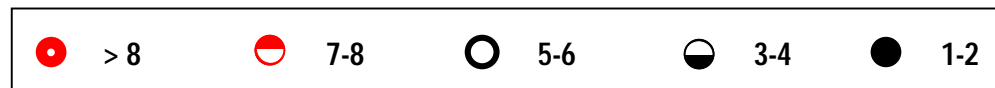


UML 2.0 RFI Response Overview

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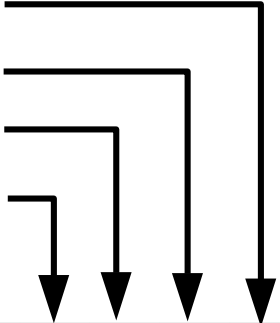
- Input to a possible UML 2.0 RFP comes from
 - RTF roadmap
 - RFI responses
 - » Verification of roadmap
 - » Identification of additional issues
- **23 responses to RFI**
 - 6 vendor, 6 user, 4 academic, 4 consultant, 2 organization
 - » Several consortia (3 vendor, 3 user)
 - Received many enhancement suggestions, but also warnings that the language is already too large and complex



Legend (responses)

-
- **Process to identify input**
 - Collate responses to questionnaires
 - Relate issues identified by responses to roadmap items
 - Group new issues identified into themes
 - Begun to review and consolidate in working group meeting
 - **Agenda**
 - Summarize responses to questionnaire
 - Submitters' presentations
 - Present consolidation of responses
 - Suggest updated roadmap and next steps

- 4.1.5. What parts of the language should be removed?
 4.1.4. What parts of the language need clarification?
 4.1.3. What constructs in the language are least used?
 4.1.2. What constructs in the language are most used?



Class diagrams	●			
Sequence diagrams	◐			
Use cases	◐			
State charts	○		●	
Stereotypes and tagged values	●			
Package	●			
Implementation diagrams	◐	◐		
Collaboration diagrams	◐	◐	◐	
Activity diagrams		●	●	
Model management (except package)		●	●	
Component		●	◐	
Pattern		●		
Class, type, interface, classifier role, component		●	●	
Whole-part relationships			◐	
UML Standard Profiles				◐
Notes in semantics section				●
Standard elements without abstract semantics				●

4.1.6. What are the most difficult issues facing UML modelers and implementers?

- Specification is vague, ambiguous, hard to understand
- Modeling of large, complex systems
- System modeling
- Complexity
- Mapping to implementation
- Representing agents
- Not MOF compliant
- Requirements modeling
- Mixed levels of abstraction
- Representing interactions
- Cannot construct diagrams from model
- How to use whole-part relationships
- Default bidirectionality in associations
- Inflexible (need building blocks to define specification languages)

4.1.8 Are you using UML for any applications outside its original scope?

- Requirements modeling
- Agent-based applications
 - Spatio-temporal modeling
 - Emergence of structure/relationships
 - Creation/clone/mitosis/reproduction
 - Mobility
- System engineering
 - Time-continuous phenomena
 - Units, precision, probability distribution over data
- Modeling of time-continuous behavior
- Support exchange, sharing, and archiving of data
- Persistency modeling
- Relational data modeling

4.2 Need for a major revision RFP

4.2.1 Why is a major revision required within the next 2 years?

- Need precise semantics
- Too large and complex
- Prevent babelization (some concepts are missing)
- Ensure relevance to business modeling

4.2.2 Should more than one RFP be issued?

- Single RFP for core, multiple RFPs for profiles
- RFPs grouped in themes
- Use multiple RFP to accelerate schedule

4.2.3 What schedules do you propose for submitting responses?

- Submissions end of 2000
- Submissions mid 2001

4.2.4 Should the extension mechanisms be improved before the next major revision?

- Complete work in profile group for 1.4
- If RFP is not issued in 2000

4.3 Recommendations for a major revision

4.3.3 Should the UML Semantics and Notation be maintained as separate specification documents?

- Separate documents for Abstract syntax/Notation/Profiles**
- Integrate Semantics and Notation**

Presentation of RFI Responses

- **Interchange of models**
- **Precision**
- **Family of languages**
- **Comprehensibility**
 - **Lead to restructuring of the UML metamodel**
 - » [ad/99-12-25](#)
 - » [ad/99-12-9](#)
 - » [ad/99-12-8](#)
 - » [ad/99-12-16](#)
 - » [ad/99-12-7](#)
 - » [ad/99-12-29](#)
 - » [ad/99-12-10](#)
- **Additional modeling power needed**
 - » [ad/99-12-26](#)
 - » [ad/99-12-4](#)
 - » [ad/99-12-2](#)
 - » [ad/99-12-1](#)
 - » [ad/99-12-20](#)
 - » [ad/99-12-19](#)

UML 2.0 Roadmap issues and RFI input

- Architecture
- Extensibility
- Components
- Relationships
- Behavioral modeling
- Model management
- General mechanisms
- Large, complex systems
- Early system phases
- New domains



Legend (responses)

Roadmap: Architecture

☞ Architecture

- **Extend** – Define a physical metamodel
- **Compo** – Provide guidelines on extending UML
 - Explicitly support UML as a family of languages
- **Relatio** – Improve integrity and quality of the kernel language
- **Behavio**
 - Precise language kernel
- **Model**
 - Executable language kernel
- **Genera**
 - Additional concepts layered on top of kernel
- **Large**
 - Improve structure of metamodel (MOF compliance)
 - Specify mapping between abstract syntax and notation
- **Early s**
 - Indication of semantic variation points
- **New dc**
 - Make precise the integration between different views

Roadmap: Extensibility

- Architecture
 - ☞ Extensibility
 - Components
 - Relationships
 - Behavioral models
 - Model management
 - General mechanisms
 - Large, complex systems
 - Early system phases
 - New domains
- First-class extensibility mechanism
 - User-defined diagram types
 - Use MOF to create concrete metamodels
 - Improve the rigor of profile specifications
 - Multiple stereotypes per item
 - Remove “Standard Profiles”

Roadmap: Components

- Architecture
 - Extensibility
 - ☞ **Components**
 - Relationships
 - Behavioral models
 - Model management
 - General mechanisms
 - **Large, complex systems**
 - **Early system phases**
 - **New domains**
- ◉ **Improve the semantics and notation to support component-based development**
 - **Additional architectural detail**
 - ◉ **Hierarchically structured**
 - ◉ **Clarify relationship to interfaces**
 - **Better support for interfaces**
 - **Usage protocol formalizes interfaces**
 - **Support build process**


Roadmap: Relationships

- Architecture
 - Extensibility
 - Components
 - ☞ Relationships
 - Behavioral models
 - Model management
 - General mechanisms
 - Large, complex systems
 - Early system phases
 - New domains
- Ability to limit relations to context
 - Contextual associations
 - Different kinds of composition/aggregation
 - Provide a more complete semantics for dependencies
 - Merge dependency and association
 - More versatile notion of refinement
 - Generalization of association

Roadmap: Behavioral modeling

- Architecture
 - Extensibility
 - Components
 - Relationships
 - ☞ Behavioral modeling
 - Model management
 - General mechanisms
 - Large, complex systems
 - Early system prototyping
 - New domains
- Define activity graph independent from state charts
 - Combination of state chart and activity graph
 - Provide more permissive concurrency
 - Specify state machine generalization
 - State machine structuring
 - Provide semantics for defining patterns
 - Sequence diagram structuring
 - Decomposition of lifelines
 - Composition
 - Behavioral variants
 - Encapsulation
 - Generalization
 - Decomposition of messages
 - Spurious and lost messages
 - Broader descriptive interpretation

Roadmap: Model management

- Architecture
- Extensibility
- Components
- Relationships
- Behavioral models
-  Model management
 - Refine notation and semantics for model, subsystem to support enterprise architecture
 - Differentiate specification/class structuring
 - Internal structure of classes
- General mechanisms
- Large, complex systems
- Early system phases
- New domains

Roadmap: General mechanisms

- Architecture
- Extensibility
- Components
- Relationships
- Behavioral models
- Model management
- ☞ **General mechanisms**
- Large, complex systems
- Early system phases
- New domains

- Define mechanism for model versioning
- Specify metamodel and XMI mechanism for diagram interchange
 - Model interchange at level of semantics
- OCL
 - Integrate OCL better into UML
 - Improvements to OCL
- Notation for parameterization of all/more model elements
- Specialization without name change
- Locus of definition

Support for large, complex systems

- Architecture
 - Extensibility
 - Components
 - Relationships
 - Behavioral models
 - Model management
 - General mechanisms
 - ☞ **Large, complex systems**
 - Early system prototyping
 - New domains
- **Sequence diagram structuring**
 - **Object structuring**
 - Internal structure of classes
 - Dynamic creation of structure
 - Routing and addressing of messages
 - Concurrency of components
 - **State machine structuring**
 - Encapsulation of states
 - State sets
 - Generalization of states
 - Modeling of architecture (block diagram)
 - Modeling of layering (structure/behavior)

Early system phases

- Architecture
- Extensibility
- Components
- Relationships
- Behavioral modeling
- Model management
- General mechanisms
- Large, complex systems
- ☞ **Early system phases**
- New domains

- Preliminary modeling
 - Flow diagram
 - Dictionary
- Use cases
 - Relationships between use cases
 - Structuring
 - Distinguish human/non-human actor
 - Allow instance diagrams (snapshots) to show effect of use case
 - Association to activities
- Business rules
- System context diagram

Proposed UML 2.0 Roadmap (I)

- **Architecture**
 - Provide guidelines on extending UML
 - Improve integrity and quality of the kernel language
- **Extensibility**
 - First-class extensibility mechanism
 - Improve the rigor of profile specifications
- **Components**
 - Improve the semantics and notation to support component-based development
- **Relationships**
 - Provide a more complete semantics for dependencies
 - Generalization of association
 - Ability to limit to context
 - Model internal structure/architecture of classes and objects including systems

Proposed UML 2.0 Roadmap (II)

- **Behavioral modeling**
 - Harmonize activity graph and state charts
 - Specify state machine generalization
 - State machine structuring
 - Provide more permissive concurrency
- **Sequence diagrams**
 - Composition and behavioral variants
 - Decomposition of lifelines
 - Encapsulation
- **General mechanisms**
 - Specify metamodel and mechanism for diagram interchange
 - Notation of parameterization for all model elements including better support for patterns
 - Enhanced notion of generalization
- **Language “cleanup”**

Conclusion and Next Steps

- **A major revision of UML is needed and urgent**
- **Roadmap and RFI responses suggest two RFPs**
 - **Kernel cleanup**
 - » **Architecture**
 - » **Extensibility**
 - » **Language “cleanup”**
 - **Additional modeling power**
 - » **Components**
 - » **Relationships**
 - » **Behavioral modeling**
 - » **Sequence diagrams**
 - » **General mechanisms**
- **Target date Oslo TC meeting to finalize RFP**