OSLC PLM extensions proposal

Oct 4th 2011

V0.6

Backup materials

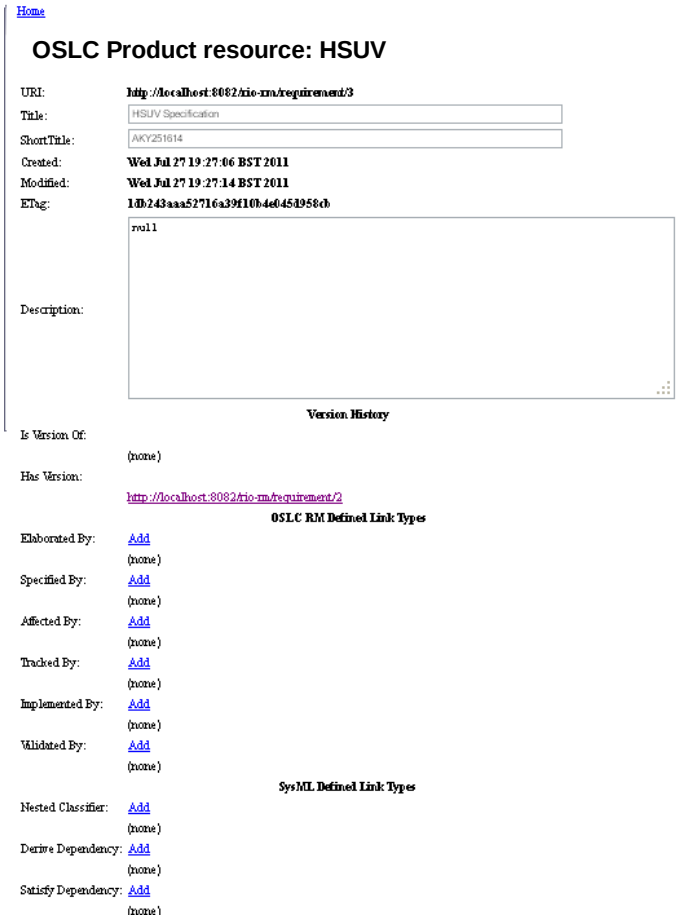
Gray Bachelor (see acknowledgements within

- Examples and detailed workings
- Industry terms
- Links

Lyo example

- Identify product say via a picker from a Product service provider

List of Product Resources, their versions or their proxies

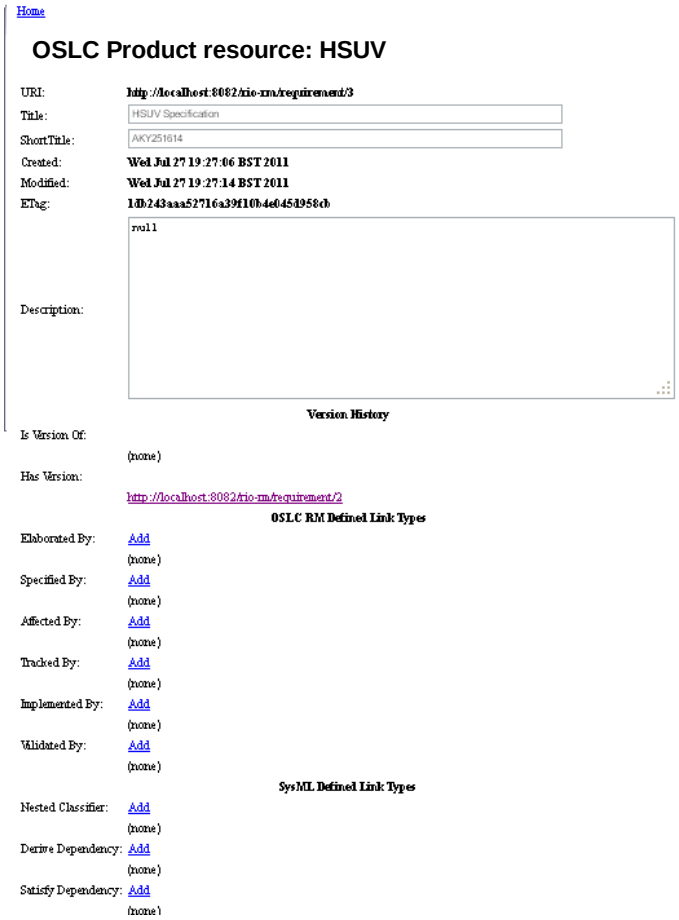


Mockup

Lyo example

- Identify product say via a View from a Product service provider

List of Product Resource or their proxy version (Tree view



Mockup

Product Resource

- Extends OSLC Core resource definition
- Recommended use of selected OSLC resource definitions
- Recommended approach to forming URIs from Application unique identities
- Recommended means to extend the terminology allowable
  - Additional namespaces
    - Industry standard e.g STEP
    - Proprietary e.g. PLMxml
- Optional
  - Version
  - Views
  - Variant expressions

Giving product identity to an OSLC resource

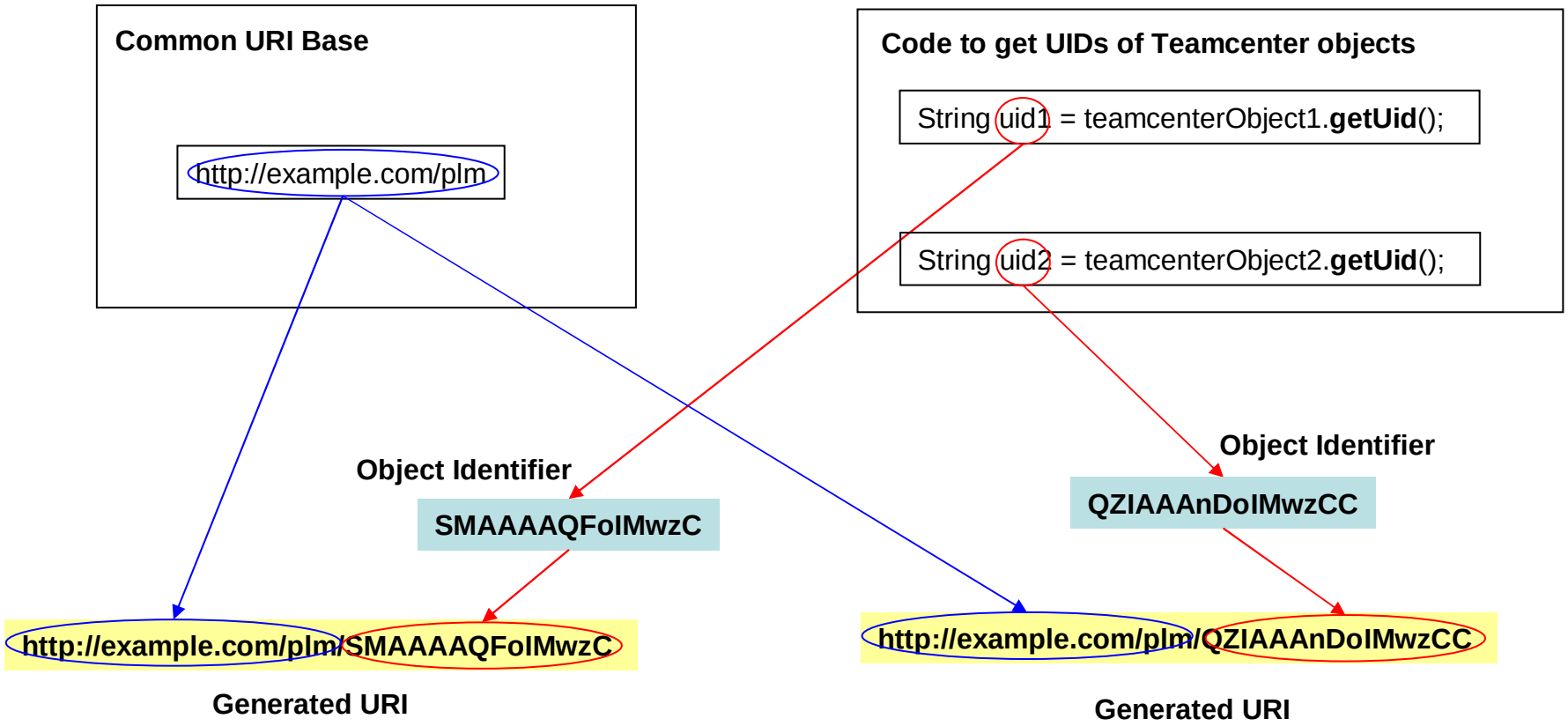
Proposed as a convention

Product resource example	OSLC Resource definitions	Format	Real world example e.g. TC	Restrictions
Product number	oslc:shortTitle	XMLLiteral	Property *item_id* of Class *Item*	Characters as valid inside an XHTML element.
Product name	dcterms:title	XMLLiteral	Property *object_name* of Class *WorkspaceObject*	
Product description	dcterms:description	XMLLiteral	Property *object_desc* of Class *WorkspaceObject*	
Application unique id	dcterms:identifier	String	UID of Class *ModelObject*	RO Assigned by service provider

Limitations

1. Product numbers and names may include versions or sequences embedded
2. Products may have multiple identities
    1. Aliases or alternative names
    2. Product family membership

Approach to forming URIs from Application unique IDs

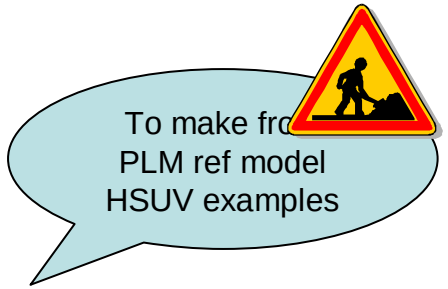


Approach to adopting external namespaces

- Example with allows use of Teamcenter NodeIDs using the PLMXML schema
- <applicationRef xmlns="http://www.plmxml.org/Schemas/PLMXMLSchema#">
- <ApplicationRef xmlns="http://www.plmxml.org/Schemas/PLMXMLSchema#" rdf:nodeID="node163c1ee6kx1">
- <version xmlns="http://www.plmxml.org/Schemas/PLMXMLSchema#">2.0</version>
- <application xmlns="http://www.plmxml.org/Schemas/PLMXMLSchema#">TOPCASED_XMI</application>
- <label xmlns="http://www.plmxml.org/Schemas/PLMXMLSchema#">_bqSmIGIeEeCPfc4lo-UQrg</label>
- </ApplicationRef>
- </applicationRef>

http://www.plm.automation.siemens.com/legacy/products/open/plmxml/docs/v1/documentation/plmxml.html
http://www.plm.automation.siemens.com/en_us/products/open/plmxml/schemas.shtml

RDF examples



- Product structure

Product X

Product X version 1 — Product X view definition 1 →
- Product A, version 1, PVD 1
- Product B, version 2, PVD 2
- Product C, version 3, PVD 3

Product X version 2 — Product X view definition 2 →
- Product A, version 2, PVD 1
- Product B, version 2, PVD 2
- Product C, version 4, PVD 3
- Product D, version 1, PVD 4

Example of a Product Resource Representation with preferred usage of selected Core resource definition

PLM Product Resource

```
<?xml version="1.0" encoding="UTF-8"?><rdf:RDF xml:base="http://mdse-server1.trl.ibm.com:8080/oslc-
tc/ModelObject/Product/A9NAAAnDoIMwzC" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:oslc="http://open-services.net/ns/core#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rio="http://open-services.net/ri/rio/">
  <rdf:Description rdf:about="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/Product/A9NAAAnDoIMwzC">
    <rdf:type rdf:resource="http://open-services.net/ns/plm#Product"/>
    <dcterms:creator rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:contributor rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:title>DualClutchTransmission</dcterms:title>
    <dcterms:description>Dual Clutch Transmission 1</dcterms:description>
    <dcterms:identifier>A9NAAAnDoIMwzC</dcterms:identifier>
    <oslc:shortTitle>000349</oslc:shortTitle>
    <dcterms:hasVersion rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductVersion/QZIAAAnDoIMwzC"/>
  </rdf:Description>
</rdf:RDF>
```

To make from PLM ref model HSUV examples

PLM Product Version Resource

```
<?xml version="1.0" encoding="UTF-8"?><rdf:RDF xml:base="http://mdse-server1.trl.ibm.com:8080/oslc-
tc/ModelObject/ProductVersion/QZIAAAnDoIMwzC" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:oslc="http://open-
services.net/ns/core#" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rio="http://open-services.net/ri/rio/">
  <rdf:Description rdf:about="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductVersion/QZIAAAnDoIMwzC">
    <rdf:type rdf:resource="http://open-services.net/ns/plm#Product"/>
    <dcterms:creator rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:contributor rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:title>DualClutchTransmission</dcterms:title>
    <dcterms:description>Dual Clutch Transmission 1</dcterms:description>
    <dcterms:identifier>QZIAAAnDoIMwzC</dcterms:identifier>
    <oslc:shortTitle>000349</oslc:shortTitle>
    <dcterms:isVersionOf rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/Product/A9NAAAnDoIMwzC"/>
  </rdf:Description>
</rdf:RDF>
```


Acknowledgement: Nakamura-san TRL

Example of a Resource Representation with preferred usage of selected Core resource definition

AM Resource as Product

```
<?xml version="1.0" encoding="UTF-8"?><rdf:RDF xml:base="http://mdse-server1.trl.ibm.com:8080/oslc-
tc/ModelObject/Product/A9NAAAnDoIMwzC" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:oslc="http://open-services.net/ns/core#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rio="http://open-services.net/ri/rio/">
  <rdf:Description rdf:about="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/Product/A9NAAAnDoIMwzC">
    <rdf:type rdf:resource="http://open-services.net/ns/am#Resource"/>
    <dcterms:creator rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:contributor rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:title>DualClutchTransmission</dcterms:title>
    <dcterms:description>Dual Clutch Transmission 1</dcterms:description>
    <dcterms:identifier>A9NAAAnDoIMwzC</dcterms:identifier>
    <oslc:shortTitle>000349</oslc:shortTitle>
    <dcterms:hasVersion rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductVersion/QZIAAAnDoIMwzC"/>
  </rdf:Description>
</rdf:RDF>
```

To make from PLM ref model HSUV examples

AM Resource as ProductVersion

```
<?xml version="1.0" encoding="UTF-8"?><rdf:RDF xml:base="http://mdse-server1.trl.ibm.com:8080/oslc-
tc/ModelObject/ProductVersion/QZIAAAnDoIMwzC" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:oslc="http://open-
services.net/ns/core#" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rio="http://open-services.net/ri/rio/">
  <rdf:Description rdf:about="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductVersion/QZIAAAnDoIMwzC">
    <rdf:type rdf:resource="http://open-services.net/ns/am#Resource"/>
    <dcterms:creator rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:contributor rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:title>DualClutchTransmission</dcterms:title>
    <dcterms:description>Dual Clutch Transmission 1</dcterms:description>
    <dcterms:identifier>QZIAAAnDoIMwzC</dcterms:identifier>
    <oslc:shortTitle>000349</oslc:shortTitle>
    <dcterms:isVersionOf rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/Product/A9NAAAnDoIMwzC"/>
  </rdf:Description>
</rdf:RDF>
```


Acknowledgement: Nakamura-san TRL

Product view resource example

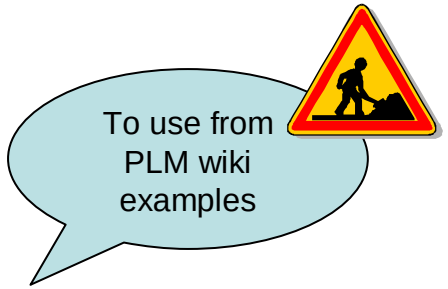
PLM Product View Definition Resource


```
<?xml version="1.0" encoding="UTF-8"?><rdf:RDF xml:base="http://mdse-server1.trl.ibm.com:8080/oslc-
tc/ModelObject/ProductView/AxJAAAWjoIMwzC" xmlns:dcterms="http://purl.org/dc/terms/" xmlns:oslc="http://open-
services.net/ns/core#" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rio="http://open-services.net/
  <rdf:Description rdf:about="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/QZIAAAnDoIM
    <rdf:type rdf:resource="http://open-services.net/ns/plm#ProductView"/>
    <dcterms:creator rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/_UNKNOWN_USER_"/>
    <dcterms:title>DualClutchTransmission</dcterms:title>
    <dcterms:description>Dual Clutch Transmission 1</dcterms:description>
    <dcterms:identifier>QZIAAAnDoIMwzC</dcterms:identifier>
    <oslc:shortTitle>000349</oslc:shortTitle>
    <dcterms:hasPart rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/QIFAAAnDoIMwzC"/>
    <dcterms:hasPart rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/QxMAAAnDoIMwzC"/>
    <dcterms:hasPart rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/Q5PAAAnDoIMwzC"/>
    <dcterms:hasPart rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/gFCAAAnDoIMwzC"/>
    <dcterms:hasPart rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/gNFAAAnDoIMwzC"/>
    <dcterms:hasPart rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/gVIAAAnDoIMwzC"/>
    <dcterms:hasPart rdf:resource="http://mdse-server1.trl.ibm.com:8080/oslc-tc/ModelObject/ProductView/gdLAAAnDoIMwzC"/>
</rdf:Description>
</rdf:RDF>
```


To make from PLM ref model HSUV examples

Acknowledgement: Nakamura-san TRL

RDF examples



- Requirements structure

Req collection Y

Req coll Y version 1 Req view definition 1 → Req A, version 1, RVD 1
Req B, version 2, RVD 2
Req C, version 3, RVD 3

Req Coll Y version 2 Req view definition 2 → Req A, version 2, RVD 1
Req B, version 2, RVD 2
Req C, version 4, RVD 3
Req D, version 1, RVD 4

Requirements Resource definitions with PLM extensions: Examples on the OSLC wiki

Req #	Scenario req	Scenario version	Usage example	Relationships	Notes
45	REQ-20188-A	A	Requirement Version	isVersionOf 46	
46	REQ-20188	Base	Base Requirements Resource	hasVersion 45 hasVersion 49	
49	REQ-20188-B	B	Requirement Version	isVersionOf 46	
61	REQ-20186-A-_view	A	Requirement View with Variant expression	subject 62 hasPart 64 hasPart 67	Variant expression are applied to the hasPart URI
62	REQ-20186-A	A	Requirement Version	isVersionOf 63	
63	REQ-20186	Base	Base Requirements Resource	hasVersion 62	
64	REQ-20187-A_view	A	Requirement View	subject 65	
65	REQ-20187-A	A	Requirement Version	isVersionOf 66	
66	REQ-20187	Base	Base Requirements Resource	hasVersion 65	

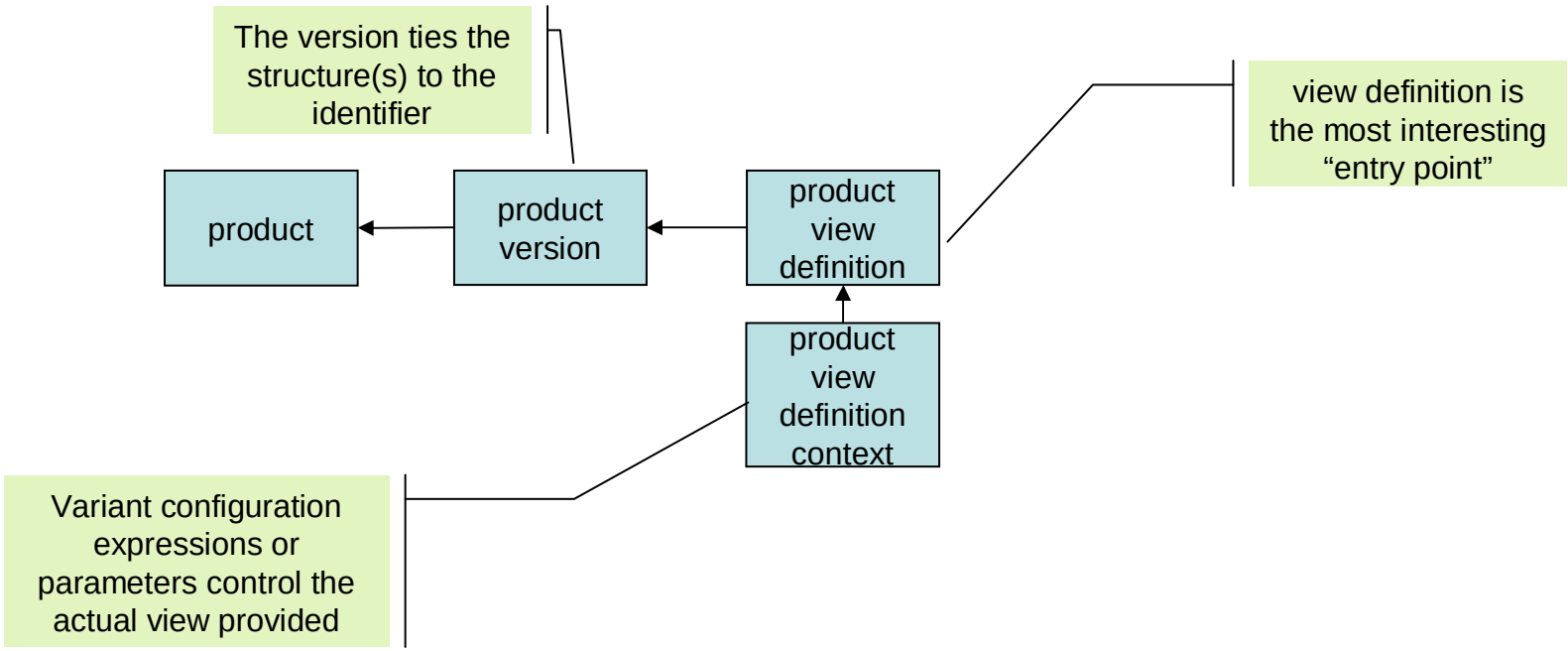
Extension to include variant expressions

- Note Req61 / 20186 has this in the HSUV model

Lyo example

- TC Product information
- TC Requirement information

Industry standard product representation: Basic concept



Product

- Within ISO10303 “A **Product** is the identification of a product or of a type of product. is a collector of data common to all revisions of the **Product**.
- NOTE 1 Products that this entity data type can represent, include: products existing in the real world; products that may come into existence as a consequence of some realization process. This includes parts and documents; products that are functions”
- For OSLC PLM The HSUV is a product that could be represented by the entity data type Product.
- Within ISO10303 “ A product may have zero or more versions. A version of a product is represented with an instance of the entity **Product_version** or of one of its specializations.
- Within ISO10303 “Attributes
  - id
  - name
  - Description
- EXAMPLE 3 Part numbers, stock item numbers, and serial numbers are examples of product identifiers.

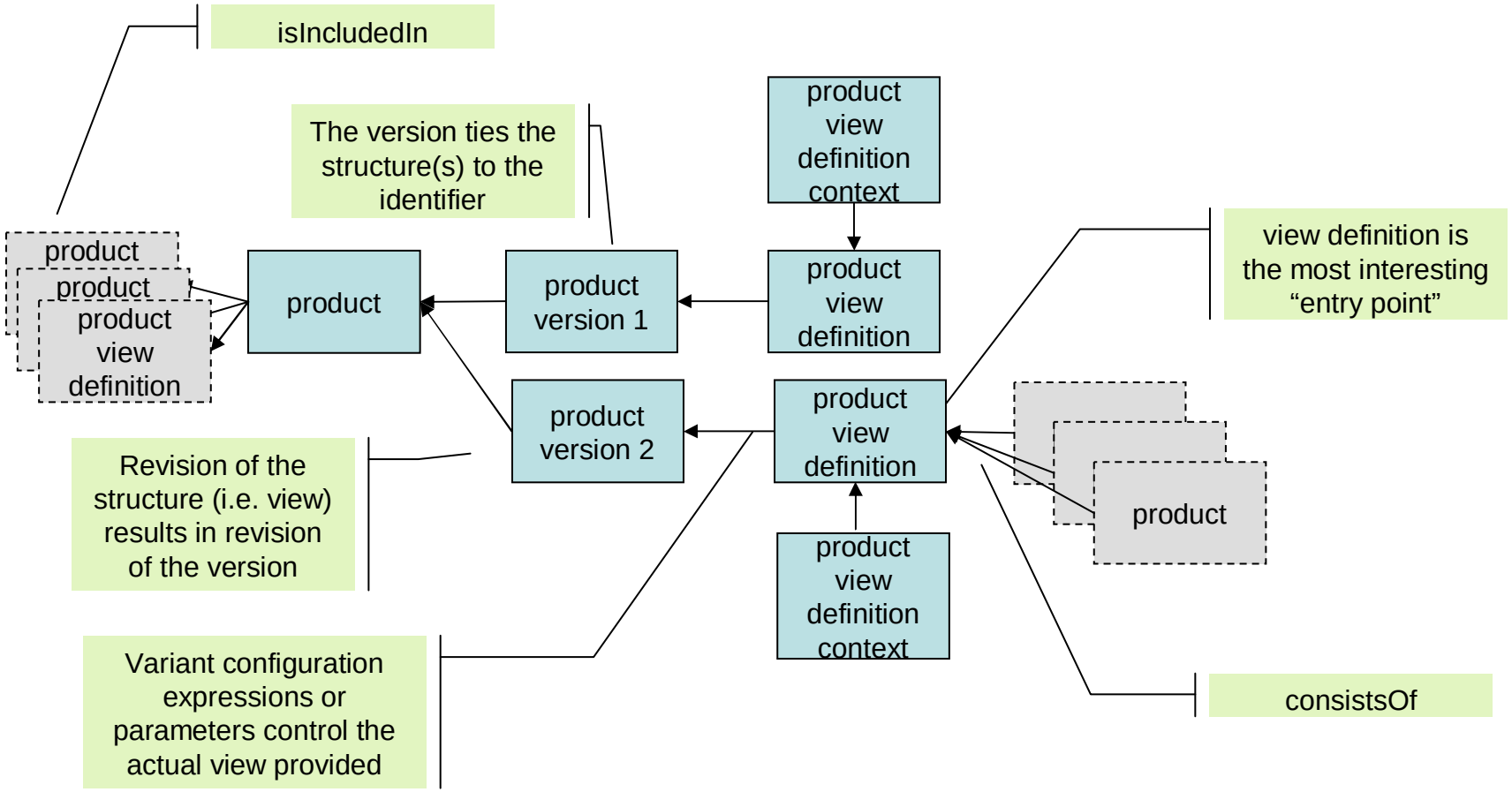
Product version

- Within ISO10303 “A Product_version is a revision of a Product
- It is a collector of the definitions of this revision of the Product.
- NOTE The set of all instances of Product_version of the same Product represents the history of the product
- Attributes
  - id: the identifier for the Product_version.
  - description: the text that provides further information about the Product_version. The value of this attribute need not be specified
  - of_product: the Product, the Product_version identifies a version of.

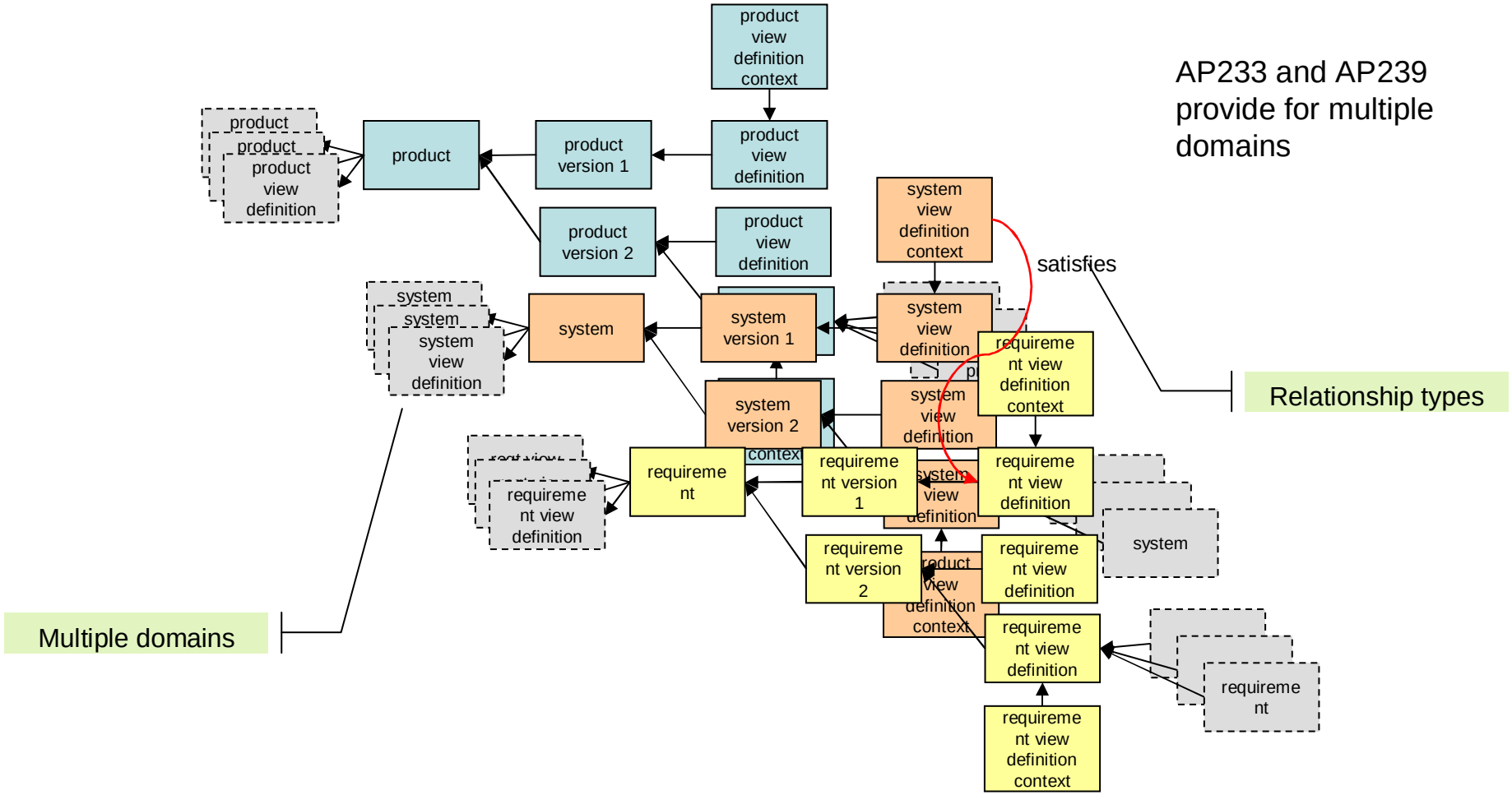
Product view definition

- Within ISO10303 “A Product_view_definition is a characterization of a Product_version, relevant in one or more application domains and for one or more life cycle stages.
- A Product_view_definition is a collector of the properties that characterize the Product_version in the defined_version, initial_context and additional_contexts.
- Product view definition has an initial and additional contexts defined by View_definition_contexts
  - Application domain
    - “Electrical”, “Process planning”
  - Lifecycle state
    - “Concept”, “Develop”
- For OSLC PLM the design of the HSUV and the as-built description of the HSUV can be represented as two instances of Product_view_definition.

Industry standard product representation: Basic concept in action



Industry standard product representation: Advanced multi-domain concepts



Useful links

- OSLC PLM proposals
  - http://open-services.net/bin/view/Main/Plm20SpecExtensions
- Core Spec
  - http://open-services.net/bin/view/Main/OslcCoreSpecification
- CM Spec
  - http://open-services.net/bin/view/Main/CmSpecificationV2
- AM Spec
  - http://open-services.net/bin/view/Main/AmSpecV2
- RM Spec
  - http://open-services.net/bin/view/Main/RmSpecificationV2
- ISO STEP definitions
  - http://stepmod.cvs.sourceforge.net/viewvc/stepmod/stepmod/data/modules/

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- Particular thanks to
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  - Hisashi Miyashita, IBM Research
  - Andreas Tsiotsias, IBM