

Electronic Healthcare Record (EHR) with Terminology in Semantic Web

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Background

- Worked on RDF representation of FHIR in HL7 ITS WorkGroup
- SNOMED ontology indicates that Coded Element is not the optimal binding
- Continued to seek a Semantic Web optimum
- Developed executable on an Open Data Platform which supported Semantic Web
- The Ontology of an EHR can execute

HL7 RDF Instance

(from HL7 FHIR RDF in turtle)

- [a fhir:AllergyIntolerance;
-
- fhir: AllergyIntolerance.code [
- fhir:CodeableConcept.coding [a <http://snomed.info/id/409137002>;
- fhir:Coding.system [fhir:value "http://snomed.info/sct"];
- fhir:Coding.code [fhir:value "409137002"];
- fhir:Coding.display [fhir:value "No Known Drug Allergy
(situation)"]
-]
-]
-]
- Verbatim RDF interpretation of FHIR with **terminology type added**

SNOMED OWL

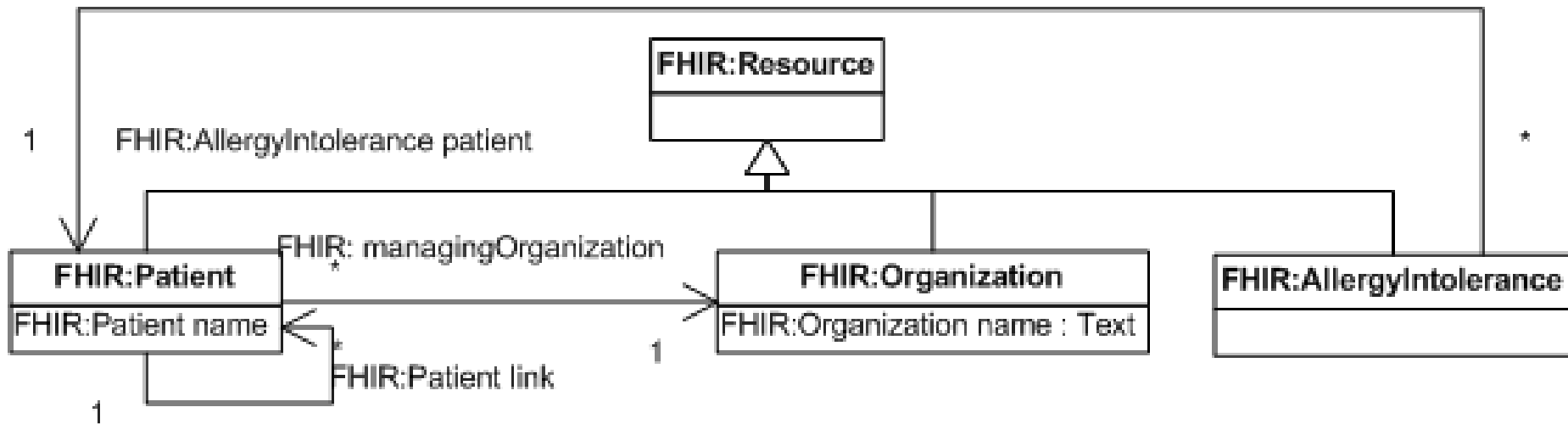
released by IHTSDO

- `<http://snomed.info/id/409137002> rdf:type owl:Class ;`
 - `rdfs:label "No Known Drug Allergies" ;`
 - `rdfs:subClassOf <http://snomed.info/id/138875005> .`
-
- 138875005 is the root SNOMED concept

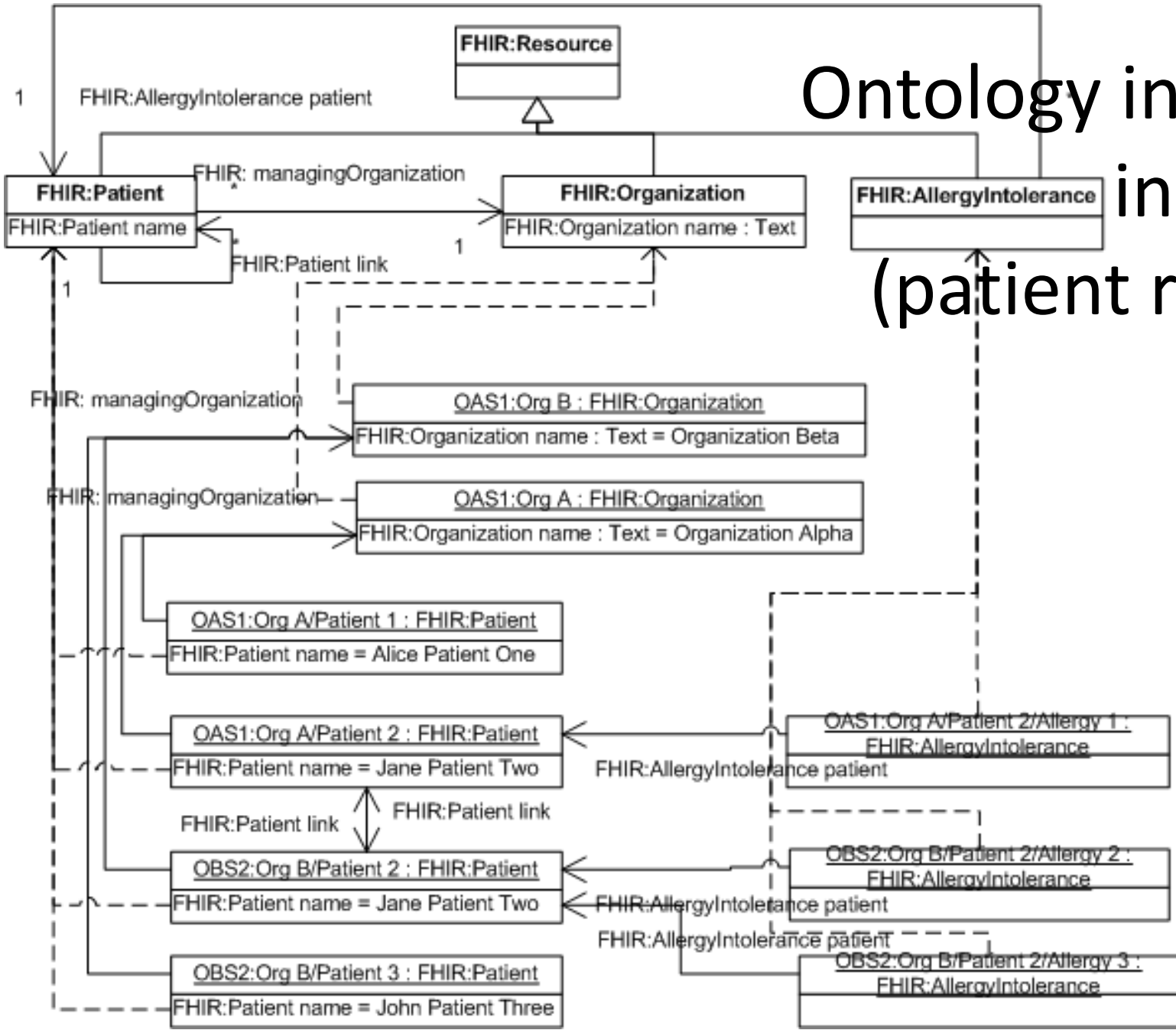
Binding Simplification

- [a fhir:AllergyIntolerance;
 a http://snomed.info/id/409137002;
- other properties
-];
- This breaks with the verbatim representation

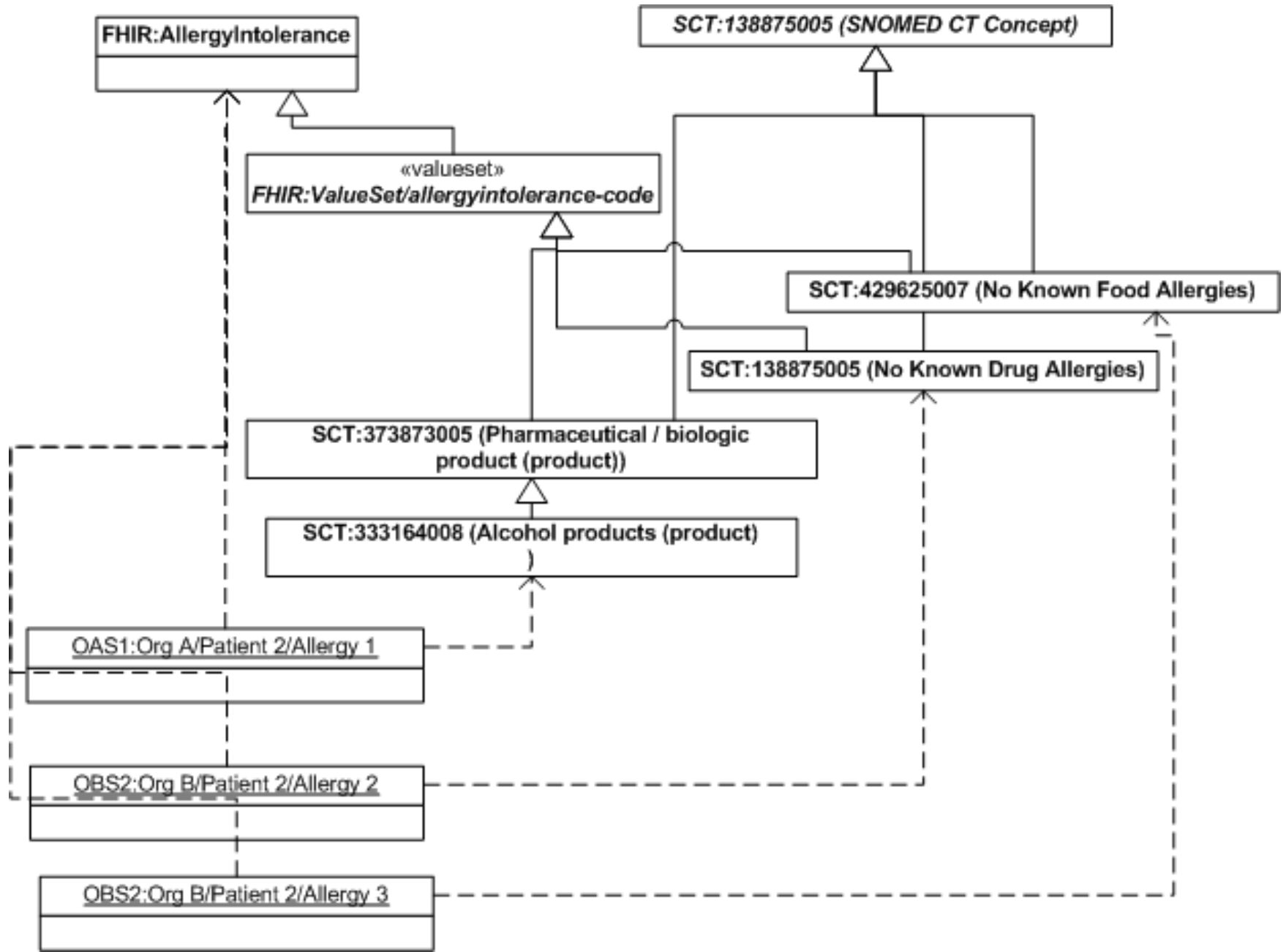
Example FHIR Ontology (T-box)



Ontology including instances (patient records)



Binding to Terminology



Proof of Concept

- Semantic Web platform (Semantic MediaWiki) executes the Ontology
- Model is translated into SMW PSM
 - Classes are Categories, Subcategories
 - Associations/Attributes are Properties
- Templates define the visual presentation including run-time embedded queries (SPARQL like)
- Forms are developed for Health structured data capture
- Took < 1 week to implement

Conclusion

- Open Data Platform allows a Model to become executable
- Implements some of the OMG MDA concepts
- Semantic MediaWiki (SMW) was a successful start
- Platform needs to be hardened
- Platform is not Health Domain specific and is widely used
- Development productivity is accelerated

Links

- https://www.semantic-mediawiki.org/wiki/Semantic_MediaWiki
- https://wikiapiary.com/wiki/Semantic_statistics
 - There are **1,858** wikis on WikiApiary that use Semantic MediaWiki to store more than **1,111,264,536** values for **1,249,149** properties. For **1682** of them statistical information is collected
- <http://wiki.cancer.org.au/australia/Guidelines>
 - Wiki-based clinical practice guidelines will ultimately improve the standard and consistency of clinical practice according to the best and most recent scientific evidence available. It is a service provided by Cancer Council Australia to inform clinical practice.
- http://www.wikidoc.org/index.php/Main_Page
 - WikiDoc is an open source website that allows an international community of healthcare professionals to add and edit medical content in a process termed co-creation. WikiDoc is designed to facilitate collaborative authoring

Demonstration