

# ISO/IEC JTC 1/SC 32 N 0689

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**Attachment-1**  
**(Attachment to SC32N0687)**

**A Report of the Study Period**

**Rationale for the NWI:**  
**Framework for Registering Business Objects**

**September, 2001**

**Japan National body**  
**ISO/IEC JTC1 SC32 WG2**

## 1. Foreword

*This document is prepared as the final report on the study period which was given at the SC32 Plenary to a NWI proposal submitted by Japan National Body at the Santa-Fe Meeting in Jan., 2000.*

This NWI proposal intended to initiate a new standard activity on the meta model framework for registering various types of the business objects, such as domain specific business scenario, business process models, business entity profiles, interface formats common elementary objects and software components.

After the Santa Fe meeting (Feb. 2000) via Helsinki meeting (Nov. 2000), the study was continued focusing on following aspect of the proposal.

- Clarify the scope
- Clarify the meta model concept
- Stock take major related standard activities
- Investigate the possibility of the co-operation or collaboration among related standard groups.
- Develop a base document to demonstrate the necessity of the new standard activity and to invite discussions and proposals

The NWI proposal is proposing a new standard activity within ISO/IEC JTC1 SC32, which focuses on a common framework of meta model which enables consistent registration of the various types of the business objects, extending ISO/IEC 11179 Specifications and the MOF (Meta Object Facility) which will be proposed by OMG to ISO JTC1 by the PAS procedure.

The business object registry should provide a common infrastructure for effective and efficient exchanging and interchanging of various types of business information and software, which are needed to establish business collaboration through the electronic commerce and EDI.

## **2. Problems to be addressed**

To cope with the requirements for the harmonized exchanging of business information, data, and software among different organization through EC or EDI, there must be common data element specifications and message interchanging protocols, such as the ISO/IEC 11179 (JTC1 SC32) and the ISO 9735 (TC 154).

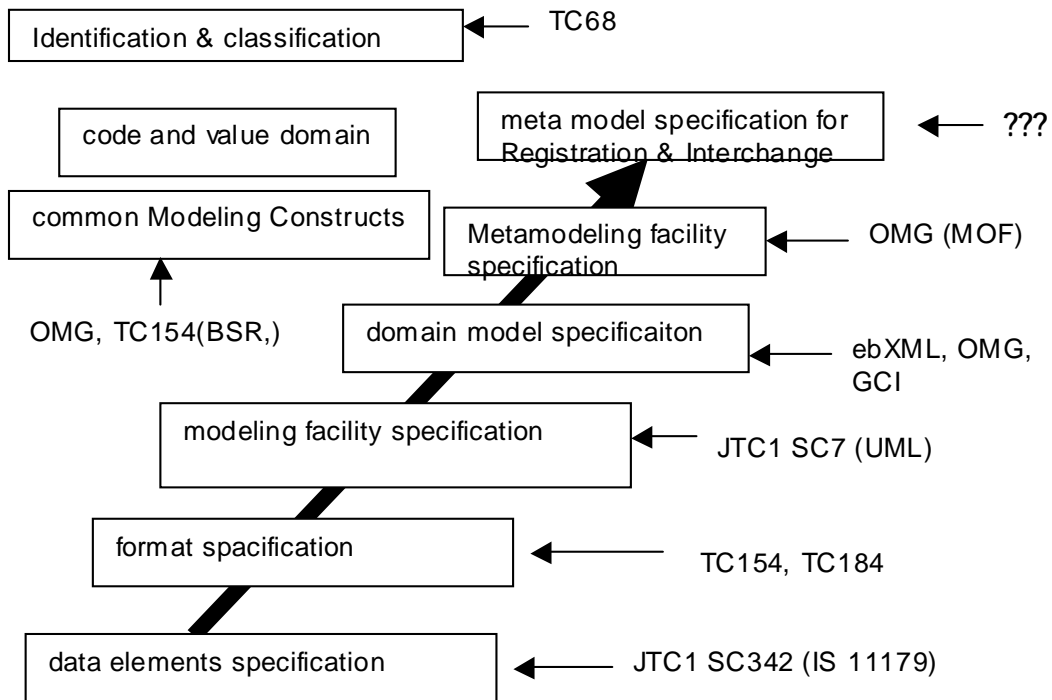
To increase the share-ability of the business information and software, many industrial consortia have been in charge of the standardization for more high level specifications of business transactions, business protocols and business process models, facilitating UML and XML.

The UML and XML have almost become international standard in the object modeling area. A lot of standard groups such as TC184 (production data), TC68 (banking data) in ISO, ebXML, UN/CEFACT, OASIS, VICS (CPFR), EAN,UCC (GCI), Rosetta-net, XBRL, OMG at the outside of ISO, they are endeavor to standardize business process models which represent the best practices, and standard modeling constructs such as data elements, entity profiles and value domains at each domain.

One of the things to be mentioned is that most of those standard efforts tend to be focused on the contents of meta model to represent the semantics of businesses, using UML Stereotype mechanism.

However, there are no specific common scheme for consistent representation and reusing of metamodels, then, every standard group has to specify their metamodel scheme by their own manners.

Due to lack of the mechanism which enables the effective and efficient sharing and exchanging those domain specific business objects, there must be fudge duplications and inconsistencies of the business object specifications, and also unnecessary transformation or translation work to keep a cross industrial collaboration.



## Standard Organizations and their Concerns

Organization \ Issue	ISO SC 32	ISO TC 68	ISO TC 154	ISO TC 184	AR TS	Eb XML	Rosetta	CP FR	SC OR	UN/CEFACT	EA	OMG	GCI	XBRL
Business Identification	X	X								TM				
Codes & Values	X	X											X	
Information elements	X		X	X	X	X		X					X	X
Interchange format			X	X		X	X						X	
Domain Models				X	X	X	X	X			X	X	X	
Business Protocols			X			X	X	X			X		X	
Best Practices				X				X	X				X	
<b>Metamodel</b>	<b>X</b>					<b>X</b>				<b>X</b>		<b>X</b>	<b>X</b>	
Methodology										X		X		
Information View			X	X	X								X	X

### 3. Objectives of the Proposed Standard

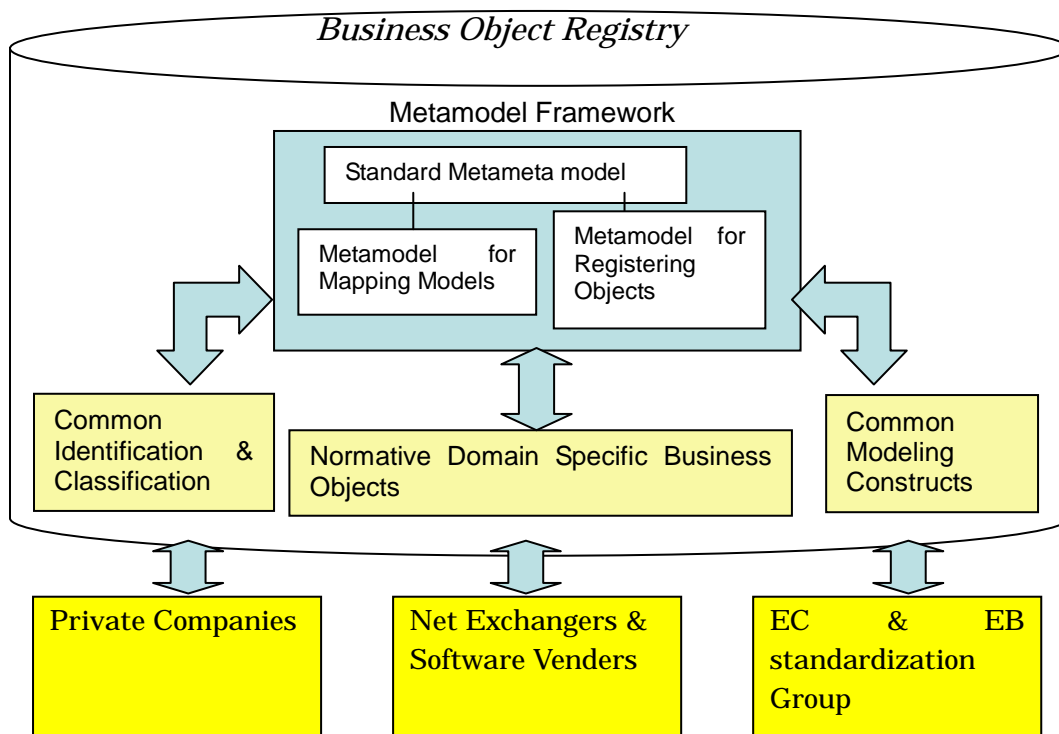
This proposed standard intends to provide the bases to enable efficient specifying of the metamodels for interchanging of various types of business objects among different organizations by establishing a unified view to the business object registering.

The scheme should be consisted of both a metamodel framework and normative contents to be used in the specification of individual metamodels.

The standard should be responsible to provide a unified consistent metamodels to be referred by those who want to interchange business object through the Electronic Commerce by the internet.

The standard also has to provide schematic metamodels to enable those who have to develop standards, to access and locate appropriate standards to be conformed.

A unified view mechanism to the categories and identifications of businesses objects, such as Business Entities, Business Events, and Business Processes, should be prepared for those who want reuse and share those objects.



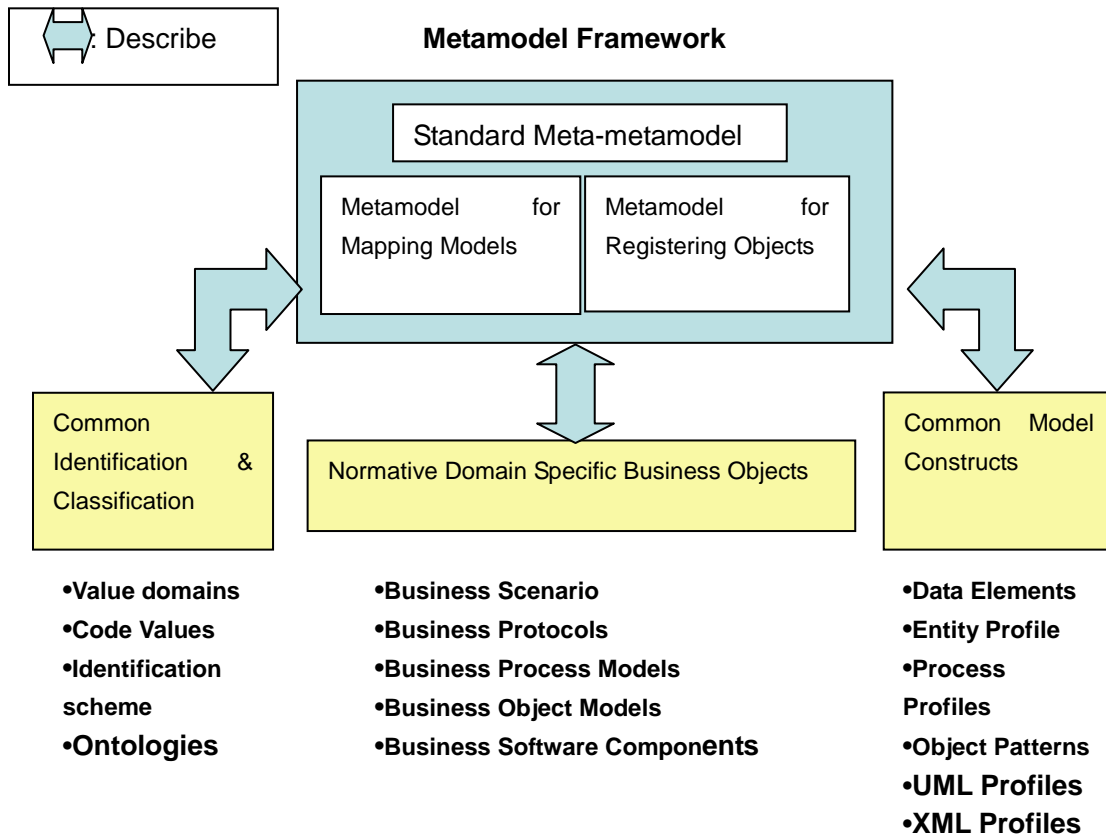
## **The standards to be developed**

Following standards should be developed, keeping the consistency with standards which were already defined and enforced in the particular communities.

- **Meta Modeling Facility (MOF) with the PAS from OMG**
- **Metamodel Framework**
  - **Normative Contents of Meta-Meta level of the MOF**
  - **Normative Contents for**
    - ◇ **Registering Modeling Constructs**
    - ◇ **Registering Business Objects**
    - ◇ **Mapping between Models**
- **Registration Procedure**

Then, following standard activities should be required.

- Extension of IS11179-3
- Selection of Meta Object Facility (MOF)
- Extension of MOF
  - A) For registering BO
  - B) For the Mapping between models
- Identification and enumeration of Metamodeling Constructs
- Establish unified view to metamodel framework
  - A) Identification and enumeration of Common Modeling Views
  - B) Identification and enumeration of Common Modeling Constructs
  - C) Identification and enumeration of Domain Dependent Constructs



## 4. Purpose and Justification

### 4.1 The necessity of the Meta model framework

This proposal intends to establish a common metamodel framework for registering business objects, which should be shared by those people who want to interchange individual enterprise object between different organizations.

The goals and objectives of the framework should be following:

- ( 1 ) Establish a metamodel container to register unified views (set of attributes) of business process models or model elements with a multi dimensional scheme.
- ( 2 ) Establish a scheme which requires keeping the conformance to normative modeling constructs in the developing enterprise object models and software components.
- ( 3 ) Establish a scheme which allows the appropriate mapping between models which are developed with different modeling facilities or modeling constructs.

## 4.2 The Potential Users of the standard

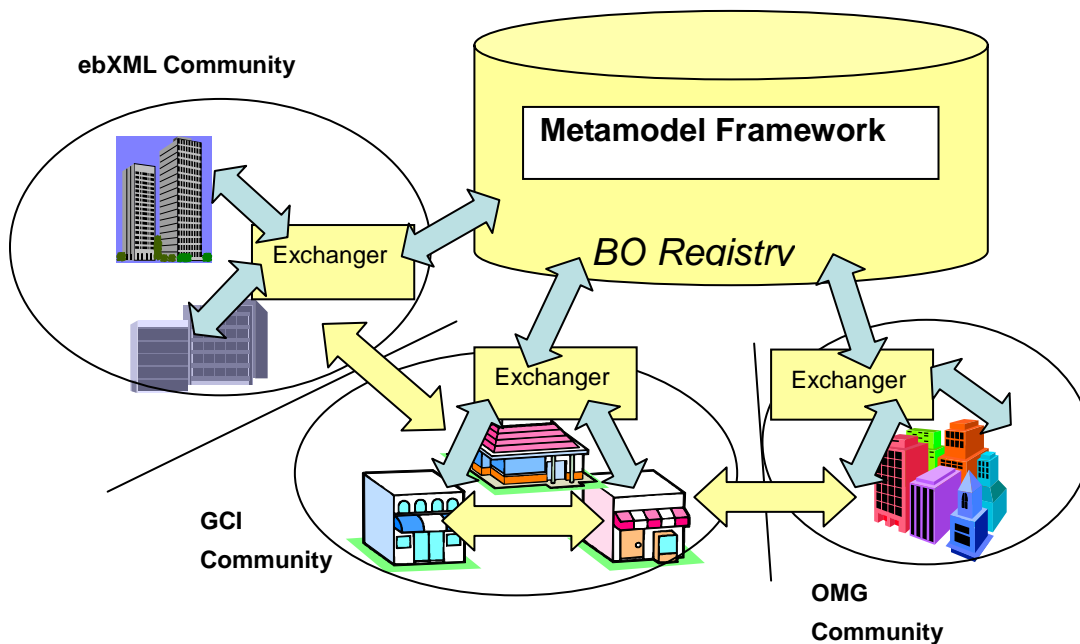
(1)The potential first line user of this standard could be following standard groups.

- The group or organization who develop standards for reusable business software
- The group or organization who develop standard for domain specific business process models and want to share them among different organizations.

This standard will provide them an open infrastructure to register their standards.

(2)The Potential End Users of the standard could be commercial venders, such as

- Net exchangers or the venders who provide the exchange services following a particular standard such as ebXML.
- A particular organization who want to register their products and want to collaborate with other organizations through EC or Internet.
- Net exchange service venders who have to handle more than two different standards protocols or business process models.
- Organizations who develop reusable business objects or software and want to make business on that.



## 4.3 The existing standards to be considered

In the development of the standard, following existing standards should be referred and shall not develop any duplicate standards which would be same as pre-existing standards. Then, investigation and getting consensus on those could be the key issues for the project.

However, mete-meta level contents of the framework should be defined by investigating the commonality of the following existing standards.

**(1) For Basic Concept of the Framework**

- IS11179
- MOF (OMG)
- ebXML (BP,CC, Repository, etc)
- UN/CEFACT TMWG metamodel

**(2) For the Modeling Constructs**

- ISO TC154 BSR for modeling constructs registering
- UML Metamodel
- UML Profiles for :
  - EDOC, EAI, CCA
- Various Code value standards in ISO

**(3) For Domain Model Registering**

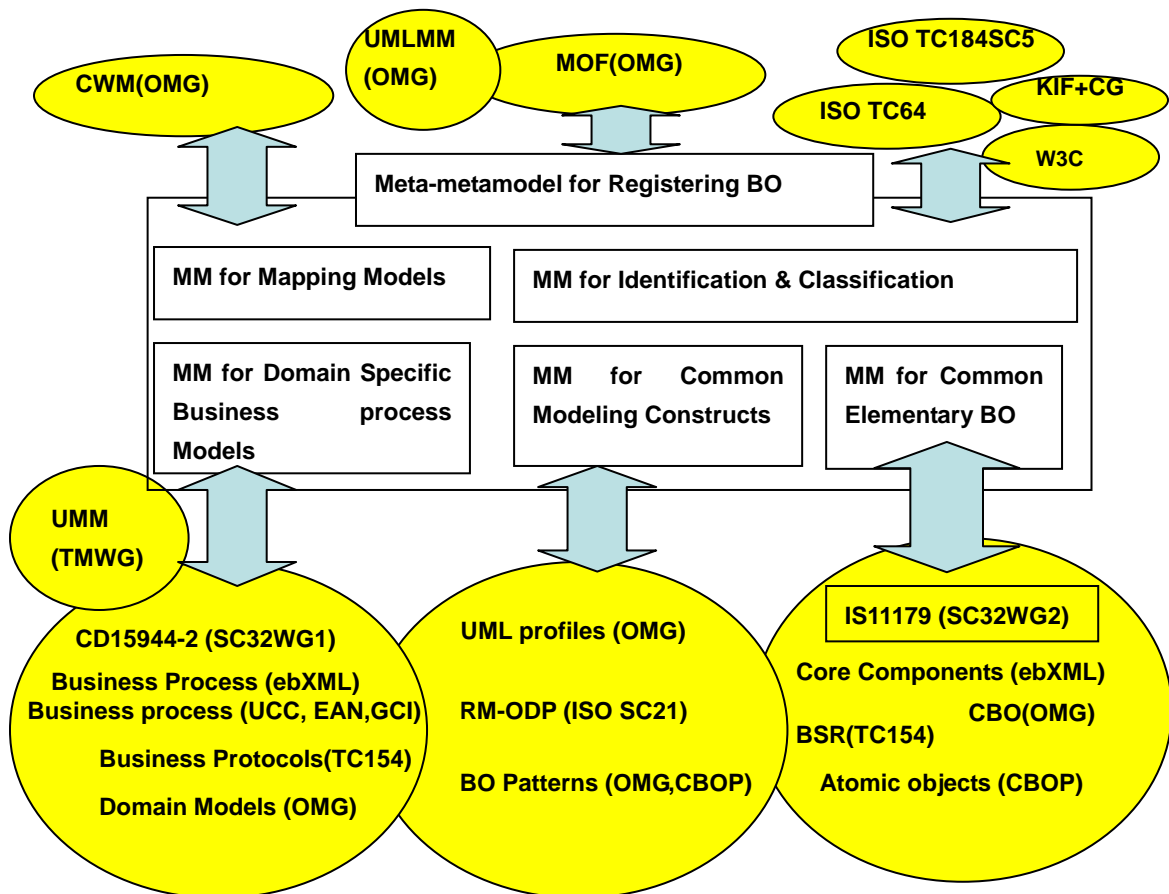
- GCI (EAN,UCC) for Business Process Models

**(4) For Model Mapping**

- OMG CWM for Mapping Scheme

**(5) For Identification & Classification**

- ISO TC68



#### **4.4 The benefits of the Metamodel framework:**

The framework could be useful in both information system constructions and sharing & exchanging of business process models and software components among organizations. However, following aspect of the architecture should be reinforced.

- Provide common bases for exchanging information contents among different domains and different organizations across countries.
- Provide common bases for effective evaluation mechanism of proprietary components in both software and information content, by asking for each component to declare their ingredients with specifying standard elements.
- Provide common bases for evaluating business performance of the enterprise.
- Provide common bases for effective investigation of business modeling and its change which might cause information system changes.

The identification & classification scheme provides modelers a mean for accessing to proper normative modeling constructs to be applied to individual enterprise object model developments from the metamodel registry. Then, those systems that are developed with same modeling constructs, could be easily collaborated each other.

#### **In the Markets:**

•An Unified Metamodel Framework which enables Interchange & Sharing of the various type of enterprise business objects, in E-Commerce, E-Business, EDI, and the business collaborations, such as SCM, e-CRM, etc..

#### **In the Vender Communities:**

•An Unified Registering Scheme which allows the those who want to develop sharable enterprise business objects and those who want to access appropriate normative models, modeling constructs and objects in the developing easy to collaborate business systems.

#### **In the Standardizations Communities:**

•An Unified Metamodel Framework which establishes the harmonization of the different views to the modeling and the Interchanging of the enterprise business object, which were proposed by the individual domains of the standardization

•A Normative Scheme which enables the appropriate locating and positioning of their standard development activities, which were been taken place within ISO or the outside of ISO.

#### 4.5 Extension of IS11179 and MOF

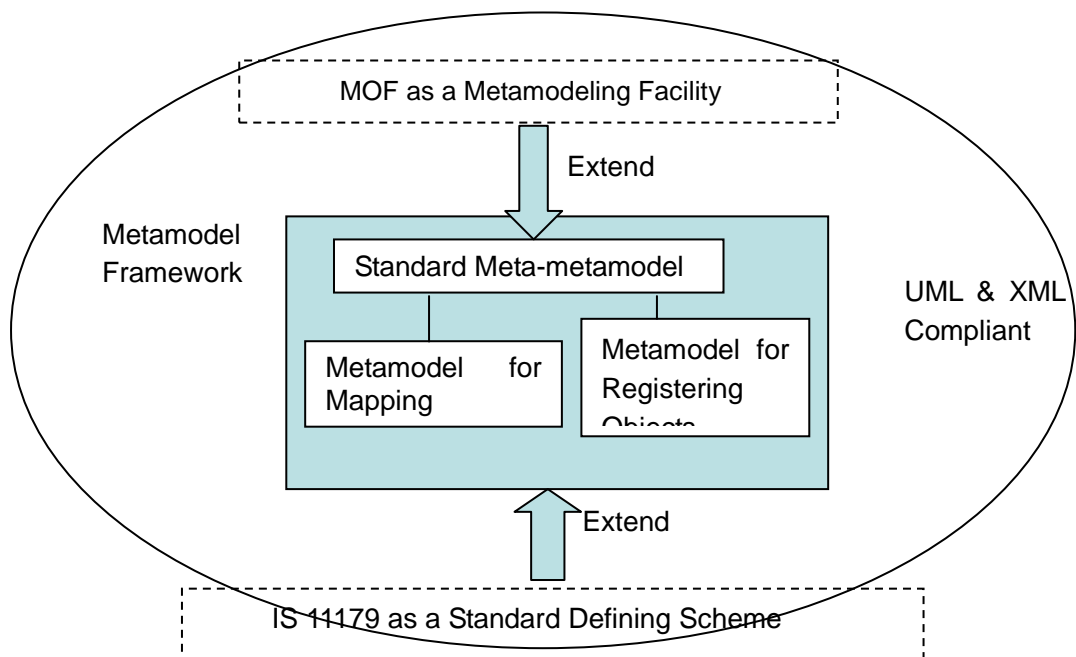
In this proposed project, the extension of IS11179 should be investigated to enhance the capability for the structured object handling. Also, the MOF (Meta Object Facility) which was standardized by OMG should be investigated to materialize the metamodel framework.

Metamodel framework for registering various types of Business Objects, including Business Process models, Modeling constructs, Software components, might requires the extension on the meta-meta objects in MOF to materialize the objectives.

Meta model framework for the mapping between different models also needed to enable effective interchange between business objects (both Model and Software) which are developed according to different standards.

The meta model framework should be used as a mapping feature between models which are represented by different manners or different constructs.

Regarding MOF, the PAS proposal form OMG to JTC1 should be proceeded within this project. However, independent IS number should be provided to the MOF.



## Meta Model Standard Activities

### 1. ISO and ISO/IEC JTC1 Activities

#### -JTC 1 SC32/WG2 11179

- EPA (U.S. Environmental Protection Agency)
- EDR (Environmental Data Registry)
- HCFA (Health Care Financing Administration)
- USHIK (The United States Health Information Knowledgebase)
- VHA (The U.S. Department of Veterans Affairs)
- NASA Metadata Registries for Aeronautics and Space
- IEEE P1489 ITS (Intelligent Transportation Systems)
- OASIS (The Organization for the Advancement of Structured Information Standards)

#### -JTC1 SC7/WG11

CDIF Integrated Meta-model (ISO of meta-models and related technologies for all

CASE and related modeling techniques)

#### -JTC1 SC7/WG17

15414 RM-DOP (Information Technology—Open Distributed Processing—Reference Model)

#### -ISO/TC154 BSR (Basic Semantics Register)

#### -ISO/IEC 14662 Open-edi reference model

#### -ISO/TC215 Generic Domain Model

#### -JTC1 SC36

- IEEE LTSC (P1484) (Learning Technology Standards Committee)
- CEN/ISSS LT (Information Society Standardization System, Learning Technology)
- PROMETEUS (PROmoting Multimedia access to Education and Training in European Society)
- ARIADNE (Alliance of Remote Instructional Authoring and Distribution Networks of Europe)
- ADL (DoD Advanced Distributed Learning)
- IMS Global Learning Consortium
- AICC (Aviation Industry CBT Committee)
- GESTALT (Getting Educational Systems Talking Across Leading-edge Technologies)
- GEN Project (Gateway to Education Materials)

#### -ISO/TC211 Geographic Information / Geomatics

- IHB (International Hydrographic Bureau)
- DGIWG (Digital Geographic Information Working Group)
- ICA (International Cartographic Association)
- UN Economic Commission for Europe. Statistical Division
- FIG (International Federation of Surveyors)
- EPSG (European Petroleum Survey Group)
- IAG (International Association of Geodesy)
- ISPRS (International Society for Photogrammetry and Remote Sensing)
- OGC (Open GIS Consortium, Incorporated)

The Permanent Committee on GIS Infrastructure for Asia and the Pacific  
CEO (European Commission, Joint Research Centre. Centre for Earth Observation)  
ISCGM (International Steering Committee for Global Mapping)  
CEOS (Committee on Earth Observation Satellites)  
CEN/TC 287 Geographic information  
FGDC (The Federal Geographic Data Committee)

**-JTC1/SC32 SQL/MM- Spatial**

**-ISO/TC204 Transport information and control systems**

**-ISO/DIS 15511: Information and Documentation—International Standard Identifier for Libraries and Related Organizations (ISIL)**

**-ISO/DIS 17933: Information and Documentation—GEDI: Generic Electronic Document Interchange**

**2. CEN Activities**

- CEN/TC278 GDF(Geographic Data Files)
- CEN/TC287 Geographic Information
- CEN/TC251/WG2 Terminology of Health Informatics
- CEN/ISSS (Information Society Standardization System), LT (Learning Technology)

**3. OMG Activities**

- OMG MOF (Meta Object Facility Specification)
- OMG EDOC (UML Profile for Enterprise Distributed Object Computing)
- OMG EAI (UML Profile for Event-based Architectures in Enterprise Application )
- OMG CWM I(Common Warehouse Metadata Interchange)
- OMG WfMC (Workflow Management Coalition)
- OMG XMI (XML Metadata Interchange)
  
- OMG PTF (Platform Technology Committee)
  - OMG PTFs
  - Analysis and Design (A&D), ORBOS
  - OMG SIGs
    - Security, Realtime, Japan, Document Management, and Internet, Product Standard Definition Sub committee
- OMG DTF (Domain Technology Committee)
  - OMG DTFs
    - Business Objects, Electronic Commerce, Finance, Healthcare, Life Sciences Research, Manufacturing, Telecom, Transportation, Utilities
  - OMG SIGs
    - Autonomous Decentralized Service Systems (ADSS), Analytical Data Management (ADM), Electronic Customer Relationship Management (ECRM), Enterprise Application Integration (EAI), Human Resources HR), Simulation, Test, PPE, QoS for XML and UML, Retail
- OMG WGs
  - Agents, C4I Roadmap, C4I Satellite Systems and Ground Station, Common Warehouse

Metamodel, Electronic Commerce, Process, Safety Critical, Security, Test, Transportation, Workflow, Business Objects and RM-ODP, Embedded Systems, Graphics & Communication Association, Knowledge Management, Realtime Java, Telecom Wireless CORBA, Life Sciences Research (Bibliographic Services, Cheminformatics, Clinical Trials, Entity Identification, Macromolecular Structure, Visualization & UI)

#### **4. W3C Activities**

- W3C XML (Extensible Markup Language)
- W3C WML (Wireless Markup Language)
- W3C CompactHTML
- W3C XHTML (The Extensible HyperText Markup Language)
- W3C HDML (Handheld Device Markup Language)
- WAP/W3C WAP Forum
- W3C XML Data
- W3C XML RDF (Resource Description Framework)
- W3C MCF (Meta Content Framework Using XML)
- W3C XML RDF Schema
- W3C SOX (Schema for Object oriented XML)
- W3C PICS (Platform for Internet Content Selection)
- W3C DSIG (PICS Signed Labels)
- W3C XML Schema
- W3C XML Query
- W3C DOM (Document Object Model)
- W3C XML Namespace
- W3C CSS (Cascading Style Sheets)
- W3C XSL (Extensible Stylesheet Language)
- W3C DCC (Document Content Description)
- W3C DDML (Document Definition Markup Language)  
(XSchema)
- W3C XLink (XML Linking Language)
- W3C XPointer (XML Pointer Language)

#### **5. Related Consortia / ORGs**

**-MDC (Metadata Coalition): Software industry consortium**

**-ebXML (UN/CEFACT and OASIS)**

ebXML Requirement, Business Process Methodology, Core Component, Transport and Packaging, Technical Architecture, Registry and Repository, Technical Coordination & Support, Marketing, Awareness and Education

-FIPA (Foundation for Intelligent Physical Agents)

#### **6. Examples of Standard / Specifications**

**-OIM (Open Information Model):**

Produced by MDC. Covering a very broad spectrum of subject areas built based on UML

OIM is a vendor-neutral and technology-independent specification of core metadata types found in

operational, data warehousing, and knowledge management environments.

**-BEM (Business Engineering Metamodel):**

Part of MDC’s OIM. Addresses process and organization design amongst other aspects.

**-MOF (Meta Object Facility Specification)**

Adopted technology by OMG for defining metadata and representing it as CORBA objects.

Metadata is itself a kind of information, and can accordingly be described by other metadata. In MOF terminology, metadata that describes metadata is called meta-metadata, and a model that consists of meta-metadata is called a metamodel.

*One kind of metamodel plays a central role in the MOF. A MOF metamodel defines the abstract syntax of the metadata in the MOF representation of a model. Since there are many kinds of metadata in a typical system, the MOF framework needs to support many different MOF metamodels. The MOF integrates these metamodels by defining a common abstract syntax for defining metamodels. This abstract syntax is called the MOF Model and is a model for metamodels; i.e. a meta-meta-model. The MOF metadata framework is typically depicted as a four layer architecture as shown below.*

Meta-level	MOF terms	Examples
M3	Meta-metamodel	The “MOF Model”
M2	Metamodel, meta-metadata	UML Metamodel, CWM Metamodel
M1	Model, metadata	UML models, CWM metadata
M0	Object, data	Modeld systems, Warehouse data

- EDOC (UML Profile for Enterprise Distributed Object Computing)
- EAI (UML Profile for Event-based Architectures in Enterprise Application )
- CWM (Common Warehouse Metadata)
- WfMC (Workflow Management Coalition)
- XMI (XML Metadata Interchange)
- OSF (Organizational Structure Facility)
- PDM (Product Data Management Enablers):
- PMF (Part Management Facility):
- PIDS (Person Identification Service):
- SPE (Software Process Engineering):
  - VCard
  - BizTalk
  - EDI
  - STEP
  - OPEN/OML Metamodel
  - Data Access Metamodel

-CBOP (Consortium for Business Object Promotion)

7. Learning Technology Metamodel Example

-IEEE 1484:

-General Activities

Architecture and Reference Model, Glossary

-Learner-Related Activities

Learner Model, Task Model, Student Identifiers, User Interfaces, Quality System for Life-Long Learning, Competency Definitions

-Content-Related Activities

CBT Data Interchange, Course Sequencing, Content Packaging

-Data and Metadata

Learning Objects Metadata, Localization, Semantics and Exchange Bindings, Data Interchange Protocols, HTTP Bindings

-Management Systems and Applications

Computer Managed Instruction, Platform and Media Profiles, Tool/Agent Comm. Enterprise Interfaces

Objects

-Learning Asset (LA)

Reusable leaning resource (e.g. course, course module, test item, document, tool, etc.)

-Learning Objects Metadata (LOM)

Data that describes a Learning Asset

Is the metadata component of a Learning Object

-Learning Object (LO)

Conceptual, not a concrete object

-Learning Objects Metadata (LOM), Draft 2.5

Status: Working Draft #4, 2000-03

Summary: Search/cataloging information

Target: Draft Standard by 2000Q2

-IEEE 1484.12: Learning Object Metadata Mapping of Dublin Core Elements

DC.Identifier	General.Identifier
DC.Title	General.Title,
DC.Language	General.Language,
DC.Description	General.Description,
DC.Subject	General.Keywords and Classification.Purpose
DC.Coverage	General.Voverage
DC.Type	Educational.LearningResourceType,
DC.Date	LifeCycle.Contribute.Date
DC.Creator	LifeCycle.Contribute.Entity
DC.OtherCreator	LifeCycle.Contribute.Entity,
DC.Publisher	LifeCycle.Contribut Entity,
DC.Format	Technical.Format

DC.Rights	Rights
DC.Relation	Relation
DC.Source	Relation.Resourcece

-Content of metadata

-General Element

Identifier, Title, Catalog Entry, Language, Description, Keywords, Coverage, Structure, Aggregation Level

-Life Cycle Element

Version, Status, Create contribute (Role, Entity, Date),

-Meta-Metadata Element

Identifier, Catalog Entry, Contribute, Metadata Schema, Language

-Technical Elements

Format, Size, Location, Requirements (Type, Name, MinimumVersion, MaximumVersion), Installation Remarks, OtherPlatformRequirements, Duration

-Educational Elements

InteractivityType, LearningResourceType, InteractivityLevel, SemanticDensity, IntendedEndUserRole, Context, TypicalAgeRange, Difficulty, TypicalLearningTime, Description, Language

-Rights Management Elements

Cost, CopyrightAndOtherRestrictions, Description

-Relation Elements

Kind, Resource (Identifier, Description)

-Annotation Elements

Person, Date, Description

-Classification Elements

Purpose, TaxonPath (Source, Taxon (Identifier, Entry)),Description, Keywords

## 8. References (URLs)

ISO

<http://www.iso.ch/>

ISO/TC211

<http://www.statkart.no/isotc211/>

ISO/TC204

<http://www.sae.org/TECHCMTE/204.htm>

CEN/TC287

<http://forum.afnor.fr/afnor/WORK/AFNOR?GPN2/Z13C/indexen.htm>

DIGEST

<http://www.j2geo.ndhq.dnd.ca/digest/html/DIGEST.HTM>

OGC (OpenGIS Consortium)

<http://www.opengis.org/>

<http://www.opengis.org/techno/guide.htm>

<http://www.opengis.org/techno/specs.htm>

OII (A List of Geographic Data Exchange Standards)

<http://www2.echo.lu/oii/en/gis/html>

U.S.Gazeteer (Census Bureau)

<http://www.census.gov/cgi-bin/gazetteer>

Geographic Names Information System, United States and Territories (USGS)

<http://www-nmd.usgs.gov/www/gnis/gnisform.html>

Australian Geographic Place Names (Gazetteer)

<http://kaos.erin.gov.au/database/MAN200R.html>

FGDC

<http://www.fgdc.gov/index.html>

Executive Order 12906

<http://www.fgdc.gov/Communications/GenInfo/execord.html>

National Performance Review

<http://www.npr.gov/>

Clearing house

<http://130.11.52.178/gateways.html>

<http://ceonet.ccrs.nrcan.gc.ca/cs/en/>

GI2000

<http://www2.echo.lu/gi/en/intro/gihome.html>

EUROGI

<http://www.geog.uu.nl/eurogi/eurogi.html>

<http://www.gsi-mc.go.jp/REPORT/GIS-ISO/KMGIS/kmindex.html>

ISO/IEC Joint Technology Committee 1, Information Technology

<http://www.jtc1.org>

ANSI: American National Standards Institute

<http://www.ansi.org>

IEEE:

Institute for Electrical and Electronic Engineers

<http://www.ieee.org>

IEEE LTSC

<http://ltsc.ieee.org>

CEN Information Society Standardization System (ISSS), Learning Technology(LT) Workshop

<http://www.cenorm.be/iss/standardization/lt>

AICC: Aviation Industry CBT Committee

<http://www.aicc.org>

IMS: IMS Global Learning Consortium

<http://www.imsproject.org>

ARIADNE: Alliance of Remote Instructional Authoring and Distribution Networks of Europe

<http://ariadne.unil.ch>

PROMotion Multimedia access to Education and Training in European Society

<http://www.prometeus.org>

GESTALT: Getting Educational Systems Talking Across Leading-edge Technologies

<http://www.fdgroupp.co.uk/gestalt>

GEN Project: Gateway to Education Materials

<http://www.geminfo.org>

ADL: DoD Advanced Distributed Learning

<http://www.adlnet.org>

MetaModel.com

<http://www.metamodle.com/>

W3C

<http://www.w3.org>

OMG

<http://www.omg.org>

**Table1. Standard / Specification concerning Metadata and Metamodel**

Specification /Standard	Purpose and Subject	Object (modeling constructs)	Viewpoint	Metadata	Metamodel
11179-3 rev	Managing Data Element: Identification, Classification and Registry	Model Element: Data Element Concept, Data Element, Conceptual Domain, Value Domain Data Element Derivation, Derivation Rule, Data Element Example Value Meaning, Value, Permissible Value, Enumerated Domain, Non-enumerated Domain Registration Authority, Registrar Administered Component, Organization, Submission, Stewardship, Reference Document, Person Context, Definition ( of Administered Component), Designation ( of Administered Component), Registration Authority Identifier, Component Identifier, Language Identifier Classification Scheme, Classification Scheme Item, Classification Scheme Item Relationship Data Element Concept Relationship, Object Class, Property, Concept Relationship Value Domain Relationship, Datatype Dimensionality, Unit of Measure, Unit Conversion Rule Representation Class	Data exchange Metadata registry Metadata exchange	Objects	Metadata defined using UML

BSR	<p>Basic Semantic Register: An official ISO register of data for use by designers, implementers and users of information systems in a manner which will allow systems development to move from a closed to an open multilingual environment, especially for use in domestic and international electronic communication including electronic commerce and EDI</p>	<p>Semantic Components: (Delivery, Actual, Latest, Person, Purchase Order, BillOf Material, Date, Name, Identifier, etc.) Semantic Unit: (Goods Delivery, Latest. Date, Sales.Information.Contact. Telephone.Number, Product.BillOfMaterial.Reference.Identifier, etc.) Bridges: (The links between a Semantic Unit and its equivalence in various directories)</p>	<p>Cost Reduction Business Efficiency Multilingual Communication</p>	<p>Objects and 11179's Objects</p>	<p>Not-specified formally</p>
<p>RM-ODP (Enterprise Language)</p>	<p>Reference Model: Providing a co-ordinating framework for the standardization of open distributed processing (ODP) Providing a language (concepts, structures, and rules) for developing, representing, and reasoning about a specification of an ODP system from the enterprise viewpoint. Providing rules which establish correspondences between the enterprise language and the other viewpoint languages to ensure the overall consistency of a specification</p>	<p>Concepts: -General concepts -Behaviour concepts -Policy concepts -Delegation concepts -Force concepts  Structuring rules: -Overall structure of an enterprise specification -Scoping statement -Community rules -Common community types -Lifecycle of a community -Objective rules -Behaviour rules -Policy rules -Enterprise object rules -Force rules</p>	<p>Enterprise specification</p>	<p>objects</p>	<p>Using BNF notation</p>

UML	Modeling Language: Specifying, visualizing, constructing, and documenting the artifacts of software systems as well as for business modeling and other non-software systems.	Model Elements: Static Structure Diagrams Use Case Diagram Sequence Diagrams Collaboration Diagrams Statechart Diagrams Activity Diagrams Implementation Diagrams	Foundation, Behavioral_Elements and Model_Management	Objects	Semantic Model defined recursively, using UML. MOF defines the meta-metamodel of UML
MOF	Meta Object Facility: An extensible framework for defining models for metadata and representing its as CORBA objects to store and access metadata in a repository.	Class Object Data Attribute Association Method Model Generalization	Meta-level layers (M0, M1,M2,M3) Metadata Metamodel Meta-metadata Meta-metamodel	Objects for each Meta-level	The “MOF Model” is the MOF’s built-in meta-metamodel.
EDOC	UML profile: For Enterprise Distributed Object Computing	Model Element: -Community &Roles Package -Business Process Package -Business Object Package -Business Event Package -Component Package -Collaboration Package	Enterprise Computational Information Engineering (RM-ODP Viewpoint) UML profile Mapping	Objects	Using UML that is MOF-equivalent meta-metamodel
EAI	UML profile: For Event-based Architectures in Enterprise Application Integration.	Model Element: -Business Event -Message -Message Broker -Message oriented middleware (MOM)	Event-Based	Objects	Using UML that is MOF-equivalent meta-metamodel

CWM	Common Warehouse Metamodel: Defining Metamodel for interchange of warehouse metadata.	Model Element: -Foundation Package (Business Information, Data Types, Expressions, Keys and Indexes, Software Deployment, Type Mapping) -Resource Package (Relational, Record, Multidimensional, XML) -Analysis package (Transformation, OLAP, Data Mining, Information Visualization, Business Nomenclature) -Management Package (Warehouse Process, Warehouse Operation)	Data resources Data analysis Warehouse management	Objects	Using UML that is MOF-equivalent meta-metamodel
WfMC	Workflow Process Metamodel:				Using UML that is MOF-equivalent meta-metamodel
XML	eXtensible Markup Language: An open architecture metadata capability for integration of structured data in relational databases with data in legacy systems and files	Document Type Element: Tag Data Attribute List Attribute	Tagged Data	Document Type Definitions	Semantics Model of DTD

XMI	XML metadata Interchange: Allows metadata to be interchanged as streams or files with a standard format based on XML.	UML Model Elements XML Document Type Definition	Mapping from UML to XML DTD	Objects	Using XML DTD Semantic Model
RDF	Resource Description Framework:				
MCF	Meta Content Framework Using XML				
SOX	Schema for Object oriented XML				
XML-Schema					
MDIS	MDS's Interchange Specification: Those that pertain to the semantics and syntax used to represent the metadata to be exchanged. Those that pertain to some framework in which the specification will be used.	Model Element: Header Definition of common properties Database Subschema Record Element Relationship Dimension Level	The Metamodel The mechanism for extending the metamodel The Interchange Specification Access Framework	Objects	Using Formal Language

MDC-OIM	<p>Open Information Metadata specifications: Facilitates sharing and reuse between tools and systems in a platform independent manner.</p>	<p>UML Model Element: Component Description and Specification Database and Warehousing Business Engineering Knowledge Management (Table, Column, Business Process, Business Object, Dictionary, Term, Synonym)</p>	<p>Technology-independent MDC core model XML encoding</p>	<p>Objects (Customer Table, Order Entry, Process, Expense Report, Business Object)</p>	<p>Using XML DTD Semantic Model</p>
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BEM	<p>Business Engineering Metamodel: Part of MDC's OIM.</p> <p>Addresses process and organization design amongst other aspects.</p> <p>A business is defined as a set of cooperative activities that are performed by the interaction of people and machines.</p> <p>Documenting the structure and processes of a business in a formal and accurate way is necessary not only to re-engineer them but also to automate or semi-automate them by computers.</p>	<p>Model Element:</p> <p>Business Goals</p> <ul style="list-style-type: none"> <li>-Goal</li> <li>-Goal Impact</li> <li>-Measure Expression</li> <li>-Measure Expression Dependency</li> <li>-Mission</li> <li>-Objective</li> <li>-Vision</li> </ul> <p>Organizational Elements</p> <ul style="list-style-type: none"> <li>-Authority</li> <li>-Business Unit</li> <li>-Industry</li> <li>-Information Resource</li> <li>-Organizational Role</li> <li>-Person</li> <li>-Physical Resource</li> <li>-Policy</li> <li>-Resource</li> <li>-Resource Role</li> <li>-Skill</li> </ul> <p>Business Rules</p> <ul style="list-style-type: none"> <li>-Action Rule</li> <li>-Business Rambling</li> <li>-Business Rule</li> <li>-Business Rule Set</li> <li>-Fact Rule</li> <li>-Inference Rule</li> <li>-Resource Rule Role</li> </ul>	<p>Goal and Objective</p> <p>Organizational Business Rule</p>	Objects	Using UML
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PDM	<p>Adopted specification by OMG's Manufacturing Domain Task Force.</p> <p>Provides a set of core capabilities on which other manufacturing vertical solutions can be built, including a shared concept of organizational role and responsibility.</p>				
OSF	Organizational Structure Facility				
PMF	<p>Adopted specification by OMG's Finance Domain Task Force. Provides sophisticated modeling of the parties involved in an agreement (in the broadest sense) and the role adopted by each.</p>				

PIDS	OMG adopted specification (with a proposed revision under adoption voting), under the CORBAmed Domain Task Force. Focuses on identifying people (patients) within and across different systems based on matching personal traits.				
SPE	Software Process Engineering: Covers how software development is organized and representation of the formal processes deployed. Covers organization, planning and responsibilities.				
VCard	Widely used format for exchanging personal and contact information (most email and office contact management systems accept it).				

ebXML (Technical Architecture)	Business Process Metamodel: Create a single global electronic market that enables organizations to find each other and conduct business together through the exchange of information in the form of XML based business documents.	Market Party Role Community Business Object Business Process Economic Resource Business Event Business Transaction	Market Business Process Information exchange Business Document	Objects	Using UML
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<p>ebXML (Requirements)</p>	<p>Requirements specification: Providing clearly articulated requirements from representatives of international business and accredited standards organizations to assist the ebXML project team members in developing their deliverables in a consistent manner.</p>	<p>Business Requirements: -General Business Requirements -Conducting Electronic Business using ebXML -Globalization -Accessibility -Usability/Interoperability -Security -Legal -Digital Signatures -Management</p> <p>Technical Framework Requirements: -General Requirements -Requirement -Business Process -Technical Architecture -Core Components -Transpot/Routing &amp; Packaging -Registry and Repository -Technical Coordination &amp; Support -Marketing, Awareness &amp; Education</p> <p>Org. &amp;Procedural Requirements</p>	<p>Scope Project teams Project team Requirement</p>	<p>none</p>	<p>none</p>
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IEEE 1484 (LTSC)	Learning Technology Metamodel: Search/cataloging learning technology information	Learning Asset (LA) Learning Objects Metadata (LOM) -General Element: -Life Cycle Element -Meta-Metadata Element -Technical Elements -Educational Elements -Rights Management Elements -Relation Elements -Annotation Elements -Classification Elements Learning Object (LO)	Reusable leaning resource Component Localization Semantics & Exchange Bindings Data Interchange Protocols HTTP Bindings	Objects (Dublin Core Elements)	Not specified
FGDC (GIS)	Content Standard for Digital Geospatial Metadata	Information Element: Identification Data Quality Spatial Data Organization Spatial Reference Entity and Attribute Distribution Metadata Reference	Data exchange Data management Data Quality	Objects	Not-specified

