**Title of session**: RDF bindings for statistical data and metadata

**Day**: Thursday

**Participants**: Achim Wackerow, Wendy Thomas, Eric Prud’hommeaux, Gary Gerg-Cross, Guillaume Duffes, Daniella Meeker, Diedre Lungley, Nick Car, Gregg Kellogg

**Chair**: Achim Wackerow

**Note taker**: Wendy Thomas

**Background information**

Approach:

* Group by things that are used together based on example data

Basic production:

* PIM (XMI) to PSM (XMI) using a configuration file
* OWL/RDF-S and other important vocabularies: DC, DCAT, ORG, PROV, FOAF, SKOS/XKOS, CSVW, PAV, DataCube
* We need to clarify the vocabularies that are introduced in the configuration file

Criteria:

* Being used
* Strong Potential
* Endorsed by W3C – might be rare
* Mapping exists between similar vocabularies (i.e. DC and PROV, DC and FOAF)
* Use what is useful to the people doing it
* Only a couple of properties of Dublin Core get used but are very “book” and “publication” centric
* SIO (Scientific Integration Ontology) is another we should look at (see Michel from last year

Mapping is done at the model level

* Property by property and relationship by relationship
* Iterative process of finding what is clear relationship
	+ May have to edit for a clean match
	+ Remaining items
		- Check on-line for a vocabulary
		- Create a primary DDI Vocabulary
			* Could be an extension/qualification of an existing vocabulary
* Order: RDF, RDF-S, OWL, PROV,
* If you put in PROV Person, it will infer that it is FOAF Person; but many sparkle queries may not do that
* As you go along you want to extend existing broader or looser concepts and relate any DDI vocabulary terms
* If it is equivalent use the OWL or others say that the tools are not used If what you’re using is the same thing use the existing and you can use more than one (both FOAF person and PROV person)
* Most is used without any inference at all
* Model the selected RDF classes in the UML model in a separate package in the model which could then be related to the classes
* Use in Model:
	+ Make sure they are using inference
	+ Leverage the same fragments and determine if we are saying something sensible
	+ If we aren’t doing inference which vocabulary term is going to best serve the populace
* How much of an open world do you expect to use DDI within; where you need to intersect with specific vocabulary terms
* Mapping:
	+ If there is a one to one relationship the configuration file needs
	+ Pushing it from the configuration from the configuration file to the UML
		- Reduces duplication between XMI and RDF configuration file
	+ By putting out overlap lists (PROV and FOAF for example)
		- Put out list of classes used in each vocabulary including overlap
		- Equivalencies are difficult to maintain and can have unintended consequences
		- Rely on external mappings rather than express internally
		- Everywhere you are using FOAF Agent you can use DC Agent
			* If you have a new thing you have to say that it is a sub-class of both a FOAF Agent and DC Agent
* Map out an example to PROV which, unlike many other vocabularies, assumes or depends on inference
* Most people will do inference free sparkle queries
	+ You’d have to go through extra steps to resolve into PROV
* Configuration:
	+ UML (PIM) transform to PSM (OWL/RDF) transform to syntax
	+ Configuration files exist for each transformation
	+ If the PSM is the equivalent to the PIM do you need the first configuration?
		- Annotation could come out at a separate stream
* DDI use of these vocabularies is for the purpose expressed by the DDI namespace not to be a PROV centric
* Is there a reason for having a PSM?
	+ Consistency in production
	+ If it’s easy its cheap, but if it’s easy is it needed?
	+ Should the rules be imbedded in the program or are the rules in the configuration file?
	+ Consistency in rules update
* What types of changes are you trying to future-proof against?
	+ What structures in the PIM mean?
	+ Modeling change in terms of structure (not content)
* Round-trip issues for lossless transfer
	+ In XML land you are passing a document boundary (instance to instance, document to document)
	+ In general, a relationship goes from on object to another
		- Information resources are a set of objects(?)
	+ In XML there are references (external/internal). While there is nothing stopping you imbedding a new document or including it by reference. This has a consequence in XML. In RDF you have chains of triples
	+ All the questions that you might want to ask can only be asked in our triple store. In other instances, you want to go into an external store. Certain engines can do this but often it is documentation

## Review of the RDF document by Richard Cyganiak

Do the RDF names spaces need to be aligned with the XML

* If you have to resolve the namespace
* You can use the same one because
	+ Identify a namespace and resolution via namespace

Must it be resolvable?

* Should be resolvable with content negotiation

Classes – start with upper case

Abstract classes –

* We have abstract classes in UML but abstract is not supported by
* Object oriented is used in a strict sense
* Abstract usage in the bindings
	+ Abstact nature gets lost, it never gets used as an abstraction but as a means of identifying the allowed subtypes (similar to how we have done this in the XML bindings)
	+ You can declare it in the OWL ontology as say a label (non-executable) can write a SHACL or ShEx rule.
		- Extended validation of documents
			* SHACL business based
			* ShEx academic based
* Use of cardinality
	+ Semantic way – no cardinality constrains (theoretical principal)
	+ Real world – should you do in OWL? Yes, but it is not enforced
	+ Put them in at least as a theoretical expression of what you want even if they cannot be currently enforced
		- SHACL and ShEx should eventually provide some enforcement
* XSD data types
	+ Yes, these can be used directly in RDF
	+ Supports full sub-types
* Mapping to other vocabularies
	+ Shouldn’t use ‘same as’ because you are making a strong claim (including restrictions)
	+ Equivalent is also very strong
	+ “subclassOf” or “subpropertyOf”
	+ Don’t do secondary or tertiary languages unless
	+ Should avoid others like “similar”
* There a requirement of ordering within collections
	+ OrderList ontology – miniature ontology – just a sequence
	+ Will need to make our own as there doesn’t seem to be a language to do that
	+ DISCO used a SKOS construct – but we should use a native based ontology order
* Jena’s rdfcat to merger generated RDF/XML with the vocabulary mappings and write result to Turtle
	+ Merge to a single store (Jena is an example of a tool to do this)

## FHIR perspective

Use of references (relationships)

* Embedding versus reference
* If these are separate documents, then reference can provide you with extra information
* Is it stupid to go through an extra arch to get to the information?
* When dealing with documents that reference other documents are they first class objects that have multiple properties with them (UUID’s etc.)
	+ DDI does have the requirement of additional information
	+ DDI has objects that get referenced by multiple locations
* May stick them in a graph
* Use a name-graph store (have to put in both graph identification and object)
* There are RDF stores where the default draft is the unit of all the named graphs
* Named graphs help support grabbing everything in a graph but slows down querying across graphs
* Rest protocol used
* A data set could have a default graph and any number of named graphs – you can pack multiple documents in one document
* You need something like TRIG to create collections of files

Lossless round-tripping

* From Binding A to Binding B and back again
* Both JSON XML go from an ordered tree to a graph
	+ Create a Tree root and node role (hierarchy)
* If you try to do this without going to the model, you would probably found you did go through the model (you need to know the schema in order to spit the graph content into the right tree order)
	+ If sequencing is not an issue you can forget about a lot of things such as putting ordinals on things, consulting the schema for order (RDF to XML),
	+ In RDF if you have an order (ordinal) you need to use the DDI ordering as the general RDF ordering does not translate (as the XML has no order)
	+ Preference of No Order option if available in any binding
* Issue of multiple tree roots
	+ If you go in from an object (i.e. Question) up to the Tree Root a single object might have multiple Tree Roots because it is included in multiple documents by external reference
	+ Decide what the root element is…derive the root element
	+ A “reference” in this case is one that is an arc reference rather than an XML version of a reference i.e. nesting
	+ We may not need tree root because it is clear by arching
	+ You can actually provide a noderole
		- Fhir:noderole value fhir:treeroot
* Materializing datatypes
	+ Use RDF friendly datatypes
	+ xsd datatypes
	+ Sparql uses only datetime for comparison, not between various date – the behaviors are defined by not required in implementations
* Other risks involving round trips
	+ Using XML, RDF and JSON
	+ Couple of program libraries
	+ We will need a notion of equivalence
		- An expensive tool that does canonicalization (those that do the same signature)
			* A whitespace sensitive way of doing this
			* www.w3.org/TR/xml-c14n section 3.x
		- Can’t really do this with Turtle – what do you do with a blank node, giving it an id
			* End of line blanks, different end of line, etc. need to be addressed
		- Use canonicalization as a black box
	+ FHIR did a lot of reverse engineering to get this legible for users
		- hl7-fhir.github.io/ovservation-example.jason.html
* Extensibility
	+ Mapping is a problem as RDF allows writing extra triples; detecting these triples is hard because is it something we know about and the XML works differently
	+ FHIR is not good

*[Links to any relevant documents*]

Linked Open Vocabularies [**http://lov.okfn.org/dataset/lov**](http://lov.okfn.org/dataset/lov)

[RDF Schema/OWL Binding for the DDI Model - Richard Cyganiak](https://ddi-alliance.atlassian.net/wiki/download/attachments/491669/RDF%20Schema%20Binding%20from%20the%20DDI%20Model%20v3.1.docx?version=1&modificationDate=1445413241579&api=v2)

**Decisions**

*[Please note any proposals agreed]*

**Issues requiring further discussion**

*[Please note pros and cons for different positions and the reasoning for them]*

**Is there a need for a continuation of this discussion?**

*[Possible options are further session, plenary, or evening session]*

**Is there a need for a longer document to continue this discussion?**

*[Please note the specific subject and who is going to do this]*