

## INTRODUCTION

This paper documents the current state of the UML 2.0 initiative, as of November 2004.

### WHAT IS UML 2.0?

UML 2.0 is actually four Requests for Proposal (RfP). Here's a list (OMG document numbers in parens):

- Infrastructure(ad/2000-09-01)- This RfP solicits proposals to restructure the architecture of the UML language to improve architectural alignment with other OMG modeling standards, and to provide first class extension mechanisms
- OCL(ad/2000-09-03) - This RfP solicits proposals for defining an OCL metamodel consistent with the UML metamodel.
- Diagram Interchange(ad/2000-09-04) – This RfP seeks proposals to add sufficient detail of graphical and diagram information necessary to represent and interchange the diagrammatic aspects UML models in an interoperable manner.
- Superstructure(ad/2000-09-02) -This RfP solicits proposals to extend the UML models and diagrams themselves. Specific requirements were:
  - Enable the modeling of structural patterns, such as component-based development and the specification of run-time architectures.
  - Clarify the semantics of the generalization, dependency, and association relationships.
  - Support encapsulation and scalability in behavioral modeling, in particular, for state machines and interactions.
  - Remove restrictions on activity graph modeling due to the mapping to state machines.

### OBJECT CONSTRAINT LANGUAGE (OCL)

OCL has been the least contentious of the 4 submissions. OCL now has a metamodel expressed in MOF, rather than a grammar, a semantics expressed also using MOF, and it has been evolved to keep it consistent with MOF 2.0 and UML 2.0.

### DIAGRAM INTERCHANGE

This submission proposes a model for diagram interchange based on general graph theory; the model contains classes like Diagram, Node and Edge. However, it does not define a metamodel for UML diagrams, as was arguably initially intended and in fact was proposed by some of the initial submitters. A diagram metamodel is necessary for any truly interoperable UML diagram interchange to operate. Recognising this, the ADTF is drafting a new RfP for Concrete Syntax; however this initiative lacks a sponsor and so is currently stalled. The current standard is very useful however to support general model browsers and we should expect some to emerge soon.

### INFRASTRUCTURE

Much of the effort on infrastructure has gone on harmonising the infrastructure metamodel with MOF 2.0, which was one of the requirements of the RfP. It is reused in the Superstructure via the Kernel package, upon which all other packages depend.

## SUPERSTRUCTURE

The superstructure submission proposes a number of changes to UML, including:

- Moving activity diagrams to a different, more data-flow-based semantics
- Making state-machine more reusable
- Providing support for peer-to-peer component connection (capsules and ports)
- Providing more direct support for whole-part relationships
- Redesigning collaborations and particularly sequence diagrams along Message Sequence Chart lines

### WHEN WILL UML 2.0 HAPPEN?

The UML 2.0 RfPs were issued in September 2000 with a fairly conservative timetable; however, such has been the magnitude of the task that the timetable has slipped markedly. Here's the schedule as it has turned out:

RFP	INITIAL SUBMISSION	1 <sup>ST</sup> REVISED SUBMISSION	2 <sup>ND</sup> REVISED SUBMISSION	3 <sup>RD</sup> REVISED SUBMISSION	ADOPTION
OCL	August 2001	June 2002	January 2003	No	March 2003
Diagram Interchange	October 2001	September 2002	January 2003	No	March 2003
Infrastructure	August 2001	June 2002	September 2002	January 2003	March 2003
Superstructure	October 2001	September 2002	January 2003	April 2003	June 2003

This isn't the end of the process because the specs then have to be made ready for publication. Each specification becomes the responsibility of a Finalisation Task Force (FTF), which is supposed to take up to a year after the date of adoption to provide a publicly available specification, dealing with any comments made against the adopted specification. The Infrastructure FTF has been merged with the MOF FTF because the specifications are so tightly aligned. The initial timetable for all four FTF's is listed below:

FTF	DRAFT ADOPTED SPEC	FINAL ADOPTED SPEC	COMMENTS DUE	INTERIM REPORT	FINAL REPORT
OCL	August 15 <sup>th</sup> 2003	October 15 <sup>th</sup> 2003	November 15 <sup>th</sup> 2003	No	April 30 <sup>th</sup> 2004
Diagram Interchange	July 1 <sup>st</sup> 2003	August 15 <sup>th</sup> 2003	September 8 <sup>th</sup> 2003	January 15 <sup>th</sup> 2004	April 30 <sup>th</sup> 2004
Infrastructure and MOF	July 1 <sup>st</sup> 2003	August 1 <sup>st</sup> 2003	November 7 <sup>th</sup> 2003	January 15 <sup>th</sup> 2004	April 30 <sup>th</sup> 2004
Superstructure	July 1 <sup>st</sup> 2003	August 1 <sup>st</sup> 2003	November 7 <sup>th</sup> 2003	January 15 <sup>th</sup> 2004	April 30 <sup>th</sup> 2004

However, principally due to the number of issues in Superstructure and Infrastructure (over 800 issues were raised against superstructure and to date an impressive 600 have been dealt with in some way) the FTF's were initially rechartered to end on September 30<sup>th</sup> 2004. Since then we have seen more delays, some more serious than others, with the current picture looking like this:

- OCL – April 22<sup>nd</sup>, 2005
- Diagram Interchange – April 22<sup>nd</sup>, 2005
- Infrastructure and MOF – January 10<sup>th</sup>, 2005
- Superstructure – November 12<sup>th</sup>, 2004

So the good news is that Superstructure, the most important of the technologies for end users, is essentially done bar approval by the OMG's board of directors.

#### ARTISAN'S INVOLVEMENT

ARTiSAN supported the Unambiguous UML (2U) consortium's infrastructure and superstructure submissions, particularly the template-based approach to building models, which we've now embodied in the ARTiSAN Pattern Wizard, due out shortly. However, in the interests of hastening the arrival of UML 2.0, 2U agreed to withdraw their submissions and merge with the UML 2 Partners (U2P) and it is only their infrastructure and superstructure submissions that now remain. ARTiSAN is now a supporter of U2P.

#### WHAT NEXT?

##### UML CONCRETE SYNTAX

This RfP is currently in draft form and it was hoped to publish at the June 2003 meeting of the OMG in Paris; it asks for a mechanism to define the syntax of diagrams and for a definition of the UML 2.0 diagram-set in that language. It is urgently needed to plug the gap between Superstructure, which defines diagrams informally and by example, and Diagram Interchange, which defines a general (i.e. not UML-specific) metamodel for diagrams; however the original sponsor of this RfP is no longer active within the OMG and it still languishes in its draft form.

##### UML FOR SYSTEMS ENGINEERING

This RfP (ad/03-03-41) was published in March and solicits proposals for customising UML for use in Systems Engineering. The RfP is very detailed – here's the introduction:

“This Request for Proposal solicits submissions that specify a customization of UML™ for Systems Engineering (SE). The customization of UML for systems engineering is intended to support modeling of a broad range of systems, which may include hardware, software, data, personnel, procedures, and facilities.

- The customization of UML for SE should support the analysis, specification, design, and verification of complex systems by:
- Capturing the systems information in a precise and efficient manner that enables it to be integrated and reused in a wider context
- Analyzing and evaluating the system being specified, to identify and resolve system requirements and design issues, and to support trade-offs
- Communicating systems information correctly and consistently among various stakeholders and participants”

ARTiSAN is a co-submitter against this RfP with the SysML consortium. The original timetable was aggressive:

RFP	LOI	INITIAL SUBMISSION	REVISED SUBMISSION	ADOPTION
March 2003	September 2003	November 2003	March 2004	June 2004

However, the consortium is always monitoring progress and intends to deliver a high quality, consistent specification, and so have decided to delay the project allow further revised submissions as necessary:

- Revised Submission Date – August 2004
- Second Revised Submission – November 2004.
- Third Revised Submission and potential adoption – February 2005.

#### EXECUTABLE UML

Currently in RfP drafting phase, this initiative aims to provide an executable semantics for a subset of UML 2.0, based on a virtual machine. The RfP should be issued in February 2005.

### GLOSSARY

#### ADTF

Analysis and Design Task Force – the entity within the OMG that oversees the development of modelling technologies including MOF and UML and their various profiles.

#### RFP

Request for Proposal – an invitation to OMG member organisations to propose either new technologies, or extensions to existing technologies.

#### LOI

Letter of Intent – an indication that an OMG member organisation intends to submit against a given RfP.

## MOF

Meta-Object Facility – The modelling language in which all other OMG modelling languages is defined, plus associated facilities such as XMI.

## UML

Unified Modelling Language – The OMG's official language for describing the design of software systems.

## MDA

Model-driven Architecture – The use of models to drive all aspects of system and software architecture

## OMG

Object Management Group – A not-for-profit organisation which through its members standardises existing technology in the area of MDA.

## XMI

XML-based Model Interchange – A mechanism for exchanging model data using XML; the allowable information is defined as an XML schema based on the metamodel of the model being exchanged.