

Object Management Group

First Needham Place
250 First Avenue, Suite 100
Needham, MA 02494

Telephone: +1-781-444-0404
Facsimile: +1-781-444-0320

Request for Proposal XMI Profile for ISO 20022

This version without boilerplate text: OMG Document finance/2005-11-02
Official version with boilerplate text: OMG Document dtc/2005-09-14

Letters of Intent due: February 20, 2006
Submissions due: April 3, 2006

Objective of this RFP

This RFP defines the concept of an *XMI Profile* as a set of values of some or all of XMI's 21 mapping parameters, and calls for an XMI Profile that produces XMI mapping behavior that aligns as closely as possible to ISO 20022's UML-XML mapping.

ISO 20022 defines rules for generating an XML schema from a UML class model, and is being used by banking industry standards organizations to define XML messages for electronic payments.

XMI, although technically a MOF-XML mapping, can also be used—and is often used—to generate an XML schema from a UML class model. Furthermore, XMI is configurable, in that it specifies 21 configuration parameters that determine how the mapping should be executed.

For further details see Chapter 6 of this document.

6.0 Specific Requirements on Proposals

6.1 Problem Statement

6.1.1 XMI and Other Model-Driven XML Standards Are Not Aligned

XMI is not the only standard for model-driven XML technology¹ in the software industry. ISO 20022 is another such standard. XMI and ISO 20022 cover basically the same space, but are not aligned. This RFP seeks to address the lack of alignment between these two technologies.

6.1.2 Background Information

6.1.2.1 ISO 20022 and the Electronic Payments Domain

The ISO 20022 standard, named the *UNiversal Financial Industry message scheme* (UNIFI)², was created by TC68, ISO's technical committee for financial services. SWIFT, the organization that manages standards networks used globally for cross border electronic communication among financial institutions, has been a major driver of this new standard.

ISO 20022 defines a UML-based methodology for modeling business transactions, message flows, and messages, and defines a set of rules for deriving XML schemas from the UML models.

SWIFT is also active, along with most of the world's largest banks, in the *International Standards Team (IST) Harmonization Group*³, which is using ISO 20022's UML modeling approach and UML-to-XML mapping rules to produce XML schemas for next generation electronic payment systems. The banks active in this group include ABN AMRO, Bank of America, Citibank, Deutsche Bank, HSBC, JPMorgan Chase, Nordea, Standard Chartered, and Wells Fargo. Standards organizations active in the finance industry that are collaborating in the IST Harmonization Group in addition to SWIFT include IFX, OAGi, and TWIST.

While technically ISO 20022 is agnostic as to business domain and could thus be applied to generating XML for any vertical market, in practice it is primarily used in the banking and electronic payments industries.

¹ We use the term *model-driven XML technology* to describe technology capable of generating XML automatically from other kinds of models, such as UML or MOF models.

² [ISO 20022]

³ [ISTH]

6.1.2.2 *XMI as a UML-XML Mapping*

Technically, XMI is a mapping of MOF to XML. It tells you how to take a model expressed in the MOF language and derive an XML schema or DTD from the model. The schema or DTD becomes a format for encoding instances of the model.

The MOF language is more or less a subset of UML, used for defining metamodels, and MOF metamodels are similar to UML class models. Pragmatically speaking, therefore, the XMI rules can be applied to derive an XML schema from a UML class model, as long as the UML class model does not use a few class modeling constructs that MOF does not support.

6.1.2.3 *XMI is a Parameterized Mapping*

Early versions of XMI offered a one-size-fits all mapping. The rules were inflexible. Consider, for example, the two basic ways to map a class attribute to XML. One way is to map the containing class (i.e. the class that contains the attribute) to an XML element, and map the class attribute to an XML attribute of the XML element. The other way maps the class to an XML element in the same fashion, but maps the class attribute to another XML element that is nested within the XML element that corresponds to the class. There are pros and cons for each approach. The point is that forcing everyone to adopt one and only of these approaches in all cases proved too inflexible to be sold to industry. Other examples abound.

As a result, XMI 2.0 is a parameterized mapping. There are a host of options, each of which has as default that an XML engineer can override. Table 1 and Table 2 are reproduced from the XMI 2.0 specification;¹ they list all of the parameters and their defaults. The specification also contains detailed explanations of each of the parameters. XMI 2.1 has the same parameters.

¹Table 1 and Table 2 reprinted from [XMI 2.0]. Object Management, Inc. (C) OMG. 2003.

Table 1: XMI Mapping Parameters, Part 1

Tag Name	Value Type	Default value	Description
Naming tags			
xmiName	string	nil	Provides an alternate name from the MOF name for writing to XML. Useful in cases where the MOF name has characters that conflict with XML. This value is used rather than the MOF name.
idName	string	xmi:id	The value is the name of the id attribute.
nsURI	string	nil	The namespace URI of the MOF package.
nsPrefix	string	nil	The namespace prefix of the MOF package; this is used in schemas. (Any legal XML prefix may be used in documents.)
XML Syntax tags			
serialize	boolean	true	If false, suppresses serialization of the MOF construct. Typically applied to derived features.
attribute	boolean	false	If true, serializes the MOF construct as an XML attribute.
element	boolean	false	If true, serializes the MOF construct as an XML element.
remoteOnly	boolean	false	If set on one end of a bidirectional relationship, only serializes that end if it is remote.
href	boolean	false	If true, use the href attribute rather than the idref attribute for links within a document.
Ordering			
superClassFirst	boolean	false	If true, serialize the super class content first.
ordered	boolean	false	If true, serialize object content in the order it is defined in a MOF metamodel.

Table 2: XMI Mapping Parameters, Part 2

Tag Name	Value Type	Default value	Description
Content			
includeNils	boolean	false	If false, do not serialize nil values.
XML Schema Production			
enforceMaximumMultiplicity	boolean	false	If true, enforce maximum multiplicities; otherwise, they are "unbounded."
enforceMinimumMultiplicity	boolean	false	If true, enforce minimum multiplicities; otherwise, they are "0."
useSchemaExtensions	boolean	false	If true, use schema extensions to represent inheritance in the MOF metamodel.
schemaType	string	nil	The name of a datatype defined in the XML Schema Datatype specification.
contentType	string	empty	Defines the schema content type. Other valid values are: complex, any, mixed, complex, and simple.
processContents	string	strict	If the contentType is any, this tag is used to specify the value of the processContents attribute of the any element. Other valid values are: lax, skip.
form	string	nil	Specifies the value of the form attribute for attributes. Other valid values are qualified and unqualified.
defaultValue	string	nil	Specifies the default value for attributes.
fixedValue	string	nil	Specifies the fixed value for attributes.

6.1.2.4 Definition of XMI Profile

This RFP defines the concept of an *XMI Profile* as a set of values for some or all of XMI's 21 mapping parameters.

(Note that the parameters are MOF Tags, whose values actually are all of type String. The distinction between boolean and string parameters is purely conceptual.)

6.1.2.5 SWIFT and XMI Parameterization

The consultations within industry that led to the parameterization of new versions of XMI included SWIFT as a major protagonist. Many of the parameters in XMI stem from discussions with SWIFT in the context of ebXML standards work in the early days of ebXML.

SWIFT has agreed to provide assistance in analyzing how best to profile XMI for alignment with ISO 20022.

6.2 Scope of Proposals Sought

This RFP calls for specification of an XMI Profile for ISO 20022. It defines the notion of an XMI Profile as a set of values of the XMI mapping parameters. An

XMI Profile for ISO 20022 would codify a set of values of the XMI mapping parameters that produces XMI mapping behavior that aligns as closely as possible to ISO 20022's UML-XML mapping rules.

If the profile does not produce one hundred percent alignment with ISO 20022, it would still be useful. It would make it easier to construct transformations between XMI-compatible XML and ISO 20002 compatible XML via techniques such as the application of style sheets. The RFP has an optional requirement for the specification of transformations that bridge any such gap. The transformations could be specified as XSLT style sheets, via MOF QVT, or via some other means.

The RFP also has an optional requirement for defining new XMI mapping parameters that enable the profile to align more closely with ISO 20022 and that have general value beyond the specific case of ISO 20022 alignment.

6.3 Relationship to Existing OMG Specifications

- UML 1.4.1—ISO 20022 is a UML-XML mapping
- MOF 1.4—XMI 2.0 is a MOF-XML mapping
- XMI 2.0—XMI 2.0 is the version of XMI for which the profile should be defined because ISO 20022 is based on UML 1.x and XMI 2.0 is based on MOF 1.x, whereas XMI 2.1 is based on MOF 2.0.
- XMI 2.1—XMI 2.1 is relevant because new XMI mapping parameters that proposals may define (in accordance with optional requirement 6.6.3) must be compatible with XMI 2.1.

6.4 Related Activities, Documents and Standards (explain these further)

- MOF 2.0 Query, View, Transformations (QVT)—Still a work in progress as of the writing of the RFP
- ISO 20022¹--A standard used in the finance industry which, among other things, defines a way to transform UML class models into XML schemas. The standard is under the jurisdiction of ISO TC 68 (Financial Services).
- IFX Forum—International Financial eXchange Forum, a financial standards organization that is a member of the IST Harmonization Group.²

¹ [ISO 20022]

² [IFX]

- SWIFT—A banking standards organization that also runs a network for transactions involving banks and that is a member of the IST Harmonization Group.
- IST Harmonization—A consortium of IFX, SWIFT, TWIST, and OAGi that used ISO 20022 to define the next generation of electronic payment messages.¹
- OAGi—The Open Applications Group, a standards group for business software interoperability, which is a member of the IST Harmonization Group.²
- TWIST—Transaction Workflow Innovation Standards Team , a standards organization that specifies XML-based standards for financial markets, and which is a member of the IST Harmonization Group³

6.5 Mandatory Requirements

6.5.1 Define an XMI Profile

Proposals shall define an XMI Profile that, when applied, produces XMI mapping behavior that aligns as closely as possible with ISO 20022's UML-XML mapping. The Profile shall be based on XMI 2.0.

(See section 6.1.2.4 for the definition of the concept of an XMI Profile).

6.5.2 Packaging of MOF Tags

Proposals shall specify a mechanism for packaging a set of instances of the XMI mapping parameters as a set of instances of MOF tags.

(See section 6.1.2.3 for an explanation of XMI mapping parameters.)

6.6 Optional Requirements

6.6.1 Transformation: ISO 20022 → XMI Profile for ISO 20022

Proposals may define a transformation that converts ISO 20022 conformant XML documents into XMI documents that conform to the XMI Profile for ISO 20022.

¹ [ISTH]

² [OAGi]

³ [TWIST]

6.6.2 Transformation: XMI Profile for ISO 20022 → ISO 20022

Proposals may define a transformation that converts XML documents that conform to the XML Profile for ISO 20022 into XML documents that conform to ISO 20022.

(See 6.2 for the motivation for the above two optional requirements).

6.6.3 New XMI Mapping Parameters

Proposals may define new XMI mapping parameters, where they can be justified as having substantial additional value beyond the definition of this profile. Proposals shall ensure that any new mapping parameters work with XMI 2.1, and that the defaults for the parameters ensure backward compatibility with the current versions of XMI 2.0 and XMI 2.1.

6.7 Issues to be discussed

6.7.1 Rationale for Each Value

Proposals shall explain the rationale for each value of an XMI parameter that the profile specifies.

6.7.2 Documentation of Any Gap Between the Profile and ISO 20022

Proposals for a profile that achieves less than 100% alignment with ISO 20022's mapping rules shall document the remaining gap. Proposals shall use concrete examples with financially-oriented UML models in order to compare the results of applying ISO 20022's mapping rules to the results of applying the XMI Profile.

6.7.3 Choice of Transformation Technology

Proposals that satisfy any of the optional requirements shall explain the rationale for the choice of transformation specification technology. For example, a proposal that specifies transformations via XSLT should explain the rationale for using XSLT.

6.7.4 Approach to Bridging Differences Between UML and MOF

Since XMI is technically a MOF-XML mapping, and ISO 20022 is a UML-XML mapping, proposals shall explain how they manage the differences.

6.8 Evaluation Criteria

The primary evaluation criterion is how close the proposed set of parameter values aligns with ISO 20022. Optional transformations to bridge any remaining gap will be evaluated for accuracy and efficiency. Optional new XMI parameters will be evaluated as to how necessary they are and how great the potential is for them to disrupt XMI tools.

6.9 Other information unique to this RFP

6.10 RFP Timetable

The timetable for this RFP is given below. Note that the TF or its parent TC may, in certain circumstances, extend deadlines while the RFP is running, or may elect to have more than one Revised Submission step. The latest timetable can always be found at the *OMG Work In Progress* page at <http://www.omg.org/schedules/> under the item identified by the name of this RFP. Note that “<month>” and “<approximate month>” is the name of the month spelled out; e.g., January.

Event or Activity	Actual Date
<i>Preparation of RFP by TF</i>	<i>June 21, 2005</i>
<i>RFP placed on OMG document server</i>	<i>August 22, 2005</i>
<i>Approval of RFP by Architecture Board</i>	
<i>Review by TC</i>	
<i>TC votes to issue RFP</i>	<i>September 16, 2005</i>
<i>LOI to submit to RFP due</i>	<i>February 20, 2006</i>
<i>Initial Submissions due and placed on OMG document server (“Three week rule”)</i>	<i>April 3, 2006</i>
<i>Voter registration closes</i>	<i>May 1, 2006</i>
<i>Initial Submission presentations</i>	<i>April 25, 2006</i>
<i>Preliminary evaluation by TF</i>	<i>June 1, 2006</i>
<i>Revised Submissions due and placed on OMG document server (“Three week rule”)</i>	<i>June 5, 2006</i>
<i>Revised Submission presentations</i>	<i>June 27, 2006</i>
<i>Final evaluation and selection by TF</i> <i>Recommendation to AB and TC</i>	<i>September 26, 2006</i>

<i>Approval by Architecture Board</i> <i>Review by TC</i>	<i>September 28, 2006</i>
<i>TC votes to recommend specification</i>	<i>September 29, 2006</i>
<i>BoD votes to adopt specification</i>	<i>December 6, 2006</i>

Appendix A References and Glossary Specific to this RFP

A.1 References Specific to this RFP

[IFX] *Interactive Financial eXchange Forum*, <http://www.ifxforum.org>

[ISO 20022] *ISO 20022 UNiversal Financial Industry message scheme*,
<http://www.iso20022.org>

[ISTH] *IST Harmonization World Wide Payment Harmonization Project: Backgrounder*,
<http://www.openapplications.org/wg/PaymentHarmonization/200311107-Gartner/Background.htm>

[OAGi] *The Open Applications Group*, <http://www.openapplications.org>

[SWIFT] *SWIFT*, www.swift.com

[TWIST] *Transaction Workflow Innovation Standards Team*,
<http://www.twiststandards.org>

[XMI 2.0] *XMI 2.0 Specification*, OMG Document formal/03-05-02, May 2003

[XMI 2.1] *XMI 2.1 Specification*, OMG Document ptc/04-06-07, June 2004

A.2 Glossary Specific to this RFP

XMI Mapping Parameter: One of the parameters specified in XMI 2.0 and

XMI Profile: A set of values of some or all of the XMI mapping parameters