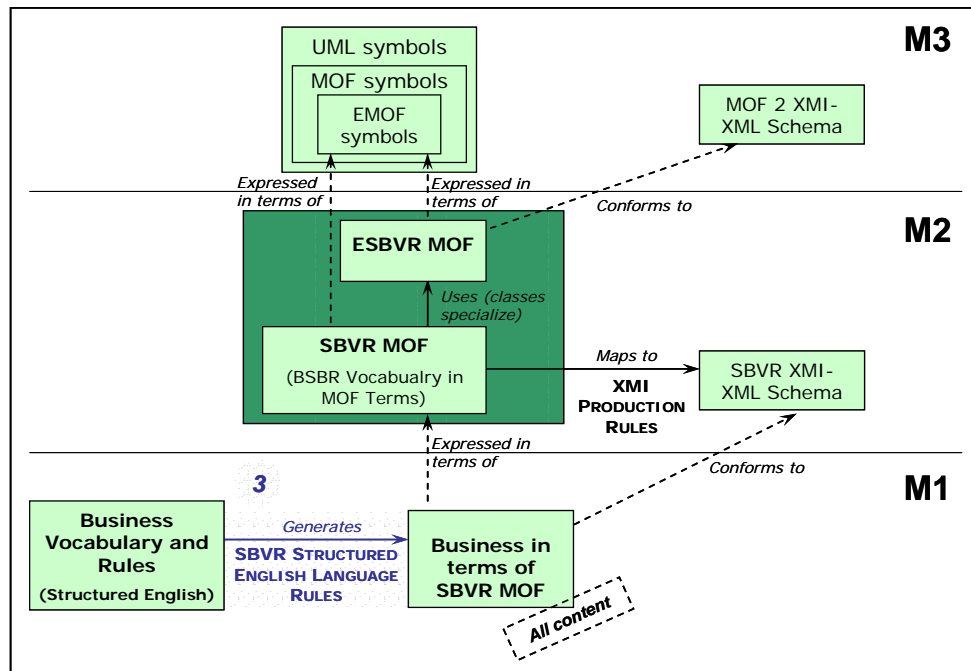


Figure 48 A business vocabulary and rules in terms of SBVR MOF model [SBVR]

First of all, a given business vocabulary has to be expressed in terms of SBVR MOF, as shown in Figure 48 (step 3). Using Structured English language rules, each element in the vocabulary can be seen as an instance of a class defined in the SBVR MOF; this process is applied simply recognizing the meaning of the different styles used within the vocabulary. Hence, the MOF repository model mapped from the SBVR Vocabularies, which is used to capture the SBVR itself, is also used to capture business vocabularies and business rules in general.

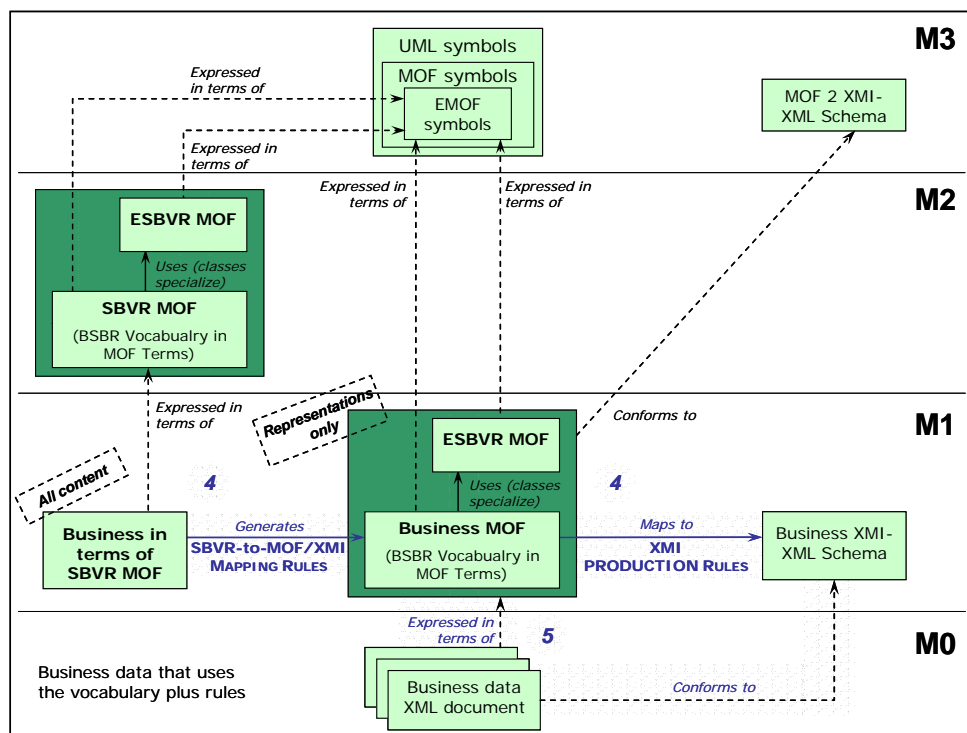


Figure 49 Business facts in terms of the business MOF model and XML Schema [SBVR]

Starting from this representation of the business vocabulary, it is possible to obtain a model untied to SBVR MOF (Figure 49, step 4), that directly specializes ESBVR concepts; in other words, it is possible to express business model as direct instance of EMOF concepts.

The final step (Figure 49, step 5) is producing XML documents that describe the business starting from vocabulary and rules. Obviously, the XML files containing business data must conform to the XMI-XML Schema generated in the previous step. The data are in fact express in terms of the business MOF model and they are understood only with respect to the business concepts.

Some considerations are needed referring to communication of content via XML. First of all, reference schemes are very important when content are exchanged via XML. As previously explained, a reference scheme indicate what types of facts are needed in order to refer to a specific instance (for example, a car can be identified considering that it has a vehicle identification number). Since in some cases the sender and receiver of an XML document use different reference schemes, it is important to provide sufficient content in an XML document to satisfy the reference schemes of both the participants.

Moreover, in order to exchange a document, it is important to choose the right XML schema, so that all facts to be communicated can be expressed. For example, when facts are defined as atomic formulations (e.g. *The car is owned by the branch*) that do not involve modalities, quantifiers and other SBVR vocabulary elements, but only facts from business vocabulary, the XML schema generated from the business model is appropriate. Conversely, an SBVR XMI-XML Schema is needed if facts use SBVR concepts and formulations, such as for communicating business vocabularies or rules (e.g. *It is prohibited that a barred driver is a driver of a rental*), even though the rule statements also use a business vocabulary. This comment results clearer considering that a rule can not be stored and exchanged in the form it is written. It is necessary to decompose it into a list of facts that can be put in a MOF repository or an XML file to formally represent the business rule.

Considering the last rule proposed as example, a representative logical formulation is the modal formulation shown below. Each subordinated line below expresses a fact about the thing introduced above it.

obligation claim

- . claims the modality 'obligation'
- . embeds a logical formulation that is a logical negation
- . . has a negand that is an existential quantification
- . . . introduces a variable
- ranges over the concept 'barred driver'
- . . . scopes over an existential quantification
- introduces a variable
- ranges over the concept 'rental'
- scopes over an atomic formulation
- is based on the fact type 'rental has driver'
- has a role binding
- is of the fact type role 'rental' of 'rental has driver'
- binds to the variable that ranges over the concept 'rental'
- has a role binding
- is of a fact type role 'driver' of 'rental has driver'
- binds to the variable that ranges over the concept 'barred driver'

The reference scheme used for a logical formulation is based on its overall structure, including any semantic formulation nested within it [SBVR].

7.8 Expressing the BML Metamodel using SBVR

The first project phase produced a MOF-compliant metamodel that embeds general concepts useful to describe all kinds of business. In order to introduce SBVR as concrete syntax for BML, it

is necessary to translate this metamodel in accordance with the SBVR syntax. The output of this complex mapping can be named as *BML Vocabulary and Rules*.

This translation is realized on the basis of the converse process, clearly explained in SBVR specification, that defines the way to obtain a graphical (UML-based) representation of an SBVR-compliant vocabulary. For example, each class generates a vocabulary entry; associations imply creating fact types; relationship multiplicities are translated using necessity statements (structural rules) and so on.

Even if this translation process could seem very simple, it actually requires a lot of care. In fact, due to their different purposes, MOF-compliant metamodels and SBVR vocabularies tend to emphasize different aspects of modelling; as a consequence, some changes have to be made in order to use forms of expression very close to natural language. For example, names of both associations or association ends could be modified in order to obtain sentences that could be used by people in their speech.

In order to demonstrate how this translation is performed, consider Figure 50:

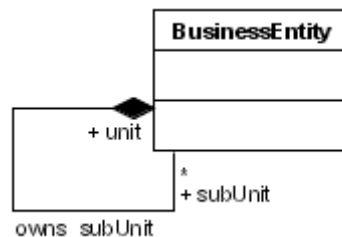


Figure 50 Composition of BusinessEntities in the BML metamodel

This excerpt from the BML metamodel generates the following vocabulary entries:

business entity

Definition: business element that represents something that has a real existence in a business context.

Note: It has an own existence independently from its functions, activities or relationships.

Note: It extends the business element concept.

subunit

Concept Type: *role*

General Concept: business entity

unit

Concept Type: *role*

General Concept: business entity

unit owns subunit

Concept Type: *partitive fact type*

Definition: business entity with the *role* of unit is a composition of smaller entities (subunits), this relationship meets the need to represent complex organizational structures.

Necessity: Each subunit is owned by exactly one unit

Synonymous Form: subunit is owned by unit

Example: For example, a Car rental is composed by several Car Rental Agencies.

Some considerations about this example are needed. First of all, note that for business entity no General Concept is provided: in this case, it is elicited directly from the definition, that highlights the inheritance from the business element concept (not shown in the figure). Moreover, unit and

[subunit](#) do not own a definition: since they are roles of business entity, there is no need to further define them. In regard to the fact type [unit owns subunit](#), the verb used in the metamodel (i.e. 'owns_subUnit') is changed into 'owns' in order to avoid unnecessary repetitions; furthermore, a passive form is provided as synonymous form. Moreover, its concept type is 'partitive fact type' to represent the composition association that models this relationship within the BML metamodel. Finally, note that all the definitions are provided in an informal or semiformal way.

To obtain an SBVR-compliant version of the BML this translation must be applied to the whole metamodel; as a consequence, it is necessary to pay attention in order to give a coherent and understandable form to the whole vocabulary structure. Nevertheless, this translation is not the sole work needed to fully express BML semantics using SBVR, since it is necessary to introduce some constraints. This last step is essential for expressing the 'operative rules' of BML, i.e. to force some particular use of BML concepts and relationships. For example, if it is required that a behaviour fulfilling a commitment involves the same actors that are participants of that commitment, it is necessary to introduce the following rule:

it is necessary that each [actor](#) that is involved in a [behaviour](#) is involved in the [commitment](#) that is fulfilled by the [behaviour](#).

Obviously, this formulation requires defining passive forms for the fact types expressing the relationships between the different concepts involved in the rule formulation.

Furthermore, a special treatment should be applied to the 'attribute' class. In fact, defining attributes in terms of their type and multiplicity is a way to describe the characteristics of an object suitable for IT professionals. Business people are not aware of these elements; they only know that something has a specific characteristic. To meet business people needs, realizing an actual CIM, a BML vocabulary should define a 'characteristic' concept as a role of a business object (i.e. the generic element to define data types). In this perspective, also the multiplicity of an attribute, defined within the BML metamodel, could be modelled without introducing a specific entry, since it could be specified using a necessity statement. Conversely, if a one-to-one mapping were performed, several vocabulary entries should be introduced and this would generate a very complex way to define attributes.

The following vocabulary entries show a possible way to model these concepts using SBVR.

business object

Definition: generic kind of characteristic owned by a [business element](#)

Example: [date](#) or [time](#)

characteristic

Concept Type: [role](#)

General Concept: [business object](#)

business element has characteristic

Concept Type: [is-property-of fact type](#)

Definition: [business element](#) owns a specific [characteristic](#) that

Necessity: Each [characteristic](#) is of exactly one [business element](#)

Example: Each [rental](#) has exactly one [rental date](#).

Note that in the previous example [rental](#) is a [business element](#) while [date](#) is a [business object](#).

Finally, applying the same considerations made above, the 'name' attribute used in the metamodel for a generic business element seems to be unnecessary; as a consequence, it should not be in the BML Vocabulary.

A further remark is related to the MOF version of the vocabulary generated through this translation process. In fact, applying the MOF/XMI mapping rules provided by SBVR, as described in 7.8, it is possible to generate a MOF-compliant representation starting from the BML Vocabulary and Rules. Note that this resulting model is deeply different from the BML Metamodel proposed in the first part of this document. Even if they both express the BML semantics, they should not be confused: while the latter can be called a Business Object Model, the former, generated from the vocabulary, can be defined as fact-oriented, since it reflects the SBVR fact-orientation. Anyway, since BML is oriented toward business people but it can also be used by IT professionals, both these representations can be useful for BML purposes.

7.9 Creating a BML business model

BML Vocabulary and Rules define standard terms, facts and rules specializing SBVR meta-concepts. In the same way, BML is used in order to create business models: a modeller specializes BML terms and facts in order to define concepts proper of a given business or domain. For example, remembering that [business entity](#), [service](#) and their related fact type ([business entity provides service](#)) are concepts defined by the BML metamodel, if an 'Hotel' and its main service must be modelled it is possible to write:

hotel

General Concept: [business entity](#)

Definition: A public house kept for the lodging and entertainment of travellers, or of any who wish to use its accommodation

Source: based on Oxford English Dictionary ["hotel"]

hotel provides room rental

General Concept: [business entity provides service](#)

room rental

Definition: [service](#) offered in order to provide accommodation for customers

The example proposed above shows how each element introduced in a business model is referred to a more general concept defined within the BML Vocabulary. Obviously, the created model has also to respect BML Rules. The way of forcing this compliance is strictly related to the design choices for a modelling tool; for example, a tool could let the user say everything, it could provide a semantic check on BML models once they are created or it could provide a structured way to write these models in compliance with the metamodel. This means that at the moment no assumptions can be made at this regards. Anyway, some considerations can be proposed about the general ideas standing behind BML models creation.

As previously described, specializing BML concepts is a general way to create a business model. Actually, since SBVR provides a great flexibility in terms of importing vocabularies, it is also possible to use concepts defined by external sources in order to create a specific business vocabulary.

At this regard, referring to the BML architecture (see Figure 6), it is necessary to spend some words about the Generic Package. As previously stated, this package aims at providing some useful concepts that are not abstract enough to be embedded in the metamodel, but that are sufficiently generic to be applied within different domains. Since the generic package has been already defined as an instance of the BML Metamodel (i.e. as an UML model), it has to be translated in an SBVR-compliant version. As a consequence, each object included in this package generates terms and rules that feed the *Generic Vocabulary*, following rules and principles described for the BML metamodel in the last section. For example, the generic package will contain terms such as [number](#), [date](#), [text](#), [average](#), [sum](#) and provide common sentential forms such as [number₁ is greater than number₂](#), [date₁ precedes date₂](#). Once generated, the Generic Vocabulary acts as a sort of library usable by modellers in several ways. For example, terms and facts can be directly used or they can be specialized within the business model.

In the same way, it is possible to import and use concepts coming from other existing vocabularies. At this regard, it is necessary to pay particular attention to domain models. In fact, the BML framework can be used by a community to create vocabularies defining concepts, patterns and structures typical of a given industry or business environment. The advantages coming from using such kind of models are essentially related to reusability and standardization. In fact, if a domain is already modelled, generally it is possible to describe a business with a low effort and in an easy way, using existing definitions or adapting them to specific needs, if

necessary. Moreover, in this way it is possible to share concepts and definitions with the most members of the community.

These considerations are well-grounded also in relation with other external vocabularies. Importing already defined concepts, although not domain-specific, can bring several advantages anyway. First of all, this allows to save efforts and time, needed to create a vocabulary and define business rules. Other advantages are related to sharing meanings with external organizations involved in the business, such as some partners that are not members of a specific community, or to the possibility to discover and adopt best practices created by similar organizations.

Summarizing, it is possible to follow several ways for creating a BML business model, that are:

- directly specializing BML concepts;
- using the generic package provided by the platform;
- using a domain model provided by an industry or a community or other existing vocabularies.

Obviously, these are not exclusive ways, their combinations are allowed in order to provide modellers with great flexibility and easiness of use. Choosing the right way to create a business model represents a key factor in order to obtain a good representation of the enterprise being described.

7.10 BML SBVR-based editor

The first aim of this section is providing a general overview about a possible architecture of a BML modelling tool based on SBVR.

First of all, it is necessary to point out that this tool will be very different from the editor proposed for the creation of UML-based models (see section 6). In fact, while the latter is thought for IT professionals, that own strong competences in terms of UML modelling, an SBVR-based tool has to enable business people to write models using natural language. Due to this orientation, the tool must be designed as a sort of text editor: an user simply types something about the business, while the tool manages inserted data in the right way. Obviously, as mentioned above, it is necessary to define a mechanism in order to validate each created model, in compliance with the BML metamodel and respecting the SBVR syntax.

A proposal for the architecture of the SBVR-based editor for BML is depicted in Figure 51. As shown, this hypothesis defines four internal components:

- BML validator;
- logical parser;
- MOF converter;
- XMI producer.

Below is proposed a description for each of them.

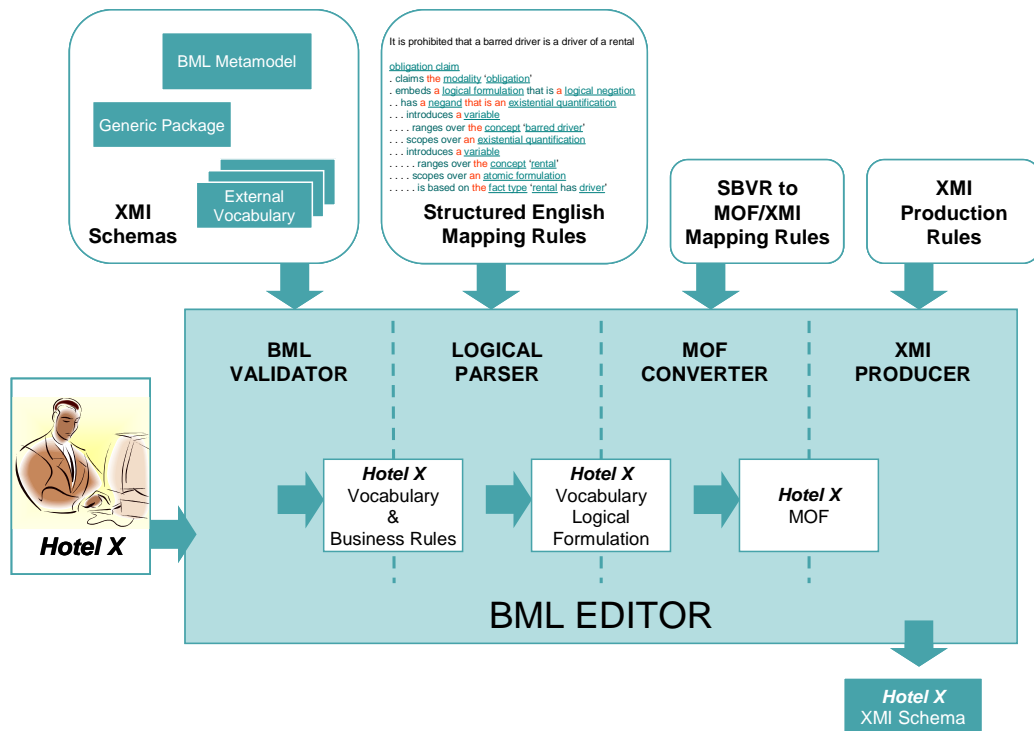


Figure 51 BML Editor

The first component manages the typing phase. At this regard, it is hypothesized to provide a structured way to create vocabulary entries and define business rules, in order to facilitate the compliance with the metamodel. This means that the BML editor should be able to propose expressions available in a BML perspective; in this way, a modeller could be helped to formulate semantically correct constructs. Furthermore, an automatic completion could be a very powerful functionality for this modelling tool in order to suggest possible forms of expression. As a consequence, this component needs to embed a system performing a check on the typed statements. This means that the expression inserted by the user is analyzed from both a syntactic (SBVR-compliance) and a semantic perspective (BML-compliance), pointing out possible inconsistencies.

Figure 52 shows an example of interface for the modelling tool. Even if it is not based on the BML metamodel (it is thought for a generic SBVR editor), note how available concepts could be shown in a simple and intuitive way (i.e. through a tree).

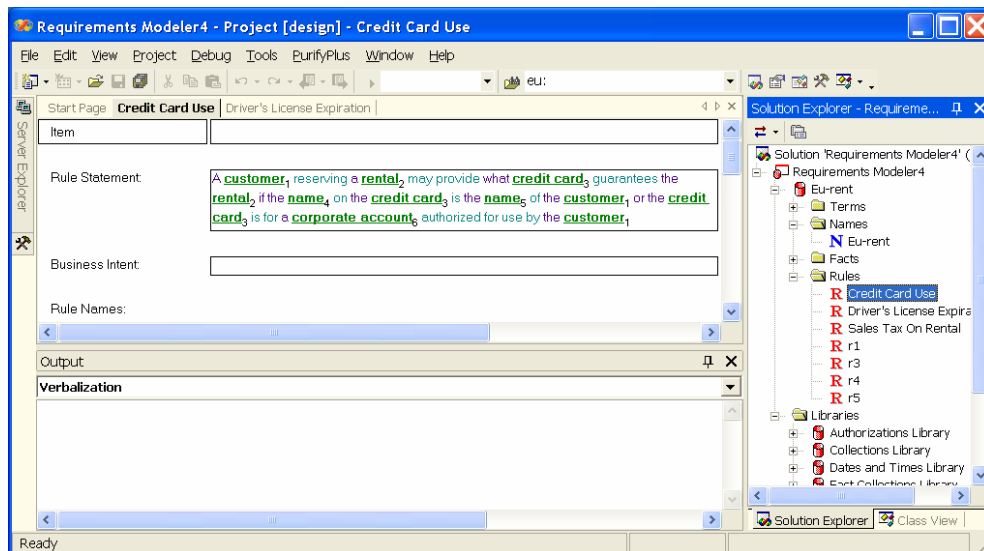


Figure 52 Hypothesis of user interface [UNISYS]

The logical parser is essentially a system for analyzing propositions, that guides the interpretation of complex logical formulations. In fact, applying iterated decompositions (as shown for a rule in section 7.8), it is possible to extract information starting from the typed expressions. It aims at identifying and interpreting quantifiers, logic operators, modal operators and keywords in order to obtain a set of formal sentences that express the business meanings. Finally, the MOF converter and the XMI producer aim at producing a MOF/XMI implementation of the formal statement produced by the logical parser, in order to enable interchange capabilities for a BML model. In fact, these components apply SBVR mapping rules to translate a vocabulary expressed in terms of logical formulations into documents, gathered within DBE repositories and used in distributed environments.

Appendix A: The Generic Package

A.1 Generic Package

In order to address possible difficulties in directly instantiating the BML Metamodel, due to its high level of abstraction, the BML framework has been enhanced providing its users (the business modelers) with a package (at M1 level, called *Generic Package*) which offers a great deal of similarities with their everyday language.

This appendix has been enclosed to reach the aim to go into details with the classes that make the package a full set of instruments at business modellers' disposal.

Generic Package classes do not have the high level of abstraction that is peculiar to M2 level elements but like those they possess generality and independence from business domain. Hence, it has seemed a logical decision to include the classes into a M1 level package that can be imported (and possibly not modified) if necessary. In other words, like Business Models, the Generic Package contains instances of the Metamodel classes, that can be extended (or used *as-is*) to describe own business.

The reader will have a clearer idea after reading the examples of the Generic Package use mechanisms illustrated in Appendix C.

The current version of the package is far from being complete and exhaustive. It does not intend to be a final version but rather a first outline which has to be tested and validated in the second phase of the DBE project through concrete applications to real world cases.

The following section defines the classes belonging to the Generic Package.

Real – is a classifier element that is an instance of *PrimitiveType*, 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.

This data type is borrowed from UMM Data Types [UMM].

Date – is a classifier element that is an instance of *PrimitiveType*, representing the predefined type of date. Instance of Date follow the format YYYY-MM-DD (Date Part in ISO 8601).

This data type is borrowed from UMM Data Types [UMM].

Time - is a classifier element that is an instance of *PrimitiveType*, representing the predefined type of time. Instances of Time follow the format hh:mm:ss+hh:mm (Time Part in ISO 8601).

This data type is borrowed from UMM Data Types [UMM].

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

This data type is borrowed from UMM Data Types [UMM].

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

This data type is borrowed from UMM Data Types [UMM].

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

This data type is borrowed from UMM Data Types [UMM].

CustomerType – defines an enumeration of some classifications of customer based on the degree of fidelity he's gained in the long-time relationship with the hotel, bank, and so on.

DocFormat – defines an enumeration used to distinguish between hardcopy and softcopy documents.

RuleLanguage – defines an enumeration of some languages through which it is possible to build expression, rules, and so on.

TravellingMeans – is an enumeration of some transportation means.

UnitOfMeasure – defines an enumeration of units of measure used in international trade. Its enumeration literals refer to UN/ECE Recommendation 20. This data type is borrowed from UMM Data Types [UMM].

OrgConfiguration – defines an enumeration of organization structures. Its enumeration literals refer to [MINTZBERG].

Catalogue – defines a list of product descriptions.

CatalogueElement – defines an element of a catalogue. In particular it is the description of a product.

PostalCode – is a data type used to define the postal code that characterizes localities, cities; it is used in Address.

Address – is a data type used to represent the collection of information which locates and identifies a specific address.

VAT_Number – is a data type used to indicate the VAT_Number that distinguishes a company.

Measurement – is a data type 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. This data type is borrowed from UMM Data Types [UMM].

Period – is a data type used to define a period starting on a date or/time and ending on a date/or time. This data type is borrowed from UMM Data Types [UMM].

Amount – is a data type used to define a number of monetary units specified in a currency where the unit of currency is explicit or implied. This data type is borrowed from UMM Data Types [UMM].

Quantity – is a data type used to represent a number of non monetary units together with relevant supplementary information. This data type is borrowed from ebXML Core Components [ebXML]

ChargePrice – is a data type used to describe information about the amount of money expected, required, or given in payment for something. This data type is borrowed from ebXML Core Components [ebXML]

UnitChargePrice – is a data type used to describe a financial liability calculated using a per unit charge or price for a quantity (e.g. Euro per day). This data type is borrowed from ebXML Core Components [ebXML]

PercentageChargePrice – is a data type used to describe a financial liability calculated using a percentage charge. It reports the percentage and the amount on which the charge is made. This data type is borrowed from ebXML Core Components [ebXML]

Document – is a data type used to describe a document. This class is intentionally made up of a few attributes to preserve its characteristics of generality and business domain independence.

Organization – Organization is an instance of *BusinessEntity* that indicates a group of people who form a business, club, etc. together in order to achieve a particular aim. It has the same attributes that the ebXML Organization class [ebXML], in addition the BML version owns a new attribute (Structure) that references to OrgConfiguration class.

Customer – is a data type used to represent a customer but just the “role” not the person. For the aim of BML and DBE in general it was

Rule - is an instance of Means, referring to an element of guidance, derived from business Policy; it is a highly structured statement, usually expressed in terms of standard vocabulary. A rule can be related to another one in a great variety of way (duplication, conflict, interpretation, support, ...). The following statement represents an example of business rule: “An order must not contain more than 25 order items”. Both of these elements of guidance drive the definition of Strategy and Tactic and provide support in Ends achievement.

Strategy - is an instance of Means, describing a long-term and broad plan describing all the elements (things, processes, locations, people, timing) used to achieve some business goals; in other words, it represents a planning of the Mission. The following statement is a good example: “implement a Customer Relationship Management System”.

Policy - is an instance of Means, modelling an element of guidance whose purpose is to drive the enterprise in the selection from a variety of alternatives. This statement tends to be not much structured and not focused on a single aspect. A business policy can be composed of other policies, in order to create a “parts explosion” of it. The sentence “a business representative will personally contact each customer who makes a complaint” is an example of business policy.

Mission - is an instance of Means, capturing what the business is or will be doing on a day-to-day basis to make a Vision operative. It is usually expressed by a generic and very simple statement containing action, product/service and market/customer; an example is “provide consulting services to European SMEs”.

Tactic - is an instance of Means shorter and narrower in scope than a Strategy; we can state that the former implements the latter, even if this distinction is never very marked and need a deep knowledge about business context. We also can assert that a Tactic is a plan formulated to achieve Objectives. The following statement is an example of Tactic: “provide each member of the sales force with a palmtop”.

Goal - is an instance of End, representing a desired result focused toward a specific business aspect and long-term oriented. Example of Goal: “to improve customer satisfaction over the next five years”.

Objective - is an instance of End, capturing an attainable, time-targeted and measurable desired result. It’s oriented toward a specific business aspect and it quantifies a Goal. An example is the statement “create an operational customer call centre by a fixed date”.

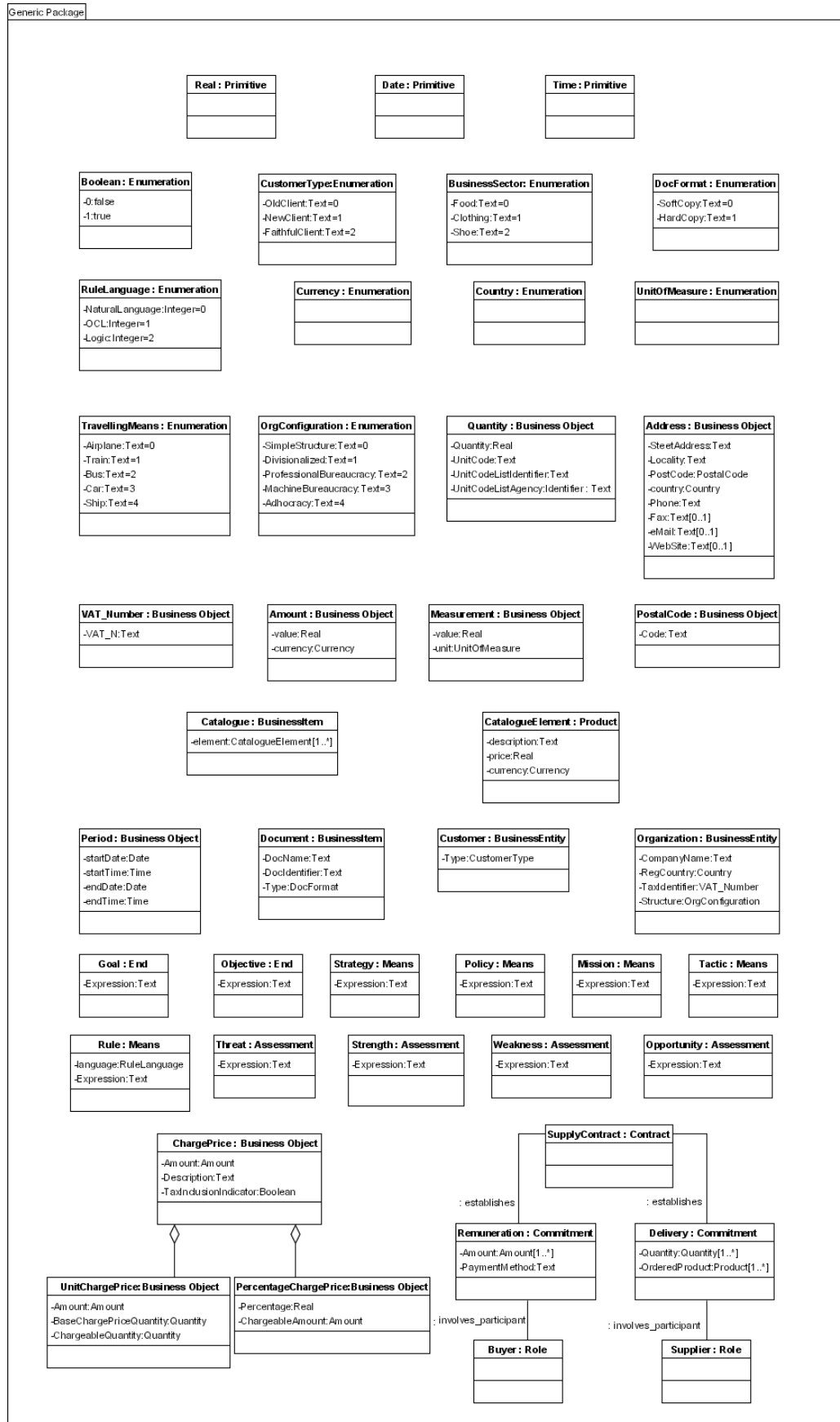
Threat - is an instance of Assessment used to indicate an unfavourable impact of the external environment on achieving some organizational Ends or in employing some organizational Means; “social resistance toward an organizational activity” represents an example of Threat.

Strength - is an instance of Assessment used to describe an advantage within the enterprise that helps it in achieving some Ends or in employing some Means; the “resource quality of branch managers” can represents an example of Strength.

Weakness - is an instance of Assessment used to indicate some area of inadequacy within the enterprise that hampers it in achieving some Ends or in employing some Means; “an old technology infrastructure” can be an example of Weakness.

Opportunity - is an instance of Assessment used to model a favourable impact of the external environment on achieving some organizational Ends or in employing some organizational Means; the “lack of competitors” is an example of Opportunity.

SupplyContract - is a construct modelling representing an agreement to supply a specific product; it is for illustration purposes only and the next version of this document will contain also a service supply contract.



Appendix B: Related works in business modelling

B.1 Introduction

Nowadays the general trend is to face the global competition; this situation implies a number of integration problems that enterprises have to manage: integration of markets, integration between several development and manufacturing sites, integration between suppliers and manufacturers, integration of design and manufacturing, integration of multi-vendor hardware and software components, etc. Enterprise Integration is therefore, not only a problem of interconnecting physical and software applications but also requires a global business integration, aiming at the use of the existing or new enterprise resources in order to better achieve the overall business objectives.

In order to integrate and coordinate these components they need to be modelled thus enterprise modelling (EM) is a prerequisite for enterprise integration.

Enterprise modelling can be defined as the art of representing the enterprise in terms of its organisation and operations (e.g. processes, behaviour, activities, information, object and material flows, resources and organisation units, and system infrastructure and architectures). The finality is to make explicit facts and knowledge that add value to the enterprise or can be shared by business applications and users. The main purpose of enterprise modelling is not only to be applied for better enterprise integration but also to support analysis of an enterprise, and more specifically, to represent and understand how the enterprise works, to capitalize acquired knowledge and know-how for later reuse, to design and redesign a part of the enterprise, to simulate the behaviour of the enterprise, to make better decisions or to control, coordinate and monitor some parts of the enterprise.

Enterprise Modelling techniques and associated visual languages are very important and useful to support new approaches to enterprise business transformation and improvement, developing smart organisations and new networked organisations.

Within the initiative on Computer Integrated Manufacturing (CIM), Enterprise Modelling was born in the United States at the beginning of the 80's and emerged through large CIM projects, e.g. ICAM (Integrated Computer Aided Manufacturing) led by the US Air Force or CAM-I (Computer Aided Manufacturing - International) via the project "Factory Management". In the mid-80's, Europe launched several projects on Enterprise Modelling giving birth to several enterprise modelling languages (including notably GRAI and CIMOSA). As a result, in the 90's many commercial tools dealing with EM or business process modelling appeared on the marketplace, e.g. ARIS ToolSet, FirstSTEP, METIS, Enterprise Modeller, KBSI tools, CimTool, MOOGO, IMAGIM and many others as well as a myriad of workflow systems, each one with its own modelling environment (Action Workflow, COSA, FlowMark, Lotus Notes, Teamware Flow, Ensemble, WorkParty, ...). This intensive production of tools has led to a *Tower of Babel* situation in which the many tools, while offering powerful but different functionalities and semantics, are unable to interoperate and can hardly or not at all communicate and exchange models. This is a serious drawback for awareness, acceptance and wide use of the EM technology in industry which cannot capitalise from previous modelling efforts. This situation hinders true enterprise integration, interoperability, and sharable enterprise knowledge.

B.2 UN/CEFACT Modelling Methodology (UMM)

In 1998 the UN/CEFACT Techniques and Methodologies Working Group (TMWG) developed a modelling methodology for inter-organizational business processes with the aim to guarantee unambiguous definitions of BOV models or standards, of the Open-EDI Reference Model. The result was the UN/CEFACT Modelling Methodology (UMM). The definition of BOV standards based on UMM was called object-oriented EDI (OO-EDI).

As a result the UN/CEFACT Modelling Methodology (UMM) is a conceptual framework that provides a methodology for the incremental construction of "Business Process and Information Models" as support for e-business data interchange. This methodology allows to obtain an appropriate detail of the specifications, in order to easily explain model to business experts, network application suppliers and those persons that have to integrate the business applications.

The main characteristics of UMM are the following:

- It uses a metamodel for supporting business processes and information and it provides a processes' analysis methodology that is quite understandable.
- It provides a methodology and several support components for capturing the business knowledge, without any reference to the implemented technology; finally UMM allows to obtain the semantics of the business processes, separating it from the syntax;
- The presence of patterns, a set of business processes and reusable information descriptions, that help domain experts and analysts to be more efficient and to obtain valid and reusable results;
- UMM improves process in order to obtain predictable results from software projects. To reach this result UMM facilitates the definition of reusable process models and it focuses on the steps that are independent from technology and typical protocols of the software process planning;
- It is an extension of UML. As a matter of fact the UMM Metamodel, that is an UML-profile, is used to describe UMM components that analysts and domain experts may use to describe and analyze individual processes;
- It structures the Business Operational View (BOV) of the Open-EDI Reference Model in layers and in views.

In the past, methodologies for communication among commercial partners, as EDI, focused on modelling the exchanged documents; on the contrary, UMM focuses on modelling the business actions and the objects that create and use business information.

According to the Open-EDI Reference Model¹⁶, the business transactions may be considered from two points of view:

- the Business Operations View (BOV) defined as a perspective of commercial transactions that considers only the business decision making and the engagements among the involved organisations;
- the Functional Service View (FSV) that focuses on the implementation of specifications and technologic aspects of the Open-EDI.

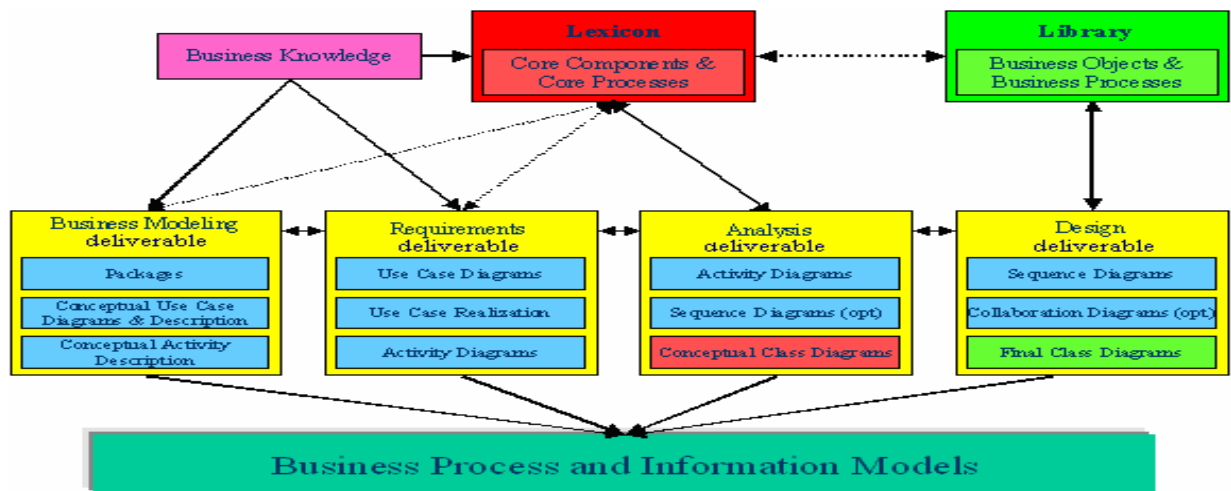
UMM is a technique of formal description of an Open-Edi scenario and it implements only the BOV because it is technology-neutral, furthermore the FSV' specifications are out of the scope of this methodology.

B.2.1 UMM Workflows

UMM needs a "Lexicon" that contains the Core Components and the Core Business, with crossed relationships and references, expressed in a business terminology and organized through an industrial domain. Through many crossed questions business experts capture the Business Knowledge and enable its evolution and growth. From a functional point of view, the Lexicon is a bridge between the industrial or business language and the UML model. Furthermore models can reuse the artefacts, since these are deliverables from a Library of Business objects and processes. The UP provides a top-down approach for business analysis; this approach adopts the basis workflow recommended by the Information Technology Industry for the development of software applications.

Each workflow use deliverables from the previous workflow.

¹⁶ As defined in ISO/IEC 14662



UMM Architecture

The main purpose of "Business Modelling" workflow is to structure business information and processes through the creation of an appropriate UML diagram for the description of business models with related key concept. In particular, this workflow aims to:

- understand and structure the dynamics of business domain;
- ensure that all the users, standard developers and software suppliers, have a common knowledge about the business domain;
- capture the project's justifications;
- structure the model adopting a Business Operations Map (BOM) compliant form, through a process partition into two dimensions: Business Area and Process Area;
- understand the everyday business, deriving from technical solutions, without any reference with the business domain;
- identify the stakeholders of the modelled domain and the stakeholders that could be independent on the process, inside the domain.

BOM Metamodel allows to represent a business process through several detailed business processes called "Business Collaboration Use Case". As a result this workflow populates the model according to the BOM Metamodel.

"Requirement" workflow helps to understand, formalize and structure requirements inside the correspondent B2B domain, through "UMM use case diagrams". In particular:

- it provides a detailed description of the business processes and of the elements that are involved;
- it identifies, describes and defines the Business Collaboration, in order to identify and describe the Business Transaction;
- it identifies and describes the business entities.

"Analysis" workflow aims to identify and define the "case of use", to detail the activities and the collaboration rules among partners through the use of UMM class diagrams. Analysis workflow translates requirements deriving from the previous workflow into specifications that make the software developers and message designers able to plan and implement e-business solutions. In particular this workflow:

- builds a set of business objects from the Requirements;
- transforms requirements into a well-defined object-oriented specification;
- provides the basis for a project that involves electronic information interchange;
- provides interfaces of system integrators in order to link the existing information systems;
- specifies in an explicit way the dynamics of the business system;
- defines a Business Collaboration Protocol from each Business Collaboration Use Case;
- for each Business Transaction Activity, defines a Business Transaction Activity Graph, and it identifies information deriving from the application and response information;
- Creates class diagrams that reuse structures of existing information.

Analysis Workflow reflects the business knowledge of the Lexicon, by using common business processes and common information entities. These entities are used to identify the class candidates and class attributes in the conceptual diagram.

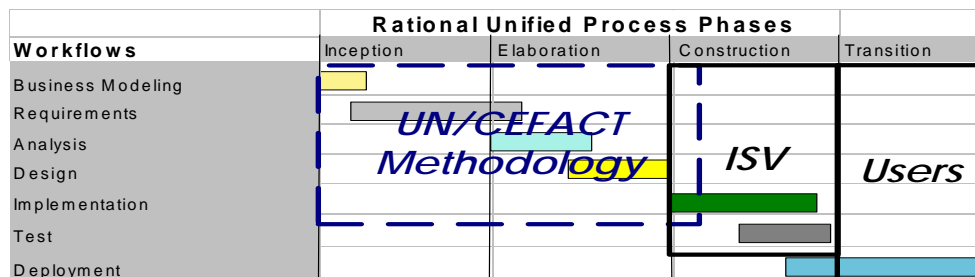
"Design" workflow defines the collaboration dynamics, with the detailed structure of data that business partners interchange among themselves. In particular:

- starting from the conceptual class diagram, produced by the analysis workflow, it develops the Information Model;
- it develops views of business services those describe the business collaboration;
- it develops the Class Diagram that describes the interchange of business messages (signals and actions) in a business collaboration;
- it integrates business objects in the information model;
- it selects interaction patterns of business services, in order to describe each interchange.

Inside each workflow, UMM defines the use and the relations of methods, patterns and model artefacts. For each workflow a method is applied to a model and it uses modelling techniques with a well-defined semantics.

The building of a UMM-compliant business model is a "top-down" modelling activity; this allows to express the common semantics that will be used to describe a public process of business collaboration. The business processes, previously defined, will be registered into UMM Business Component Libraries, that are Registries, and they will provide the definitions of business entities and of the other elements of the business collaboration models. These definitions may be used to validate and classify the semantics used in the model construction. It is possible to build also a common vocabulary that will facilitate the reuse and the integration of components contained in the UMM Business Component Libraries. The Libraries will contain the components captured during the modelling, the collaboration processes, the enterprises profile; they stick to UMM and to the rules produced by the UML Reference Guide. The components will be classified and identified through appropriate metadata that will facilitate the search and the localization of reusable components. If these components are new, they will have to follow the procedures outlined by UN/CEFACT, in order to be included in the Library.

This top-down approach empathizes the use of UMM Business Component Libraries, and it implies the identification of business objectives and requirements that stakeholders can measure and verify. The possibility to track these objectives is the basis for defining the success or the failure of a business model.



UP phases and workflows

B.2.2 UMM Metamodel

UMM extends UML Metamodel including a set of syntactic and semantic specifications, through business domain stereotypes, in order to completely define information, business processes, deliverables and to describe the behaviours of "interface-specific" objects.

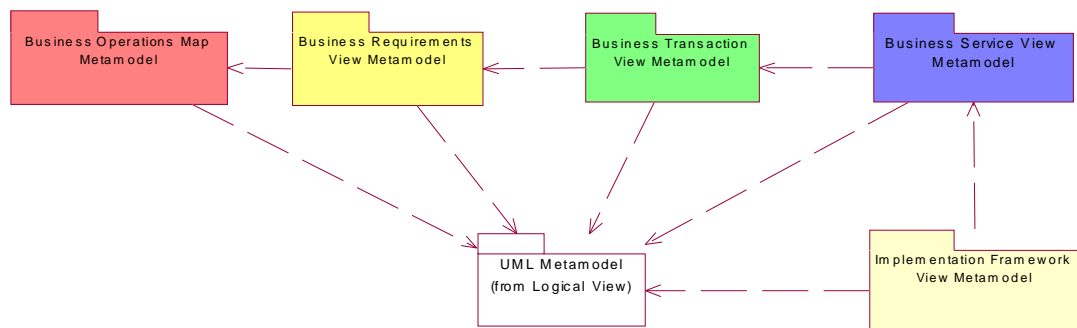
Stereotypes are mechanisms that extend UML Metamodel and include syntax and semantics specifications for a particular domain. For this reason UMM Metamodel can be defined as a UML-profile. Considering the steps of Business Modelling, Requirements, Analysis and Design, we may say that UMM Metamodel facilitates the specifications reuse and the reproduction of process models that are insensitive to protocols and technology. As a result UMM "Business Process and

Information Modelling” is based on UML and it is built using the same syntax and semantics of UMM Metamodel.

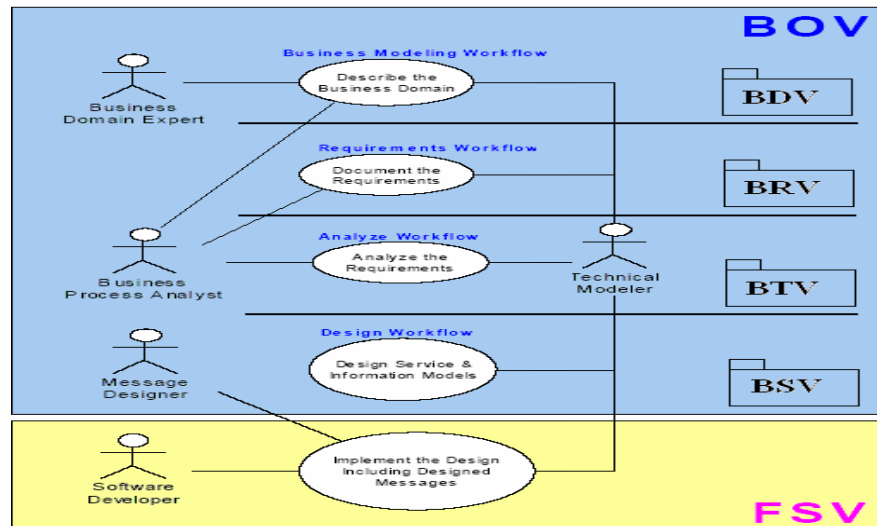
Metamodel for e-business processes, that is the UMM Metamodel (see the figure below) is organized in packages. It is based on a precise extension of UML Metamodel that expresses a business process through an object-oriented model. Each package defines and describes a set of components that allow to describe and analyse business processes and information model from a particular “view”. UMM uses four main views, all contained in the BOV, that are:

- Business Domain View (BDV) – it establishes the context of the business process considering the possibility that UMM Libraries may already contain process description or terminologies, previously defined and reusable. The correspondent package is the BOM Metamodel.
- Business Requirements View (BRV) – it captures business scenarios, inputs, outputs, constraints, business process boundaries and the interrelations of a business collaboration. As a result, the BRV defines the choreography of a Business Transaction. The view reflects how an expert domain sees and describes the process that have to be modelled. BRV is expressed using a language and concepts that adapts to the business domain expert.
- Business Transaction View (BTV) – it captures the entities semantics of the business information and their exchange flows among roles. BTV also captures how they elaborate the business activities. This view describes how a business analyst sees the process that has to be modelled. The language reflects the way in which a business analyst uses to provide requirements to software designers and to business domain experts.
- Business Service View (BSV) – it specifies services components, agents and exchanged messages, necessary to carry out and validate a business collaboration. The BSV is expressed by a language and through technical concepts, specific of a software developer.

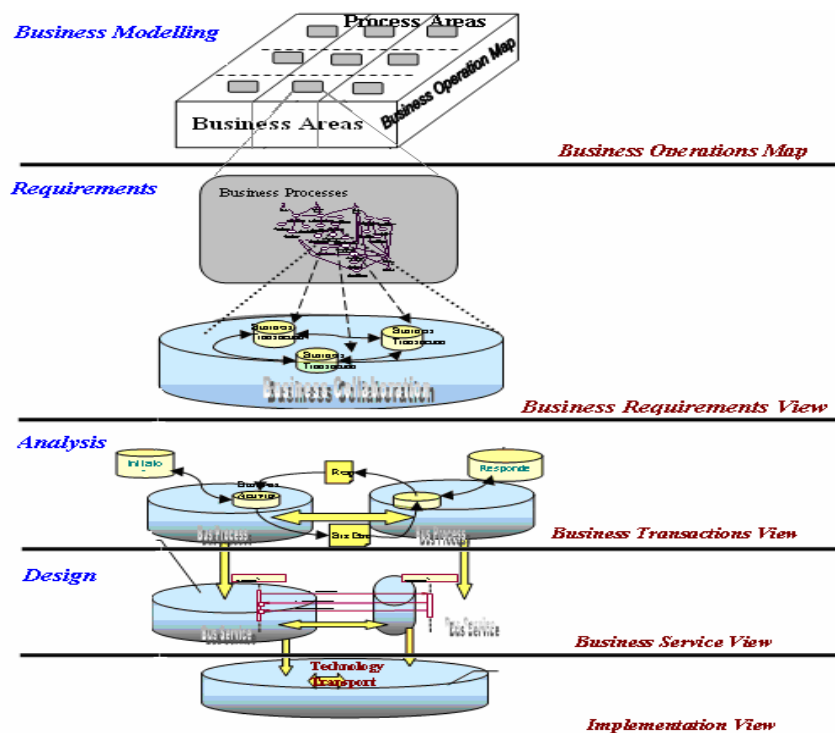
The Implementation View is not part of UMM and it is a specification of business interactions, according to protocols and selected technologies.



Structure of UMM Metamodel



UMM Use Case, workflow, actors and relationships with Open-EDI Reference Model



UMM Views

B.2.3 UMM worksheets and patterns

UMM foresees the usage of a repository that gathers technology, information and business models for various domains. The use of a Glossary and a Requirement helps business experts to collect all the business requirements, terms and definitions.

UMM has adopted the use of worksheets in order to gather and organize necessary information for the production, also manual, of an UMM model for each work area. UMM models may be generated in different ways and the worksheets have to facilitate the correspondent uploading. It is allowed to use tools, as the UML Modeller or the Business Process Editor (BPE), in order to generate models in an indirect and automated way. The information grouping process for the various work areas is iterative.

UMM includes patterns for the business activities transaction and for their associated service collaborations.

Patterns are metamodel applications characterized by common business processes and information representation. A metamodel provides syntax and grammar in order to express the design. Patterns are subjective applications that are aligned to the business requirements and that capture the common structure and semantics.

The use and reuse of patterns to specify business process scenarios allow to create reusable business process and information model. UN/CEFACT did not specify the business patterns to be used in the Business Process workflows and Requirements.

The Analysis Patterns are modelling patterns that may be applied to the Business Transaction Pattern Metamodel, in order to represent specific business transactions. The Business Transaction Pattern Metamodel provides a language and a grammar for the creation of business collaboration models.

Design Patterns are patterns that specify the possible interactions of Business services. There are five types of interaction:

- Service-Service;
- Agent-Service-Service;
- Service-Service-Agent
- Service-Agent-Service
- Agent-Service-Agent.

To each interaction corresponds a pattern.

B.3 ebXML

ebXML is a framework for e-business and it was born by the common initiative of UN/CEFACT (United Center for Trade Facilitation and Electronic Business) and OASIS (Organization for the Advancement of Structured Information Standards). In addition, many enterprises and world standard as Sun, IBM, CommerceOne, IONA, RosettaNet supported this initiative.

ebXML objective is to provide a standard that enables enterprises of any size, in any location, to meet and conduct business through the exchange of XML-based messages. In this way, ebXML provides a XML metamodel (both through DTD and XML schemas) based upon prior UN/CEFACT work, specifically the metamodel behind the UN/CEFACT Modeling Methodology (UMM). The "framework" can be used in a uniform and substantial way to exchange e-business data in many environments: application-to-application (A2A), application-to-human and human-to-application. The main result should be the creation of a single global electronic marketplace.

ebXML is based on international standards (HTTP, TCP/IP, MIME, SMTP, FTP, UML, SOAP, XML) and it aims to become a standard itself. The main reason of its success is the use of the suite XML of W3C and the correspondent technical specifications, as a matter of fact business and technical communities decide to accept ebXML because of the use of XML. However, some key elements of its technical structure may need the adoption of alternative technical and technological specifications as those adopted by Internet Engineering Task Force (IETF), International Organization for Standardization (ISO), Institute of Electrical and Electronics Engineers (IEEE), International Electrotechnical Commission (IEC), UN/CEFACT, OASIS, and Object Management Group (OMG).

In a IT scenario where everyone adopts an own XML, ebXML play a significant role as an unifying architecture.

In order to achieve the scope, ebXML has developed a set of technical and business principles to pursue. These principles are:

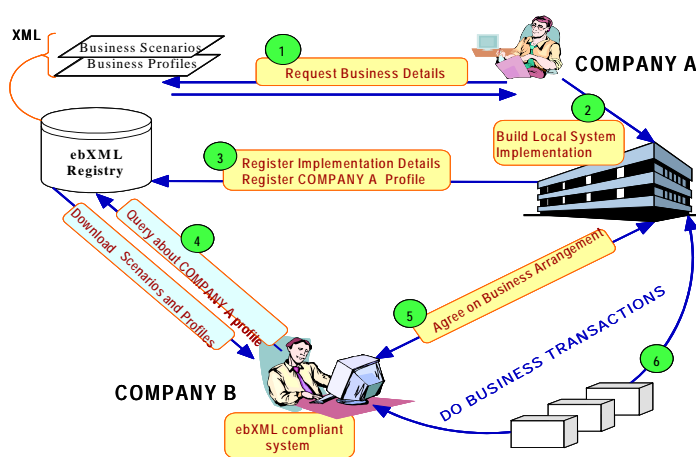
- to allow a simple and universal e-commerce by using XML;
- to use technical specifications of XML, divulgated by W3C;
- to provide an inter-sector and interoperable standard for the business-to-business (B2B) commerce and business-to-consumer (B2C) commerce;
- to support vertical and horizontal groups among industry and commerce participants;

- to consider the structure components and contents of XML initiatives and blend them in a single XML standard, in order to apply it for all the commercial or business relationships;
- to promote the development of long-term horizontal solutions, by using common resources now invested in short-term vertical solutions;
- to avoid proprietary solutions that could influence financial choices and could constrict ebXML users to buy, install or support particular applicative software in commercial information exchange;
- to minimize e-commerce costs;
- to provide a multilingual support;
- to conform to national and international rules and specifications for commerce;
- to propose a migration path that allows to develop XML EDI standards, starting from standardized EDI.

ebXML was born in San Jose (California) in 1999. The first phase of the project was developed by two organisations. In particular, UN/CEFACT looked after the maintenance of ebXML contents, about professional practices (models of common components and business processes); on the other hand, OASIS looked after the maintenance of technical infrastructure (registry/repository, collaboration protocols security). Now the set of specifications, that are modular, self-sufficient and independent among them, is complete.

Finally, enterprises have a standard, XML-based, to exchange e-commerce messages, to conduct commercial relationships, to communicate data using the same semantics, to define commercial processes.

The following figure shows an example of process and the necessary steps to configure and use ebXML applications.



An e-Business scenario through ebXML

Company A discover an ebXML registry, accessible via Internet (Step 1). The Company analyzes the contents of the ebXML Registry and decide to acquire an own ebXML-compliant application (Step 2). It is possible that "ebXML-compliant" applications or components already exist, so the Company sends information about its Business Profile to the ebXML Registry, with implementation details and reference links (Step 3).

The Business Profile will describe the competences, constraints and Business scenarios supported by Company A. This information, in a XML-format, will be contained in the Business Processes. The system will verify the format and the steps for each business process. At this point Company A receives an acknowledgement (Step 3) as a confirm of the registration.

Let's suppose that the Company B is looking for a possible commercial partner. After searching in the ebXML Registries, it discover the business scenarios supported by Company A (Step 4). Company B sends a request to Company A and it outlines the intention to apply oneself in a business scenario using ebXML (Step 5). Company B acquires an ebXML-compliant application (dedicated).

Before applying itself in a interchange scenario, Company B sends to Company A a "scheme" of the proposed business, directly on the ebXML-compliant software interface of Company A. This scheme will contain requests and agreements and it will describe the requirements for the information exchange. Finally, the Companies can operate in e-business, using ebXML (step 6).

The key concepts of ebXML architecture are the standardized data infrastructure, a semantic framework and shared researches:

- ebXML infrastructure for data communication can work among different communication systems. This infrastructure might use a standard mechanism for the messages transfer, with a defined interface, packaging rules, a predictable delivery model and a security model. The infrastructure plays the role of an interface for business service and will manage with entry and exit messages.
- ebXML has a shared vocabulary and a terminological library that can act as commercial framework. The same framework is a shared set of XML-based vocabularies, with a process for the definition of the present communication structures. As a result, applications that use ebXML can "interoperate" in different business systems. The semantic framework will have a metamodel for Business Process and Information Model, common business processes and a set of reusable business logics, based on core components.
- ebXML allows enterprises to find themselves through a discovery mechanism, in order to stipulate agreements and to carry out business transactions: un shared repository allows to identify which services the other enterprises offer.

Each component needs a document for technical specifications; it is possible to improve or perfect the ebXML specifications in an incremental way, individually or through a certain combination.

ebXML has six different technical committee with the OASIS and UN/CEFACT supervision. In particular, OASIS controls projects about "Messaging Services", "Registries and Repositories", "Collaborative Protocol Profile" and "Implementation, Interoperability and Conformance", while UN/CEFACT controls projects about "Core Components" and "Business Process Models". The architecture also defines how each deliverable depends on the others, produced by different teams. The figure below shows these dependences. On the top there are the "Core Components" that will be assembled within the commercial documents. The definition of "Business Process" refers to commercial documents/core components that are supported in a single step of a business process' choreography. The definitions of commercial partners include the "Collaboration Protocol Profiles" and roles covered by the enterprises. Furthermore, the layer includes the "Collaboration Protocol Agreements".

"Registry and Repository" have to record the core components, the business components, the choreography of business processes and the CPP/A. Each element that arrive to the registry/repository have to be labelled with a unique identifier, in order to allow the identifying mechanism. The "Transport and Routing" layer have to ensure messaging services, necessary to exchange commercial documents in runtime.



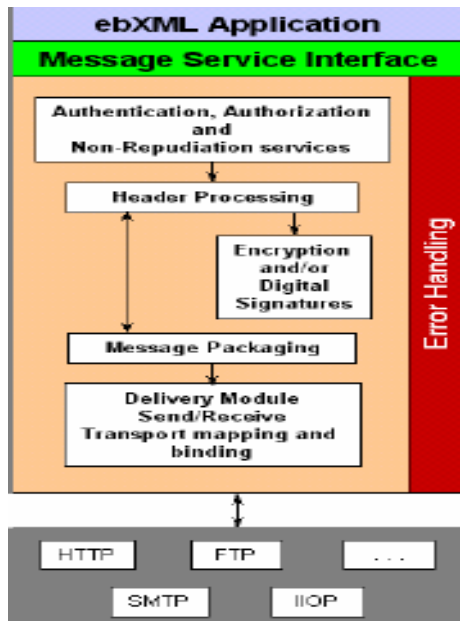
ebXML Deliverables

B.3.1 Messaging Services

The ebXML Messaging Service v2.0 (ebMS), signed by the members of OASIS as an "OASIS open standard" and built using the SOAP "core" specifications (SOAP stands for Simple Object Access Protocol). The "OASIS ebXML Messaging Service Technical Committee" is responsible of the

maintenance of Messaging Service. This service represents a specification that is autonomous compared to the other ebXML specifications, it is supported by several commercial and open-source software implementations.

It defines a connection format and a communication protocol in order to support the XML-based e-business and the development of structures that allow a dependable delivery of business information, the packaging and transfer of data, in various format as UN/EDIFACT or X12, not only in XML format.



ebMS

ebXML Message Service is logically positioned among one or more business applications and a communication protocol (HTTP, SMTP, ftp, ...). It is conceptually divided into three parts: the abstract Service Interface, the functions provided by the Message Service Header (used to send and receive message), the mapping of fundamental transfer services (as HTTP or SMTP).

ebMS is neutral as regards the content, that may be based on XML, EDI or binary data vocabularies. The ebXML architecture implies that the ebMS protocol can be transferred through various available communication protocols. The aim is to ensure accuracy by using available or emergent technology, without creating new standards or communication protocols.

B.3.2 Registries and Repositories

"OASIS/ebXML Registry Technical Committee" as OASIS Open Standard has approved 2 main specifications:

1. "OASIS/ebXML Registry Information Model v2.5": it defines the information model for an ebXML registry. In other words it establishes the information type and organization.
2. "OASIS/ebXML Registry Services Specification v2.5": it defines the interface towards the Registry Services, the interaction protocols, the messages definition and the XML-Scheme.

The ebXML Registry provides a set of services to share information, promoting the integration of business processes and adopting the ebXML specifications. Shared information becomes objects of a repository and it is managed through registration services, provided by ebXML.

ebXML Registry/Repository provide a "warehouse" where information may be stored in a persistent way. Stored information is considered an object and it is in a repository; it is managed through the ebXML Registry Services; in particular the content is composed by documents, XML Scheme, descriptive processes, ebXML Core Components, context description, UML models, information about involved parts and software components.

An ebXML-compliant registry should support the following functionalities:

- to discover possible commercial partners, with correspondent profiles;
- to discover the capabilities of business processes and communication specifications;
- to discover data interchange specifications, used within the context of a business process;
- to search software components in order to integrate information in the business applications;

- to develop models for business process;
- to discover core components and core business objects.

These activities have to work in an automatic way, without the human presence, through the Internet.

The implementation of ebXML registration implies the use of the Registry Information Model in order to determine the classes that have to be included in the Registry Implementation and the attributes and methods these classes should have. It is implemented inside an ebXML Registry, as physic schemes.

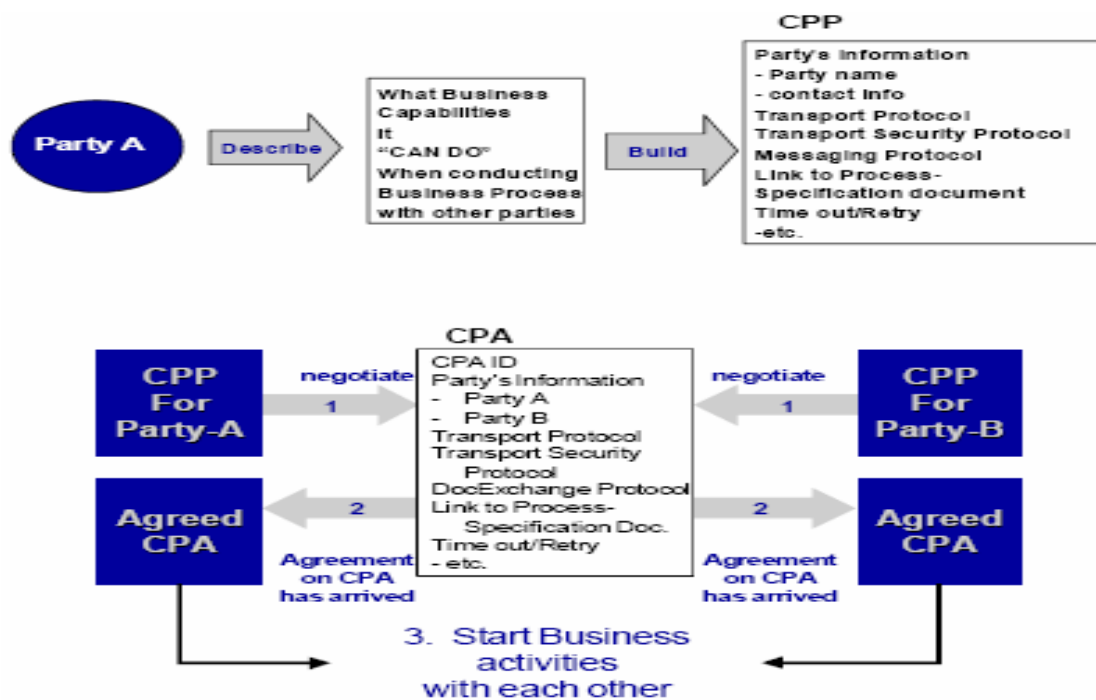
B.3.3 Collaborative Protocol Profile/Agreement

The OASIS members signed the "ebXML Collaboration-Protocol Profile v2.0" specification and "ebXML Collaboration-Protocol Agreement v2.0", developed by the "OASIS CPP/A Technical Committee", as an "OASIS open standard".

A business partner is an entity that takes part in affair operations with another partner. The information exchange needs that each part knows the business and technological capabilities supported by the other part, the correspondent collaboration role, and finally the technological details about sending and receiving messages. In a business collaboration, a CPP may describe the method used by each part to exchange information. On the other hand, business and technological capabilities accorded in order to undertake e-commerce relationship are expressed as CPA.

This specification defines a "Mark-up Language Vocabulary" in order to create electronic CPP e CPA. As a matter of fact, CPA e CPP are not papers, but XML electronic documents, that are conform with an "ebXML Business Process Specification Schema". CPP and CPA can be processed by computers of each part in order to set and configure the electronic systems and to carry out the business information exchange. CPP/A doesn't concern about the legal aspects.

Let's consider an interaction process between two companies:



View of a CPP and a CPA

Company A describes itself in a CPP, also using multiple CPP that describe different views that the company want to show. The CPP have to be stored in a repository to facilitate the search. Company B can find the A's CPP by searching in the repository. Starting from interactions among

information (stored in the correspondent CPPs), the companies build together a single copy of the CPA.

After several negotiations, a complete and definitive CPA copy is stored in both the servers; this process can be manually or automatically carried out.

Finally, the companies configure their systems to run-time, on the basis of the same copy of CPA, and they can open the commercialization.

B.3.4 Business Process Model

The “ebXML Business Process Specification Schema” (ebBPSS), developed by UN/CEFACT Techniques and Methodologies Group, provides a standard framework that allows to configure business systems to runtime, in order to support economic transactions. This specification is “open” and it is based on UMM Metamodel. Each economic transaction can be implemented by using one or more of available standard models, that determine the exchange of documents and business messages among partners, in order to carry out the requested e-commerce transactions.

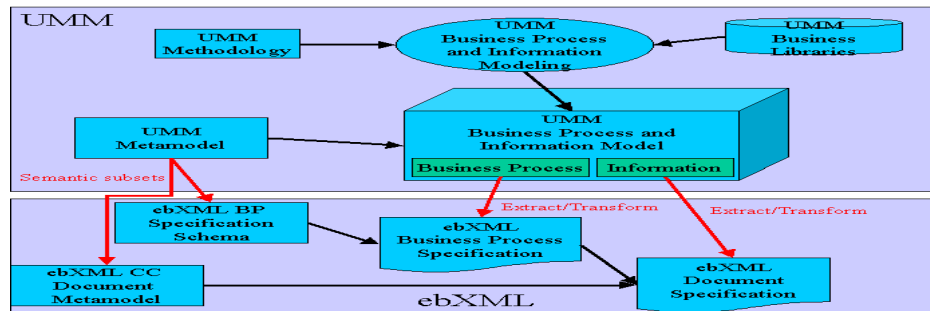
The Business Process Models describes interoperable business processes that allow business collaborations. In ebXML, “Business Process and Information Modelling” and UMM modelling methodology are not mandatory. However, Business Process Models for e-commerce have to be converted in software components that collaborate among them, on behalf of commercial partners. As a result, ebXML defines an “ebXML Specification Scheme” for business processes, whose aim is to provide a bridge between e-business processes modelling and the specifications of e-business software components.

A business process describes in details how the partners negotiate, the roles, the relations and responsibilities. An interaction among roles follows a choreographic set of business operations. The exchange sequence depends on the business process, the messaging and on security considerations. There is always a request of business documents, but not always there is a document delivery: it depends on the transaction semantics. A business operation is expressed as an exchange of electronic commercial documents, which are composed of reusable objects of business information.

At a lower level, business processes can be composed of common reusable business processes, and the objects of business information are composed of reusable core components, that are stored in the UMM Business Library. The UMM Metamodel supports a set of points of view about the business process that provide a semantic set (vocabulary) for each view. These points of view also represent the basis for the definition of semantics and objects that are necessary for information and business processes interoperability.

By the use of UMM methodology and Metamodel, the user can create a complete “Business Process and Information Model”. Even the model is syntactically independent and not directly interpreted by an ebXML-complaint software.

The ebXML BPSS provides an additional view about UMM Metamodel, as it provides a nominal set of elementary specifications that are necessary for a collaboration among business partners. It also provides a set of configuration parameters for runtime systems, with the aim to carry out the collaboration among e-business software components. The ebXML BPSS represents a semantic subset of UMM Metamodel. As a result, users can create the specifications of business processes, that are necessary to configure their ebXML-compliant software. The ebXML Business Process Specification is available in 2 versions: UML version and XML version. In particular, the XML version has to be interoperable with ebXML-compliant software. ebXML BPSS works, with the CPP and CPA specifications, in order to fill the gap between Business Process Modelling and the configuration of ebXML software compilers for e-commerce.



Relations between the UMM MetaModel and the ebXML Business Process Specification Scheme

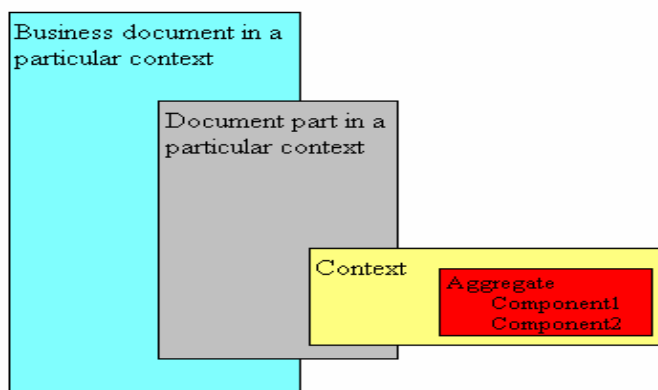
B.3.5 Core Components

The "ebXML Core Components Technical Specification v2.1" (CCTS), developed by UN/CEFACT Techniques and Methodologies Group, provides a way to identify, capture, and maximize the reuse of business information, with the aim to sustain and improve the information interoperability through various business situations. It is a flexible standard since the semantic standardization is quite neutral, so it is independent on the adopted semantic syntax, for example XML or UN/EDIFACT. The mechanism of Core Components uses the richness of information, achieved through BP&CC or UN/CEFACT solutions, in order to identify the exact similarity and the differences among different semantic models.

The Business Processes are related to the exchange of business information. A detailed analysis of business processes shows the single fragments of business information, that are the entities, which need to be exchanged.

The business documents give a complete business idea, from a semantically point of view: who, what, when, where and why. In terms of e-business, "what" is typically the product (goods or services). A good is a product that the companies send, store, buy, select, etc. A service is provided by companies and they can involve parts and/or goods. Parts can be organisations or individuals and they can be associated to other parts or products.

Dealing with ebXML, this issue is addressed to the Core Components architecture, through a combination of information structures and the use of "Context". This structure uses a set of layers, designed to be included in the report of industrial business processes, related to the business community. As a consequence, in each industrial sector, experts of that sector lead the discovery activity. Once the different industries analyze the results, it's possible to find a pattern of common processes and requirements of common information components. Moreover an architecture for core components is designed, in order to support the specialization based on the specific use of context.



Core Components and Context

It is shown that the core components can be built inside document parts in a particular context, characterized by certain business information requirements. These parts can be aggregated in business documents.

A Core Component is a fundamental block that creates a significant and semantically correct package for the information interchange.

A core component contains pieces of information that are necessary to describe a specific

concept.

It represents a minimum set of information that may be used, as basis vocabulary, to describe business processes.

The term "Reuse" represents the common use of core components, when they are adopted for a specific purpose of affairs; the scope is defined as the combination of context in which that scope exists. Each reuse, specific of a context, of a common core component, is catalogued as a new business information "that uses the core component X".

A domain component is specific of an industrial area and it can be used only in that domain; it may be reused in another domain only if it is suitable or adaptable for the particular use, in this case the component becomes "core" or "common".

It is also possible to build aggregates components; some of them are specific of domains. Aggregates and components can be grouped in "document parts"; they could be useful to individually satisfy the information requirements of a business process. They also could be aggregated in a structured way to gain the same objective.

Core components and the correspondent duplicates (specific of the domain) can be stored in an ebXML Registry. XML elements of a business message can refer to these components through their unique identifier (UUID). In this way it is allowed the connection among languages and among different XML-based business vocabularies.

B.4 BPMI.org

The Business Process Management Initiative (BPMI.org) is an independent organisation devoted to the development of open specifications for managing e-Business processes that span multiple applications, corporate departments and business partners, behind the firewall and over the Internet. BPMI.org is a no-profit corporation in the State of California. Specifications are free for organizations that want to change, improve or extend them. BPMI develops key specifications to support the development of BPM systems, rather than formal standards.

BPMI.org complements initiatives such as J2EE and SOAP that enable the convergence of legacy infrastructures toward process-oriented enterprise computing and initiatives such as ebXML, RosettaNet, BizTalk, WSDL, DDI, tpaML and E-Speak that support process oriented business-to-business collaborations. BPMI.org defines open specifications such as the Business Process Modelling Language (BPML) and the Business Process Query Language (BPQL) that will enable the standards-based management of e-Business processes with forthcoming Business Process Management Systems (BPMS), in much the same way SQL enabled the standards-based management of business data with off-the-shelf Database Management Systems (DBMS). BPMI.org has been initiated by Intalio, Inc. and it was created in August 2000 by a group of sixteen enterprise software vendors and consulting firms. Membership is open to all companies, non-profit organisations and individuals.

BPMI.org considers an e-business process, led by two business partners, as composed of 3 components: a Public Interface and two Private Implementations, one for each partner.

The Public Interface is common and it is supported by protocols as ebXML, RosettaNet, and BizTalk. The Private Implementations are specific for each partner and they can be described in various languages: BPML is just one of these languages. Once an e-business Process Private Implementation is developed, it has to be implemented in a platform that will actually perform it. For this reason, BPMI.org defines BPQL, a management interface standard for the e-business processes execution.

Furthermore, UDDI (Universal Description, Discovery and Integration) may support BPQL to provide a standard way for registration, claiming, and discovery of Public Interfaces of e-business processes.

B.4.1 Business Process Modelling Notation (BPMN)

Business Process Modelling Notation (BPMN) is a standard provided by BPMI. BPMI Notation Working Group released specifications 1.0 in 2004.

The Group grouped in a unique standard solution existent competences and experiments about notation and business modelling methodologies as UML Activity Diagram, UML EDOC Business Processes, IDEF, ebXML BPSS, Activity-Decision Flow (ADF) Diagram, RosettaNet, LOVeM, and Event-Process Chains (EPCs).

The main purpose of BPMN is to provide a notation that all business users can understand. These users may be business analysts that create processes drafts, technical developers that are responsible of technology improvement and business persons that manage and control those processes. In other words, BPMN aims to fill the gap between business process design and process implementation.

Another objective is to ensure that XML languages used to carry out business processes, as Business Process Execution Language for Web Services (BPEL4WS), can be displayed using a unique business-oriented notation.

BPMN defines notation and semantics of a Business Process Diagram and represents the fusion of several practices inside business modelling community. Business Process Diagram is based on an ad hoc flowcharting technique that creates graphical models of business process operations. A Business Process Model is a set of graphical objects, which are activities and control flows that define their elaboration order. BPMN aims to standardize a notation for business processes modelling, compared to modelling notations and points of view that already exist. In order to do this, BPMN provides a way to communicate process information to other business users, process developers, customers and suppliers. BPMN also focuses on traditional modelling concepts related to B2B processes (as public and private processes and choreographies), and advanced modelling concepts as exception handling, transactions and compensation.

Business process displayed in a flow-chart format helps a lots of business persons; as a matter of fact there are lots of business analysts that analyze enterprises work and business processes through simple flow-charts.

This implies a technical gap between the format of initial design of a business process and the format of the language used to carry out the same process. In order to fill this gap, BPMN aims to create a link among various modelling notations of IT-oriented languages that implement processes inside a business process management system. Business Process Execution Language for Web Services (BPEL4WS v1.1) maps BPMN graphical objects which are supported by a wide set of attributes.

Main characteristics of BPMN structure are the following:

- the choice of forms and icons used for graphical elements. The aim is to create a standard and visual language that all process modellers can recognize and understand, without regards to diagram source. There is quite flexibility about dimensions, colours, styles and text position of defined graphical elements.
- BPMN elements have a semantic meaning. This specification defines how graphical elements can interact among them, also considering conditional interactions based on attributes that imply behavioural variations of the elements. A BPMN-conform tool has to stick to these semantic definitions.
- There is not a standard mechanism to exchange BPMN diagrams. As soon as it is defined, a BPMN-conform tool will be able to import and export BPMN diagrams in the specified configuration.

BPMN only supports modelling concepts that may be applied to business processes and allows the creation of "end-to-end" business processes. There are three kinds of basis end-to-end sub-model:

- Private or internal business processes, that are generally called workflows or BPM processes. A private business process can be mapped on one or more BPEL4WS documents;
- Abstract or public processes, that represent the interactions among a private business process and the other processes or participants. These processes show more that is the sequence of messages necessary to interact with a business process. A single abstract process can be mapped on a single BPEL4WS abstract process;

- Collaboration or global processes, that show interactions among business entities (two or more). These interactions are defined as a sequence of activities that represent the messages exchange pattern among involved entities. Collaboration process can be shown as two or more abstract processes that communicate. A single collaboration process can be mapped on several collaboration languages, as ebXML BPSS, RosettaNet, or W3C Choreography Working Group specification. However, these mapping may be considered as future directions for BPMN.

Among these three BPMN sub-models, several kinds of Business Process Diagrams can be created.

BPMN diagrams can model different process actors, and each participant can see the diagram in a different way: activities and processes can be considered internal or external as regards a participant. In runtime, the difference between internal and external activities will allow the participants to see the activities status and to diagnose some problems. However, diagram is the same.

BPMN has to be extendible by modeller and modelling tools. Extensibility allows modellers to add no-standards elements or artefacts in order to satisfy particular needs, as requirements for a vertical domain.

In BPMN a process is a Flow Objects graphic. A Flow Object is a set of other activities and controls that manage the sequence of activities.

Processes may be defined using different layers, from processes of big enterprises to processes carried out by a single person. Low level processes can be grouped in order to achieve a common business objective. A business process can contain more than a separated process. Each process can have its own sub-processes, that are inside a pool.

A BPD is made of a set of graphical elements, which allow the development of simple diagram as, for example, flowchart diagram.

A driver for developing of BPMN is to create a mechanism for the creation of business process model that has to be the more simple is possible, and able to manage complex business processes. In order to achieve these two objectives, graphical aspects of notation have been organized in specific categories. Inside basis categories, it is possible to bring variations or more information, in order to support complexity requirements, without change diagram objectives.

There are 4 basis element categories:

1. Flow Objects: little set of core elements. The main elements of this category are: Event, Activity, Gateway;
2. Swim lanes: mechanism to organize activities in visual and separated categories, which allow to show different functional capabilities or responsibilities. BPMN uses this concept to facilitate activities organisation and partition. The main elements of this category are: Pool, Lane;
3. Artefacts: elements that may be added to a diagram in order to offer further details and information about a process, as regards the context in which business processes are modelled. This context is not directly referred to the Sequence Flow or to process Message Flow. The main elements of this category are: Data Object, Group, Text Annotation;
4. Connecting Objects: elements used to connect Flow Objects in a diagram. The main elements of this category are: Sequence, Flow Message, Flow Association.

Another list of elements also exists and it is used for more complex situations. Furthermore, not-graphical elements will support graphical ones and they will provide necessary information for other business modelling purposes.

B.4.2 Business Process Modelling Language (BPML)

The Business Process Modelling Language (BPML) is a meta-language for business process modelling, just as XML is a meta-language for business data modelling. BPML provides an abstract execution model for collaborative transactional business processes based on the concept of a transactional finite-state machine. BPML considers e-Business processes as made of a common public interface and as many private implementations as process participants. This enables the public interface of BPML processes to be described as ebXML business processes or

RosettaNet Partner Interface Processes, independently of their private implementations. In much the same way XML documents are usually described in a specific XML Schema layered on top of the eXtensible Markup Language, BPML processes can be described in a specific business process modelling language layered on top of the extensible BPML XML Schema. BPML represents business processes as the interleaving of control flow, data flow, and event flow, while adding orthogonal design capabilities for business rules, security roles, and transaction contexts. Defined as a medium for the convergence of existing applications toward process-oriented enterprise computing, BPML offers explicit support for synchronous and asynchronous distributed transactions, and therefore can be used as an execution model for embedding existing applications within e- Business processes as process components.

In particular, BPML provides an abstract model and XML syntax in order to express business processes and to support entities. It doesn't define applicative semantics; on the contrary it defines an abstract model and grammar for describing general processes. This implies that BPML can be used for the definition of collaborative business processes, complex Web-services and multi-party collaborations. BPML specifications depends on other specifications, as XML 1.0, XML-Namespaces, XMLSchema 1.0 e XPath 1.0. Moreover, BPML supports services for importation WSDL 1.1 definitions.

A high-level BPML description follows:

- BPML Constructs are vital parts on which BPML abstract model is based; BPML specification provides abstract model and XML syntax for these structures.
- BPML Definitions are constructs that may be referenced. Actually a BPML process is already a construct and a set of multiple constructs.
- BPML Package is a collection of BPML definitions and of other language definitions (XML-Schema or WSDL).
- BPML Document is an XML representation of a BPML package based on the syntax of this specification.

A Process is seen as a set of activities which represent a component that carries out a specific function. Activities can contain complex or atomic activities. There are 3 types of process: Nested, Exception and Compensation. In particular:

- Nested process is defined to be carried out in a specific context;
- Exception process, defined as part of a main process, manages unusual conditions that can interrupt the execution of that process;
- Compensation process provides compensation logic for its main process.

A process can also represent an activity inside a greater composition, it can be defined as part of a main process, or it can be invoked by another process. Processes are usually defined as reusable work units.

Context defines the common behaviour of activities which are carried out. Thus activities are carried out through properties that are defined in the same context.

A process can be launched in 3 different ways: as response to an input message, as response to a signal pointed out, or it can be invoked by an activity or a scheduler.

An Activity Set contains a list of activity definitions. Generally, list's activities are carried out in a certain order, so when an activity is completed the follower activity can be carried out.

Even Control Flow is modelled as "activity". As a matter of fact, control flow uses a block-structured approach, in which each block can be considered as an activity. Blocks can be placed on arbitrary layers. This approach allows to manage activities context at a specific layer.

BPML represents business processes as a stock phrase of control flow, data flow, and event flow, and it adds orthogonal planning capabilities for business rules, security roles, and transaction contexts.

BPML provides an explicit support for synchronous and asynchronous distributed transactions, so it can be used as a model in order to insert available applications inside e-business processes, as process components.

B.5 OMG Standard

The Object Management Group (OMG) was founded in April 1989; it is a not-for-profit corporation that includes about 800 members. The OMG produces specifications of standards to improve software systems interoperability and distribution. The most popular specifications are probably CORBA and UML.

The main objective of the OMG is to push CORBA forward as the “Middleware that’s Everywhere” through specifications of standards: CORBA/IIOP, Object Services, Internet Facilities and Domain Interface specifications, UML and other specifications supporting Analysis and Design.

The OMG has three main bodies, the Platform Technology Committee (PTC), the Domain Technology Committee (DTC) and the Architecture Board. The consistency and the integrity of the work produced in PTC and DTC is managed by an Architectural Board. Within the Technology Committees and Architectural Board rest all the Task Forces, Special Interest Groups, and Working Groups that drive the technology adoption process of OMG. OMG’s specifications are written and adopted, following a well-defined process: each company, institution, or government agency can join OMG, and contribute to or influence the specifications.

There are three main methods for influencing OMG processes. The first is the ability to vote on work items or adoptions in the Task Forces that are ultimately reviewed and voted on at the Technology Committee level. The second is the ability to vote on work items or adoptions, at one or both of Technology Committee levels. The third is the ability to actually adopt technology, at one or both of Technology Committee levels.

Membership fees are based on these levels of influence.

OMG was born to create a component-based software marketplace by hastening the introduction of standardized object software. The organization’s charter includes the establishment of industry guidelines and detailed object management specifications to provide a common framework for application development. According to these specifications it will make it possible to develop a heterogeneous computing environment across main hardware platforms and operating systems. Nowadays OMG’s specifications can be implemented on many operating systems in the world. They define standard interfaces for Distributed Object Computing. These specifications are widely used to develop and deploy distributed applications for vertical markets, including Manufacturing, Finance, Telecoms, Electronic Commerce, Real-time systems and Health Care. The big claim of OMG is the adoption of object-orientation (OO) for software development: object management is defined as software development that represents the real world through “objects”. This approach has the usual merits of the OO paradigm (encapsulation, inheritance, modularity, extendibility, re-use, and so on).

OMG only produces specifications (and not software) and distributes them for free. Everybody can download specifications from OMG website for free, write software implementations that conform to the specifications, and use them, give them away, or sell them. Probably the most popular specification is related to CORBA (Common Object Request Broker Architecture). CORBA is supported by UML, the Unified Modelling Language, OMG’s standard for Object Oriented Analysis and Design. UML, in turn, is supported by the Meta-Object Facility, XML Metadata Interchange (XMI), and the Common Warehouse Metamodel (CWM).

The following sections deal with Model Driven Architecture (MDA) approach, a framework that allows to define modelling languages, the Meta Object Facility (MOF) standard, through which MDA concepts find a formalization, and the Architecture of Business Modelling, that aims at organizing and structuring business modelling as a support for decision making.

B.5.1 Model Driven Architecture (MDA)

Model Driven Architecture (MDA) is an evolution of CORBA/OMA that addresses integration and interoperability of software systems over their entire lifecycle, from Analysis and Design, through implementation and deployment, to maintenance and evolution.

Based on UML models, MDA-based development integrates applications of the enterprise, and between one enterprise with another. One attempt of MDA is to provide an overall framework in which the role of OMG and non OMG standards can co-exist and interoperate.

MDA aims to prevent and manage common issues that characterize software development.

Generally software development process has the following phases: conceptualization and requirements gathering, analysis and functional description, project, codifying, test and deployment. Documentation production (textual descriptions, UML diagrams and graphics) is carried out in the first three phases. Each time a modify occurs, it is carried out in terms of code and rarely there's enough time to update the documentation. This approach may create several problems, specially if the project team change every few.

Actually there's a set of problems related to the adoption of new technologies: one of these is the software portability. Periodically, software industry turns out new technologies and several enterprises adopt them. This implies that the value of oldest technologies reduces and software needs to be modified in order to be portable on new platforms.

Another problem is the software interoperability: none software system is projected to work alone. As a matter of fact, nowadays the trend is to develop "component-based" software realities, in order to guarantee easier development and maintenance. As a result, it's clear that a new application has to be interfaced with other systems which already exist. From this point of view, high-level documentation can be considered mandatory.

Model Driven Architecture (MDA) aims to be the answer for these problems. It is a framework, based on Unified Modelling Language (UML) and other standards for visualization, storage and interchange of software projects and models. MDA allows to:

- Describe a system, without regards to the platform that supports it;
- Specify the platform;
- Choose a particular platform for the system and to transform system specifications into platform specifications.

The main objectives of MDA are: software portability, software interoperability, and software reusability. As a result, MDA promotes the creation of abstract and machine-readable models, developed without any reference to the implementation technology and stored in standardized repositories. In this way, MDA guarantees repeated accesses and allows to transform them, automatically or through specific tools, into schemes, code and scripts for different platforms.

Furthermore MDA supports applications for all the application lifecycle, from planning and development to implementation and maintenance; this ensures an essential contribute to the return on investment because available domain models and applications can be reused and adapted.

B.5.1.1 Main Concepts

A system may include lots of things: a program, a single computer system, some combinations or parts of different systems, a federation of systems, but also a person, an enterprise or a group of enterprises.

A model is a description of a system (or part of it) written in a well-defined language that has a syntax and a semantics (specific meanings) and that can be automatically interpreted by a computer.

A metamodel is the representation of model of a well-defined language, known as metalanguage. As a consequence, a metamodel can formally describe all the elements that a model uses.

A system viewpoint is a technique to abstract the use of a selected set of architectural concepts and structural rules, with the aim to focus on a particular aspect inside the system. MDA specifies three types of system viewpoint:

- computation independent viewpoint, that focuses on the environment and system requirements. Structure details and the way of working of the system are not specified.
- platform independent viewpoint, that focuses on system operations, leaving out details for a particular platform;
- specific platform viewpoint, that starts from platform independent view by focusing on details of a specific system platform.

MDA also allows to carry out automatic transformations between models; transformation stands for an automatic generation of an "objective" model starting from a "source" model of the same system. In order to define a transformation, a set of "transformation rules" is necessary; the

rules describe how a model in source language can be transformed in another model in objective language.

First of all a transformation has to preserve the original meaning; the rules must be unambiguous in order to allow a consistent transformation throughout an objective model. A Computation Independent Model (CIM) sees the system independently from the computation; it doesn't show details about the system structure.

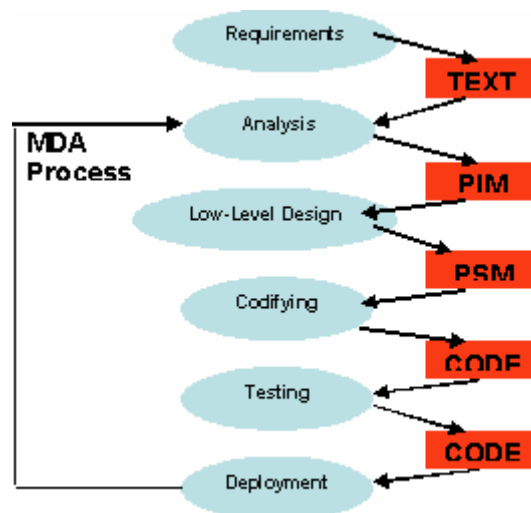
In general, domain experts refer to CIM in terms of domain model or vocabulary. Sometimes they don't know models or artefacts used to achieve functionality for which CIM requirements are articulated. CIM plays a key role in order to fill the gap between domain experts and their requirements, on one hand, and design experts and artefacts construction on the other hand.

Platform Independent Model (PIM) sees the system from a point of view that is independent from the platform; it is suitable for many similar types of platform. Inside a PIM, the system is modelled only considering business information and using a formalism, typically UML.

Platform Specific Model (PSM) sees the system from a point of view that is specific of the platform; it combines PIM specifications with details that specify how that system uses a particular type of platform. For example, a PSM dedicated to DBMS world contains elements as "table", "column", "foreign key". In order to represent a PSM particular and specific UML stereotypes will be used.

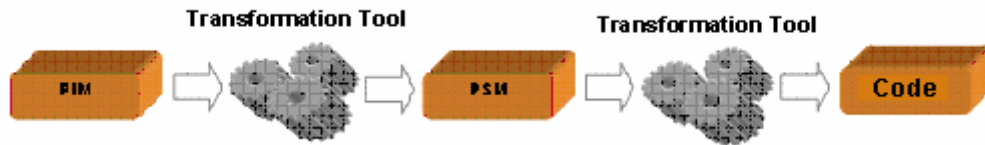
B.5.1.2 MDA Software Development Process

MDA Development Process is similar to traditional process of software development, but it introduces an important change about the production of suitable documentation.



MDA Software Development Process

Requirements phase produces a textual documentation in which system specifications are described in an informal and schematic way. Analysis phase implies the PIM fulfilment; afterwards PIM is transformed in one or more PSMs, according to the adopted technologies. In the following phases the model is transformed in code. Each model has a different level of abstraction: this allows developers to work on different abstraction level in order to build more complex systems, with less efforts. The innovative aspect of this framework is that MDA allows to use specific tools that can automate the transformation process, while traditional approach adopts a manual transformation.



Main phases of MDA Development Process

In order to implement MDA process MDA Building Block are necessary; in particular they are:

- a set of high-level models, that are complete, detailed, coherent, and based on a well-defined formalism;
- a standard formalism able to define these models;
- a set of transformation rules in order to obtain necessary PSMs, starting from a certain PIM;
- a formal language in order to write definitions. It has to be interpretable by specific transformation tools;
- one or more transformation tools that implement the described transformation and that allow to carry out fine-tuning on singular steps;
- a transformation tool, from PSM to code, in order to obtain a complete application.

MDA adoption implies several advantages. From a productivity point of view, in this approach developer's focus is on PIM development. Although the transformation into PSM is a complex operation, it is an activity that can be reused in different contexts. At the moment the main part of developers is engaged to define PIM and this tendency increases the productivity, for two reasons:

1. working at PIM level means that technical and technological details may be omitted;
2. PIM is a business model, so it deals with an ambit that is more similar to reality that final users ask for.

As a consequence it is possible to develop better and faster.

It is clear that productivity increases if there is an instrument that can automatically transform PIM in different PSMs.

MDA approach guarantees the software portability; as a matter of fact a PIM is a model independent from technology so it is always valid. Sometimes it may difficult to find appropriate tools able to transform PIM in different PSMs and which are specific for those PSMs.

MDA approach also guarantees software interoperability, because PSMs generated from a PIM supports interrelations. In MDA ambit they are called "bridges". In order to build a bridge, it is necessary to find a correspondence between specific elements of a PSM and specific elements of another PSM. MDA also defines how to create these bridges (it defines the rules). A complete interoperability will be achieved at a cross-platform level once there are specific tools able to generate PSMs starting from a PIM, and to generate bridges among them and towards other platforms. In this way, investment at PIM level will be safeguarded over time.

MDA allows to correctly manage the maintenance of software documentation. Working with MDA, it is produced a PIM, from which a set of PSM derives; code derives from the PSMs.

So PIM is a high-level representation (made of models) of the code and it is the best source of documentation, always aligned with produced code. Also in this case it's important to use a tool able to preserve and maintain all the relations among PIM and PSMs.

B.5.2 Meta Object Facility (MOF)

In 1997 OMG ratifies Meta Object Facility (MOF). MOF represents a standard that allows to apply basis principles described in MDA approach. It defines an abstract language and a framework in order to build and manage metamodels which are independent from technology.

MOF uses an approach for metadata integration that goes beyond the simple construction of repositories of integrated metadata. In particular, MOF admits that it's possible to have different languages for different aspects of the system, with different abstraction levels. MOF is the key to support MDA because it provides to architects a great liberty of action in defining different modelling languages which will allow to manage different metadata in an integrated way.

Furthermore, MOF defines a framework for implementing metadata repositories, that uses the mapping on other technological standards in order to transform MOF metamodels in API. In this sense repositories are interoperable because they work on different technological platforms.

B.5.2.1 Metadata Architecture

MOF applies MDA principles in order to product software for metadata management, by focusing on metamodels. A MOF Metamodel is a definition of an “abstract syntax” for a language, and some informal and textual elaborations about language semantics. A definition of abstract syntax is a model of classes that uses modelling constructs of UML classes; thus it is possible to use UML tools to define an abstract syntax.

MOF has a stratified metadata architecture, based on four levels that are typical of a classic metamodeling architecture.

These architecture have a layer that links metamodels and models. Levels that mark the architecture are the following:

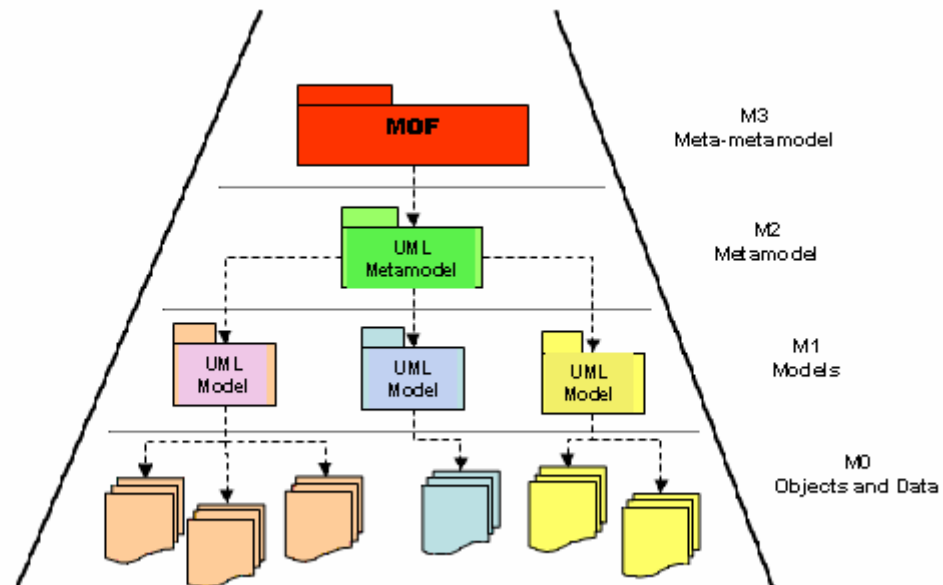
- A meta-metamodel level, that describes structure and semantics of meta-metadata. In other words it represents an “abstract language” for the definition of different types of metadata. This level is defined as MOF, and conceptually it is unique.
- A metamodel level that describes and defines structure and semantics of metadata. Meta-metadata are grouped as metamodels, where a metamodel is an abstract language that describes different types of data, that is a language without a “concrete syntax” (a notation).
- A model level that includes metadata which describe data of previous level. Metadata are grouped as models.
- An information level, that includes data and objects that will be instances of the elements of the previous level.

Advantages of a stratified architecture are several. First of all, this architecture supports all possible modelling paradigms; it allows to inform different types of metadata; it allows the incremental addition of new metamodels and metadata; it supports interchange of models and metamodels among parties that use the same meta-metamodel.

Other characteristics that mark MOF are the following:

- MOF Model, or MOF meta-metamodel, is object-oriented, with metamodeling constructs aligned with modelling constructs about typical UML objects. Although it can be used to define not-OO metamodels;
- Architecture levels can be more than four, according to MOF organization. MOF levels are only a common practice in order to understand relationships among different types of data and metadata;
- A model, as a set of metadata, can have more than a meta-level;
- MOF Model is self-descriptive, it is formally described by its metamodeling constructs. As a result, MOF Model is in the upper level. It is different from others arbitrary MOF metamodels; it is a MOF metamodel of MOF.
- Generally it is better to use a level numbering: M0 indicates information level, M1 indicates model level and so on. In some cases, however, it is better to use “meta” prefix:
- “metadata” refers to data that describe other data;
- “metamodel” refers to a model of a kind of metadata;
- “metaobject” è refers to an abstract object (of a certain technology) that represents metadata.

In the other cases it's better to refers to an element a san instance of a class of the upper level.



Architecture of MOF Metadata

B.5.2.2 Metamodelling Constructs

MOF represents an object-oriented framework, as a consequence its main concepts are:

- Classes, that model MOF metaobjects. Classes defined at M2 level have instances at M1 level; each of these instances is an object and it is characterized by a state and a behaviour. The state and behaviour at M1 level are defined by the class at M2 level.
- Associations, which model binary relations between metaobjects. At M1 level, an association defined at M2 level defines relations among couples of classes' instances. Conceptually these links have not an identity as object, so they haven't attributes or operations.
- Types of data, that model other data. This concept is used to describe values which refers to attributes or operations and, as a consequence, it has not an identity as object.
- Packages, which allow a metamodel modularization, at M2 level, and the creation of "containers" for metadata, at M1 level. They allow to define the validity boundaries of links, attributes and elements.

OMG also provides specifications about mapping of MOF-compliant abstract syntax, that is MOF-compliant metamodels, using a concrete syntax. There are three standardized mapping:

- MOF-CORBA: defined to represent models as CORBA objects;
- MOF-XML (XMI): defined to represent models as XML documents;
- MOF-Java (JMI): defined to represent models as Java objects.

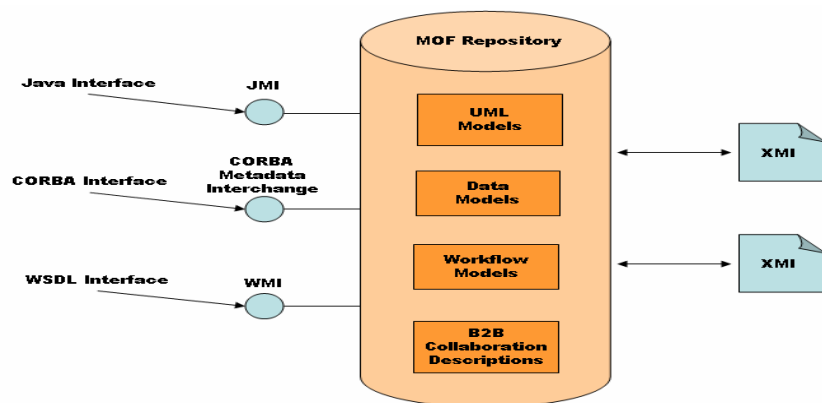
B.5.2.3 Model Repository

The definition of a metamodel is not enough to create its instances. As a matter of fact, we can define several models from the same metamodel. In order to create models that suit a certain metamodel, it is necessary to use a set of objects that allow to create instances. In this approach, key activities are the following:

- to generate interfaces that are related to metamodel elements;
- to implement interfaces.

Metamodel and the set of conforming models make up a "Model Repository". In other words, it is necessary to define a delimited environment in which is possible to create meaningful and valid instances.

For a certain metamodel it is possible to generate more Model Repositories, by adopting different elaboration methodologies. MOF is itself a metamodel, so a MOF Repository can be defined. Inside the repository, metadata is represented as a Java and/or CORBA and/or WSDL object and it can be exported through Java, CORBA and WSDL interfaces. Repository clients will use interfaces in order to create new metadata or to modify or delete another. Model manipulation inside repository takes place using API, that are specific for each type of model. For each model type, a tool produces API for metamodel which describes that type of model. Repositories can also map metadata on XML document, allowing exporting and importing metadata. As a matter of fact, a tool also produce XML DTD or XML-Schema, which describe the format used to import and export models. This MOF functionality allows to use different repositories for different business domains. Metadata exchange among different repositories (in various domains) takes place through XML documents, instead of CORBA or Java interfaces.



Example of MOF Repository

B.5.3 Architecture of Business Modelling

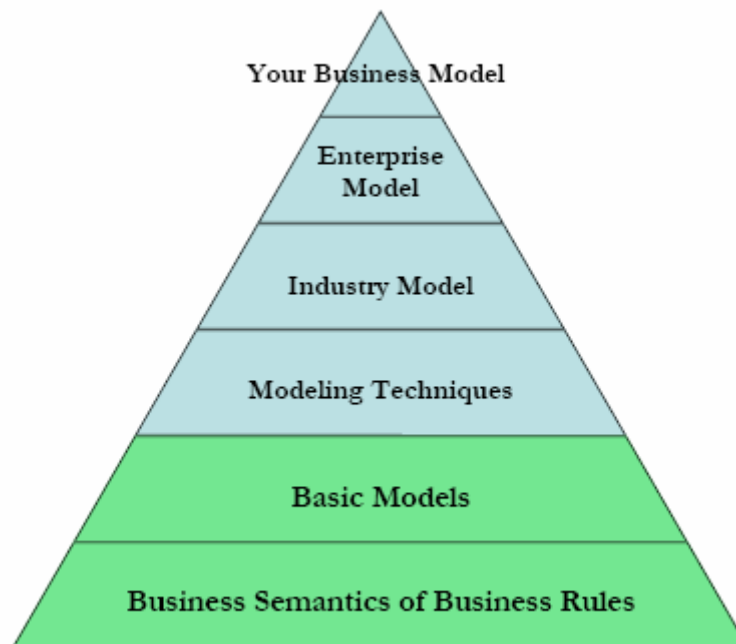
Architecture of Business Modelling, also called Business Modelling Request For Purpose (RFP), is one of the RFPs developed by Business Rules Special Interest Group (BR SIG) of Object Management Group (OMG), with the aim to organize and structure business modelling as a support for decision making. Business Modelling RFP(s) bases on a metamodel that can model any kind of human work activity, in any domain, in language which is familiar to domain experts. Business models contemplated by the Business Modeling RFP(s) have the same perspective of the business owner or planner. Business models focus on the business itself, rather than the information system. In focusing on the concerns of business owners and planners, the business models are independent from implementation considerations, record-keeping systems (automated or manual), or technologies that might be used. Limiting the scope of the business models in this way has the dual advantages of simplifying the modeling process and preserving the ability to use the resultant models with alternative implementation approaches and technologies, as with the OMG's Model Driven Architecture™ (MDA). Business models may describe parts of the business and rules that are not related to an information system as well as those that are. There are uses of business models that transcend system development.

A key objective of OMG Business Modeling is to fill the gap between business and IT, in order to support model driven system development. Business models are expressed in language familiar to "business people", but they are also rigorously mapped to formal logics and are constructed on the OMG's Meta Object Facility™ (MOF) technology. This combination of natural language expression, formal logic, and MOF allows business people to express their domain in their own language and it allows IT professionals to use software programs to interchange, interpret and process the expressions. As such, these business models can effectively serve as Computation Independent Models (CIM) in the MDA.

Business Modelling RFP also supports definition and reuse of specialized vocabularies and multi-level modelling techniques which are general and widely applicable. Individual companies and even different groups within a company need to be able to tailor these vocabularies and techniques to their own needs. This will require means to import and reuse vocabularies and the ability for users to define their own meta-languages based on familiar terminology of their domain, retaining a basic linguistic and logical model underneath.

B.5.3.1 Overall Structure of Business Modelling Metamodel

In order to achieve more flexibility, Business Modelling Metamodel (BMM) adopts a layered approach. Quite independent Packages, also called “basic models”, can together provide the needed range of expressivity and flexibility. General capabilities provide common semantics and promote model interchange and tool interoperability through business modelling techniques.



Business Modelling Metamodel Approach

The pyramid above illustrates the layered approach. The bottom two layers, shown in green, represent the Business Semantics of Business Rules (BSBR) metamodel and the Business Modelling Metamodel (Basic Models) proposed by OMG. The upper layers could be provided by vendors of modelling techniques, industry groups, and so on. “Your Business Model” layer represents a particular model for a particular project or purpose, which leverages the other layers.

Business Semantics of Business Rules (BSBR) package provide the logic basis for others packages; it is made of the Business Vocabulary and Business Rules sub-packages. Business Vocabulary provides the linguistic capabilities for business modelling, fully mapped to formal logic. The Business Rules package adds the capability to formalize logical expressions in natural language using terms of Vocabulary. The other packages define standard terms, facts and rules about the basic subject, specialize BSBR meta-concepts, or extend the BSBR metamodel with additional meta-concepts.

B.5.3.1.1 Basic Models Packages

The objective of Business Modeling RFP is to develop the Basic Models Package. It is made of seven sub-packages. Six of these, should contain an own metamodel in order to model a subject

of basic model. Each subject refers to a question; according to Zachman six questions can virtually describe any business domain: "What? How? Where? Who? When? Why?". Correspondent six sub-packager are (in order) "Business Domain", "Business Process", "Location", "Business Organization", "Event", e "Business Motivation". The last sub-package, "Constructs", contains metamodel that describe standard associations among the six basic models. At the moment these seven metamodels are expressed in UML terms, but in the next submissions they will be expressed in BSBR Metamodel terms.

Let's consider the main characteristics of the packages:

- Constructs Package: it provides a metamodel of rules and useful linkages among the six basic models.
- Business Domain Package: it is a place holder for a standard vocabulary and related rules of the domain, in the domain language. Business Domain package offers a metamodel for a general business domain, since it models concepts as "Product", "Business Function", "Customer", "Asset", "Liability" and "State".
- Business Process Package: it contains metamodel for processes description. Process are described in terms of input, activity, output, rules about sequence, branching, looping and synchronization. Times, places, who or what carries out the activities are not included at this level.
- Location Package contains metamodel that describes geographical locations, business sites, areas, volumes, and perimeters, political subdivisions and boundaries, and logical connections among them.
- Business Organization Package contains the metamodel that describes organizational units, relationships among them, roles performed by each unit. In this package, persons can be modelled as a kind of organizational unit. Hierarchies, partnerships, and federations are parts of the model.
- Event Package contains metamodel of time that includes calendars, clocks, timers, time periods and time intervals, and relationships among them. This package adds temporal logic capabilities to models. Event also describes business events, as temporal ordering or partial ordering in business activity cycle, and supports the definition of event-condition-action rules.
- Business Motivation Package contains metamodel that describes business means, goals, objectives, strategies, tactics, plans, policies, laws, regulations and related elements and rules.

Appendix C: SMEs Use Cases

C.1 Introduction

This appendix describes the results of the task (B4) SME Needs and functional requirements, which takes part of the DBE Business Modelling Language (WP15). It is divided into two parts, whose main purpose is to provide information about the interviewed SMEs. These interviews took place during the weeks 24-25: CW24 between 7th-9th of June 2004 in Tampere-Finland, and CW25 between 14th and 18th of June 2004 in Aragon-Spain.

The first objective of this appendix is to identify the SMEs current status and their business requirements, difficulties and expectations about DBE Project. The second objective is summarising the use cases developed during the interviews with the SME partners. Finally, this work aims at finding necessary information to develop the BML framework, which should be expressed in terms of business concepts.

C.2 Elicitation Techniques

The *elicitation* is the set of activities involved in discovering the requirements for the new "system". It is a process complicated by the multi-dimensional nature, economic and business environment, organisational issues and political factors, and so on.

C.2.1 Traditional – based on questions/dialogues

C.2.1.1 Interviews

Interviews are a very commonly used technique of requirements elicitation. During interviewing, a range of staff is interviewed using structured techniques to identify features and problems of the current system and required features of the future system. Basically, there are two types of interviews:

- Closed interview where the requirement engineer looks for answers to a pre-defined set of questions.
- Open interview where there is no pre-defined agenda and the requirement engineer discusses, in an open way, what stakeholders want from the system.

C.2.1.2 Survey

Surveys are an ideal mechanism to gather and analyse large amounts of direct feedback about members, prospects and employees. They should consist of both open and closed questions.

C.2.2 Model-based – based on tasks/goals

C.2.2.1 Scenarios

Scenarios are examples of interaction sessions, which are concerned with a single type of interaction between an end-user and the system. End-users simulate their interaction using the scenario.

C.2.2.2 Use cases

A use-case is a modelling technique used to describe what a new system should do or what an existing system already does. A use-case model is built through an iterative process during which discussion between the system developers and the customers (and/or end users) lead to a requirement specification on which all agree.

C.2.2.3 Observational – based on watching

It can be passive, where it is based on watching people do task, or active, where an external person becomes part of system.

C.2.3 Exploratory – based on interaction

C.2.3.1 Prototyping

Prototypes are valuable for requirements elicitation because users can experiment with the system and point out its strengths and weaknesses. They have something concrete to criticise. It uses mock-ups of system to encourage realistic interaction. Interactively design requirements for system using scenarios, goals, questionnaires, interviews, etc.

This *requirement elicitation* was carried out in a couple of interviews, surveys (traditional methodology) and use-cases (model-based methodology) with users/stakeholders from different companies, opportunity spaces and regions.

As information-gathering tool, *interviews* have a number of advantages, such as:

- The ability to gather detailed information through a two-way dialogue;
- An open, spontaneous process which can lead to valuable insights, especially when open questions are used;
- Responses that can easily be quantified, especially when closed questions are used;
- Being one of the best methods for gathering qualitative data such as opinions, and subjective descriptions of activities and problems.

The *use-case* is a sequence of actions that provide a measurable value to an actor. Another way to look at it is an use case describes a way in which a real-world actor interacts with the system. Several advantages exist to this approach: the use case becomes easier to test because each statement is easier to understand and to validate.

C.3 Part One: Leisure services

The first part summarises the information obtained from SMEs during the interviews, which took place in Benasque Valley and Saragossa (Spain) by the CW 25 (June 2004).

The focus of the interviews were SMEs, which offer leisure services, such as travel agencies, hotels, sport service providers, food and handcraft gifts, etc.

Nº	Type of organisation	Name	Contact
1.	Travel Agency	Viajes Orienta Siete Mares	Javier Lozano Pérez
2.	Hotel	Hospedaria Hospital de Benasque	Fernando Panart
3.	Hotel	Hotel Ciria	José María Ciria
4.	Real estate business	Habitat Benasque	Manuel Martín Gimeno
5.	Sport service provider	Equipo Barrabés Guías de Montana	Gaby Mur
6.	Sport service provider	Radical Snowboard	Jordi Casas
7.	Sport service provider	Escuela de Parapente Pirineos	Mariano Ucedo Rufat
8.	Food and Handcraft gifts	Sabores de Pueblo	Miguel Chéliz
9.	Governmental	Aramón Montañas de Aragón	Christóbal Roldán Ramírez

C.3.1 Requirement Analysis

This section presents general information about each interviewed SME, a short description of them and about their services and their sub-contracted services. Moreover, the IT infrastructure of the SMEs, and some important information about the IT purchase process of each SME are also presented. Finally, some positive and negative aspects are listed. The positive aspects are related to their expectation of DBE, their IT experiences and their possible future engagement at

DBE Project. Consequently, the negative aspects are related to the SMEs problems, which DBE cannot help, and the ones that DBE could help them to solve.

C.3.1.1 Travel agency - Viajes Orienta Siete Mares

General Information:

1	Country:	<ul style="list-style-type: none"> Spain
2	Address	<ul style="list-style-type: none"> San Clemente 18 50001 Saragossa Phone: + 34 (976) 79 43 44 Fax: 976 79 43 40 Email: empresas@viajesorienta.com www.viajesorienta.com
3	Contact:	<ul style="list-style-type: none"> Javier Lozano Pérez Manager
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> Transportation and Travel OEM Limited company 13
5	Outsourced services:	<ul style="list-style-type: none">
6	Clients:	<ul style="list-style-type: none"> Spain Companies (most profitable offered service is Meeting in Nature) Congress/Conventions: <ul style="list-style-type: none"> 90% Spain 10% International

Description:

Viajes Orienta Siete Mares is a travel agency specialized in customized high-quality trips and tourist services tailored to client demands with a long experience of more than twenty years in tourism. The team of professionals are high qualified that ensures the success of the individual or business trips of the clients. Orienta offers a guaranteed best price service through a comparative budget between the different suppliers. Orienta selects single responsible suppliers with absolute reliability and a high standard of quality.

Services:

- Conventions: conventions have become an essential tool in the communication between top management and its employees. Its core concept is a "no stressful sessions of work" for the participants, and its newest element is "the stimulus and pride of being a member of a successful group". Orienta help companies to organize its convention on an original and customized form, taking care of all details to assure a unique, motivated and unforgettable event to all guests and participants.
- Incentive travel: An Incentive trip is an excellent investment for companies, since it motivates the employee in his/her activities. Therefore, it is important to trust an agency to guarantee that the participants obtain the greater benefits of the trip.
- Big accounts: to optimise the finance account of the companies through:
 - flight tickets: until 25% off on standard rate;
 - Hotels: between 10 and 50% off on official tariff.
 - Rental car: until 40% off on official prices.

- Congress: Orienta is an active, dynamic and innovating agency in the sector of Professional Congress Organizer (PCO) with 20 years of experience in the sector, which it can ensure the success of the congress through dedicated time to prepare the congress content and to arrange the innumerable technical, lodging and social details of the congress program. A congress is a unique opportunity that demands the aid of professionals of the sector.

Extra services (sub-contractors):

- Sportive activities
- Catering
- Transportation

IT-Infrastructure:

1	Connection	<ul style="list-style-type: none"> ▪ 3 ADSL (Galileo, Amadeus Professional, and Internet)
	Technological platform	<ul style="list-style-type: none"> ▪ Windows NT/2000
	Database	<ul style="list-style-type: none"> ▪ Access
	Security	<ul style="list-style-type: none"> ▪ Firewall (but it slowed down the system so they turned off)
2	Office Software	<ul style="list-style-type: none"> ▪ MS Office ▪ Adobe reader
	Extra Software	<ul style="list-style-type: none"> ▪ OfiViaje (www.ofiJean.com)
	Future acquisitions	<ul style="list-style-type: none"> ▪ CRM (but price and implementation time too high) ▪ WiFi ▪ Intranet between Orienta offices ▪ Web site in English for foreigner customers
3	Internet	<ul style="list-style-type: none"> ▪ Email internal and external ▪ Information / research ▪ Booking flies and hotels (www.bancotel.es; www.transhotel.com; Galileo, Amadeus and Amadeus Pro Systems) ▪ Presentation of products and services
	Web-site	<ul style="list-style-type: none"> ▪ Information to companies (incentive travel, conferences & conventions; and company account) ▪ Information about trips (Safari, Paradise islands, Ecologic sites, and classical trips in Africa, America, Oceania, Middle East, Asia, and Europe) (link to http://www.tandem-tours.com/indexAlta.html) ▪ Information about cheaper trips (link to http://travelofertas.com/index.php) such as active vacation. ▪ Rates ▪ Spanish ▪ Magazine (www.masdeviajes.com) ▪ Bulletin/Forum
4	Systems with partners: (These systems could avoid costs on telephone calls and speed up the process)	<ul style="list-style-type: none"> ▪ Reverse auction system to hotels rooms. ▪ On line system with password for catering services, where Orienta could log in and specify the menu to a specific amount of people. The system generates automatically an offer to Orienta based on its demands. ▪ "Messenger system" between clients and Orienta ▪ "Messenger system" between Orienta and small hotels without booking system

IT-Purchase process:

1	Purchase decision by:	▪ Group
	Interviewed personally involved	▪ Yes (Mr. Lozano Pérez – Manager)
	Payback (ROI)	▪
2	Software vendor selection	▪ Acceptance of the employees ▪ Price ▪ Product functionality

Difficulties and Expectations:

- Mr. Pérez is an IT enthusiastic, he always tries to find a way to save his client's working time during a trip arrangement. He understands the concept -"Time is money", so if a supplier needs 3 days to send him an offer and afterwards more telephone calls to handle price and conditions, it means that he lost time and money. Therefore, he would like to integrate more IT to support some activities, such as online reverse auction for reservation rooms. It can help him while he organises a conference/congress, when the demand of rooms is high. Another support could be a kind of "online messenger" between Orienta and its special clients (companies) to solve problem and demands faster than nowadays by phone.
- Language of web site: only Spanish, although they want to increase market area.
- Despite the knowledge of the advantages of a CRM system. Mr. Pérez hadn't implement this system, he would like to acquire one with a high cost-benefit range.

C.3.1.2 Hotel - Hospedaría Hospital de Benasque**General Information:**

1	Country:	▪ Spain
2	Address:	▪ Camino Real de Francia s/n ▪ 22440 Benasque (Huesca) ▪ Phone: + 34 (974) 552 012 ▪ Fax: + 34 (974) 306 866 ▪ Email: infos@llanosdelhospital.com ▪ www.llanosdelhospital.com
3	Contact:	▪ Fernando Panart ▪ Manager
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	▪ Hotel and Restaurant ▪ OEM ▪ Limited company ▪ 35 ▪ ▪
5	Outsourced service	▪
6	Clients:	▪ Spain (Madrid and Levante) ▪ 90% direct reservation ▪ 5% through travel agencies ▪ 5% companies (conventions and meetings)

Description:

Hospital de Benasque is a hotel located in the core of the Natural Park Possets-Maladeta. It was a refuge for walkers, and after eight centuries since its creation by the Hospitalarian monks, it was reconstructed.

Services:

The Services provided by Hospital de Benasque include: Lodging and Restaurant.
 The Services provided by Llanos del Hospital Ski station include Ski school and Ski resort.
 Other services offered:

- Rental Nordic skiing equipment
- Conference room
- Swimming pool
- SPA (Wellness)

Extra services (sub-contractors):

- Hiking, climbing, trekking, paragliding, rafting, horse riding, guide's service, etc..

IT-Infrastructure:

1	Connection	<ul style="list-style-type: none"> ▪ Radio (credit card only) ▪ Mobile ▪ Modem
	Technological platform	<ul style="list-style-type: none"> ▪ Windows NT/2000
	Database	<ul style="list-style-type: none"> ▪ Access
2	Office Software	<ul style="list-style-type: none"> ▪ MS Office
	Extra Software	<ul style="list-style-type: none"> ▪ Reservation management system (Visual basic) ▪ Billing system
3	Internet	<ul style="list-style-type: none"> ▪ Email internal and external ▪ Information / research ▪ Presentation of products and services ▪ Banking transactions
	Web-site	<ul style="list-style-type: none"> ▪ Language: English, Spanish, and French ▪ Information ▪ Rates ▪ Maps ▪ Photos and films (rooms) ▪ Virtual tour (area) ▪ Weather ▪ Snow conditions ▪ Bulletin

IT-Purchase process:

1	Purchase decision	<ul style="list-style-type: none"> ▪ Individual
	Personally involved	<ul style="list-style-type: none"> ▪ Yes (Mr. Panart – Manager & CIO)
	Payback (ROI)	<ul style="list-style-type: none"> ▪ 6-12 months
2	Software vendor selection	<ul style="list-style-type: none"> ▪ Modern software architecture ▪ Price ▪ Product functionality

Difficulties and Expectations

- Mr. Panart worked as a computer systems analysts in the automotive company; he is an IT enthusiastic, and he knows about its possibilities. And the Benasque community knows about his IT expertise and believes in his judgement. Therefore, Mr. Panart is a possible key partner to this project. He can influence the others to take part.
- Mr. Panart believes that with "DBE Platform" he can get another kind of guests, which stays for a longer period (more than 2 days).

- Due to the difficulties over the control of the purchased and consumed material (specially beverages and cleaning products), Mr. Panart expects to find through DBE Platform an inventory system to his hotel/restaurant.
- Mr. Panart reservation process offers the possibility of a fully automate reservation process; despite of this he doesn't want it fully automated. He wants to get in touch with his clients and explain them the hotel conditions (price and accessibility). Mr. Panart thinks it is too dangerous to have a fully automated system to subcontract services.
- The employees responsible for the different services (cleaning, food & drinks, etc.) directly purchase their materials. This decentralized process has its advantages, but the problem is that Mr. Panart doesn't have any control over the material purchased and consumed. The stock management of beverages and cleaning material is quite difficult.
- Because of avalanches during the winter, it is possible to stay without telephone communication or access in the main road from Llanos de Hospital to Benasque
- Mr. Panart doesn't like to work with travel agencies and reservation centres, mainly because they are interested in his hotel only during the high season (winter). But during summer time, when he needs help to get new clients, they just forget him. Another problem is that either the reservation centres dictate the room price or the hotel has to pay a fee to them to take part of their database, consequently the hotel profit margin decreases.

C.3.1.3 Hotel - Hotel Ciria

General Information:

1	Country:	<ul style="list-style-type: none"> ▪ Spain
2	Address:	<ul style="list-style-type: none"> ▪ Avda. de los Tilos s/n ▪ 22440 Benasque (Huesca) ▪ Phone: + 34 (974) 55 16 12 ▪ Phone: + 34 (974) 55 10 80 ▪ Fax: + 34 (974) 55 16 86 ▪ Email: hotelciria@hotelciria.com ▪ www.hotelciria.com
3	Contact:	<ul style="list-style-type: none"> ▪ José María Ciria ▪ Manager
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> ▪ Hotel and Restaurant ▪ OEM ▪ Limited company ▪ 27 ▪ ▪
5	Outsourced service	<ul style="list-style-type: none"> ▪ Accounting (ACI Group)
6	Clients:	<ul style="list-style-type: none"> ▪ Spain ▪ Winter: 50% Madrid, 20% Catalonia, 30% Astoria, Valencia, etc. ▪ 80% Private ▪ 20% Travel agencies

Description:

This is a nicely decorated mountain hotel for nature lovers and adventure sports. The hotel offers 44 rooms, distributed in three floors, equipped with full bathroom, air conditioning, heating, hairdryer, mini-bar, satellite TV, telephone with direct dial, radio, video and balcony. All Suites have a Jacuzzi. Facilities available to guests include bar/café, TV room, lounges, garden/terrace, bicycle hire, professional massage, disabled facilities, lift, medical service, and laundry, meeting rooms, money exchange, fax, car park and garage.

The hotel is located 148 km away from Huesca and 212 km away from Jaca in the Benasque Valley.

Services

- Hotel: there are double and single rooms at the first and the second floors, with complete bath, hair-dryer and TV-color, and the majority with terrace.
- Restaurant: Dionisio Ciria is in "charge of the ovens", "El Fogaril" is one of the best restaurants in the valley. It is specialized in typical kitchen from Aragon and other native dishes recovered by the traditional culinary of the area (Pyrenees).

Extra services (sub-contractors):

- Sportive activities – special customers → direct contact with Barrabés Equipo common customers → <http://www.benasque.com/activid.html>
- Sport schools – special customers → direct contact with Barrabés Equipo common customers → <http://www.benasque.com/escuelas.html>

IT-Infrastructure:

1	Connection	<ul style="list-style-type: none"> ▪ ASDL ▪ WiFi
	Technological platform	<ul style="list-style-type: none"> ▪ Windows NT/2000
	Database	<ul style="list-style-type: none"> ▪ Access (data concerning the Hotel management system)
2	Office Software	<ul style="list-style-type: none"> ▪ MS Office
	Extra Software	<ul style="list-style-type: none"> ▪ Hotel management system (reservation and billing)
3	Internet	<ul style="list-style-type: none"> ▪ Email ▪ Information / research ▪ Presentation of products and services
	Web-site	<ul style="list-style-type: none"> ▪ Information ▪ Rates ▪ Language: Spanish ▪ Maps ▪ Photos (rooms) ▪ Virtual tour (rooms) ▪ Weather forecast (http://www.benasque.com/meteo.html) ▪ Sport activities (http://www.benasque.com/activid.html) ▪ Sport schools (http://www.benasque.com/escuelas.html)

IT-Purchase process:

1	Purchase decision	<ul style="list-style-type: none"> ▪ Individual
	Personally involved	<ul style="list-style-type: none"> ▪ Yes (Mr. Ciria – Manager & Owner)
	Payback (ROI)	<ul style="list-style-type: none"> ▪
2	Software vendor selection	<ul style="list-style-type: none"> ▪ Consultancy service (Barrabés Business Solutions - http://www.barrabesinternet.com/homebs.asp)

Difficulties and Expectations:

- Mr. Ciria is interested in the project.

- Mr. Ciria doesn't like to offer sub-contracted services such as sport activities, because it means more responsibilities, but he offers special services, such as accompany service to British Ornithologists to observe the bird species of the area. He already has a network of service providers whom he contacts by telephone.
- Mr. Ciria offers events to his clients, such as special weekends and complete packages, which he needs to contact his network of service providers for this extra activities, such as Barrabés, tour guides for Ornithologists, etc..
- The Hotel Management System satisfies Mr. Ciria expectations, it manages all reservation, client expenses, material inventory and generates the client's bill/receipt.
- Language of the web site: only Spanish, although they want to get more foreigner customers.

C.3.1.4 Real Estate Business - Habitat Benasque

General Information:

1	Country:	<ul style="list-style-type: none"> Spain
2	Address:	<ul style="list-style-type: none"> Avda. de los Tilos s/n Edificio Sayo II 22440 Benasque (Huesca) Phone: + 34 (974) 55 12 64 Fax: + 34 (974) 55 14 58 Email: info@habitatbenasque.com www.habitatbenasque.com
3	Contact:	<ul style="list-style-type: none"> Manuel Martín Gimeno Manager
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> Real estate business OEM Limited company 8
5	Outsourced service	<ul style="list-style-type: none">
6	Clients:	<ul style="list-style-type: none"> Spain (Cataluna, Valencia, Madrid, and Euskadi) Private and travel agencies, but no groups. 76% clients are loyal High amount of regular clients

Description:

Habitat Benasque is a company located in the valley of Benasque, it works as a real estate business and has been renting apartments since 1992. It offers to its clients an ample supply of apartments, where they can enjoy their leisure time. At the web site of Habitat Benasque there are also information about existing services in the Valley. If a client wishes to acquire a second house, he/she only needs to ask Habitat Benasque professional team to find the apartment.

Services:

- Rental apartments: Offers for rental apartments for vacation in Benasque, Cerler and Eriste. The rental service includes only the apartment (lodging). The client must rent an apartment for at least 7 days.
Summer 2004: Apartments at Habitat Benasque-Cerler, Residencial Linsoles, and Residencial Ribagorza. The types of apartments are: Type A (dinner room, 1 sleeping room, sofa bed, kitchen and bathroom), Type B (dinner room, 2 sleeping rooms, sofa

bed, kitchen and bathroom), and Type C (dinner room, 3 sleeping rooms, kitchen and 1 or 2 bathrooms). The rates are divided into low, medium and high season; and the apartments types.

- Sales: Information about the apartment, such as
Location: For example: Apartments with 2,3 or 4 rooms, located in the heart of Benasque village in the Valley of the same name. They are close to the Natural Park Posets-Maladeta, the alpine ski resort of Cerler and to Nordic ski resort of Llanos del Hospital. The building is constructed in natural stone and old wood, taking part of a tourist residential complex that by its quality and services is unique in the Pyrenean area. Its architectonic style is absolutely integrated with the nature.
Structural condition: Here, there is a description about some structural conditions of the building, such as: facade, floor, heating, telecommunication facilities, garage, etc.
Plan/Layout: The client can see the architectonic plans of the offered apartment.
Photos: The client can see the photos from the building.
- Second hand apartments: Offers of relatively new apartments, with an antiquity mainly between 3 and 7 years. It is also offered businesses, lands, and old houses to reform, stables and/or barns. Contact by telephone, fax or email.

Extra services (sub-contractors):

- Sport activities for very special guests: direct contact with Barrabes.

IT-Infrastructure:

1	Connection	▪ ADSL
	Technological platform	▪ Windows NT/2000
	Database	▪ Access (client data)
2	Office Software	▪ MS Office
	Extra Software	▪
3	Internet	▪ Information ▪ Presentation of products and services ▪ Email external (clients) ▪ Merchandise through "El Corte Inglés"
	Web-site	▪ Information ▪ Spanish ▪ Maps ▪ Rates (summer and winter)

IT-Purchase process:

1	Purchase decision	▪ Individual
	Personally involved	▪ Yes (Mr. Jimeno – Manager)
	Payback (ROI)	▪
2	Software vendor selection	▪ No ASP ▪ Consultancy from Grupo7 (http://www.grupo7.com/)

Difficulties and Expectations:

- Mr. Gimeno invests in advertising in many specific magazines, press and El Corte Inglés (department store in Spain).
- Accounting and billing done computer-based, but not integrated with all other systems and client database.
- A table with all confirmations (rent apartments) is done in the end of each month. This is a handmade table and Mr. Gimeno doesn't want to automate it.
- Language of web site: only Spanish.

- About the DBE Project, Mr. Gimeno thinks it will be like all other projects (it will not be as successful as expected), it will be like any reservation centre system.

C.3.1.5 Sport Service Provider - Equipo Barrabés Guías de Montaña

General Information:

1	Country:	<ul style="list-style-type: none"> Spain
2	Address:	<ul style="list-style-type: none"> Equipo Barrabés Guías de Montaña (part of the group Barrabés Esquí & Montaña) Edificio Barrabés Ctra.Francia s/n 22440 Benasque (Huesca) Phone: +34 (974) 551 056 Fax: +34 (974) 551 681 Mobil: +34 902 14 800 www.barrabes.com/equipo/portada.asp
3	Contact:	<ul style="list-style-type: none"> Mr. Gaby Mur (Manager)
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> Sport and Leisure Service Provider Limited company 2-23
5	Outsourced service:	<ul style="list-style-type: none"> Accounting (Barrabes)
6	Clients:	<ul style="list-style-type: none"> Spain 70% private 10% retailers 10% wholesalers Relationship based on tradition

Description:

The Equipo Barrabés Guías de Montaña is a group of professionals, whose objective is to supply all clients with a very customized treatment, assuming to transmit with rigor and high quality the techniques guaranteeing security and fun.

The Equipo Barrabés is divided into two departments, the Equipo Barrabés Guías de Montaña and Equipo Barrabés School of Ski and Snowboard

The Equipo Barrabés Guías de Montaña works in the Pyrenees, but offers also courses in the Alps and trips to the Andes.

At the moment, its office is in the store Barrabés Esquí y Montaña dedicated to the Ski and Mountain equipment. It is also possible to get information by Email equipo@barrabes.com, by phone or under www.barrabes.com

The Equipo Barrabés Guías de Montaña has vehicles to offer its clients a complete service, transportation to the area of activity by vehicles 4x4 or trips to other courses sites in Spain or abroad.

Services:

- Winter: skiing school*, mountain guides
- Summer: mountain guides, cliffs, trekking, mountain bike tour, etc.

Extra services (sub-contractors):

* Star products

- Rafting*
- Climbing*
- Paraglide
- Snowboard
- Kayak
- Lodging (reservation made only for special clients)
- Mountain refuge: reservation made by phone at least 3 days in advance.

IT-Infrastructure:

1	Connection	▪ ADSL (from Barrabés Equipment Store)
	Technological platform	▪ Windows NT/2000
	Database	▪ Access
2	Office Software	▪ MS Office
	Extra Software	▪ All software from Barrabés store (full integration) ▪ Coming soon: Online Reservation System (Filemaker)
3	Internet	▪ Information ▪ Presentation of products and services ▪ Email external (clients) ▪ Weather forecast
	Web-site	▪ Information ▪ Booking Form (but not saved in any DB) ▪ Spanish ▪ Maps ▪ Rates

IT-Purchase process:

1	Purchase decision	▪ Individual
	Personally involved	▪ No (Barrabés – IT Manager)
	Payback (ROI)	▪
2	Software vendor selection	▪ Consultancy service (Barrabés Business Solutions - http://www.barrabesinternet.com/homebs.asp)

Difficulties and Expectations:

- Mr. Mur has a good informal network, and he can influence other active sport companies to take part in DBE project.
- He plans to get in touch with travel agencies, which are not familiar with his company's activities. It can open to his company a great market.
- An expected advantage is to connect his company with sport clubs and travel agencies.
- Mr. Mur advertises the Equipo Barrabés in fairs, catalogues and magazines specialized on the tourism sector.
- The group Barrabés is a pioneer using IT in Spain; it was the first company to sell through Internet (www.barrabes.com). Consequently, it was founded another company specialized in IT and e-Business (Barrabés Business Solutions - <http://www.barrabesinternet.com/homebs.asp>).
- Most of the booking process for outsourced activities (sub-contractors) and mountain cottages are done by telephone and in most of the cases is constrained by weather conditions, guider availability, etc.
- Difficulty to standardize a billing system, due to different types of charge, such as guides by hour, rafting by period, long trips by day.

C.3.1.6 Sport Service Provider - Radical Snowboard

General Information:

1	Country:	<ul style="list-style-type: none"> Spain
2	Address:	<ul style="list-style-type: none"> Edificio Ribagorza Avda. de Francia s/n 22440 Benasque (Huesca) Phone: +34 (974) 551 425 Mobil: +34 678 404 546 Centro Comercial 22449 Cerler (Huesca) Phone: +34 (974) 551 433 Email: radical@radicalsnowboard.com Email: escuela@radicalsnowboard.com www.radicalsnowboard.com
3	Contact:	<ul style="list-style-type: none"> Mr. Jordi Casas (Manager – Owner)
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> Sport and Leisure Service Provider Limited company 14 (18 by winter)
5	Outsourced service	<ul style="list-style-type: none"> Accounting
6	Clients:	<ul style="list-style-type: none"> Spain, Holland, and Portugal 60% private (Groups) 40% travel agencies (group of school-kids from Barcelona – about 1770 hours of classes)

Description:

Company specialized in winter sports especially snowboard activities.

Services:

- Snowboard school: A 10 years old dedicated snowboard school, which offers private classes and snowboard courses. There are also special classes for: freestyle and free riding, preparation for specific exams (Los Bloques), and other techniques. Specialized instructors in teaching kids up to 5 years.
- Back country (Free ride snowboard trips): This service is offered to all snowboarders, who like free ride and nature contact. A pre-evaluation of the snowboarder level is required, though it is accessible to all levels. Trips take place anywhere in the Pyrenees, specially by Cerler ski station (Cibollés, Caranasa, Canal Amplia, Sarrau, Gallinero south, La Olla, etc.) or Llanos del Hospital (possibility of free ride through different summits of the Posets-Maladeta natural park)
- Radical Sleds (Snowmobile/Sleds): A plenty new service offered to reach hidden places of Cerler station full of new sensations. The client is introduced to this fascinating circuit mounted in Ampriu area. There are different possible guided excursions itineraries
- Snow work: A company dedicated to carry out services where the accesses are practically impossible due to the snow conditions, and meteorological situations. These areas are reached by ATV Quad 4x4 and snowmobiles (sleds). Maintenance of TV repeaters and mobile antenna were works done already.
- Freeski: It is offered courses and private classes of radical (extreme) snowboard.
- Other course: Telematik

Extra services:

- Clothing store
- Rental equipment
- Repair shop
- Internet café at "La Cabana"

IT-Infrastructure:

1	Connection	▪ ADSL
	Technological platform	▪ Windows NT/2000
	Database	▪ Access ▪ Excel (sales and teachers' payments)
	Security	▪
2	Office Software	▪ MS Office ▪ Excell (sales and instructors' payment)
	Extra Software	▪ AM Táctil y Tecnidata
	Future acquisitions	▪ Web site in English for foreigner customers ▪ Online registration
3	Internet	▪ Email external ▪ Information / research ▪ Purchase equipment ▪ Outsourced: http://www.linza.net/html/inicio.html
	Web-site	▪ Language: Spanish ▪ Presentation of products and services ▪ Information to clients about free ride trips, snowboard school, special work on snow, ▪ Rates ▪ Bulletin / Forum ▪ News ▪ Link to weather forecast (http://www.cerler.com/asp/partenieve.asp)
4	Systems with partners: (These systems could avoid costs on telephone calls and speed up the process)	▪

IT-Purchase process:

1	Purchase decision by:	▪ Group
	Interviewed personally involved	▪ Yes (Mr. Casas – Manager)
	Payback (ROI)	▪
2	Software vendor selection	▪ Price ▪ Recommendation (friend/family)

Difficulties and Expectations:

- Mr. Casas would like to have the booking process completely automated and all systems integrated.
- Mr. Casas never used any ASP system but he couldn't have problems to use hosted systems.
- Mr. Casas invests on advertisement in many specific magazines and brochures.
- Mr. Casas works together with hotels offering vacation packages. Now he offers also these packages through other web sites.

- Mr. Casas expectations are high in relation with DBE Project, specifically concerning reliable cost-benefit of automated solutions for his needs.
- Language of web site: only Spanish, although they want to increase market area.
- Spanish ski school has a monopoly on the slopes to sell courses and classes.

C.3.1.7 Sport Service Provider - Escuela de Parapente Pirineos

General Information:

1	Country:	<ul style="list-style-type: none"> Spain
2	Address:	<ul style="list-style-type: none"> Avda. El Ral 54 22466 Castejón de Sos (Huesca) Phone: +34 (974) 553567 Fax: +34 (974) 553567 Mobil: +34 689 090838 E-mail: escuela@parapentepirineos.com www.parapentepirineos.com
3	Contact:	<ul style="list-style-type: none"> Mr. Mariano Ucedo Rufat (Manager – Owner)
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> Sport and Leisure Service Provider Limited company 2 (+8 instructors, +1 chauffeur, +1 cameraman)
5	Outsourced service	<ul style="list-style-type: none"> Accounting
6	Clients	<ul style="list-style-type: none"> Spain Madrid, Barcelona, and Valencia Courses (1 week): 75% Initiation; 25% Advanced 15% and increasing every year the participants of double flights (trial) Private (few travel agencies); students (University or Schools) 90% regular customers 60% friends recommendation

Description:

This paragliding school has been established in 1985 in Castejón de Sos, more than two thousand students got lessons and more than forty thousand flights took place under its supervision. Today "Parapente Pirineos" offers a complete, progressive and customized education, with the best and the most modern material and in the best zone of flight - The Castejón de Sos, in the heart of Pyrenean (Aragon). The school is recognised by the Spanish Aeronautical Federation.

Services:

- **Beginners & Advancer courses:**
 The initiation course is for those people who never have flown and want to begin with paragliding. The approximate duration of the course is five or six days and daily six or eight hours. The minimum age is 16 years old, with parents' authorization until the age of 18. The people older than 50 years old will only be able to make the course if they are in very good physical condition.
 The requirements to take part on the advanced course is to have made a complete initiation course, have done at least five flights in the last two years and to be in good

physical condition. This course is the continuation of the initiation course and the objective is to know new sites flight, improve the pilot technique, to acquire experience and to reach autonomy in well-known flight and calmed aerologic zones.

- High yield cross:

For totally independent pilots, who have made one or more advanced official training courses and have experience with thermal flight. It is not about a course, but five days of flight attended by an instructor who will help the participant to choose the flight zone, to evaluate the conditions, the possibilities and the risks. The instructor flies with or before the participant, communicates by radio with the student, which improves the ancestries and informs the landing conditions as well as the risks. It is included transportation to the takeoff and landing areas.

These courses are programmed based on the demand and there isn't a fixed calendar, but they don't take place during August. It is necessary to have a minimum of four students. The price is similar to the advanced course: 425€.

- Solo flights:

For those people who already have made an initiation course, the school offers the possibility of flying with equipment and advising of an instructor. It is the ideal form to continue acquiring experience with a maximum security and without having to buy a paraglide. The school provides the complete flight equipment (paraglide, radio and helmet), the transportation to the takeoff and landing area, advising by an instructor in the takeoff and another during landing.

- Double flights:

This is a two-seats paraglide fly with a qualified instructor. Any previous knowledge is not required, so if you have between 8 and 80 years and want to have a different vision from the world.

- Competition:

An example of a competition organised by Parapente Pirineos is the "XI Paraglide Pyrenean Cup", which took place in Castejón de Sos during 28, 29 and 30 of May 2004. It was valid to the National League and the Paraglide championship of Aragón, organized by the "Federación Aragonesa de los Deportes Aéreos" and the Paraglide Pyrenean Club. This competition has an Open-style and is recognized as a category FAI II.

Extra services:

- Sales of equipment
- Rent of equipment
- Repair shop
- Organisation of competition

IT-Infrastructure:

1	Connection	<ul style="list-style-type: none"> ▪ Analogcommunication channel (RTB- Red Telefónica Básica) ▪ Coming soon: ADSL + WiFi
	Technological platform	▪ Windows NT/2000
	Database	<ul style="list-style-type: none"> ▪ Access ▪ Excel
	Security	▪
2	Office Software	<ul style="list-style-type: none"> ▪ MS Office ▪ Excel (Billing)
	Extra Software	▪
	Future acquisitions	▪ Web site in English for foreigner customers
3	Internet	<ul style="list-style-type: none"> ▪ Email external ▪ Information / research

	Web-site	<ul style="list-style-type: none"> ▪ Language: Spanish ▪ Information to clients about paraglide flights, courses, competitions, events, licences ▪ Online Booking ▪ Rates
4	Systems with partners: (These systems could avoid costs on telephone calls and speed up the process)	<ul style="list-style-type: none"> ▪

IT-Purchase process:

1	Purchase decision by:	<ul style="list-style-type: none"> ▪ Individual
	Interviewed personally involved	<ul style="list-style-type: none"> ▪ Yes (Mr. Ucedo Rufat – Manager)
	Payback (ROI)	<ul style="list-style-type: none"> ▪
2	Software vendor selection	<ul style="list-style-type: none"> ▪ Price ▪ Recommendation (friend/family)

Difficulties and Expectations:

- Mr. Ucedo Rufat is an IT enthusiastic, given that he has an Access DB with his clients historical data. He saves the data of all sub-contracting services in- and outsourced services (given and received) on Excel tables.
- Mr. Ucedo Rufat sends advertisements and discount rates of all courses to the current students every year .
- Language of web site: only Spanish, although they want to increase market area. This translation service can be easily offered through DBE Platform.
- Despite of advantages from a complete automated booking process, Mr. Rufat is quite sceptical about it. It will be necessary an intensive teamwork between DBE partners and Mr. Rufat to encrease his enthusiasm.

C.3.1.8 Food and Handcraft Gift Shop - Sabores de pueblo**General Information:**

1	Country:	<ul style="list-style-type: none"> ▪ Spain
2	Address:	<ul style="list-style-type: none"> ▪ Avda. Ordesa ,2 ▪ 22330 Ainsa (Huesca) ▪ ▪ Calle San Sebastián 3 ▪ 22440 Benasque (Huesca) ▪ ▪ Phone: +34 974-500062 ▪ Fax: + 34 974-510011 ▪ E-mail: info@saboresdepueblo.com ▪ www.saboresdepueblo.com
3	Contact:	<ul style="list-style-type: none"> ▪ Mr. Miguel Chéliz (Manager)
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> ▪ Food ▪ Wholesale (direct sales) ▪ Limited company ▪ ▪ ▪

5	Outsourced service	▪ Accounting
6	Clients	▪ Spain ▪

Description:

Angela Sierco founded the store Sabores de pueblo in 1972 in Ainsa, a precious touristic town of the Pyrenean (Huesca). Since its foundation it is a family owned company, commercialising general high quality aliments of the region (Aragon). In 1997 and 1998 the descendants of Mrs. Angela Sierco (Mr. Miguel and Mrs. Chéliz) opened two other stores in Ainsa and Benasque for handcraft, bio/ecological products of the region.

Since 2002 there is also an online shop with all products available at the 3 stores. A client can order online and in about 24hours the order is delivered at his/her address in Spain. An international delivery is also available, constraint by special delivery channel, customs duty rules and taxes, which the client needs to agree to this extra payment.

Services:

- Direct purchase (3 stores)
- Bulletin (<http://www.saboresdepueblo.com/boletin/suscripcion.asp>)
- Explanation about the purchasing process: legal aspects, general information, how to buy (http://www.saboresdepueblo.com/tienda/proceso_compra.asp)
- Special baskets for companies or hotels: contact info@saboresdepueblo.com or call +34 974-500062
- Online purchase
- Type of products:

Oil & Vinegar	Conserves & Patés	Sweats	Ham & Sausage	Liqueurs	Jam & Marmalade	Honey	Cheese
Chocolate	Torrone	Mushroom	Wine	Books & Music	Bio/Eco Products	New products	Baskets

- Recipies (first, second dishes and desserts) linked to the products sold online (<http://www.saboresdepueblo.com/recetas/recetas.asp?tipo=1>)

BRAZO DE GITANO

INGREDIENTES PARA 10 PERSONAS

- 8 huevos
- 8 cucharadas de azúcar
- 8 cucharadas de harina
- 2 sobres de gaseosas Armisén
- 1 bote de mermelada artesana de frambuesa

ANADIR A LA CESTA

MERMELADA ARTESANA DE FRAMBUESA

Precio: 5,52 €

¿Qué puedo cocinar con este producto?

Unidades: 1

COMPRAR

Preparación:

Postre casero que se hace desde hace muchos años en todos los pueblos del Alto Aragón, principalmente en alguna celebración o fiestas. Sencillo de hacer a la vez que económico.

Calentar el horno a 180° C. Separar las claras de las yemas del huevo. Batir las claras a punto de nieve. Batir las yemas con el azúcar y mezclar con las claras. Cuando esté bien batido se agrega la harina mezclada con las gaseosas y se vuelve a batir hasta que no queden grumos.

Preparar el molde con un papel de alimentación y azúcar, para evitar que se pegue. Poner al horno durante 30 minutos aproximadamente. Dar vuelta el bizcocho en un trapo de punto espolvoreado con azúcar, añadir la mermelada de frambuesa que se desee y enroscar el bizcocho. Ya está listo para su consumo.

CARACTERÍSTICAS

Ingredientes: 59% frambuesas, 44% azúcar.

Peso neto: 420 gr.

Extra services (sub-contractor):

- Delivery: national and international (DHL)

IT-Infrastructure:

1	Connection	▪ ADSL & Modem
	Technological platform	▪ Windows NT/2000
	Database	▪ SQL (web site)
	Security	▪
2	Office Software	▪ MS Office Excel (Billing)
	Extra Software	▪ Barcode (outcome from store) Inventory: outcome control from storage
	Future acquisitions	▪ Inventory: income control to storage
3	Internet	▪ Email external ▪ Information / research
	Web-site	▪ Language: Spanish ▪ Information to clients about products, receipts, and the online purchasing process ▪ Online Purchasing ▪ Prices
4	Systems with partners: (These systems could avoid costs on telephone calls and speed up the process)	▪

IT-Purchase process:

1	Purchase decision by:	▪ Group
	Interviewed personally involved	▪ Yes (Mr. Chéliz– Manager)
	Payback (ROI)	▪
2	Software vendor selection	▪ Price ▪ Recommendation (friend/family)

Difficulties and Expectations:

- Mr. Chéliz knows the importance of the inventory management, but it would be quite expensive to track the incoming material; therefore the control of the sold products through barcodes was implemented.
- Mr. Chéliz manages the stocks of online products apart from the products sold in the stores. When an online product is out of stock, it disappears automatically from the web site.
- Language of web site: only Spanish, although it is written on the web site that they can send all products to all countries in Europe.
- Although the shipping company offers the possibility to track the delivery process, Mr. Chéliz doesn't offer this functionality to his clients, because the products sold online are sent within 24hours. If a client wants to know the current position of his/her order, Mr. Chéliz calls the shipping company and asks them, then informs his client by e-mail.

C.3.1.9 Governmental Association – Aramón Montañas de Aragón**General Information:**

1	Country:	▪ Spain
2	Address:	▪ Edificio Aída ▪ C/ Madre Rafols 2, planta 6, oficina 3 ▪ 50004 Saragossa

		<ul style="list-style-type: none"> ▪ Phone: +34 (976) 447 040 ▪ Fax: +34 (976) 280 236 ▪ E-mail: info@aramon.es ▪ www.aramon.es
3	Contact:	<ul style="list-style-type: none"> ▪ Mr. Cristóbal Roldán Ramírez (Sub director)
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> ▪ Association ▪ Service Provider ▪ Limited company ▪ ▪ ▪
5	Outsourced service	<ul style="list-style-type: none"> ▪
6	Clients	<ul style="list-style-type: none"> ▪ Spain ▪ Portugal (increasing) ▪ Holland (decreasing) ▪ North Europe ▪ Morocco and Argentina

Description:

Aramón, Mountains of Aragón, first Spanish holding of the winter activities, was founded as a result of a joint venture from Government of Aragón and Ibercaja to explore the winter sport business in Aragon. The major shareholders belong to the Government of Aragón and Ibercaja.

It was founded in November 2001 and administers the ski station of Cerler, Formigal, Panticosa, Javalambre and Valdelinares, which is the largest skiing area in Spain about 20% of the total area. This way, Aramón offers the possibility to its clients to acquire just one single ski-card to its five stations and their 155,5 kilometres of slope.

Services:

- Administration of the ski resorts:
 Cerler - <http://www.cerler.com/Formigal> - <http://www.formigal.com/>
 Panticosa - <http://www.aramonpanticosa.com/>
 Javalambre - <http://www.javalambre.com/>
 Valdelinares - <http://www.valdelinares.com/>
- Sales of the ski passes to all five ski stations

Extra services (sub-contractor):

- WiFi network for the Cerler ski station
- Escuela Española de Esquí: (Courses – ski and snowboard)
 - Private classes
 - Group classes
 - Special private classes

Difficulties and Expectations:

- Language of web site: only Spanish, although they want to increase market area.
- Mr. Ramírez hopes that DBE could improve the summer tourism of the resorts.

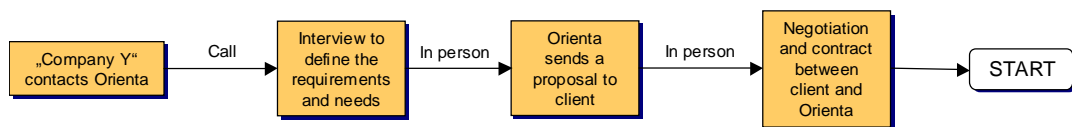
C.3.2 Use Cases - Leisure services

The second part summarises the use cases developed during the interviews with the SME partners.

C.3.2.1 Travel Agency - Viajes Orienta Siete Mares:

The CEO from "Company Y" wants to arrange a convention (workshop) to the sales and marketing departments. The motto is "Better communication between employees to increase satisfaction, subsequently increases commitment and consequently increases profits." So "Mrs. A", the CEO Secretary, contacts Mr. Lozano Pérez (Orienta Manager) for the organisation of this convention.

For this organisation Mr. Lozano Pérez needs to collect some information about the company's philosophy and its needs and demands. So, he goes to the "Company Y" to get this information through a standard Questionnaire, which Orienta developed itself. After that, he sends a proposal followed by the sign of contract to organise this convention to "Company Y".



Contact process

The demands from "Company Y" are:

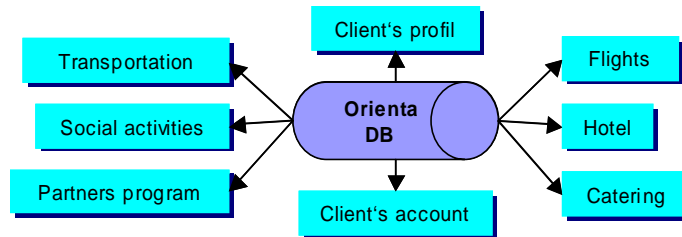
The convention should take place in two months in Saragossa at a 4 or 5 stars hotel to about 100 participants from 5 different sites from Europe.

- The participants will be able to travel with their partners (wives or husbands).
- Flights to all participants and their partners from their countries to Saragossa.
- Transfer from Airport and the Main train station to the Hotel to all participants and partners.
- The speakers should hold their presentations in English (official company's language) and the convention would take 3 full days.
- It should be offered the possibility to all participants and their families to spend the weekend in Saragossa.
- During the day, the employees from "Company Y" will take place of activities and sessions to develop their capabilities to work in a group (team work) and to increase the communication between the sites.
- The CEO and the chiefs of sales and marketing departments from each site will take part of this convention to incentive their employees to exchange information and to increase the feeling of being part of a group (pride).
- Some of the participants will travel with their partners (wives or husbands), consequently some extra activities during the day should be offer, such as sightseeing, museum visitation, shopping, and some active activity.
- At night, after dinner, all participants and their partners will have the possibility to take part in social games developed to increase the communication between families (participants and wives/husbands).
- The social program on Friday night should be a composed of a theatre piece and then a typical dinner at a local restaurant.

To fulfil the company's wishes, Mr. Lozano Pérez checks Orienta's database from other conventions in Saragossa:

- Hotels: There are 3 five stars hotel, and 4 four stars hotels, where the convention could take place.
- Catering: There are 4 possibilities for catering service, Each of them can deliver services to up to 1000 people.
- Transportation: There are 4 or 5 companies, but normally Orienta contracts always the same one ("Transport Q").

- Flight: There is the possibility for private jets for the domestic flights, which normally is cheaper.
- The information about clients' profiles and accounts can be found at the Orienta's database.

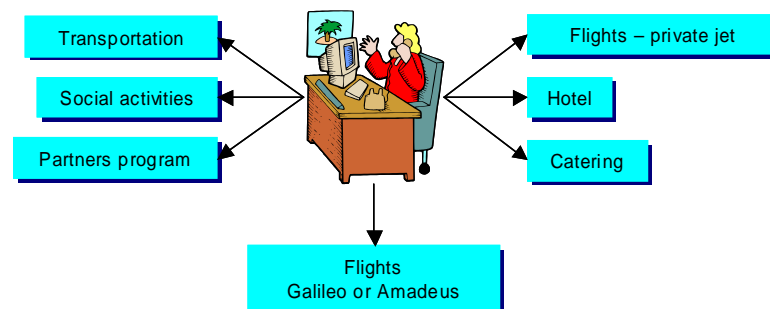


Databank's information

- Social activities: If the company is a regular customer, this information can be found at the Orienta's database. If not it is possible to check other companies' social activities.
- Partners program: If the company is a regular customer, this information can be found at the Orienta's database. If not it is possible to check other companies' social activities.

Mr. Lozano Pérez or his employee will contact by telephone with the possible suppliers:

- Hotels: They will be contacted based on the Company Y's specification, like 4 or 5 star hotels, conference room to 150 participants, 150 available double rooms, recreation room during nights (family games), easy accessibility to museums, shopping malls, theatre, etc. (partner program and social activities).

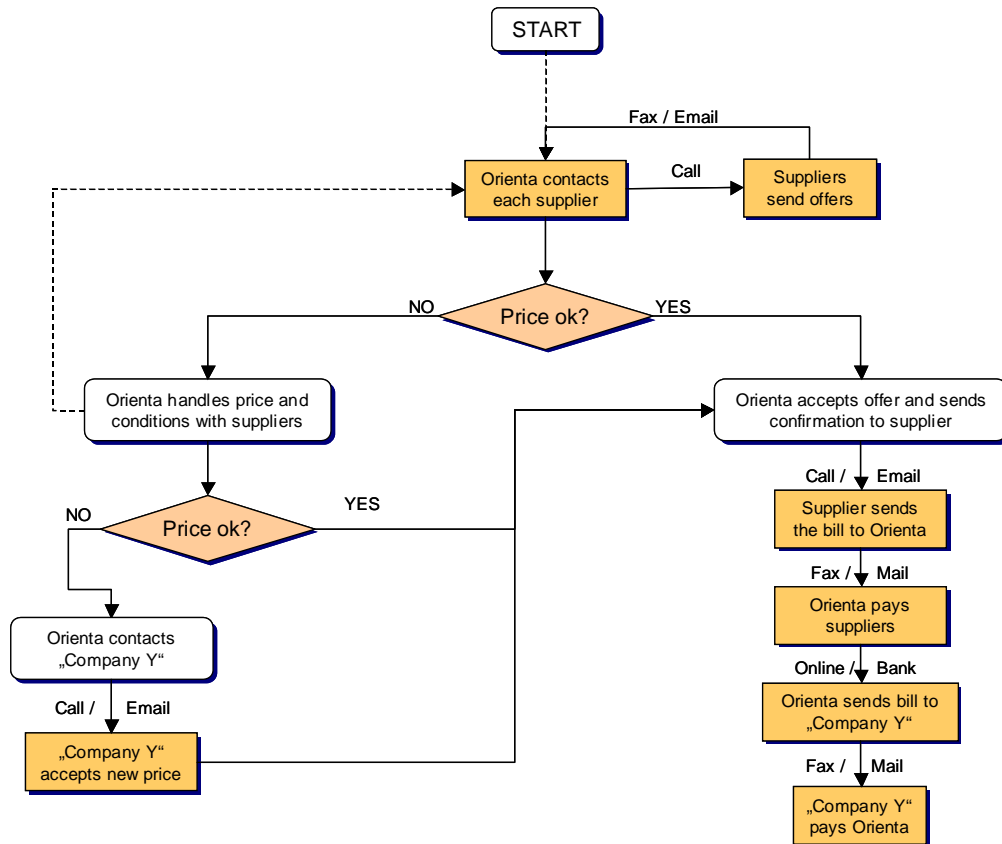


Booking channels

- Transportation: If the company "Transport Q" will not be able to supply the demand from "Company Y", another company will be contract. The activities are transfer (airport-hotel-airport; main train station-hotel- main train station), social activities at night, and partner program.
- Catering: If the hotel doesn't offer this service a company will be contract.
- Flights: The flights are booked through Galileo or Amadeus Professional Systems. A private jet company can do the domestic flights to Saragossa, because there are not so many international flights to the Saragossa airport, it can be cheaper then the commercial domestic flights, and it is seen as a benefit to the client as a personalized service.
- Social activities: A theatre piece will be booked to Friday night. Some restaurants will be contact to send an offer to a dinner to about 312 people (150 participants, the 5 chief of sales and marketing and the CEO and their partners). A sub-contracted company ("Transport Q" or another) will do the transportation of all participants.
- Partners program: Some activities will be arranged during the day to the partners from the participants, such as sightseeing, shopping, museum visiting, etc. Transportation needs to be arranged to support all these activities.

This is an expensive and long process, because the suppliers take about 2 days to send by fax or email an offer to Orienta, and then there is always a telephone negotiation.

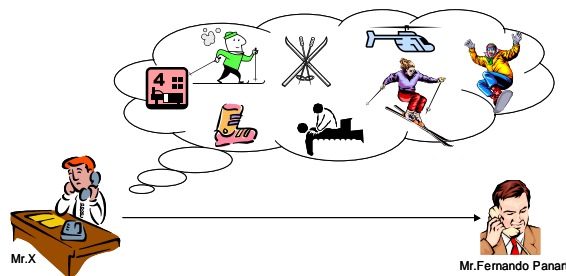
If any problem occurs during the negotiation or if Mr. Lozano Pérez doesn't get the price previously estimated, he contacts his client and handles this problem. It means that he needs at least one extra call; normally it will be more than 2 calls.



Orienta's convention process

C.3.2.2 Hotel - Hospedería Hospital de Benasque:

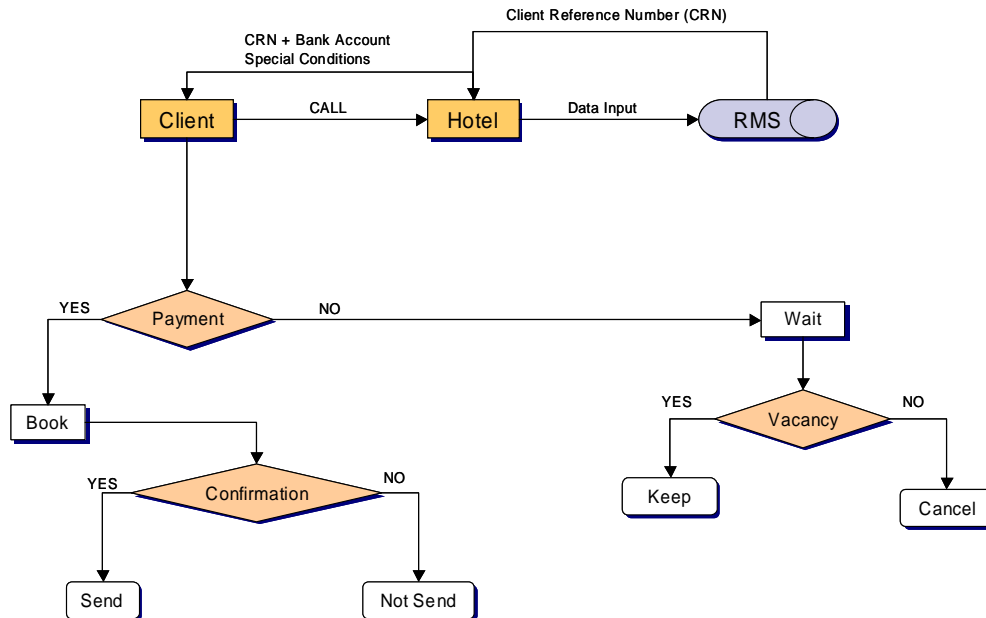
An "old client" – Mr. X (private or a travel agency) wants to book a vacation for his whole family (2 adults and 2 kids) at the Hospedería Hospital de Benasque. First of all, he looks at the web site (www.lanosdelhospital.com) and checks the rates, the sport activities offered and the weather forecast. Since online booking is not possible, he decides to call and book a double room with living room for his whole family.



Contact channel

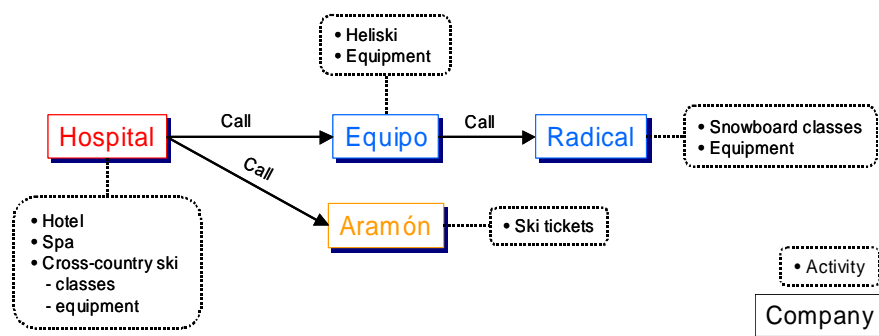
Mr. Fernando Panart (Manager) explains to Mr. X the current situation and instructions to arrive there. The current situation is, owing to heavy snowfall from the previous night, the machines couldn't take all the snow from the road. Consequently, it is not easy to arrive. Mr. X also wants to book some cross-country ski classes for the kids, and to rent the whole ski-equipment for the whole family. As a surprise to his wife he gets information about their wellness activities. Mr. X's would like to make Heli-ski, and his son would like to get some private snowboard classes.

Mr. Fernando (Manager) enters the information about Mr. X's reservation at the Reservation Management System (RMS) and gives him his client reference number, which the system generated. He tells Mr. X that his reservation will be confirmed after receipt of payment. Furthermore, the client gets the Hotel's bank account number and asks for a confirmation by Email or telephone.



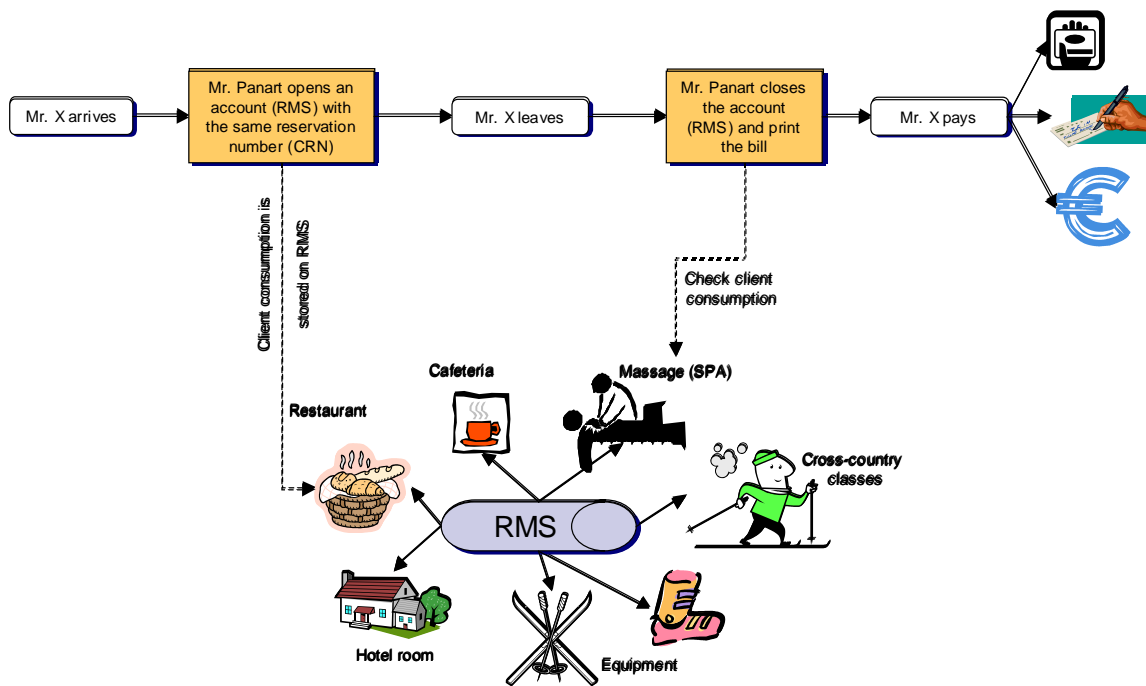
Reservation Process - Hospedaria Hospital de Benasque (Hotel)

In spite of some of the activities not being offered at the hotel, Mr. Fernando will book them to Mr. X, because he wants his clients extremely satisfied. So, Mr. Fernando calls Mr. Gaby Mur, the manager of Equipo Barrabes, and tells him that Mr. X (client) wants to make Heliski and his son would like to get private snowboard classes. Although he knows that Mr. Gaby doesn't offer any of these activities he knows that Mr. Gaby can arrange everything for him. Therefore, Mr. Gaby calls Mr. Jodi Casas, the manager of Radical Snowboard, and tells him to arrange the snowboard private classes for Mr. X's son. And he manages to book the Heliski for Mr. X himself.



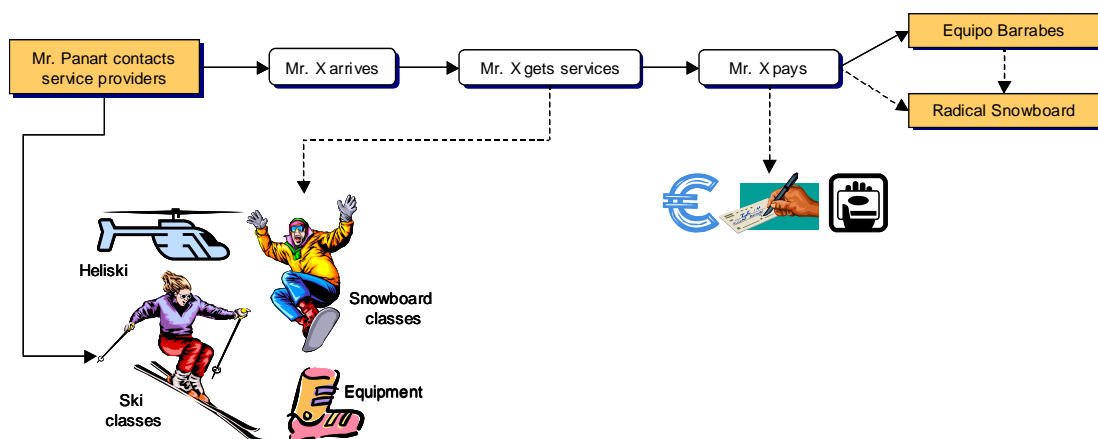
Booking channels

After Mr. X arrives at the Hotel, an account is opened, where all his family's expenses will be booked. This account becomes the same CRN-number from the reservation process. When Mr. X leaves the hotel it is necessary only to close the account at RMS and the bill will be generated automatically. Mr. X can pay the bill cash, by credit card, or by check.



Client expenses payment process

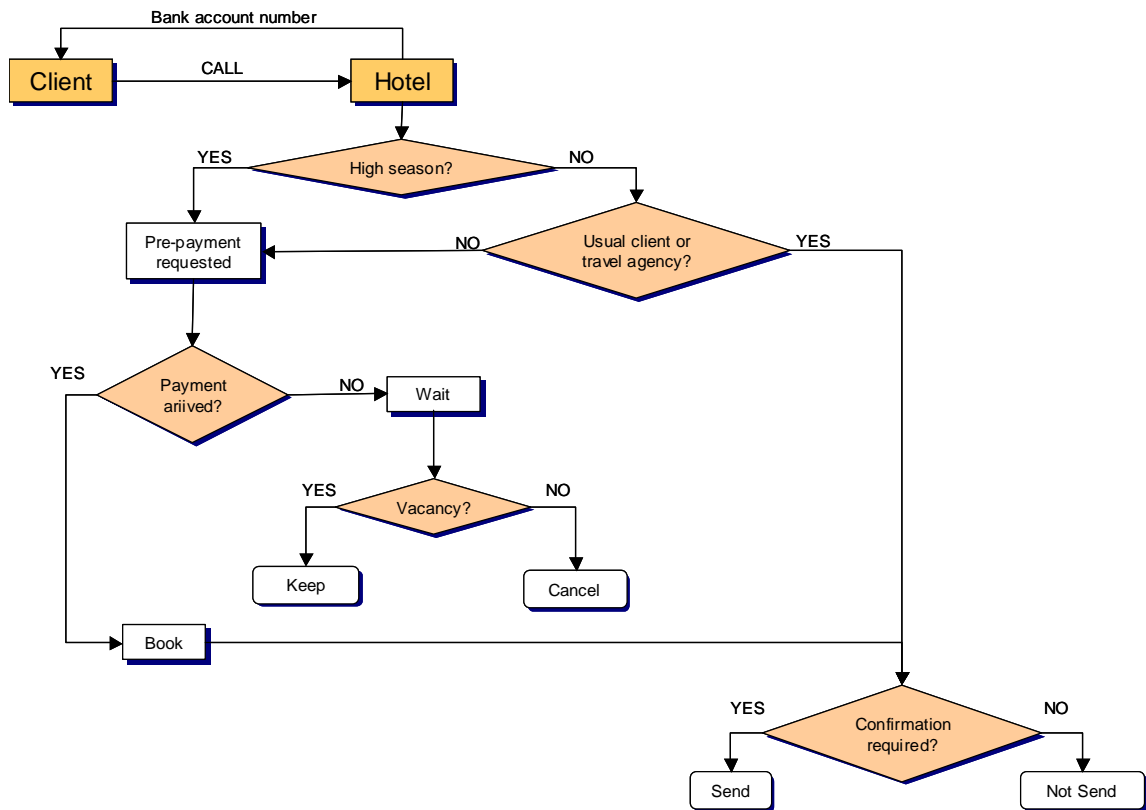
The other expenses from Mr. X will be paid directly to the service providers. It can be done into two different ways; first Mr. X can pay directly both service providers (Equipo Barrabés and Radical Snowboard) or Mr. X can pay all services to Equipo Barrabés and the last one pays Radical Snowboard.



Extra expenses payment process

C.3.2.3 Hotel - Hotel Ciria:

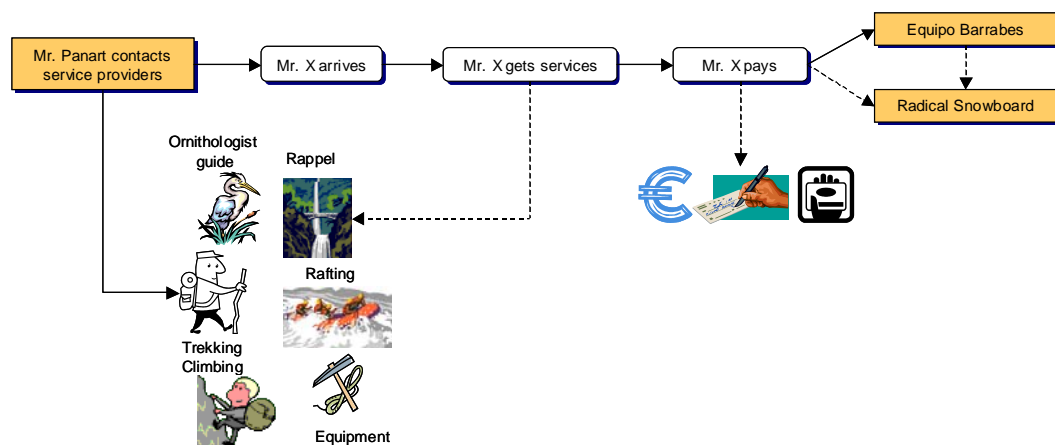
A client calls Hotel Ciria to book a room to his family. The attendant asks his name, and checks on the system if Mr. X is a regular client or not. At the same time the attendant checks if Mr. X reservation is during the high season. With both information (season and client fidelity), the attendant requests from Mr. X a pre-payment, and Mr. X requests a confirmation. The attendant informs Mr. X the hotel bank account and the value of the deposit, and asks some personal information (full name, address, city, number of guests). After Mr. X's payment, the attendant sends a confirmation by email or by phone.



Reservation process - Hotel Ciria (Hotel)

Mr. X asks also for some special services, such as a Guide for his wife to observe the birds, some trekking and climbing activities for his son and himself, and for his daughter he asks for some rappel and rafting activities. Because Mr. X is a regular client and Mr. Ciria knows that he is a "good client" (high fidelity level) he will arrange these extra activities.

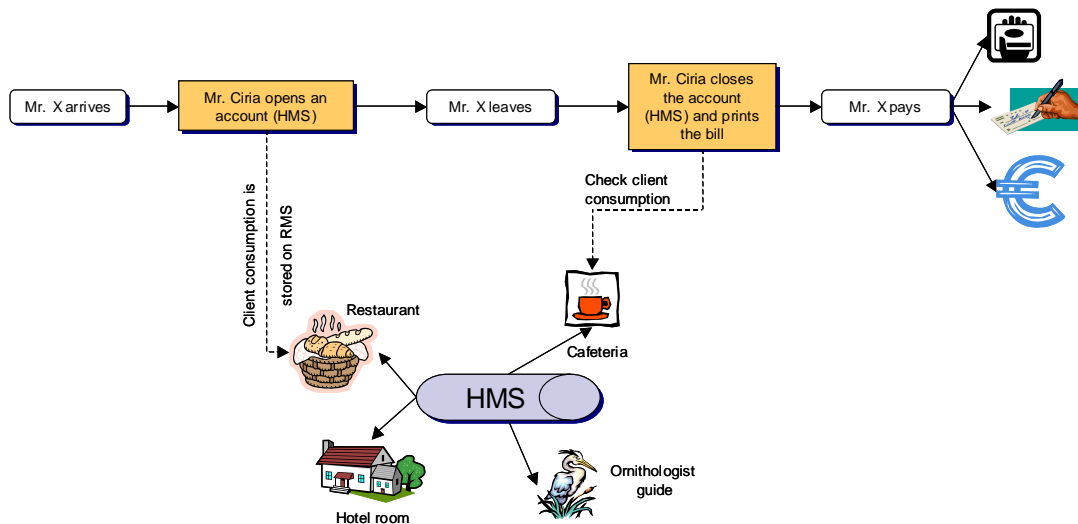
Mr. Ciria doesn't have any problem to arrange an Ornithologist guide to Mr. X's wife. To all other activities he will contact Equipo Barrabés to arrange these extra activities. He has a good relationship with Mr. Gaby from Equipo Barrabés and he knows that despite some of the services are not offered by Equipo Barrabés, Mr. Gaby knows another company (Radical Snowboard) who can provide these services.



Extra expenses payment process

The extra expenses from Mr. X will be paid directly to the service providers. It can be done in two different ways; either Mr. X can pay directly both service providers (Equipo Barrabés and Radical Snowboard) or Mr. X can pay all services to Mr. Gaby (Equipo Barrabés) and he pays Mr. Casas (Radical Snowboard).

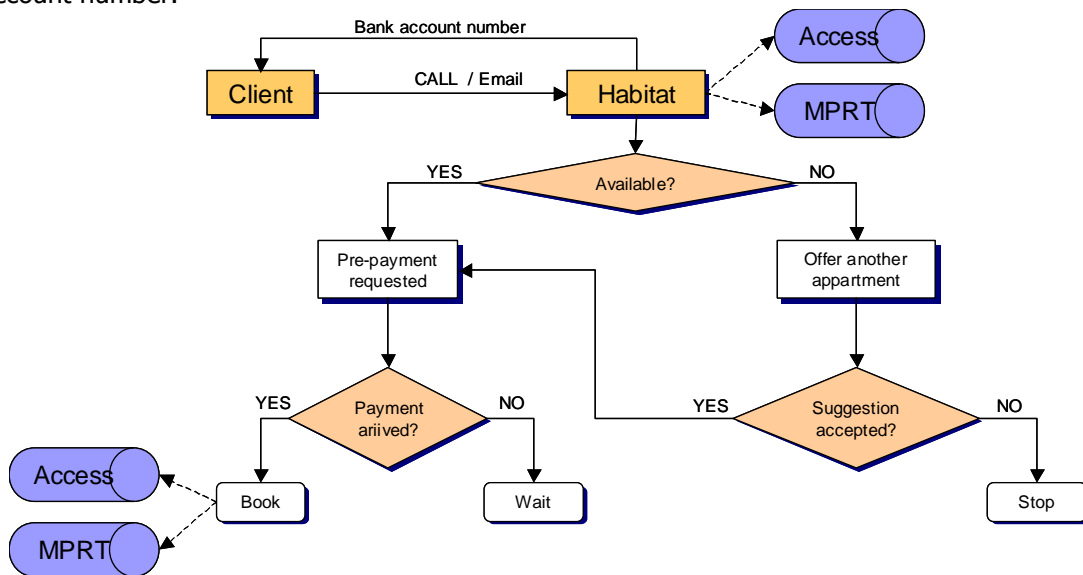
After Mr. X arrives at the Hotel, an account is opened, where all his and his family's expenses will be booked. This account becomes the same CRN-number from the reservation process. When Mr. X leaves the hotel it is necessary only to close the account at RMS and the bill will be generated automatically. Mr. X can pay the bill cash, by credit card, or by check.



Client expenses payment process

C.3.2.4 Real Estate Business - Habitat Benasque:

Mr. X (client) contacts Mr. Gimano to make an apartment reservation for one week. Mr. Gimano check if this apartment is available, if it still available, he asks for a pre-payment and gives the Habitat's bank account number. If the apartment isn't more available, he suggests another one. If the client accepts his suggestion, he asks for a pre-payment and gives the Habitat's bank account number.

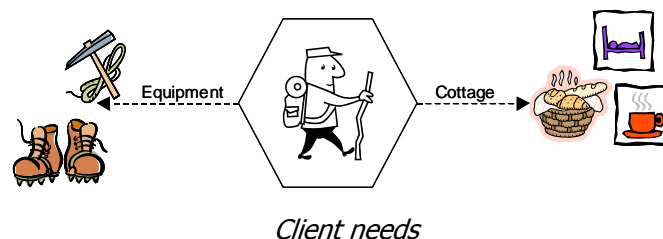


Reservation process - Habitat Benasque (Real Estate Business)

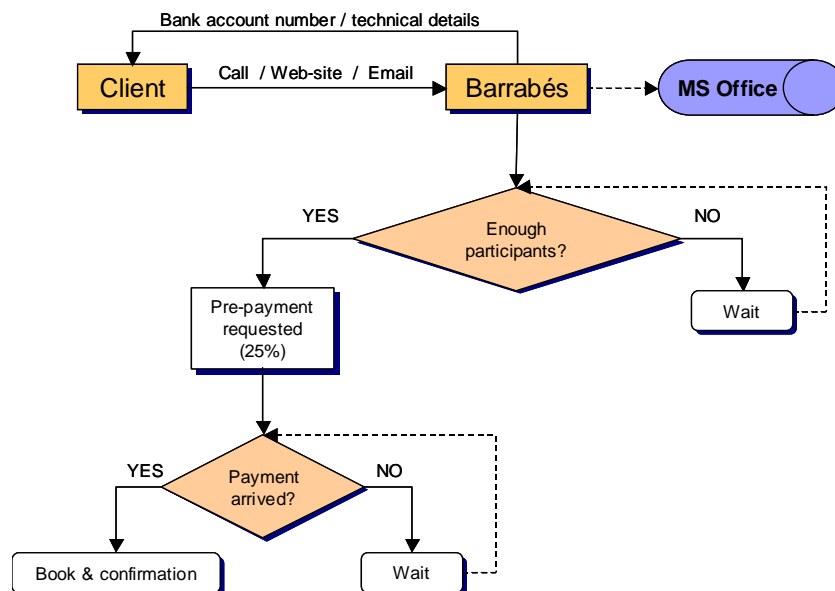
After the first contact with Mr. X, Mr. Gimano includes this reservation on the monthly planning reservation table (MPRT), which is not computer based. After Mr. Gimano gets the pre-payment, he saves all data on his computer (Excel table) and updates his paper-based MPRT. When the client arrives in Benasque, he needs to pick up the keys at Habitat's office.

C.3.2.5 Sport service provider - Equipo Barrabés

Mr. X (client) contacts Mr. Mur from Equipo Barrabés to arrange a 5 days trekking trip through the Pyrenees with accommodation on cottages in the mountains for him and 3 other friends. First of all Mr. Mur needs to analyse in detail this request, to verify the trekking route and the possibilities to accommodation. After, he designed the 5 days trip, he sends to Mr. X a document with a detailed description of the service and the technical aspects of this trip. Besides, a list of the obligatory equipment and the bank account number to the 25% as a pre-payment are also sent. If Mr. X doesn't have all these obligatory equipment, he has the possibility to buy or rent the equipment at Barrabés Esquí & Montaña. Mr. Mur suggests a primary meeting to get to know each other, to talk about the required physical conditions and to explain the risks.



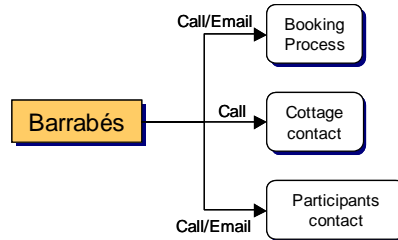
Meanwhile, Mr. Mur calls mountain cottages and makes the reservation for 5 persons (bed and food - breakfast and dinner). The payment of the cottages services is done normally cash. Close to the departure date, Mr. Mur checks the weather forecast, the cottage reservations and the rented equipment.



Reservation process - Equipo Barrabés (Sport service provider)

If Mr. X (alone – without his friends) contacts Equipo Barrabés and wants to book a standard hiking trip offered by Equipo Barrabés, he will need to wait until a minimum group of participants apply to the same trip. Normally, it is necessary a group of at least 4 persons for a hiking trip to take place. After a group of 4/5 is registered, Mr. Mur contacts all participants by phone or Email

and gives them Barrabés' bank account number and asks them to deposit 25% of the whole price as a pre-payment. Besides, a list of the obligatory equipment and the technical description of the trip are also sent. If any of the participants doesn't have all obligatory equipment, Mr. Mur explains about the possibility to buy or rent the equipment at Barrabés Esquí & Montaña. Mr. Mur suggests a primary meeting to get to know each other, to talk about the required physical conditions and to explain the risks.

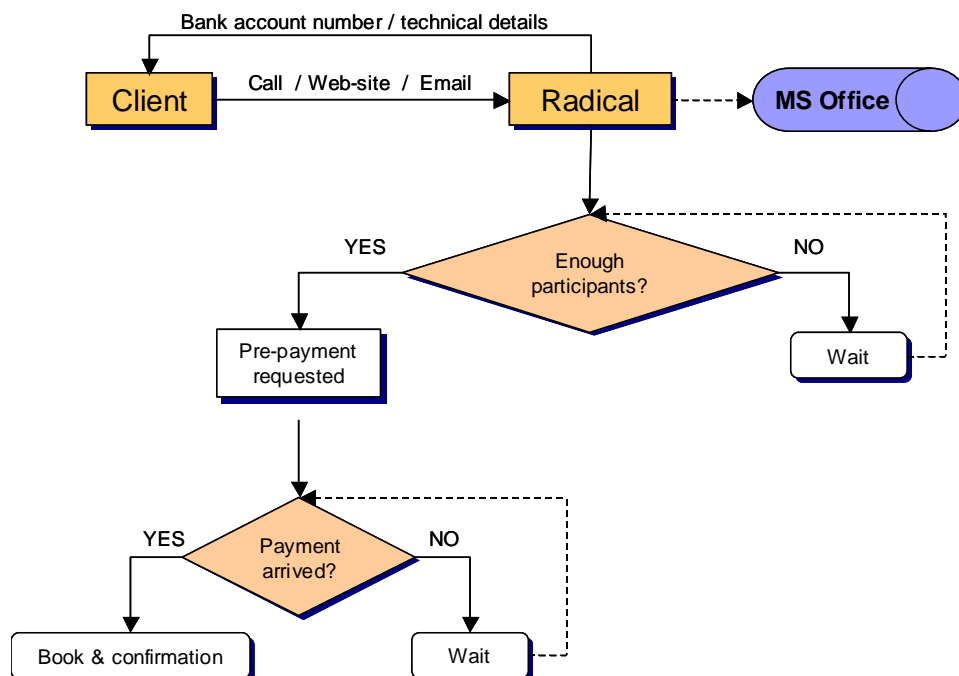


Booking channels

Meanwhile, Mr. Mur calls the mountain cottages and makes the reservation for all participants (bed and food - breakfast and dinner).

C.3.2.6 Sport Service Provider - Radical Snowboard

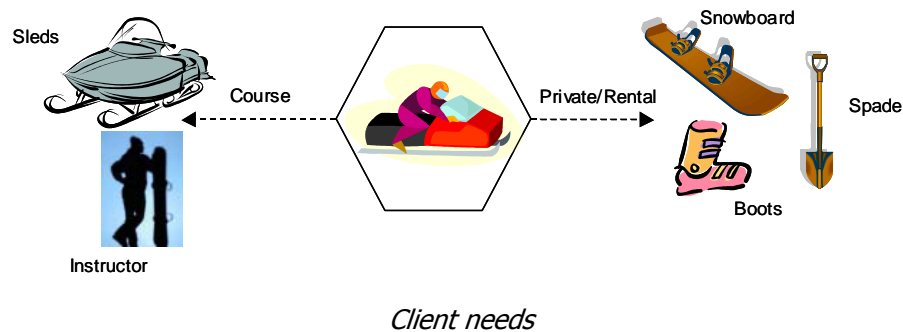
Mr. X (client) contacts Mr. Casas from Radical Snowboard to arrange a special course (Free style snowboard off slope with sleds) for him and his 4 friends. First of all Mr. Casas needs to analyse the details regarding this request, to verify the trekking route and the sleds availability. After, designing this special private course, he sends to Mr. X a document with a detailed description of the service and the bank account number to the pre-payment are also sent. If Mr. X doesn't have all these obligatory equipment, he can rent from Radical Snowboard.



Reservation process – Radical Snowboard (Sport service provider)

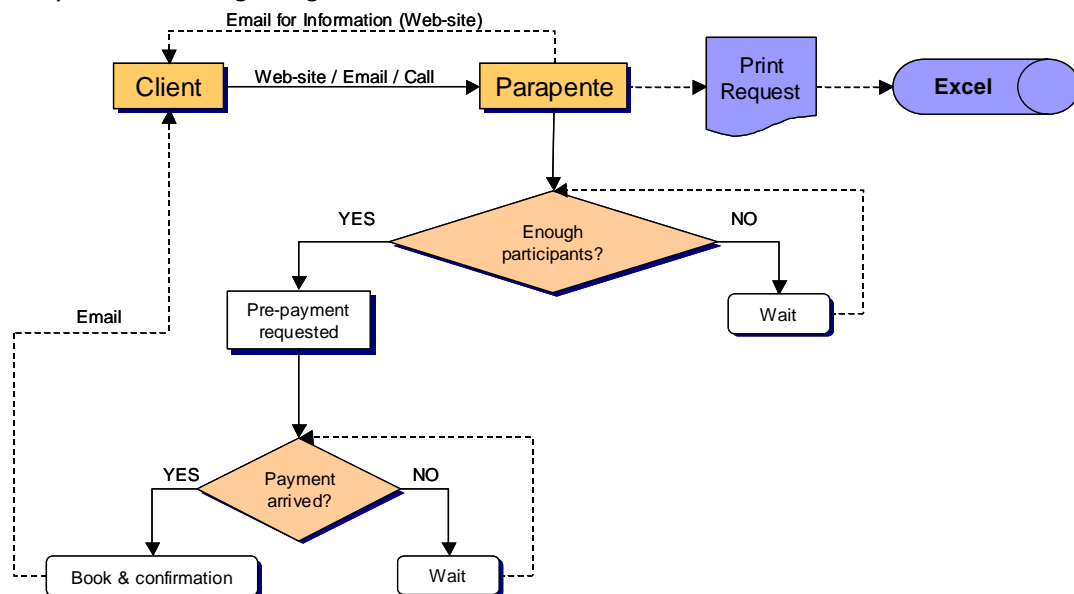
If Mr. X (alone – without his friends) contacts Radical Snowboard and wants to book a standard course (Free style snowboard off slope), he will need to wait until a minimum group of

participants apply to the course. Normally, it is necessary a group of at least 4 persons for a course to take place. After a group of 4/5 is registered, Mr. Casas contacts all participants by phone or Email and gives them Radical's bank account number and asks them to deposit a pre-payment. Besides, a list of the obligatory equipment and the technical description of the trip are also sent. If any of the participants doesn't have all obligatory equipment, Mr. Casas explains about the possibility to buy or rent the equipment at Radical Snowboard.



C.3.2.7 Sport Service Provider - Escuela de Parapente Pirineos

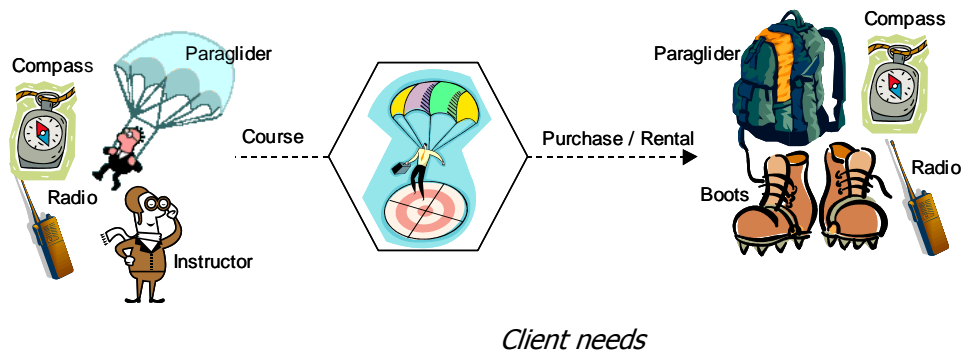
Mr. X (client) wants to take part on an initiation course (beginners). To do so, he needs just to fill up the questionnaire at the web site (<http://www.parapentepirineos.com/inscripcion.htm>). If there are enough participants Mr. Ucedo Rufat asks the participants to send a pre-payment (120€) by check or mail order (money). If not Mr. Ucedo Rufat waits until a group of minimum 4 participants are registered and then asks them to make the pre-payment. The rest will be paid one day before the beginning of the classes.



Reservation process - Escuela de Parapente Pirineos (Sport Service Provider)

The courses can be cancelled if there isn't a minimum of 4 students; the notification of cancellation is sent one week before the course beginning and the advanced payment is given back.

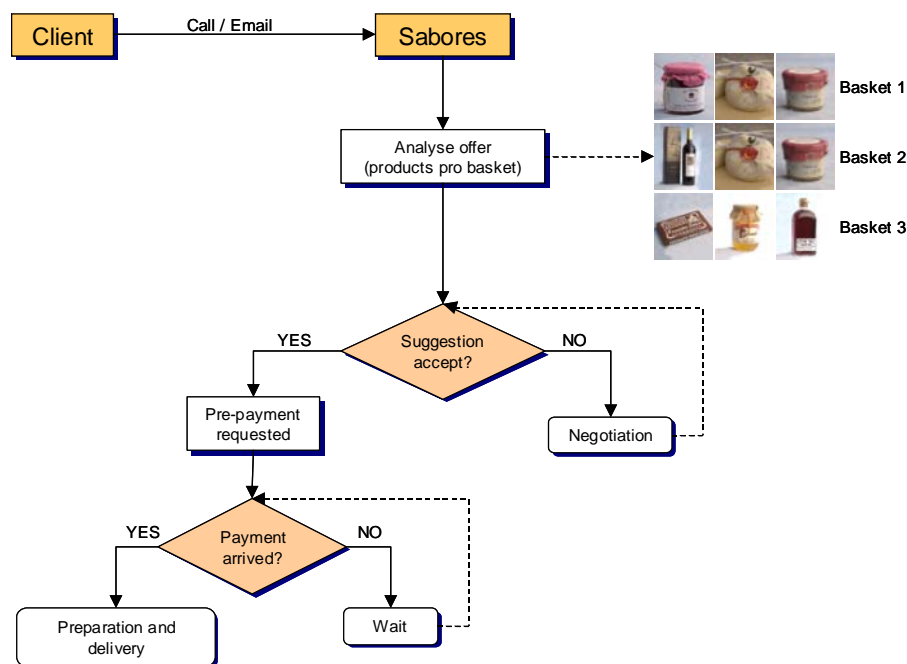
Mr. Ucedo Rufat contacts all participants by Email and gives them a list of the obligatory equipment and the technical description of the course. If any of the participants doesn't have all obligatory equipment, Mr. Ucedo Rufat explains about the possibility to buy or rent the equipment at Escuela de Parapente Pirineos.



C.3.2.8 Food and Handcraft Gift Shop - Sabores de pueblo

Mr. Panart, the manager of Hospedería Hospital de Benasque calls Mr. Chéliz to order special baskets with handcraft and bio/ecological products from the region (Aragon) to offer to his guests during Christmas time.

Mr. Chéliz analyses this order and sends back an offer to Mr. Panart. His offer contains the amount of each product and its price (marmalade, chocolate, wine, cheese, ham, etc.), the basket suggestions and their prices.

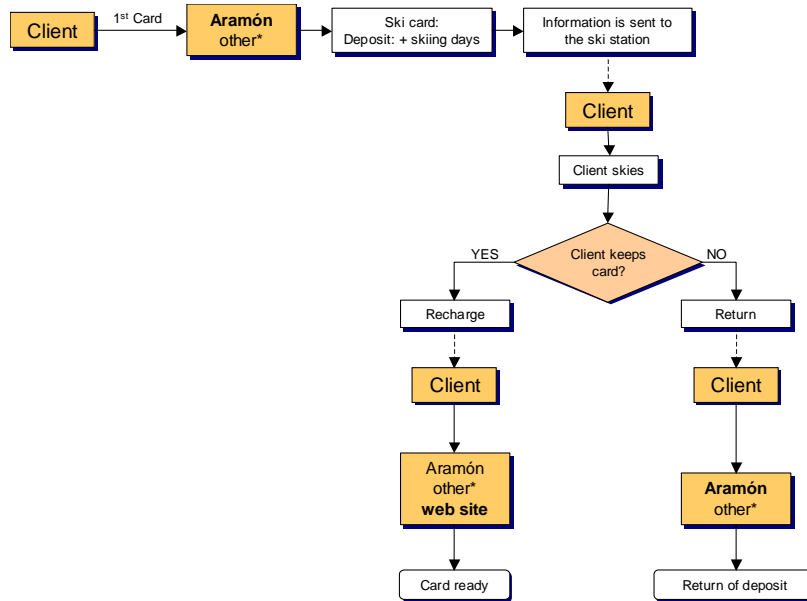


Purchase process - Sabores de pueblo (Food and Handcraft Gift Shop)

C.3.2.9 Governmental Association – Aramón Montañas de Aragón

Mr. X wants to spend some days in Benasque and go skiing in Cerler ski resort, but he wants to avoid queuing to buy his ski card every time. He lives in Saragossa and read at the Aramón web site about the possibility to recharge his ski card directly online. Before that he needs to acquire an "Aramón 5 station" card, so he goes to Aramón office in Saragossa. There he buys his new card, which he can use in all ski resorts that belong to Aramón. Meanwhile, he decides also to charge his card for 7 consecutive days.

For the registration process, Mr. X gives some private information to Aramón, which assures to use these information only as statistical data and to acknowledge its clients.



Card purchase process

- *Aramón and other:* Aramón, Ibercaja, travel agencies and associated establishments
- Deposit: 3€
- Skiing days modalities: Season or days

After these vacation days, Mr. X decides to recharge his "Aramón 5 station" card to 5 more non-consecutive days during the winter season. So, he charges it online through Aramón web site.

C.3.3 Use case - Incentive travel

C.3.3.1 Process: Contact Orienta

Mr. X (client) contacts the Company Orienta (Mr. Javier Lozano Pérez) to arrange an incentive week (7 days) with workshop to a group of employees. The client specifies also that this workshop should take place close to the mountains, such as Benasque Valley. Due to the wish of some of the participants to get some ski and/or snowboard classes during these days. Furthermore, the participants are going to rent the skiing equipment, and the tickets for the ski station should be available at the hotel to the participants. The hotel should offer also some other activities such as swimming pool, and wellness (spa). Orienta should arrange also a small gift to each participant with typical food from the valley, such as jelly, sweets, etc.

The conference room should contain a beamer, a white board, and seat places for about 30 people. In addition, 3 other small rooms should be available to the participants to develop parallel activities, and they should be close to the main workshop room.

The restaurant and the catering service should offer vegetarian food for 5 participants; all participants are going to have their main meals (breakfast, lunch and dinner) together at the main restaurant room. The coffee breaks should be served on a room close to the workshop room 3 times a day.

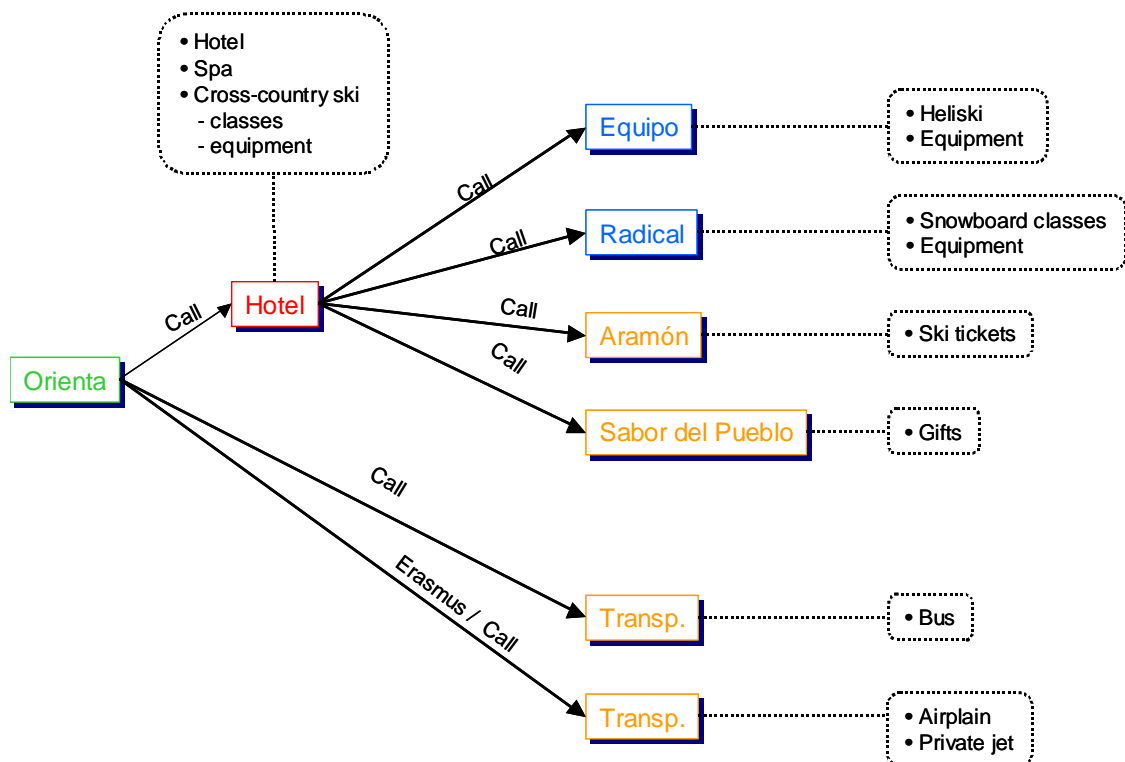
The participants are going to fly from Madrid to Saragossa and then they are going to travel together by train, or by bus to their final destination. Orienta should arrange all transportation from Madrid to Benasque.



Client requirements

C.3.3.2 Indirect contact process - Service providers and Aggregators

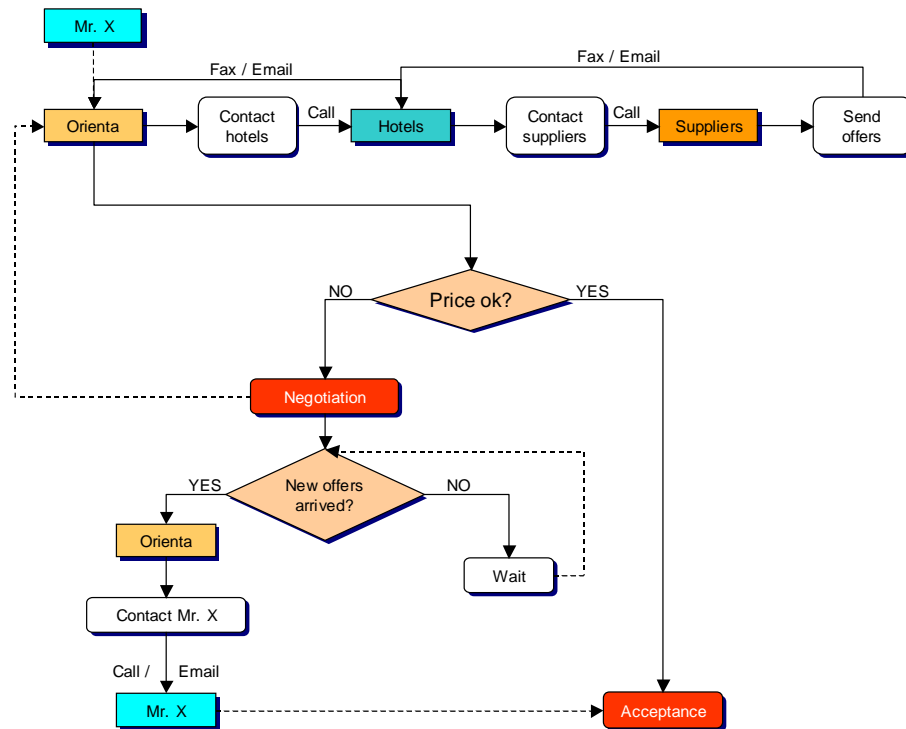
After the client specifies everything, Mr. Perez (Orientas' manager) starts organising the incentive week itinerary. First of all, he looks at the website (<http://www.benasque.com/>) for possible hotels and service providers. But he knows from past experiences, for example, that the Hospital and the Hotel Ciria are possible candidates, because both hotels could offer a conference room, a good restaurant, and good accommodation to all 30 participants. The differences between them are that the Hotel Ciria is located in Town and there is no swimming pool, and the Hospital is far from the centre with difficult access but with swimming pool and wellness (spa). So, he needs to check with his client, which of these hotels is the best choice to this incentive week. Then, he contacts them by phone to check availability and prices.



Indirect reservation channels

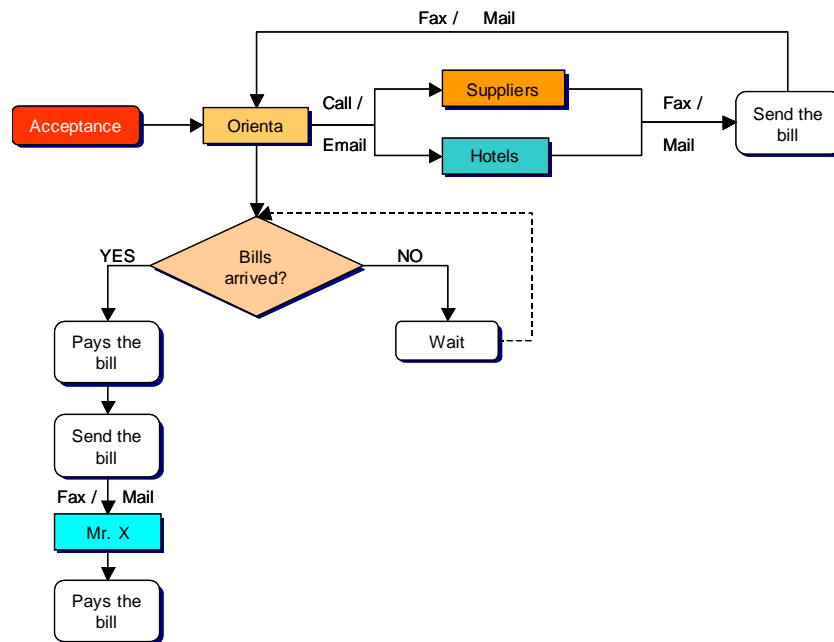
First of all, he contacts (phone) the Hotels to check availability of rooms to all participants. The hotels offer the catering service as an extra service, and the possibility to have all meals at the hotel restaurant. A special menu to this event can also be arranged. They also offered to book

the required sporting activities to Mr. Javier, it means the hotels contact different service providers to get different offers to the specific sports activities, such as snowboard, heliski, and their necessary rental equipment. Another extra service offered from the hotels is to arrange the required gifts from Sabores del pueblo store, and the ski tickets ("Aramón 5 station" card). Mr. Pérez still needs to call the transportation companies, and to book the flights. Although he works normally with a specific transportation company in Saragossa, he calls the other ones (5 in Saragossa). The transportation from Madrid to Saragossa can be done in two different ways; by commercial airlines, or by private jets, which normally is cheaper. So, he checks both possibilities.



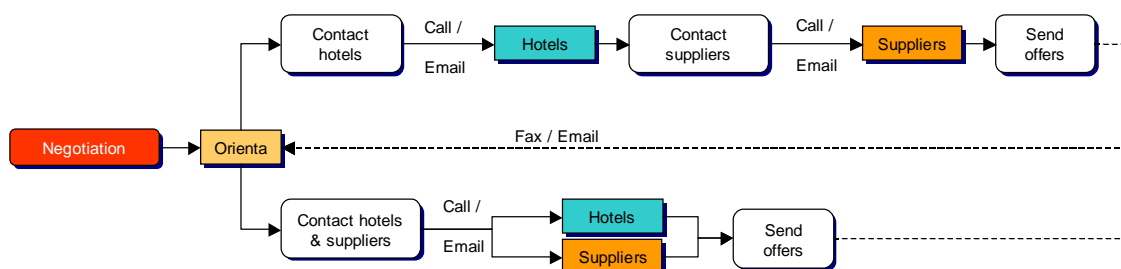
Reservation process and channels

The hotel managers after contacting all service providers (basically by phone) send their offers to Mr. Pérez by fax. Mr. Pérez analyses the offers and discusses with Mr. X (client) to get his acceptance of some possible differences between requirements and offers. After Mr. X agreement, Mr. Pérez confirms (by phone) the services to the winner (hotel).



Acceptance process and channels

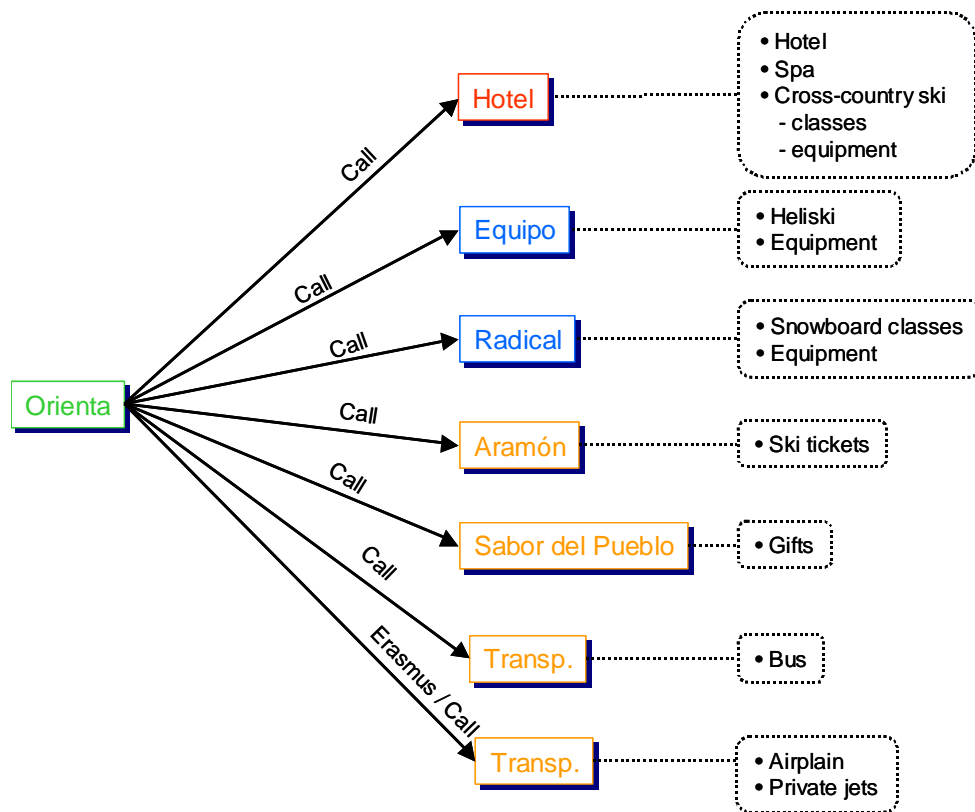
If Mr. X doesn't agree with any point of the offers, Mr. Pérez needs to handle with the winner hotel manager or directly with the service provider (by phone).



Negotiation process and channels

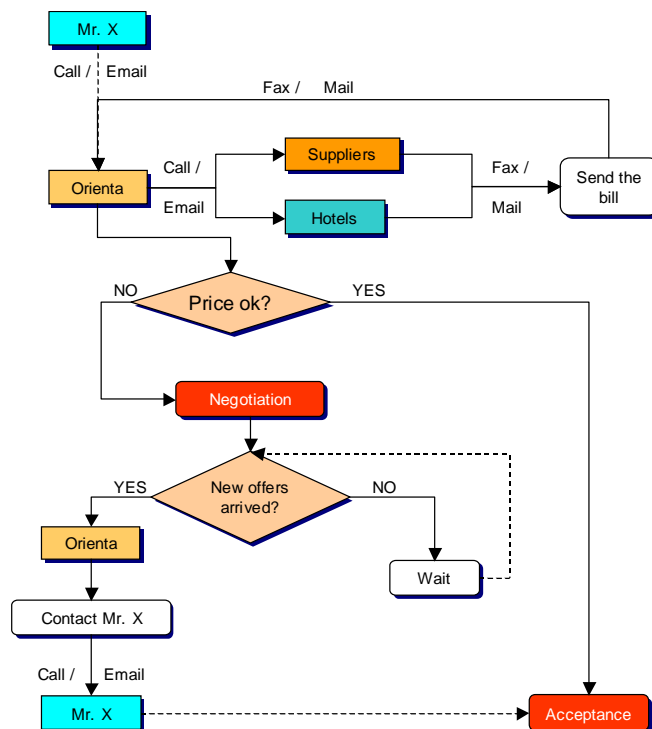
C.3.3.3 Direct contact process - Service providers and Aggregators

After the client specifies everything, Mr. Perez (Orientas' manager) starts organising the incentive week itinerary. First of all, he looks at the website (<http://www.benasque.com/>) for possible hotels and service providers. But he knows from old experiences, for example, that the Hospital and the Hotel Ciria are possible candidates, because both hotels could offer a conference room, a good restaurant, and good accommodation to all 30 participants. The differences between them are that the Hotel Ciria is located in Town and there is no swimming pool, and the Hospital is far from the centre with difficult access but with swimming pool and wellness (spa). So, he needs to check with his client, which of these hotels is the best choice to this incentive week.



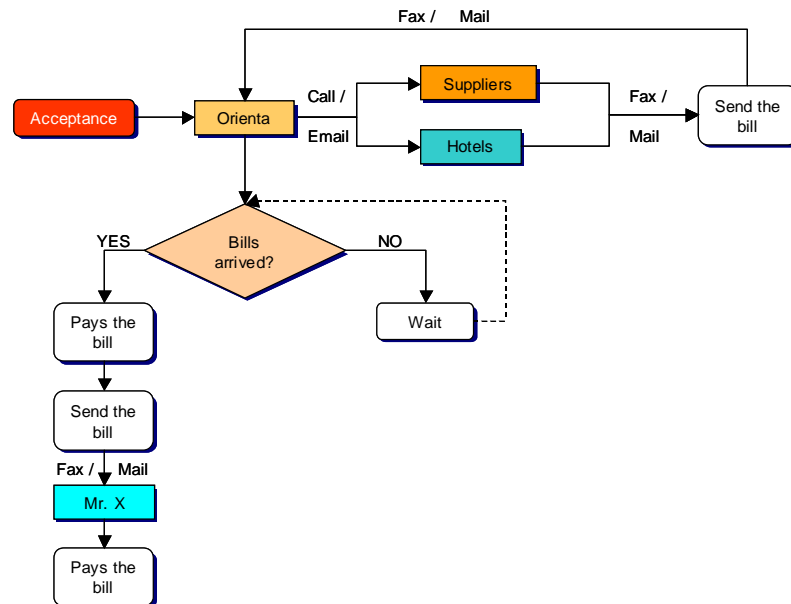
Direct reservation channels

First the contacts the hotels by phone to check availability and prices. On this case, the hotel managers don't offer to arrange the extra activities required, such as sport activities, gifts, and ski tickets. So, Mr. Pérez needs to contact all service providers.



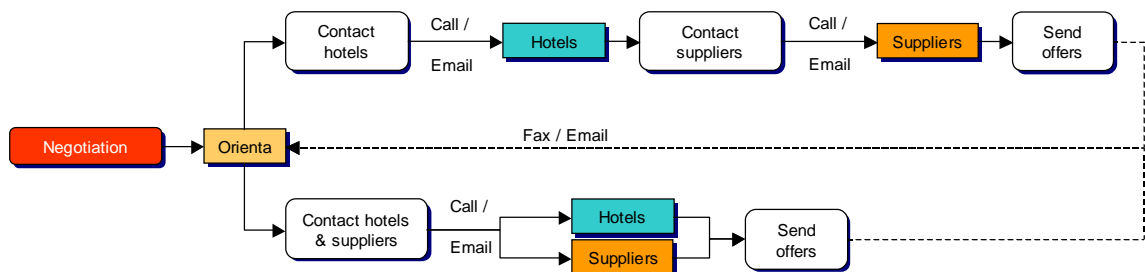
Reservation process and channels

The service providers send their offers to Mr. Pérez by fax. Mr. Pérez analyses them and discusses with Mr. X (client) to get his acceptance of some possible differences between requirements and offers. After Mr. X agrees Mr. Pérez confirms (by phone) the services to the winners (hotel and service providers).



Acceptance process and channels

If Mr. X doesn't agree with any point of the offers, Mr. Pérez needs to handle with the suppliers (hotel and service providers) by phone.



Negotiation process and channels

C.3.4 BML-Infrastructure

C.3.4.1 Travel Agency – Orienta Siete Mares

<ul style="list-style-type: none"> Travel Agency Name: The name that the agency is known by. 	<ul style="list-style-type: none"> Viajes Orienta Siete Mares
<ul style="list-style-type: none"> Company name: The legal name that refers to the hotel in billing and tax paperwork. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> Saragossa

<ul style="list-style-type: none"> ▪ Address: A description of the location of the agency, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ San Clemente 18 ▪ 50001 Saragossa
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the agency. They enable the agency to be reached from the outside world. 	<ul style="list-style-type: none"> ▪ Phone: + 34 (976) 79 43 44 ▪ Fax: + 34 (976) 79 43 40 ▪ Email: empresas@viajesorienta.com ▪ www.viajesorienta.com
<ul style="list-style-type: none"> ▪ Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> ▪ Customized service for private and company customers ▪ The agency owns the Q of tourist quality
<ul style="list-style-type: none"> ▪ Activities of the agency: Kind of services offered in the agency:. 	<ul style="list-style-type: none"> ▪ Vacation ▪ Billeting (plane, hotel, and rent-a-car) ▪ Conferences (Conventions, incentive travels, etc.)
<ul style="list-style-type: none"> ▪ Indications: How to reach the agency 	<ul style="list-style-type: none"> ▪ None
<ul style="list-style-type: none"> ▪ Customer Assistance: How to assist the client before and during the travel (call centre, tour operator) 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Tax: Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: health (sickness), luggage, etc. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Modes to book a trip: Available telecommunication infrastructure for booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Telephone, ▪ Fax, ▪ Email, ▪ Web services (only for Information)
<ul style="list-style-type: none"> ▪ Modes to get a confirmation: Available telecommunication infrastructure for trip confirmation (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Fax ▪ Email ▪ Mail
<ul style="list-style-type: none"> ▪ Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Discount policy: The incentives that the agency offers to its customers. Ranging from discounts on bills, free 	<ul style="list-style-type: none"> ▪

gadgets, gift certificates...	
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Service from other companies: Services provided by subcontractors to the company (rental car, rental boat...) 	<ul style="list-style-type: none"> ▪ Rental car ▪
<ul style="list-style-type: none"> ▪ Agency commission: Applied rates or fees on sales. Considered to be the agencies' income. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Suppliers: Service providers of the travel agency (Transportation companies, hotels, catering) 	<ul style="list-style-type: none"> ▪ Catering ▪ Transportation companies available in Saragossa

C.3.4.2 Hotel - Hospedaría Hospital de Benasque

<ul style="list-style-type: none"> ▪ Hotel Name: The name that the hotel is known by. 	<ul style="list-style-type: none"> ▪ Hospedaría Hospital de Benasque
<ul style="list-style-type: none"> ▪ Company name: The legal name that refers to the hotel in billing and tax paperwork. 	<ul style="list-style-type: none"> ▪ Hospital de Benasque S.L.
<ul style="list-style-type: none"> ▪ Number of stars: Refers to the classification of the hotel in the industry. The status is defined by local industry regulations. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> ▪ Benasque (Huesca)
<ul style="list-style-type: none"> ▪ Address: A description of the location of the hotel, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ Camino Real de Francia, s/n ▪ 22440 Benasque (Huesca)
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the hotel. They enable the hotel to be reached from the outside world. 	<ul style="list-style-type: none"> ▪ Phone: + 34 (974) 552 012 ▪ Fax: + 34 (974) 306 866 ▪ info@lloanosdelhospital.com ▪ www.lloanosdelhospital.com
<ul style="list-style-type: none"> ▪ Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> ▪ Hospital de Benasque is a hotel located in the core of the Natural Park Possets-Maladeta at the foot of the biggest glaciers of the Pyrenees. It was a refuge for walkers, and after eight centuries of its creation by the Hospitalarian monks, it was reconstructed.
<ul style="list-style-type: none"> ▪ Number of rooms: Describes the capacity of the 	<ul style="list-style-type: none"> ▪ 9 duplex rooms (split-level rooms) with two bedrooms up to 4 people;

<p>hotel by the number of rooms. The rooms could be either single, double, multiple or suites</p>	<ul style="list-style-type: none"> 7 double rooms with living area up to 4 people and one bathroom; 23 special double rooms (3 of them with king bed); 11 double rooms (3 of them with king bed); 2 single rooms; 4 refuge rooms with bathroom inside (3 of them up to 4 people, and the other one up to 8 people)
<ul style="list-style-type: none"> Kind of services offered in each room: The list of extra services in the room, ranging from "room service", mini-bar, cable TV, etc. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Kind of services offered in the hotel: Illustrated by the available activities inside the hotel (type of breakfast, restaurants, swimming pool, conference hall, etc) 	<ul style="list-style-type: none"> Restaurant la FuenRoya offers different and exquisite plates. Ski resort (cross-country ski) Swimming pool Spa
<ul style="list-style-type: none"> Kind of service offered by other partners: Illustrated by available services offered outside the hotel (shopping, cinema, museum) 	<ul style="list-style-type: none"> Shopping Hiking/climbing Horse riding Biking Alpine ski Guide's service
<ul style="list-style-type: none"> Transportation facilities: Available transportation means offered by the hotel from and to the airport, railway station, etc. 	<ul style="list-style-type: none"> None
<ul style="list-style-type: none"> Indications: How to reach the hotel and how to reach important sites from the hotel (important museum, attraction parks, etc) 	<ul style="list-style-type: none"> Standard information to reach Benasque Valley by Car; by Bus; and by Train By Car: It is possible to arrive by car to the Benasque's Valley from all parts of Spain, passing normally trough Barbastro and Graus. (and a pdf-Document) By Bus: There are different bus lines that go from the main cities directly to Huesca or to Benasque. (Huesca-Lleida; Huesca-Saragossa; Huesca-Barcelona; Huesca or Lleida-Benasque) By Train: The nearest train station is Monzón-Río Cinca. There are many trains covering the route Madrid-Saragossa-Barcelona that stop there. Once there, there are buses to Barbastro and from Barbastro to Benasque.
<ul style="list-style-type: none"> Number of available room/ date: Describes the number of unoccupied rooms. (single/double/multiple) 	<ul style="list-style-type: none"> Reservation management system

<ul style="list-style-type: none">Unit charge price for each room: The amount of money charged for each type of room and per night. (single/double/multiple)	<table><tr><td></td><td colspan="2">Single</td><td colspan="2">Double</td><td colspan="2">Triple</td><td colspan="2">Quadruple</td></tr><tr><td>Type of Room</td><td>High</td><td>Low</td><td>High</td><td>Low</td><td>High</td><td>Low</td><td>High</td><td>Low</td></tr><tr><td>Special double</td><td>88</td><td>82</td><td>108</td><td>100</td><td colspan="4"></td></tr><tr><td>Double</td><td>64</td><td>59</td><td>78</td><td>72</td><td colspan="4"></td></tr><tr><td>Triple</td><td colspan="4"></td><td>133</td><td>125</td><td colspan="2"></td></tr><tr><td>Quadruple</td><td colspan="4"></td><td colspan="2"></td><td>163</td><td>155</td></tr><tr><td>Duplex</td><td>146</td><td>135</td><td>156</td><td>145</td><td>177</td><td>166</td><td>187</td><td>175</td></tr><tr><td>Refuge</td><td>27</td><td>25</td><td colspan="6"></td></tr><tr><td>Boards</td><td colspan="8"></td></tr><tr><td>Half meal</td><td>16</td><td>16</td><td>32</td><td>32</td><td>48</td><td>48</td><td>64</td><td>64</td></tr><tr><td>Full meal</td><td>28</td><td>28</td><td>56</td><td>56</td><td>84</td><td>84</td><td>112</td><td>112</td></tr></table>										Single		Double		Triple		Quadruple		Type of Room	High	Low	High	Low	High	Low	High	Low	Special double	88	82	108	100					Double	64	59	78	72					Triple					133	125			Quadruple							163	155	Duplex	146	135	156	145	177	166	187	175	Refuge	27	25							Boards									Half meal	16	16	32	32	48	48	64	64	Full meal	28	28	56	56	84	84	112	112
		Single		Double		Triple		Quadruple																																																																																																				
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	Triple					133	125																																																																																																					
	Quadruple							163	155																																																																																																			
	Duplex	146	135	156	145	177	166	187	175																																																																																																			
	Refuge	27	25																																																																																																									
	Boards																																																																																																											
Half meal	16	16	32	32	48	48	64	64																																																																																																				
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<ul style="list-style-type: none">Tax: Illustrated by the sales tax, determined by the local government and usually added to the room price, if not previously included in the price.	<ul style="list-style-type: none">IVA 7%																																																																																																											
<ul style="list-style-type: none">Surcharges: Additional fees added to the original price. This surcharge could be due to ...	<ul style="list-style-type: none">PetsSafe																																																																																																											
<ul style="list-style-type: none">Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: health, damage, accident, luggage, etc.	<ul style="list-style-type: none">																																																																																																											
<ul style="list-style-type: none">Modes to book a room: Available telecommunication infrastructure for room booking (Telephone, Fax, e-mail, Web services, Other)	<ul style="list-style-type: none">Telephone,Fax,Email,Web services (only for Information)																																																																																																											
<ul style="list-style-type: none">Modes to get a confirmation: Available telecommunication infrastructure for room booking (Telephone, Fax, e-mail, Web services, Other)	<ul style="list-style-type: none">TelephoneEmail																																																																																																											
<ul style="list-style-type: none">Bank Account Details: Account number, name of the bank, bank identification code, and bank address.	<ul style="list-style-type: none">																																																																																																											
<ul style="list-style-type: none">Discount policy: The incentives that the hotel offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates...	<table><tr><td></td><td colspan="2">Check in</td><td colspan="2">Check out</td><td colspan="2">Discount</td><td colspan="2">Season</td></tr><tr><td>3 Nights Full board</td><td>Sunday Monday Tuesday</td><td colspan="2">Wednesday Thursday Friday</td><td colspan="2">7%</td><td colspan="2">Low</td></tr><tr><td>3 Nights Full board</td><td>Sunday</td><td colspan="2">Friday</td><td colspan="2">7%</td><td colspan="2">Low</td></tr><tr><td>From ... to...</td><td>Thursday</td><td colspan="2">Sunday</td><td colspan="2">7%</td><td colspan="2">Low</td></tr></table>										Check in		Check out		Discount		Season		3 Nights Full board	Sunday Monday Tuesday	Wednesday Thursday Friday		7%		Low		3 Nights Full board	Sunday	Friday		7%		Low		From ... to...	Thursday	Sunday		7%		Low																																																																			
		Check in		Check out		Discount		Season																																																																																																				
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<ul style="list-style-type: none">Tax identifier: A code provided by the local tax administration to identify the company in its internal database.	<ul style="list-style-type: none">																																																																																																											
<ul style="list-style-type: none">Number of host for the night: Illustrated by the occupancy rate	<ul style="list-style-type: none">Reservation management system																																																																																																											

<ul style="list-style-type: none"> Name and data about host for the night: The registration application where customers provide their personal information. 	<ul style="list-style-type: none"> Complete Name No. of guests Country/City Check-in/Check-out dates Reason for the travel (business or vacation)
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C.3.4.3 Restaurant la FuenRoya at Hotel Hospedaría Hospital de Benasque

<ul style="list-style-type: none"> Restaurant Name: The name that the restaurant is known by. 	<ul style="list-style-type: none"> Restaurant la FuenRoya
<ul style="list-style-type: none"> Company name: The legal name that refers to the restaurant in billing and tax paperwork. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Rating: Refers to the classification of the restaurant in the industry. The status is defined by local industry regulations. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> Benasque (Huesca)
<ul style="list-style-type: none"> Address: A description of the location of the restaurant, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> Camino Real de Francia s/n 22440 Benasque (Huesca)
<ul style="list-style-type: none"> Telephone, telex, fax, e-mail: Available telecommunication infrastructure and codes specific to the restaurant. They enable the restaurant to be reached from the outside world. 	<ul style="list-style-type: none"> Phone: + 34 (974) 552 012 Fax: + 34 (974) 306 866 Email: infos@llanosdelhospital.com http://www.llanosdelhospital.com/frames3.htm
<ul style="list-style-type: none"> Description and relevant note: Proximity to important places or availability of specific services such as a playground for kids. 	<ul style="list-style-type: none"> Same building of Hospital de Benasque
<ul style="list-style-type: none"> Number of seats: Describes the capacity of the restaurant by the number of seats. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Menu: Illustrates the restaurants culinary specialty and offerings. It specifies the types of food served such as international, ethnic, traditional, diet cuisine. 	<ul style="list-style-type: none"> Appetisers Main Dishes Meats Desserts
<ul style="list-style-type: none"> Atmosphere: Type of ambiance that characterizes the place: family, trendy, and romantic, indoor, outdoor, other. 	<ul style="list-style-type: none"> Mountain Indoor Family
<ul style="list-style-type: none"> Entertainment: Services provided in order to 	<ul style="list-style-type: none">

entertain customers (karaoke, dance show, live music, other)	
<ul style="list-style-type: none"> Serving modes: The different ways the restaurant provides its services ranging from on spot service, delivery, takeaway, to catering. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Accessibility: Characterizes the accessibility to the restaurant. It includes access for disabled, parking lot, and highway exit. 	<ul style="list-style-type: none"> Parking Disable facilities
<ul style="list-style-type: none"> Directions: how to reach the restaurant from the major roads. 	<ul style="list-style-type: none"> 13 km from the center of Benasque Village
<ul style="list-style-type: none"> Price category: Classifies the restaurant on pricing basis. Upscale, family, economic and fast food prices. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Tax: Illustrated by the sales tax, determined by the local government and usually added to the bill, if not previously included. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Processes to book a table: Available telecommunication infrastructure for table reservation. (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Telephone Fax E-Mail
<ul style="list-style-type: none"> Bank Account Details: Account number, name of the bank, bank identification code, branch address. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Discount policy: The incentives that the restaurant offers to its customers. Ranging from discounts on bills, happy hours, free gadgets, gift certificates, others. 	<ul style="list-style-type: none"> Menu (daily)
<ul style="list-style-type: none"> Tax Identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none">

C.3.4.4 Hotel- Hotel Ciria

<ul style="list-style-type: none"> Hotel Name: The name that the hotel is known by. 	<ul style="list-style-type: none"> Hotel Ciria
<ul style="list-style-type: none"> Company name: The legal name that refers to the hotel in billing and tax paperwork. 	<ul style="list-style-type: none"> Registration: Volume 155 – Book 35 – Folio 33 – Section 8^a - Page HU223 Inscription 3^a
<ul style="list-style-type: none"> Number of stars: 	<ul style="list-style-type: none">

Refers to the classification of the hotel in the industry. The status is defined by local industry regulations.	
<ul style="list-style-type: none"> Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> Benasque (Huesca), Spain
<ul style="list-style-type: none"> Address: A description of the location of the hotel, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> Avda. de los Tilos s/n 22440 Benasque (Huesca)
<ul style="list-style-type: none"> Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the hotel. They enable the hotel to be reached from the outside world. 	<ul style="list-style-type: none"> Phone: + 34 (974) 55 16 12 Phone: + 34 (974) 55 10 80 Fax: + 34 (974) 55 16 86 Email: hotelciria@hotelciria.com www.hotelciria.com
<ul style="list-style-type: none"> Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> 200 meter away from public swimming pool
<ul style="list-style-type: none"> Number of rooms: Describes the capacity of the hotel by the number of rooms. The rooms could be either single, double, multiple or suites 	<ul style="list-style-type: none"> 44 rooms Double and single rooms Lofts: marriage, duplex-salon (2), duplex-quadruple & duplex-quintuple (3), and suites with Jacuzzi (2).
<ul style="list-style-type: none"> Kind of services offered in each room: The list of extra services in the room, ranging from "room service", mini-bar, cable TV, etc. 	<ul style="list-style-type: none"> Safe Air conditioned Telephone Television & via satellite Mini-bar
<ul style="list-style-type: none"> Kind of services offered in the hotel: Illustrated by the available activities inside the hotel (type of breakfast, restaurants, swimming pool, conference hall, etc) 	<ul style="list-style-type: none"> Reception 24 hours Garage/Parking Currency exchange Bar/Cafeteria Fax service Credit cards Massages Terrace/Solarium Elevator Convention room Television room Private Halls Restaurant (typical gastronomy) Banquets Wi-Fi connection
<ul style="list-style-type: none"> Kind of service offered by other partners: Illustrated by available services offered outside the hotel (shopping, cinema, museum) 	<ul style="list-style-type: none"> Shopping Hiking/climbing Horse riding Biking Alpine ski Guide's service
<ul style="list-style-type: none"> Transportation facilities: Available transportation means offered by the hotel from and to the airport, railway station, etc. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Indications: 	<ul style="list-style-type: none"> Standard information to reach Benasque Valley by

How to reach the hotel and how to reach important sites from the hotel (important museum, attraction parks, etc)	<p>Car; by Bus; and by Train</p> <ul style="list-style-type: none"> By car: http://www.benasque.com/coche.html. The common route is through Barbastro and Graus. By bus: http://www.benasque.com/bus.html. It is common to travel from Barbastro. By train: http://www.benasque.com/tren.html. By train since Monsoon Cinca River to Barbastro and then by bus to Benasque Valley.
<ul style="list-style-type: none"> Number of available room/ date: Describes the number of unoccupied rooms. (single / double / multiple) 	<ul style="list-style-type: none"> Hotel management system (HMS)
<ul style="list-style-type: none"> Unit charge price for each room: The amount of money charged for each type of room and per night. (single/double/multiple) 	<ul style="list-style-type: none"> High season PAX/day: (+ IVA 7%) Full board: 70,62€ Half board: 60,29€ Low season PAX/day: (+ IVA 7%) Full board: 59,95€ Half board: 49,61€ Only breakfast: 34,81€ Supplements Day/Room: (+ IVA 7%) Suites: 79,52€ Duplex: 39,75€ (for occupation with less than 4 persons) Single room: 9,94€ Cradle: 3,45€
<ul style="list-style-type: none"> Tax: Illustrated by the sales tax, determined by the local government and usually added to the room price, if not previously included in the price. 	<ul style="list-style-type: none"> IVA 7% (Hotel)
<ul style="list-style-type: none"> Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> Animals Safe
<ul style="list-style-type: none"> Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: health (sickness), luggage, etc. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Modes to book a room: Available telecommunication infrastructure for room booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Telephone Email with a sample (Date of check-in; Date of check-out; Number of rooms; Type of rooms; Board (full board-FM, half board-HM, breakfast-B);; Reservation name; Telephone for contact; Email for contact)
<ul style="list-style-type: none"> Modes to get a confirmation: Available telecommunication infrastructure for room booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Telephone Email
<ul style="list-style-type: none"> Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Discount policy: 	<ul style="list-style-type: none"> Discounts:

The incentives that the hotel offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates...	3rd PAX in double room: 20% 3rd and 4th PAX in duplex and suites: 10% 5th PAX in duplex-quintuple: 20% ▪ Special offers PAX/day: (+ IVA 7%) (not available between July and August) 7 days: Full board: 347,38€ 7 days: Half board: 277,99€ 5 days: Full board: 248,14€ 5 days: Half board: 198,67€
▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database.	▪
▪ Number of host for the night: Illustrated by the occupancy rate	▪ Hotel management system (HMS)
▪ Name and data about host for the night: The registration application where customers provide their personal information.	▪ Complete Name ▪ No. of guests ▪ Country/City ▪ Date of Check-in/Check-out ▪ Reason for the travel (business or vacation)

C.3.4.5 Restaurant: El Fogaril at Hotel Ciria

▪ Restaurant Name: The name that the restaurant is known by.	▪ El Fogaril
▪ Company name: The legal name that refers to the restaurant in billing and tax paperwork.	▪
▪ Rating: Refers to the classification of the restaurant in the industry. The status is defined by local industry regulations.	▪
▪ Location: The site where the physical building is situated.	▪ Benasque (Huesca), Spain
▪ Address: A description of the location of the restaurant, as written or printed on mail as directions for delivery.	▪ Avda. de los Tilos s/n ▪ 22440 Benasque (Huesca)
▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and codes specific to the restaurant. They enable the restaurant to be reached from the outside world.	▪ Phone: + 34 (974) 55 16 12 ▪ Phone: + 34 (974) 55 10 80 ▪ Fax: + 34 (974) 55 16 86 ▪ http://www.hotelciria.com/restaurante.htm#
▪ Description and relevant note: Proximity to important places or availability of specific services such as a playground for kids.	▪ At the Hotel Ciria building ▪ Close to Barrabés Esquí & Montaña store
▪ Number of seats:	▪

Describes the capacity of the restaurant by the number of seats.	
<ul style="list-style-type: none"> Menu: Illustrates the restaurants culinary specialty and offerings. It specifies the types of food served such as international, ethnic, traditional, diet cuisine. 	<ul style="list-style-type: none"> Typical food from Aragon, Pyrenees Common plates: wild boar, grey partridge, red deer and trout.
<ul style="list-style-type: none"> Atmosphere: Type of ambiance that characterizes the place: family, trendy, and romantic, indoor, outdoor, other. 	<ul style="list-style-type: none"> Family Indoor
<ul style="list-style-type: none"> Entertainment: Services provided in order to entertain customers (karaoke, dance show, live music, other) 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Serving modes: The different ways the restaurant provides its services ranging from: on spot service, delivery, takeaway, to catering. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Accessibility: Characterizes the accessibility to the restaurant. It includes access for disablers, parking lot, and highway exit. 	<ul style="list-style-type: none"> Parking/Garage by Hotel Ciria
<ul style="list-style-type: none"> Directions: how to reach the restaurant from the major roads. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Price category: Classifies the restaurant on pricing basis. Upscale, family, economic and fast food prices. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Tax: Illustrated by the sales tax, determined by the local government and usually added to the bill, if not previously included. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Processes to book a table: Available telecommunication infrastructure for table reservation. (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Telephone
<ul style="list-style-type: none"> Bank Account Details: Account number, name of the bank, bank identification code, branch address. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Discount policy: The incentives that the restaurant offers to its customers. Ranging from discounts on bills, happy hours, free gadgets, gift certificates, others. 	<ul style="list-style-type: none"> Dinner menu

<ul style="list-style-type: none"> ▪ Tax Identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
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C.3.4.6 Real estate business - Habitat Benasque

<ul style="list-style-type: none"> ▪ Agency Name: The name that the hotel is known by. 	<ul style="list-style-type: none"> ▪ Habitat Benasque
<ul style="list-style-type: none"> ▪ Company name: The legal name that refers to the hotel in billing and tax paperwork. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> ▪ Benasque (Huesca)
<ul style="list-style-type: none"> ▪ Address: A description of the location of the agency, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ Avenida de los Tilos, s/n. ▪ Edificio Sayo II ▪ 22440 Benasque (Huesca)
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the agency. They enable the hotel to be reached from the outside world. 	<ul style="list-style-type: none"> ▪ Phone: + 34 (974) 55 12 64 ▪ Fax: + 34 (974) 55 14 58 ▪ Email: info@habitatbenasque.com ▪ www.habitatbenasque.com
<ul style="list-style-type: none"> ▪ Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> ▪ Check in: 5-7pm ▪ Check out: 11am
<ul style="list-style-type: none"> ▪ Number of apartments: Describes the capacity of the apartments by the number of rooms. The apartments could be 1, 2, or 3 bedrooms. 	<ul style="list-style-type: none"> ▪ 22 ▪ Type A (dinner room, 1 sleeping room, sofa bed, kitchen and bathroom), ▪ Type B (dinner room, 2 sleeping rooms, sofa bed, kitchen and bathroom), ▪ Type C (dinner room, 3 sleeping rooms, kitchen and 1 or 2 bathrooms).
<ul style="list-style-type: none"> ▪ Kind of services offered in each apartment: The list of extra services in the room, ranging from "room service", mini-bar, cable TV, etc. 	<ul style="list-style-type: none"> ▪ TV-Color
<ul style="list-style-type: none"> ▪ Kind of services offered in the apartment building: Illustrated by the available activities inside the apartment. 	<ul style="list-style-type: none"> ▪ Residencial Linsoles: Sauna, Squash, Golf, Tennis; Gymnasium and pool ▪ Residencial Ribagorza: Pool and Tennis
<ul style="list-style-type: none"> ▪ Kind of service offered by other partners: Illustrated by available services offered outside the agency (shopping, cinema, museum) 	<ul style="list-style-type: none"> ▪ Activities: http://www.habitatbenasque.com/activ.htm ▪ Services: http://www.habitatbenasque.com/serv.htm
<ul style="list-style-type: none"> ▪ Transportation facilities: Available transportation means offered by the agency from and to the airport, railway station, etc. 	<ul style="list-style-type: none"> ▪ Maps available at the web site

<ul style="list-style-type: none">▪ Indications: How to reach the Habitat and how to reach important sites from the Apartment (important museum, attraction parks, etc)	<ul style="list-style-type: none">▪ Standard information to reach Benasque Valley by Car; by Bus; and by Train																																																																												
<ul style="list-style-type: none">▪ Number of available apartment/ date: Describes the number of unoccupied apartments. (Types A, B and C)	<ul style="list-style-type: none">▪ Monthly planning reservation (paper based table)																																																																												
<ul style="list-style-type: none">▪ Unit charge price for each apartment: Summer: The amount of money charged for each type of apartment and per week. (1,2, or 3 bedrooms) Winter: The amount of money charged for each type of apartment and per day. (1,2, or 3 bedrooms)	<ul style="list-style-type: none">▪ Prices in €; Taxes not included (IVA 7%)▪ Summer rates: <div>Habitat Benasque - Cerler</div> <table><tr><td></td><td>Low</td><td>Medium</td><td>High</td></tr><tr><td>Type A</td><td>260</td><td>300</td><td>375</td></tr><tr><td>Type B</td><td>300</td><td>360</td><td>435</td></tr><tr><td>Type C</td><td>350</td><td>390</td><td>450</td></tr></table> <div>Residencial Linsoles</div> <table><tr><td></td><td>Low</td><td>Medium</td><td>High</td></tr><tr><td>Type A</td><td>300</td><td>375</td><td>490</td></tr><tr><td>Type B</td><td>350</td><td>450</td><td>550</td></tr><tr><td>Type C</td><td>390</td><td>490</td><td>600</td></tr></table> <div>Residencial Ribagorza</div> <table><tr><td></td><td>Low</td><td>Medium</td><td>High</td></tr><tr><td>Type A</td><td>300</td><td>375</td><td>450</td></tr><tr><td>Type B</td><td>350</td><td>450</td><td>500</td></tr><tr><td>Type C</td><td>390</td><td>470</td><td>550</td></tr></table> <ul style="list-style-type: none">▪ Winter rates: <div>Habitat Benasque - Cerler</div> <table><tr><td></td><td>Low</td><td>Medium</td><td>High</td></tr><tr><td>Type A</td><td>51</td><td>60</td><td>75</td></tr><tr><td>Type B</td><td>69</td><td>77</td><td>100</td></tr><tr><td>Type C</td><td>82</td><td>91</td><td>133</td></tr></table> <div>Residencial Linsoles</div> <table><tr><td></td><td>Low</td><td>Medium</td><td>High</td></tr><tr><td>Type A</td><td>51</td><td>60</td><td>75</td></tr><tr><td>Type B</td><td>69</td><td>77</td><td>121</td></tr></table>		Low	Medium	High	Type A	260	300	375	Type B	300	360	435	Type C	350	390	450		Low	Medium	High	Type A	300	375	490	Type B	350	450	550	Type C	390	490	600		Low	Medium	High	Type A	300	375	450	Type B	350	450	500	Type C	390	470	550		Low	Medium	High	Type A	51	60	75	Type B	69	77	100	Type C	82	91	133		Low	Medium	High	Type A	51	60	75	Type B	69	77	121
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<ul style="list-style-type: none">▪ Tax: Illustrated by the sales tax, determined by the local government and usually added to	<ul style="list-style-type: none">▪ IVA 7%																																																																												

the room price, if not previously included in the price.	
<ul style="list-style-type: none"> ▪ Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> ▪ Pets
<ul style="list-style-type: none"> ▪ Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: fire, etc. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Modes to book an apartment: Available telecommunication infrastructure for room booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Telephone ▪ Fax ▪ Email
<ul style="list-style-type: none"> ▪ Modes to get a confirmation: Available telecommunication infrastructure for room booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Telephone ▪ Email
<ul style="list-style-type: none"> ▪ Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Discount policy: The incentives that the hotel offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Agency commission: Applied rate or fee on both sales and rent. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Number of host for the month: Illustrated by the occupancy rate 	<ul style="list-style-type: none"> ▪ Table (paper based document)
<ul style="list-style-type: none"> ▪ Name and data about host for the week: The registration application where customers provide their personal information. 	<ul style="list-style-type: none"> ▪ Complete Name ▪ No. of guests ▪ Country/City ▪ Date of Check-in/Check-out ▪ Reason for the travel (business or vacation)
<ul style="list-style-type: none"> ▪ Customer service: Fulfilling customers' needs and inquiries. Bringing assistance, support and advice. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Service from other companies: Services provided by subcontractors to the company 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Activities of the agency: Kind of services offered in the agency (estate valuation, rent, sales, financing) 	<ul style="list-style-type: none"> ▪ Rent ▪ Sales
<ul style="list-style-type: none"> ▪ Geographic reach: 	<ul style="list-style-type: none"> ▪

The area of operations (Local based, regional, national or international)	
<ul style="list-style-type: none"> Type of customers: Family status (Married with children, young couple, singles) 	<ul style="list-style-type: none"> Family

C.3.4.7 Sport service provider - Equipo Barrabés

<ul style="list-style-type: none"> Company Name: The name that the hotel is known by. 	<ul style="list-style-type: none"> Equipo Barrabés Guías de Montaña (part of the group Barrabés Esquí & Montaña)
<ul style="list-style-type: none"> Company name: The legal name that refers to the company in billing and tax paperwork. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> Benasque (Huesca)
<ul style="list-style-type: none"> Address: A description of the location of the hotel, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> Edificio Barrabés Ctra.Francia s/n 22440 Benasque (Huesca)
<ul style="list-style-type: none"> Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the company. They enable the company to be reached from the outside world. 	<ul style="list-style-type: none"> Phone: +34 (974) 551 056 Fax: +34 (974) 551 681 www.barrabes.com/equipo/portada.asp
<ul style="list-style-type: none"> Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Kind of services offered by Barrabés store: Illustrated by the available activities inside the store. 	<ul style="list-style-type: none"> Winter: skiing school, mountain guides Summer: mountain guides, cliffs, trekking, mountain bike tour, etc.
<ul style="list-style-type: none"> Kind of service offered by other partners: Illustrated by available services offered outside the hotel (shopping, cinema, museum) 	<ul style="list-style-type: none"> Rafting Climbing Paraglide Horse riding Snowboard Rappel
<ul style="list-style-type: none"> Transportation facilities: Available transportation means offered by Barrabés from and to the hotel, apartment, sites, etc. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Indications: How to reach the Barrabés and how to reach important sites from the Barrabés store (river, mountains, etc) 	<ul style="list-style-type: none"> By Car; by Bus; by Train: standard information how to reach Benasque Valley
<ul style="list-style-type: none"> Number of available apartment/ date: Describes the number of 	<ul style="list-style-type: none">

unoccupied apartments. (Types A, B and C)	
<ul style="list-style-type: none"> Unit charge price for each activity: 	<ul style="list-style-type: none"> Rafting: 37€ Hydro speed: 41€ Horse riding: 10€ / hour Kayak (storm): 50€ Kayak (light): 7€ / hour Paraglide double: 83€ Ultra light: 48€ Mountain bike tour: 30€ ½ tour Kayak (storm) + Rappel: 94€ Rappel + Rappel: 89€ Mountain bike+ Rappel: 72€ Trekking ½ day + Rappel: 82€ Mont Blanc (5 days): 860€ (max. 2PAX) 3000m Mountains: 70€ (min.3PAX)
<ul style="list-style-type: none"> Tax: Illustrated by the sales tax, determined by the local government and usually added to the room price, if not previously included in the price. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: health, luggage, etc. 	<ul style="list-style-type: none"> Insurance Equipo Barrabés (skier) Equipo Barrabés incorporates in all its courses and activities a free insurance during the courses and or activity. It covers: <ul style="list-style-type: none"> Medical attendance Emergency equipment and specialists. Complementary medical exams Hospitalisations, treatments and chirurgical interventions. Medication during hospitalisation or ambulatory Emergency dental treatment Repatriation or transportation of the wounded or dead person Displacement of a relative in case of hospitalisation Recovery time in a hotel Earlier return Rescue till 3000€ (500.000 ptas.)
<ul style="list-style-type: none"> Modes to book a activity: Available telecommunication infrastructure for room booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Telephone Fax Web site Email
<ul style="list-style-type: none"> Modes to get a confirmation: Available telecommunication infrastructure for course booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Telephone Email
<ul style="list-style-type: none"> Bank Account Details: Account number, name of the bank, bank identification code, 	<ul style="list-style-type: none">

and bank address.	
<ul style="list-style-type: none"> Discount policy: The incentives that the sport agency offers to its customers. Ranging from special offers pack, weekends, etc. 	<ul style="list-style-type: none"> Summer special offers: Special week – Pack Multi-activity 5 days (min.4 PAX): Pack 1: 152€ 1st day.- Senderismo ½ day 2nd day.- Horse hiding 3rd day.- Trekking 4th day.- Rappel 5th day.- Rafting Include: mountain guide, technical material, insurance, Rafting 2 hours of duration, rappel.1/2 day trekking and ecological hiking. Pack 2:191€ 1st day - ½ day Trekking 2nd day - Hydro speed 3rd day - Quads. 4th day.- Rappel 5th day – Rafting Pack 3: 162€ 1st day - ½ Trekking 2nd day - Horse riding. 3rd day - Mountain bike 4th day - Rappel 5th day – Rafting Special weekend: Weekend 1: Trekking Aneto (3404 MTS.) + Rafting: 99 €, Include: mountain guide, technical material, insurance, Rafting 2 hours of duration,1/2 day trekking. Minimum 6 PAX Weekend 2: Rappel + Rafting: 82 €, Include: Rappel 1 day, rappel guide, technical material, insurance, Rafting 2 hours of duration.
<ul style="list-style-type: none"> Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Number of clients for the month: Illustrated by the occupancy rate 	<ul style="list-style-type: none"> Reservation system
<ul style="list-style-type: none"> Name and data about host for the week: The registration application where customers provide their personal information. 	<ul style="list-style-type: none"> Complete Name No. of participants Country/City Date Telephone Email
<ul style="list-style-type: none"> Geographic characteristics: Defined by the mountain height and the altitude of the location (Hotel and ski resort) 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Characteristics of the resort: Defined by the number of slopes, the difficulty level of slopes. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Monitors team: The number of on spot instructors, their qualifications, 	<ul style="list-style-type: none">

specialties and skills.	
<ul style="list-style-type: none"> ▪ Machinery: Characterised by the availability of adapted machines to the environment (snowmobile, snow making machine, snow-scooters..) 	▪
<ul style="list-style-type: none"> ▪ Seasons: The approximate starting date of the season and the ending date. (In this case, the ski season or the trekking one) 	▪
<ul style="list-style-type: none"> ▪ Other services: The weather forecast of the mountain. 	▪

C.3.4.8 Sport service provider - Radical Snowboard

<ul style="list-style-type: none">▪ School Name: The name that the agency is known by.	<ul style="list-style-type: none">▪ Radical Snowboard												
<ul style="list-style-type: none">▪ Company name: The legal name that refers to the hotel in billing and tax paperwork.	<ul style="list-style-type: none">▪												
<ul style="list-style-type: none">▪ Location: The site where the physical building is situated.	<ul style="list-style-type: none">▪ Benasque Valley												
<ul style="list-style-type: none">▪ Address: A description of the location of the hotel, as written or printed on mail as directions for delivery.	<ul style="list-style-type: none">▪ Edificio Ribagorza▪ Avda. de Francia s/n▪ 22440 Benasque (Huesca)▪▪ Centro Comercial▪ 22449 Cerler (Huesca)												
<ul style="list-style-type: none">▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the agency. They enable the agency to be reached from the outside world.	<ul style="list-style-type: none">▪ Phone: +34 (974) 551 433 (Benasque)▪ Phone: +34 (974) 551 425 (Cerler)▪ Mobil: +34 678 404 546▪ Email: radical@radicalsnowboard.com▪ Email: escuela@radicalsnowboard.com▪ www.radicalsnowboard.com												
<ul style="list-style-type: none">▪ Description and relevant note: Proximity to important place or availability of specific services	<ul style="list-style-type: none">▪ Winter sport specialized in snowboard classes and trips												
<ul style="list-style-type: none">▪ Kind of services offered in the agency: Illustrated by the available activities offered.	<ul style="list-style-type: none">▪ Private classes▪ Group courses▪ Off slope▪ Sleds and Quad▪ Telematik												
<ul style="list-style-type: none">▪ Indications: How to reach the agency	<ul style="list-style-type: none">▪ By Car; by Bus; by Train: standard information to reach Benasque Valley												
<ul style="list-style-type: none">▪ Unit charge price for each activity:	<ul style="list-style-type: none">▪ Private classes - Snowboard:<table><tr><td></td><td colspan="3">Private classes (€)</td></tr><tr><td>Duration</td><td>1 student</td><td>2 students</td><td>3 students</td></tr><tr><td>1 hour</td><td>24</td><td>29</td><td>34</td></tr></table>		Private classes (€)			Duration	1 student	2 students	3 students	1 hour	24	29	34
	Private classes (€)												
Duration	1 student	2 students	3 students										
1 hour	24	29	34										

	<table><tr><td>2 hours</td><td>48</td><td>56</td><td>61</td></tr><tr><td>3 hours</td><td>71</td><td>80</td><td>85</td></tr><tr><td>4 hours</td><td>94</td><td>102</td><td>107</td></tr></table>	2 hours	48	56	61	3 hours	71	80	85	4 hours	94	102	107						
	2 hours	48	56	61															
	3 hours	71	80	85															
	4 hours	94	102	107															
	<ul style="list-style-type: none">15% discount for students till 10 years old.More then 4 students: increase 5€/personVideo record and correction: 20€/personTaxes (IVA) includes in price																		
	<ul style="list-style-type: none">Snowboard courses:																		
	<table><tr><th colspan="3">Snowboard course (€)</th></tr><tr><th>Duration</th><th>Adults</th><th>Kids (until 11 years old)</th></tr><tr><td>5 days (10 hours)</td><td>67</td><td>62</td></tr><tr><td>4 days (8 hours)</td><td>56</td><td>55</td></tr><tr><td>3 days (6 hours)</td><td>44</td><td>43</td></tr><tr><td>2 days (4 hours)</td><td>34</td><td>32</td></tr></table>	Snowboard course (€)			Duration	Adults	Kids (until 11 years old)	5 days (10 hours)	67	62	4 days (8 hours)	56	55	3 days (6 hours)	44	43	2 days (4 hours)	34	32
	Snowboard course (€)																		
	Duration	Adults	Kids (until 11 years old)																
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	4 days (8 hours)	56	55																
	3 days (6 hours)	44	43																
	2 days (4 hours)	34	32																
	<ul style="list-style-type: none">Minimum: 4 personsTax (IVA) included in price																		
	<ul style="list-style-type: none">Free ride snowboard trips:																		
	<table><tr><td></td><td>1 PAX</td><td>2 PAX</td><td>3 PAX</td><td>4 PAX</td></tr><tr><td>Full journey (€)</td><td>70</td><td>140</td><td>210</td><td>280</td></tr><tr><td>Half journey (€)</td><td>35</td><td>70</td><td>105</td><td>140</td></tr></table>		1 PAX	2 PAX	3 PAX	4 PAX	Full journey (€)	70	140	210	280	Half journey (€)	35	70	105	140			
		1 PAX	2 PAX	3 PAX	4 PAX														
	Full journey (€)	70	140	210	280														
	Half journey (€)	35	70	105	140														
	<ul style="list-style-type: none">Other courses:																		
	<table><tr><td>Snow rackets trip</td><td>30€/person</td><td>½ journey</td></tr><tr><td>Snowboard beginners (basic level)</td><td>200€</td><td>4 days</td></tr><tr><td>Snowboard beginners (extreme)</td><td>260€</td><td>2 days</td></tr><tr><td>Course of security in snow-covered mountain:</td><td>110€</td><td>2 days</td></tr><tr><td>Course of mountaineers techniques</td><td>110€</td><td>2 days</td></tr></table>	Snow rackets trip	30€/person	½ journey	Snowboard beginners (basic level)	200€	4 days	Snowboard beginners (extreme)	260€	2 days	Course of security in snow-covered mountain:	110€	2 days	Course of mountaineers techniques	110€	2 days			
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	Snowboard beginners (extreme)	260€	2 days																
Course of security in snow-covered mountain:	110€	2 days																	
Course of mountaineers techniques	110€	2 days																	
<ul style="list-style-type: none">GuiderDisaster insuranceSecurity equipmentTechnical equipmentTax (IVA) included in price																			
<ul style="list-style-type: none">Conditions for rent a Snowmobile or Quad:																			

	Working hour (minimum 1 hour)		60€ (1 st hour)		
	Waiting hour		20€ (full hour)		
	Trip from Cerler to maintenance point (1 Sled or Quad)		0,40€/km		
	Trip from Cerler to maintenance point (2 or + Sled or Quad)		0,50€/km		
	Service availability		365 days/year (+25% during holidays)		
	Services out of Benasque Valley		12€/day		
	▪				
	▪ Free ski				
	Snowboard - private classes (€)				
	Duration	1 PAX	2 PAX	3 PAX	4 PAX
1 hour	28	36,40	42	50,40	
2 hours	24	64,10	73,95	88,75	
3 hours	80	96,15	110,95	133,10	
Snowboard - 15 hours course (€)					
	3 PAX	3 to 6 PAX	Exclusive 3 PAX	Exclusive 4 PAX	
Price	250	225	375	282	
Snowboard - 6 hours course – 2 days (€)					
	3 PAX	3 to 6 PAX	Exclusive 3 PAX	Exclusive 4 PAX	
Price	55	52	80	60	
Off slope – 15 hours (€)					
	4 to 6 PAX				
Price	175				
▪ Other course:					
Telemark (€)					
	3 PAX	3 to 6 PAX	Exclusive 3 PAX	Exclusive 4 PAX	
Price	120	105	175	132	
▪ Rental equipment:					
Board+ boots					
1 day	2 days	3 days	Up to 4 days		
20 €	35 €	45 €	15 €/day		
Snowboard + boots					
1 day	2 days	3 days	Up to 4 days		

	18 €	30 €	35 €	12 €/day
	Board during course			
	1 day	2 days	3 days	Up to 4 days
	16 €	27 €	32 €	11 €/day
<ul style="list-style-type: none"> ▪ Tax: Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price. 	<ul style="list-style-type: none"> ▪ IVA (7%) 			
<ul style="list-style-type: none"> ▪ Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> ▪ 			
<ul style="list-style-type: none"> ▪ Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: health (sickness), luggage, etc. 	<ul style="list-style-type: none"> ▪ Accident insurance 			
<ul style="list-style-type: none"> ▪ Modes to book a trip: Available telecommunication infrastructure for booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Telephone, ▪ Mobil phone ▪ Email 			
<ul style="list-style-type: none"> ▪ Modes to get a confirmation: Available telecommunication infrastructure for trip booking (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Telephone ▪ Email 			
<ul style="list-style-type: none"> ▪ Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none"> ▪ 			
<ul style="list-style-type: none"> ▪ Discount policy: The incentives that the agency offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates... 	<ul style="list-style-type: none"> ▪ 			
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪ 			
<ul style="list-style-type: none"> ▪ Geographic characteristics: Defined by the mountain height and the altitude of the location (Hotel and ski resort) 	<ul style="list-style-type: none"> ▪ 			
<ul style="list-style-type: none"> ▪ Characteristics of the resort: Defined by the number of slopes, the difficulty level of slopes. 	<ul style="list-style-type: none"> ▪ 			
<ul style="list-style-type: none"> ▪ Monitors team: The number of on spot instructors, their qualifications, specialties and skills. 	<ul style="list-style-type: none"> ▪ 			

<ul style="list-style-type: none"> ▪ Machinery: Characterised by the availability of adapted machines to the environment (snowmobile, snow making machine, snow-scooters..) 	▪
<ul style="list-style-type: none"> ▪ Seasons: The approximate starting date of the season and the ending date. (In this case, the ski season or the trekking one) 	▪
<ul style="list-style-type: none"> ▪ Other services: The weather forecast of the mountain. 	▪

C.3.4.9 Sport service provider - Escuela de Parapente Pirineos

<ul style="list-style-type: none"> ▪ School Name: The name that the agency is known by. 	<ul style="list-style-type: none"> ▪ Escuela de Parapente Pirineos 		
<ul style="list-style-type: none"> ▪ Company name: The legal name that refers to the company in billing and tax paperwork. 	▪		
<ul style="list-style-type: none"> ▪ Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> ▪ Benasque Valley 		
<ul style="list-style-type: none"> ▪ Address: A description of the location of the hotel, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ Avda. El Ral 54 ▪ 22466 Castejón de Sos (Huesca) 		
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the agency. They enable the agency to be reached from the outside world. 	<ul style="list-style-type: none"> ▪ Phone: +34 (974) 553567 ▪ Fax: +34 (974) 553567 ▪ Mobil: +34 689 090838 ▪ E-mail: escuela@parapentepirineos.com ▪ www.parapentepirineos.com 		
<ul style="list-style-type: none"> ▪ Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> ▪ High yield cross: For totally independent pilots, who have made one or more advanced official training courses and have experience with flight in thermal. It doesn't take place in August. ▪ Single flights: For those people who already have made an initiation course, it is offered the possibility to fly with equipment and advising from the school. 		
<ul style="list-style-type: none"> ▪ Kind of services offered in the agency: Illustrated by the available activities offered. 	<ul style="list-style-type: none"> ▪ Beginners and advancers courses ▪ High yield cross trips ▪ Single and double flights 		
<ul style="list-style-type: none"> ▪ Indications: How to reach the agency 	▪		
<ul style="list-style-type: none"> ▪ Unit charge price for each activity: 	<ul style="list-style-type: none"> ▪ Courses: <table border="1"> <tr> <td>Courses:</td><td>Price (€)</td></tr> </table>	Courses:	Price (€)
Courses:	Price (€)		

	<table><tr><td>Initiation course (Beginners)</td><td>380</td></tr><tr><td>Advanced course (Advancer)</td><td>425</td></tr></table>	Initiation course (Beginners)	380	Advanced course (Advancer)	425												
	Initiation course (Beginners)	380															
	Advanced course (Advancer)	425															
	<div>▪ Flights:</div> <table><tr><td>Flight</td><td>Unevenness</td><td>Duration</td><td>Price (€)</td></tr><tr><td>Liri</td><td>1.300 ms</td><td>20-30 min</td><td>67</td></tr><tr><td>Rials</td><td>300 ms</td><td>15 min</td><td>45</td></tr><tr><td>Photographic reportage</td><td>Spool of 12 exhibitions</td><td>Not revealed</td><td>15</td></tr></table>	Flight	Unevenness	Duration	Price (€)	Liri	1.300 ms	20-30 min	67	Rials	300 ms	15 min	45	Photographic reportage	Spool of 12 exhibitions	Not revealed	15
	Flight	Unevenness	Duration	Price (€)													
	Liri	1.300 ms	20-30 min	67													
	Rials	300 ms	15 min	45													
	Photographic reportage	Spool of 12 exhibitions	Not revealed	15													
	<div>▪ Others::</div> <table><tr><td></td><td>Price (€)</td></tr><tr><td>High yield cross</td><td>425</td></tr><tr><td>Aragon's license</td><td>103</td></tr><tr><td>National license</td><td>119</td></tr><tr><td>Trimester license (single students)</td><td>59</td></tr><tr><td>Extension to international license</td><td>16</td></tr><tr><td>License pilot two-seats</td><td>Consult</td></tr></table>		Price (€)	High yield cross	425	Aragon's license	103	National license	119	Trimester license (single students)	59	Extension to international license	16	License pilot two-seats	Consult		
		Price (€)															
High yield cross	425																
Aragon's license	103																
National license	119																
Trimester license (single students)	59																
Extension to international license	16																
License pilot two-seats	Consult																
<div>▪ Tax:</div> <div>Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price.</div>	<div>▪</div>																
<div>▪ Surcharges:</div> <div>Additional fees added to the original price. This surcharge could be due to ...</div>	<div>▪ Lost flights:</div> <div>Between 300 and 600m unevenness: 15€</div> <div>Higher than 600m unevenness: 33€</div>																
<div>▪ Insurance:</div> <div>Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: health (sickness), luggage, etc.</div>	<div>▪ Accident insurance</div> <div>▪ Helvetia Safe: valid only during the course with a limited cover to 6.000€ (30€)</div> <div>▪ Federal License: an insurance against accident with unlimited cover (quarterly 59€ or annual 97€). The insurance covers from the moment that is requested by the school, although the federated card takes about ten days and it is sent by mail.</div>																
<div>▪ Modes to book a course:</div> <div>Available telecommunication infrastructure for booking (Telephone, Fax, e-mail, Web services, Other)</div>	<div>▪ Online</div> <div>▪ Telephone,</div> <div>▪ Mobil phone</div> <div>▪ Email</div>																
<div>▪ Modes to get a confirmation:</div> <div>Available telecommunication infrastructure for trip/course confirmation (Telephone, Fax, e-mail, Web services, Other)</div>	<div>▪ Telephone</div> <div>▪ Email</div>																

<ul style="list-style-type: none"> ▪ Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Discount policy: The incentives that the school offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates... 	<ul style="list-style-type: none"> ▪ July and September: 10% ▪ Rest of the year and June: 20% ▪ Fidelity: 10% (pro participant that made two or more courses in the last three years; and for the relatives in first degree) ▪ By the purchase of a complete flight equipment: the participant gets 50% off in the advanced course
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Characteristics of the resort: Defined by the number of landing strips 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Monitors team: The number of on spot instructors, their qualifications, specialties and skills. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Machinery: Characterised by the availability of aircrafts. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Other services: The weather forecast of the flight zone. 	<ul style="list-style-type: none"> ▪

C.3.4.10 Food and Handcraft Gift Shop - Sabores de pueblo

<ul style="list-style-type: none"> ▪ Store Name: The name that the agency is known by. 	<ul style="list-style-type: none"> ▪ Sabores de Pueblo
<ul style="list-style-type: none"> ▪ Company name: The legal name that refers to the company in billing and tax paperwork. 	<ul style="list-style-type: none"> ▪ Chelizsierco S.L.
<ul style="list-style-type: none"> ▪ Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> ▪ Benasque Valley
<ul style="list-style-type: none"> ▪ Address: A description of the location of the stores, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ Avda. Ordesa ,2 ▪ 22330 Ainsa (Huesca) ▪ ▪ Plaza Alfonso I, 3 ▪ 22330 Ainsa (Huesca) ▪ ▪ Calle San Sebastián 3 ▪ 22440 Benasque (Huesca)
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the agency. They enable the agency to be reached 	<ul style="list-style-type: none"> ▪ Phone: +34 974-500062 ▪ Fax: + 34 974-510011 ▪ E-mail: info@saboresdepueblo.com ▪ www.saboresdepueblo.com

from the outside world.	
<ul style="list-style-type: none"> Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> Explanation about purchasing process at the web site (http://www.saboresdepueblo.com/tienda/proceso_compra.asp)
<ul style="list-style-type: none"> Kind of services offered: Illustrated by the available activities offered. 	<ul style="list-style-type: none"> Post-sales services: Phone: +34 974-500062 (Tuesday to Thursday from 11am to 2pm and from 5 to 8pm) Special baskets <ul style="list-style-type: none"> - Christmas - Company - Hotels
<ul style="list-style-type: none"> Indications: How to reach the agency 	<ul style="list-style-type: none"> Ainsa (Huesca) Avda Ordesa, 2 (close to Tourist office) Pza Alfonso I, 3 (in front of the church) Benasque (Huesca) Calle San Sebastián, 3 (close to Tourist office)
<ul style="list-style-type: none"> Unit charge price for each product: The amount of money charged for each type of product 	<ul style="list-style-type: none"> See web site (http://www.saboresdepueblo.com/tienda/tienda.asp)
<ul style="list-style-type: none"> Tax: Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price. 	<ul style="list-style-type: none"> IVA: normally 7% 4% for Cheeses and Books 16% for Wines, Liquors, Music and Crafts
<ul style="list-style-type: none"> Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> Delivery cost: Package till 10 Kg: 7 € Package up to 10 Kg: Information will be sent by Email.
<ul style="list-style-type: none"> Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances are: health (sickness), luggage, etc. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Modes to buy a product: Available telecommunication infrastructure for purchasing (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Web site (online purchase) In Loco (3 stores)
<ul style="list-style-type: none"> Modes to pay: Available telecommunication infrastructure for confirmation (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Stores: <ul style="list-style-type: none"> - Credit Card (VISA & MasterCard) - Cash Online: <ul style="list-style-type: none"> - Credit card (VISA & MasterCard) - Bank transfer (3 days to transfer the money – do not forget the purchase number). The client must fax the transfer doc to complete the purchase process. - Refund (6% more of transaction costs)
<ul style="list-style-type: none"> Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Discount policy: 	<ul style="list-style-type: none">

The incentives that the company offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates...	
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Kind of products offered: Illustrated by the available products offered 	<ul style="list-style-type: none"> ▪ Oil & Vinegar ▪ Conserves & Patés ▪ Sweats ▪ Ham & Sausage ▪ Liqueurs ▪ Jam & Marmalade ▪ Honey ▪ Cheese ▪ Chocolate ▪ Mushroom ▪ Wine ▪ Books & Music ▪ Bio/Eco Products ▪ New products ▪ Baskets
<ul style="list-style-type: none"> ▪ Kind of supplier: (worldwide supplier, nationwide supplier...) 	<ul style="list-style-type: none"> ▪ Local ▪ National

C.3.4.11 Governmental Association – Aramón Montañas de Aragón

<ul style="list-style-type: none"> ▪ Agency Name: The name that the agency is known by. 	<ul style="list-style-type: none"> ▪ Aramon Montañas de Aragón
<ul style="list-style-type: none"> ▪ Company name: The legal name that refers to the company in billing and tax paperwork. 	<ul style="list-style-type: none"> ▪ Aramon Montañas de Aragón S.A.
<ul style="list-style-type: none"> ▪ Location: The site where the physical building is situated. 	<ul style="list-style-type: none"> ▪ Saragossa
<ul style="list-style-type: none"> ▪ Address: A description of the location of the company, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ Edificio Aída ▪ C/ Madre Rafols 2, planta 6, oficina 3 ▪ 50004 Saragossa
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, e-mail: Available telecommunication infrastructure and numbers specific to the agency. They enable the agency to be reached from the outside world. 	<ul style="list-style-type: none"> ▪ Phone: +34 (976) 447 040 ▪ Fax: +34 (976) 280 236 ▪ E-mail: info@aramon.es ▪ www.aramon.es
<ul style="list-style-type: none"> ▪ Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> ▪

<ul style="list-style-type: none"> Kind of services offered in the company: Illustrated by the available activities offered. 	<ul style="list-style-type: none"> Ski resorts administration Ski card
<ul style="list-style-type: none"> Indications: How to reach the company 	<ul style="list-style-type: none"> There is a "how to reach" in each ski station web site
<ul style="list-style-type: none"> Unit charge price for each activity: 	<ul style="list-style-type: none"> Ski card: Season: <ul style="list-style-type: none"> Adults: 533€ Kids: 427€ Senior: 427€ 5 non consecutive days: <ul style="list-style-type: none"> Adults: 133€ Kids: 106€ Senior: 106€
<ul style="list-style-type: none"> Tax: Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Insurance: Illustrated in different categories where each premium is added to the normal fee. The types of insurances include: health (sickness), luggage, etc. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Modes to buy the ski card: Available telecommunication infrastructure for purchasing (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Direct at ski resort, hotels, Ibercaja, travel agencies and associated establishments
<ul style="list-style-type: none"> Modes to recharge the ski card: Available telecommunication infrastructure for recharge (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Web site, and ski resorts
<ul style="list-style-type: none"> Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Discount policy: The incentives that the company offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates... 	<ul style="list-style-type: none"> The ski card to the whole season
<ul style="list-style-type: none"> Tax identifier: A code provided by the local tax administration to identify the company in its internal 	<ul style="list-style-type: none">

database.	
<ul style="list-style-type: none"> ▪ Geographic characteristics: Defined by the mountain height and the altitude of the location (Hotel and ski resort) 	▪
<ul style="list-style-type: none"> ▪ Characteristics of the resort: Defined by the number of slops, the difficulty level of slops. 	▪
<ul style="list-style-type: none"> ▪ Monitors team: The number of on spot instructors, their qualifications, specialties and skills. 	▪
<ul style="list-style-type: none"> ▪ Machinery: Characterised by the availability of adapted machines to the environment (snowmobile, snow making machine, snow-scooters) 	▪
<ul style="list-style-type: none"> ▪ Seasons: The approximate starting date of the season and the ending date. (In this case, the ski season or the trekking one) 	▪
<ul style="list-style-type: none"> ▪ Other services: The weather forecast of the mountain. (proper equipment and technician for weather forecasting) 	▪

C.4 Part Two: Conference Organiser

The first part summarises the information obtained from SMEs during the interviews, which took place in Tampere (Finland) by the CW 24 (June 2004).

The focus of the interviews were SMEs, which organise conferences and/or deliver a software, which support a conference organisation. Ines Alves de Queiroz and Dieter Hertweck interviewed the following organizations:

N°	Type of organisations	Name	Contact
1.	e-Business Researcher	eBRC	Ms. Hanna Martin
2.	Science Park Administrator	Technology Centre Hermia	Ms. Johanna Salomaa-Valkama
3.	Conference Manager	SuviSoft	

C.4.1 Requirement Analysis

In Requirement Analysis, the organizations are introduced by general information, a short description and by the provided services. Thereafter, the current IT-Infrastructure and IT-Purchase process is described. Finally, the negative and positive aspects are mentioned. The positive aspects mean in how fare IT-technologies or combined systems with other partners are already established and in which way the DBE projects can benefit from these experiences. On the other hand, the negative aspects are the ones, which inhibit the implementation of Conference Management Systems or the growth of the organisations.

C.4.1.1 e-Business Researcher - eBRC

General Information:

1	Country:	<ul style="list-style-type: none"> Finland
2	Address:	<ul style="list-style-type: none"> Mailing address: P.O.Box 541 FIN- 33101 Tampere Visiting address: Hermiankatu 7 B 111 FIN - 33720 Tampere Phone: +358 3 3115 4675 Fax: +358 50 325 6515 E-mail: hanna.martin@uta.fi www.ebrc.info
3	Contact:	<ul style="list-style-type: none"> Ms. Hanna Martin, Project Manager
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> e-Business Research Project of two universities 9
5	Outsourced service	<ul style="list-style-type: none"> The entire internet system
6	Clients	<ul style="list-style-type: none"> Other Universities; several business partner

Description:

eBRC, one of the six subprograms of eTampere, is aimed at turning e-business related research and development ideas into new knowledge. eTampere aims to enhance the humanly sustainable information society development by creating new knowledge, new business, and new public online services.

eBRC is co-founded by two different universities: The Tampere University of Technology and the University of Tampere. As such, eBRC is a "border-crossing partnership" – a joint venture born to create value to a multitude of partners, rather than a single parent. This is reflected in eBRC's organization, values, and way to operate.

The mission of eBRC is to generate relevant new knowledge on selected business phenomena related to the e-business. The new knowledge will be utilized in the education and research activity by the partner universities and in the business practise by the businesses participating in the underlying research projects. The objective of eBRC is to become one of Europe's leading e-business researchers by 2006. (Quote from the Homepage of the eBRC)

Services:

- Organisation of scientific conferences (eBRF) in frame of the project eBRC (eTampere)

Extra services (sub-contractors):

- SuviSoft (Conference Management System Provider)
- Response® Audience Response System¹⁷

IT-Infrastructure:

1	Connection	▪
	Technological platform	▪ Windows
	Database	▪
	Security	▪
2	Office Software	▪ MS Office
	Extra Software	▪
	Future acquisitions	▪ A flexible conference management system (CMS), where all wanted reports could be generated.
3	Internet	▪ Email internal and external ▪ Information / Research

¹⁷ Each participant will receive a portable handset for voting/answering, which enables each presenter to receive instant response from his/her audience.

	Web-Site	<ul style="list-style-type: none"> ▪ Company eBRC: ▪ Languages: Finish, English ▪ Information about projects from the Tampere University of Technology and the University of Tampere ▪ Publications ▪ Links to conferences about eBusiness ▪ Links to "Call for papers" of Journals ▪ Conference eBRF ▪ Languages: Finish, English ▪ Information ▪ Fee ▪ Registration ▪ Review process
4	Systems with partners: (These systems could avoid costs on telephone calls and speed up the process)	<ul style="list-style-type: none"> ▪

IT-Purchase process:

1	Purchase (CMS) decision by:	▪ Group
	Interviewed personally involved	▪ Yes (Ms. Hanna Martin)
	Payback (ROI)	▪
2	Software (CMS) vendor selection	<ul style="list-style-type: none"> ▪ Price (normally they pay a symbolic fee to use the software) ▪ Warranty ▪ Maintenance ▪ Payment modes Note: related to product and not to vendor. ▪ Product functionality ▪ Product stability and usability (easy to use)

Difficulties and Expectations:

- Ms. Hanna Martin knows the advantages of a good Conference Management System. She has many ideas to improve the system of SuviSoft.
- The program eBRF is together with the main program eTampere limited to five years

C.4.1.2 Science Park Administrator - Technology Centre Hermia**General Information:**

1	Country:	▪ Finland
2	Address:	<ul style="list-style-type: none"> ▪ Technology Centre Hermia Ltd ▪ Hermiankatu 1 ▪ FIN-33720 Tampere ▪ Telephone: +358 3 316 5550 ▪ Fax +358 3 316 5552 ▪ e-Mail: ttoy@hermia.fi ▪ http://www3.hermia.fi/english/
3	Contact:	▪ Johanna Salomaa-Valkama, Communications Manager
4	Sector:	▪ Real estate, consulting, expertise

	Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> ▪ Limited Company ▪ About 35 (the half employed in several projects) ▪ 5,3 mill ▪ 38,800
5	Outsourced service	▪ Extranet and applications, like the registration system
6	Clients	▪ New technology companies

Description:

Tampere Technology Centre Ltd was established in November 1990 as a development and administration company for Technology Centre Hermia. It had been divided into three business units: *Hermia Premise Services*, *Hermia Business Development* and the *Centre of Expertise*. Since the first of June 2004 the business activities of the Tampere Technology were divided in two new companies the Technology Centre Hermia Ltd and the Hermia Premise Services Ltd. The company's project and development activities will continue under the company Technology Centre Hermia Ltd, and the real estate business activities under the company Hermia Premise Services Ltd. In autumn 2004 the Hermia Premise Service Ltd will merge with to other companies to the Tampere Science Park Ltd.

Services:

Tampere Technology Centre Hermia offers companies an operational environment in which they have the opportunity to grow and develop without caring about the office needs. The entire office space comes to over 100.000 square metres. The companies can define the office space they need: from 6,5 square meters for start-up and small companies to 1500 square metres for bigger companies. About 150 companies and research units have their offices in one of the Hermia Science Park buildings.

Additional to the office premise the Hermia Business Incubator also operates in Hermia's small business centre, giving advice and tailored training for start-up incubator companies.

Extra services (sub-contractors):

- Optinet (Extranet Provider)

IT-Infrastructure:

1	Connection	<ul style="list-style-type: none"> ▪ Intranet ▪ WLAN
	Technological platform	▪
	Database	▪
	Security	▪
2	Office Software	▪
	Extra Software	▪
	Future acquisitions	<ul style="list-style-type: none"> ▪ Automated invoice system ▪ Perhaps professional conference tool
3	Internet	▪

	Web-Site	<ul style="list-style-type: none"> ▪ Company TTC: ▪ Languages: Finish, English ▪ Information about the Company ▪ Brochures and Publications ▪ Pictures of the offices and environment ▪ Conference Tampere Crossing ▪ Languages: Finish ▪ Information ▪ Fee ▪ Registration
4	Systems with partners: (These systems could avoid costs on telephone calls and speed up the process)	<ul style="list-style-type: none"> ▪

IT-Purchase process:

1	Purchase (CMS) decision by:	▪
	Interviewed personally involved	▪
	Payback (ROI)	▪
2	Software (CMS) vendor selection	<ul style="list-style-type: none"> ▪ Warranty ▪ Maintenance ▪ Payment modes Note: related to product and not to vendor.

Difficulties and Expectations:

- Ms. Johanna Salomaa-Valkama has experience with a System that wasn't made for conference purpose. Nevertheless or even therefore she has good ideas what a professional Conference Management System had to automate.
- The Conference "Tampere Crossing" will be transferred into an international conference in the next years.

C.4.1.3 Conference Organizer - SuviSoft**General Information:**

1	Country:	▪ Finland
2	Address:	<ul style="list-style-type: none"> ▪ Hermiankatu 3 A ▪ FIN- 33720 Tampere ▪ Tel.: + 358 3 316 5488 ▪ Fax: + 358 3 316 5490 ▪ E-Mail: suvisoft@suvisoft.fi ▪ http://www.suvisoft.fi
3	Contact:	▪
4	Sector: Position in the Supply chain: Business status: Number of employees: Sales per year (€): Profit per year (€):	<ul style="list-style-type: none"> ▪ Conference organization ▪ OEM ▪ Limited company ▪ 11 ▪ ▪ 200,000€
5	Outsourced service	▪
6	Clients	▪

Description:

SuviSoft Oy Ltd is a Finnish service provider specialized in online management solutions. And provided the first conference in September 2000. By now the service of SuviSoft are used by more than 30,000 users from all over the world in nearly twenty countries.

Services:

SuviSoft provide several modules which can combined and modified to the customers' need: abstract handling, registration, hotel booking, proceedings publishing, online payment, travel service, mobile service and graphic design. These services have been used in several business areas, namely conference management, exhibition management and association membership management. The online services offer state of the art technology tools to event organizers allowing them to save time and effort while keeping full control of the event. The service of SuviSoft will be described in the BML-Infrastructure with an example, the ISSPA 2003. The ISSPA was a conference about "Signal Processing and its Applications" hold in Paris. This conference was nearly completely organized by SuviSoft. The host of the conference accomplished just tasks concerning the content like the selection of the reviewers.

Extra services (sub-contractors):

- Book printing
- Server hosting (external servers at the nearby universities)

IT-Infrastructure:

1	Connection	▪
	Technological platform	▪ Linux, Microsoft
	Database	▪ MySQL
	Security	▪ SSL
2	Office Software	▪ Microsoft office
	Extra Software	▪ HeiTML (like HTML) for website ▪ CSV-interface
	Future acquisitions	▪ New interfaces
3	Internet	▪
	Web-Site	▪ Language: English ▪ Information about service ▪ Possibility to give feedback ▪ References, involved events
4	Systems with partners: (These systems could avoid costs on telephone calls and speed up the process)	▪

IT-Purchase process:

1	Purchase (CMS) decision by:	▪
	Interviewed personally involved	▪
	Payback (ROI)	▪
2	Software (CMS) vendor selection	▪ Warranty ▪ Maintenance ▪ Payment modes Note: related to product and not to vendor.

Difficulties and Expectations:

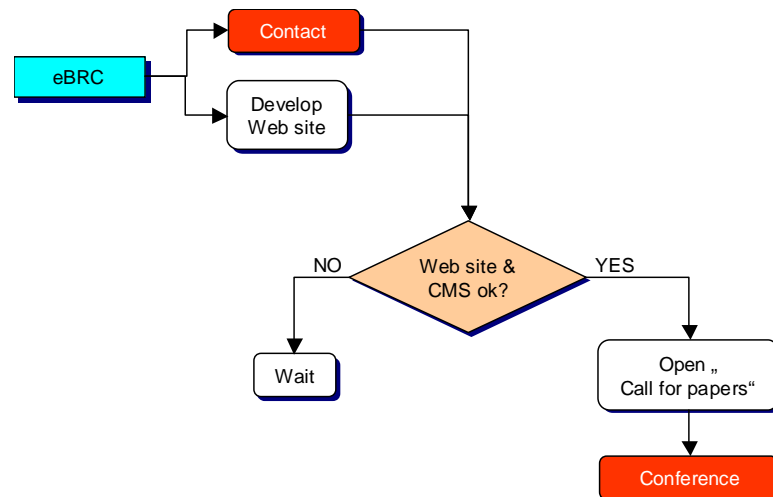
- SuviSoft is a worldwide operating Conference and Exhibition Software Provider as well as Organizer with much experience.
- SuviSoft will be developed to a full Event Organizer with all services under one umbrella.
- Hanna Martin from eBRC had problems with some of the modules of SuviSoft. I.e. she hold the generation of reports for inflexible in use.

C.4.2 Use Cases - Organization Process

Below are described conference organization process of each interviewed organization. During the description of the whole processes, some important sub processes and decisions are mapped by figures.

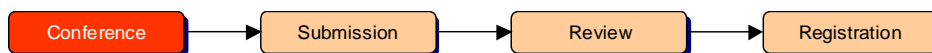
C.4.2.1 Business Researcher - eBRC

The Organizing Committee (Ms. Martin) decides to start the organization of the next eBRF Conference. First of all, she needs a Conference Management System (CMS), so she contacts the System Provider (SuviSoft), which supplied the previous eBRF Conference. Ms. Martin tells them the needs and some improvements suggestions for the current year. Meanwhile, Ms. Martin contacts also the other suppliers, such as Conference Hall, Restaurants, Hotels, etc.



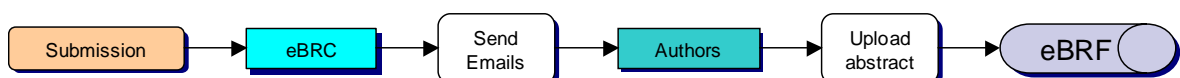
Conference management process

When the CMS is already connected with the eBRF Web site, the Organizing Committee publishes the “call for papers” at the web page, and sends Emails to all participants from the last editions. The conference process is divided into 4 sub-processes: submission, review and registration.



Conference sub-processes

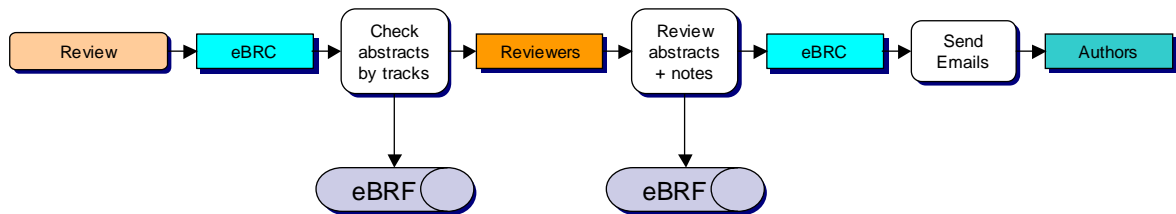
The researchers who want to present their “working papers” just need to create an account (ID and password) at the conference web site and upload their abstracts to one of the 3 possible tracks. The abstracts should not be longer than 3 pages.



Submission sub-process

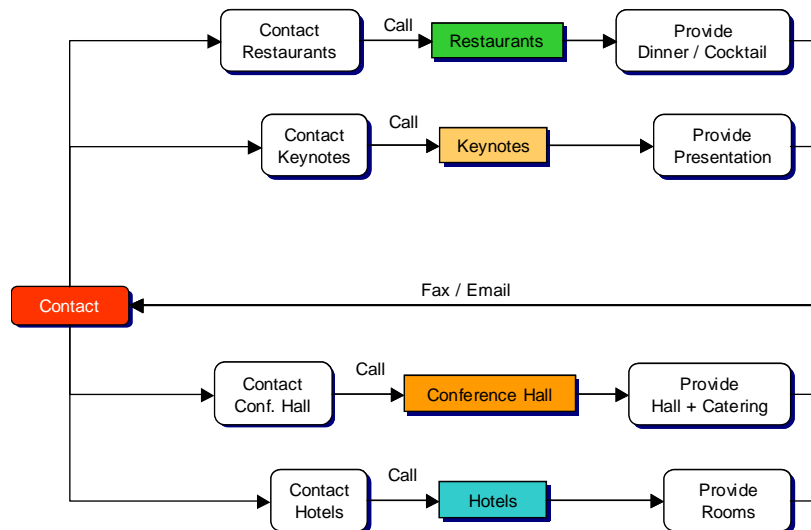
After the deadline of the paper submission process, begin the review process. First, each track responsible (two professors and one doctor) checks the content of the abstracts to verify if they were correctly uploaded to the proper topic.

Then, the reviewers login with their own passwords at the CMS and rate the abstracts directly online. The criteria are technical content, originality, clarity of presentation, and relevance to the conference, the abstracts are evaluated based on these 5 criteria through a "blind review process". Each abstract receives two grades (1-5) from two "blind reviewers".



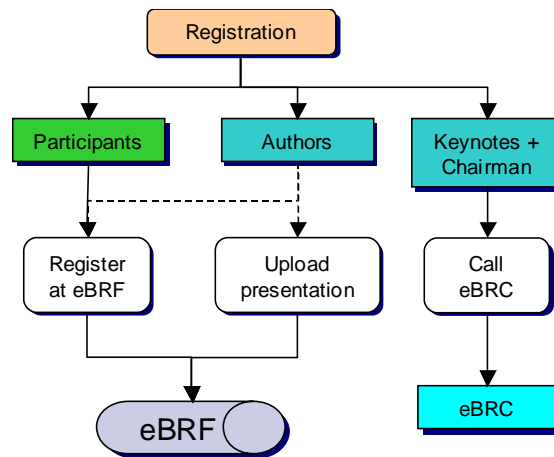
Review sub-process

During the review process, the Organizing Committee arranges the venues, the evening programs and the catering as well as the keynote speaker.



Contact sub-process

At the end of the review process, the system generates a "scale down" list with all papers. If an abstract receives "one rejection and one acceptance", a 3rd reviewer is asked to go over the special cases. Finally, the Organizing Committee sends by Email the information about acceptance or rejection of the abstracts to the authors. The authors of the accepted abstracts receive also a "paper number", which they need to enter on the registration form. Moreover, the authors are invited to make their registration, at least one author per abstract needs to attend the conference to get the paper published in the proceedings.

*Registration sub-process*

Meanwhile, the registration system is already connected to the eBRF web page; the conference program and registration conditions are already online. So, the registration process starts and the interested people can register to the conference. The registration form consists on 5 parts: personal information, accompanying guest, social events, payment, and hotel reservation. In case of doubts, the participants can get into contact with one of the two contact persons, which answer all questions by phone or Email.

Personal Information	
* First Name:	<input type="text"/>
* Last Name:	<input type="text"/>
* Gender:	<input type="radio"/> Male <input type="radio"/> Female
* Position:	<input type="text"/>
* Company/Organization:	<input type="text"/>
* Address:	<input type="text"/>
* Postal Code:	<input type="text"/>
* City:	<input type="text"/>
* Country:	<input type="text"/> <div> Afghanistan Albania Algeria </div>
* Email:	<input type="text"/>
URL:	<input type="text"/>
Tel.:	<input type="text"/>
Fax:	<input type="text"/>
Paper Number (if you're a presenter):	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Special diet:	<input type="text"/>
Accompanying Guest	
* First Name:	<input type="text"/>
* Last Name:	<input type="text"/>
* Gender:	<input type="radio"/> Male <input type="radio"/> Female
Special diet:	<input type="text"/>

Registration form I

Social Events**Participant : EUR 400 (Inc. VAT 22 %)**

- ☐ **Day 1 - Reception** (Included)
☐ **Day 2 - Conference dinner** (Included)
☐ **Day 3 - Sauna evening by the lake** (EUR 30.00)

Accompanying Guest - if necessary : EUR 60 (Inc. VAT 22 %)

- ☐ **Day 1 - Reception - Accompanying Guest** (Included)
☐ **Day 2 - Conference dinner - Accompanying Guest** (Included)
☐ **Day 3 - Sauna evening by the lake - Accompanying Guest** (EUR 30.00)

Payment

- **The registration will not be valid before we have received your payment in full.** The payment has to be made by **bank transfer** to the following account:
- Account holder: Tampere University of Technology
VAT: FI02459034
Bank: Nordea
Account number: 166030 - 104011
Swift code: NDEAFIHH
IBAN: FI1216603000104011
- The account number and your personal reference number will be sent to you by e-mail "**eBRF 2004-Registration**" after submitting the registration form.

Hotel Reservation

- All participants are requested to make their own hotel reservation for the conference. More information at the conference web site <http://www.ebrf.fi/conference2004/>

Registration form II

After the registration, the authors need to send their presentation (as a PowerPoint file). The ID and password are the same used at the abstract submission process. After the registration process is over, the conference can start.

Two months after the conference take places; the authors send their final paper, uploading at the web site as they did during the presentation submission process.

C.4.2.2 Science Park Administrator - Technology Centre Hermia

The conference "Tampere Crossing" was developed by ten persons of different Organization in Tampere to get the maximum use for the participants. They wanted to combine the placement of general "nice to know"-knowledge and specific knowledge in several subjects. Therefore all auditors take part in two plenary sessions as well as in three special sessions. In the plenary sessions the keynote speakers refer current trends of research and development. In each of the three special sessions the participant can choose one of 7 sub conferences where specific knowledge regarding one subject is presented.

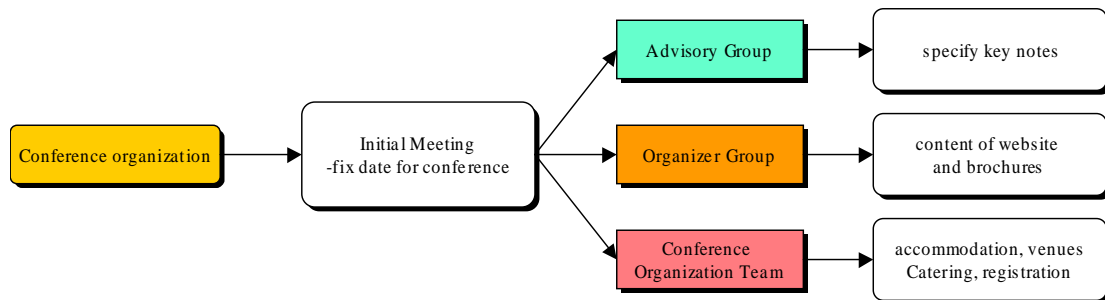
Tampere Crossing

D A Y 1	9:00	Reception						
	10:00	Plenary Session I (Keynotes)						
	12:00	Lunch Break						
	13:00	1	2	3	4	5	6	7
	14:45	Coffee Break						
	15:15	1	2	3	4	5	6	7
	17:00	Conference Dinner						
	23:00							
D A Y 2	9:00	Coffee						
	10:00	1	2	3	4	5	6	7
	12:00	Lunch Break						
	13:00	Plenary Session II (Keynotes)						
	14:30	Coffee Break						
	15:15							
	16:30	Farewell Speeches						

Schedule of the conference

Due to fact that "Tampere Crossing" is an non-profit conference and all the profit is given to an welfare organization the speakers, including the keynote speakers, speak without getting a fee and the extranet with website and registration system is provided for free.

At the beginning of the last and first organization of the "Tampere Crossing" conference stood an initial meeting. At this meeting all parties fixed the date for the conference. At the same time it was checked if the venue "Tampere Hall" is free at this date and the venue were reserved. The further organization was divided in three teams, the Advisory Group, the Organizer Group and the Conference Organization Team.



Conference Organization

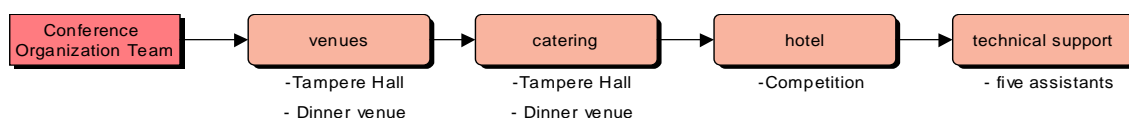
The Advisory Group consisted of twenty representatives from the city and the university who specified the keynotes. They took care that current development in research are reflected the topics of the plenary sessions.

The Organizer Group cared about the general marketing of the conference and the general program. Each sub session had an own marketing and contacted their interest group itself. The Organizer Group combined all sub programs to one program.

First three, later in the process five persons, formed the Conference Organization Team which had the remaining work like the website, the registration of the participants the venues, the catering, and accommodations.

The first important step in the organization was to define the keynotes and the basic content of the sub sessions. The Advisory and the Organizer Group cared about this. Meanwhile the Conference Organization Team contacted the Extranet Provider ("Optinet"). They developed together the needed System. Although the System wasn't made for Conference Purpose it worked well after little improvements. After the website were ready to go online the first information were published. Interested parties could sign to an info letter. These persons were informed by web information as soon as further information came up. In this case there were about 80 persons that signed to this list.

Then the Conference Organization System had to organize the venues and accommodation. The venue for the conference was already reserved from the beginning on because they need many space for such a big conference. So they just had to engage the local caterer there and for handling the technical support they had to hire five IT-specialists from the "Tampere Hall".



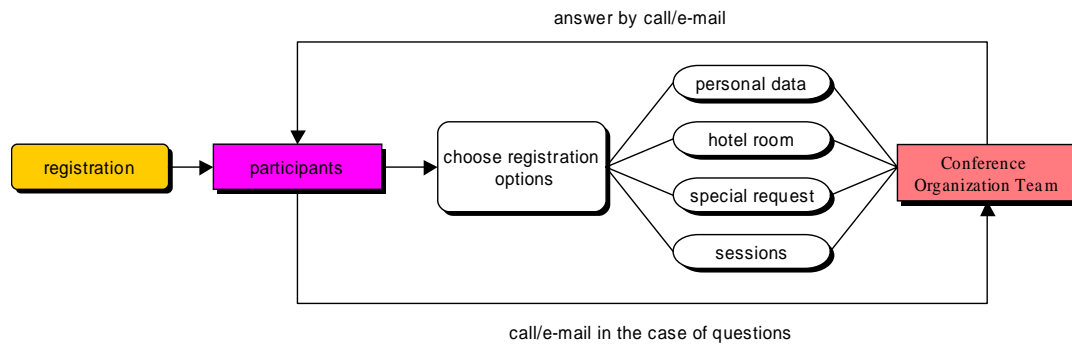
Tasks of the Conference Organization Team

For the conference dinner, which was included in the conference fee, they chose a cultural centre as venue that had been an industry building. Also there was a local caterer who had to be hired. They wasn't happy with the situation that they can't chose the caterers, but the participants were really satisfied with the catering as they reported after the conference.

To find a cheap and good accommodation for the participants they made a competition between the hotels. One of the Conference Organization Team rang all hotels that came into question to get an offer. The cheapest hotel was taken. The person responsible for the hotel booking administered the data about the hotel rooms and the reservation in an Excel sheet. Just one

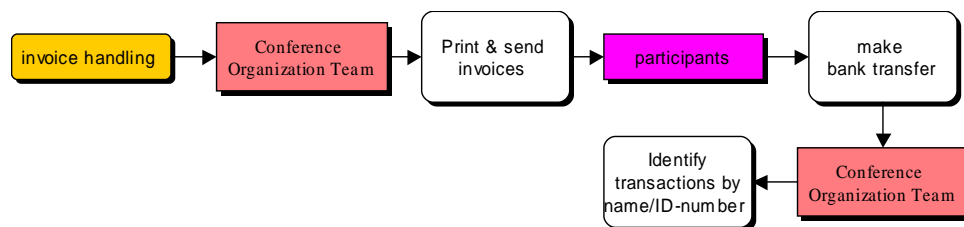
problem appeared. Two weeks before the conference they have had no rooms left thus they had to call the people to ask if they also pay a hire amount for another hotel. All in all the hotels had no interest to connect the systems because it is easier for them just to allocate a number of rooms and let the conference organizer do the rest with the reservation.

When the accommodations and the framework of content just like the name and theme of the sub sessions were clear the registration started. During registration a hotel room could be booked and the sessions had to be chosen. And there was a text field for special wishes like vegetarian food or an additional guest. For asking question the participants could call the Organization Team, who had a telephone number and the e-mail addresses at the website.



Registration Process

After the registration of the participants the Conference Organisation Team printed out the invoices that were generated automatically by System at the basis of the database. Then the invoices were sent to the participants with an identification number to identify them. The participants had to transfer the conference fee (250 €) to a company account. The Conference Organisation Team had to check manual with the name and ID number who had paid. Ms. Johanna Salomaa-Valkama would like to automate the invoice system in the future.



Invoice Handling

Reports with the information from the database can't be generated directly from the system, but they could export the data to excel and then generate all wanted reports. Just for the future when the conference is growing they want also automate the report generating. Perhaps they also implement even a Conference Management System in the Future.

Then the Conference started with a reception in the morning. Every participant got at both mornings a SMS with the daily program and the room numbers. Also an MMS service has been available. All participants who had an MMS mobile phone could get a map where to go. But this service was used little because of the lack of MMS phones. For using these services everybody had to give the mobile phone number during registration.

For presentation the speakers gave their PowerPoint files via CD or USB-Stick to the Main Computer. Just a few connect their system like a laptop to system. From the Main Computer the speakers could hold their presentation in each room.

To make the PowerPoint files available for the participants about 50 % of the files also published at the website. The other 50 % of the speakers didn't want their files to be published.

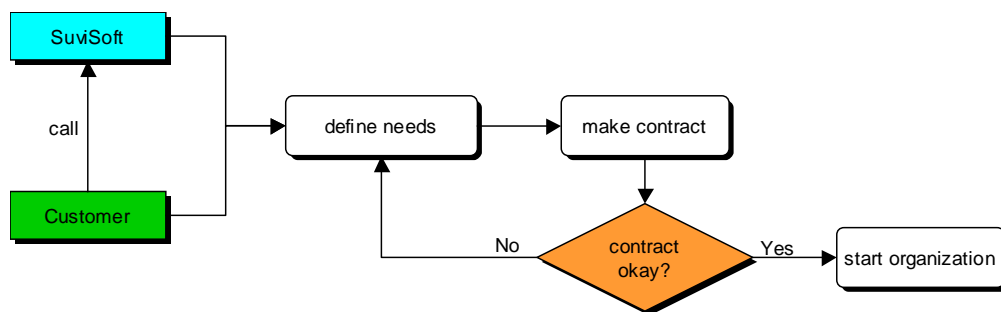
Over W-LAN or an e-mail room every participant had the possibility to go online during the whole conference.

In the end the Conference Organization Team hold a little survey about the conference. They want to make every year a little survey to get a kind of Conference history to analyse the satisfaction of the participants.

C.4.2.3 Professional Conference Organizer - SuviSoft

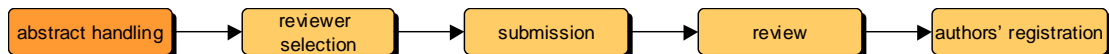
The Organization Process of SuviSoft will be described by the ISSPS 2003, one of the conferences SuviSoft organized nearly completely.

The "Laboratoire de Traitement et Transport de l'Information" (L2TI) and the "Laboratoire de Traitement du Signal et des Images de l'ENST-Paris" (TSI), in association with the SPRC at QUT (Brisbane), decided to host the ISSPS 3003 in Paris. They contacted SuviSoft to organize this conference. They defined which modules from the basic structure SuviSoft provide are important and how they should be customized. SuviSoft offered a contract according to their needs.



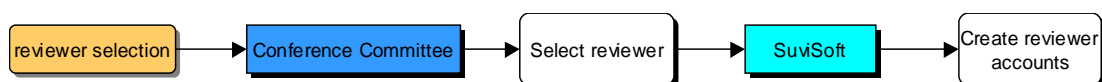
Completion of the contract

After the completion of the contract SuviSoft began with the realization. First the abstract handling had to be managed. The abstract handling was divided in 4 sub processes.



Abstract handling sub processes

The three organizations had form a Conference Committee that selected together with the Program Chairmen the reviewer. Information about the reviewer was sent to SuviSoft that collected the necessary information like name and e-Mail address about the reviewer and install their accounts.



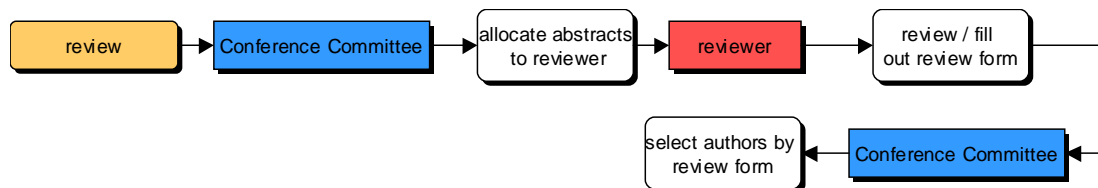
Selection of the reviewer

Thereafter the call for papers was published and the submission process started. Each author who was interested in submitting an abstract sent information about him to SuviSoft, whereupon he got an account. Then the authors load their abstracts up by "copy paste" and filled out a submission report where information about the abstracts had to be given. The content of the submission form were among others the topic of the abstract. Every author had to allocate his abstract to one of twenty different topic tracks. In the end 600 papers had been submitted.



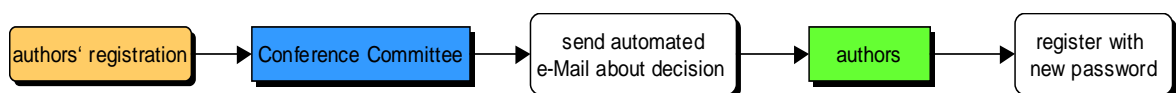
Submission sub process

On the basis of the track number the author had mentioned the Conference Committee allocated the abstracts to the different Program Chairmen who on the other hand allocated the abstracts to their reviewers. The reviewers entered to their accounts were they see all the abstracts they had to review and short guidelines. They could do the review directly at the website, save the abstracts to their computer or print them. After the review they filled out a review report, developed by the Conference Committee to choose the authors. The review form contained different grading, recommendations and comments directed to the authors. The Chairmen could control the whole review process, they could for example lock in with their master password and make the review themselves, if any reviewer were too late. Finally the Conference Committee decided with the help of the review form who they want to admit to the conference.



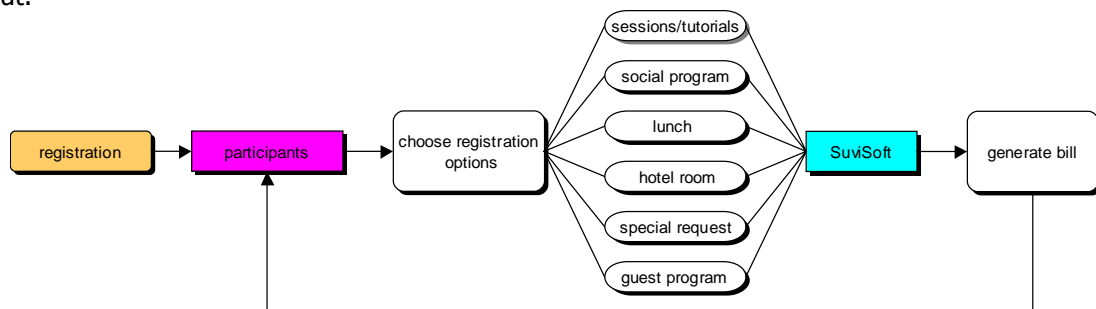
Review process

Then the decision was given to the system. The system generated automatically e-Mails to the authors by clicking a button "accepted" or "rejected". In these e-Mails also the comments the reviewer wanted to give to the authors were published. Then the authors who were accepted could start with the registration. Unfortunately, they had to get a new password for this.



Authors' registration

After the program was planned by the Conference Committee the registration for the participants could open at the website. The conference website was linked directly with the server of SuviSoft so that the information about the participants were hosted by SuviSoft. The participants had to fill out, which tutorials and sessions they want to visit, if they take part at the social program, if they have special wishes concerning lunch, like vegetarian food, in which hotel room they want to stay, if there is a partner or guest and an additional space for other special request. After submitting the system generated a bill, which was send to the participant and could be printed out.



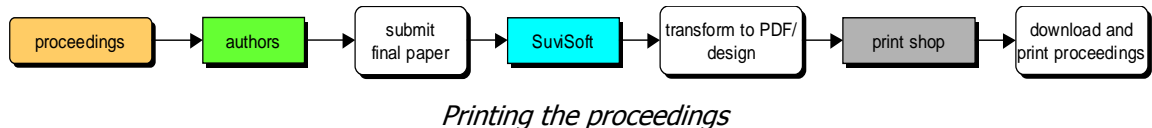
Participants' registration

In this conference they were late with the hotel booking. Most participants already had registered to system at the time when they installed the hotel booking system to the homepage. Therefore this time the participants informed SuviSoft by e-Mail which hotel they want. Normally SuviSoft ask hotels for free rooms. The hotels provide a number of rooms that SuviSoft put to their homepage. The system counts down when a participant book a room. After a deadline

SuviSoft have to give the names of participants to the hotels. But most hotels rather accept booking by fax because thereby they had a kind of receipt.

SuviSoft opened a conference account where the participants transfer the conference fee to. Also credit card payment was made possible. The Conference Committee had online invoice control to see who has paid which amount and could decide how often they want to have the money transferred to their account.

After the conference SuviSoft had finally to organize the printing of the proceedings. The authors uploaded their final papers to their account. SuviSoft transferred all formats to PDF and an internal designer created a common style. Thereafter the serially numbered pages were saved at the SuviSoft server and downloaded by FTP from the printing house, which produced the final proceedings in one to two weeks.



C.4.3 BML-Infrastructure

At this part, interesting information for the construction of the Business Modeling Language are listed.

C.4.3.1 e-Business Researcher – eBRC

<ul style="list-style-type: none"> Conference name: The name the conference is known by 	<ul style="list-style-type: none"> eBRF (e-Business Research Forum)
<ul style="list-style-type: none"> Company name: The legal name that refers to the company in billing and tax paperwork. 	<ul style="list-style-type: none"> eBRC
<ul style="list-style-type: none"> Location: The site where the physical building of the company is situated. 	<ul style="list-style-type: none"> Tampere (Finland)
<ul style="list-style-type: none"> Mailing Address: A description of the location of the company, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> P.O. Box 541 FIN- 33101 Tampere
<ul style="list-style-type: none"> Telephone, telex, fax, and e-mail: Available telecommunication infrastructure and numbers specific to the company. They enable the company to be reached from the outside world. 	<ul style="list-style-type: none"> Phone: +358 3 3115 4675 Fax: +358 50 325 6515 E-mail: hanna.martin@uta.fi www.ebrc.info
<ul style="list-style-type: none"> Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> eBRC is co-founded by two different universities: The Tampere University of Technology and the University of Tampere. Therefore, eBRC has offices in both institutions.
<ul style="list-style-type: none"> Topic of the conference: Issues the conference is about. 	<ul style="list-style-type: none"> On-working researches and new technologies concerning e-Business
<ul style="list-style-type: none"> Target Group: The groups or entities that the 	<ul style="list-style-type: none"> Universities, Governments, Enterprises

conference is aiming.	
<ul style="list-style-type: none"> Conference Fee: The amount that has to be paid for participating in the conference 	<ul style="list-style-type: none"> Participants: 400 € incl. VAT 22% (2004) Accompanying guest: 60€ incl. VAT 22% (2004)
<ul style="list-style-type: none"> Number of guest participants: Number of persons taking part in the conference as listener 	<ul style="list-style-type: none"> 170 (in 2003)
<ul style="list-style-type: none"> Number of employees involved in conference organization: Number of persons from the company organizing the conference 	<ul style="list-style-type: none"> Organizing Committee: 10 persons Contact Persons: 2 persons
<ul style="list-style-type: none"> Number of speakers: Number of oral presenters during the conference 	<ul style="list-style-type: none"> Here: number of abstracts accepted to the conference (effective number of presenters could be higher): 50 (in 2003), 80 (in 2004)
<ul style="list-style-type: none"> Number of keynote speaker Main speakers in the conference 	<ul style="list-style-type: none"> 5 (in 2004)
<ul style="list-style-type: none"> Service from other companies: Service provided by subcontractors to the company 	<ul style="list-style-type: none"> Conference Management System; <ul style="list-style-type: none"> - Booking process - Review process
<ul style="list-style-type: none"> Organization of the abstracts review process: How the review process of abstracts is handled 	<ul style="list-style-type: none"> Blind review: "Call for papers" is published on web site. Authors upload their abstract to this web page. About 30 external reviewers rate the abstracts. About 80 abstracts will be accepted.
<ul style="list-style-type: none"> Venue of the conference: Physical building where the conference is hold 	<ul style="list-style-type: none"> Tampere Hall: a big congress and concert centre
<ul style="list-style-type: none"> Catering The service of providing food & beverages 	<ul style="list-style-type: none"> Catering company from Tampere Hall (exclusive)
<ul style="list-style-type: none"> Activities for participants: Events, happenings and entertainment for the conference participants 	<ul style="list-style-type: none"> Included (2004): <ul style="list-style-type: none"> - Reception - Conference dinner Extra: <ul style="list-style-type: none"> - Sauna evening by the lake (30 €)
<ul style="list-style-type: none"> Accommodation for the participants: Booked rooms for participants in hotels and houses 	<ul style="list-style-type: none"> Suggestions at Web-site (2004) <ul style="list-style-type: none"> - Hotel Ramada & Hotel Villa Rates for single and double rooms - Link to Tourist Bureau – Accommodation and Restaurants (http://www.tampere.fi/matkailu_v/english/restaur.htm) Room quotas are guaranteed at least until the 5th of September 2004. When booking, remember to mention that you take part in the conference. Conference takes place on 21st -22nd of September.
<ul style="list-style-type: none"> Modes to get information about the conference: Available telecommunication infrastructure for conference information (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> Main channel: Web site E-Mail or telephone (2 contact persons)
<ul style="list-style-type: none"> Modes to register to the conference: 	<ul style="list-style-type: none"> Participants: Web site Key Notes: Telephone or Email

Available telecommunication infrastructure for registration (Telephone, Fax, e-mail, Web services, Other)	
<ul style="list-style-type: none"> ▪ Tax: Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price. 	<ul style="list-style-type: none"> ▪ VAT 22%
<ul style="list-style-type: none"> ▪ Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none"> ▪ Account holder: Tampere University of Technology VAT: FI02459034 Bank: Nordea Account number: 166030 - 104011 Swift code: NDEAFIHH IBAN: FI1216603000104011
<ul style="list-style-type: none"> ▪ Discount policy: The incentives that the agency offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Company commission: Applied rate or fee on organisation of conference 	<ul style="list-style-type: none"> ▪

C.4.3.2 Science Park Administrator - Technology Centre Hermia

<ul style="list-style-type: none"> ▪ Conference name: The name the conference is known by 	<ul style="list-style-type: none"> ▪ Tampere Crossing
<ul style="list-style-type: none"> ▪ Company name: The legal name that refers to the company in billing and tax paperwork. 	<ul style="list-style-type: none"> ▪ Technology Centre Hermia Ltd
<ul style="list-style-type: none"> ▪ Location: The site where the physical building of the company is situated. 	<ul style="list-style-type: none"> ▪ Tampere (Finland)
<ul style="list-style-type: none"> ▪ Mailing Address: A description of the location of the company, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ Hermiankatu 1 FIN- 33720 Tampere
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, and e-mail: Available telecommunication 	<ul style="list-style-type: none"> ▪ Phone: +358 3 316 5550 ▪ Fax: +358 3 316 5552

infrastructure and numbers specific to the company. They enable the company to be reached from the outside world.	<ul style="list-style-type: none"> ▪ e-Mail: ttoy@hermia.fi ▪ http://www3.hermia.fi/english/
<ul style="list-style-type: none"> ▪ Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> ▪ The Science Park lies next to the Tampere University of Technology and the Technology Centre of Finland (VTT).
<ul style="list-style-type: none"> ▪ Topic of the conference: Issues the conference is about. 	<ul style="list-style-type: none"> ▪ Knowledge for Future
<ul style="list-style-type: none"> ▪ Target Group: The groups or entities that the conference is aiming 	<ul style="list-style-type: none"> ▪ Enterprises
<ul style="list-style-type: none"> ▪ Conference Fee: The amount that has to be paid for participating in the conference 	<ul style="list-style-type: none"> ▪ Participants: 250 € incl. VAT 22% (2004) ▪ Accompanying guest: 60€ incl. VAT 22% (2004)
<ul style="list-style-type: none"> ▪ Number of guest participants: Number of persons taking part in the conference as listener 	<ul style="list-style-type: none"> ▪ 350
<ul style="list-style-type: none"> ▪ Number of employees involved in conference organization: Number of persons from the company organizing the conference 	<ul style="list-style-type: none"> ▪ Altogether 5 from the company forming the Conference Organization Team ▪ External: <ul style="list-style-type: none"> - Advisory Group: 20 persons - Organizing Group: 10 person
<ul style="list-style-type: none"> ▪ Number of speakers: Number of oral presenters during the conference 	<ul style="list-style-type: none"> ▪ 80
<ul style="list-style-type: none"> ▪ Number of keynote speaker: Main speakers in the conference 	<ul style="list-style-type: none"> ▪ 6
<ul style="list-style-type: none"> ▪ Service from other companies: Service provided by subcontractors to the company 	<ul style="list-style-type: none"> ▪ Extranet with applications
<ul style="list-style-type: none"> ▪ Organization of the abstracts review process: How the review process of abstracts is handled 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Venue of the conference: Physical building where the conference is hold 	<ul style="list-style-type: none"> ▪ Tampere Hall: a big congress and concert centre
<ul style="list-style-type: none"> ▪ Catering: The service of providing food & beverages 	<ul style="list-style-type: none"> ▪ Catering company from Tampere Hall (exclusive)
<ul style="list-style-type: none"> ▪ Activities for participants: Events, happenings and entertainment for the conference participants 	<ul style="list-style-type: none"> ▪ Included (2004): Conference dinner
<ul style="list-style-type: none"> ▪ Accommodation for the participants: Booked rooms for participants in hotels and houses 	<ul style="list-style-type: none"> ▪ Reservation for one hotel (the hotel with the best prize) possible at the website ▪ Other hotel suggestion also at the web page
<ul style="list-style-type: none"> ▪ Modes to get information about the conference: Available telecommunication infrastructure for conference information (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ All visitors from the last years get web information

<ul style="list-style-type: none"> ▪ Modes to register to the conference: Available telecommunication infrastructure for registration (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Registration on two web sites: one for the listener and one for the speaker (also the key note speaker)
<ul style="list-style-type: none"> ▪ Tax: Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price. 	<ul style="list-style-type: none"> ▪ VAT 22%
<ul style="list-style-type: none"> ▪ Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Discount policy: The incentives that the agency offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Company commission: Applied rate or fee on organisation of conference 	<ul style="list-style-type: none"> ▪

C.4.3.3 Professional Conference Organizer - SuviSoft

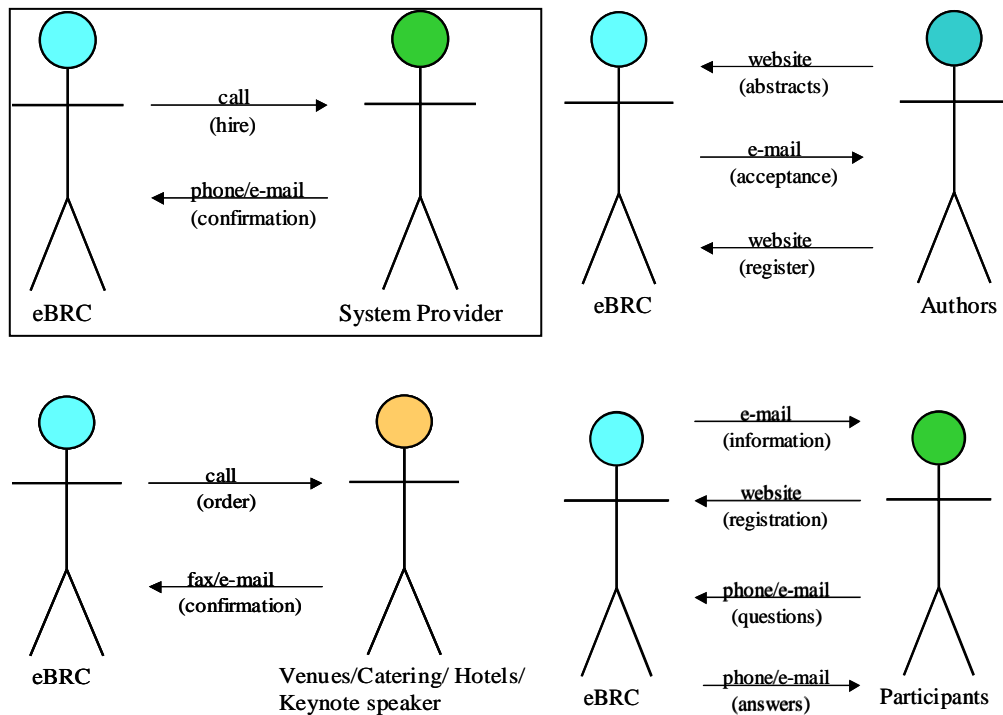
<ul style="list-style-type: none"> ▪ Conference name: The name the conference is known by 	<ul style="list-style-type: none"> ▪ ISSPA (International Symposium on Signal Processing and its Applications) http://www-l2ti.univ-paris13.fr/~isspa2003/
<ul style="list-style-type: none"> ▪ Company name: The legal name that refers to the company in billing and tax paperwork. 	<ul style="list-style-type: none"> ▪ SuviSoft Oy Ltd
<ul style="list-style-type: none"> ▪ Location: The site where the physical building of the company is situated. 	<ul style="list-style-type: none"> ▪ Tampere (Finland)
<ul style="list-style-type: none"> ▪ Mailing Address: A description of the location of the company, as written or printed on mail as directions for delivery. 	<ul style="list-style-type: none"> ▪ Hermiankatu 3 A FIN- 33720 Tampere
<ul style="list-style-type: none"> ▪ Telephone, telex, fax, and e-mail: Available telecommunication 	<ul style="list-style-type: none"> ▪ Tel.: + 358 3 316 5488 ▪ Fax: + 358 3 316 5490

infrastructure and numbers specific to the company. They enable the company to be reached from the outside world.	<ul style="list-style-type: none"> ▪ E-Mail: suvisoft@suvisoft.fi ▪ http://www.suvisoft.fi
<ul style="list-style-type: none"> ▪ Description and relevant note: Proximity to important place or availability of specific services 	<ul style="list-style-type: none"> ▪ Situated in the Technology Centre Hermia.
<ul style="list-style-type: none"> ▪ Topic of the conference: Issues the conference is about. 	<ul style="list-style-type: none"> ▪ Signal Processing and its Applications
<ul style="list-style-type: none"> ▪ Target Group: The groups or entities that the conference is aiming 	<ul style="list-style-type: none"> ▪ Everyone interested in the topic
<ul style="list-style-type: none"> ▪ Conference Fee: The amount that has to be paid for participating in the conference 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Number of guest participants: Number of persons taking part in the conference as listener 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Number of employees involved in conference organization: Number of persons from the company organizing the conference 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Number of speakers: Number of oral presenters during the conference 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Number of keynote speaker: Main speakers in the conference 	<ul style="list-style-type: none"> ▪ 3
<ul style="list-style-type: none"> ▪ Service from other companies: Service provided by subcontractors to the company 	<ul style="list-style-type: none"> ▪ Conference committee (L2TI, TSI, SPRC at QUT)
<ul style="list-style-type: none"> ▪ Organization of the abstracts review process: How the review process of abstracts is handled 	<ul style="list-style-type: none"> ▪ Blind review with 600 papers hold at the website
<ul style="list-style-type: none"> ▪ Venue of the conference: Physical building where the conference is hold 	<ul style="list-style-type: none"> ▪ Les Salons de l'Aveyron (Paris/France)
<ul style="list-style-type: none"> ▪ Catering: The service of providing food & beverages 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Activities for participants: Events, happenings and entertainment for the conference participants 	<ul style="list-style-type: none"> ▪ Opening ceremony ▪ Conference diner
<ul style="list-style-type: none"> ▪ Accommodation for the participants: Booked rooms for participants in hotels and houses 	<ul style="list-style-type: none"> ▪ Several hotels linked at the conference website
<ul style="list-style-type: none"> ▪ Modes to get information about the conference: Available telecommunication infrastructure for conference information (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪

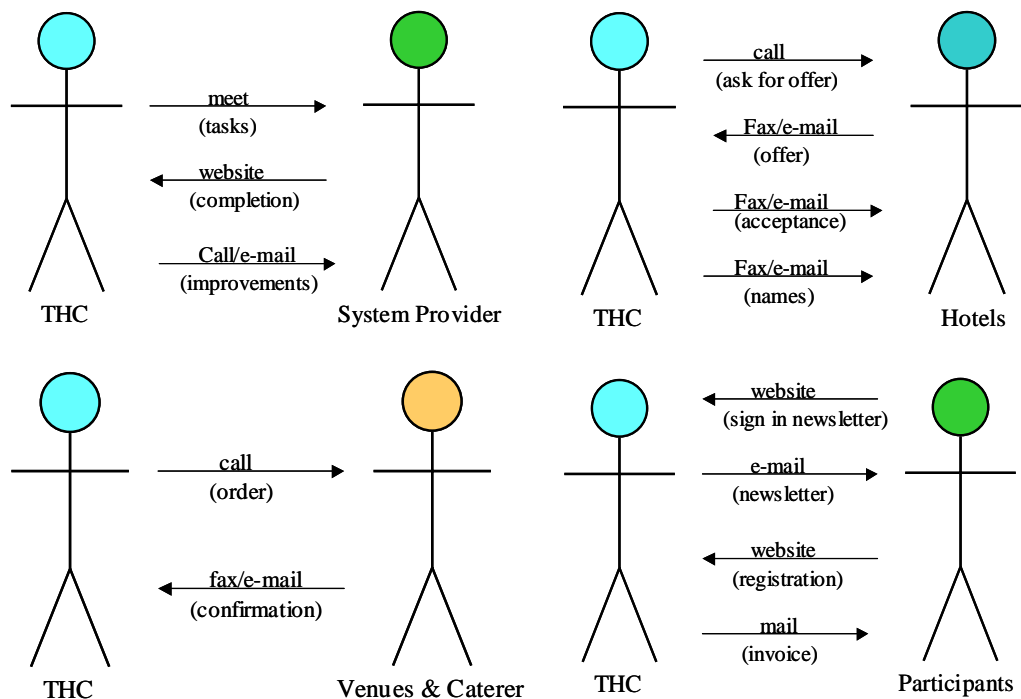
<ul style="list-style-type: none"> ▪ Modes to register to the conference: Available telecommunication infrastructure for registration (Telephone, Fax, e-mail, Web services, Other) 	<ul style="list-style-type: none"> ▪ Registration at the web page www-l2ti.univ-paris13.fr/~isspa2003
<ul style="list-style-type: none"> ▪ Tax: Illustrated by the sales tax, determined by the local government and usually added to the final price, if not previously included in the price. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Surcharges: Additional fees added to the original price. This surcharge could be due to ... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Bank Account Details: Account number, name of the bank, bank identification code, and bank address. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Discount policy: The incentives that the agency offers to its customers. Ranging from discounts on bills, free gadgets, gift certificates... 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Tax identifier: A code provided by the local tax administration to identify the company in its internal database. 	<ul style="list-style-type: none"> ▪
<ul style="list-style-type: none"> ▪ Company commission: Applied rate or fee on organisation of conference 	<ul style="list-style-type: none"> ▪

C.4.4 Communication Channels

C.4.4.1 e-Business Researcher – eBRC



C.4.4.2 Science Park Administrator - Technology Centre Hermia



C.4.4.3 Conference Organizer - SuviSoft

Appendix D: Example of BML model

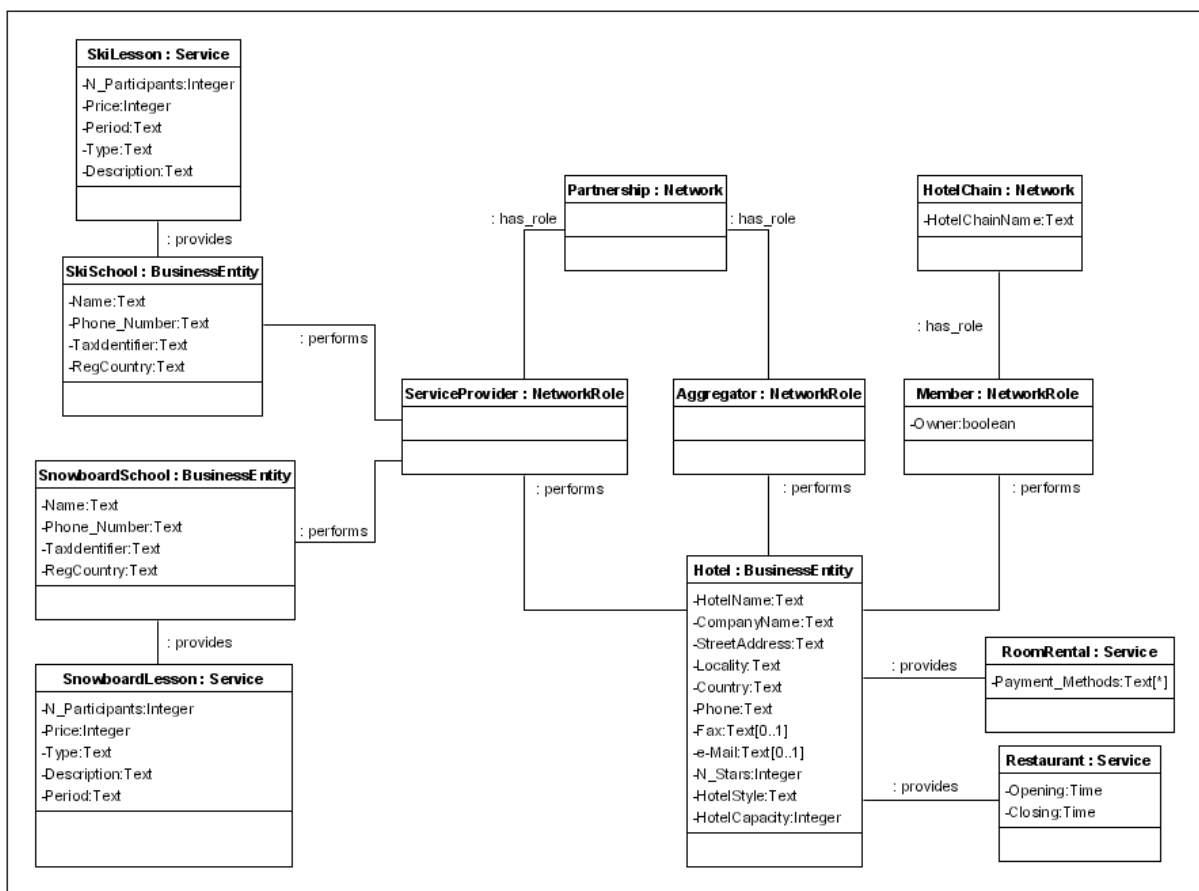
D.1 Hotel example

This model describes the functioning of a hotel following all the indications available in the Appendix C in addition to other characteristics and tasks of a hotel.

The example does not use the Generic Package defined in Appendix A, since the aims of this model are:

1. to validate the BML metamodel, by directly instantiating it;
2. to show that by using the Generic Package (see the following section "How to use the Generic Package") time for modelling can be strongly reduced.

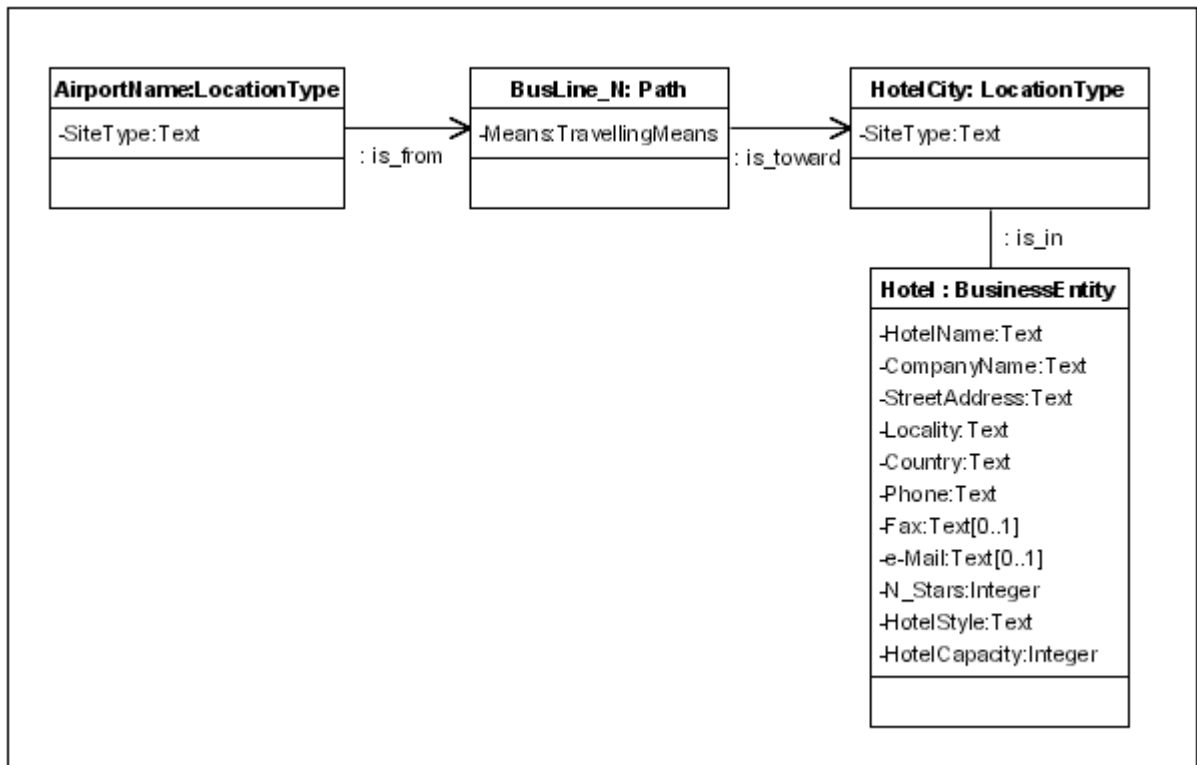
The entire model will be divided in sub-groups for a better comprehension.



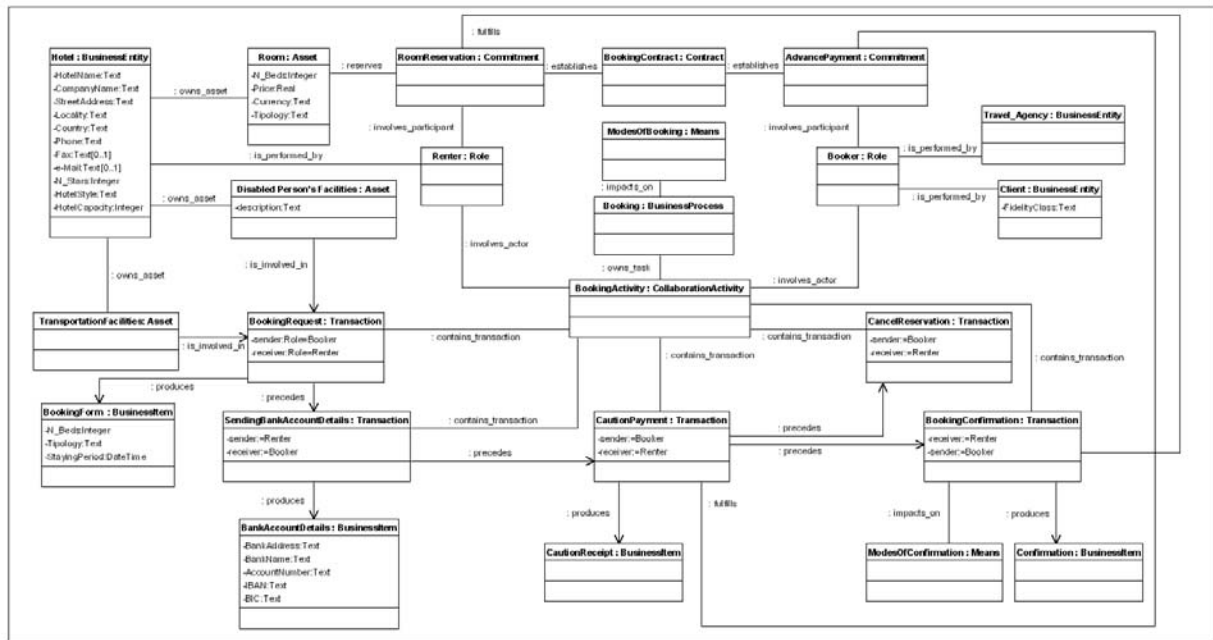
In this part of the model there is the description of the different roles that "Hotel" plays inside the network "Hotel Chain" and the network "Partnership".

In the first case the "Hotel" could be part of a "Hotel Chain" and with the use of the attribute "owner" which belongs to the class "Member" it could describe the ownership of the entire chain to the "Hotel". In the second case the "Hotel" has the role of the "Aggregator" while managing the relationship with the partners: "Ski School" and "Snowboard School". The "Hotel", in the role of the "Service Provider", organizes for its customers the services that its partners offer (ski lesson, snowboard lesson). The "Hotel" also offers to its customers services like "Room Rental" and "Restaurant".

All the other kinds of services described in the Appendix C and offered from other partners could be illustrated like mentioned above.



In the diagram shown above, explains the path to reach the "Hotel" passing by different location and using different transportation modes. In the specific case, the departure is from the class "Airport Name" of type "Location Type" and arrives at "Hotel City" taking a bus route symbolised by "Bus Line_N".



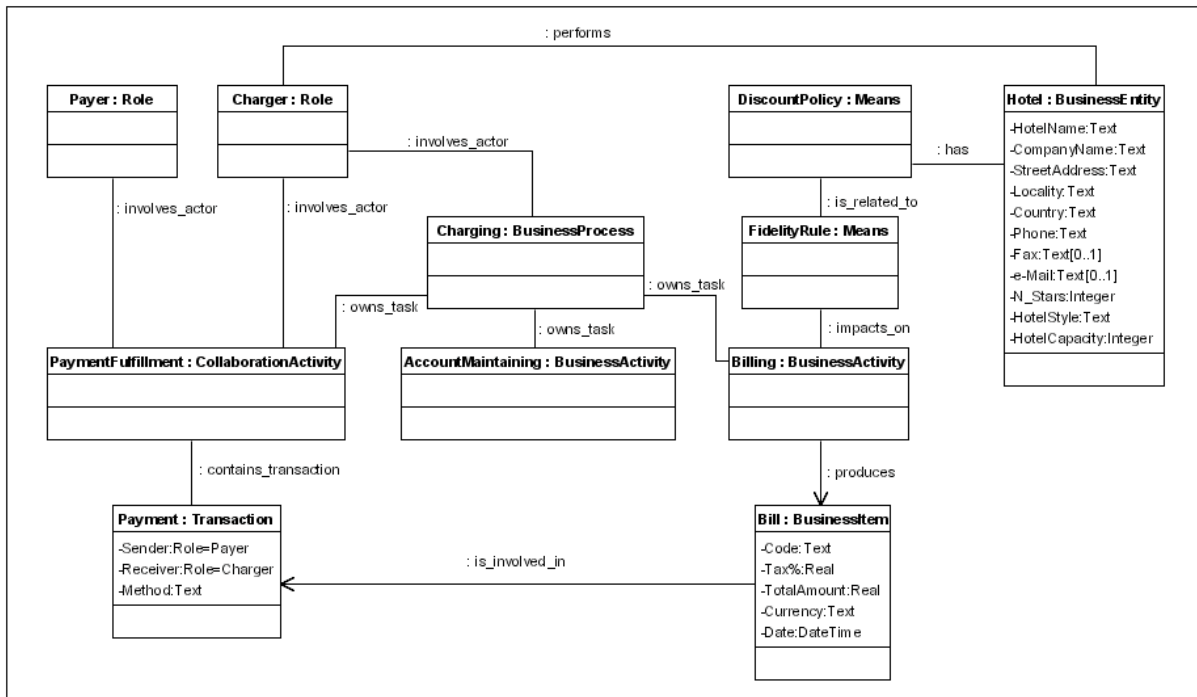
In this part, there is the description of the "Booking" process which could be made using different telecommunication infrastructure: "Modes of Booking" (For example: Phone, Fax, Email). The "Booking" process is composed by a "Booking Activity" that includes different transactions linked by the associations "precedes", that indicate the right timing sequence in which they happen.

The transactions are:

- "Booking Request" in which the client lists all the peculiarities of the needed room and the staying period. This transaction produces a hotel document : "Booking Form" in which are mentioned all the client's requests.
- "Sending Bank Account Details" is a transaction in which the hotel sends the bank account details, summarized in the document "Bank Account Details", used by the client to make the payment.
- "Caution Payment" in which the client puts down the deposit required by the hotel to book the room. This transaction produces the "Caution Receipt".
- "Booking Confirmation" in which the client asks for a confirmation, by e-mail or telephone ("Modes Of Confirmation"), to make sure about the right execution of the booking process.
- "Cancel Reservation" in which the client can also ask for the cancellation of his reservation after the payment of the deposit.

The "Hotel" has a role of the "Renter" both in the "Booking Activity" process and in the "Room Reservation". The "Booking Contract" establishes the commitment of the hotel, as "Renter", by the "Room Reservation" that fulfils the transaction "Booking Confirmation". The client ("Travel Agency" or "Client") has a role of "Booker" in the commitment "Advanced Payment" that fulfils the transaction of "Caution Payment".

The "Hotel" owns the assets : "Transportation Facilities" and "Disabled Person's Facilities" are involved in the transaction of the "Booking Requests" and the asset "Room" is used in the commitment of the "Room Reservation".



Here comes the description of the "Charging" process which is formed by the following activities:

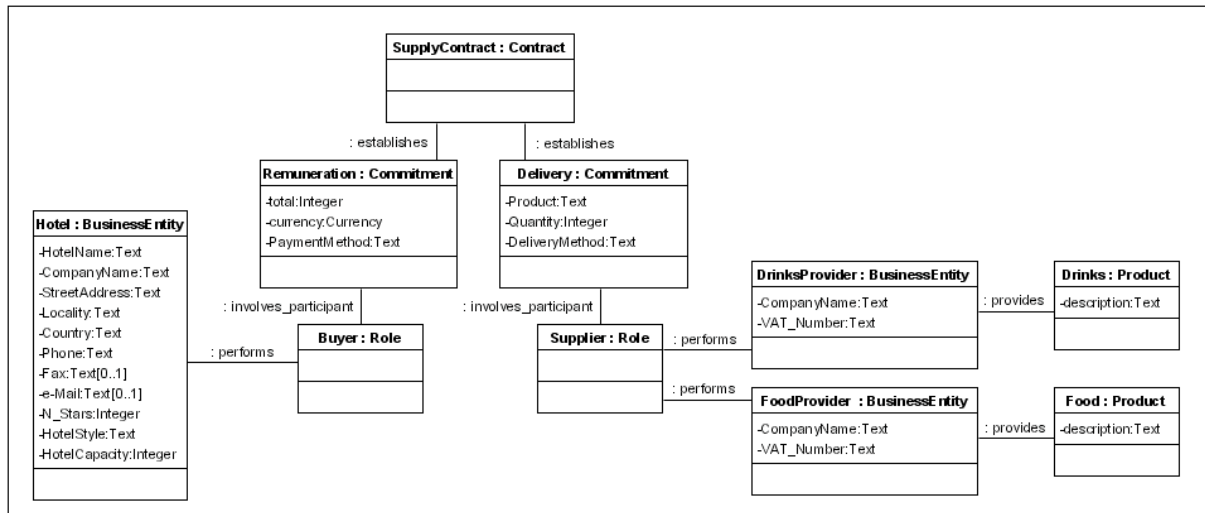
1. "Payment Fulfilment"
2. "Account Maintaining"
3. "Billing".

The first activity puts the hotel in the role of "Charger" and the client in the role of "Payer" and provides the transaction "Payment", which has the attribute "Method", with the different modes of performing it.

The second activity starts with the event "Account Open" and finishes with the event "Account Close" and encloses all the entries of all services used and consumed by the client (solarium, minibar...)

The third activity, "Billing", starts with the closing of the account and generates the "Bill" which is used in the "Payment" transaction.

The "Hotel" could apply a "Discount Policy" which is linked to the customer fidelity. The "Fidelity Rule" is a rule established by the hotel and which influences the "Billing".



In this part of the model, there is the description of the relationship of the hotel with its suppliers. The "Supply Contract" states the commitment symbolised by the "Remuneration" of the hotel which is the "Buyer" for the products offered from the suppliers. "Drinks Provider" and "Food Supplier" play the role of the "Supplier" in the commitment of "Delivery" supplying "Drinks" and "Food".

Note:

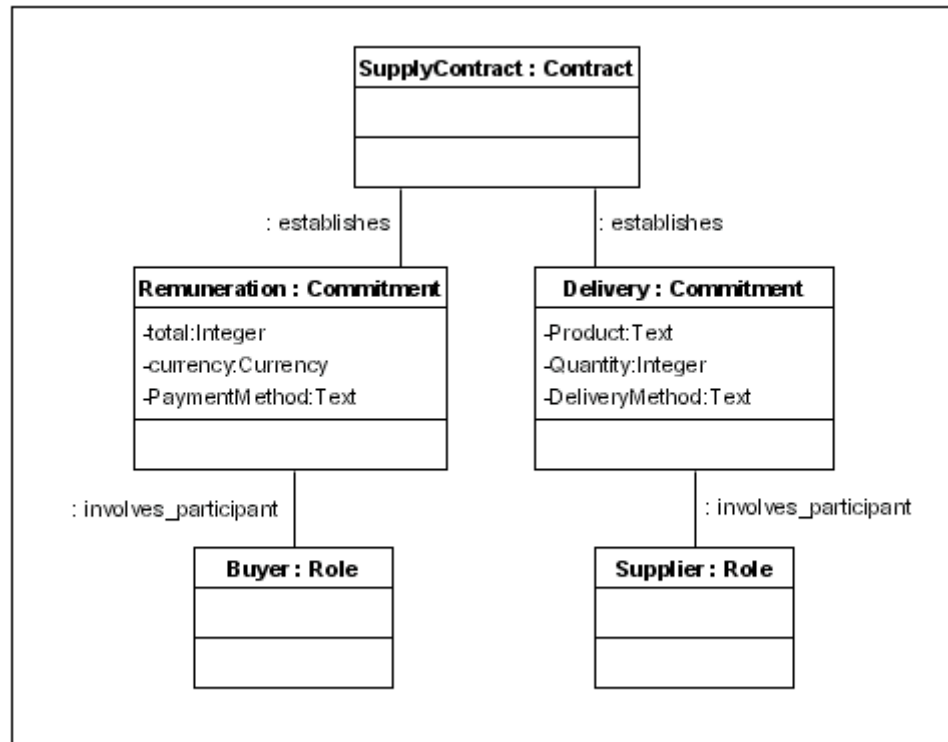
The terms written between brackets represent the different classes of the model.

In order to simplify the model data type such as: string, real, integer and Boolean are not defined.

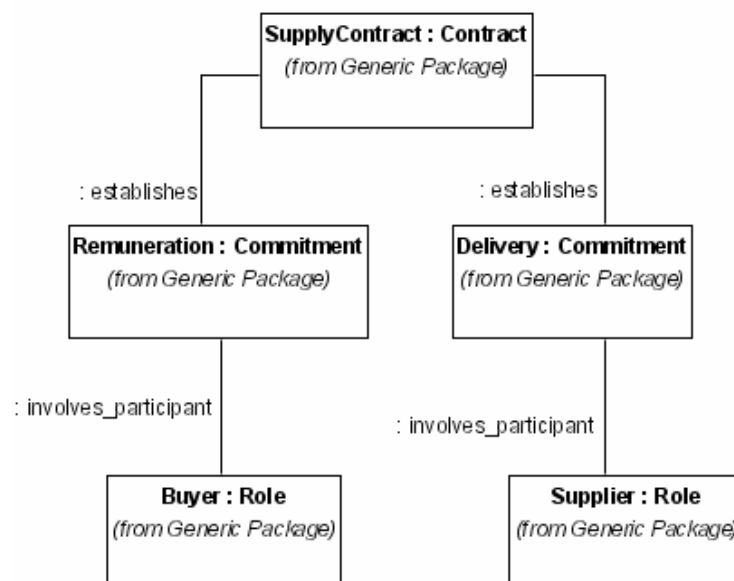
D.2 How to use the Generic Package

There are three modes to use the Generic Package that are described by the following three examples.

The first example illustrates the case in which the Generic Package classes are used *as-is*. In this case the Business Modeller does not need to create new instances of Metamodel classes. In the following picture an excerpt of Hotel Model is shown.



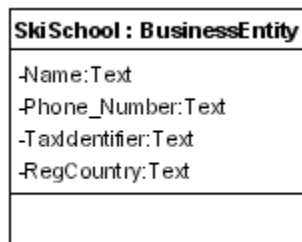
Next picture illustrates the classes of the Generic Package that could be brought in the model.



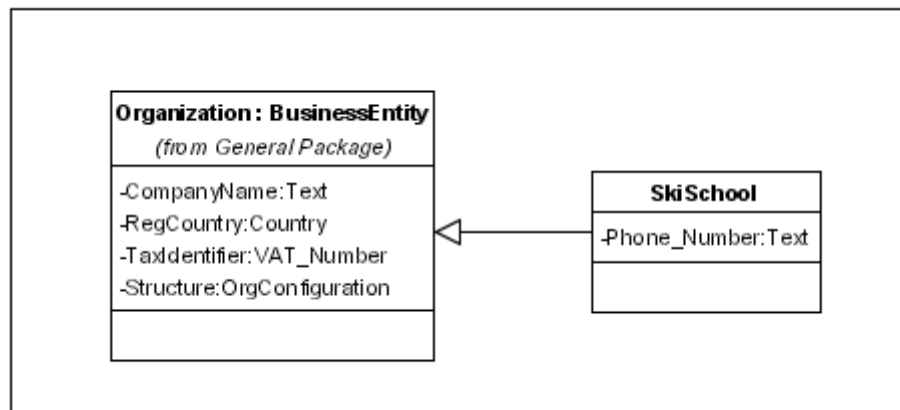
In the second example the needed class is obtained making a specialization of some existing ones taken from Generic Package.

The class **SkiSchool** is specialised with the use of the **Organization** class which is present in the Generic Package.

The next picture illustrates the **SkiSchool** class shown in Hotel Model.

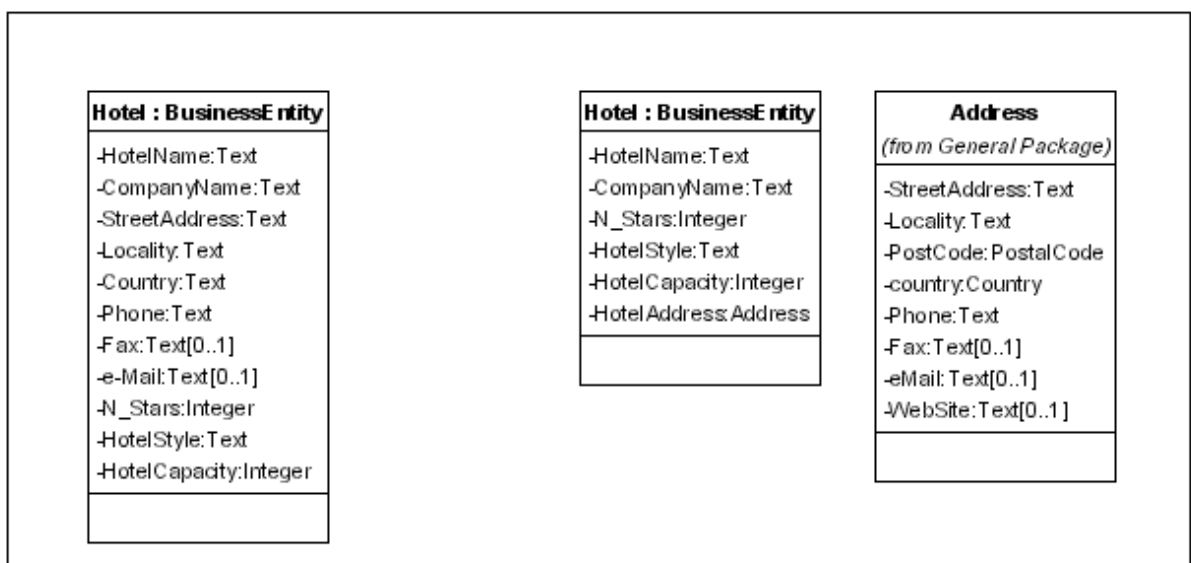


The next figure shows the class SkiSchool as a specialization of Organization class.



The last mode to use the Generic Package is unifying some of the simple attributes expected for the needed class choosing as attribute one class: one from the Generic Package.

To explain this procedure, the following picture shows that instead of the attributes *Locality*, *Country*, *Phone*, *Fax* and *e-Mail* it's been decided to instantiate the class *Address* (with the use of the attribute *HotelAddress*).



Whatever is the preferred mode to use it, it is positive that the Generic Package is very helpful for both the Domain Modeller and the Business Modeller.

The following figure shows the entire Hotel Model:

