

W3C LBD Community Group

Minutes - Call 28/06/2022

Attendees:

- Mathias Bonduel (KU Leuven and Neanex Technologies)
- Alex Donkers (Eindhoven University of Technology)
- Jeroen Werbrouck (UGent)
- Gabriel Fierro
- Sebastian Reiß
- Katja Breitenfelder (Fraunhofer IBP / acatech)
- Nicoleta Bocaneala (Birmingham City University, UK)
- Salvador González Gerpe (Universidad Politécnica de Madrid)
- Edlira Vakaj (BCU)
- Kevin Luwemba Mugumya (University of Nottingham Malaysia)

Presentation slides

- Link to Github repository:
https://github.com/w3c-lbd-cg/lbd/blob/gh-pages/presentations/building%20performance/20220628_AlexDonkers_LetsAddOccupantsToOurDigitalTwins.pdf

Date and time

- 28/06/2022, Tuesday, 15:00-16:30@UTC/ 17:00-18:30@CEST/ 08:00-09:30@PST

Moderators

1. Mathias Bonduel

Agenda

1. Introduction of new members
2. Presentation: Alex Donkers - 'Let's add occupants to our digital twins!'
3. Questions
4. Further topics

Minutes

1. Introduction of new members
 - a.
2. Presentation: Alex Donkers - 'Let's add occupants to our digital twins!'

- a. Missing in the scene are people/occupants > add them to digital twins, besides sensors, actuators and assets
 - i. Complaints, requirements from occupants > find patterns and act before complaints
- b. How to monitor building performance
 - i. Focus is often indoor env quality: air, visual, acoustic, thermal > a lot of parameters from BIM, sensors from building, sensors from occupants, etc
 - 1. Complexity of parameters > calculations need a lot of inputs > three data categories
 - a. Topology (rooms, elements, relations) => BOT
 - b. Static properties: don't change too much (geometry, material)
 - c. Dynamic properties: sensor, weather
 - 2. different approaches (Tang2019) for properties
 - a. SOSA/SSN > sensor in graph, less suitable for large timeseries datasets
 - b. Link to timeseries database > scale better
 - c. Four levels of detail for properties
 - i. Level 4: execution
 - 3. Automate calculation live > monitoring in python script/app
 - a. Dynamically querying timeseries db (InfluxDB)
- c. How to integrate the occupant?
 - i. currently : often web surveys, e.g. yearly > downsides: no realtime action, memory from people, boring to fill
 - ii. Developed a smart watch application "Mintal" working on fitbit > like/dislike > type of performance > location
 - 1. Create RDF metadata in the back
 - a. Occupant info
 - b. Localization
 - c. Medical data
 - d. Feedback
 - 2. OFO ontology (same pattern as Alex' BOP ontology > used for sensors in buildings and static data)
 - a. CQ5: feedback can be stored as static or as dynamic (in InfluxDB)
 - 3. Property chains to limit redundant inputs from user
 - iii. Architecture
 - 1. Smartphone connected with bluetooth > to InfluxDB and GraphQB > use in python script/app (first GraphQB before querying InfluxDB)
 - 2. Observe patterns vs feedback moments
 - 3. Static building data from IFC converted to RDF
 - 4. Results of KDD procedure as RDF back to the GraphDB

- iv. Case study 1
 - 1. Inputs
 - a. Temp, acoustic, RH, air quality, etc
 - b. Weather data
 - c. 3D BIM
 - d. 2 occupants over 3 weeks > feedback as labeled data in the timeseries DB (useful for machine learning)
 - 2. Compare IEQ performance
 - a. Compared living and office > see how the rooms behave on their properties
 - 3. Individual thermal comfort profiles > identified properties that might influence it => heart rate, outdoor temp (indoor temp did not influence), time of the day
 - 4. Individual visual comfort > outdoor visibility
 - 5. Knowledge integration > OPO (occupants preference ontology)
- v. Case study 2 > same building and occupants, but with interactive dashboards
 - 1. Three types
 - a. Tips > “turn down radiator”
 - b. Direct feedback > feedback by occupant on every parameter (hardcoded)
 - c. Microsurveys > human readable questions, randomly through the day
 - 2. Calculate preference values
 - a. E.g. indoor air quality > feedback by user > tip by system > 10 min after following the tip, the indoor air quality got better
 - b. Occupant changed task > changed pref illuminance > tip > occupant did not follow the tip
 - i. More home automation needed?
 - c. Preference of occupants changed in both directions + preferences are different for the occupants
- d. Current work
 - i. Building a visual tool to link geometric data of a building with sensor data > occupants and FM > based on Comunica, trying now to add sensor data
 - ii. Advance the workflow discussed earlier, with machine learning. Enable actuation based on the feedback. Remove static setpoints by dynamic individual parameters by the experience of the occupants

3. Questions

- [Gabriel Fierro]

- Visually compared patterns in ontologies (colors) > haven't found one with all the levels of details. Very often you can use one specific ontology. Created explicit alignments
- [Gabriel Fierro] hasLocation is dynamic property?
 - Can be, but depends on use case. Workspace can be fixed. In case of smartphone, we don't store it in the graph but in the timeseries db. Don't use the hasLocation that much, Fol is often enough to learn from the feedback. Alternative might be to make the observation have a location
- [Mathias] level of detail 4 from SOSA/SSN > any benefit?
 - Property state (result in SOSA/SSN) is something different than execution (closer to observation in SOSA/SSN)
 - Not always needed
 - [Mathias] in SOSA/SSN also option to work without result class (hasSimpleResult)
 - BOP superclasses. BOP implements subproperties and property chains to simplify
 - Balance between ontology flexibility vs simplicity
 - [Mathias] SOSA/SSN property is an individual? Punning
 - Property such as "temp of room X" > no functional property between "property" and Fol in current SOSA/SSN
 - [Mathias] unit separately from timeseries DB
 - Separate, datapoints in timeseries and add units once in the graph
- [Mathias] GDPR and personal data
 - Using SOLID pods > individual user would have it's own pod and can give access rights
 - Option to turn off/on the medical data with fitbit
 - Influx DB has access tokens > you can solve access via SOLID
- [Mathias] multiple Fol classes in your own ontologies
 - BOP as upper ontology, abstract as possible
 - OFO as sub ontology of BOP
- [Mathias] open smart home dataset > own version from Georg?
 - Added BOP patterns, reuse what already was there (incl sensor data)
 - Added open flat and published the dataset incl sensor data

4. Further topics

Next Call

- 12/07/2022, 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/>