

FEBRUARY, 2017 - SYSML 2.0 MODEL CONSTRUCTION RFP

REQUIREMENTS

1. Model Construction Functional Requirements for the Systems Modeling Environment (SME)

- **1.1 Functional Requirements Overview**

- Model construction is the ability to create, retrieve, update and delete individual model elements or collections of model elements. Model construction can be conducted in two complementary ways i) interactively, one model element at a time using the graphical interface of the SME or ii) in batch mode by importing model element specifications from an external file, database or software application. The interactive mode follows the requirements specified in the SME Visualization section. Control of access to (possibly role based) and configuration control of the model follows the requirements in the SME Model Management section. Collaborative, configuration controlled access to the model by multiple users follows the requirements specified in the SME Collaboration section. The interaction of model construction with model analysis follows the requirements in the SME Model Analysis section.
- The use of the term “model element” in the requirements covers all relevant SysML language constructs including structure, behavior, requirements and parametric constraint elements, views and viewpoints, diagrams, reports, patterns, queries, constraints, expressions as defined in the glossary below and in the SME Concept Model.

- **1.2 Create**

- i. The SME shall provide the ability to create an individual model element from a list of properties, operations and relationships interactively by the user
- ii. The SME shall provide the ability to create a collection of model elements from a list of properties, operations and relationships in batch import mode
- iii. The SME shall provide the ability to create a link to an internal or external model, model element or file/database
- iv. The SME shall provide the ability to create a model query.

- **1.3 Retrieve**

- i. The SME shall provide the ability to Retrieve a model element interactively using the tool graphical browsing interface
- ii. The SME shall provide the ability to Retrieve a collection of model elements using a standardized query language
- iii. The SME shall provide the ability to Retrieve the contents of a link to an internal or external model, model element or file/database
- iv. The SME shall provide the ability to Retrieve the results of a model query

- **1.4. Update**

- i. The SME shall provide the ability to Update a model element interactively using the tool graphical interface
- ii. The SME shall provide the ability to Update a collection of model elements using a standardized update expression language

- iii. The SME shall provide the ability to Update a link to an internal or external model, model element or file/database
- iv. The SME shall provide the ability to Update a model query
- **1.5 Delete**
 - i. The SME shall provide the ability to Delete a model element or collection of model elements from a diagram without deleting from the model
 - ii. The SME shall provide the ability to Delete a model element or a collection of model elements from the model
 - iii. The SME shall provide the ability to Delete a link to an internal or external model, model element or file/database
 - iv. The SME shall provide the ability to Delete a model query.

2. Model Construction Service Interface Requirements

- **2.1 Service Requirements Overview**
 - i. Model construction services further specify each of the functions defined by the functional requirements above and provide a definition of the signatures associated with each of the functions.
- **2.2 Create**
 - i. return value: Single UUID or collection of UUID's of the model elements that were created
 - ii. Function Name: createModelElements
 - iii. Function Parameters:
 - 1) Collection of "Attribute", attribute type, name and value quadruplets
 - 2) Collection of operations
 - a) "Operation" type
 - b) return type,
 - c) operation name and
 - d) operation parameter type and name pairs
 - 3) Collection of "Relationship", relationship type, relationship name and related element UUID quadruplets
 - iv. Example: createModelElements({ {Attribute, String, Name, "MyName"}, {Attribute, String, Description, "My description"}, {Operation, Integer, Sum, {{myValue1, 10}, {myValue2, 20} } } }, {Relationship, Dependency, "my dependency", aUUID })
- **2.3 Retrieve**
 - i. Return value: Single UUID or collection of UUID's of the model elements that were retrieved
 - ii. Function Name: retrieveModelElements
 - iii. Function Parameters:
 - 1) (Optional) Collection of SysML Query string
 - 2) (Optional) Collection of Attribute Name, Value based boolean expressions
 - iv. Example: retrieveModelElements({"Type == Block", "Attribute1 == Aircraft"})
- **2.4 Update**
 - i. Return value: Single UUID or collection of UUID's of the model elements that were updated

- ii. Function Name: updateModelElements
- iii. Function Parameters:
 - 1) Collection of UUID, Attribute Name, Value triplets
- iv. Example: updateModelElements({{MyUUID, MyAttributeName1, NewValue1}, {MyUUID, MyAttributeName2, NewValue2}})
- **2.5 Delete**
 - i. Return value: Boolean (true if deleted successfully, false if error condition)
 - ii. Function Name: deleteModelElements
 - iii. Function Parameters:
 - 1) Collection of UUIDs
 - iv. Example: first retrieve a collection of model element UUID's and then invoke the deleteModelElements service using the UUID collection as a parameter.

3. Model Construction Concept Definitions

- **3.1 Concept Definitions Overview**
 - The concepts defined in this section clarify the meaning of terms used in the requirements sections above.
- **3.2 Core concepts related to model construction**
 - Model - A full set of model elements representing a complete characterization of a modeling project
 - Model Element - A defined concept that is part of the SysML 2 standard
 - Collection - a group of any of the following model element, attributes, operations, values, UUID's , etc.
 - Model Collection - A collection of model elements with the scope of a modeling project's model
 - Create - Create any model element or group of model elements
 - Retrieve - Retrieve any model element or group of model elements
 - Update - Change the properties, operations and/or relationships associated with an individual model element or a collection of model elements
 - Delete - Delete a model element or a collection of model elements either from a diagram or from the model
 - UUID (Universal Unique Identifier) - A globally unique identifier for each model element
 - Relationship - Dependency, Association
 - Interactive - User initiated operations using the graphical interface of the SysML web based or client user interface
 - Batch Mode - User initiated operations using external collection of model element properties, operations and/or relationships
 - External Collection - A file based or database or link based mechanism to persist descriptions of model elements
 - Model Construction Assumptions - Model construction is defined in the context of other SME functions for Collaboration, Model Management, Model Analysis, etc.