WISHI Hackathon Planning

Michael Koster
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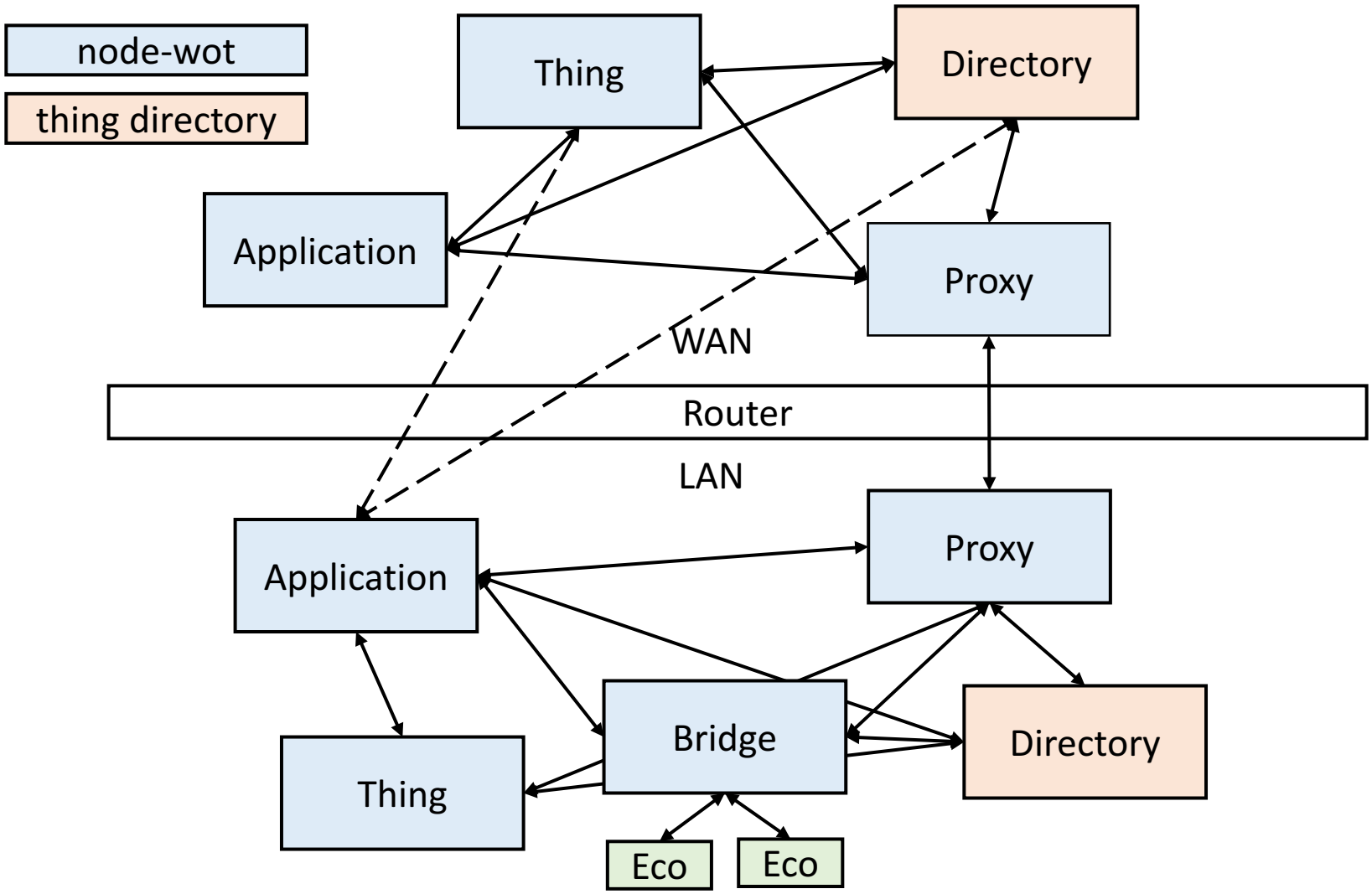
Topics

- Hackathon Infrastructure and Example
- Semantic Modeling for IPSO Smart Objects

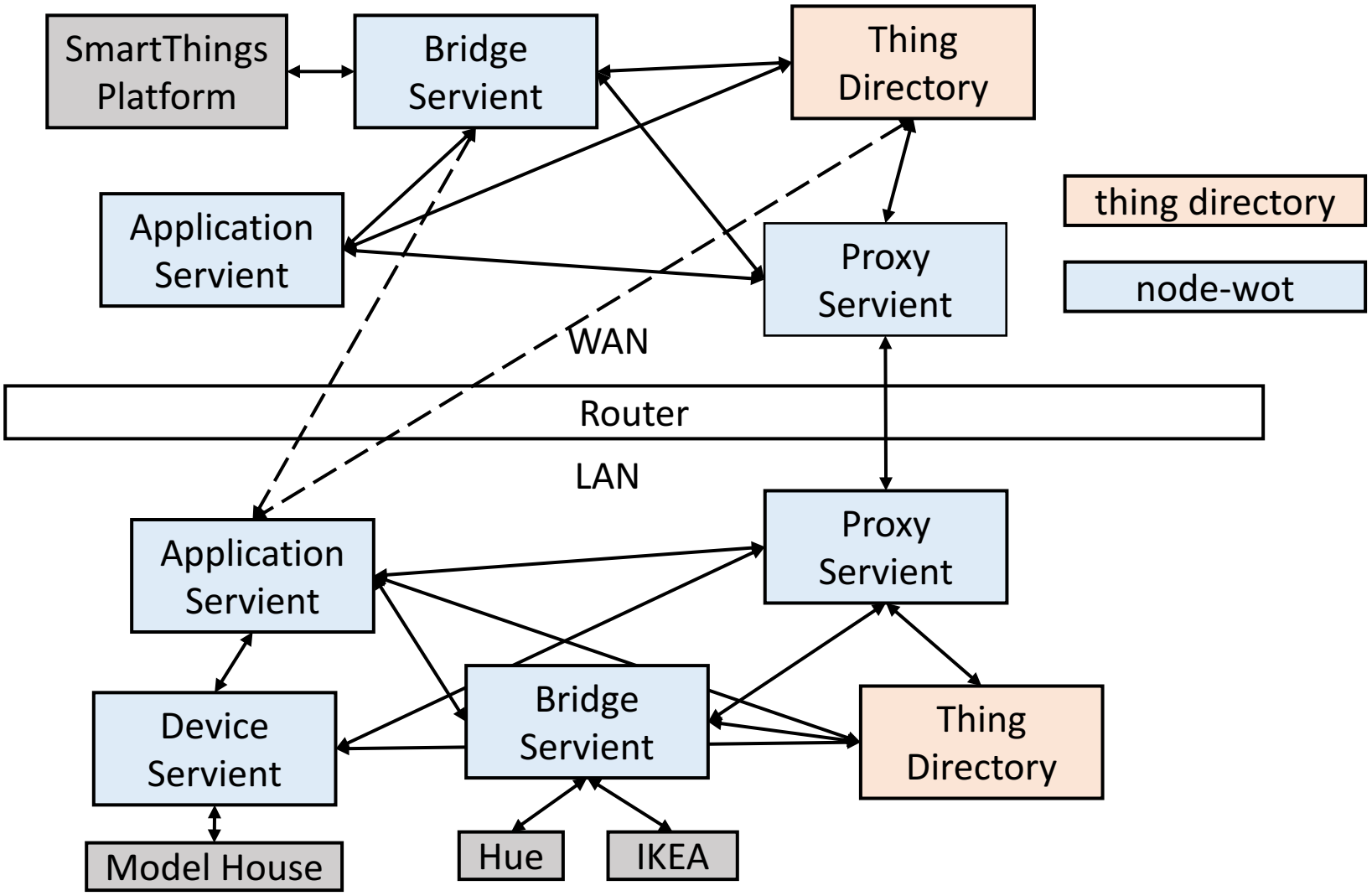
Hackathon Infrastructure

- Thing Directories
- Application Servients
- Thing Servients
- Proxies
- Bridges

System Architecture

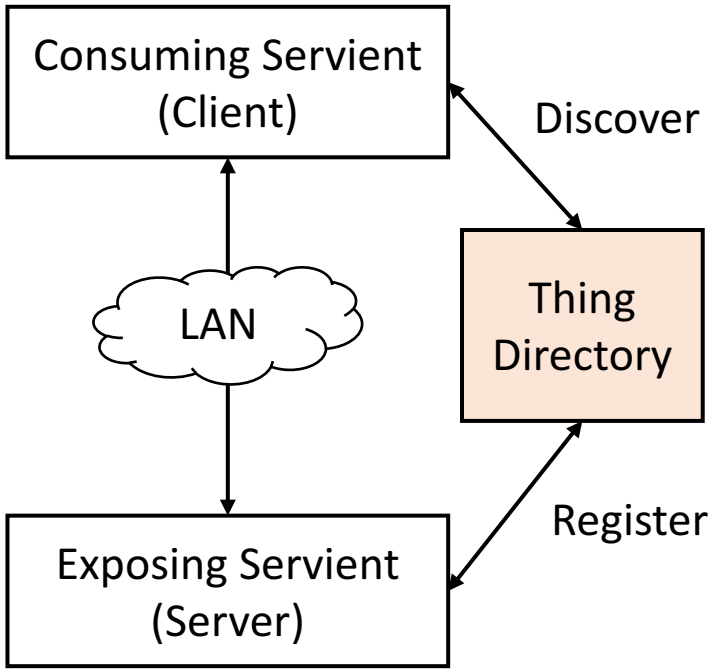


SmartThings



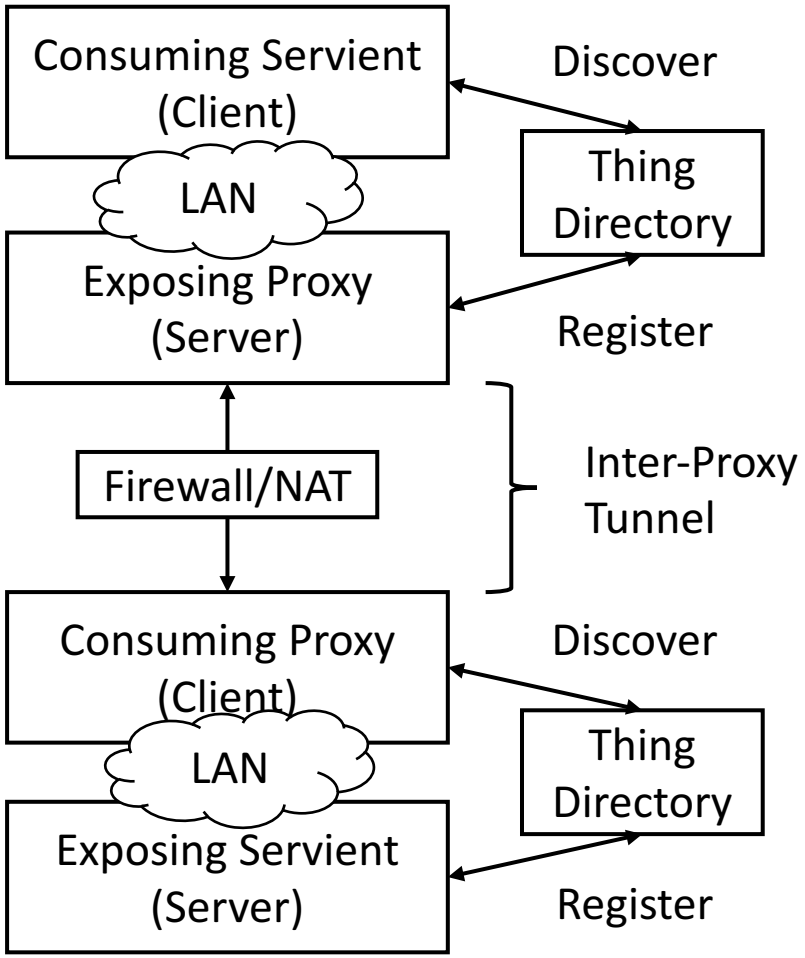
Client-Server Roles

1. Exposing Servient constructs exposed thing
2. Exposing Servient registers with directory
3. Consuming Servient discovers + consumes



Proxy Roles

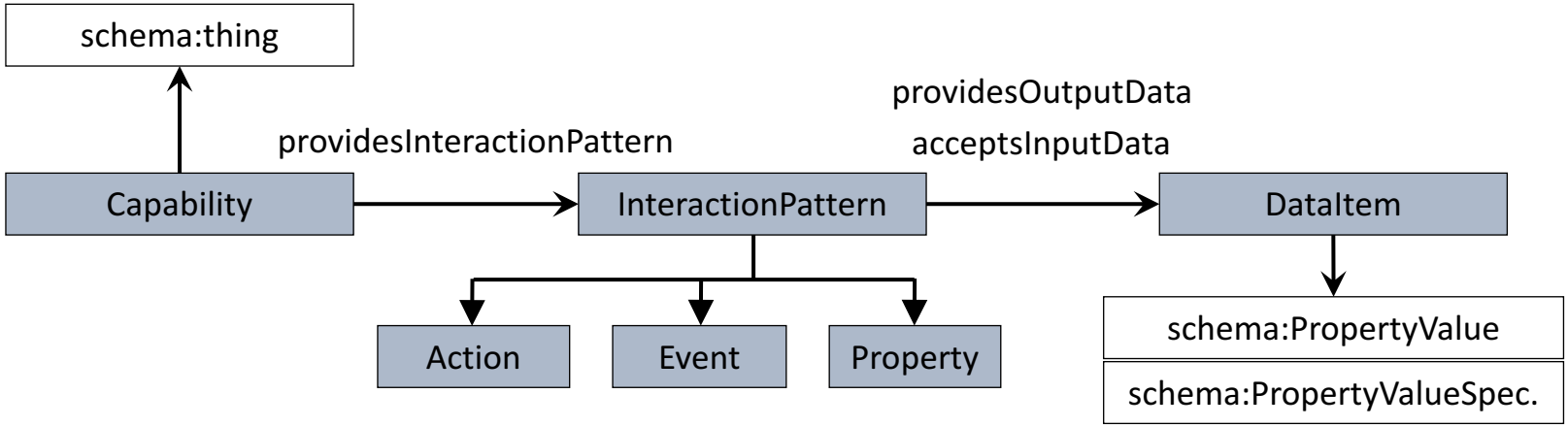
1. Exposing Servient registers with the local Directory
2. Consuming Proxy discovers + consumes
3. Consuming Proxy binds to tunnel and pushes a TD template
4. Exposing Proxy binds to tunnel and receives the TD template
5. Exposing Proxy constructs the Exposed Thing and registers it with the remote Directory
6. Consuming Servient discovers and consumes

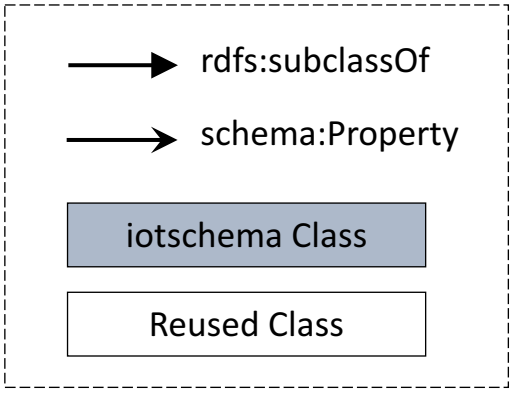


Semantic Models for IPSO Smart Objects

- Create and extend iot.schema.org definitions to describe IPSO Smart Objects
- Use W3C WoT Thing Description for annotation of instances
- Could also annotate RFC 6690 links or add new Resource IDs to tag Objects

iot.schema.org Semantic Categories





Semantic Models for IPSO Smart Objects - Mapping

- IPSO Object ID Definitions
  - iot.schema.org Capability, e.g. Temperature Measurement
- IPSO Resource ID Definitions
  - iot.schema.org Data Item, e.g. TemperatureData
  - iot.schema Data Items are defined in the context of some particular capability, not reusable like IPSO definitions
- iot.schema.org Property Interaction
  - Abstract class e.g. "Temperature" to model read/write access
  - Annotation goes on the abstract WoT property
  - Form to define the transfer layer semantics
  - Native annotation could be applied to the Resource ID

Semantic Models for IPSO Smart Objects – Resource ID

- Resource IDs are used for metadata
  - Units, Minimum, Maximum
  - Mapping to iot.schema.org PropertyValueSpecification terms
- Resource IDs to augment Capabilities
  - Minimum and Maximum tracking resources with Reset
  - E.g. add a Limits Capability with a Reset Action, which would enable composing limits onto another capability

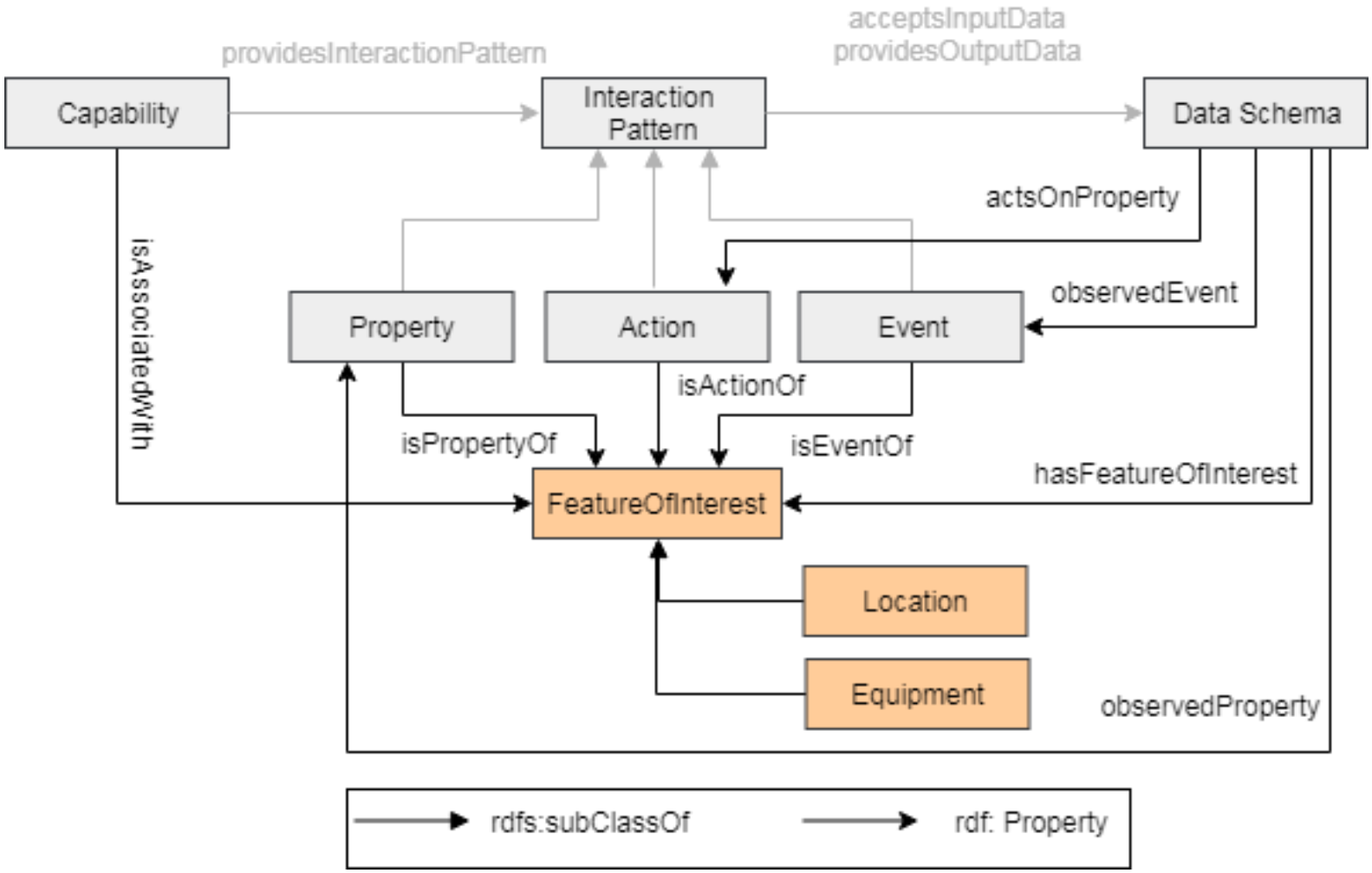
Semantic Models for IPSO Smart Objects – iot.schema categories

- iot.schema.org Actions are abstract orchestrations of state transitions on properties
- WoT Actions define a payload and a form for invoking the action
- Action definitions, e.g. SetTemperature can be mapped to Property updates using WoT TD
- Property Update Actions can be auto-generated to expose updates as actions

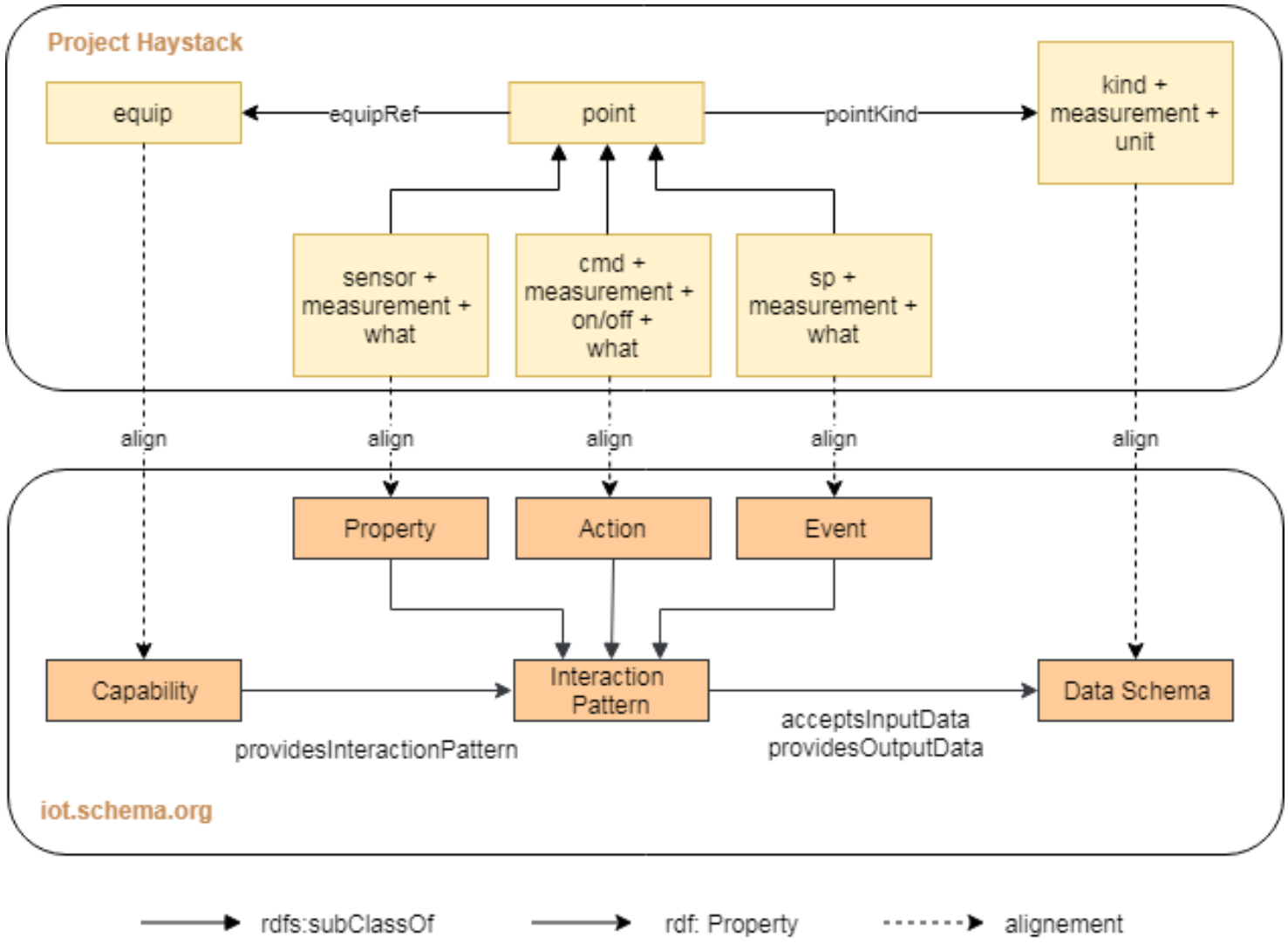
Example TD Instance for an IPSO Smart Objects

- JSON Equivalent Representation
- JSON Schema with Semantic Annotation
- WoT Thing Description with semantic annotation

Feature Of Interest Pattern



Integration of Haystack vocabulary in iot.schema.org



Feature of Interest Example

```
{
  @id": "iot:LiquidMixingSystem",
  "@type": "rdfs:Class",
  "rdfs:comment": "A LiquidMixingSystem is an Equipment.",
  "rdfs:label": "LiquidMixingSystem",
  "rdfs:subClassOf": {
    "@id": "iot:Equipment"
  }
},
{
  "@id": "iot:LiquidPipe",
  "@type": "rdfs:Class",
  "rdfs:comment": "A Liquid pipe is an Equipment.",
  "rdfs:label": "LiquidPipe",
  "rdfs:subClassOf": {
    "@id": "iot:Equipment"
  }
}
```

Thing Description Annotation

```
{
   "@context": [{
      "iot": "http://iotschema.org/",
      "festoPA":http://example.com/FestoPA/
   }],
   "@type": [ "Thing", "iot:Pump", "iot:Valve", "iot:FloatSwitch", "iot:UltrasonicSensing“ ],
   "iot:isAssociatedWith" : {"@id": "festoPA:FESTO-1", "@type": "iot:LiquidMixingSystem"},
   "name": "FestoLive",
   "id": "urn:dev:wot:siemens:festolive",
   "security": [{"scheme": "basic"}],
   "properties": {
   "PumpStatus": {
      "@type": "iot:OperationStatus",
      "isPropertyOf": {"@id": "festoPA:Pipe2", "@type": "iot:LiquidPipe"},
      "type": "object",
      "properties": {"PumpStatus": {"type": "boolean"}},
      "writable": false, "observable": false,
      "forms": [{
         "href": "https://129.144.182.85/iot/api/devices/Festo/PumpStatus",
         "mediaType": "application/json" }]
}
```