W3C LBD Community Group
Minutes - Call 19/10/2021

Attendees:

- Conor Shaw (University College Dublin)
- Ranjith Soman (Imperial College London)
- Karl Hammar (Jönköping University)
- Mathias Bonduel (Neanex Technologies)
- Christian Kreyenschmidt (Jade University)
- Philipp Hagedorn (RUB, Germany)
- Joel Bender (Cornell University)
- Anna Wagner (Individual assoc. With PROSTEP)
- Mads Holten Rasmussen (NIRAS)
- Jeroen Werbrouck (UGent - RWTH Aachen)
- Alex Donkers (Eindhoven University of Technology)
- Rahel Zeleke (Jönköping University)

Presentation slides

- https://github.com/w3c-lbd-cg/lbd/blob/gh-pages/presentations/construction_planning/20211019_AEC-controlRoom_RanjithSoman.pdf

Date and time

- 19/10/2021, Tuesday, 15:00-16:30@UTC/ 17:00-18:30@CEST/ 08:00-09:30@PST

Moderator

1. Mathias Bonduel

Agenda

1. Introduction of new/returning members
2. Presentation by Ranjith Soman: ”AEC Production control room- Role of linked data”
3. Q&A
4. Call for elevator pitches and announcement of next meeting

Minutes

1. Introduction of new/returning members
2. Presentation by Ranjith Soman: ”AEC Production control room- Role of linked data”
    a. Demonstrator project w/ industry, aiming to transfer knowledge from academia to industry settings.

b. Success of infrastructure projects depends on staying within planned time- and cost boundaries. Causes of overruns include inefficient monitoring and control. Automation can help, but large amounts of data generated from automation needs to be made accessible/integrated.
c. AEC production control room aims to visualize and interact with real-time construction information.
d. Previous setup: typically whiteboard-based, sticky notes, etc., Lacking traceability, fragmented data.
e. Goal: data recorded through digital systems (mobile app, web app, touch screens) and visualized through large screens etc.
f. Four main processes to be supported:
    i. Planning / Contract programme and delivery programme
    ii. Look ahead planning
    iii. Document control
    iv. Site logistics
g. A “simple” process such as a truck delivering to the construction site could consist of 5+ steps, each with a number of data points of interest, in different systems/platforms, different people involved, etc. The knowledge of these processes is typically held in the head of individual people.
    i. This is exacerbated by multiple stakeholders (subcontractors) who may have only partial knowledge of the current state of each others’ work/project (that they have dependencies on/to), leading to clashes and delays on-site.
h. Three sets of data to integrate initially:
    i. Documents and files
    ii. Real time data
    iii. Planning and 4D information
i. Key aspects of developed ontology
    i. Location
    ii. Activity (Time + Prov)
    iii. Documents
    iv. Organisation
j. Reuses existing best-practice ontologies heavily (Prov, BOT, W3C Time,
k. SHACL used to model constraints for data validation
    i. Advantages: modular, can be reused across projects, rules enable modelling unit testing environment
l. Comparatively simple constraints can be quite helpful and save quite a lot of time on-site by validating data quality. “A little semantics goes a long way”?
m. Reinforcement learning utilized to generate look ahead schedule
    i. Penalties for constraint violations
n. Visualization platform based on PowerBI builds on top of the integrated data, enabling contextual information about actors, current work steps, locations on the site, times, weather, deliveries, etc.

o. Key insights enabled:
    i. Predict task confidence levels
    ii. Identify workspace conflicts
    iii. Generate look ahead schedules
p. Challenges noticed during the project:
    i. Data accessibility
    ii. Data extraction
    iii. Submission format
    iv. Naming consistency
    v. Semantic environment
    vi. Collaboration
    vii. Resilience

3. Q&A
    a. Calin Boje: really interesting way to use SHACL, well done Ranjith. Off-topic, how did you compute the reward score based on the rules?
        i. Three sets (paper currently in the making):
            1. How fast is the algorithm converging in respect of the process - reward
            2. Resource utilization - if the chart is waving, it means it is inefficient - reward
            3. Based on SHACL constraint violation. Penalty proportional with the number of violations - penalty
    b. Mathias Bonduel: You developed the ASPCR ontology and are currently aligning with other ontologies. What is hindering you in directly reusing existing ontologies?
        i. Technically, it would be easier to reuse. Development under time constraint, so we first developed the ontology, made the POC and then aligned it.
        ii. Karim Farghaly: We are currently rebuilding the ontology with only concepts from other concepts without creating a new ontology over again.
        iii. Mathias Bonduel: Workflows for creating new ontologies are well discussed and existing. But workflows for reviewing existing ones and applying them to your use case are lacking
        iv. Ranjith: Currently working on a search engine for LD in AEC similar as is already available in medicine
    c. Mathias Bonduel: Do you use reasoning with the reused ontologies? Combining several ontologies with different complexities may result in inconsistencies. As a community, we need a best practice on which ontology combinations are valuable for which use cases.
        i. Mathias: In context of using SHACL besides validation (creating Application Profiles indicating the coherence between terminology of different ontologies), it would also be great to have a modelling tool for SHACL, maybe based on CHOWLK.
    d. Calin Boje: Since you have so many tools on each construction project, how do we ensure the population of a central graph (like your ontology) with relevant data? I think you had a slide on this process

        i. PoC sometimes “hacked” to get the data. Data integration is a complicated task.
        ii. Karim: We used to extract data as CSVs from source systems, using individual users with individual logins. Those files have then be mapped and visualized in PowerBI
    e. Calin: What is the effort on the SHACL rules? How many did you do? How complicated was it?
        i. Basic rules were easy, but there were more complex rules, e.g. document-based. More than 50 SHACL shapes only for documents, which also required SPARQL writing.
    f. Mathias: SHACL is used in different places in the workflow. How did you manage your SHACL shapes?
        i. Four major headings for labeling.
        ii. Back references to ontologies is not optimal for all shapes, as SPARQL SHACL may query across multiple ontologies.
        iii. Mathias: An annotation ontology for grouping SHACL shapes would be beneficial
4. Call for elevator pitches and announcement of next meeting
    a. Advertisement by Karl: Check out Workshop on Ontology Design and Patterns at ISWC 2021: http://ontologydesignpatterns.org/wiki/WOP:2021

Next Call

- 02/11/2021, 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/
https://github.com/w3c-lbd-cg/lbd/tree/gh-pages/minutes