OSLC PLM Workgroup

Working meeting

Sept 7th 2010

open-services.net

V0.3

Organisers today

- Workgroup lead: Rainer Ersch, Siemens
- Coordinator: Gray Bachelor, IBM

Today’s agenda

- Roll call and brief introductions - welcome new members
- Objective for today's meeting - Discuss progress with the investigation of defining a reference context for SE Scenario #1
- Overview and discussion on representation of context and implementation based upon STEP
- Discuss traceability scenarios within SE

Today's objectives

1. To continue to discuss the product context and implementation based upon STEP
2. To agree an approach to define an initial resource definition for context and implementation

A note about today's materials

- We are still exploring the materials available in the public domain

Summary of the approach

- Our scenario #1 provides the basis for exploring the coverage of the existing OSLC Specs
- We identified two actions as typical of the need to trace product and system context and implementation
  - a4 Locate requirements in change request context
  - a7 Locate Reusable Implementation to Satisfy Change ?
- These actions require that we identify means to represent
  - Requirements as configured text, documents and models
  - Context and implementation as configured structures, meta-data and models
  - Relationships between Requirements, Context and Implementations
- We propose initially to define a reference or boundary representation of product and/or system to use to evaluate the existing Specs (resources and services)
- There is not a single dominant representation of product and system structure to use as a reference
- We agreed to explore the Standard for the Exchange of Product model data (STEP)
  - Based upon ISO 10303 and is meant for product data exchange between tools
  - has a modular construction applied in multiple Application Protocols with significant industry support
  - has a proven and flexible core construct of Product, Product_version, Product_view_definition
- We agreed to explore and apply the SysML SUV example to support our investigation

Progress made

- Initial identification of relevant assets and information in the public domain
- Production of sample data from the SUV SysML example (Requirements diagram)
  - STEP representation (.stp file)
  - OWL representation (.owl file)
- Exploration of SUV Requirements representation in OWL
  - STEP file
  - ontoSTEP
  - Protege

What to work with ….?

AVAILABLE

SUV example
SysML diagrams

Requirements Diagram
Block Diagrams

ISSUES
- **No product identity & structure**
- **No versions**

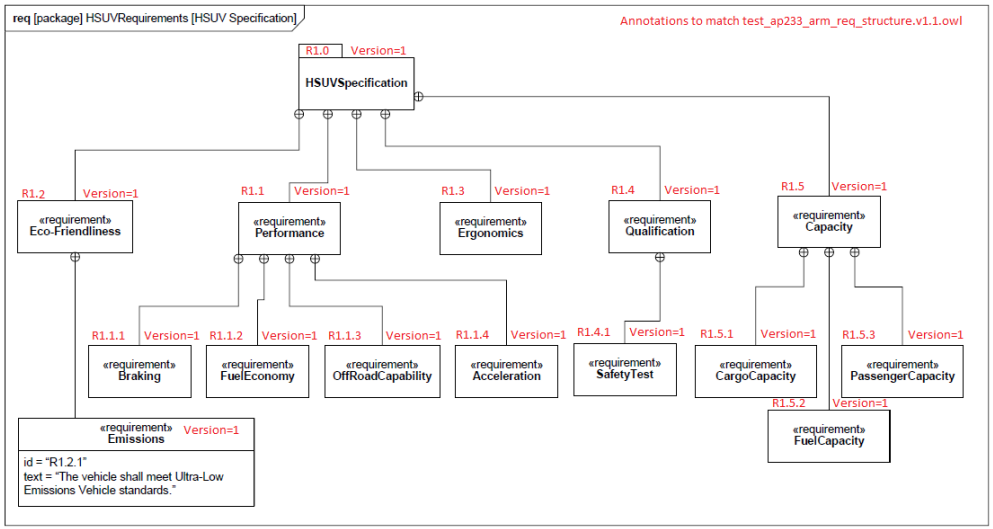
stp file

ontoSTEP **Protege**

owl file

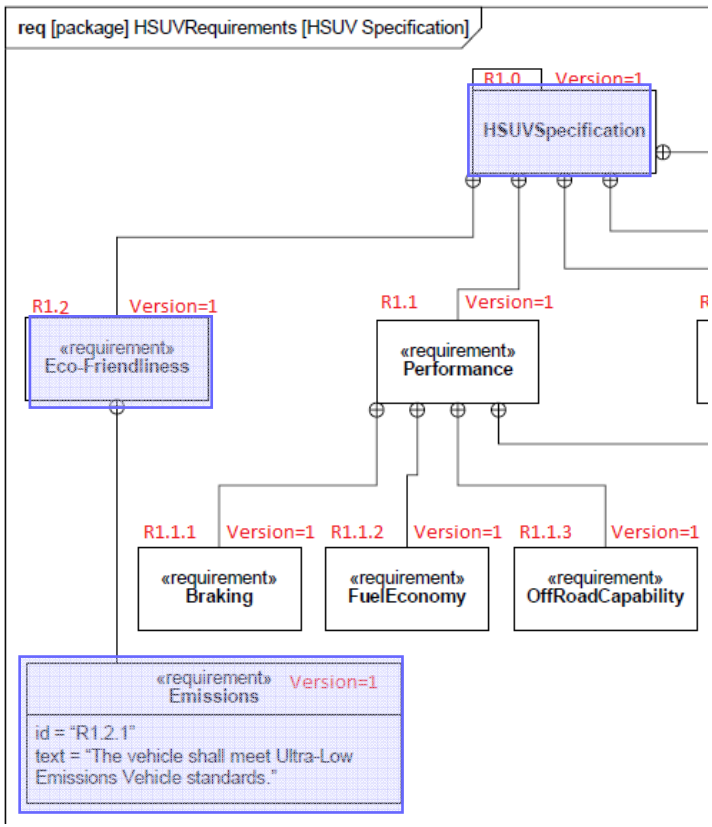
Rhapsody

xmi file



- **xmi path not explored yet**

STEP sample



Each STEP element has an identity

#10=REQUIREMENT('R1.0','HSUVSpecification','Test of HSUV Specification instantiation');

#20=REQUIREMENT_VERSION('1','HSUVSpecification version',#10);

#30=REQUIREMENT_VIEW_DEFINITION('1','HSUVSpecification View Definition','',#40,(),#20);

#40=VIEW_DEFINITION_CONTEXT('Requirements','Concept Definition','');

#50=REQUIREMENT('R1.2','Eco-Friendliness','Eco-Friendliness');

#60=REQUIREMENT_VERSION('1','Eco-Friendliness version',#50);

#70=REQUIREMENT_VIEW_DEFINITION('1','Eco-Friendliness View Definition','',#40,(),#60);

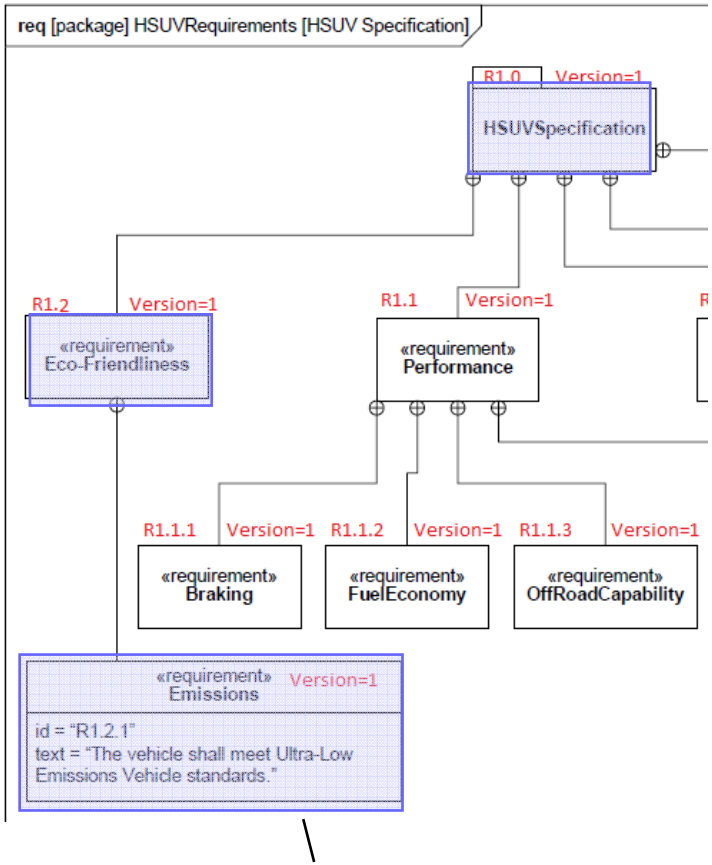
#80=REQUIREMENT_COLLECTION_RELATIONSHIP('R1.0-2','isComposedOf','Points to member requirement of HSUVSpecification',#30,#70);

#90=REQUIREMENT('R1.2.1','Emissions','The vehicle shall meet Ultra-Low Emissions Vehicle standards.');

#100=REQUIREMENT_VERSION('1','Emissions version',#90);

#110=REQUIREMENT_VIEW_DEFINITION('1','Emissions View Definition','',#40,(),#100);

OWL example



OWL for the Emissions requirement

OWL for the Emissions requirement

STEP Application Reference Models (*ARM*)

```
<!-- http://www.iso.org/TC184/SC4/WG12/test_ap233_arm_req_structure#i110 -->

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   <rdf:type rdf:resource="&ap233_systems_engineering_arm_lf;requirement_view_definition"/>
   <ap233_systems_engineering_arm_lf:requirement_view_definition_has_defined_version rdf:resource="#i100"/>
   <ap233_systems_engineering_arm_lf:product_view_definition_has_defined_version rdf:resource="#i100"/>
   <ap233_systems_engineering_arm_lf:product_view_definition_has_additional_characterization rdf:resource="#i110_additional_characterization"/>
   <ap233_systems_engineering_arm_lf:product_view_definition_has_id rdf:resource="#i110_id"/>
   <ap233_systems_engineering_arm_lf:product_view_definition_has_name rdf:resource="#i110_name"/>
   <ap233_systems_engineering_arm_lf:product_view_definition_has_initial_context rdf:resource="#i40"/>
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<!-- http://www.iso.org/TC184/SC4/WG12/test_ap233_arm_req_structure#i110_additional_characterization -->

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   <ap233_systems_engineering_arm_lf:to_string rdf:datatype="&xsd;string"></ap233_systems_engineering_arm_lf:to_string>
</owl:Thing>

<!-- http://www.iso.org/TC184/SC4/WG12/test_ap233_arm_req_structure#i110_id -->

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</ap233_systems_engineering_arm_lf:string>

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      >Emissions View Definition</ap233_systems_engineering_arm_lf:to_string>
</owl:Thing>
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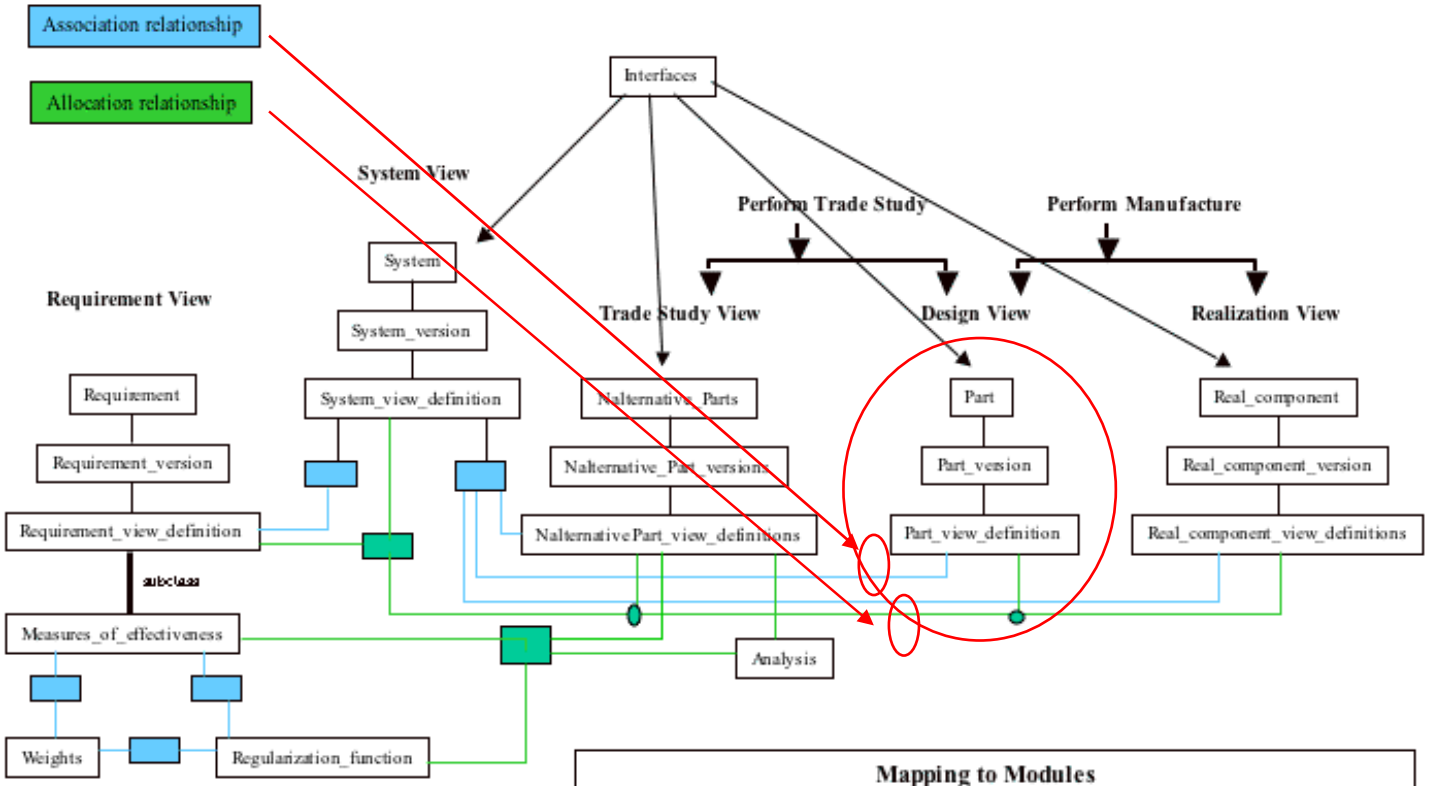
Propose to define a set of resources based upon the core Product / Part structure



…and add versions into the Hybrid SUV SysML model Block Diagram

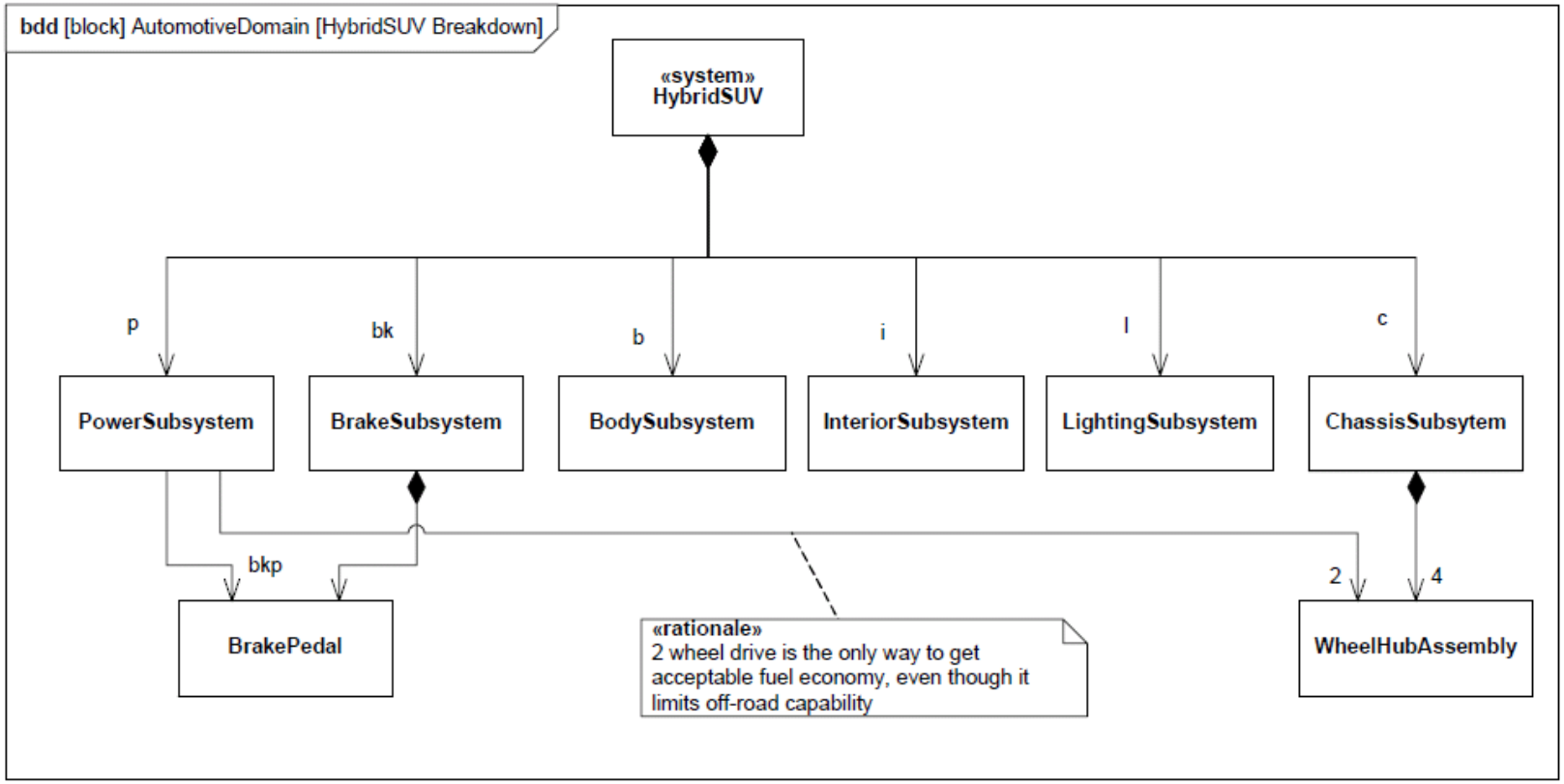


Figure 16 - Defining Structure of the Hybrid SUV System (Block Definition Diagram)

http://www.sysml.org/

http://www.omg.org/cgi-bin/doc?formal/2010-01-01

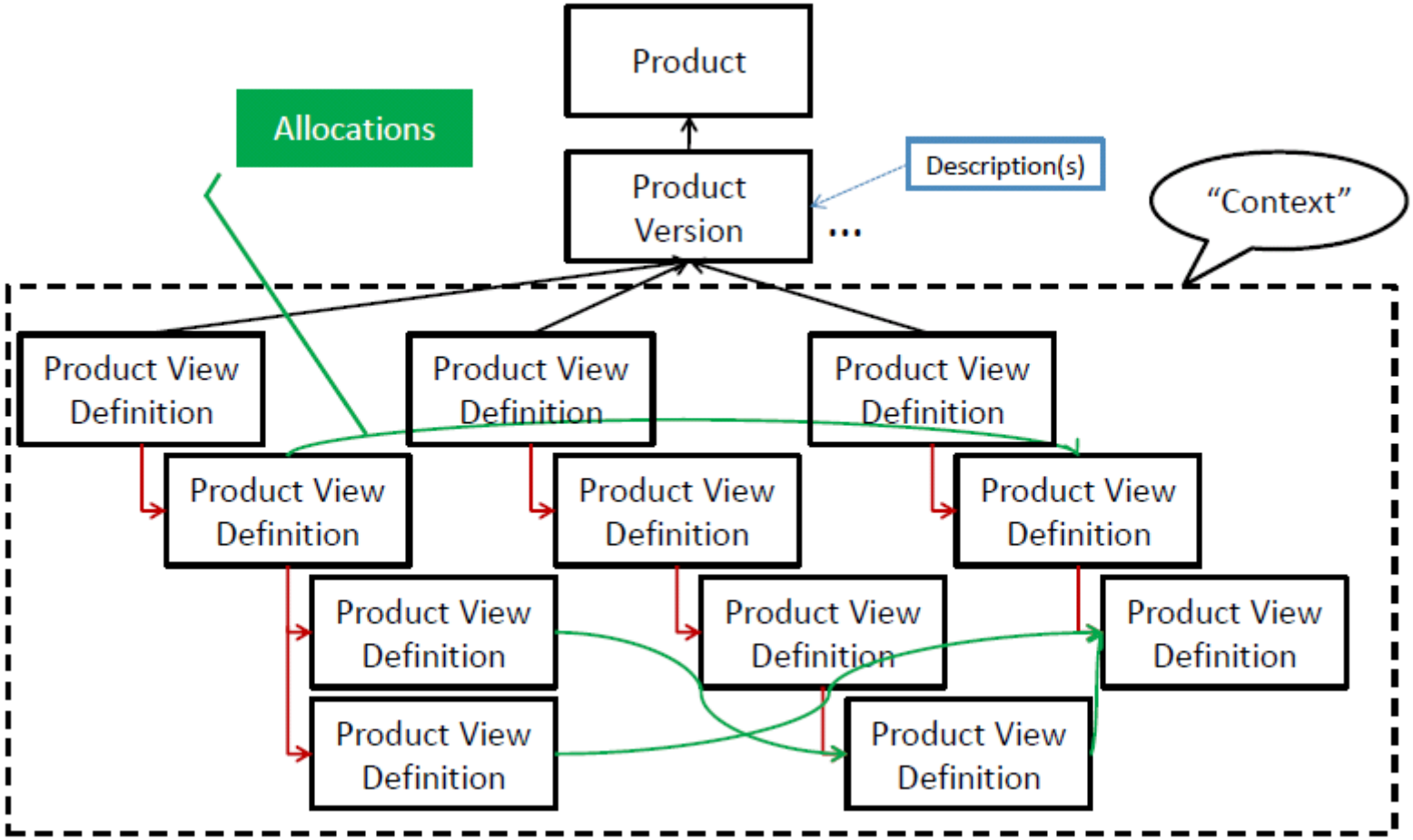
Discussion topics

- How to represent the context and implementation in the Scenario #1 ?
- What aspect of STEP to focus on ?
- What representation is most useful ?
  - Is OWL adequate for this next stage ?
- What work has been done that we can build off ?
  - Additional work out there in the industry ? SysML / AP233 ? STEP OWL ?
  - RM Spec
  - Traceability scenarios
- How to use the SUV model as an example ?
  - Versions
  - SysML Block diagram
- How to communicate the analysis and reasoning ?
  - Resources
  - Relationships
  - Services

Supporting information

STEP Key Product Structure Concepts

- Acknowledgement: Mike Loeffler



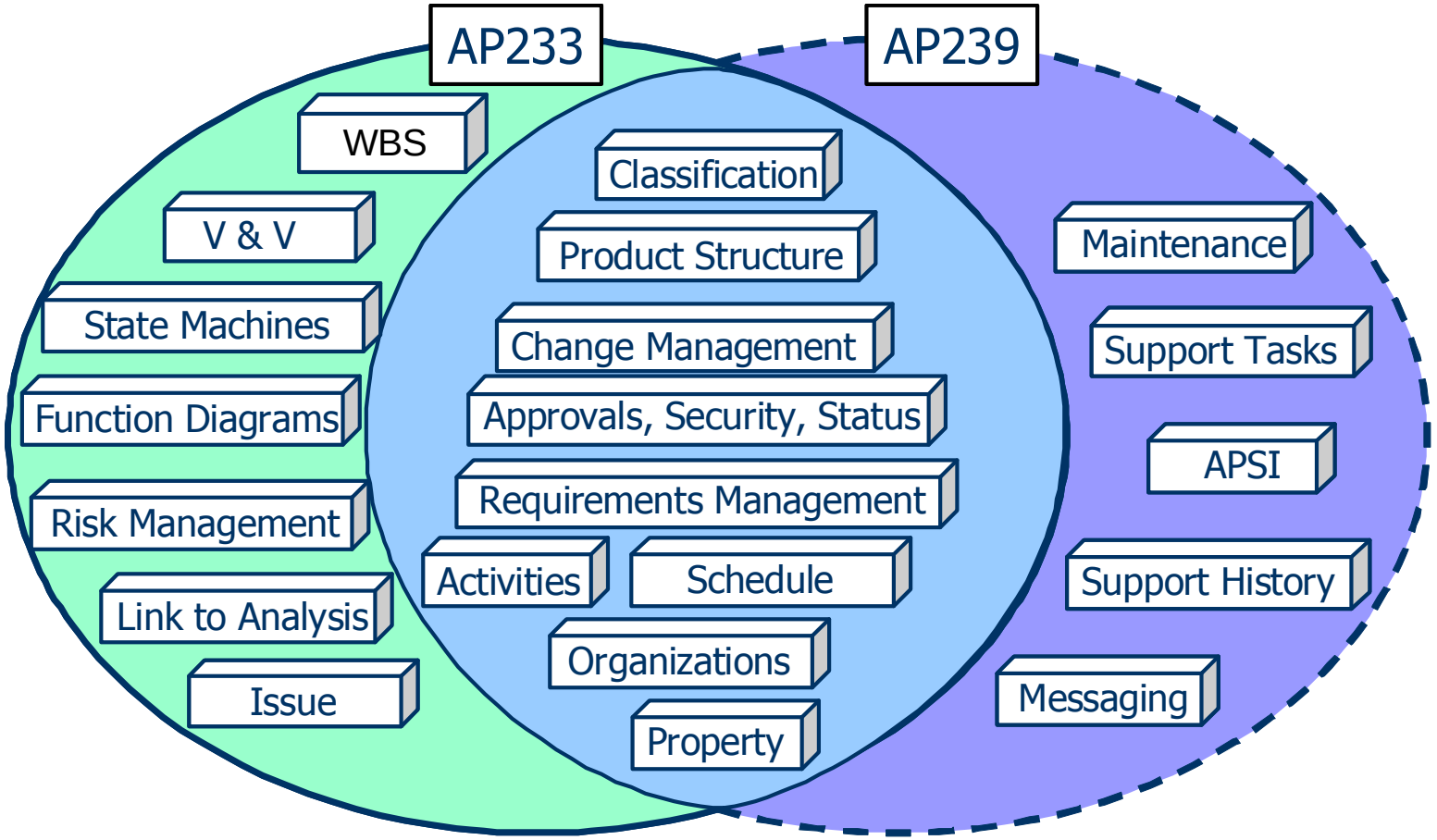
STEP Key Product Structure Concepts

- Acknowledgement: Mike Loeffler
- Product (also known as “Item”) is root of whole structure, can represent a single product design or a whole family or product line, has minimal identification metadata
- Each Product Version (there can be many) can have both Product View Definition(s) and one or more Descriptions (files or other data representations)
- Product View Definition (or DDID) is the “Context”, the root of the breakdown structure that describes the internal construction of the Product Version
- Product View Definition can be multiple, each has a qualification of what type of view it represents (i.e. mechanical, electrical, hydraulic, software, etc.)
- Each different Product View Definition can have a completely different structure as appropriate to describe the viewpoint it represents
- Allocations, traces, connectivity definitions and other cross cutting relationships can be made within and between the different views
- Product View Definitions consist of pointers to the child Product View Definition(s) that make up the top level Product Version being defined; the assembly relationships are configured (turned on or off) by variant and effectivity functions

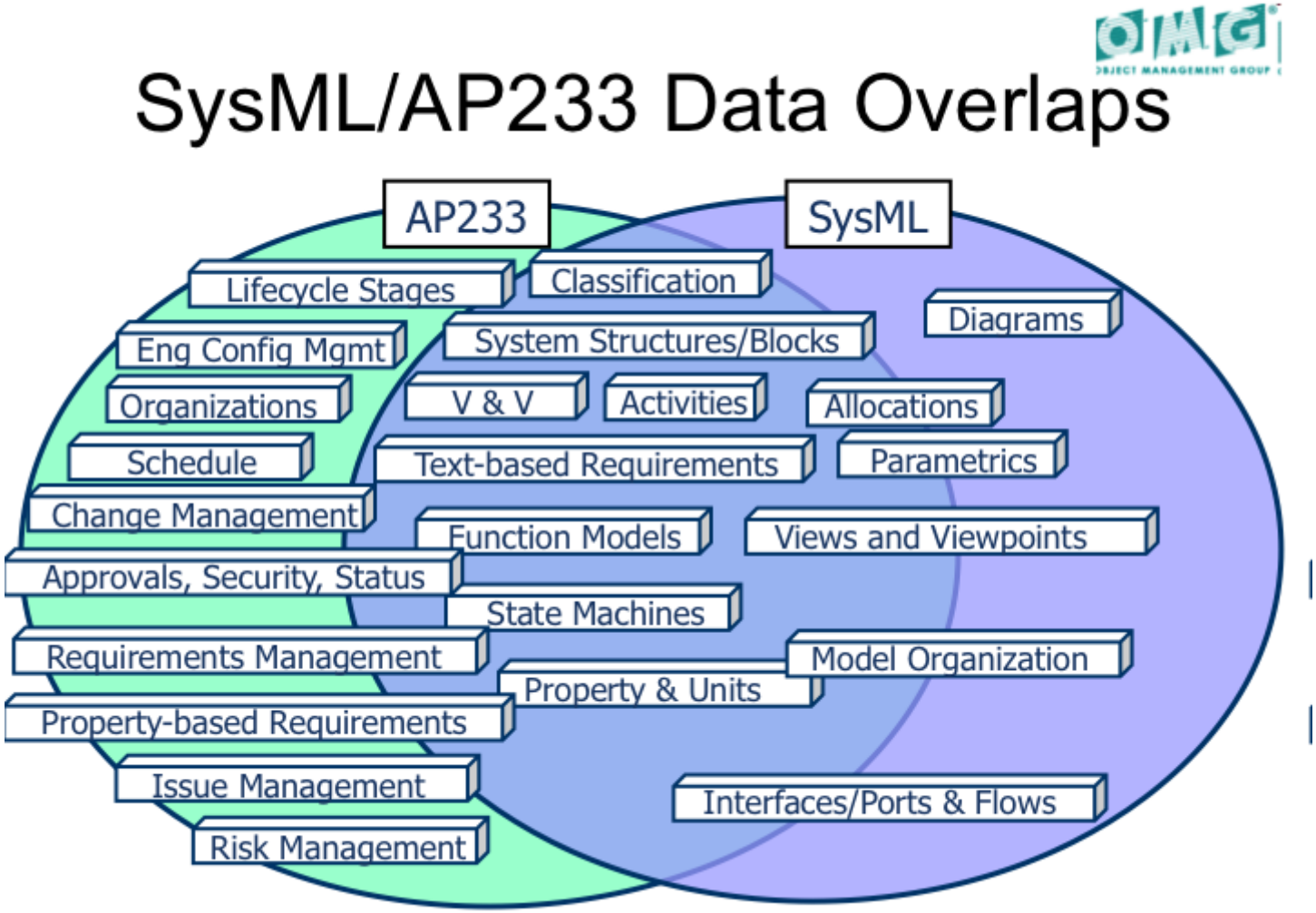
ISO 10303
Relevant STEP standard

- AP 203, *Configuration controlled 3D designs of mechanical parts and assemblies*.
- AP 210, *Electronic assembly, interconnect and packaging design*
- AP212, *Electrotechnical Design and Installation*
- AP 214, *Core data for automotive mechanical design processes*
- AP 233, *Systems engineering data representation*
- AP 239, *Product life cycle support* (aka Product Lifecycle Support (PLCS)
- PDM Schema. Intersection between AP-203 and AP-214 from an initiative of PDES Inc. and ProSTEP
  - http://pdesinc.aticorp.org/
  - http://www.prostep.com/?L=1

Where to start ?
AP239 and AP233 overlaps

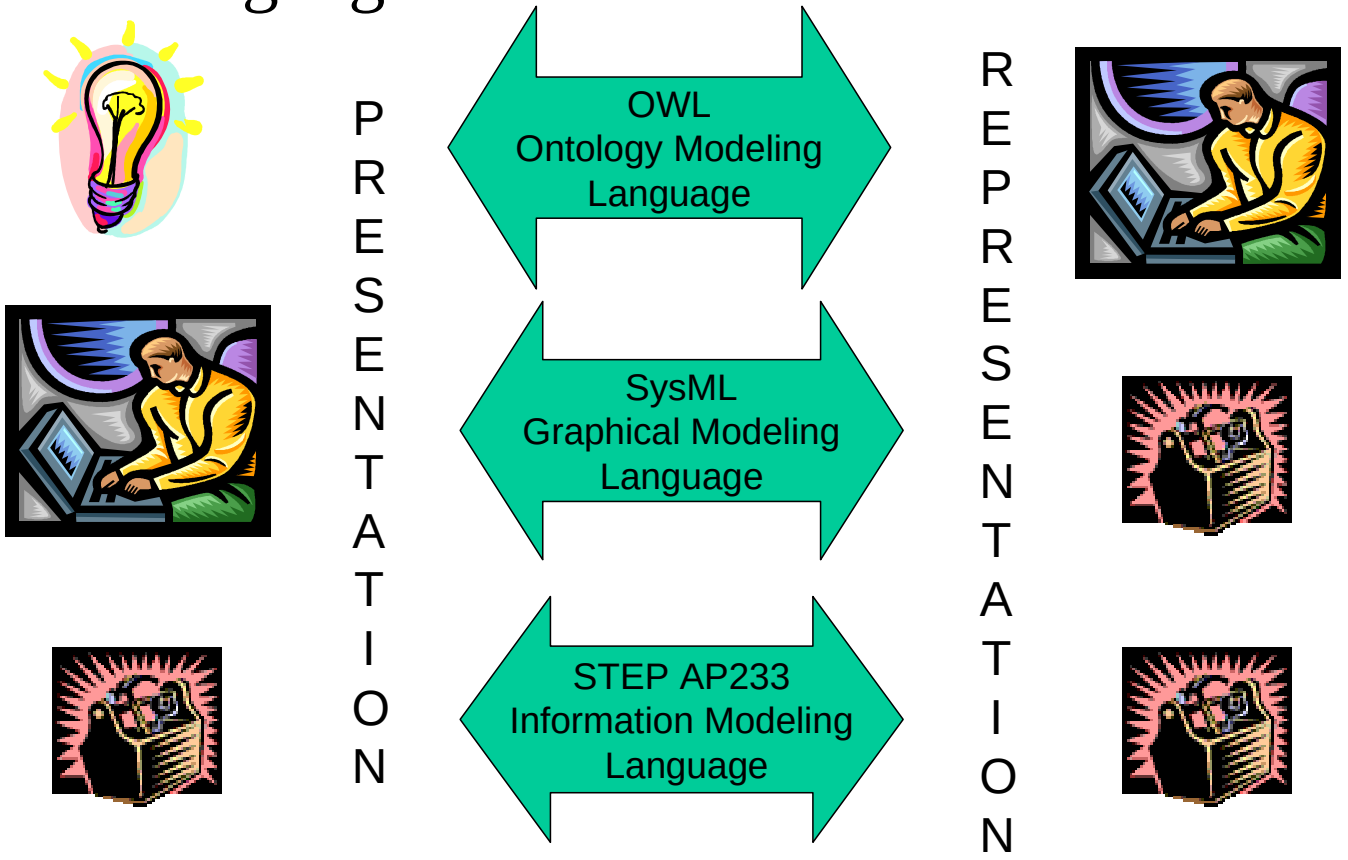


Where to start ?
SysML and AP233 overlaps



http://www.omgwiki.org/OMGSysML/doku.php?id=sysml-ap233:mapping_between_sysml_and_ap233

AP233 positioning (source DOD



SysML > AP233 Mapping

Blocks

SysML	AP233
Block	System _view_definition → System_version → System
Composition Association	Assembly_component_relationship relating two System_view_definitions
Generalization	View_definition_relationship + Classification ('Generalization')
Part/Part Definition	View_definition_relationship
Nested Part	Component_upper_level_identification
Multiplicity	Next_assembly_usage.quantity
Connector	Interface_connection
Port/Port Definition	Interface_connector
Delegation Port	Hierarchical_interface_connector

http://www.omgwiki.org/OMGSysML/doku.php?id=sysml-ap233:mapping_between_sysml_and_ap233

+ Value-properties, Constraints, Activities, State-machines, Use-cases Requirements, Packages, metadata,

Using SysML and STEP/AP214/233

- STEP has implemented EXPRESS as a representation
- SysML > xmi exists
  - http://www.omg.org/spec/SysML/20080501/SysML-profile.xmi
- SysML / AP233 mapping incomplete
  - Requirements, System
  - http://www.omgwiki.org/OMGSysML/doku.php?id=sysml-ap233:mapping_between_sysml_and_ap233
- Preferred approach ?
  - SysML > xmi
  - Xmi > AP233 represented in xml

Next meeting

- Propose
  - Spec alignment working meeting
    - Sept 21st 11am Eastern

Any other business ?

Summary

Thank you

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