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

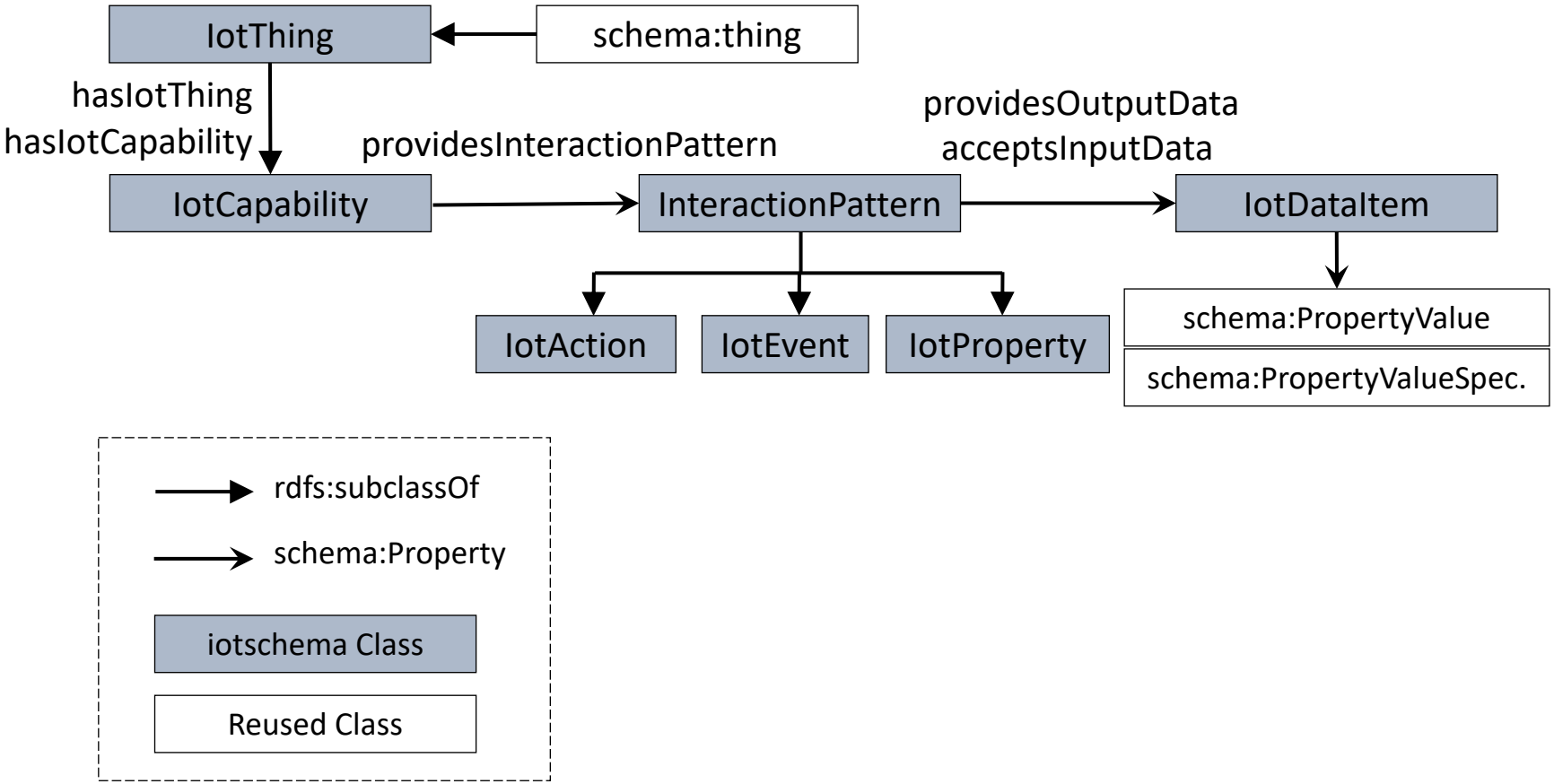
Project CHIP

- 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

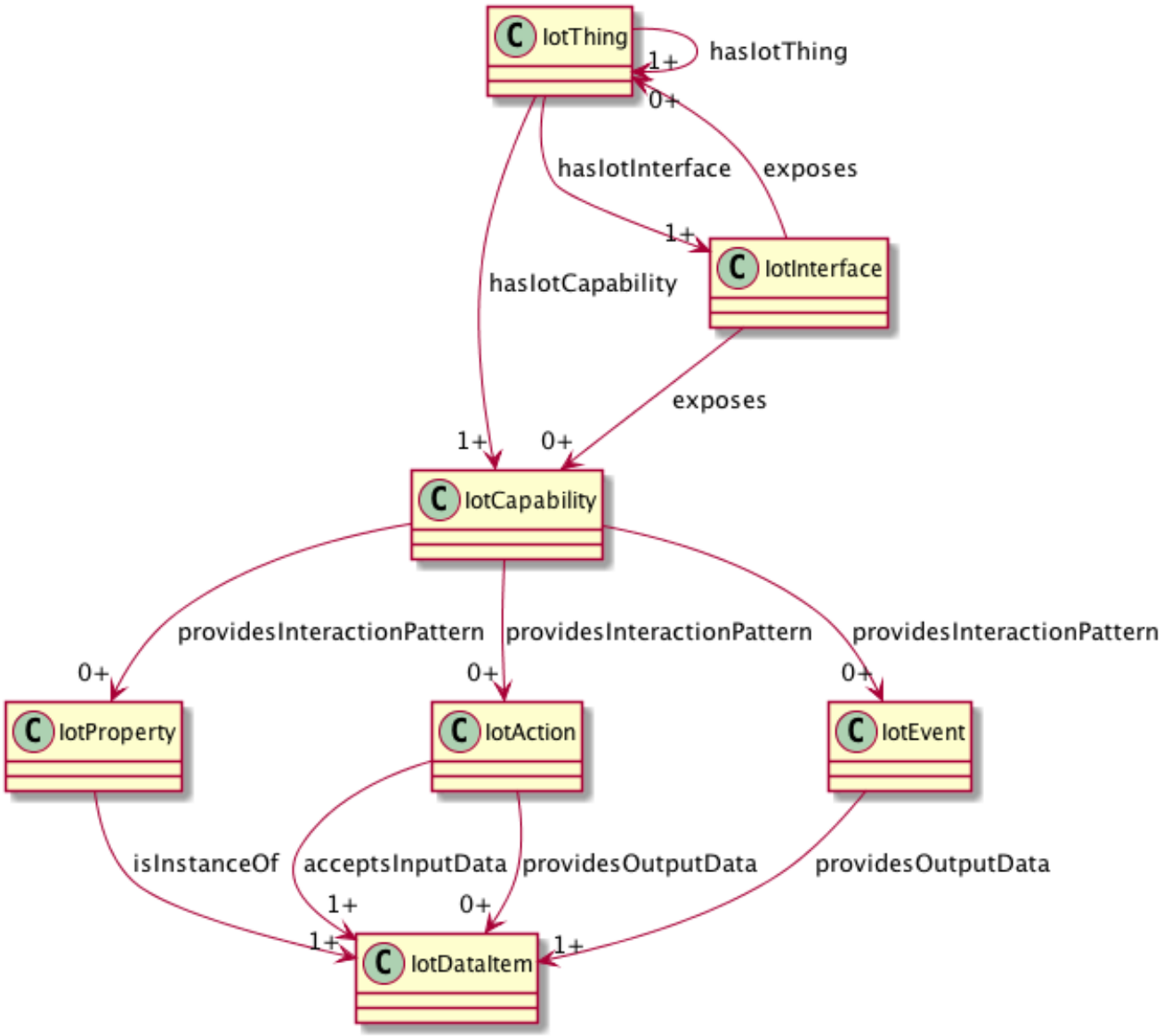
Thing Class

- 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

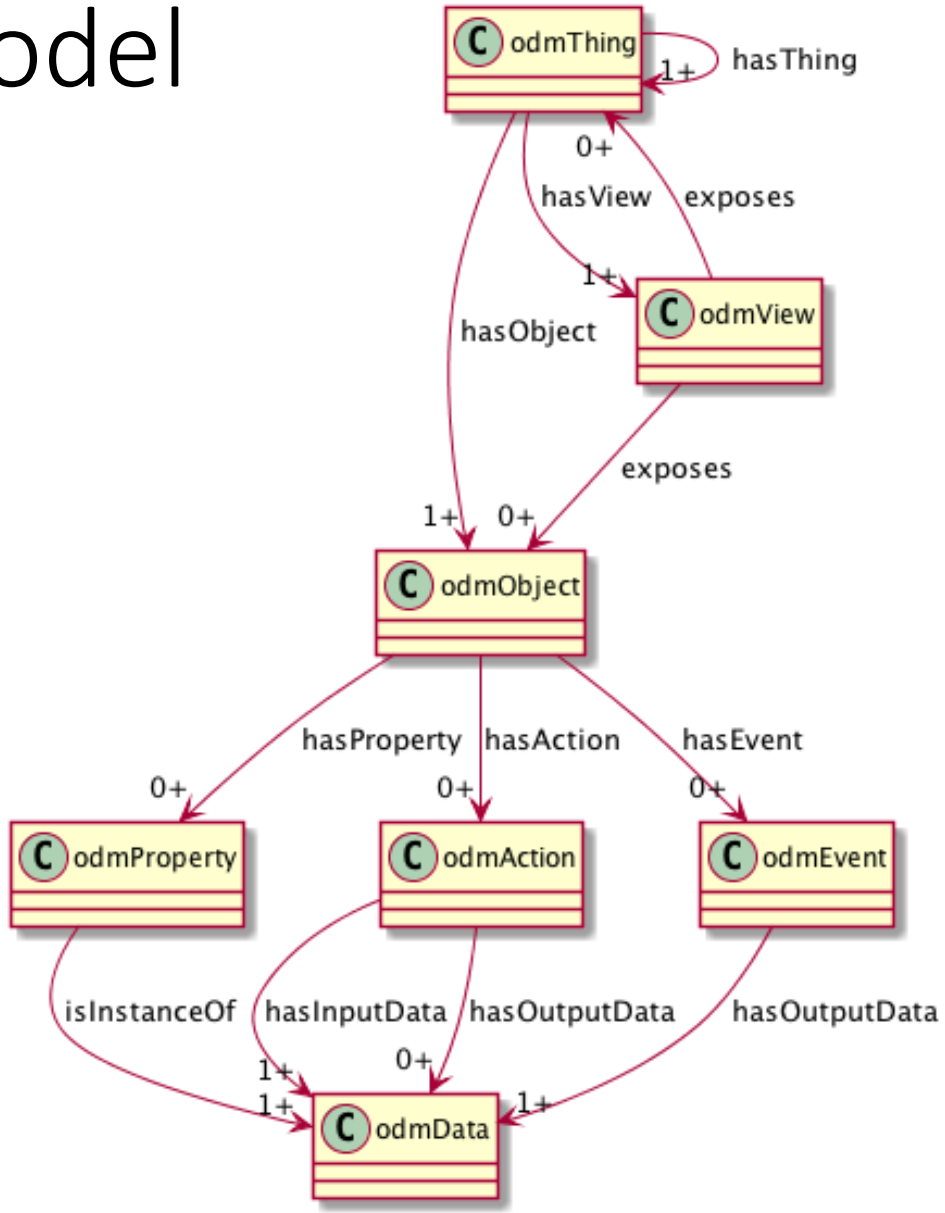


UML

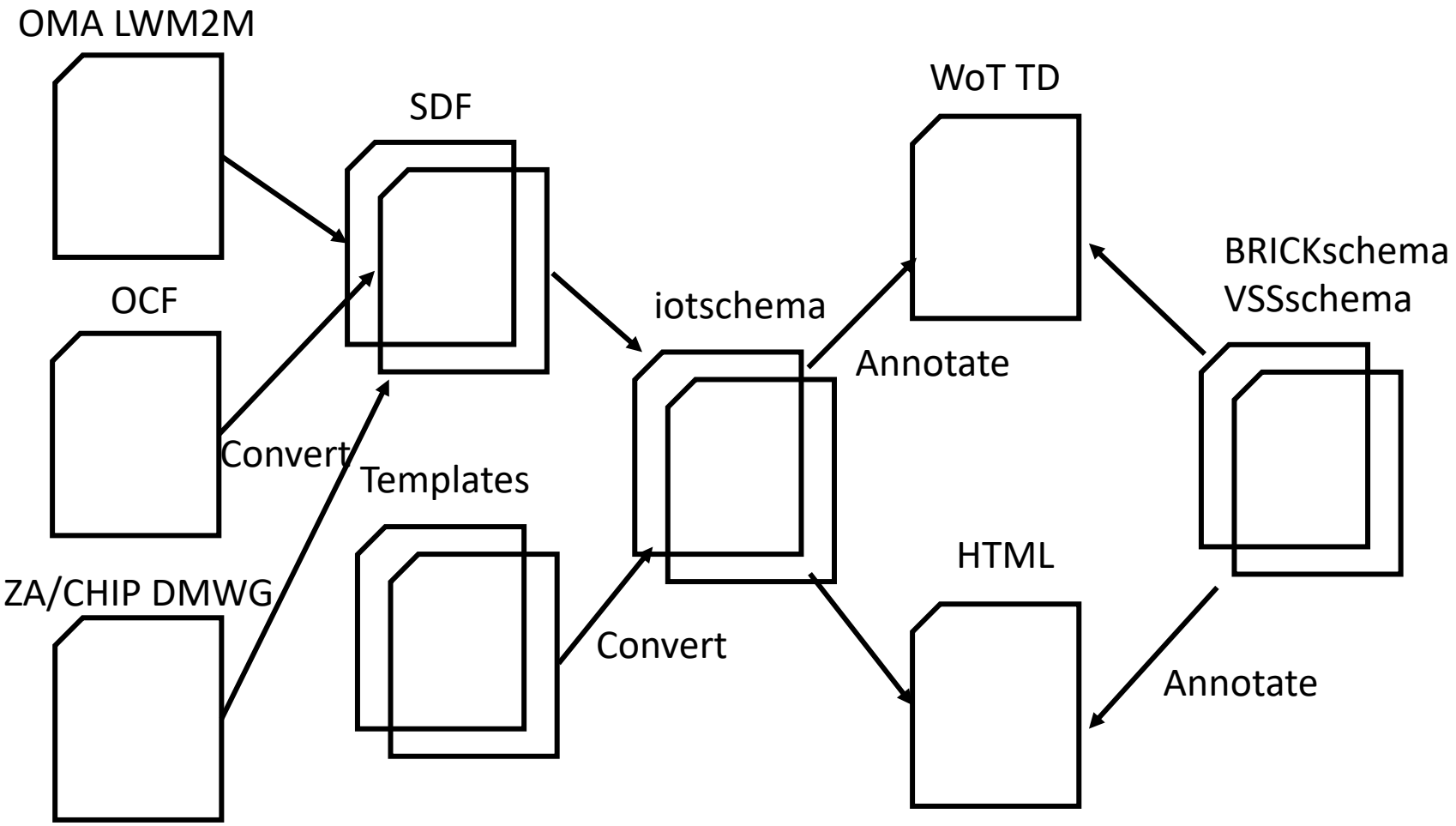

IotThing
hasIotThing
1+
0+
hasIotInterface
exposes
1+
IotInterface
hasIotCapability
exposes
1+
0+
IotCapability
providesInteractionPattern
providesInteractionPattern
providesInteractionPattern
0+
0+
0+
IotProperty
IotAction
IotEvent
isInstanceOf
acceptsInputData
providesOutputData
providesOutputData
1+
0+
1+
1+
IotDataItem

ODM Meta-Model

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



High Level


OMA LWM2M
SDF
WoT TD
BRICKschema
VSSschema
OCF
iotschema
Annotate
Convert
Templates
HTML
ZA/CHIP DMWG
Convert
Annotate

iotschema4Node-RED

iot.schema.org for Node-RED

Semantic Interoperability

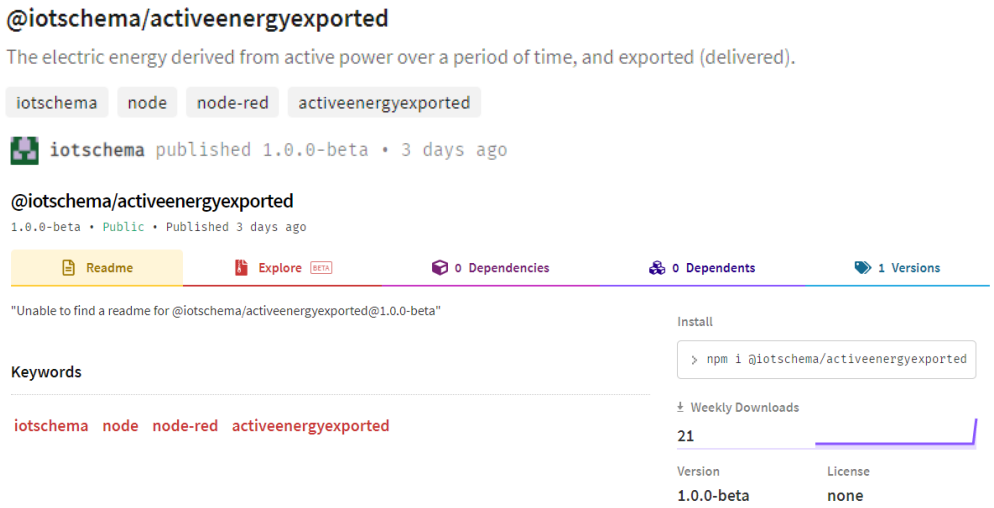
- iot.schema.org embedded in Node-RED tool
- Easies use of semantics for WoT developers
- Simplify creation of applications with W3C WoT
- Demonstrates semantic discovery and processing
- Handsome tool for WoT PlugFests

Publishing iotschema Nodes to npm

- iotschema nodes are currently being adapted for publication on the npm repository
- This will allow iotschema Node-RED developers to easily find and access nodes without having to go via the GitHub route.
- Currently available:
  - 17 packages
  - Migration for packages A-C completed
  - D-W in progress

How to use npm with iotschema nodes

- Users can simply issue the `npm install` command from their Node-RED environment
  - Example: `npm install @iotschema/binaryswitch`
- Nodes are hosted on the npm reporitory and are browsable on npmjs.com



Publishing iotschema Nodes to npm – Grouping

- One umbrella module (iotschema-capability) to install all nodes
- More granular groups to install only specific types
  - Example:

@iotschema/ambientair-capability
|
- @iotschema/nitrogenconcentration
- @iotschema/oxygenconcentration
- @iotschema/carbondioxideconcentration
- @iotschema/argonconcentration

iot.schema.org for Node-RED

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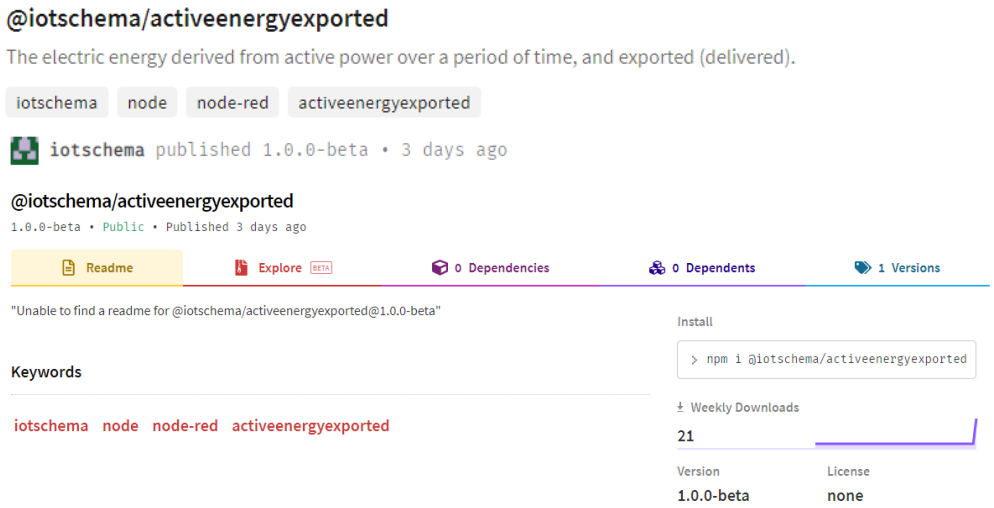

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Schema.org Integration

- 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