

OMG Business Process Specification MetaModel (Initial submission)

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Submitted by:

- *MEGA International*

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1. INTRODUCTION

1.1. SUBMITTING COMPANIES

- MEGA International

1.2. STATUS OF THE DOCUMENT

This document is the draft of an initial submission.

1.3. GUIDE TO THE SUBMISSION

- Section 2 describes the problem to be solved
- Section 3 discusses the design rationale.
- Section 4 specifies the metamodel
- Section 5 describes mappings of the metamodel to example languages
- Section 6 responds to the specific RFP requirements
- Section 7 specifies compliance points

1.4. PROOF OF CONCEPT

These specifications are based on understanding of the metamodels of existing business process modelling solutions and business process execution languages such as BPEL (Business Process Execution Language) Collaboration Language such as BPSS have also been taken under consideration.

1.5. SUBMISSION CONTACTS

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2. PROBLEM TO BE SOLVED

This specification defines a set of metamodels for business process and collaboration definitions. The metamodel will lay out a foundation for process definitions that occur at different levels in the analysis and design process. The word “process” is indeed a controversial term and does not have the same meaning depending on the audience. There are processes for business value chain analysis, business organization analysis, business automation analysis, component behaviour design or methodology description (SPEM). All these kind of processes share a common semantic but must also be described as different metaclasses to enable a complete MDA approach from pure business analysis to business IT implementation design. The value is not to have a universal metamodel for process but a common semantic with concrete metamodels that can be related to one another.

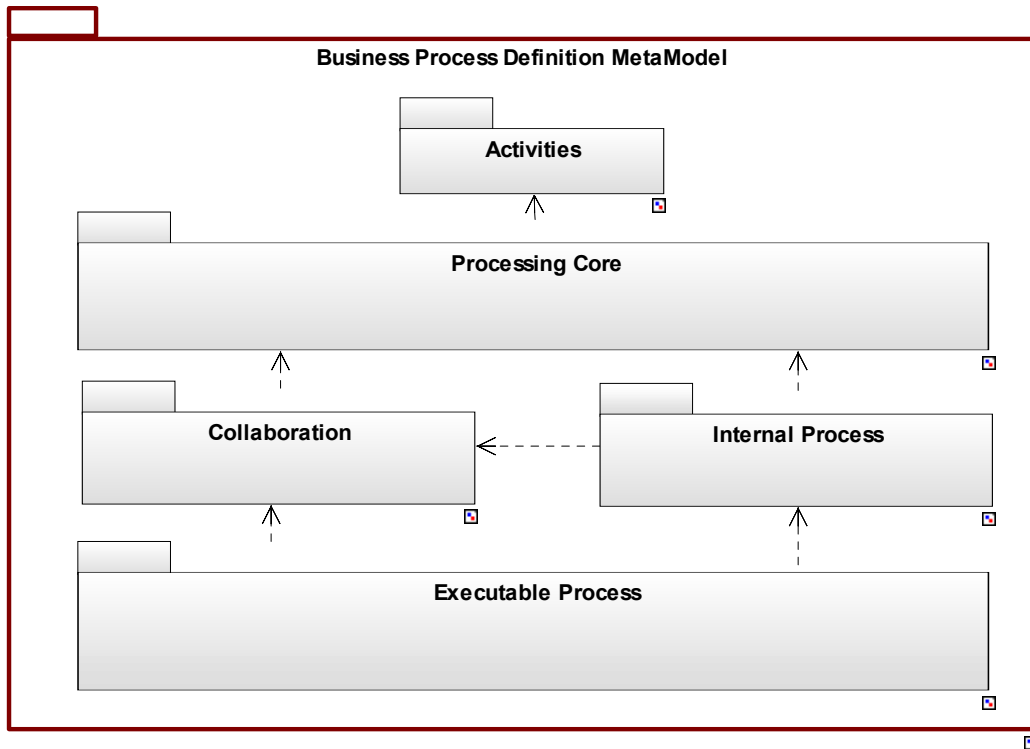
The specification developed in response to this RFP is expected to achieve the following:

- • A common abstract metamodel to unify semantics common to all concrete process metamodels. This abstract metamodel will be based on the UML 2.0 Activity Model.
- • A concrete metamodel for business process execution to unify the diverse business process definition graphical and textual notations that exist in the industry
- • Support for the specification of choreography, describing the collaboration between participating business entities using lightweight collaboration mechanisms (e.g. Webservices); and the ability to reconcile the choreography with supporting internal business processes.
- • The ability to integrate process models for workflow management processes, automated business processes, and collaborations between business units.

3. SPECIFICATION

This section presents the normative specification for business process definition metamodel. It begins with an overview, then presents different subpackages of the metamodel

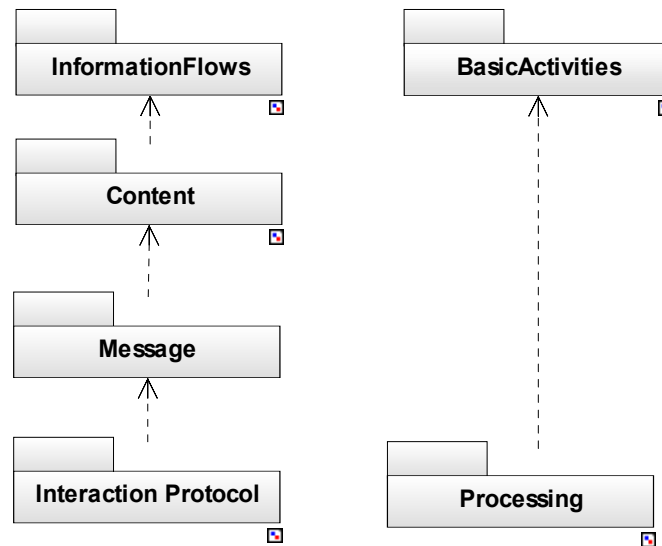
3.1. OVERVIEW



Package	Comment
Business Process Definition MetaModel	
Collaboration	The Collaboration model provides features to handle communication between partners and processes.
Executable Process	The Executable Process Model is concrete implementation of the Internal Process Model for Business Process execution.
Internal Process	This Model describes the common rules to specify coordination of steps within processing owning resources
Processing Core	The Processing Core package contains all models that are shared by concrete process metamodels.
Activities	From UML 2.0

3.2. PROCESS CORE PACKAGE

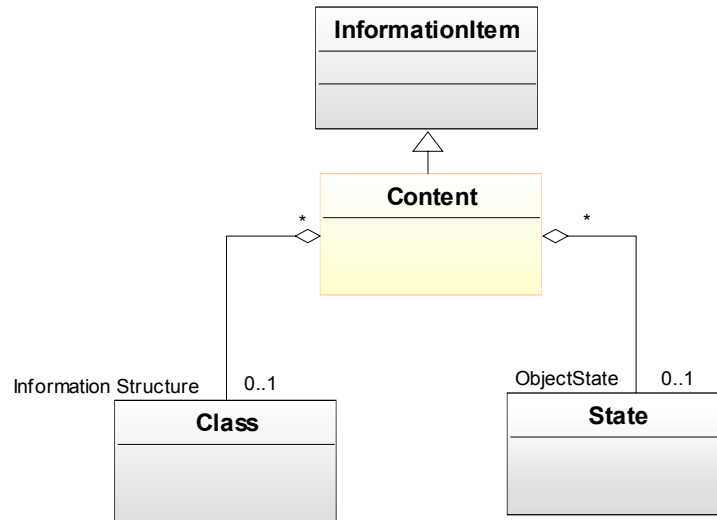
The Processing Core package contains all models that are shared by concrete process metamodels.



Package	Comment
Content	The content Model defines an intermediate information document that is carried out by Messages, Event or that are produced or consumed by Process Activities.
Interaction Protocol	Ther interaction transaction protocol model describes how message are grouped to form an interaction
Message	The Message Model describes information flow between a sender and a receiver
Processing	This Model describes the common semantic shared by all processing behavior. It includes the basis for ControlFlow and ProcessStep
BasicActivities	From UML 2.0
InformationFlows	From UML 2.0

3.2.1. CONTENT MODEL

The content Model defines an intermediate information document that is carried out by Messages, Event or that are produced or consumed by Process Activities.



3.2.1.1. CONTENT

A content designates the content of a message or an event, independently of its structure. This structure can be represented by an internal structure linked to the content. A content may be used by several messages, since it is not associated with an emitter and a destination. There can only be one content per message or event, but the same content can be used by multiple messages or events.

3.2.1.2. STATE

From UML 2.0

3.2.1.3. CLASS

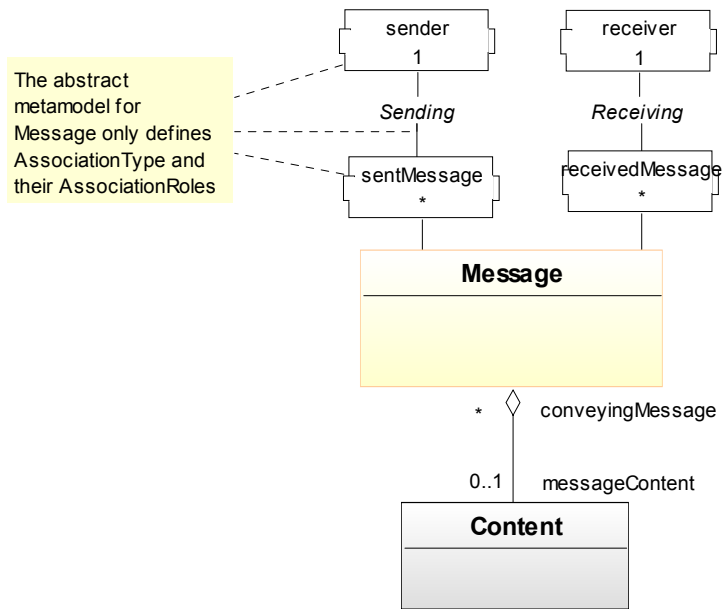
From UML 2.0

3.2.1.4. INFORMATIONITEM

From UML 2.0

3.2.2. MESSAGE MODEL

The Message Model describes information flow between a sender and a receiver



3.2.2.1. CONTENT

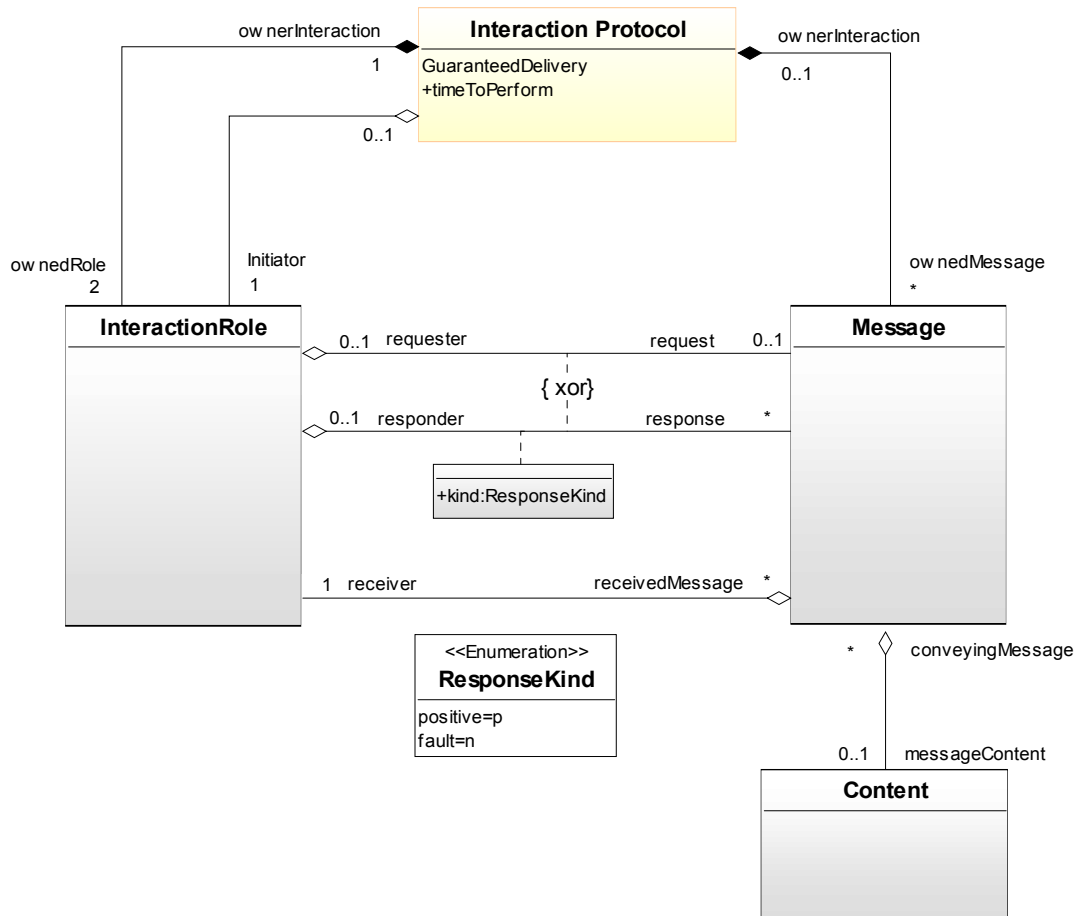
A content designates the content of a message or an event, independently of its structure. This structure can be represented by an internal structure linked to the content. A content may be used by several messages, since it is not associated with an emitter and a destination. There can only be one content per message or event, but the same content can be used by multiple messages or events.

3.2.2.2. MESSAGE

A message defines an information flow between a sender and a receiver.
A message always have only one sender and one receiver

3.2.3. INTERACTION PROTOCOL MODEL

The interaction transaction protocol model describes how message are grouped to form an interaction



3.2.3.1. CONTENT

A content designates the content of a message or an event, independently of its structure. This structure can be represented by an internal structure linked to the content. A content may be used by several messages, since it is not associated with an emitter and a destination. There can only be one content per message or event, but the same content can be used by multiple messages or events.

3.2.3.2. INTERACTION PROTOCOL

An interaction is a transaction contract between interaction role. The contract is described by messages exchanged between two roles (buyer and seller for example).

3.2.3.3. INTERACTIONROLE

3.2.3.4. RESPONSEKIND

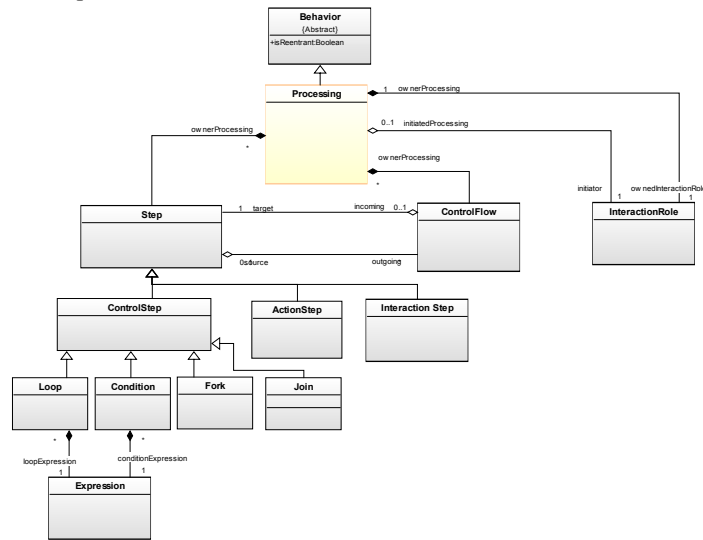
3.2.3.5. RESPONSEKINDASSOCIATION

3.2.3.6. MESSAGE

A message defines an information flow between a sender and a receiver. A message always have only one sender and one receiver

3.2.4. PROCESSING MODEL

This Model describes the common semantic shared by all processing behavior. It includes the basis for ControlFlow and ProcessStep



3.2.4.1. ACTIONSTEP

An ActionStep is a step in a processing where something occurs, either within the processing itself or within the participant of the processing

3.2.4.2. CONDITION

3.2.4.3. CONTROLFLOW

A control flow is a simple branching from one source Step to a target Step

3.2.4.4. CONTROLSTEP

A control step is a branching mechanism used to provide advanced coordination of other steps in the processing

3.2.4.5. EXPRESSION

3.2.4.6. FORK

3.2.4.7. INTERACTION STEP

3.2.4.8. INTERACTIONROLE

An InteractionRole describes communication that occurs between the processing and its environment.

3.2.4.9. JOIN

3.2.4.10. LOOP

3.2.4.11. PROCESSING

A Processing is a kind of behavior described in terms of coordinated steps. Steps are coordinated by control flow and control nodes.

A control flow is a simple branching from one step to another step

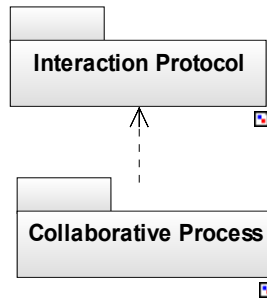
3.2.4.12.STEP

3.2.4.13.BEHAVIOR

From UML 2.0

3.3. COLLABORATION MODEL

The Collaboration model provides features to handle communication between partners and processes.

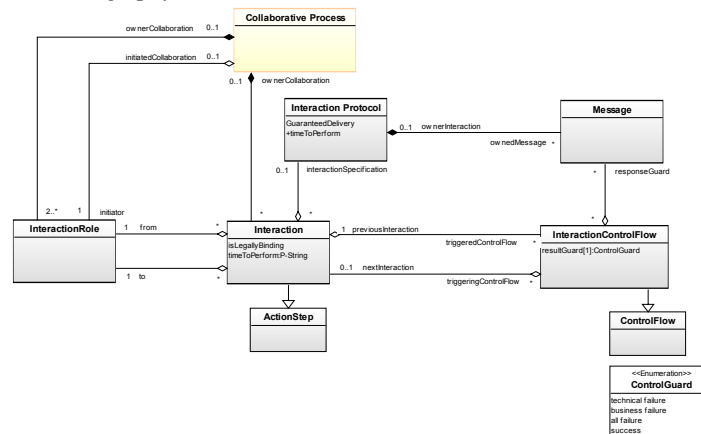


Package	Comment
Collaborative Process	The collaboration process model defines how interactions are coordinated to provide a shared behavior among participant. This model is called the choreography model in the Business Process Metamodel RFP
Interaction Protocol	The interaction transaction protocol model describes how message are grouped to form an interaction

3.3.1. COLLABORATIVE PROCESS MODEL

The collaboration process model defines how interactions are coordinated to provide a shared behavior among participant.

This model is called the choreography model in the Business Process Metamodel RFP



3.3.1.1. COLLABORATIVE PROCESS

Collaborative Processes are kind of Processes that occurs between participant to coordinated shared interactions.

InteractionTransaction are the basis of communication between participant. The

3.3.1.2. CONTROLGUARD

3.3.1.3. INTERACTION

A collaboration is a contract established in a specific context between autonomous entities that are internal or external to an enterprise.

These entities can be represented by enterprise org-units, applications, activities or business processes, as well as by external org-units.

The content of this contract is described by a "Collaboration Protocol".

3.3.1.4. INTERACTIONCONTROLFLOW

An InteractionControlFlow is a kind of ControlFlow that occur within collaborative processes. There differ from traditional InProcess Control flow because a Collaborative Process doesn't have any proper state/data.

InteractionControlFlow guards can only be based on:

- The result of a previous Interaction
- A response message of a previous Interaction

3.3.1.5. INTERACTION PROTOCOL

An interaction is a transaction contract between interaction role. The contract is described by messages exchanged between two roles (buyer and seller for example).

3.3.1.6. INTERACTIONROLE

3.3.1.7. MESSAGE

A message defines an information flow between a sender and a receiver.

A message always have only one sender and one receiver

3.3.1.8. ACTIONSTEP

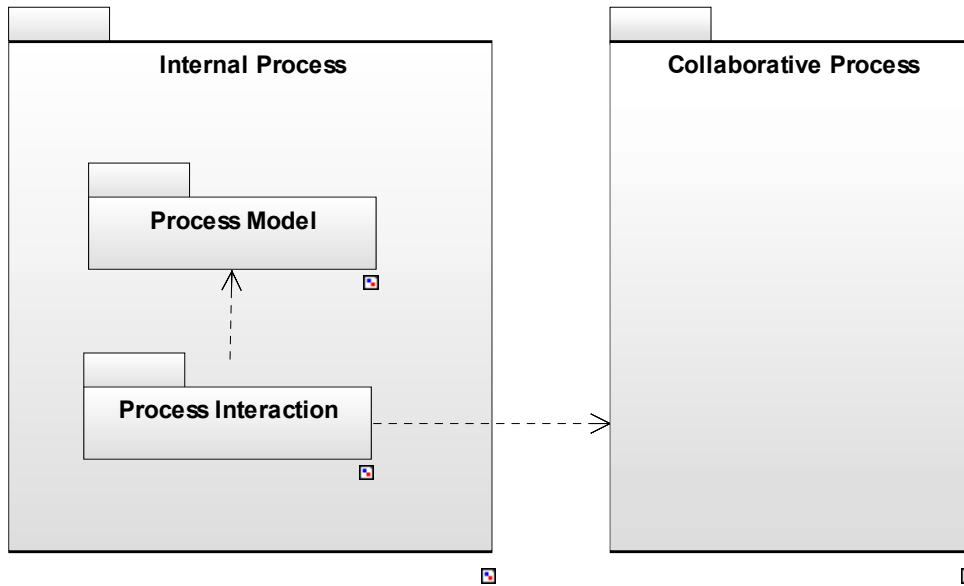
An ActionStep is a step in a processing where something occurs, eitheidr within the processing itself or within the participant of the processing

3.3.1.9. CONTROLFLOW

A control flow is a simple branching from one source Step to a target Step

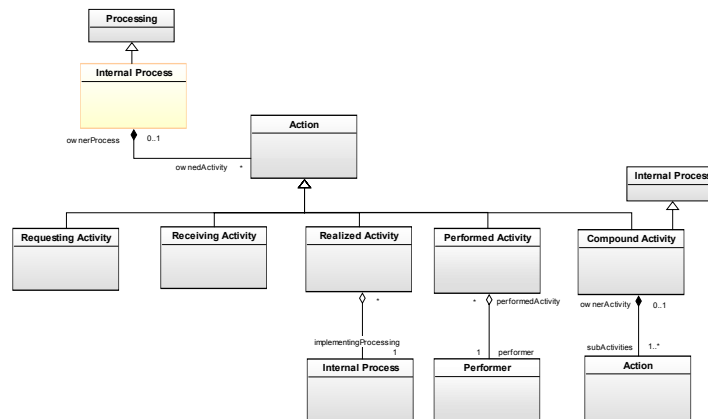
3.4. INTERNAL PROCESS MODEL

This Model describes the common rules to specify coordination of steps within processing owning resources



Package	Comment
Collaborative Process	The collaboration process model defines how interactions are coordinated to provide a shared behavior among participant. This model is called the choreography model in the Business Process Metamodel RFP
Internal Process	This Model describes the common rules to specify coordination of steps within processing owning resources
Process Interaction	The interaction model within the processing model describes how interactions with external entities are handled within processes.
Process Model	

3.4.1. PROCESS MODEL MODEL



3.4.1.1. RECEIVING ACTIVITY

3.4.1.2. ACTION

3.4.1.3. COMPOUND ACTIVITY

3.4.1.4. INTERNAL PROCESS

An Internal Process is a kind of Processing that owns resources. Step and ControlFlow in an Internal Process make use of resources for branching and decision. Process resources can also be exchanged with external participant through messages.

3.4.1.5. PERFORMED ACTIVITY

3.4.1.6. REALIZED ACTIVITY

3.4.1.7. REQUESTING ACTIVITY

A requesting Activity send a message to a partner role through an interaction port

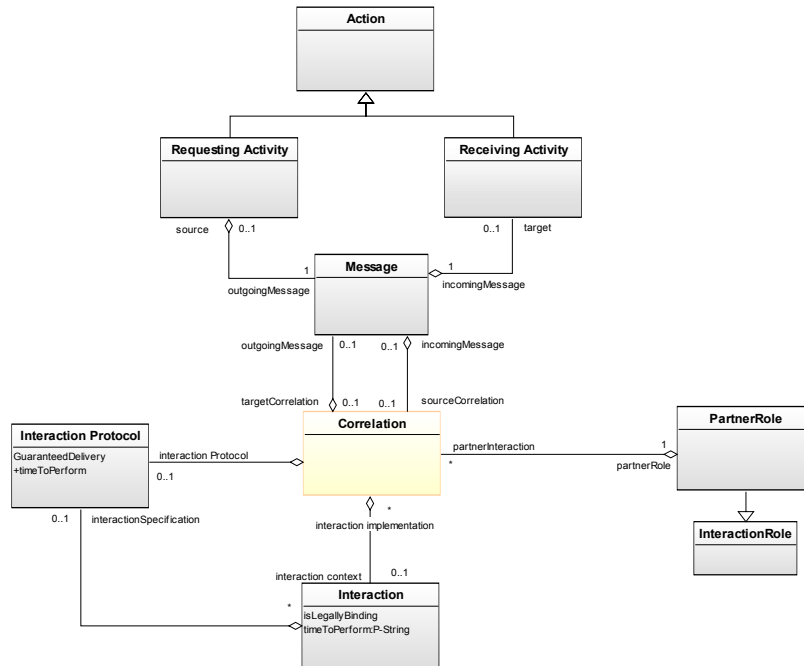
3.4.1.8. PERFORMER

3.4.1.9. PROCESSING

A Processing is a kind of behavior described in term of coordinated steps. Steps are coordinated by control flow and control nodes. A control flow is a simple branching from one step to another step

3.4.2. PROCESS INTERACTION MODEL

The interaction model within the processing model describes how interactions with external entities are handled within processes.



3.4.2.1. INTERACTION

A collaboration is a contract established in a specific context between autonomous entities that are internal or external to an enterprise. These entities can be represented by enterprise org-units, applications, activities or business processes, as well as by external org-units.

The content of this contract is described by a "Collaboration Protocol".

3.4.2.2. CORRELATION

Correlations describe how messages sent to external Entities are related to one another.

A Correlation Activity can have zero or one outgoing Message. Outgoing Message are messages going out of the process to reach external Entities

A Correlation can have one or one outgoing Message. Outgoing Message are messages going out of the process to reach external Entities

A Correlation may be associated to an interaction that act as an interaction protocol. In such a case, Messages within the interaction must correspond to Messages of the Correlation

Every Correlation is associated to a PartnerRole.

3.4.2.3. PARTNERROLE

3.4.2.4. RECEIVING ACTIVITY

3.4.2.5. ACTION

3.4.2.6. REQUESTING ACTIVITY

A requesting Activity send a message to a partner role through an interaction port

3.4.2.7. INTERACTION PROTOCOL

An interaction is a transaction contract between interaction role. The contract is described by messages exchanged between two roles (buyer and seller for example).

3.4.2.8. MESSAGE

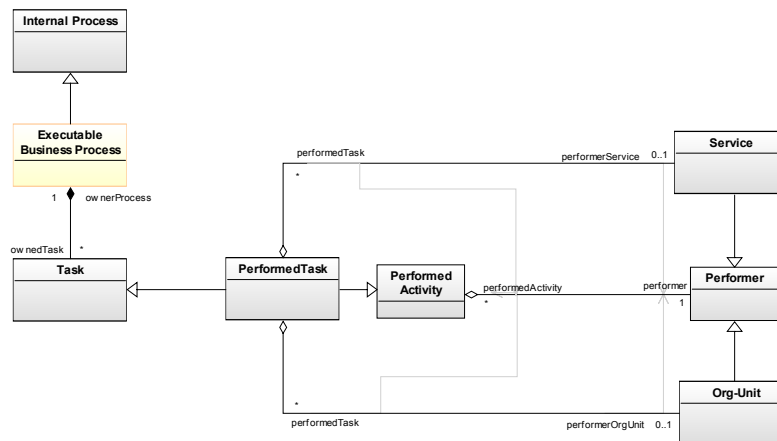
A message defines an information flow between a sender and a receiver.
A message always have only one sender and one receiver

3.4.2.9. INTERACTIONROLE

An InteractionRole describes communication that occur between the processing and its environment.

3.5. EXECUTABLE PROCESS MODEL

The Executable Process Model is concrete implementation of the Internal Process Model for Business Process execution.



3.5.1.1. SERVICE

A Service is a logical piece of software providing information to users or to other services of the IT system.

A Service presents itself a unit of coordination of information flows inside the IT system. Services are the leaves of the Application Architecture decomposition.

A Service can be implemented either by a Software component or by a workflow.

3.5.1.2. EXECUTABLE BUSINESS PROCESS

An executable process is an that can be executed Internal Process as a service from the IT System.

3.5.1.3. PERFORMEDTASK

3.5.1.4. TASK

A task is an action that occurs within an executable process

3.5.1.5. INTERNAL PROCESS

An Internal Process is a kind of Processing that owns resources. Step and ControlFlow in an Internal Process make use of resources for branching and decision. Process resources can also be exchanged with external participant through messages.

3.5.1.6. PERFORMED ACTIVITY

3.5.1.7. PERFORMER

3.5.1.8. ORG-UNIT

Element defining the organization of the enterprise.

An Org-Unit can be external. An external Org-Unit exchanges flows (Messages) with the enterprise.

EXAMPLES : Customer, Supplier, Bank.

4. LANGUAGE MAPPINGS

The following sub-sections describe mappings to specific languages as proofs of concept.

4.1.1. BPEL MAPPING

To be completed in a later version of this specification.

4.1.2. XPDL MAPPING

To be completed in a later version of this specification.

4.1.3. W3C CHOREOGRAPHY MAPPING

To be completed in a later version of this specification.

5. RESPONSES TO RFP REQUIREMENTS

The following paragraphs discuss the submission relative to the RFP requirements. Paragraph numbering starts at 6.5 to correspond to the RFP numbering.

6.5 MANDATORY REQUIREMENTS

Responses to the issues to be discussed are presented below. The RFP requirements are expressed in italics.

5.1.1. REQUIRED METAMODEL

Responses to this RFP shall provide a metamodel forming an abstract language for the expression of business process definitions.

Proposals shall depict the solicited metamodel using UML.

5.1.2. METAMODEL COMPATIBILITY

Proposals shall use the appropriate elements of existing metamodels including, UML, EDOC, MOF and OCL.

The metamodel is based on UML and uses OCL and a MOF compatible sub-set of UML.

5.1.3. MOF COMPLIANCE

The resulting metamodel shall be MOF-compliant.

Will be addressed in final specification.

5.1.4. PROCEDURAL AND RULE-BASED FLOW OF CONTROL

Proposals shall provide for specification of process flow based on control flow from completed activities to activities to be initiated as well as initiation of activities based on rules or pre-conditions.

Will be addressed in final specification.

5.1.5. SPECIFICATION OF ACTIVITY PERFORMERS

Proposals shall provide for the specification of selection criteria for performers and resources, including human performers, applications, passive resources and sub-processes.

The basis for selection shall include

- 1. Specific resource identity*
- 2. Resource attributes*
- 3. Relationships with other assigned resources*
- 4. Relationships to subject matter*

5. Combinations of the above.

Will be addressed in final specification.

5.1.6. ASYNCHRONOUS AND CONCURRENT EXECUTION

Proposals shall provide mechanisms for specifying concurrent execution of activities:

- a) *A process model shall be able to define when multiple, concurrent activities are initiated.*
- b) *A process model shall be able to define when an activity or completion of a process depend on the completion of multiple, concurrent activities. This shall include initiation of an activity based on completion of n of m concurrent activities (where $n \leq m$).*
- c) *Business processes shall be able to invoke processes that execute asynchronously.*
- d) *The model shall support specification of the publication of events and messages for asynchronous delivery.*
- e) *The model shall support receipt of messages from a collaborator and subscription to events. Messages and events shall be received as asynchronous inputs to a receiving activity executing concurrently with other activities in the process.*

Interaction Models and Activity Models handle the requirements

5.1.7. SPECIFICATION OF INITIATION AND TERMINATION

Proposals shall provide modeling constructs for specifying when and how activities and processes can be initiated and terminated:

- a) *Pre or post conditions*
- b) *Actions for initialization and termination with consideration of actions required for abnormal termination, including the initiation of compensating processes.*
- c) *Propagation of termination to active activities and sub-processes.*

Collaborative processes handle interaction fault. Issue will be addressed in final specification for Internal Processes.

5.1.8. CHOREOGRAPHY

Proposals shall provide for the specification of the signals and exchanges performed between processes to achieve collaboration as described in 6.2.5.

Addressed by the Collaborative Model

5.1.9. AUDIT LOG GENERATION

Proposals shall include provisions in the metamodel to allow the specification of business logic related audit log records. This part of the metamodel shall provide for the specification of:

- a) *The content of the log record in relation to the process definition*
- b) *The timing of the log record emission*

Will be addressed in final specification.

5.1.10. DISTRIBUTED EXECUTION

Proposals shall ensure that the form of definition does not preclude distributed execution.

The metamodel does not preclude distributed execution.

5.1.11. PROCESS DEFINITION IMPORT AND EXPORT

Proposals shall support XMI export and import for exchange of process definitions.

As a MOF metamodel, it is XMI compatible. XMI will be addressed in the final specification.

5.1.12. NON-NORMATIVE NOTATION MAPPINGS

As a proof of concept, proposals shall provide non-normative mappings to two recognized business process modeling languages, e.g.:

- *BPEL4WS*
- *XPDL*

Will be addressed in final specification.

5.1.13. COMPATIBLE VERSIONS OF EXISTING SPECIFICATIONS

The final, revised submission shall be based on the most recently adopted version of related specifications (e.g., UML and MOF) that is adopted three months prior to the final revised submission deadline for this RFP.

Will be addressed in final specification.

5.2. OPTIONAL REQUIREMENTS

Responses to the optional requirements are presented below. The RFP requirements are in italics.

5.2.1. ADDITIONAL NON-NORMATIVE MAPPINGS

Proposals may provide additional mappings to recognized languages for business process definition, complementing the list of mandatory mappings requested in 6.5.12.

Will be addressed in final specification.

5.2.2. ADDITIONAL EXECUTION CONSTRAINTS

Proposals may provide for the ability to model additional execution constraints, like maximum duration of a process or activity execution. For these additional constraints the behavior of constraint violation should be modeled and its affect on the process enactment described.

Will be addressed in final specification.

5.3. DISCUSSION TOPICS

Responses to the issues to be discussed are presented below. The RFP requirements are expressed in italics.

5.3.1. RELATIONSHIP TO EXISTING UML METAMODEL

Proposals shall discuss the relationship of model elements used for business process modeling to the existing UML metamodel to demonstrate consistency with the UML metamodel.

The Processing Model is based on the UML 2.0 Activity Model
The Collaboration Model is based on the UML 2.0 Interaction Model.

Final mapping will be addressed in final specification.

5.3.2. RELATIONSHIP TO RELATED UML PROFILES, METAMODELS AND NOTATIONS

Proposals shall discuss how business process definitions may be incorporated with or complement other UML profiles, metamodels and notations for specification of business systems, particularly the UML Profile for EDOC.

Will be addressed in final specification.

5.3.3. MAPPING TO EXISTING BUSINESS PROCESS NOTATIONS AND UML NOTATION

Proposals shall discuss how the proposed metamodel may be mapped to existing process definition notations as a demonstration of completeness and compatibility.

Will be addressed in final specification.

5.3.4. RESOURCE MODEL

Proposals shall describe assumptions regarding an associated resource model.

Will be addressed in final specification.

5.3.5. RELATIONSHIPS WITH RELATED OMG SPECIFICATION ACTIVITIES.

Proposals shall discuss how the specifications relate to the specification development efforts currently under way as noted in Section 6.4.3.

This will be discussed when we are closer to a final specification.

5.3.6. CONSISTENCY CHECKS

Proposals shall discuss how the specification supports consistency checks, particularly between choreography specifications and a business process that participates in the choreography.

Will be addressed in final specification.

5.3.7. ACCESS CONTROL

Proposals shall discuss how access authorization for process data, artifacts, activities in a process, and process enactment may be based on process roles of individuals associated with a specific process instance.

Will be addressed in final specification.

5.3.8. WEB SERVICES AND COLLABORATION SUPPORT

Proposals shall discuss how the specification supports the definition of business processes and choreography for web services and other collaborations including the relationships with messages, documents, interface specifications, participant roles, signatures and message exchanges.

Interaction Protocol are the basis for WSDL:Operation specification. Collaborative Process are used to define WSDL:PortType for each Participant

6. COMPLIANCE LEVELS

The following levels of compliance are defined for this specification.

6.1. PIM COMPLIANCE

An implementation is PIM compliant if it implements the complete PIM model in a specific technology.

6.2. OTHER?

APPENDIX A: GLOSSARY