

SysML v2

Model Interoperability & Standard API Requirements

Axel Reichwein

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Systems Modeling Environment Conceptual Architecture

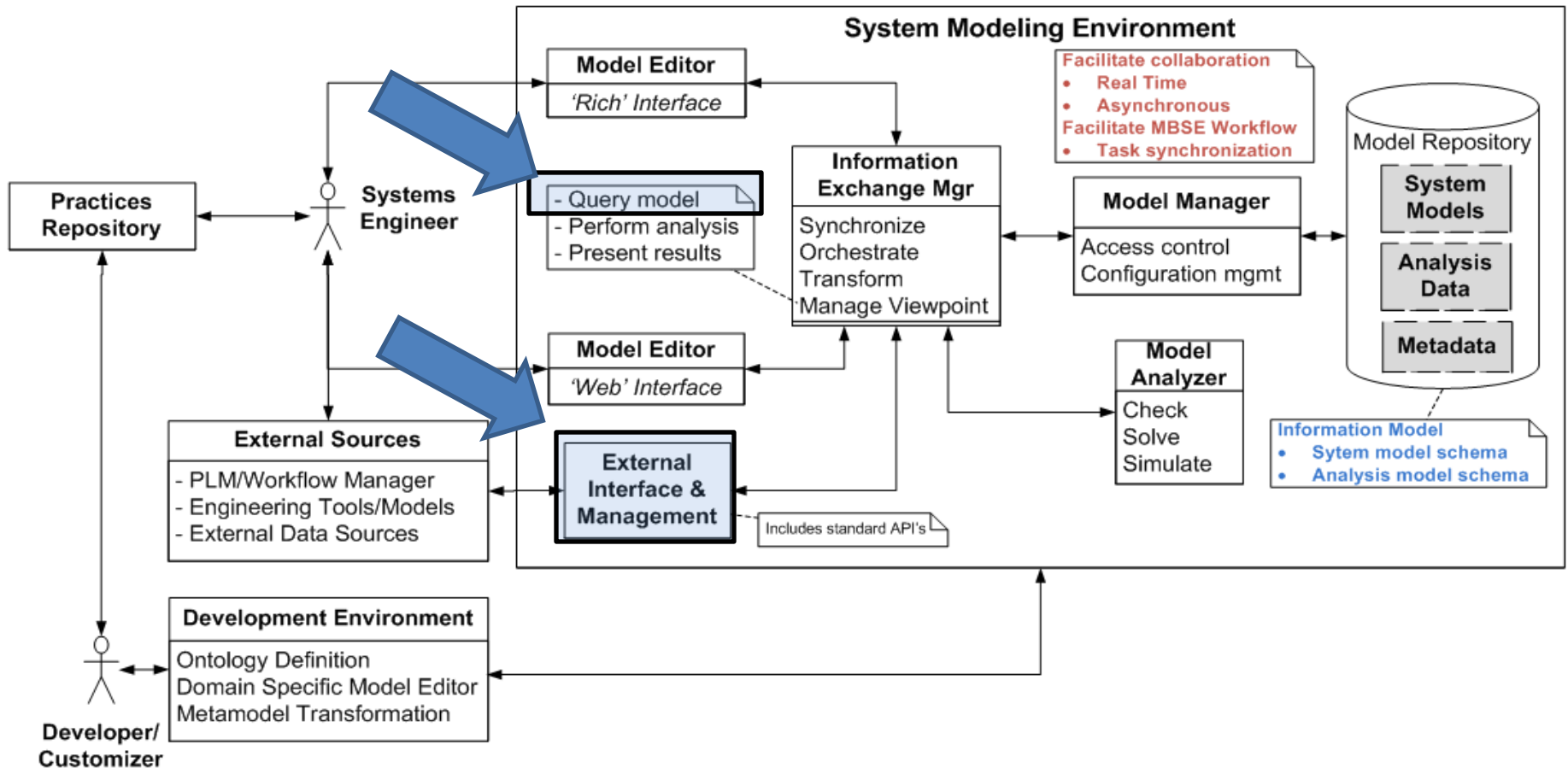


Image from "Status of SysML v2, Planning & Requirements, Berlin, Germany June 16, 2015, Sandy Friedenthal & Eldad Palachi, http://www.omgwiki.org/OMGSysML/doku.php?id=sysml-roadmap:sysml_assessment_and_roadmap_working_group"

SysML Interoperability Status Quo

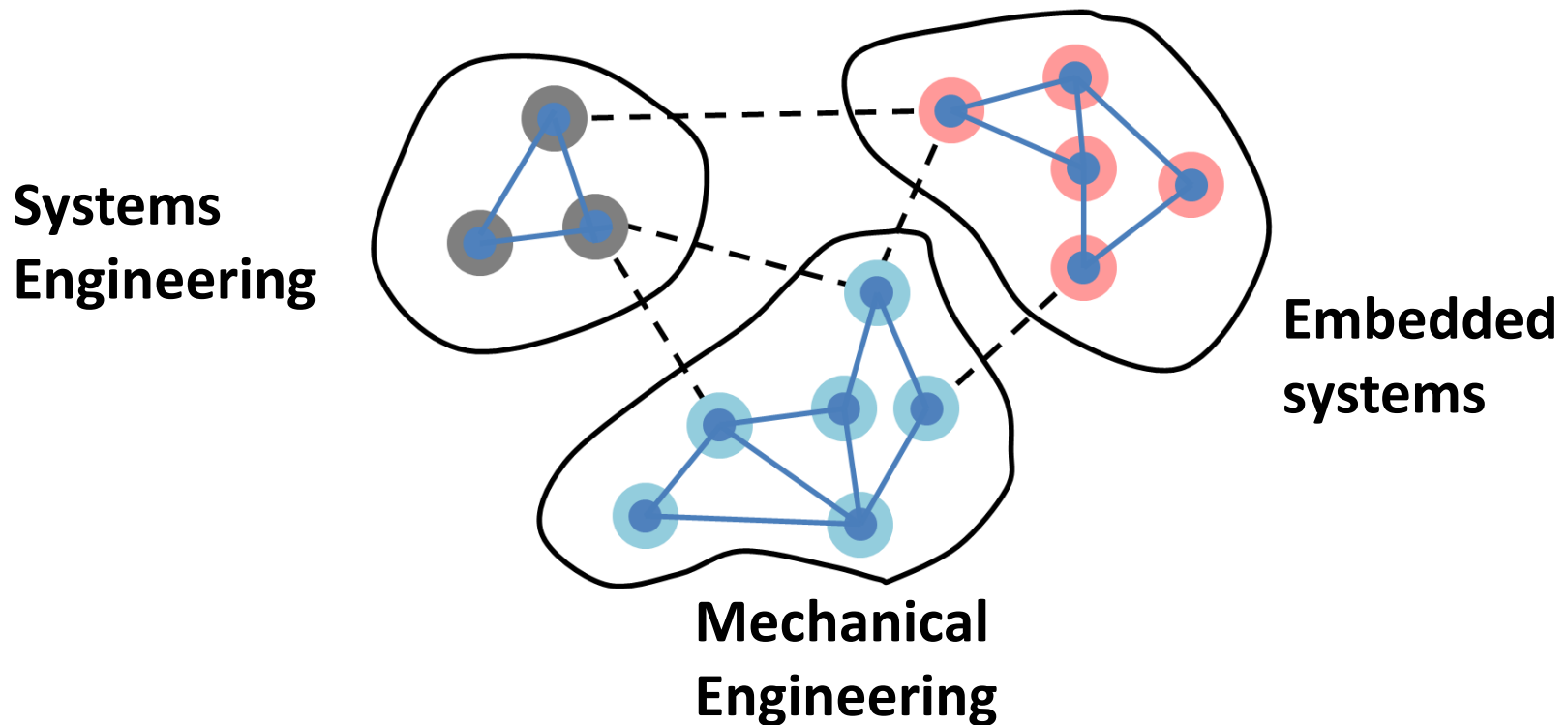
- Tool interoperability supported through
 - Common data meaning: SysML spec
 - Common data format: XMI
- But lack of interoperability due to:
 - Different possible serializations of SysML in XMI
 - Different APIs to access SysML models (from developer perspective: different API similar to different modeling language)
 - No web API

SysMLv2 Model Interoperability Requirements

Information exchange based on	Local API	Web API (based on W3C standards)
Common data format	RDF	RDF (multiple RDF serialization formats: RDF/XML, JSON-LD, Turtle)
Common communication protocol	Java	HTTP
API Structure	Tool-independent Java API	Linked Data Platform

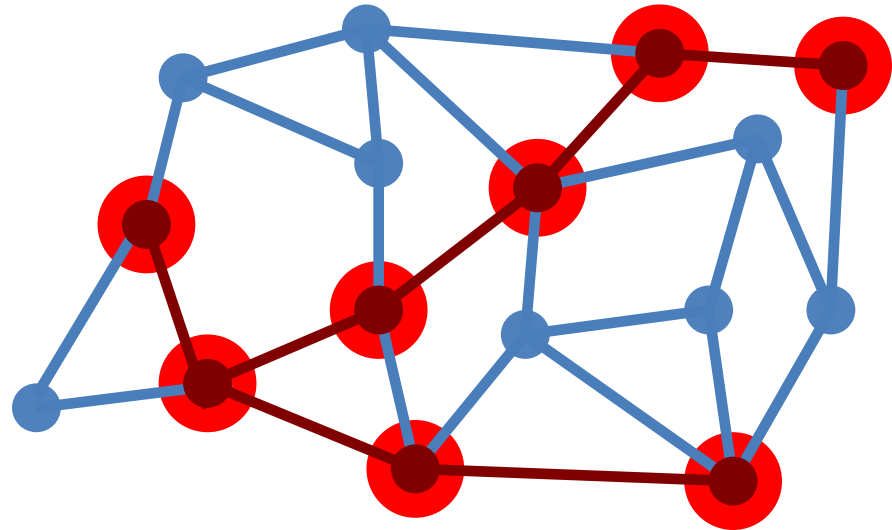
Interoperability beyond SysML

- From linked Data user perspective: SysML concepts can be used to define cross-domain relationships
- Querying relationships between SysML data and other artifacts

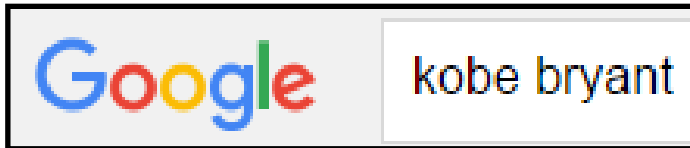


Why do we need Linked Data?

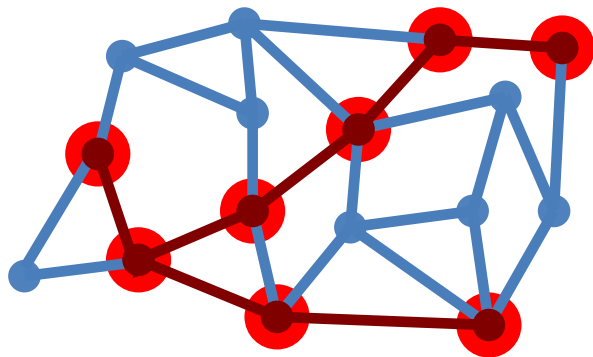
- Queries
- Impact Analysis
- Analytics
- Better Overview => Better Decisions



Google's Knowledge Graph



- Engineers also need a **Knowledge Graph**
- **Knowledge Graph** currently used by Google to improve search results



Kobe Bryant
Basketball player

Kobe Bean Bryant is an American professional basketball player who currently plays for the Los Angeles Lakers of the National Basketball Association. [Wikipedia](#)

Born: August 23, 1978 (age 37), Philadelphia, PA
Height: 6' 6"
Spouse: [Vanessa Laine Bryant](#) (m. 2001)
Current team: [Los Angeles Lakers](#) (#24 / Shooting guard)
Salary: 25 million USD (2015)
Parents: [Joe Bryant](#), [Pam Bryant](#)

Profiles

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 LeBron James Olympic teammate	 Michael Jordan	 Vanessa Laine Bryant Spouse	 Kevin Durant Olympic teammate	 Carmelo Anthony Olympic teammate
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Summary - OSLC Specification

OSLC Specification

- RDF Vocabulary
 - Resource Type URIs
 - Predicate (Property) URIs
- OSLC Resource Shapes

Example:
<http://omg.org/sysml#Requirement>

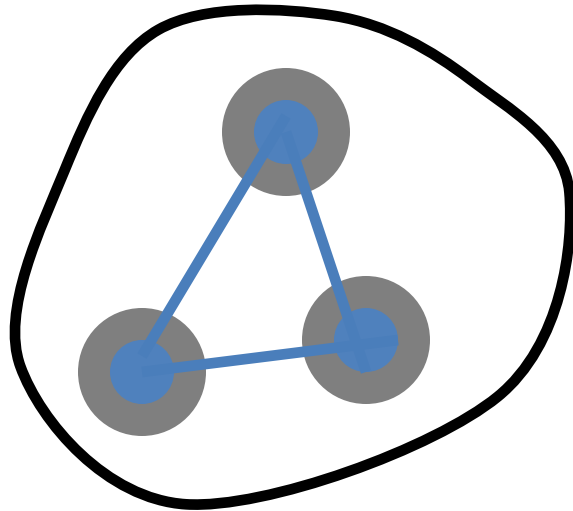
Example:
<http://omg.org/sysml#satisfiedBy>

Example:

```
<oslc:Property>  
  <oslc:name>satisfiedBy</oslc:name>  
  <oslc:propertyDefinition rdf:resource="http://open-service.net/ns/rm#satisfiedBy"/>  
  <oslc:occurs rdf:resource="http://open-service.net/ns/core#Zero-or-many"/>  
  <oslc:range rdf:resource="http://open-services.net/ns/core#Anv"/>  
</oslc:Property>
```

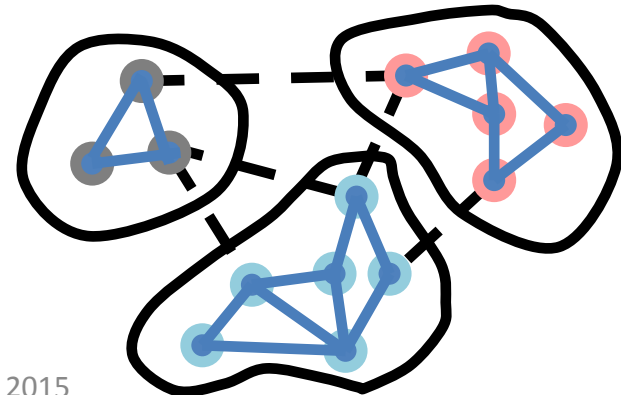

Converting Existing Standards into OSLC Specifications

Existing standard



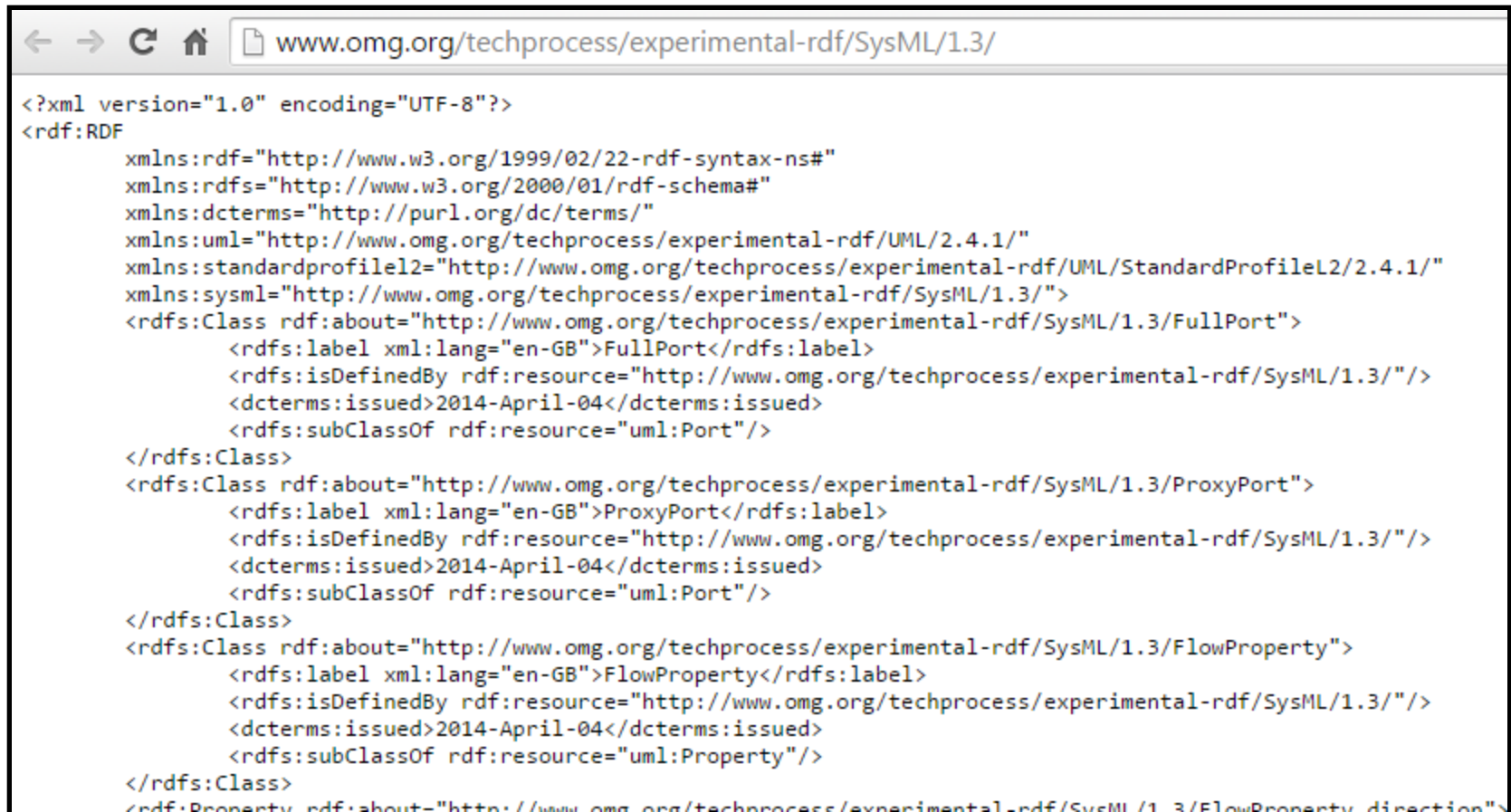
OSLC Specification

- RDF Vocabulary
 - Resource Type URIs
 - Predicate (Property) URIs
- OSLC Resource Shapes



Converting SysML into OSLC Standard

- SysML 1.3 RDF vocabulary online at <http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/>



```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:dcterms="http://purl.org/dc/terms/"
  xmlns:uml="http://www.omg.org/techprocess/experimental-rdf/UML/2.4.1/"
  xmlns:standardprofilel2="http://www.omg.org/techprocess/experimental-rdf/UML/StandardProfileL2/2.4.1/"
  xmlns:sysml="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/"
  <rdfs:Class rdf:about="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/FullPort">
    <rdfs:label xml:lang="en-GB">FullPort</rdfs:label>
    <rdfs:isDefinedBy rdf:resource="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/">
    <dcterms:issued>2014-April-04</dcterms:issued>
    <rdfs:subClassOf rdf:resource="uml:Port"/>
  </rdfs:Class>
  <rdfs:Class rdf:about="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/ProxyPort">
    <rdfs:label xml:lang="en-GB">ProxyPort</rdfs:label>
    <rdfs:isDefinedBy rdf:resource="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/">
    <dcterms:issued>2014-April-04</dcterms:issued>
    <rdfs:subClassOf rdf:resource="uml:Port"/>
  </rdfs:Class>
  <rdfs:Class rdf:about="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/FlowProperty">
    <rdfs:label xml:lang="en-GB">FlowProperty</rdfs:label>
    <rdfs:isDefinedBy rdf:resource="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/">
    <dcterms:issued>2014-April-04</dcterms:issued>
    <rdfs:subClassOf rdf:resource="uml:Property"/>
  </rdfs:Class>
  <rdfs:Property rdf:about="http://www.omg.org/techprocess/experimental-rdf/SysML/1.3/FlowProperty_direction">
```

Recommendation to generate APIs

