W3C LBD Community Group
Minutes - Call 27/05/2024

Attendees

- Katja Breitenfelder (Fraunhofer IBP, Germany)
- Alex Donkers (Eindhoven University of Technology, The Netherlands)
- Mathias Bonduel (Neanex Technologies, Belgium)
- Arghavan Akbarieh (Eindhoven University of Technology, The Netherlands)
- Amin Anjomshoaa (Vienna University of Business and Economics, Austria)
- Eva Heinlein (RWTH Aachen University, Germany)
- Georgios Triantafyllidis (Norwegian University of Science and Technology)
- Hico Mc Donald
- Isabelle Fitkau (TU Berlin, Germany)
- Jakob Martin
- Jan-Iwo Jäkel (RWTH Aachen University, Germany)
- Janakiram Karlapudi (TU Dresden, Gropyus)
- Jiucai Liu
- Klaus Linhard (Munich, Germany)
- Mads Holten Rasmussen (Amberg Group)
- Melina Rohne (RWTH Aachen University, Germany)
- Philipp Hagedorn (Ruhr University Bochum, Germany)
- Hervé Pruvost (Fraunhofer IIS/EAS)
- Rahel Kebede (Jönköping University, Sweden)
- Theo Duounas (University of Antwerp)
- Francisco Regateiro (Lisbon University, Instituto Superior Técnico)
- Wassim Jabi (Cardiff University)
- Wouter Lubbers (Semmtech)
- Ahmad
- Ali Nakhaee
- Odilo Schoch

Please join the W3C LBD CG and subscribe to the internal mailing list:
Linked Building Data Community Group (w3.org)

Presentation slides

- Slides Wassim Jabi: https://github.com/w3c-lbd-cg/lbd/blob/gh-pages/presentations/20240527_Presentation_WassimJabi.pdf
- Slides Theo Dounas: https://github.com/w3c-lbd-cg/lbd/blob/gh-pages/presentations/20240527_Presentation_TheoDounas.pdf
- Other interesting links:
    - https://github.com/arlav/IPFS_LBD/tree/main
    - https://github.com/wassimj/topologicpy
    - https://www.youtube.com/watch?v=WPPMt47buZU

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Date and time

- Monday 27th of May 2024, 15:00-16:30@UTC/ 16:00-17:30@CET/ 07:00-08:30@PST

Moderators

1. Alex Donkers

Agenda

1. Introduction of new members
2. Wassim Jabi (Cardiff University) and Theo Dounas (University of Antwerp) on “Integrating topologicpy with the semantic web: Opportunities for blockchain encoded digital twins”
3. Discussion
4. Further topics

Minutes

1. **Introduction of new members**
    - Warm welcome to all new members!
    - Amin Anjomshoaa, Vienna University of Business and Economics, Austria: working in ontologies for smart buildings
    - Wouter Lubbers, Semmtech, the Netherlands: working in linked data for data exchange and ontology building
    - Hico Mc Donald, South Africa: working for a Web3 company, building apps with Linked Data.

2. **Wassim Jabi (Cardiff University) and Theo Dounas (University of Antwerp) on “Integrating topologicpy with the semantic web: Opportunities for blockchain encoded digital twins”**
    - Wassim Jabi: intro to topologic library
        - from research work at Cardiff
            - C++ library to Python wrapped
            - renamed to topologic**py**
        - follows boundary representation schema
        - graphs to represent buildings
        - use cases (spatial analysis)
            - energy analysis
            - shortest path
            - ..
        - uses ML to cluster > AI-powered library
        - integrates with large amount of tools (Windows, Revit, Rhino, Blender, IFC, etc.) > added now also RDF
        - behind the code, everything a graph
            - implicit: connections on software level
            - explicit: customizable by users
        - everything has their own dictionaries: edges, faces, vertices, etc.
        - decomposition of topology “core” classes
            - cell = closed shell
            - cell complex = aggregated cell (~building)
        - composition of topology > query in inverse direction
        - lateral topology: find neighbors

        - live demo > jupyter notebook on Github of topologicpy
            - to RDF: take JSON intermediate from library > turn into TTL
            - manually created some geometry in the code
    - Theo Dounas: blockchain and IPFS for digital twins through topologic
        - showing/discussing WIP
        - use cases
            - digital twins
        - blockchain and smart contracts > use cases in AEC industry
            - why? immutable, trust & security, governance, incentive alignment
            - why not? expensive for storing + not relevant when one stakeholder in project or aligned incentives
                - IPFS: for storing data in decentral data
        - IPFS
            - demo for setup
            - content ID per content > hash (will change when file has changed)
            - read and write to IPFS
            - for our research: store Linked Data, geometry and other files needed for buildings
        - earlier work
            - topologic tokens for circular economy
            - theoretical papers: crypto twins (blockchain digital twin), etc
        - blockchain for architectural design
            - design decisions
            - files
            - collab mode <> competitive mode
            - trace elements from Revit space and elements
            - collective digital factories
        - combining topologic + IPFS + smart contracts
            - publishing on IPFS readable by anyone
                - can be encrypted, but still possible to know if there's a change
            - CID of the entire building > put on smart contract
            - live demo of Ethereum for small contracts

3. **Discussion**
    - [Amin Anjomshoaa] dynamic design of building. Each transaction costs a lot? Use some kind of approach for dealing with dynamic aspects (an oracle blockchain?)?
        - no need to store everything on blockchain > at key moments in design phase, use in approval and verification mechanism (snapshot of digital twin)
        - topologic is the oracle, or use git. Chain link
    - [Ali Nakhaee] NFT to represent physical objects. What advantages for project management and overall efficiency?
        - advantage only when looking at project from different points of view: building as material data bank > data gathered over element's lifetime. Immutable material passport
            - difficult to see full picture of circular economy, relatively early days
            - plans to test in real construction site
    - [Mads] curious to see how you apply bot:Interface > connection between eg zone and wall
        - topologic are abstract models, design drivers. Interface is zero thickness between cells (eg walls). But if cells have thickness, the graph is a bit more involved

        - BIM should be derived from design intent (conceptual dataset)
        - industry: start with too complex BIM models > need to simplify for spatial analysis => want to inverse this
    - [Wassim] topologic more detailed than BOT > not in favor of subclasses. Equivalence?
        - [Mathias] topologic seems more generic compared to BOT as well, since it's not specific for buildings alone but could be used for anything?
        - [Mathias] where BOT was meant for creating a topological graph of individual objects, OMG/FOG were meant for linking individual objects with their geometrical representations
            - topologic as tool to create topological (Linked Data) graph more easily
    - [Mads] Modumate demo recently seen: "graph + sketchup" > also looked into BOT for topologic representation
        - archilogic also use space graph
    - [Alex] support needed from the community?
        - new to area, first ontology on Github (topologic) > comment
        - library is available on Github: http://github.com/wassimj/topologicpy
        - IPFS demo available: https://github.com/arlav/IPFS_LBD/tree/main
        - discord channel > ask for invite to Wassim Jabi
    - [Alex] reasoning capabilities in ontologies > application in blockchain?
        - ontology of blockchain approaches in AEC > discover overlap, similarities
        - investigate Linked Data in file-less approach > study approach without IPFS when no files
        - [Wassim] IFC to topologic to RDF converter, first experiments
    - [Mathias] different TTLs can contain the same content. Same goes for other RDF serializations, or between serializations. Recommend to look intoRDF Dataset Canonicalization alogorithm as a new W3C standard
    - [Wassim] graph difference, deltas
        - [Mathias] graphy.js but not tested. Many alternatives in other communities, Linked Data developers
        - [Alex] we developed with students some RDF delta pipelines

4. **Further topics**

Next Call

- 17/06/2024, Monday, 15:00-16:30@UTC/ 16:00-17:30@CET/ 07:00-08:30@PST

  Agenda: Timo Homburg and Nicholas Car, GeoSPARQL v1.1 and future

  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://github.com/w3c-lbd-cg/lbd/tree/gh-pages/minutes