IoT Extensions for schema.org

Community Teleconference

February 20, 2020

Agenda

- Agenda review
- Announcements – T2TRG Workshop on Data Models and One Data Model + WISHI Hackathon
- Recent developments – Project CHIP
- Proposal for adding a thing class
- Availability of iotschema4Node-RED over npm
- Hosting and schema.org extension
- AOB

Announcements

- W3C WoT Online Virtual F2F March 16-18
- T2TRG Workshop March 20 at IETF 107 Vancouver
  - Technical review of SDF language (OneDM)
- WISHI Hackathon March 21 and 22 at IETF 107
  - Semantic Proxy using W3C WoT and iotschema annotation from OneDM definitions
- OneDM F2F late April, Qualcomm in San Diego
- W3C WoT Helsinki June 6-11 with T2TRG

Project CHIP

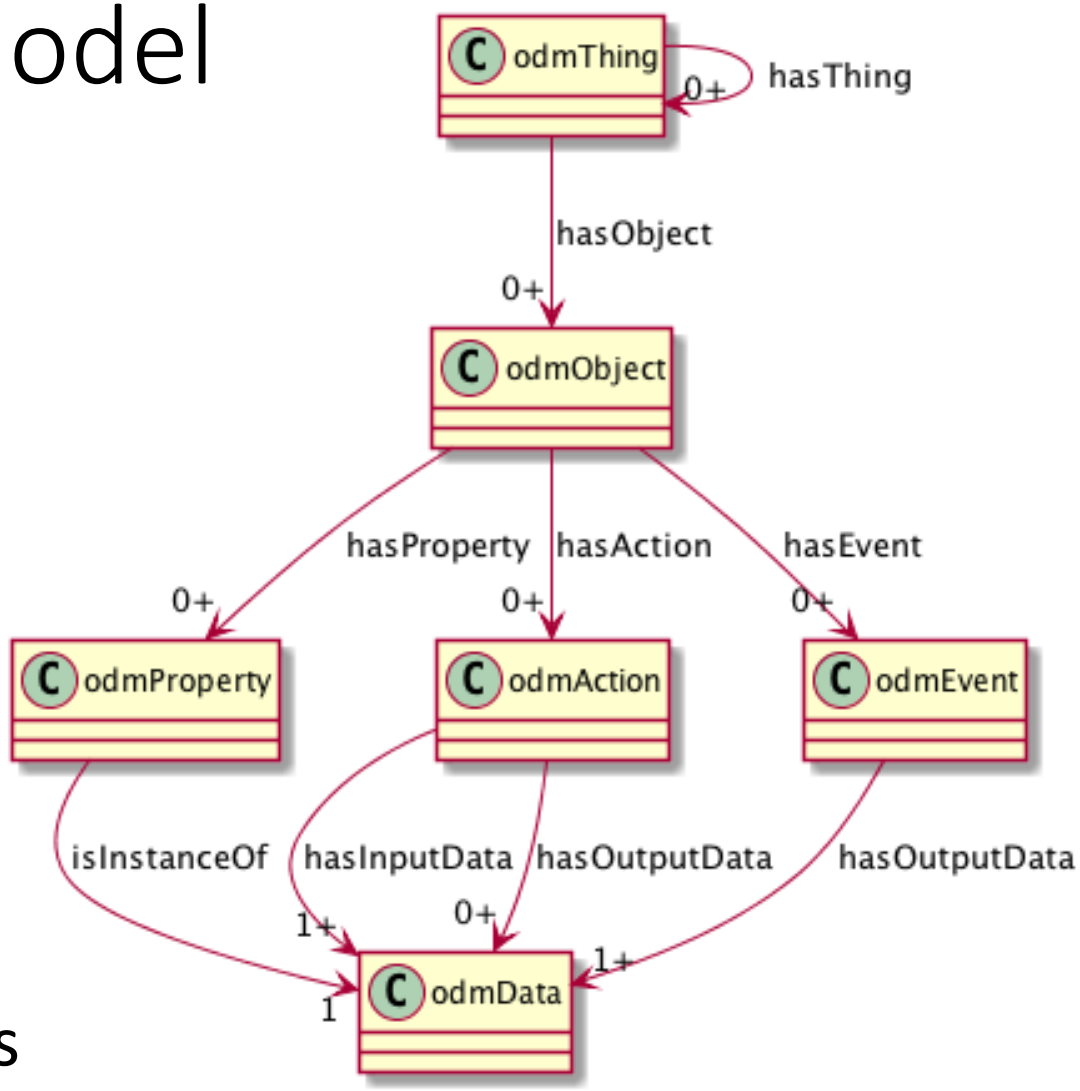
- Google and Apple joined Zigbee Alliance to create a new interoperable network standard for connected homes – Project Connected Home over IP
- Deliver a standard, open source reference stack, and certification program for interoperable devices
- What it means to iotschema - standardized data models 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

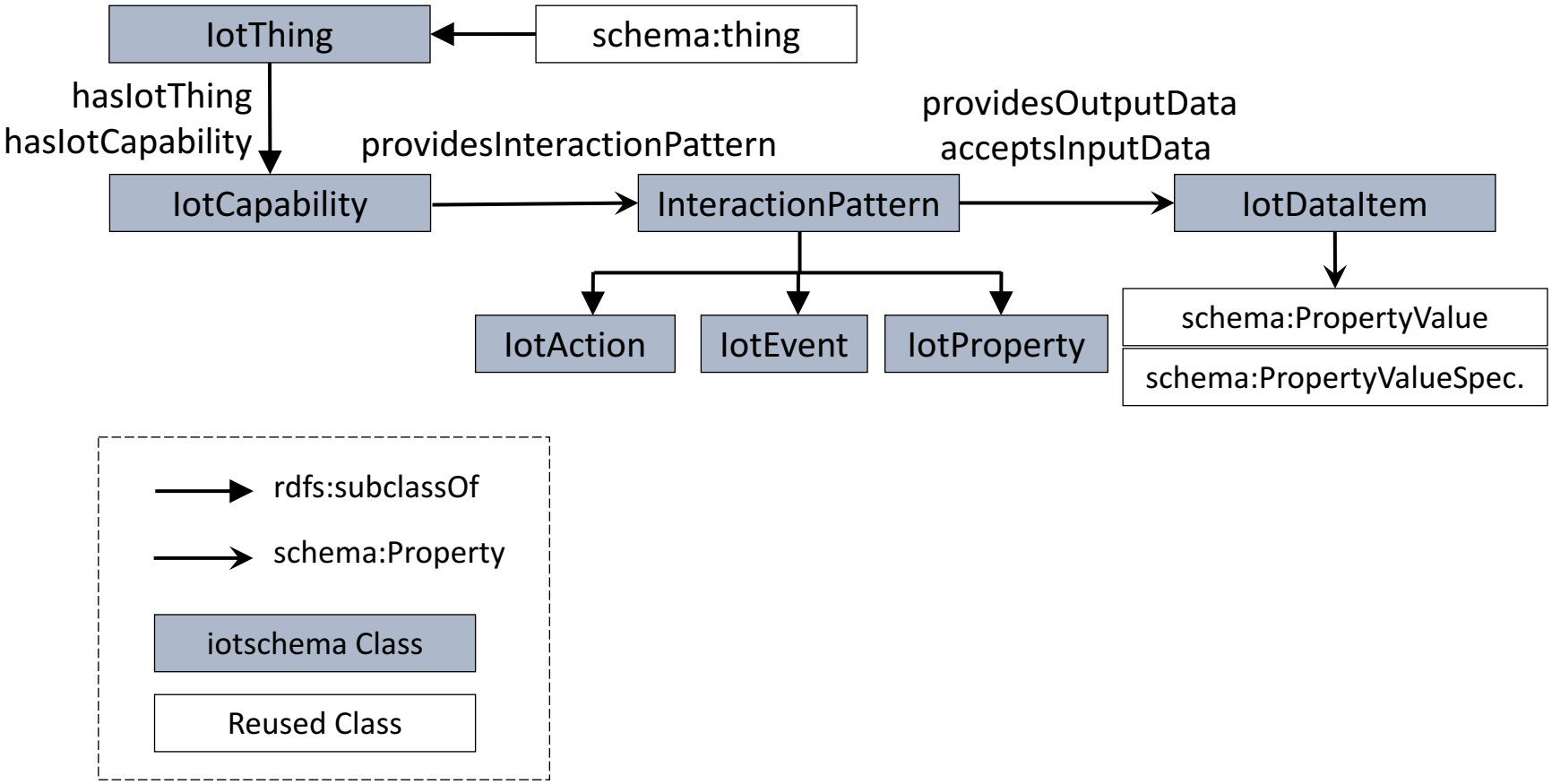
- Thing Class to compose Objects
- View (Interface) Class to virtualize affordances
- Reusable Objects
  - Property, Action, and Event Affordances
- Reusable Data Types



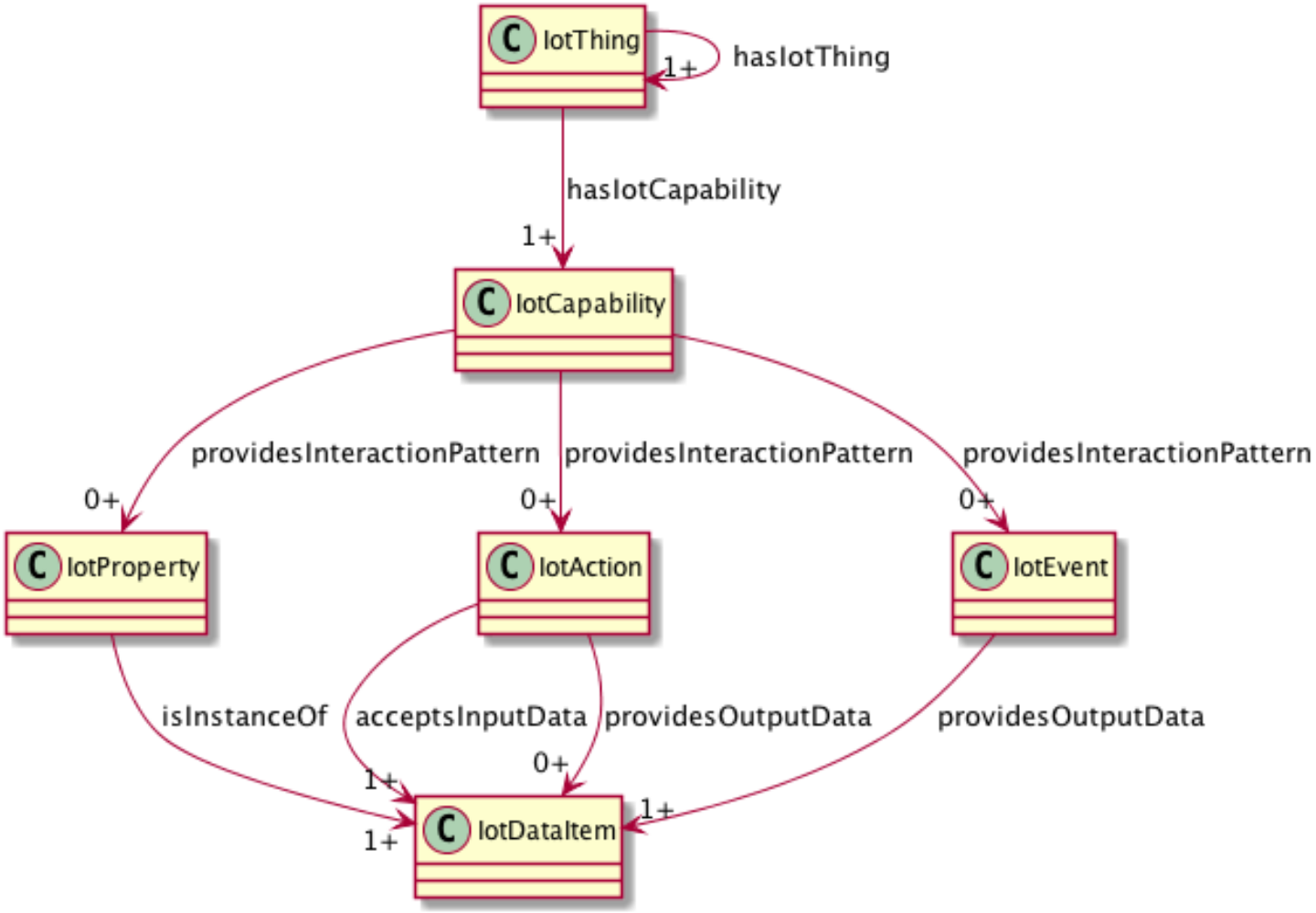
Thing Class

- 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

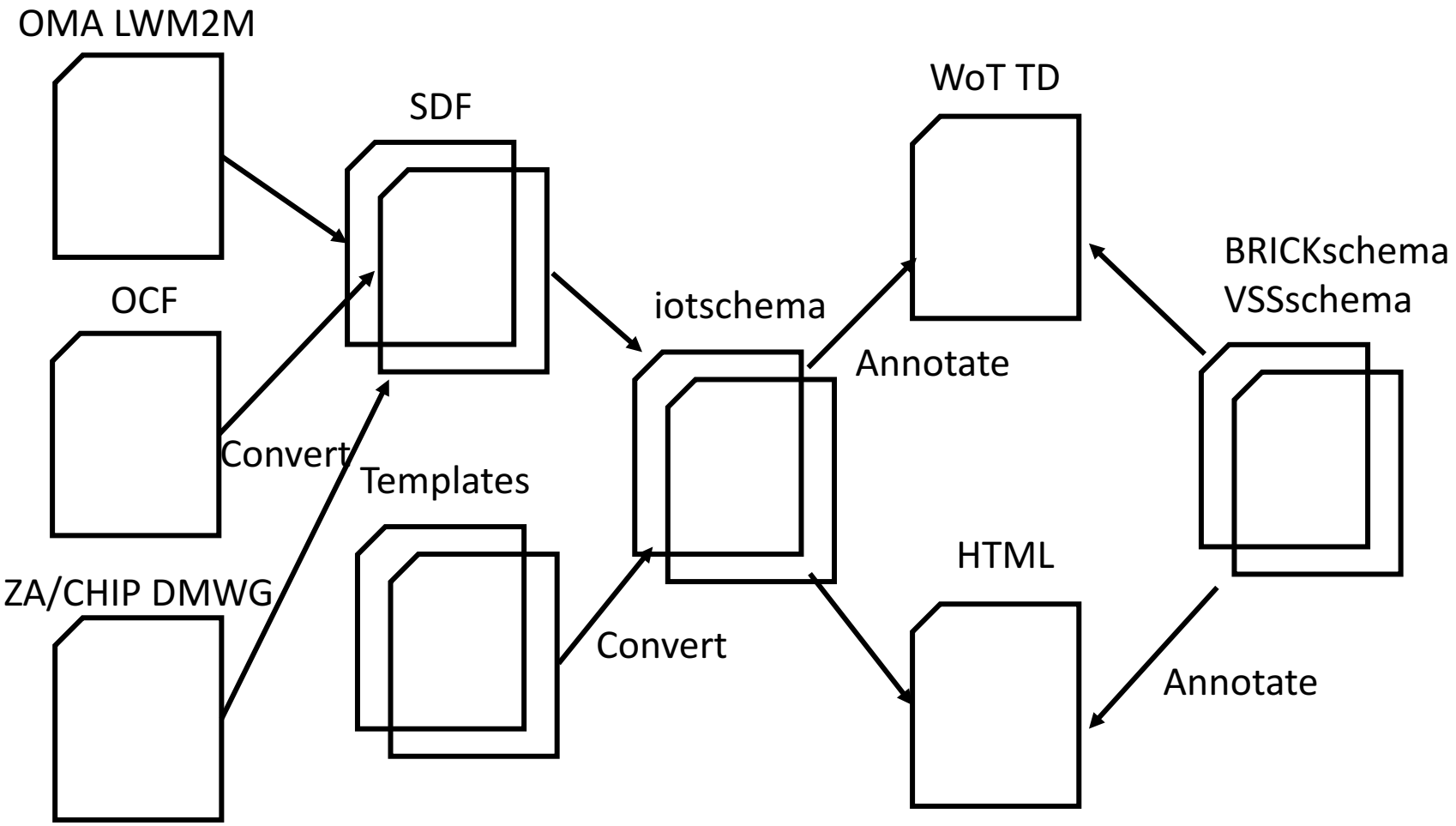
schema.org IoT Extension Meta Model with Thing Class



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 => 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 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 – 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