

Linked Data in Architecture and Construction (LDAC)

3rd International Workshop, July 2015 Eindhoven

Abstract

The topic of the 2015 LDAC workshop is *"The use the Web of Data technologies for building information management in diverse practical use cases"*. The interest to this question arises from the expected benefits such as the ability to easily link building information models to and from external data sources, to open the models to new use cases and applications, to enable truly decentralised publication of models, to support loosely coupled interoperability through cross-model linking, and to utilise reasoning and other services developed in Semantic Web research. New use cases arise in various contexts. The 2015 LDAC event provides an opportunity to present and openly discuss these use cases.

Workshop Chair

Jakob Beetz

Department of the Built Environment, Eindhoven University of Technology, Eindhoven, The Netherlands

Organising Committee

Jakob Beetz

Department of the Built Environment, Eindhoven University of Technology, Eindhoven, The Netherlands

Pieter Pauwels

Department of Architecture and Urban Planning, Ghent University, Ghent, Belgium

Kris McGlinn

Department of Computer Science, Trinity College Dublin, Dublin, Ireland

María Poveda Villalón

Department of Artificial Intelligence, Universidad Politécnica de Madrid, Madrid, Spain

Link to presentations

<https://bw-dssv17.bwk.tue.nl/public.php?service=files&t=e3d8a27a6c9fa6094f1a0669580a60bf>

Program

Wednesday, July 15th

09:30 EG-ICE Keynote Topic: Intelligence: SPACE | DESIGN. SYNTAX. SEMANTICS. COGNITION.

10:30 Break

11:00 EG-ICE session 7: Logic, graphs and data structures

12:30 Closing EG-ICE

13:00 Lunch

14:30 **Jakob Beetz**: Opening LDAC

15:00 Plenary Presentations

Nam Vu Huang, Seppo Törmä

Layered ifcOWL conversion

Pieter Pauwels, María Poveda Villalón

Towards an industry-wide ifcOWL: choices and issues

16:00 Break

16:30 Plenary Presentations

Peter Bonsma

Geometry within OWL, real use of ifcOWL and CMO with Extensions for Proficient

Hendro Wicaksono

Rules integration in OWL BIM

Walter Terkaj

Ontology-based Factory Design & Management

18:30 Wrap-up

20:00 LDAC Dinner

Thursday, July 16th

9:30 Plenary Presentations LDAC

Leif Granholm

OGC activities regarding semantic web

Daan Oosting

Use cases for linked data

Michel Böhms

Linked Data in VCON

Tarcisio Mendes de Farias, Ana Roxin

Semantically Adapting IFC Relations into OWL

Pim van den Helm

IFC Model checking with N3 and reasoning Linked building Data

12:00 Lunch

13:15 Parallel discussion and work tracks:

1. Use cases track

2. Technical track

18:30 Plenary Concluding Discussion

20:00 LDAC Dinner

Friday, July 17th

09:00 Get Together

09:30 LDAC Hands-on Sessions

Kris McGlinn

Converting Tabular Data to RDF using CSVW

Nick Kaklanis

Converting OWL to JSON-LD

Matthias Weise, Pieter Pauwels

Best practices for publishing and linking BIM data: scoping of IFC models (MVD and IfcDoc introduction)

12:00 Lunch

13:30 LDAC Hands-on Sessions

María Poveda Villalón, Pieter Pauwels

Introduction to Ontology Engineering: Tutorial

14:30 Wrap-up

Jakob Beetz

Closure, List of actions

Nam Vu Hoang

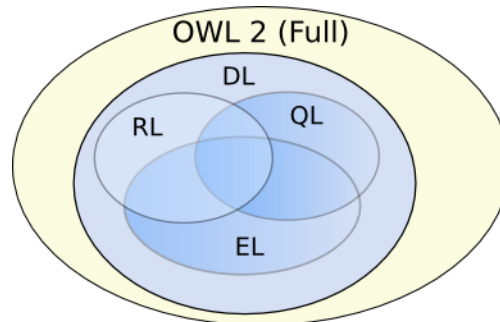
LDAC memories

16:00 Workshop end

Minutes Wednesday, July 15th

Nam Vu Huang, Seppo Törmä - Layered ifcOWL conversion

- RDF data shapes Group http://www.w3.org/2014/data-shapes/wiki/Main_Page
- comment Walter Terkaj: not only OWA: closed world assumption validation by Pellet ICV (Integrity Constraint Validator). Previously a Pellet plugin, now integrated in Stardog.
- Inverse attributes included in Nams converter?
- Michel, Robert: STEP WHERE rules contain valuable semantics and should go into the requirements.
- extends vs imports. Imports have an equivalent primitive in OWL. What is the proposal for the extends proposal?
- linked data vs. semantic web
- RDFS/OWL vs. REST API contracts for RDF resource representations
- “OWL supports inference, not validation”
- OWL DL / OWL EL / OWL RL / OWL QL



- No functions, rules, WHERE-constraints, derived attributes
 - “too hard to convert”
- Three layered ontologies. They could “extend” or “import” each other.
- comparison between OWL profiles

	ifcOWL-Simple (lightweight)	ifcOWL-Standard (normal)	ifcOWL-Extended (heavyweight)
OWL Profiles	OWL 2 EL/QL/RL/DL	OWL 2 RL/DL	OWL 2 DL
- Ontology metadata	+	+	+
- Basic constructs	+	+	+
- Type definitions	+	+	+
- Type inheritance relations	+	+	+
- Property definitions	+	+	+
- Property value ranges		+	+
- Keys of entity classes		+	+
- Property cardinalities			+
Time complexity	PTime	PTime (?)	N2ExpTime
File size	205 Kb	610 Kb	930 Kb
Triples / Classes / Properties	5200 / 1400 / 105	13200 / 2900 / 2000	22300 / 4200 / 2000
Global individuals	1315	1315	3

- Thomas Krijnen: “NOTDEFINED” ENUMERATOR values for different enums reuse?
- Simple data types are “wrapped” behind classes (`expr:REAL a owl:Class ; rdfs:subClassOf expr:Defined .`)
- Nam: Defined data types are “subclassed” (`ifc:IfcLengthMeasure a owl:Class ; rdfs:subClassOf expr:REAL .`)
- Nam: Aggregation data types are customly dealt, inspired by the Ordered List Ontology (OLO)
- INVERSE properties are not in OWL but they should go into ifcRDF.
- Walter: INVERSE can/should be included for non-conflicting cases
- Nam: No domains and ranges. Because they are not used for validation.
 - María: domains and ranges help reusability
 - might lead to helpful reasoning
- Naming
 - Nam proposes to use non-opaque URIs.
- Repeated values in STEP Physical file (SPF, ISO 10303:21) point to same resource

Pieter Pauwels, María Poveda-Villalón - Towards an industry-wide ifcOWL: choices and issues

- Two conversion implementations: Unintended fork, valuable/necessary confirmation, validation? Bundle efforts? (Prevent “Not invented here”)
- SELECT types are converted to unionOf declarations
- 1:1 domain / ranges, no super-properties
- OWL 1 DL
- Wrapped/boxed simple data types, following the same approach as Nam
- Issues:
 - Ontology name and provenance:
 - [<http://www.buildingsmart-tech.org/ifcOWL>](http://www.buildingsmart-tech.org/ifcOWL)
 - URI naming convention for object properties
 - [Attribute]_of_[Entity]
 - [Attribute]_of_[SUPERTYPE]
 - URI naming convention for individual Enumerations
 - [VALUE]_of_[EnumType]
- Comparison between approach Nam Vu Hoang / Seppo Törmä and Pieter Pauwels / Walter Terkaj:

		Pieter's & Walter's approach	Nam's & Seppo's approach
1	Number of ontologies for 1 IFC schema	1	3
2	Compatibility with OWL 2 EL/QL/RL	No	Yes
3	Domains and ranges are used	Yes	No (except for properties of basic types)
4	owl:allValuesFrom are used for properties	Yes	Yes (only Standard/Extended)
5	Simple datatypes	Replaced with XSD types	Wrap XSD types
6	Defined datatypes	Wrap XSD types	Subclasses of simple datatypes or other defined datatypes
7	Simple datatypes BOOLEAN, LOGICAL	Replaced with xsd:boolean	New enum types with values: TRUE, FALSE, and UNKNOWN
8	Simple datatype REAL	Replaced with xsd:double	User choice: xsd:decimal (default), xsd:double (only OWL 2 RL/DL), or owl:real (only OWL 2 EL/QL/DL)
9	Simple datatype NUMBER	= INTEGER	= REAL

		Pieter's & Walter's approach	Nam's & Seppo's approach
1	Number of ontologies for 1 IFC schema	1	1
2	Compatibility with OWL 2 EL/QL/RL	OWL DL	OWL DL
3	Domains and ranges are used	Can we follow the subproperty proposal?	
4	owl:allValuesFrom are used for properties	Yes	Yes (only Standard/Extended)
5	Simple datatypes	Wrap XSD types	Wrap XSD types
6	Defined datatypes	Subclasses of simple datatypes or other defined datatypes	Subclasses of simple datatypes or other defined datatypes
7	Simple datatypes BOOLEAN, LOGICAL	Replaced with xsd:boolean	New enum types with values: TRUE, FALSE, and UNKNOWN
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9	Simple datatype NUMBER	= INTEGER	= REAL

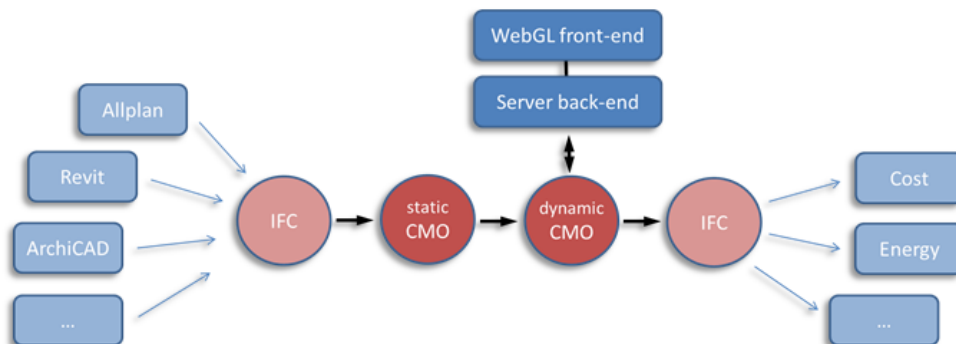
		Pieter's & Walter's approach	Nam's & Seppo's approach
10	Declarations of enum types	Using owl:oneOf	- Using rdf:type (Simple, Standard) - Using owl:oneOf (Extended)
11	Declarations of select types	Using owl:unionOf	- Using rdfs:subClassOf (Simple, Standard) - Using owl:unionOf (Extended)
12	Declarations of collection types	New pattern for LIST types	Common pattern for LIST, SET, ARRAY, BAG types
13	Naming individuals	All individuals are named using line numbers	a) IfcRoot derived objects are named with GUIDs b) Other objects are depended on user choice: - leave as blank nodes (only supported by OWL 2 RL/DL); - naming with special algorithm

		Pieter's & Walter's approach	Nam's & Seppo's approach
10	Declarations of enum types	Using owl:oneOf	- Using owl:oneOf (Extended)
11	Declarations of select types	Using owl:unionOf	- Using owl:unionOf (Extended)
12	Declarations of collection types	MANY OPTIONS HERE – LARGE IMPACT, as all geometric data (90% of IFC) is in lists ==> huge impact on triple count	

Beyond development of an extended ifcOWL

Peter Bonsma - Geometry within OWL, real use of ifcOWL and CMO with Extensions for Proficient

- More about Proficient on <http://proficient-project.eu/Main.aspx?uri=43,14,15>
- Leif: Procedural/parametric descriptions are not Geometry anymore

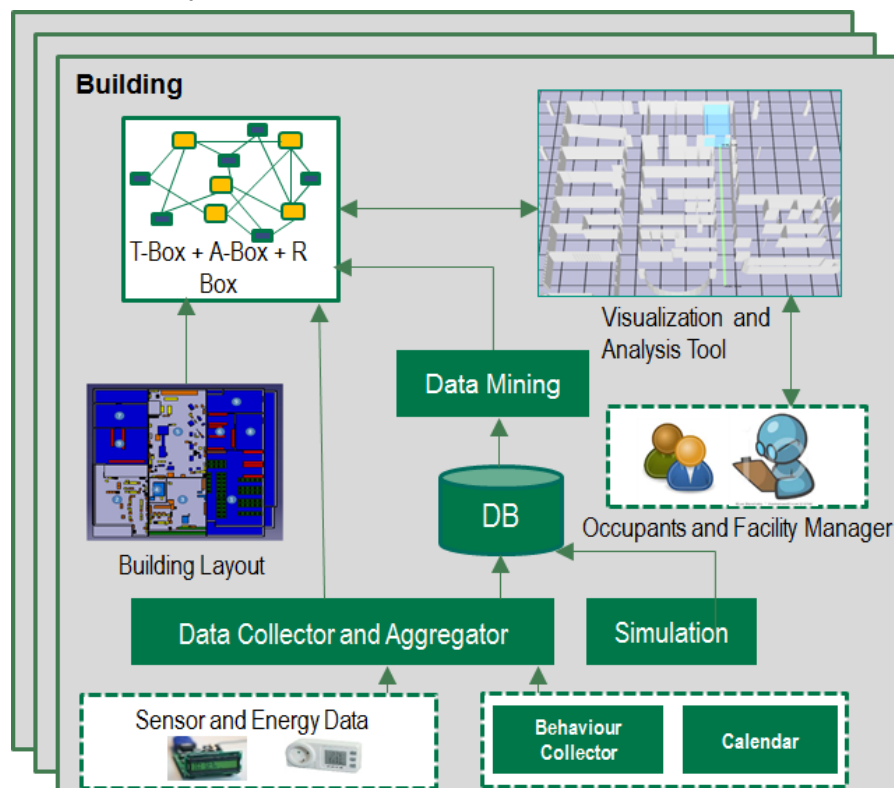


- IFC is used as a fixed model. On top of that, additional CMO instances (ABox) are created. These CMO instances add 'geometric constraints' to the IFC file.
- making the <additional> geometric constraints require <interpretation>. This is left to the end user, who uses a kind of constraint-generation tool.
- Jakob: this approach is procedural. They have to be computed in order.
- Leif: asking for main use case because this approach seems a copy of any other BIM modelling software product.

- Leif: parallel with object library work for BuildingSMART (in addition to concept library work already done)
- Pieter: constraints are actually rules, but no rule language is used. > that might be an option to consider for the future.

Hendro Wicaksono - Rules integration in OWL BIM for holistic building energy management

- KnohoIEM project (EU)
- purpose: extend BIM standards to allow reasoning capabilities, but also remain aligned with existing standards (IFC)
- use of rules (SWRL) and axioms
- Building knowledge expressed using aligned TBox + ABox + RBox
- Extract data from the collected data and generate rules based on that (data mining).
- Ontology development: From domain ontology to specific ontology.
 - 1) main taxonomy by domain experts,
 - 2) align to IFC, simple mapping through class annotation
 - 3) ontology population with OntoCAD,
 - 4) population by behaviour modeler,
 - 5) enrichment with SWRL, data mining.
 - 6) population with users, actor, goal, states.
- BuildingElement reuses some parts of DOG ontology
- aligned to IFC but by means of annotations, not OWL primitives.



- <http://github.com/Victor-Haefner/ontocad/>: OntoCAD tool that allows to populate (ABox) the ontology (TBox)
- Video: <https://www.youtube.com/watch?v=uHoF5pKbxR8>
- RBox is built either in a model-driven (top down) approach (modelling all behaviour using BPMN) or in a data-driven (bottom up) approach (machine learning approach).
- Mapping between ontologies (IFC and OntoCAD ontology) is done by the expert(s)
- Ontology available? The uri defined is <http://www.semanticweb.org/ontologies/2012/9/knoholem.owl>
- additional resources? https://www.researchgate.net/publication/224347700_DOG_an_Ontology-Powered_OS_Gi_Domotic_Gateway
<https://github.com/Victor-Haefner/ontocad/blob/master/Projects/data/forum-building.owl>
<https://github.com/Victor-Haefner/ontocad/blob/master/Projects/data/generic-ontologies/building/knoholem-ont-rdf-xml.owl>
<http://www.semanticweb.org/ontologies/2012/9/knoholem.owl>

Walter Terkaj - Ontology-based Factory Design & Management

- Common model for a factory supporting different views according to different business processes.
- uses:
 - <https://ontohub.org/repositories/fixture-design-ontologies/ontologies/9770/graphs>
 - FSM Ontology Dolog <http://people.cs.aau.dk/~dolog/fsm/> .
 - IFC OC
 - Conversion of some EXPRESS WHERE rules into OWL Class expressions for supporting validation/consistency check.
 - Make generic, top-level conversion strategies: (something like <http://www.nist.gov/el/msid/ontostep.cfm> ?)
- RdfStorageLib - VfdmCppLib - VirtualFactoryLib: allow programmers to work with the ontologies and build applications => libraries provided based on Redland RDF libraries (C API)
- GIOVE-Virtual Factory: tool that allows to design a factory based on all the outlined ontologies
- ONTO-GUI: User Interface that allows to test and 'rapid prototype' ontologies (restrictions, what object properties are there, inconsistencies?), create instances following the ontology, ... (OWL Individual Manager)
 - works with the object properties and restrictions
 - different modules: System Design module - Performance Evaluation module

Minutes Thursday, July 16th

Leif Granholm - OGC activities regarding semantic web

- Overview of the OGC standardization organization
- participation in OGC: 24 % Academia, 18% Government, 41% Commercial
- “Multi-Kernel” architecture recommended in order to prevent “over-standardization”

Daan Ostinga - Use cases for linked data

- Linked data comes at the end of the project when information is shared.
- Do not enforce large, ‘all-encompassing’ ontologies and semantics from top-down
- Imgeo: <http://www.geonovum.nl/onderwerpen/bgt-imgeo-standaarden>

Michel Böhms - Linked Data in VCON

- info about the VCon project on http://www.rws.nl/en/highways/v_con/

Tarcisio Mendes de Farias and Ana Roxin - IfcWoD, Semantically Adapting IFC Model Relations into OWL Properties

- Is order really important for justifying the use of OWL list?
- Are all IFC entities well mapped as OWL classes? what about IfcRelationship and its subtypes?
- Replace list for xyz by three properties.
- PSets should go into TBox (!)

Pim van den Helm - IFC modelchecking with N3 and reasoning

- Creating a new graph with input from ifcOWL triples + additional queries.
- Doing this with EYE (Euler reasoner).
- This results in a simplified graph that is usable for ‘simple’ N3 queries. Main goal is to lower the threshold for domain experts to use the power of semantic web technologies for validating/checking of IFC models.
- Follow the work on <https://github.com/openBIMstandards/modelcheckN3>
- Biggest issue at this moment: there is no final (standard) version of ifcOWL yet.

Lunch

Technical Session

1. Discussion items

- URI design
 - How could we design URIs in a manner that promotes linking using the Linked Data approach? That is, that the linksets would remain (mostly)

valid even when the new versions of the models are published. The goal is that a same object would always have a same URI and same URI would always mean the same object.

- Roundtrip or not
 - Do we need a reverse conversion (from RDF to IFC)?
 - What kinds of use cases are there for roundtripping?
- Model evolution
 - How to handle versioning with the Web of Data technologies/representations?
 - Use cases
- Dataset description
 - How to make datasets discoverable?
 - For instance, description about version, LOD, discipline, dataset relations.
 - ...
 - What is the use of existing vocabularies? (e.g., VoID)
- Openness
 - What parts of data are open to who?
 - How to control the access?

2. Remarks on the scope and purpose (Nam Vu Hoang)

- General questions:
 1. What are main **purposes** of ifcOWL?
 2. Which **technologies & trends** should we take into account?
 3. Which **ifcOWL layers** should we focus on and keep in mind?
 4. What kind of **type info** should be included into each ifcOWL layer?
 5. What are **criteria for comparing** alternative solutions?
- Specific problems:
 1. What are roles of domain/range restrictions? Do we need them?
 2. How should Simple Datatypes be converted?
 3. How should Declared/Defined Datatypes be converted?
 4. How should Select Datatypes be converted?
 5. How should Enumeration Datatypes be converted?
 6. How should Entity Datatypes (without properties) be converted?
 7. How should Aggregated Datatypes be converted?
 8. How should Entity Datatypes (with properties) be converted?
 9. How should inverse attributes be converted?
 10. How should entity key (unique) attributes be converted?
 11. How should different kinds of individuals in ifcRDF be named?
 12. How should ifcOWL layers be related with each other?
- Main criteria:

1. Respect a predefined OWL profile: OWL2 DL
 2. Respect data (structure) consistency
 3. Have a decidable ontology - allow inference, tradeoff between expressivity and reasoning
 4. Respect the IFC specification / the EXPRESS schema
- The scope for the meeting:
 - We agree for this meeting that we look for 1 ifcOWL Extended ontology in OWL2 DL
 - It would be a good idea to 'modularise' this ifcOWL ontology, so that we can support smaller modules in other profiles (OWL2 EL / OWL2 RL / OWL2 QL).

3. Discussion items and agreements made

Issue #1: Domains and ranges to be included or not?

1. No domains/ranges are specified in the ontology
2. OWL 2 restrictions + d/r on simple datatypes
3. putting domain/range & property restrictions whenever we can

=> Decision: we vote for option 3. This was a tight vote. There is a great argument for easy names.

Issue #2: PropertyName - Consistent use of long names or only use of long names when required (inconsistent)?

=> Decision: consistent

Issue #3: PropertyName - Camelcase long names or Underscore long names?

=> Decision: underscore

Issue #4: PropertyName - First Class Name, then Property Name?

=> Decision: PropertyName_ClassName

Issue #5: PropertyName - Exclude "Ifc" from all names (classes, properties)?

=> Decision: Keep "Ifc" included

Issue #6: PropertyName - name_of_IfcRoot | name_IfcRoot?

=> Decision: name_IfcRoot

Issue #7: Use of "Grouping" SubProperty relations (Property "Name") or not?

=> Decision: no SubProperty relations

Issue #8: How to convert LISTS and ARRAYS?

1. OLO pattern (including index of LIST items)
 2. Drummond pattern (excluding index of LIST items)
- => Decision: Drummond pattern (because it is also used by OntoSTEP)

Issue #9: How to convert SETs?

1. Follow the LIST pattern
 2. Use non-functional object properties
- => Decision: Use non-functional object properties

Issue #10: Inverse attributes?

1. included in conversion when possible
 2. not included in conversion
- => Decision: included in conversion when possible

Note: what can not be included in the conversion?

- An attribute has two or more INVERSE attributes. This is, for example, the case of attribute `RelatedDefinitions` of entity `IfcRelDeclares`. This attribute has two inverse attributes: `HasContext` of entity `IfcObjectDefinition` and `HasContext` of entity `IfcPropertyDefinition`. If all these INVERSE attributes were converted to object properties in ifcOWL, then a reasoning engine would infer that the two `HasContext` object properties are equivalent. Moreover, other inferences would lead to say that some classes are equivalent to `owl:Nothing`.
- A regular attribute or its INVERSE attribute has a LIST or an ARRAY as its range. Given the particular conversion pattern needed for ordered lists, if the INVERSE attributes were converted to object properties, then there would be a mismatch between the range of an object property and the domain of its inverse. Therefore, a reasoning engine would infer that the range of the object property is equal to the intersection of two disjoint classes. An example of this case is represented by attribute `Addresses` of entity `IfcPerson` and attribute `OfPerson` of entity `IfcAddress`.

Issue #11: NUMBER simple datatype is considered as an INTEGER or as a REAL?

=> Decision: REAL

Issue #12: REAL simple datatype is considered as an xsd:double, xsd:decimal or xsd:real?

=> Decision: xsd:double

Issue #13: LOGICAL simple datatype is considered as an xsd:boolean, or as an enumeration of TRUE, FALSE, and UNKNOWN?

=> Decision: enumeration of TRUE, FALSE, and UNKNOWN

Issue #14: BOOLEAN simple datatype is considered as an xsd:boolean, or as an enumeration of TRUE and FALSE?

=> Decision: enumeration of TRUE and FALSE (because we can then reuse the same concepts that are available in the LOGICAL datatype).

Issue #15: How to declare ENUM datatypes?

1. using owl:oneOf
2. using rdf:type only (when owl:oneOf is used, a reasoner infers the “rdf:type” relation)

=> Decision: using rdf:type only

Issue #16: How to declare SELECT datatypes?

1. using owl:unionOf
2. using rdfs:subClassOf only (when owl:unionOf is used, a reasoner infers the “rdfs:subClassOf” relation)

=> Decision: using rdfs:subClassOf only

Issue #17: What namespace structure do we use?

1. <http://www.buildingsmart-tech.org/ifcowl/IFC4>
2. <http://www.buildingsmart-tech.org/def/IFC4>
3. other

=> Decision: <http://www.buildingsmart-tech.org/ifcowl/IFC4>

resulting in:

- <http://www.buildingsmart-tech.org/ifcowl/IFC4>
- http://www.buildingsmart-tech.org/ifcowl/IFC4_ADD1
- <http://www.buildingsmart-tech.org/ifcowl/IFC2x3>
- http://www.buildingsmart-tech.org/ifcowl/IFC2x3_TC1
- <http://www.buildingsmart-tech.org/ifcXML/IFC4>

Issue #18: Naming individuals / instances?

=> Decision: following existing best practices:

- Data on the Web Best Practices:
<http://www.w3.org/TR/2015/WD-dwbp-20150625/>
- Data Identification:
<http://www.w3.org/TR/2015/WD-dwbp-20150625/#DataIdentification>
- Content Negotiation - <http://www.w3.org/Protocols/HTTP/Negotiation>
- Use unique namespaces (eventually including line number)
- Identify key use cases and for each use case define key recommendations (e.g. BIM, versioning, etc.)
- <http://www.w3.org/TR/cooluris/>
- <http://www.w3.org/2001/tag/doc/URNsAndRegistries-50.html>
- <http://www.w3.org/Provider/Style/URI>

- <http://www.w3.org/TR/2003/NOTE-chips-20030128/>
- <http://www.w3.org/2001/tag/doc/URNsAndRegistries-50.html>

Issue #19: EnumName - what naming to use?

1. follow the same approach as for object properties
2. adopt simple naming strategy

=> Decision: follow the same approach as for object properties

Issue #20: Which license to use?

=> Decision: CC-BY if possible, depending on the BuildingSMART license

Minutes Friday, July 17th

Kris McGlinn - Converting Tabular Data to RDF using CSVW

- Add semantics to a csv files using JSON.
- Download FUSEKI: <http://jena.apache.org/download/#apache-jena-fuseki>
- <http://phaedrus.scss.tcd.ie/buildviz/csvw/>
- Adding semantics to HTML - Linked Data in HTML rdfa - <http://rdfa.info/>
- What might also be of interest to the community: The Big Data Value Association:
 - <http://www.bdva.eu/?q=node/224>
 - http://www.bdva.eu/sites/default/files/europeanbigdatavaluepartnership_sria_v1_0_final.pdf
 - <http://www.big-data-europe.eu/>

Nick Kaklanis - Converting OWL to JSON-LD

Matthias Weise, Pieter Pauwels - Selection of IFC subsets using ifcOWL and rewrite rules

- Download ifcDoc tool (for Windows only):
<http://www.buildingsmart-tech.org/specifications/specification-tools/ifcdoc-tool/ifcdoc-download-page>
- Download IFC4 baseline definition:
<http://www.buildingsmart-tech.org/specifications/specification-tools/ifcdoc-tool/ifcdoc-baselines>
- IFC example files (NIBS clinic): http://www.nibs.org/?page=bsa_commonbimfiles
- IFC viewer: <http://www.iai.fzk.de/www-extern/index.php?id=1138&L=1>
- To check an IFC population model for compliance to your
- MVDXML model checker by Chi Zhang et al.
 - http://www.itcon.org/cgi-bin/works/Show?2015_2
 - <https://github.com/opensourceBIM/mvdXMLChecker>
- with a bimserver.org wrapper
- An ifcOWL version is in the development:
http://www.researchgate.net/publication/260763029_Towards_model_view_definition_on_semantic_level_a_state_of_the_art_review
- Euler engine for inference of the mvd definitions

Action Items

- Capture remaining points from ballots on ifcOWL specification
- Help Nam to implement configurations for the drum tools, Pieter and Walter are continuing their implementation so we can also validate/cross-check. Nam's tool will be the reference.
- Maria lends support with validation suite <http://oops.linkeddata.es/>
- Maria, Nam, Pieter, Seppo, Jakob (and Walter?) chip in documenting the ontology document to be published on buildingSMART
- publish on server including content negotiation. (Pieter, TU/e happy to help and/or host)
 - Set up pubby or similar
 - get the subdomain / redirect from buildingSMART
 - make the official URI resolvable
- Export labels and description for each IFC element in some tabular format from <http://www.buildingsmart-tech.org/ifc/IFC4/final/html/index.htm>
 - Jakob has an old html doc scraper and XML file of 2x3_TC1
 - We might use the ifcDOC format to harvest (Chi Zhang, Thomas Krijnen?)
- Deadlines:
 - Internal deadline: Mid-September.
 - Official Deadline: buildingSMART meeting in Singapore (mid october)
- Kris updates the Use case wiki. Everyone chips in.
- Look into the license that should be used for the ontology!
 - Suggestion: <http://creativecommons.org/licenses/by/4.0/>
 - or <http://creativecommons.org/licenses/by-nc-sa/2.0/>
- <http://purl.org/dc/elements/1.1/source> → for pointing to the original IFC element.

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Jakob Beetz, TU Eindhoven
Jyrki Oraskari, Aalto University
Kris McGlinn, Trinity College Dublin
Leif Granholm, Trimble/Tekla
Léon van Berlo, TNO
María Poveda-Villalón, Universidad Politécnica de Madrid
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Matthias Weise, AEC3
Michel Böhms, TNO
Nam Vu Hoang, Aalto University
Nick Kaklanis, CERTH-ITI
Nick Purshouse, Integrated Environmental Solutions
Odilo Schoch, ETH Zürich
Peter Bonsma, RDF Ltd.
Pieter Pauwels, Ghent University
Pim van den Helm, TNO
Robert Amor, University of Auckland
Seppo Törmä, Aalto University
Thomas Krijnen, TU/e
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