

IoT Extensions for schema.org

Community Teleconference

Mai 21, 2020

Agenda

- Agenda review
- Announcements and industry developments
- New Capability review
- Thing class
- One Data Model integration/format conversion
- schema.org integration patterns
- AOB

Announcements

- OneDM online conference in progress
 - Driving to public engagement 6/2020
 - All participants have agreed on the BSD license
- WISHI Workshops and Hackathon
 - Semantic Proxy using W3C WoT with RDF annotation based on OneDM definitions
- W3C WoT Online Virtual F2F mid-late-June
 - Focus on directory integration, discovery, semantics
- Zigbee CHIP project for IoT interoperability
 - Open source stack and data models
 - Zigbee/CHIP models can be published on OneDM

Project CHIP

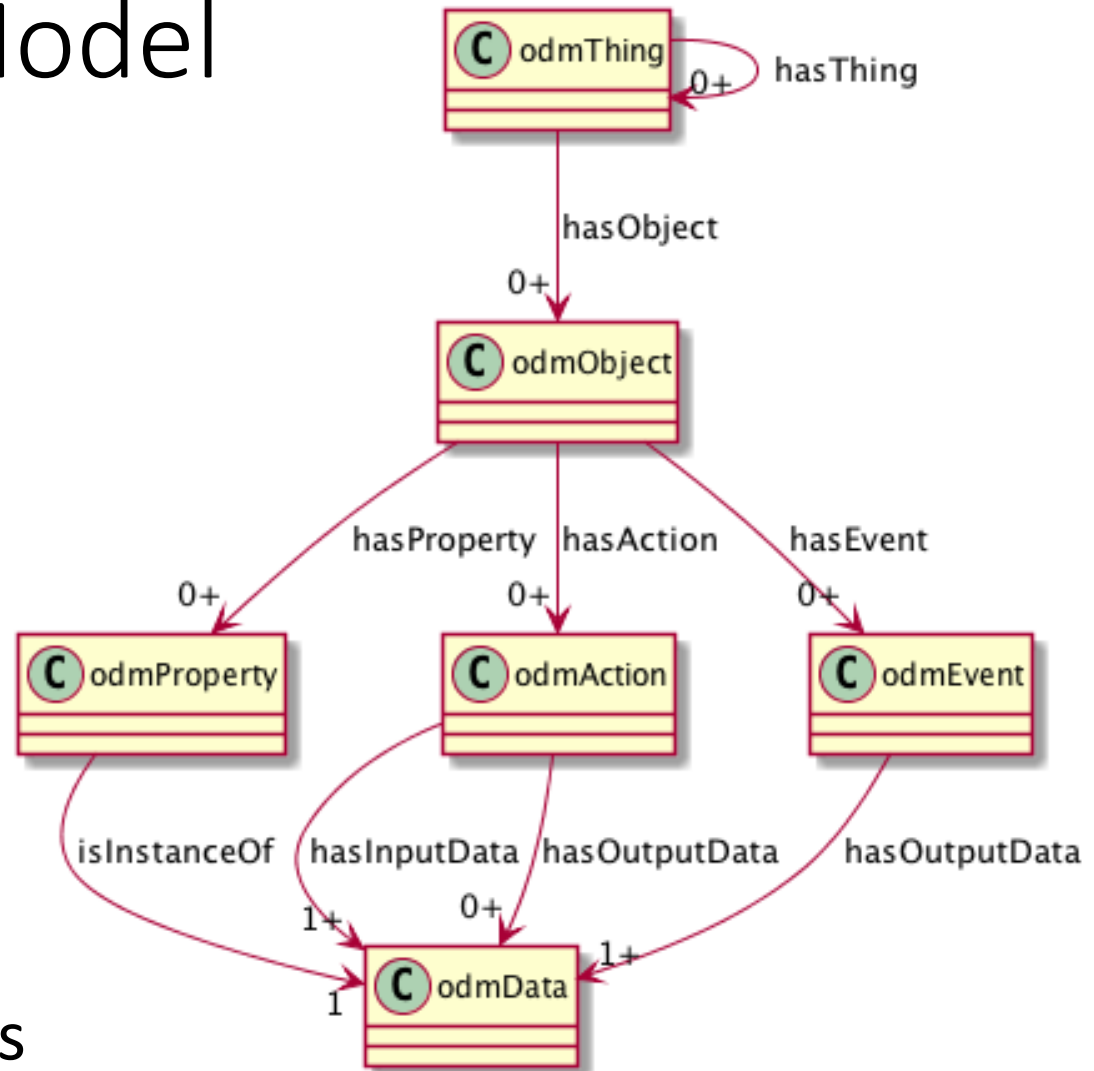
- Google and Apple joined Zigbee Alliance to create a new interoperable network standard for connected homes – Project Connected Home over IP
- Deliver a standard, open source reference stack, and certification program for interoperable devices
- What it means to iotschema – unified data models for connected home devices + Event, Action, Property model + open source license
- Still need to address system level modeling with location, context , behavior + application domains

Capability Proposal

- New Capability Review

ODM Meta-Model

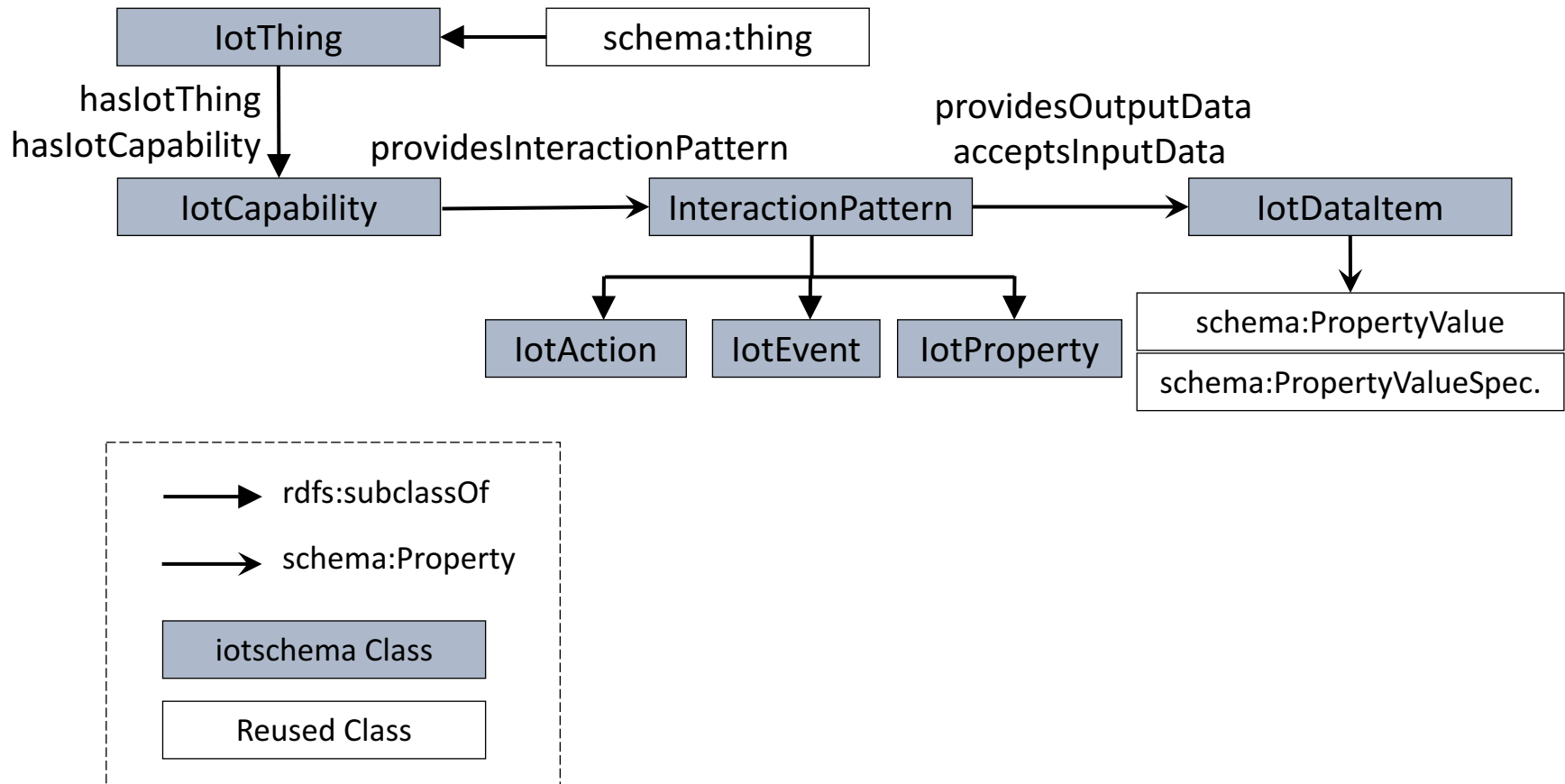
- Thing Class to compose Objects
- View (Interface) Class to virtualize affordances
- Reusable Objects
 - Property, Action, and Event Affordances
- Reusable Data Types



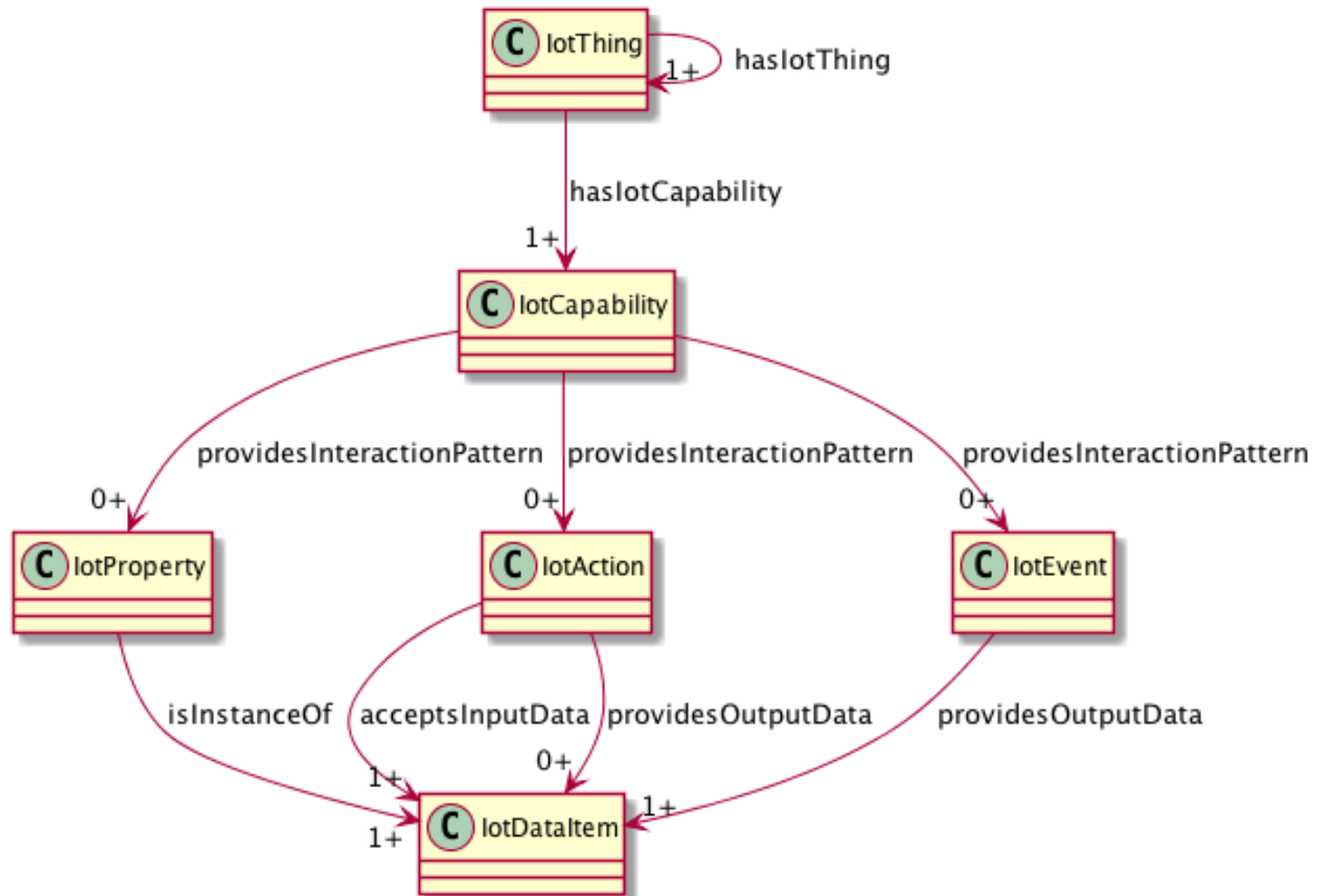
Thing Class

- Encapsulate reusable Capabilities
 - On/Off with state Property, Commands, and Events
 - Compose Air Conditioner Thing from OnOff, Mode, Speed, etc. as reusable Capabilities
- Reusable compositions of Capabilities
 - An Outlet unit for a multi-outlet strip
 - Each Outlet has OnOff, Energy Monitor, Overcurrent and Overtemperature protection Capabilities
 - Multiple Outlets are composed into an outlet strip
 - Outlet unit can be a Thing
 - Outlet Strip can also be a Thing

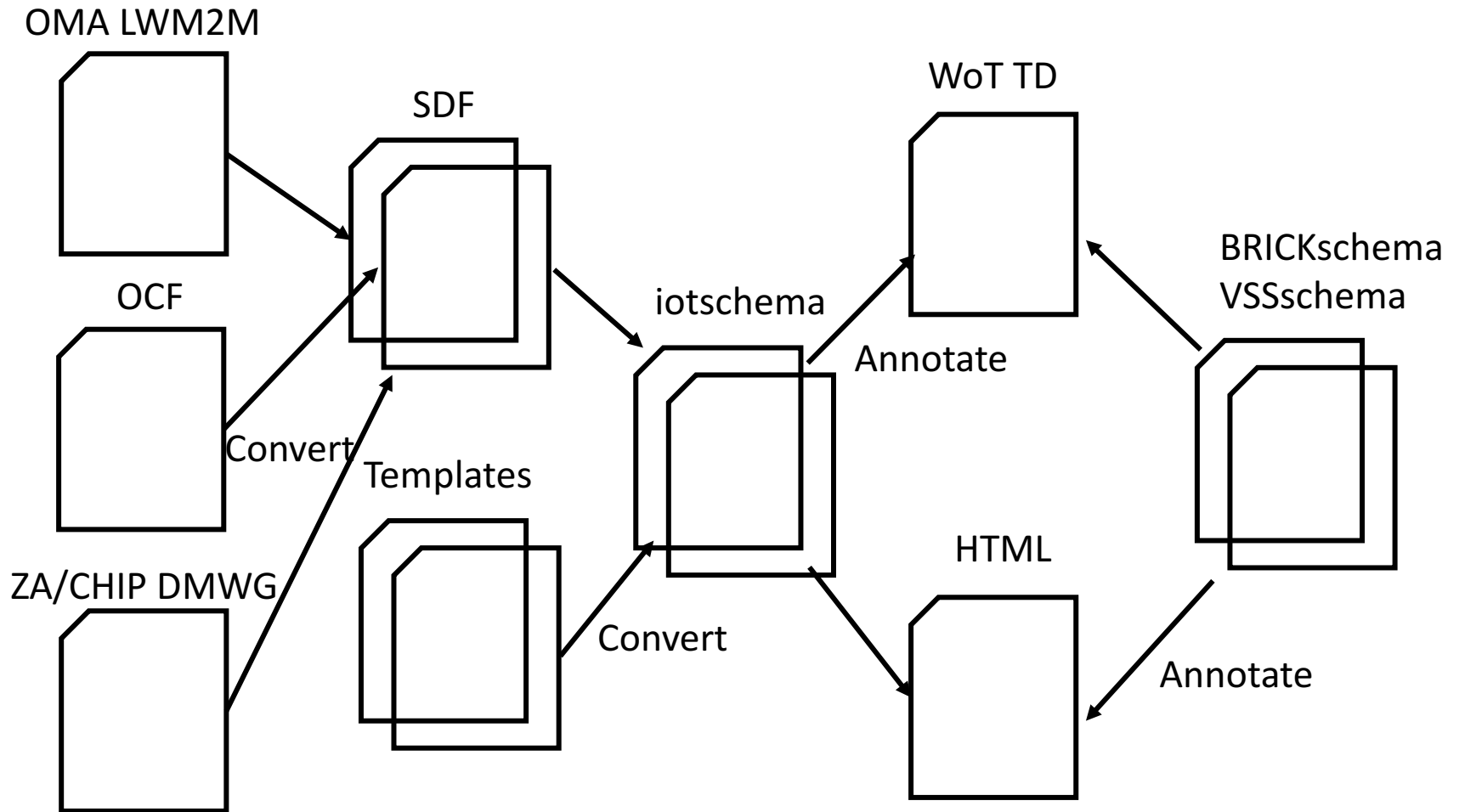
schema.org IoT Extension Meta Model with Thing Class



iotschema UML with IoTThing class



High Level Integration Patterns



One Data Model integration

- Re-shape One Data Model definitions as iotschema definitions
- One Data Model uses JSON object hierarchy vs. RDF links
 - JSON pointer fragment identifiers
 - st:#/odmObject/onoff/odmAction/turnon
- `iot:onoffCapability => iot:providesTurnonAction => iot:turnonAction`
 - `iot:providesTurnonAction` is a sub-class property from `iot:providesInteractionPattern`

iotschema from OneDM

- st:#/odmObject/onoff/odmAction/turnon
- odmObject is "sameAs" iotCapability
- Create type names
 - st:#/odmObject/switch => iot:switchCapability
 - st:#/odmObject/switch/odmAction/turnon => iot:turnOnAction (iot:switchTurnOnAction?)
- Synthesize the schema.org style property types
 - providesInteractionPattern subtypes
 - *providesSwitchTurnOnAction*

Path Construct in RDF

- `st:/odmObject/onoff/odmAction/turnon`
 - `"@id": "iot:iotCapability/onoff"`
 - `"@id": "iot:iotCapability/onoff/iotAction/turnon"`
- What does the property type look like?
 - `iot:providesInteractionPattern`
 - `iot:providesTurnonAction`
 - `iot:providesiotCapability/onoff/iotAction/turnon`

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 IoT Schema instance would contain some set of iotCapability, iotAction, iotProperty, iotEvent, iotFeatureOfInterest properties
- Specialization of iot types would happen at the next level in the graph – hosted in a separate namespace
 - URIs that point to accepted specialized definitions in one or more specialized namespaces
 - lighting controls, thermostats, etc. that conform to the base types but have their own properties

Conclusion

- Summary
- AOB