The Standards People

Towards interworking between NGSI-LD and WoT

(2nd W3C Workshop on Web of Things)

Presented by: **José Manuel Cantera**
(*FIWARE Foundation e.V.*)
On behalf of
ETSI ISG CIM

For: **Public review**
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ETSI ISG CIM: Mission

Make it easier

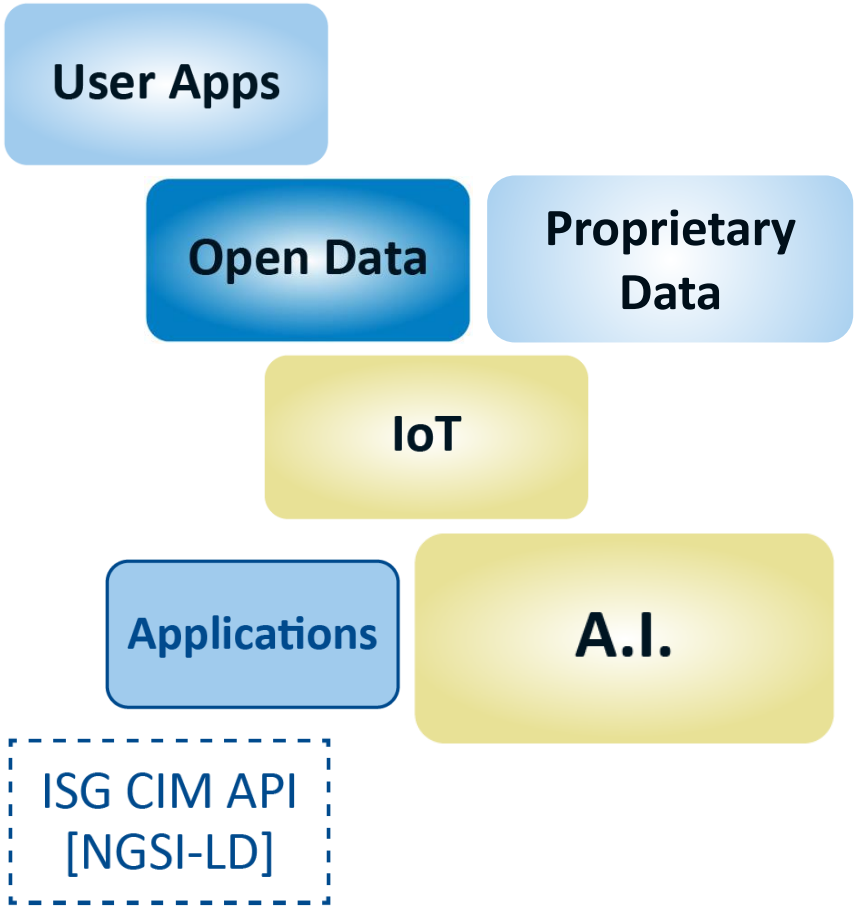
for END-USERS

and CITY DATABASES

and IoT internet-of-things

and third-party APPS

to exchange INFO



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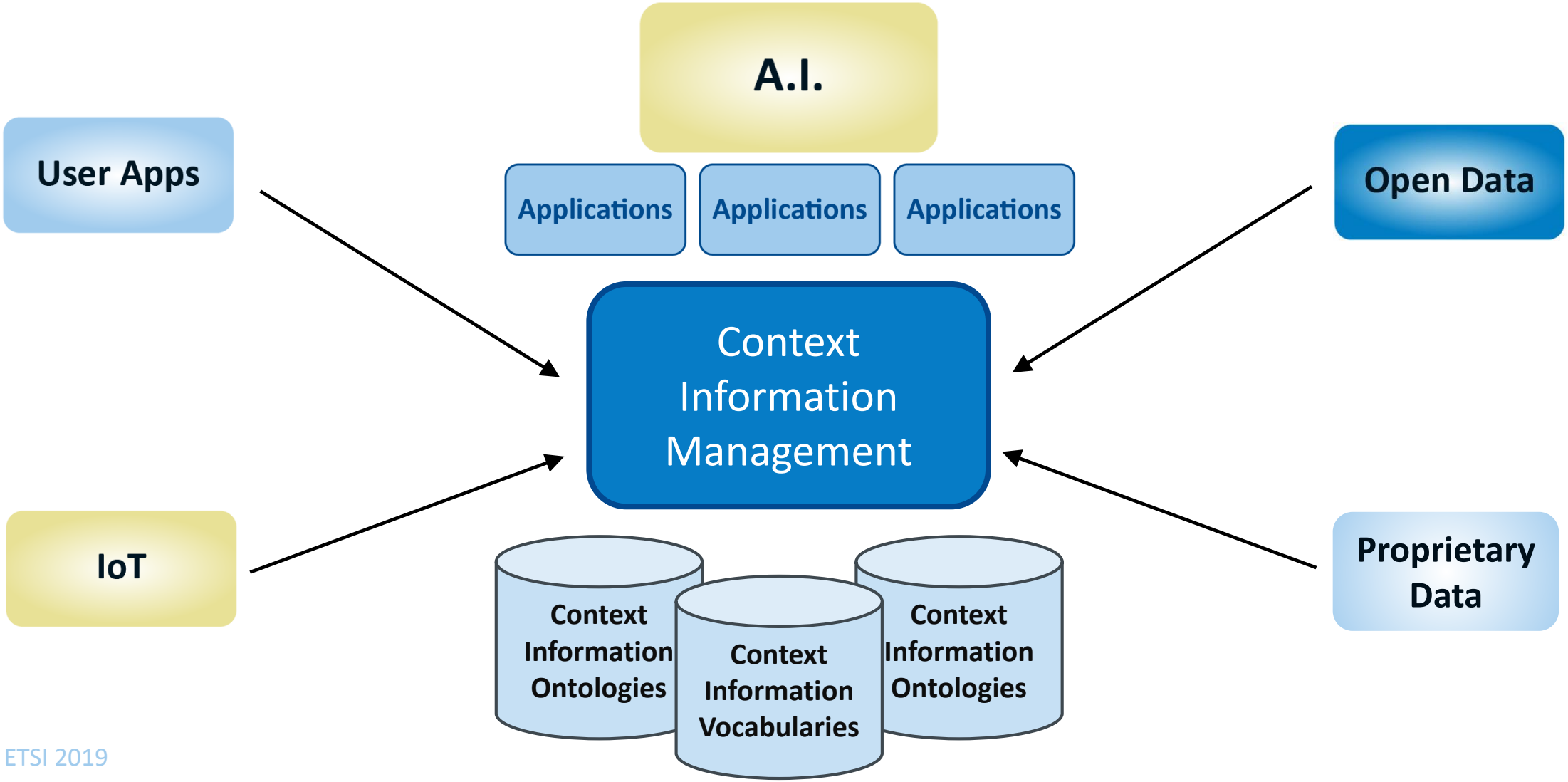
Context Information Management – Data AND Meaning



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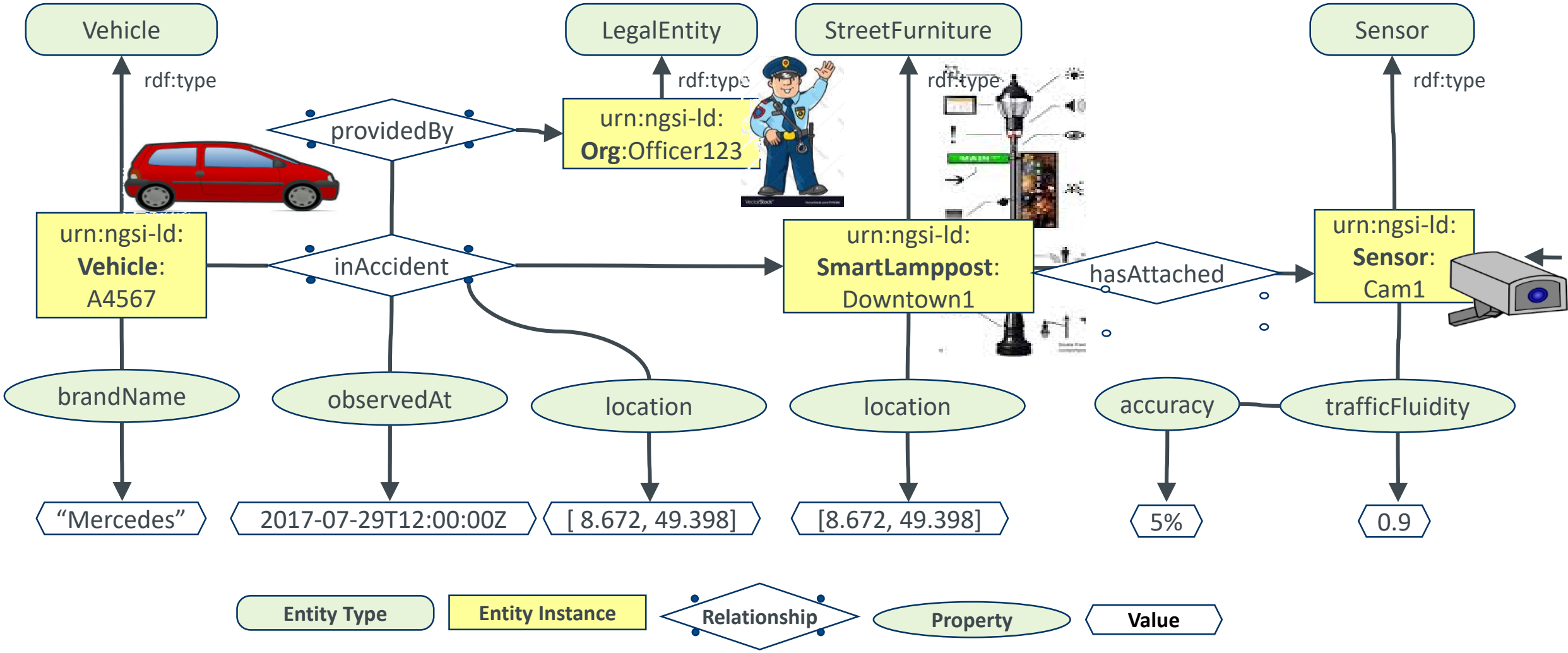
Example: Combined data exchange using Property Graphs



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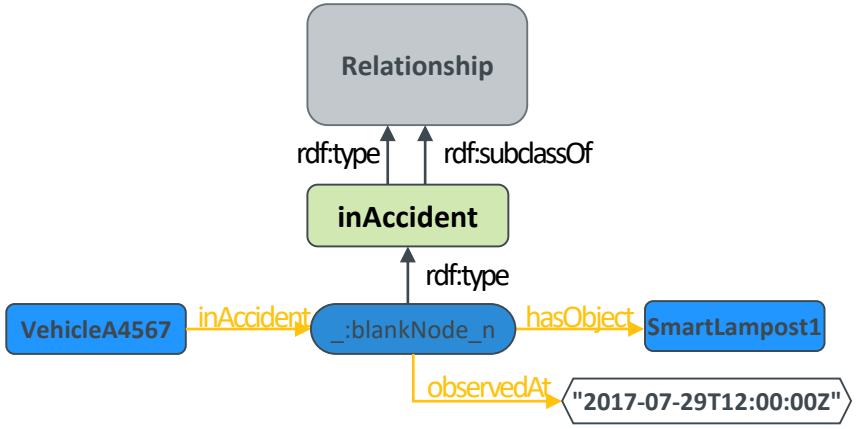
Example: Entity "Vehicle" and its @context in NGSI-LD

```
{
    "id": "urn:ngsi-ld:Vehicle:A4567",
    "type": "Vehicle",
    "brandName": {
        "type": "Property",
        "value": "Mercedes"
    },
    "inAccident": {
        "type": "Relationship",
        "object": "urn:ngsi-ld:SmartLamppost:Downtown1",
        "observedAt": "2019-05-29T12:14:55Z",
        "providedBy": {
            "type": "Relationship",
            "object": "urn:ngsi-ld:Org:Officer123"
        }
    },
}
```

```
"@context": [
    "https://uri.etsi.org/ngsi-ld/v1/ngsi-ld-core-context.jsonld",
    "https://example.org/vehicle/my-user-terms-context.jsonld"
]
```

Blank node reification



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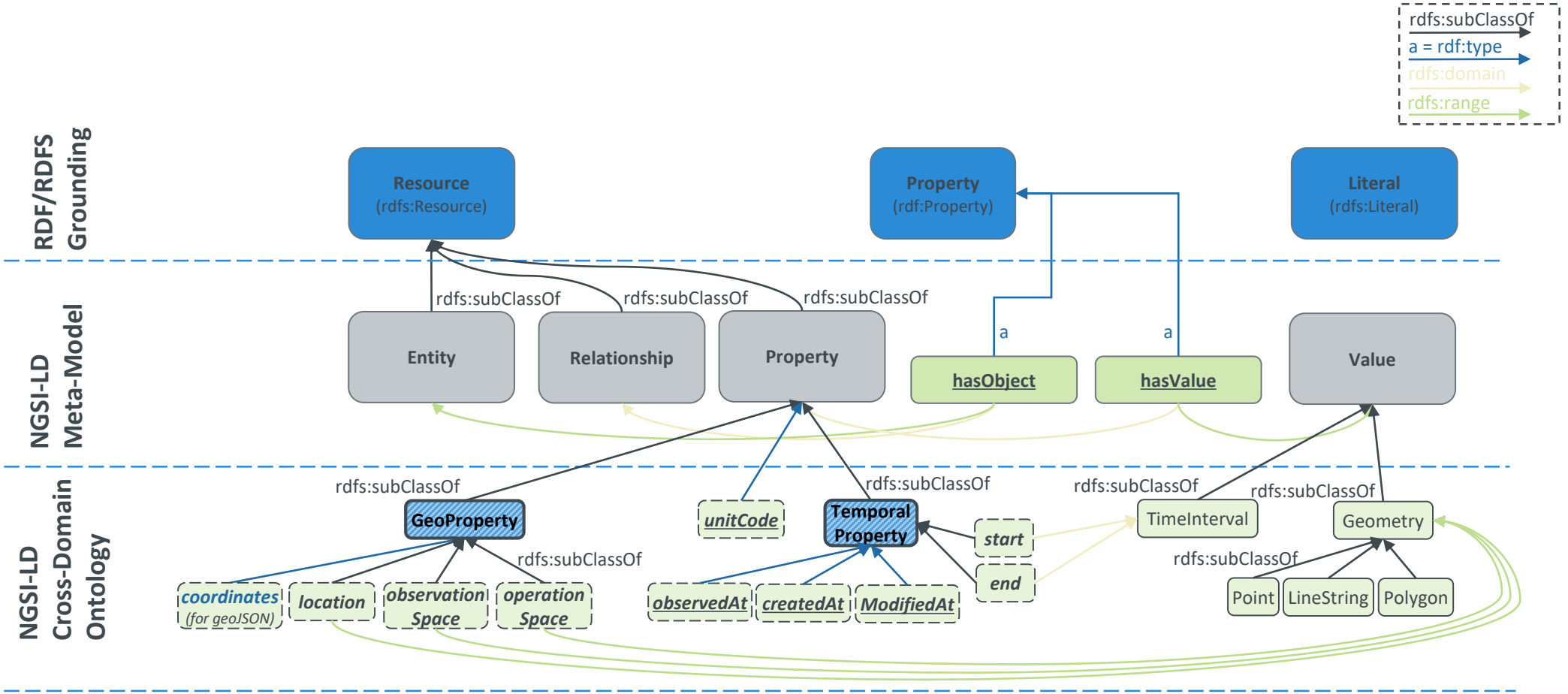
NGSI-LD Information Model



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NGSI-LD REST API Overview

- Context Information Provision
  - Create Entity (POST), Update Entity (PATCH), Delete Entity (DELETE)
- Context Information Consumption (GET)
  - Query
  - Temporal Query
  - Geo Query
- Context Information Subscription
  - Subscribe to changes in Context. Webhook-based notifications.
- Context Source Registration

  Register new Context Sources (distributed case)

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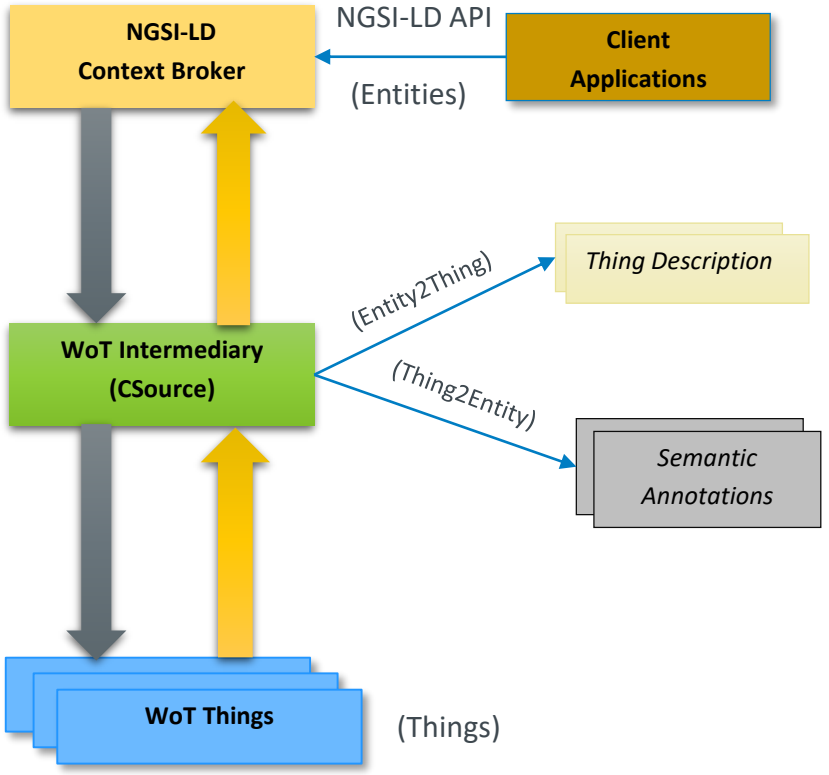
NGSI-LD interworking with WoT (conceptual architecture)



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NGSI-LD interworking with WoT (proposal)

WoT Affordance	NGSI-LD Element
Property	Attribute (Property or Relationship)
Event	Attribute (Property or Relationship)
Action	For further study

Mapping process can be guided through TD annotations expressed using standard ontologies

- W3C SSN
- SmartM2M SAREF

For discussion

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TD with semantic annotations for NGSI-LD IoW .- proposal & example


```
{
 "id": "urn:dev:ops:32473-WoT-ContainerSensor-1234",
 "name": "Sensor-Brand-Model",
 "securityDefinitions": {
  "nosec_sc": {
   "scheme": "nosec"
  }
 },
 "security": [
  "nosec_sc"
 ],
 "events": {
  "fillingValue": {
   "@type": "sosa:Observation",
   "sosa:hasFeatureOfInterest": "urn:ngsi-ld:WasteContainer:A3456",
   "sosa:observedProperty": "https://uri.fiware.org/ns/dataModels/fillingLevel",
   "data": {
    "type": ”number"
   },
   "forms": [
    {
     "href": "mqtt://192.168.1.187:1883/WasteContainer/1234",
     "contentType": "text/plain"
    }
   ]
  }
 },
 "@context": [
  "https://www.w3.org/2019/wot/td/v1",
  {
   "sosa": "http://www.w3.org/ns/sosa/"
  }
 ]
}
```


W3C SSN Annotations for NGSI-LD Mapping

Event Mapping


```
{
 "id": "urn:ngsi-ld:WasteContainer:A3456 ",
 "type": ”WasteContainer",
 "fillingLevel": {
  "type”: "Property",
  "value" : 0.85,
  "observedAt" : “2019-22-05T12:34:55Z”,
  "source" : "urn:dev:ops:32473-WoT-ContainerSensor-1234"
 },
 "color" : {
  "type”: "Property",
  "value”: "green"
 },
 "@context": [
    "https://schema.lab.fiware.org/ld/context",
    "https://uri.etsi.org/ngsi-ld/v1"
 ]
}
```


For discussion

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Conclusions & Outlook

- W3C WoT TD specification is very *promising* and flexible
- Semantic annotations to enable interworking between W3C WoT and NGSI-LD
  - Powered by concepts already defined by SmartM2M SAREF and/or W3C SSN.

- **Outlook**
  - Consolidate and further discuss our interworking proposals

  - Further standardization aspects
    - TD Template standard as a paramount aspect for scalability
    - Binding templates as a W3C Recommendation

  - Study other alternatives for semantic annotation
    - Other concepts in W3C SSN, SmartM2M SAREF, oneM2M or custom ontology, etc.

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References

Additional resources on NGSI-LD

- NGSI-LD Specification (January 2019)
- NGSI-LD HTTP REST binding - Open API Specification
- ISG CIM Public materials (whitepapers, etc.) can be found at
  - https://portal.etsi.org/CIM/OPEN

- NGSI-LD implementations and test suites
  - Created by the FIWARE open source Community
    - NGSI-LD Test Suite, Orion-LD
  - Other: Djane (Sensinov), Thing'in Project (Orange)

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Thank You !

José Manuel Cantera Fonseca
(FIWARE Foundation e.V.)

Rapporteur NGSI-LD spec

Contact for ETSI ISG CIM: ISGSupport@etsi.org

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Lindsay Frost (NEC)

Open pages for consensus material:
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