W3C LBD Community Group
Minutes - Call 23/02/2021

Attendees:

- Karl Hammar (Jönköping University)
- Mathias Bonduel (KU Leuven)
- Katja Breitenfelder (Fraunhofer IBP, TU Munich)
- Dominik Schlütter (RWTH Aachen University)
- María Poveda-Villalón (Universidad Politécnica de Madrid)
- Joel Bender (Cornell University)
- Serge Chávez (UPM)
- Mads Holten Rasmussen (NIRAS, DK)
- Elisabeth Eckstädt (Fraunhofer IIS/EAS, Germany)
- Jyrki Oraskari (RWTH Aachen University)
- Nicolas Pauen (RWTH Aachen University)
- Philipp Hagedorn (Ruhr-University Bochum, Germany)
- Sana Debbech
- Georg Ferdinand Schneider [Individual CLA but affiliated with Schaeffler]
- Anna Wagner (Individual affiliated with PROSTEP)
- Bart van Leeuwen (Netage B.V. , Netherlands)
- Luis Miguel Blanes Restoy
- Jose Castanos
- Edlira Vakaj
- Francisco Regateiro
- Jeroen Werbrouck (UGent)
- Kevin Luwemba Mugumya (University of Nottingham Malaysia)
- Madhumitha Senthilvel (RWTH Aachen)
- Ali Kücükavci

Presentation slides

- Pauen_W3C-LDCG.pdf

Date and time

- 23/02/2021, Tuesday, 16:00-17:30@UTC/ 17:00-18:30@CET/ 08:00-09:30@PST/ 00:00-01:30@CST

Agenda

1. Introduction (5 min)
2. New participants
3. Presentation: **Integrated representation of building service systems: Topology extraction and TUBES ontology,** Nicolas Pauen, RWTH Aachen
4. Questions and Discussion (30 min)
5. Open discussion

Minutes

1. Introduction
2. New participants
    a. Philipp Hagedorn, attended LDAC Workshop 2020, PhD candidate at Ruhr-University Bochum, Germany
    b. Elisabeth Eckstädt, Fraunhofer Dresden, PhD researcher
    c. Edlira Vakaj, lecturer in computer science at Birmingham City University, applying SWT and ontologies in construction
3. Presentation: **“Integrated representation of building service systems: Topology extraction and TUBES System Ontology”** (Nicolas Pauen, RWTH Aachen)
    a. Motivation
        i. Big Picture: Project RWTH Aachen “Energie Digital” (Digital Energy), focus on Complexity Management for Building Service Systems
        ii. Background: Limits of existing (BIM authoring) software tools
        iii. Questions: How many building service systems are in the model? Which building services should be included and defined in a model?
    b. TUBES System Ontology 0.1
        i. Open, minimal ontology, 5 classes, 12 object properties
        ii. Aim: Developing a topology of interconnected building service systems and their components, alignment to BOT ontology, defining distinguished classes and subclasses
        iii. Elements can be differentiated being part of the flow or part of the control (system)
        iv. BRICKS ontology could have been but was not used as a basis for the new definition
        v. Application example: Physical 1:1 testing facility at RWTH Aachen (video presenting the “Live System Topology” running via app on mobile devices)
        vi. First version of TUBES ontology > question arose on how to extract information of IFC (building model) files for further usage >
    c. Topology Extraction from IFC to RDF
        i. First method: Spatial links via geometric representation and the location of objects

ii. Second method: Typological links via IfcDistributionPort: attributes regarding its system, type and flow direction (42 system definitions)
iii. IFC2GRAPH (Spatial Algorithms)
    1. Extraction via own development: Code in python3 using ifcopenshell and networkX. Steps: (1) iterating over all Ifc classes of IfcDistributionElement and IfcBuildingElementProxy, (2) analysing all ports and exporting their topological connections (..)
    2. Open question on unassigned ports
    3. Using the Rtree package generating a spatial tree using geometric positioning of the DistributionPorts and corresponding elements (..)
    4. Export to BCF
iv. GRAPH
    1. Mapping existing IfCSystems making use of regular expressions; search algorithms to identify further systems (..)
    2. Exporting Graph2rdf (..)

d. TUBES System Ontology 2.0

i. “Viega World” - practical use case (RWTH Aachen): Complexity of systems > demand for further developing TUBES ontology (version 2)
ii. 3 types of systems defined: Hierarchical / structural / functional concept
    1. Definitions: Difference between the concepts of a system and a component.
    (a) “System”: “A system is a model of a whole isolated from the world or a subsystem.”
    (b) “Components” (..)
    (c) Definition for components describing systems via structural interconnections
    2. Functional concept: System model (..) with attributes such as inputs, outputs and states. “A state defines the internal condition of a planned or abstract system” (..) > defining directed/ undirected properties, assigning DataPointKey and stateOf and hasState properties
    3. Source and sink of systems: defining hasSource, hasSink (and..) properties
    4. Alignement to BOT ontology: Spatial elements making usage of the concept of Zones (tso:Zone, tso:System)
    5. Classification of systems: Defining input and output relations > 3 technical Solutions: StorageSystem / DistributionSystem/ ConversionSystem -> able to define different systems (..); 3 Technical Systems further subdivided (inot 7) and 11 Functional Systems (21 Classes, 67 Object Properties, 1 Datatype Properties)
    6. Invitation to check publications:

    a. Namespace: https://w3id.org/tso
    b. Ontology IRI:
    c. Documentation: https://rwth-e3d.github.io/tso/
4. Q&A
    a. (Mads) Q: Happy about alignment with BOT ontology, well structured presentation. Did you look at the SEAS System ontology? Would appreciate further alignment (with ontologies). Mads would like to test an application (professional purposes). Struggles in his company with the different definitions for complex “systems” made by different disciplines (HVAC etc.) A (Nicolas): TUBES ontology: Definition of more than one system for usage in different contexts is needed)
    b. (Bart van Leeuwen) Q: His Background: Fire protection systems for buildings. Did you look into that? A (Nicolas): Yes, but typology or ontology based he is not sure (due to division of work packages between project partners). But the project team definitely looks into that.
    c. (Anna Wagner) Q: You have some overlap with BRICKS, but decided explicitly not to reuse it. Have you aligned TUBES with BRICKS then? A: It should be done, next task to solve on the roadmap.
    d. (Mads) Q: Maybe you should limit the systems to fluids and not to automation systems (it was the same problem with BOT: making limitations was a very important issue. A (Nicolas): We will take it into account.
    e. (Joel J. Bender) Q: Invitation to overhand results to the ASHRAE working group (solving similar issues, e.g. collaborative sets of overlapping devices..) A: Gladly.
    f. (Georg) Q: Alignment to BOT on Github repo of TUBES: are you interested to submit it to the BOT repository via pull request? A: Need to discuss internally.
    g. (Karl Hammar) Q: How can object properties be differentiated between the different types of transferred substances? A: Substance-specific sub-properties are used to differentiate it. Q: How to deal with the complexity of (the different types of defined) substances in further developments in order to not ending up with a hundreds of substances? A: They intend to limit the number of substances and keep them quite generic.
    h. (Anna Wagner) Q: You have defined your TUBES zone to be equivalent to the BOT zone. Don't you think this could produce misunderstandings or do the TUBES zone actually overlap 100% and bi-directional with the BOT zone? And subsequently, the part to Mads would be: Is this how you would want BOT zone to be aligned/ mapped/ extended? A: BOT is very generic and does not pose any “danger” in that regard. If at all, the TUBES zone would be the limiting factor. However, TUBES is aiming to be just as generic, so it should be okay. Alignment will have to be checked before publishing.
5. Open Discussion
    a. Georg: Mail sent out to the mailing list regarding Web of Things use case pull request. Input welcome

Next Call

- 09/03/2021, Tuesday, 16:00-17:30@UTC
  We are interested in getting suggestions from the community about potential agenda items for the following calls. Please send your suggestions to public-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/