IoT Extensions for schema.org
Community Teleconference

November 21, 2019

Agenda

- Agenda review
- New Capability proposals:
    - Electric Power System
    - Electric Battery
- Integration with schema.org
- Admin and community items
- AOB

New Capability Proposals

Integration with schema.org

- Slides to summarize what we set out to do and where we are

- Technical summary

- Integration proposal

iotschema Review: Status and Planning

September 2019

Contents

- Charter and Objectives – What we started out to do
- Status – What we have accomplished
- W3C WoT integration – Test case and results
- Schema.org integration – Proposal and issues
- W3C Community Group – IPR policy and continuity
- OneDM Liaison Group – Report out
- Going forward – a proposal

Charter and Objectives

- Create an extension to Schema.org that will enable IoT semantics
- Work with relevant vendors and SDOs to architect a common information model for IoT
- Develop a process to enable free contribution from diverse organizations, driving toward normalization to a common model
- Enable domain and subject experts to create and maintain definitions and models
- Work on practical integration with Schema.org

Status

- Developed a common meta-model which is well adopted in industry (graphic)
  - Functional/semantic capabilities with common Property, Action, and Event classes of affordances
  - Feature of Interest integration from other namespaces – GENIVI/VSS, BrickSchema, Project Haystack
  - Integration with W3C SOSA/SSN
- Published strawman definitions for some common IoT capabilities
- Conducted test case evaluation with W3C Web of Things and IRTF T2TRG WISHI including hands-on

Information Meta-Model
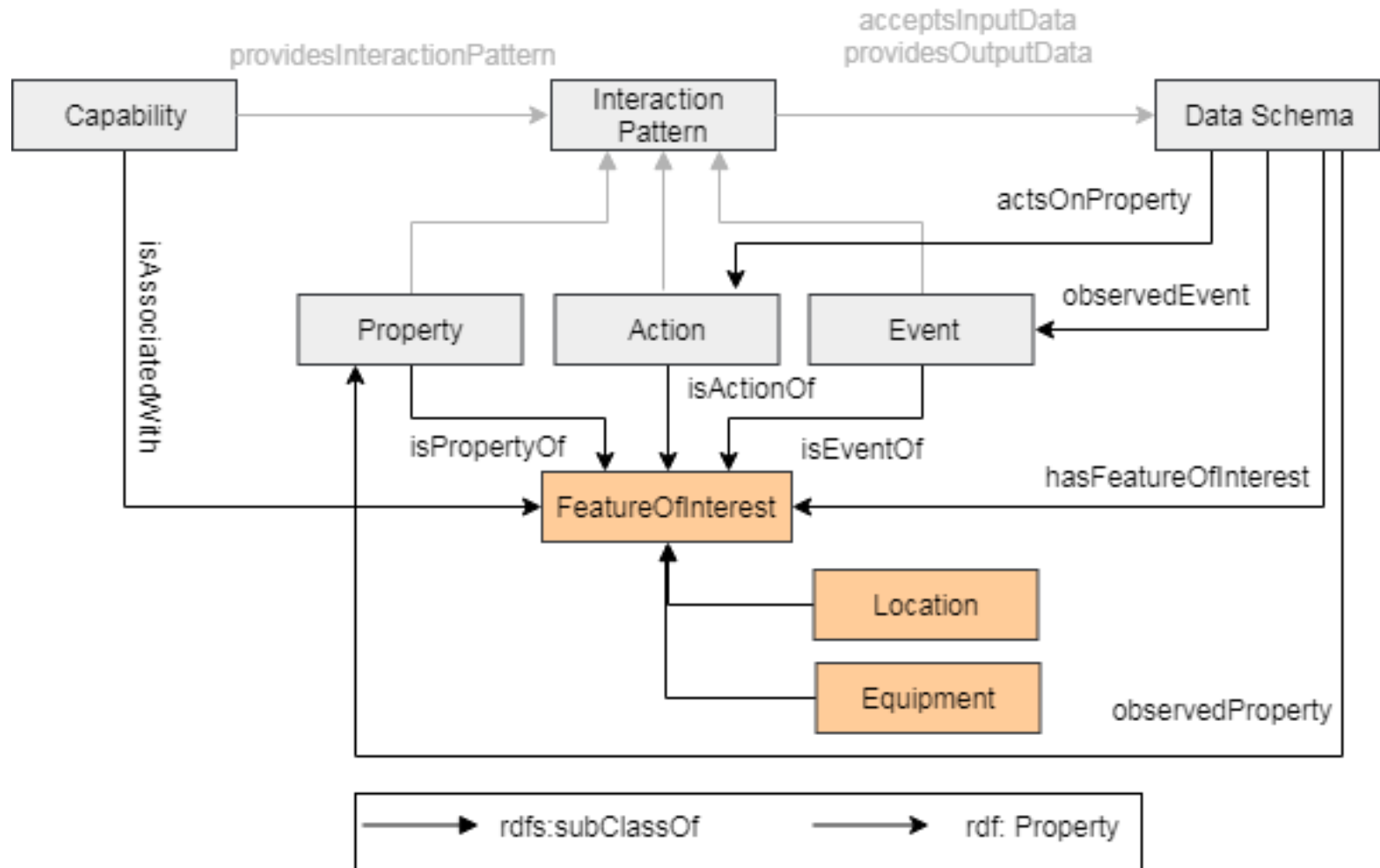
W3C WoT Test Case

- Integrated iotschema definitions with WoT Thing Description as semantic annotation (example)
- Created strawman definitions for common use
- Investigated use in discovery and configuration
- Several organizations used semantic annotation
- Node-RED application for semantic interoperability
  - Uses WoT Thing Description with iotschema annotation
- WoT discovery will be further developed

iotschema for Node-RED
Recipe-based applications

- iotschema embedded in Node-RED tool
  - Enables an easy configuration of things using iotschema definitions
- Easies the use of semantics for IoT developers
  - No need for a developer to know RDF(S), JSON-LD, RDF Shapes …
- Simplify creation of applications with W3C WoT
  - Avoids translations of serializations formats, data types, units …
- Demonstrates semantic discovery and processing
  - Integrates WoT Thing Directory
- GitHub project location:
  - https://github.com/iot-schema-collab/iotschema-node-red

Schema.org Integration

- Class names Event, Action, Property conflict
- iotschema has diverse semantic types for objects, schema.org has diverse property types
- Property types could be synthesized from objects but...
- iotschema will potentially define hundreds of types for physical quantities (temperature, humidity, voltage, acceleration...), control affordances (open/close, brightness, color control, camera controls, operating modes...), and features of interest (rooms, machines...)

Schema.org Integration

- The WoT use case is based on annotation consisting of RDF @type statements that point to URIs of defined terms for specialized types that conform to the classes in the meta-model

- These meta-model classes would only add about 6 new property types to schema.org
  - iotCapability, iotEvent, iotAction, iotProperty, iotData, iotFeatureofInterest
  - new types like iotInterface, iotThing, etc. as needed

Schema.org Integration

- There is a potential example pattern in schema.org
  - MedicalEntity, with about 7 property types
- Likewise, an instance of IoT Schema would contain some set of iotCapability, iotAction, iotProperty, iotEvent, iotFeatureOfInterest properties
- Specialization of iot types would happen at the next level in the graph
  - URIs that point to accepted specialized definitions in a different namespace (?)
  - lighting controls, thermostats, etc. that conform to the base types but have their own properties

Schema.org Integration

- The base properties line up with semantic classes that have software handlers,e.g. to discover, display, control

- The specialization information enables selection of application elements that can understand and interoperate with the specialized affordances, for example lighting controls

- More general applications might reason about semantic constructions based on their ability to parse the semantic graph

- Adaptation software may need special properties to describe data types, units, and ranges

W3C Community Group

- Started early 2019

- A few members have joined but not active yet

- IPR policy for contributions based on CG membership

- CG membership will become part of the community and be required for contributors and participants

- Can we adopt the BSD 3-Clause license for our contributed and published content?

OneDM Liaison Group

- Semi-private group of SDOs and associated vendors

- Goal is to create a common IoT data model and normalized device definitions

- Creating open source JSON language and developer tools for definitions, using BSD 3-Clause license

- High level alignment with the Property-Action-Event meta-model

- OneDM definitions can feed iotschema

- We can share OneDM language and tools

Going Forward

- Create an experimental area on schema.org for normalized, accepted iotschema content
- Create a namespaced area per contributing org in the public github, allow open contribution of raw content
  - CI tools validate the contributed definitions
- The definition can immediately be dereferenced in the contributor's namespace (on schema.org?)
- Move definitions into the official github repository and schema.org experimental area when they are accepted

To Do

- Integrate the iotschema W3C Community Group into the process, define licensing and publication

- Design a namespace scheme for contributing orgs and for linked ontologies

- Refactor the vocabulary as necessary to remediate the name conflicts

- Build and deploy CI tools to check contributions

iotschema: Resources

- **W3C Community Group:**
  The Schema Extensions For IoT
  - https://www.w3.org/community/iotschema/

- **GitHub repository:**
  - https://github.com/iot-schema-collab/iotschema

  Teleconferences:
  - https://github.com/iot-schema-collab/teleconferences

  Contributions:
  - https://github.com/iot-schema-collab/iotschema

  Charter:
  - https://github.com/iot-schema-collab/ws-charter

- **Web site:**
  Current location
  - http://iotschema.org/docs/full.html

- **Tools:**
  iotschema for Node-RED
  - https://github.com/iot-schema-collab/iotschema-node-red