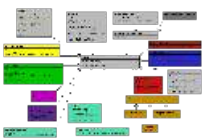


David Schröder and Jörg R. Weimar

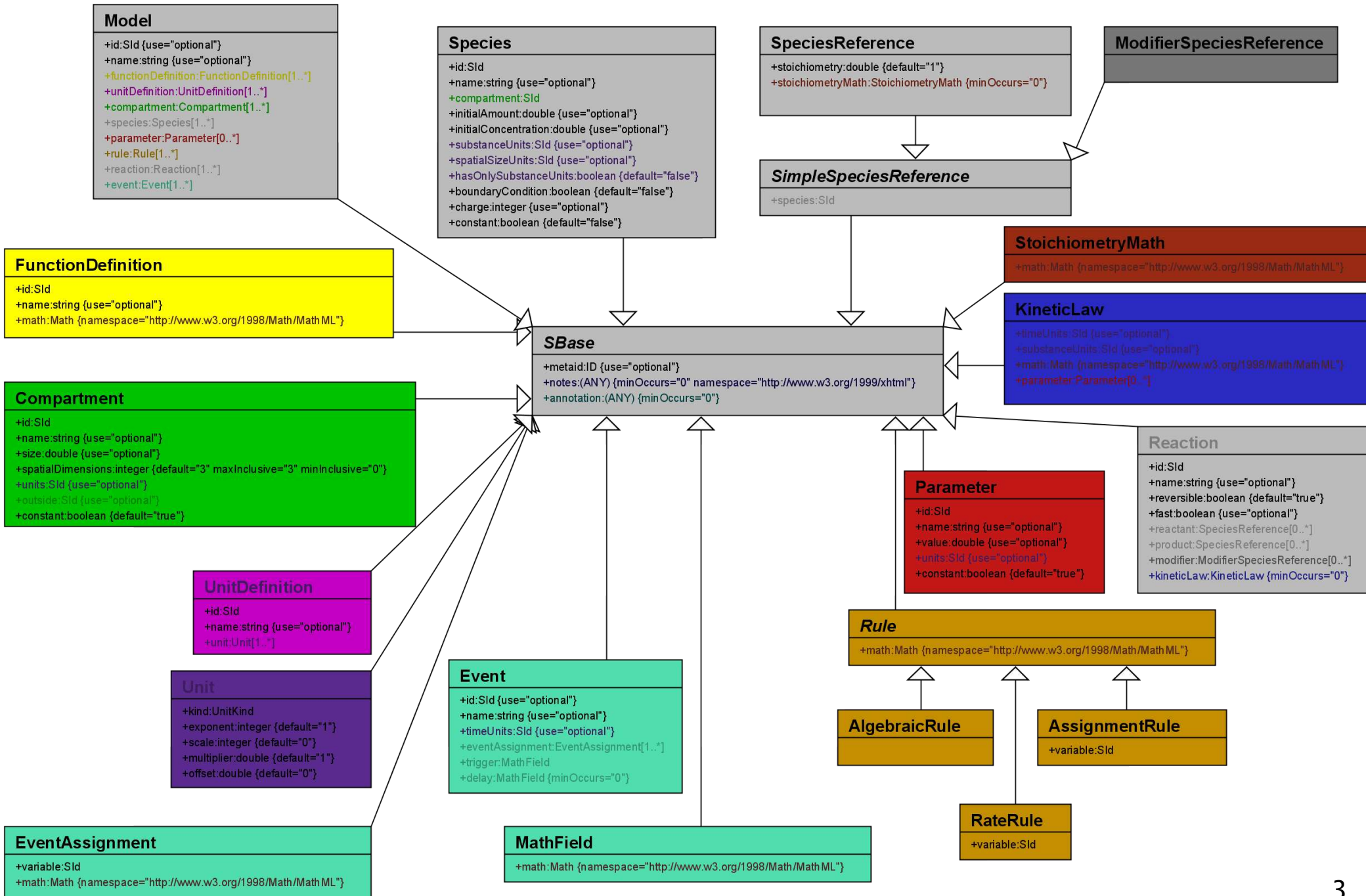
- SBML has many features
- Many tools support SBML
- None support all features
- How to specify partial support ?
- Which parts are necessary for doing/modeling XYZ ?

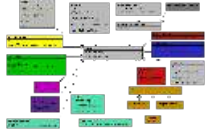
- Smallest part of SBML definition which can be removed independently of other modules.
 - ◆ XML Elements, e.g., **KineticRateLaw**
 - ◆ XML Attributes, e.g., **annotation, units**



Modularization of SBML L2

Modularization of SBML



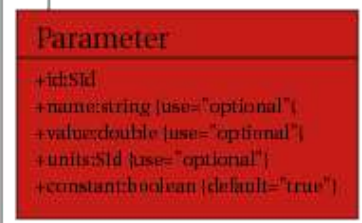
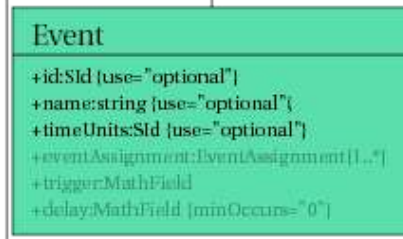
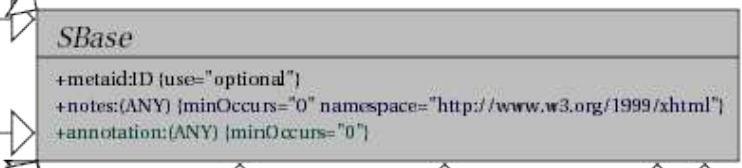
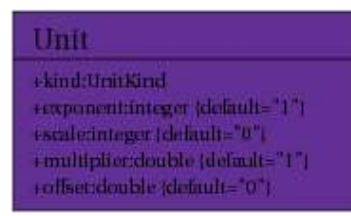
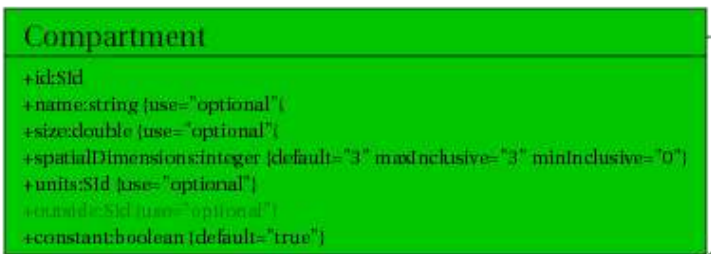
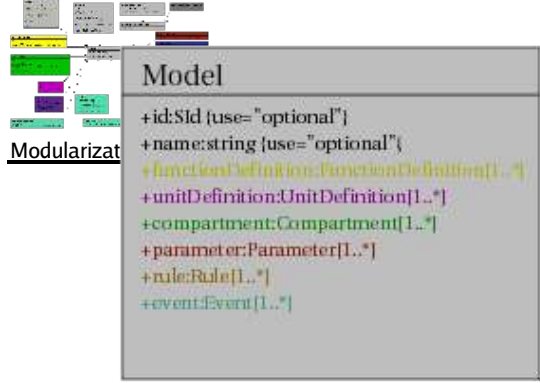


Dependencies

- ◆ Syntactic dependencies
from XSD schema
- Semantic dependencies
from English text, intuition

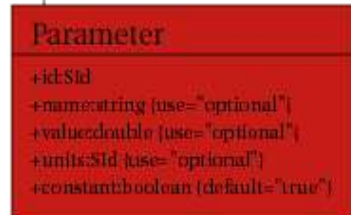
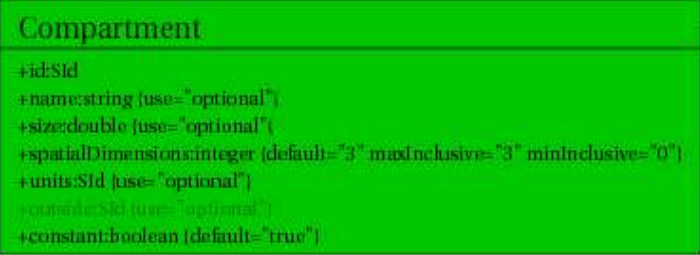
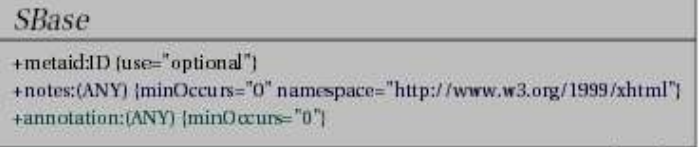
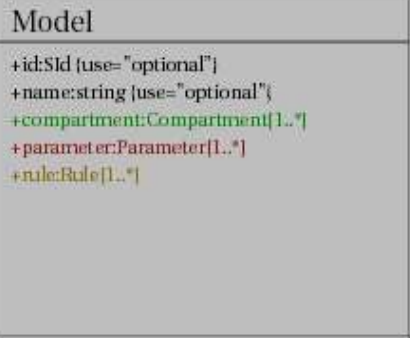
depends on module	Compartment	EventAssignment	Math	MathField	Model	Rule	SimpleSpeciesReference	Species	SpeciesReference	Unit	Units
AlgebraicRule			◇		◆	◆					
Annotation (pseudo)					◆						
AssignmentRule			◇		◆	◆					
Compartment	■				◆						
Event		◆	◇	◆	◆						
EventAssignment		■	◆		◆						
FunctionDefinition			◆		◆						
KineticLaw			◆		◆						
Math (hidden)			■		◆						
MathField			◆	■	◆						
Model					■						
ModifierSpeciesReference	○				◆		◆	○			
Notes (pseudo)					◆						
Parameter					◆						
RateRule			◇		◆	◆					
Reaction	○				◆		○	○	●		
Rule			◆		◆	■					
SBase					◆						
SimpleSpeciesReference	○				◆		■	●			
Species	●				◆		■	■			
SpeciesReference	○				◆		◆	○	■		
StoichiometryMath			◆		◆						
Unit					◆				■	●	
UnitDefinition					◆				◆	●	
Units (pseudo)					◆						■

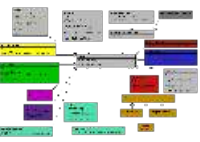
Remove Species



Remove Event, Unit, FunctionDefinition

Modularizati





Tools for Modularization

- Create XML **schema** for any consistent subset of modules
 - ◆ for validation of subsets
- Create **UML models** for a subset
 - ◆ SVG format with links
 - ◆ XMI format for use in UML tools, such as Poseidon for UML
- **Analyze SBML file** and determine module usage

Conclusion

- Modularization of SBML Level 1 and 2
- 19 Modules (L1) and 25 Modules (L2)
- Identified (some) dependencies
 - ♦ 2^{19} subsets \Rightarrow 1009 consistent
 - ♦ 2^{25} subsets \Rightarrow 5657 consistent
- Created tools for support.
- To discuss:
 - ♦ SBML tool compatibility matrix?