W3C LBD Community Group
Minutes - Call 1/06/2021

2nd Focus Group Workshop

Attendees:

- Karl Hammar (Jönköping University)
- Christian Kreyenschmidt (Jade HS Oldenburg)
- Katja Breitenfelder (Fraunhofer IBP)
- Mathias Bonduel (KU Leuven & Neanex Technologies)
- Joel Bender (Cornell University)
- Jeroen Werbrouck (UGent / RWTH Aachen)
- Al-Hakam Hamdan (TU Dresden)
- Conor Shaw (University College Dublin)
- Ibrahim Karim FA (Imperial College London)
- Ranjith Soman (Imperial College London)
- Madhumitha Senthilvel (RWTH Aachen University)
- Serge Chavez Feria (UPM)
- Philipp Hagedorn (Ruhr Uni Bochum)
- Richard Pinka

Presentation slides

- https://docs.google.com/presentation/d/1rE7T1UIz9aPLKnGVDzlqxabben7ZDQ8DysnnlUMRoEk/edit

Date and time

- 1/06/2021, Tuesday, 15:00-16:30@UTC/ 17:00-18:30@CEST/ 08:00-09:30@PST

Moderators

1. Karl Hammar

Agenda

1. Introduction of new members
2. Summarization and follow-up of pitches from last time:
    a. Pitch 1 - Pouya Zangeneh
    b. Pitch 2 - Jeroen Werbrouck
    c. Pitch 3 - Richard Pinka
    d. Pitch 4 - Conor Shaw

3. New pitches:
    a. Pitch 5 - Al-Hakam Hamdan
        i. Q&A/Discussion
    b. Pitch 6 - Mathias Bonduel
        i. Q&A/Discussion
4. Focus Group Discussion - Interests & expectations of CG participants
5. Further topics

Minutes

1. **Introduction of new memberl**
    a. Karim Ibrahim, researcher, Imperial College London, working in the field of ontology research since a couple of years, was working on FM
    b. Al-Hakam Hamdan, TU Dresden, working on ontologies and SWT for damage assessment and evaluation
    c. Ranjith Soman, researcher at Imperial College London, was involved in LDAC in past year(s); works with Karim Ibrahim, working with ontologies for construction planning and SHACL constraints
2. **Recording of the meeting by Karl Hammer**
3. **Summarization and follow-up of pitches from last time (1 minute each):**
    a. **Pitch 1 - Pouya Zangeneh :** UPonto Uniform Project Ontology
        i. Wrap-up by Karl Hammer in the absence of Pouya
    b. **Pitch 2 - Jeroen Werbrouck :** Federated data management
    c. **Pitch 3 - Richard Pinka :** HVAC tabular product data FCU unit design
    d. **Pitch 4 - Conor Shaw :** Graph-based building information enrichment for FM services
    e. **Q&A/Discussion**
        i. Q (Richard) : sees possible demand to include regulatory/legal aspects related to individual countries -> compliance to national legal compliance ? -> relevant to decision makers. A (Karl) : importance of permitting and compliance checking. Q (Karl) : How to built up “national” ontology models upon that ? A (Mathias) : considering “higher” level, e.g. ISO norms and standards which can be extended by national, regional or even a group of companies. See also the paper by Jacob Beetz “Hybrid network of concept libraries” (including ontologies) LINK to paper, need of research on industry level on this topic -> alignment of ontologies. A (Karl) : Important to answer these questions on a broader - e.g. EU level.
4. **New pitches:**
    a. **Pitch 5 - Al-Hakam Hamdan : The Damage Topology Ontology (DOT)**
        i. DOT was developed in cooperation with Mathias Bonduel
        ii. Allows to model damages topologically (damage elements, areas and patterns) and assign them to single construction elements (components or spatial zones)
        iii. Additional classes for documenting damages, e.g. for inspections.

iv. Example for assigning damages / damage areas / damage pattern inside a damage area to building elements. Multiple modeling approaches
v. Extensions of DOT : Classifying extensions, e.g. Natural Stone Damage extension (to be published in the near future by Al-Hakam) and others, all mentioned on the slides with links.
vi. Examples of German research projects implementing DOT for buildings and bridges respectively. Reference to Al-Hakams PhD thesis approaching also uncertainties (..)
vii. Mathias: DOT was also applied in Mathias' PhD on heritage buildings and in the H2020 BIM4REN project for renovations. It will be applied in H2020 SPHERE project, focusing on building digital twins
viii. Q&A/Discussion
    1. Q (Serge) : Can this Ontology be used to refer to output data of automated detection systems? A (A.) : Yes, there was a collaboration with the University of Weimar: Damage detection : scanning made with drones, link to the paper: LINK
    2. Q (Karl) : Difference between DOT and BOT? A (Mathias) : DOT is inspired by BOT by patterns etc. Difference : The domain of DOT relations for assigning damage is left loose (using schema:domainIncludes instead of the more formal rdfs:domain), meaning that it can be combined with different types of ontologies for describing any type of construction. Mathias was using DOT for his research on LBD for heritage buildings, while Al-Hakam applied DOT mainly for bridges.
    3. Q (Karim) : .. A (Al-Hakam) : 'Damage elements' and 'damage pattern' can be related to one or more geometry descriptions. Geometry can be linked with instances of classes. Damage areas, of course, should be assigned on a higher geometry level than a single damage element.. (Mathias) : it is possible to assign multiple geometry descriptions to 'damages' (pointclouds, simple CAD geometries, etc.)

b. Pitch 6 - Mathias Bonduel : The Construction Tasks Ontology (CTO)

i. Deliverable of Mathias' recently finished PhD thesis on LBD for heritage buildings (links see presentation slides).
ii. Example : Classes for construction tasks linked to a dot:Inspection which is also an cto:taskContext (grouping of tasks): can define multiple types of tasks such as inspection and repair tasks.
iii. Modeling the consequences of tasks on the construction description
iv. Construction project timeline : planning or tracking tasks and evaluating construction descriptions at certain points on time. Using a query, it is possible to extract a snapshot without tasks from a construction description combined with tasks
v. CTO task method and task provenance

vi. Extensions for the classification of reparation tasks -> relation to other ontologies (e.g. DOT, damages in timber structures); it is possible to create taxonomies of tasks and annotations relations to other taxonomies (e.g. link between damage type from a damage taxonomy and one or more reparation task types from a task taxonomy).

vii. Q&A/Discussion

1. (Ranjith) : several questions: (1) Importance of linkage to other ontologies e.g. time ontology; How did you model the timing of tasks? (2) How to create milestones and hierarchies of tasks? (3) How to deal with tasks in new construction projects? (4) How to deal with missing concepts in CTO, e.g. for describing a construction task in more detail using a structured data approach?
2. A (Mathias) : Was dealing with certain aspects in the framework of his PhD research focusing on heritage. To make CTO more reusable, certain aspects where already taken into account an a high level, which might form a starting point for extensions and/or improvements to CTO:
    a. Modeling of timing of tasks: currently used three simple PROV-O relations to describe starting/ending of a task or the occurrence of a task (single point in time). The datatype is xsd:dateTime. These simple properties were enough in my case. In addition, the use of these properties makes query writing rel. easy, while the Time ontology adds more complexity to the modeling patterns as it tries to be more exhaustive
    b. Hierarchies of tasks: the concept of cto:taskConcept can be used to group tasks. More extensive hierarchies might be needed for more advanced planning and progress tracking cases.
    c. Applicability of CTO in new construction projects: Additional subclasses of cto:Task e.g. for installment, modification or removal of objects. These high level classes should be enough for any type of construction project, but this has to be tested still
    d. Describing task procedures in more detail: the concept of cto:TaskMethod is prepared to do exactly this. Currently, only text descriptions are supported.
3. Q (Al-Hakam) : How do you know which tasks are planned and which ones are executed? (Mathias) : lifecycle of tasks (e.g. planned / executed task) not included in CTO itself. Mathias used a meta data ontology allowing to annotate a construction dataset via a meta data graph (CDC or Construction Dataset Context

ontology which is an extension of the standardized DCAT modeling approach and ontology)

4. Q (Jeroen) : Is there any room for extensions presenting the task in a machine-readable way? A (Mathias) CTO provides an open door to extensions as cto:TaskMethod can be “simple” (text description) or “complex” (modeled as a Linked Data graph). Standards for process mapping (BPMN) and existing research on how to describe processes using an ontology.
5. Q (Jeroen) : Should stakeholders like xx be considered in the graph? A (Mathias) : Other types of stakeholders should be considered within future research.
6. Q (Karl) : To what degree is RDF reification a suitable approach for modeling the consequences of tasks on building descriptions, as it is originally designed for annotating triples. How scalable is RDF reification? A (Mathias) : the method with RDF reification worked to a certain extent (queries could be made that created/returned the expected values) but should still be tested with huge data sets. This is a very valid question. RDF* might be a better alternative to RDF reification, but it had the feeling that it was not mature enough at that point in time.
7. Q (Karl) : relevant question to “What’s next” in the LBD CG.. It would be interesting setting up a library e.g. on existing ontologies and extensions, modeling patterns, best practices to combine them, applications, etc. This is one possible outcome or community effort.

5. **Focus Group Discussion - Interests & expectations of CG participants**
    a. Overview on potential Focus Groups (update !)
    b. Marked : Projects, Decentral CDEs, Construction Planning, Facility Management, HBIM, HVAC + Tooling.
    c. Round table discussion : How to take the Focus group efforts to a next level ?
        i. (Ranjith) : Interested in collaborating with Mathias on CTO/tasks
        ii. (Mathias) : Follows outputs of his PhD research in the framework of his new professional industry involvement and activities in the SPHERE project
        iii. (Jeroen) : It would be interesting to define overlaps between different research approaches and outcomes, e.g. as discussed in Focus group Workshop no.1 between Pitch no.1 and Pitch no. 2
        iv. (Karim) : is currently undertaking research with Ranjith on production control. Would be willing to be involved in different presented areas as he sees also the overlaps and cross topics between single Focus topics
        v. (Karl) : Outcome could be a coherent narrative, recommendations for the industry, e.g. a book

vi. Mathias : data interoperability is a main requirement. The distinction can be made between ‘semantic layer’, content of construction data sets, and ‘technical layer’, protocols/methods allowing linking and exchanging between different data sets. Both are needed to reach interoperability. Most people in this group are working mainly on ontologies (the semantic layer) which results in a wide variety of ‘focus groups’ focusing on semantic aspects per subdomain. The technical layer is also important
vii. (Jeroen) : Concerning the possible output of a book: Reference overview, implementation recommendations
viii. (Jeroen) : Proposes to add the Focus Topic of “Tooling” : How far can we go in creating tools able to integrate and interoperability of existing solutions (e.g. facilitating the exchange of heterogeneous data sets).
ix. (Mathias) : the ‘core’ ontologies define querying -> querying defines tooling. They influence each other
x. (Karl) : Agrees. This is one of the major challenges in ontology engineering.

6. **Further topics**
    a. Closing remark : (Mathias) : on the LDAC 2019 in Lisbon a decision was taken to give back some ontologies to the designers, instead of hosting them under the LBD CG banner on Github. Instead, it was proposed to start two LBD Github repositories containing the links to relevant ontologies and tools (LBD and related). This would be a great opportunity to continue these efforts in the future.
        i. Link to GitHub Tools
        ii. Link to Github Ontologies

Next Call

- 15/06/2021, Tuesday, 15:00-16:30@UTC/ 17:00-18:30@CEST/ 08:00-09:30@PST

  Agenda: TBD

  We are interested in getting suggestions from the community about potential agenda items and **Elevator Pitches** for the following calls. Please send your suggestions to the chairs or to internal-lbd@w3.org, whether you have a short presentation to bootstrap the discussion, and an approximate duration you think the discussion will last.

Previous minutes

https://www.w3.org/community/lbd/meeting-minutes/