

Interworking between Information Silos with NGSI-LD API



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Presented by: **Lindsay Frost**

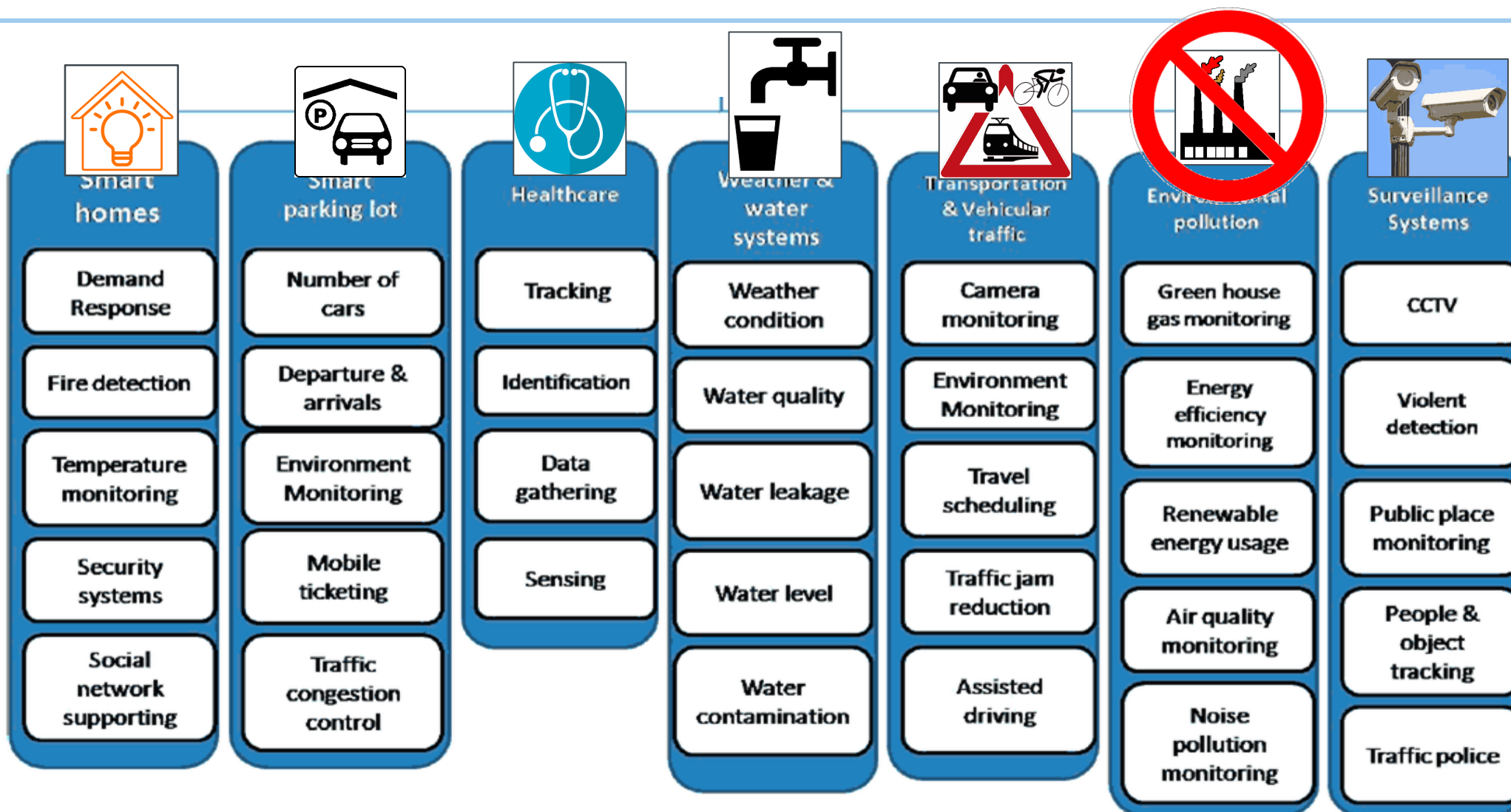
For: **IoT Forum, IoT Week,
Aarhus,, 17-21 June 2019**



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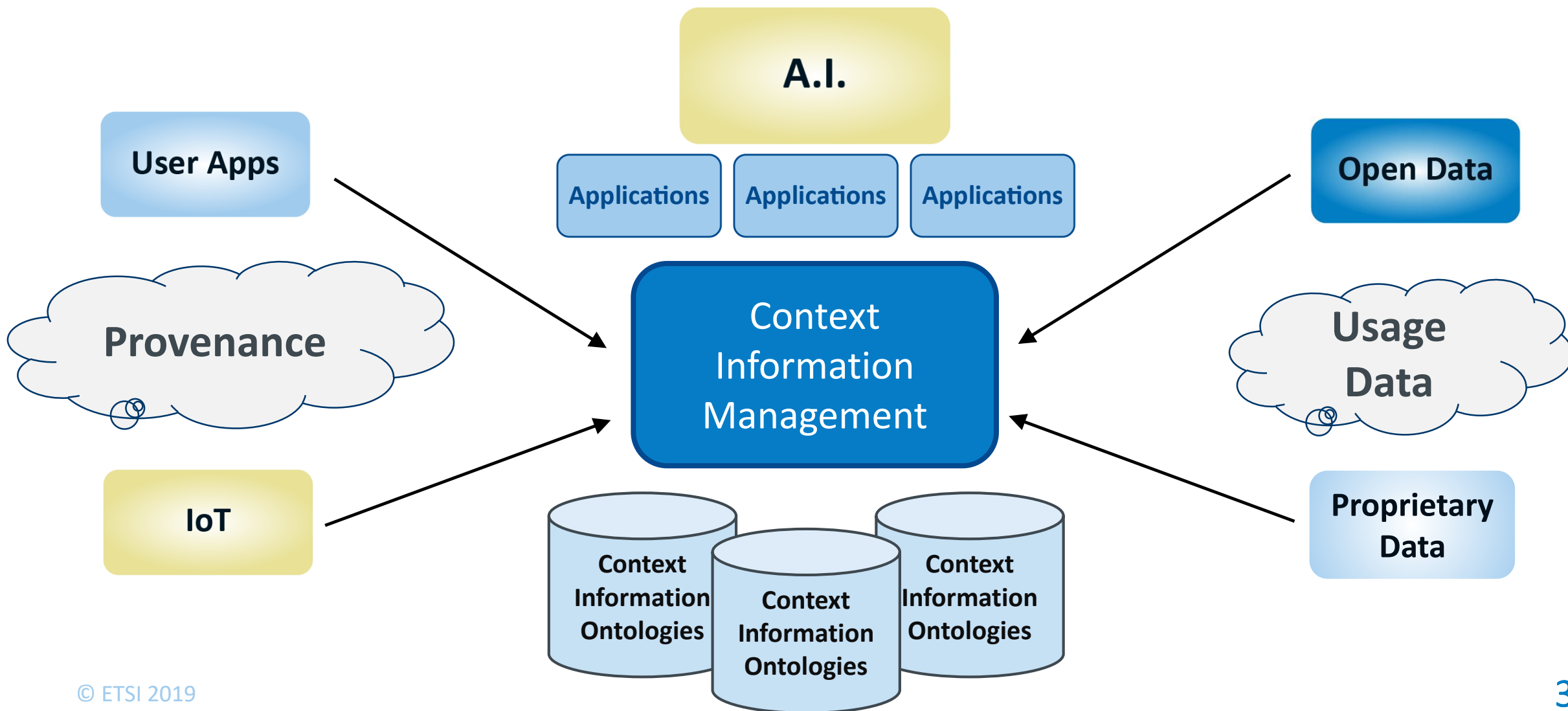
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Smart Cities and Information Silos



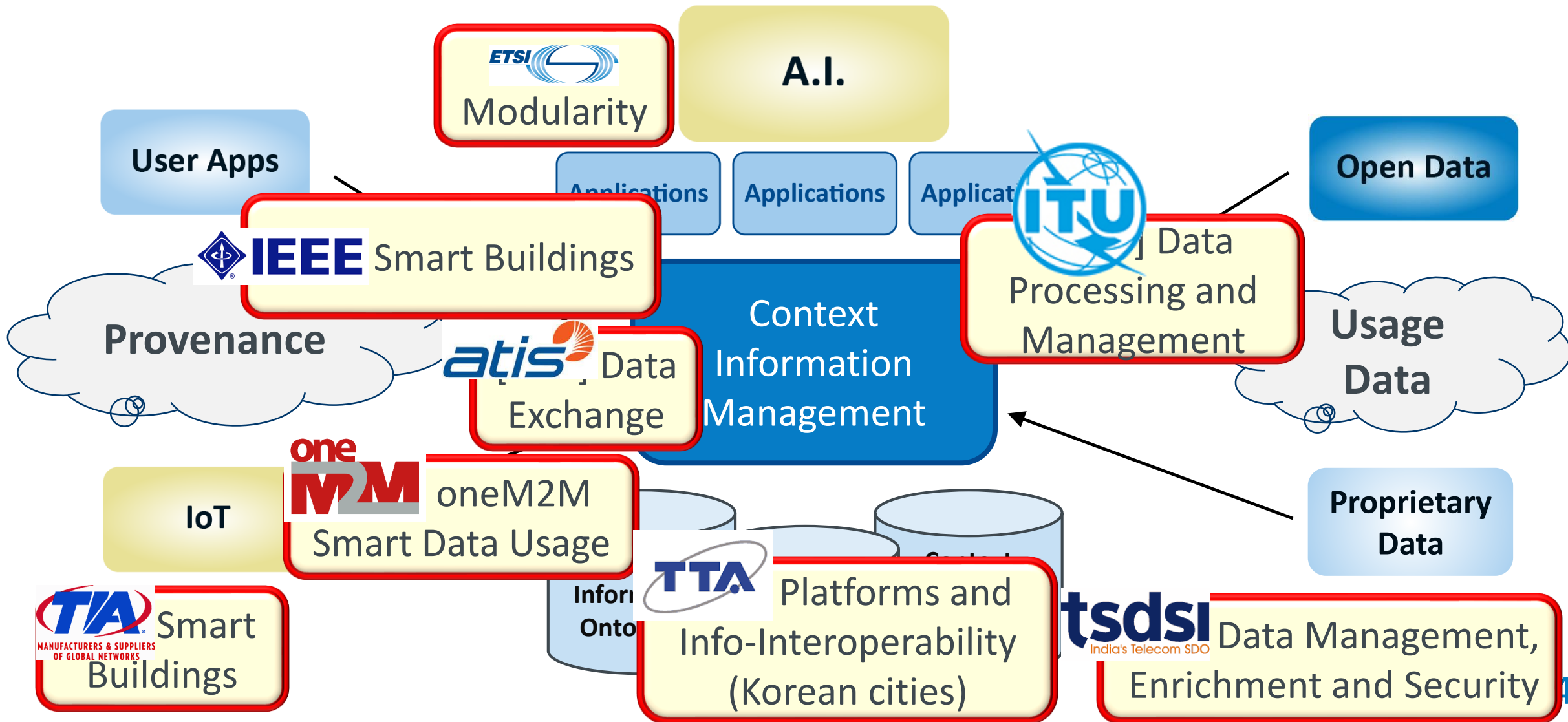
Source: Ref (1) "Review of Smart Cities based on IoT" <https://www.mdpi.com/1996-1073/10/4/421/pdf>.

Smart Cities need Information Management “between silos”



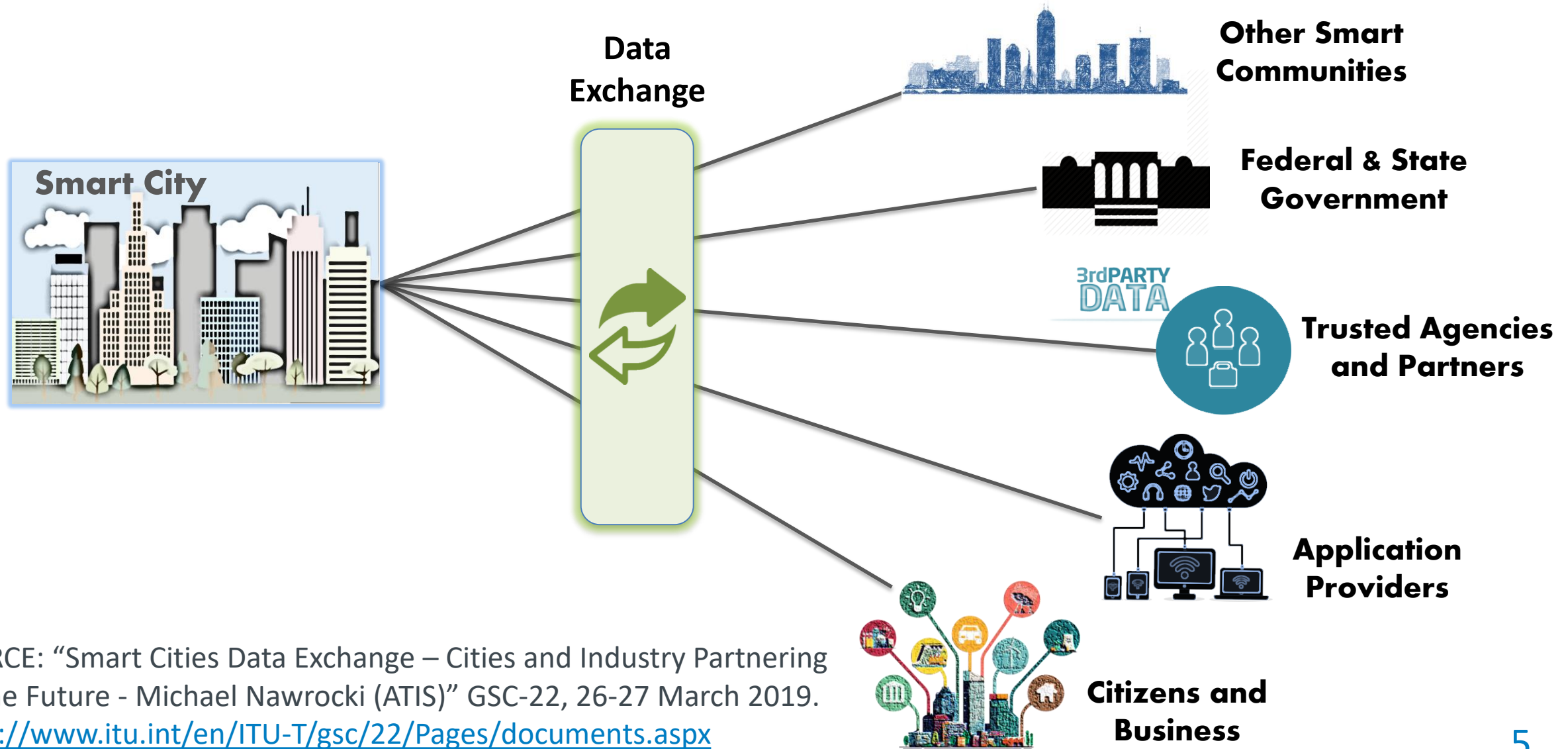
Information Management is being considered by all major SDOs

GSC-22, 26-27 March 2019. <https://www.itu.int/en/ITU-T/gsc/22/Pages/documents.aspx>



Example 1

Application Space for a Data Exchange



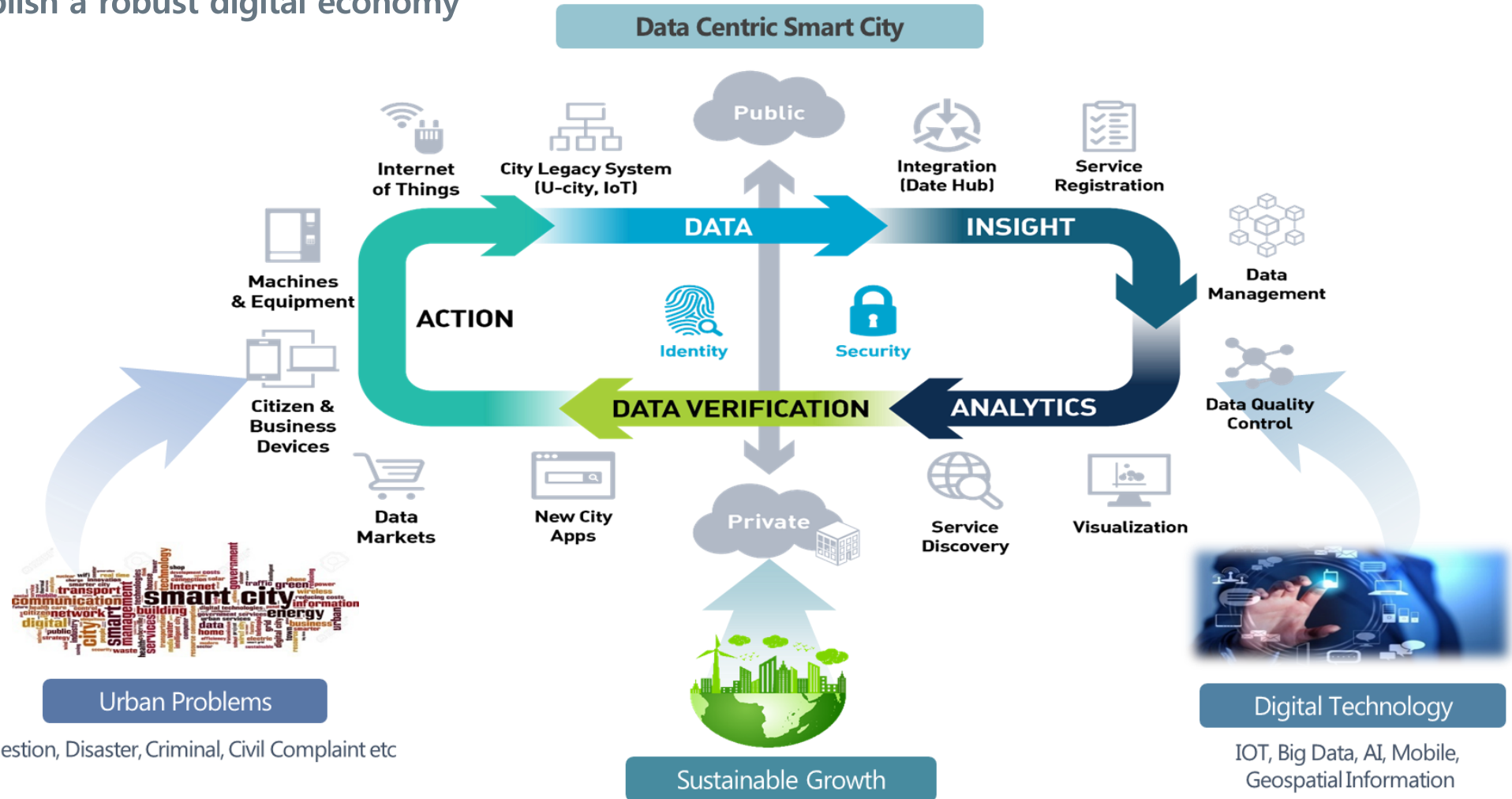
SOURCE: "Smart Cities Data Exchange – Cities and Industry Partnering for the Future - Michael Nawrocki (ATIS)" GSC-22, 26-27 March 2019.
<https://www.itu.int/en/ITU-T/gsc/22/Pages/documents.aspx>

Example 2

DATA USE AND MANAGEMENT – Data Centric Model



- Data-centric Smart City Model is necessary to resolve urban problems, ensure sustainable growth and accomplish a robust digital economy



“Urban Data Management and Modeling in Korea Smart City - Dae Yeon Cho (TTA)” GSC-22, 26-27 March 2019

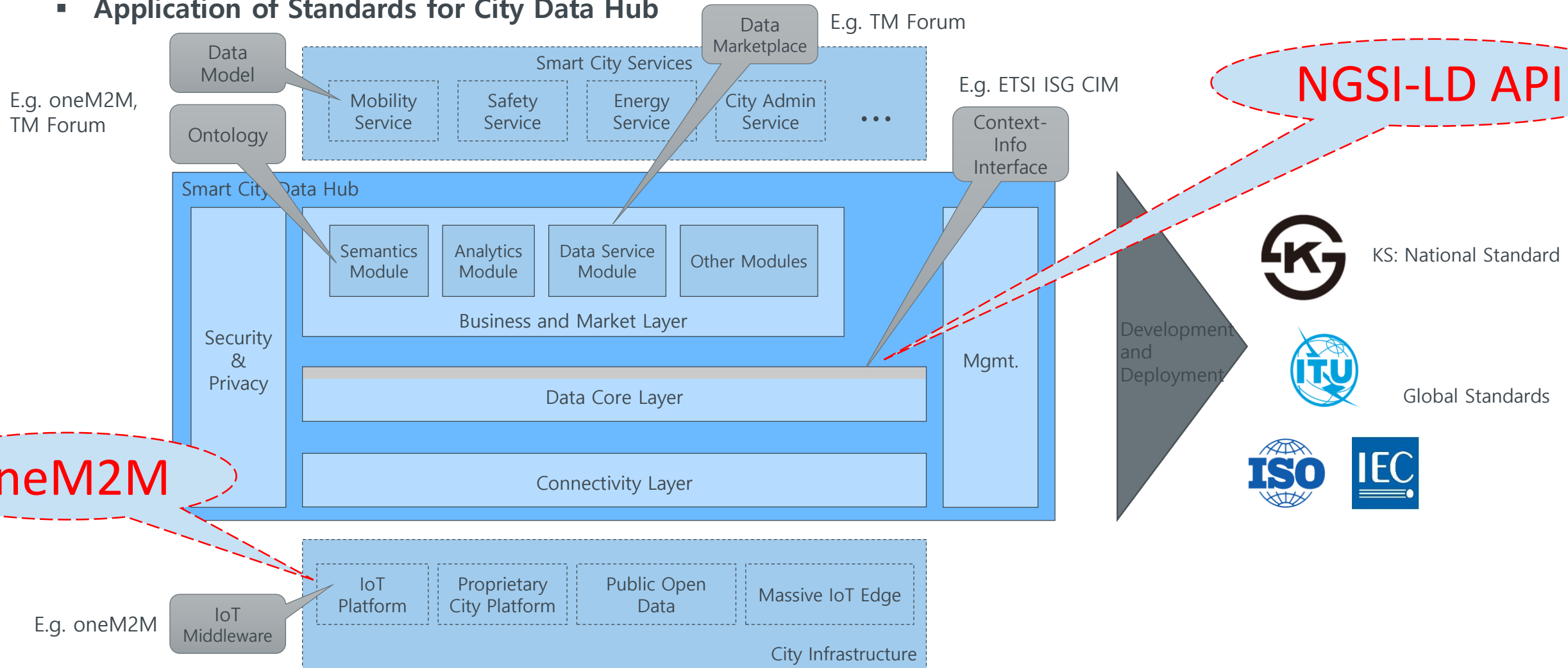
<https://www.itu.int/en/ITU-T/gsc/22/Pages/documents.aspx>

Example 2

DATA USE AND MANAGEMENT – Standards of Data Hub



Application of Standards for City Data Hub

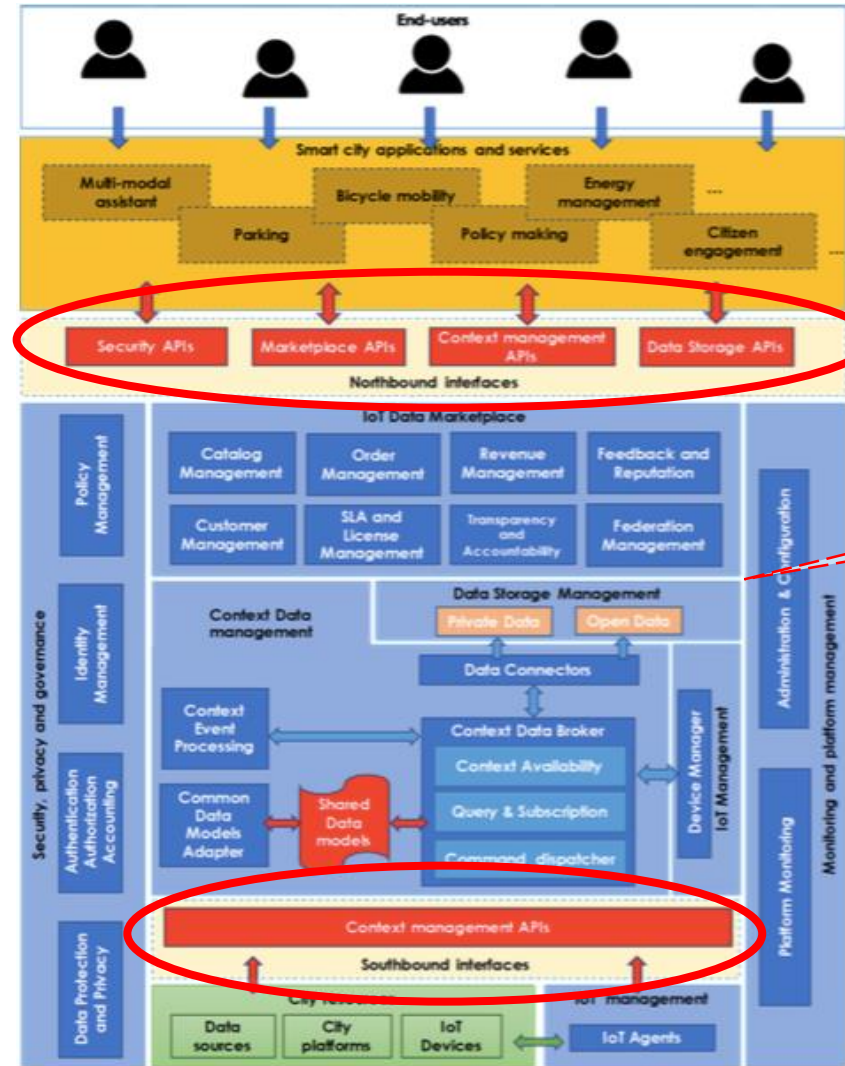


“Urban Data Management and Modeling in Korea Smart City - Dae Yeon Cho (TTA)” GSC-22, 26-27 March 2019

<https://www.itu.int/en/ITU-T/gsc/22/Pages/documents.aspx>

Example 3

Information Management: also in Synchronicity



SynchroniCity Architecture makes modules into solutions

with "Minimal Interoperability Mechanisms"

NGSI-LD API

This resulted from:

- Architecture guidelines and use case analysis
- Reference zones compliance
- Reuse of existing approaches:
 - high-level analysis of relevant European initiatives regarding IoT and Smart City platforms showed some commonalities, among the heterogeneous projects, in terms of technologies and functionalities.

ETSI has Context Information Management using NGSI-LD

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ETSI
The Standards People

Introduction Context Information Management using NGSI-LD API

Presented by: **ETSI ISG CIM** For: **Public review**
15 January 2019

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Introduction in 9 Sections

- [ETSI ISG CIM Mission: link up all data sources](#)
- [How info-exchange can help cities](#)
- [How can all THAT Information be handled ?](#)
- [Example: The happy policeman](#)
- [Information Model](#) and [Query Language](#)
- [Architectures](#)
- [Problem: A babel of Ontologies](#)
- [Not alone !](#)
- [NGSI-LD CURRENT STATUS](#)

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ETSI GR CIM 002 V1.1.2 (2018-09)

GROUP REPORT

USE CASES

Context Information Management (CIM);
Use Cases (UC)

PUBLISHED

2

ETSI

ETSI White Paper No. 31
**NGSI-LD API:
for Context Information Management**

1st edition – January 2019
ISBN No. 1234

Authors:
Dominic Ross
Svenja Pöhl
Alfred Bauer
Julia Frenn
Wesley Li

ETSI
ETSI, Sophia Antipolis Cedex, France
Tel: +33 (0) 3 80 18 42 00
info@etsi.org
www.etsi.org

Whitepaper explains concepts

This whitepaper explains the main concepts behind a new data exchange protocol called NGSI-LD which aims to make it easier to find and exchange information with open databases, mobile Apps and IoT platforms. It fills the gap between brief press releases and detailed specification documents for NGSI-LD API and related use cases .

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Draft ETSI GS CIM 004 v0.0.11 (2018-02)

GROUP SPECIFICATION

NGSI-LD API

Context Information Management (CIM);
Application Programming Interface (API)

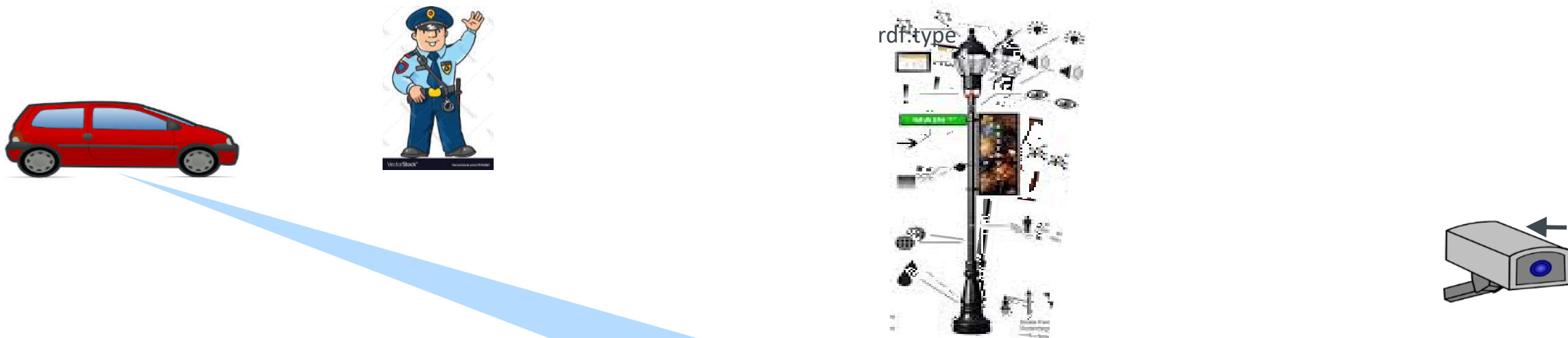
PUBLISHED

Examples how NGSI-LD could help in cross-domain Apps

- e.g. Show the air-pollution geomap near you, whatever your city
- e.g. Show the combined traffic/crime/rental "heat map" to help locate a new apartment to help city-planners
- e.g. Combine public-transport usage data with "special deals" on tickets data, to help determine optimum usage ?
- e.g. Compare hospital admissions data, with weather and pollution data, to help plan emergency services (i.e. reduce spare capacity, but make sure surges can be covered)

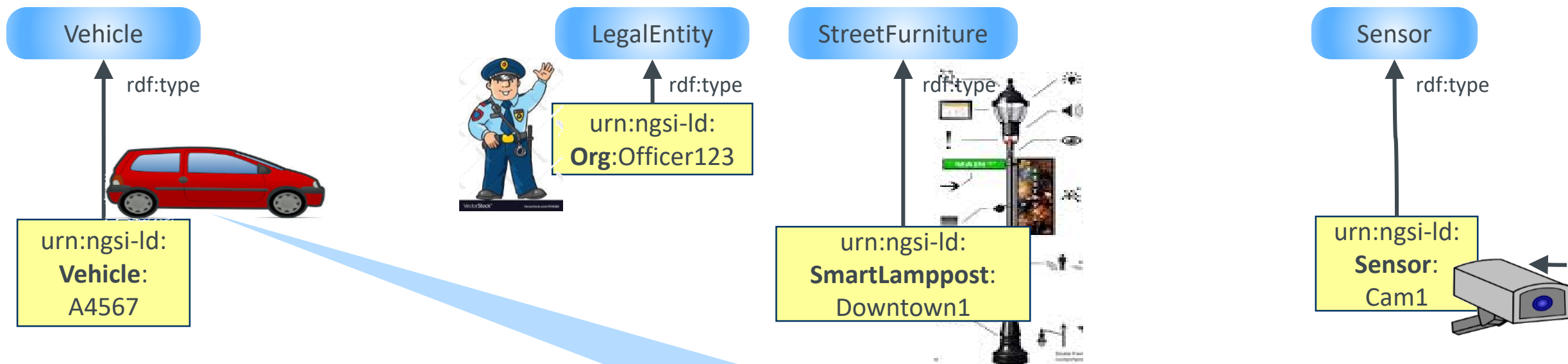
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NGSI-LD Example: Combined data exchange using Property Graphs



Imagine a car crashes into a Lamppost and the police note the details and later look for video evidence

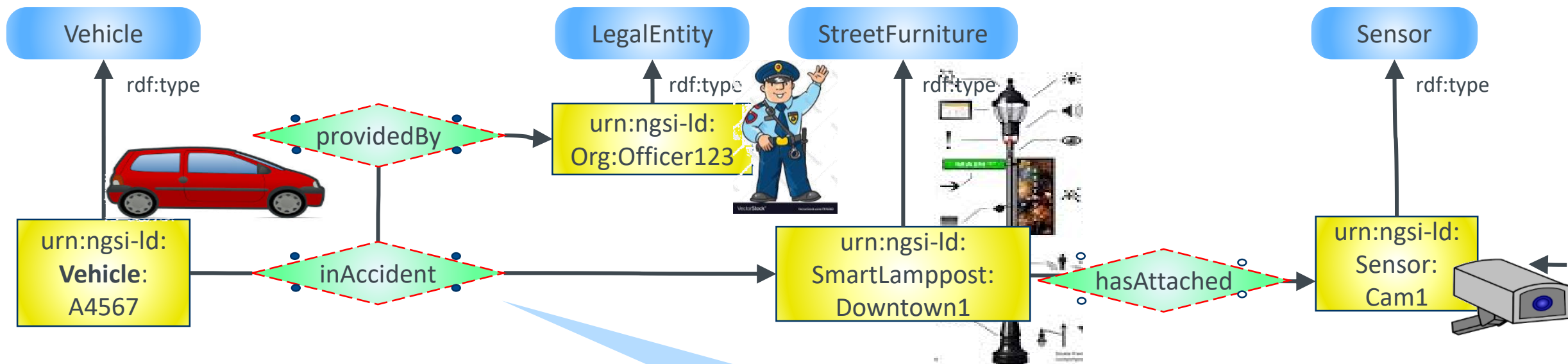
NGSI-LD Example: Combined data exchange using Property Graphs



The police or town hall need to record the accident involving four kinds of entities, and actually four specific instances of them.



NGSI-LD Example: Combined data exchange using Property Graphs



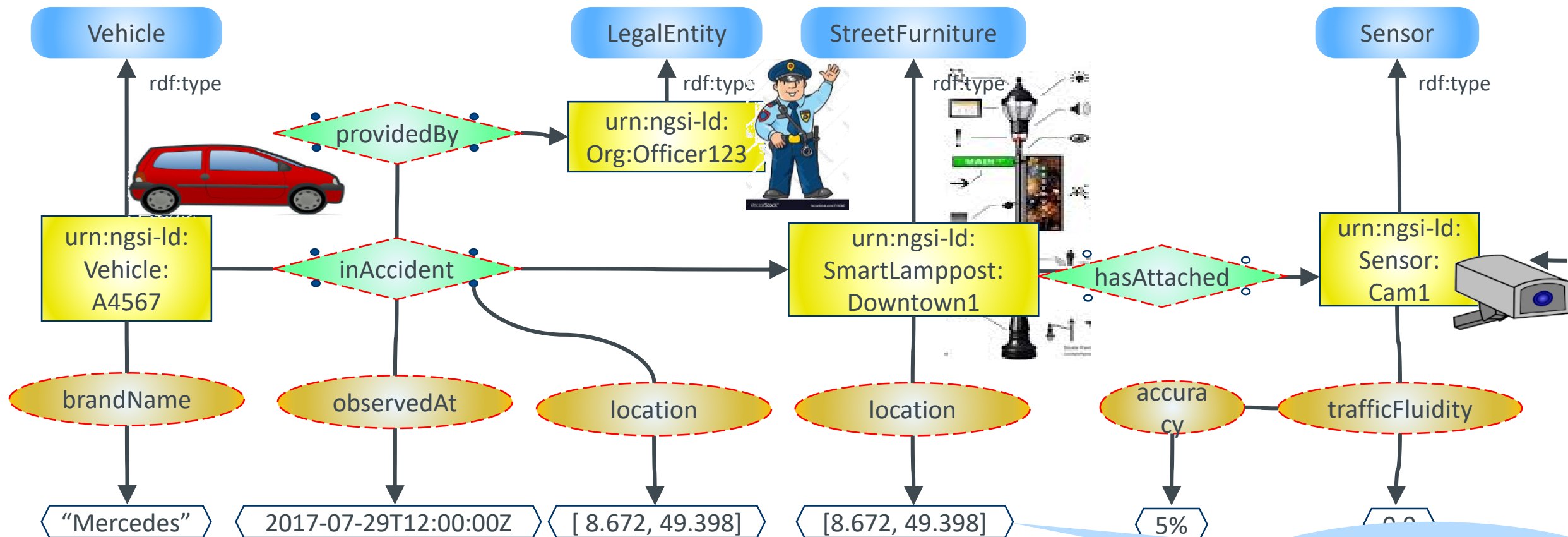
The police records show all involved in the accident: there is a set of “relationships”

ENTITIES

INSTANCES

RELATIONSHIPS

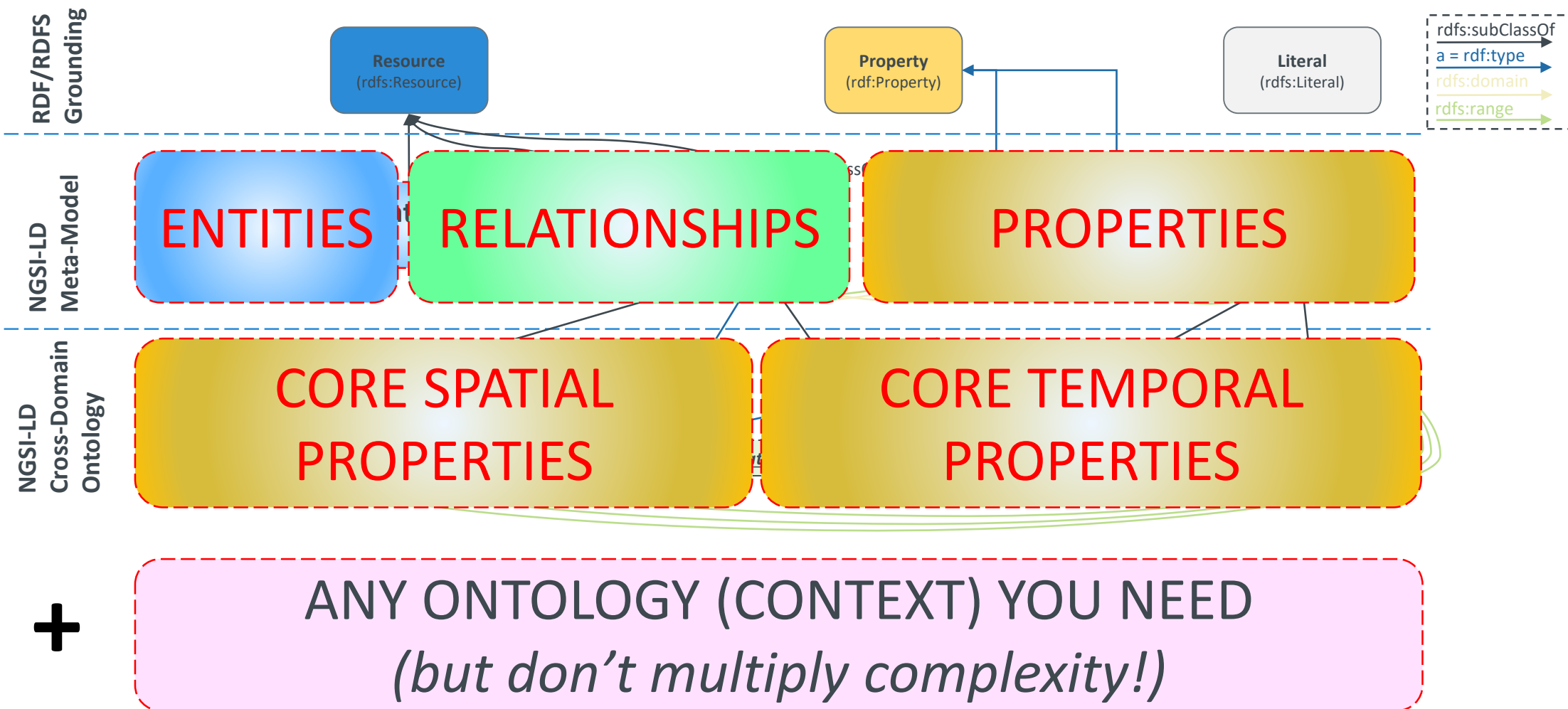
NGSI-LD Example: Combined data exchange using Property Graphs



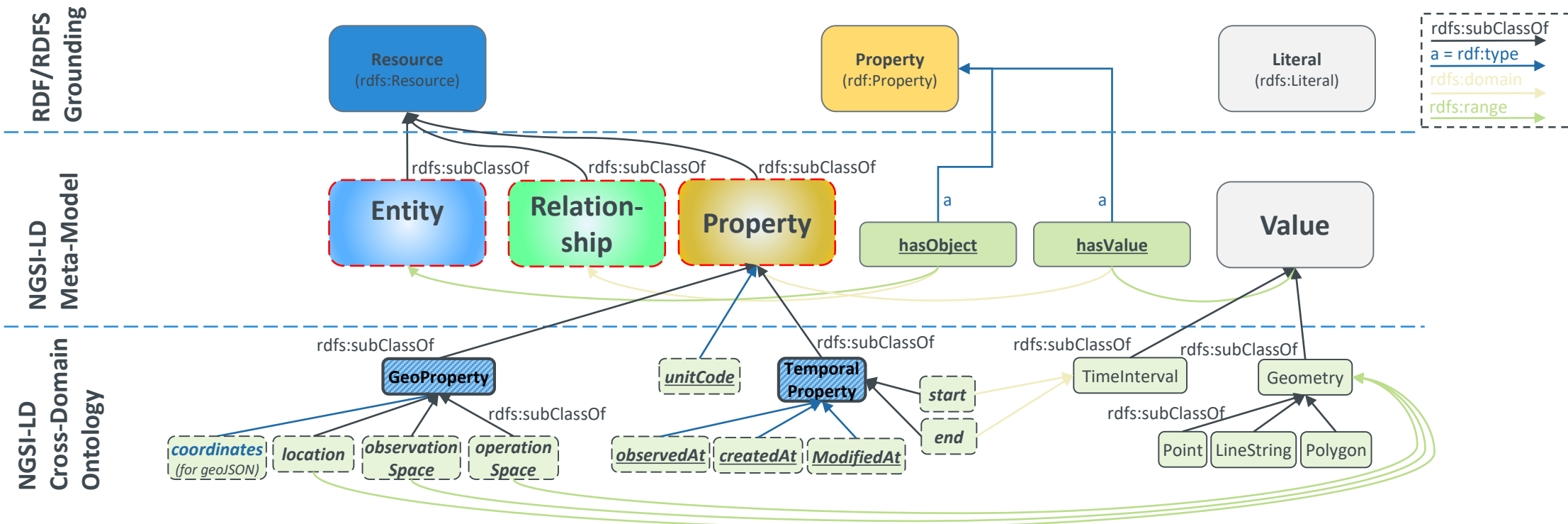
Info is noted for each entity !



Interworkable records: NGSI-LD Information Model



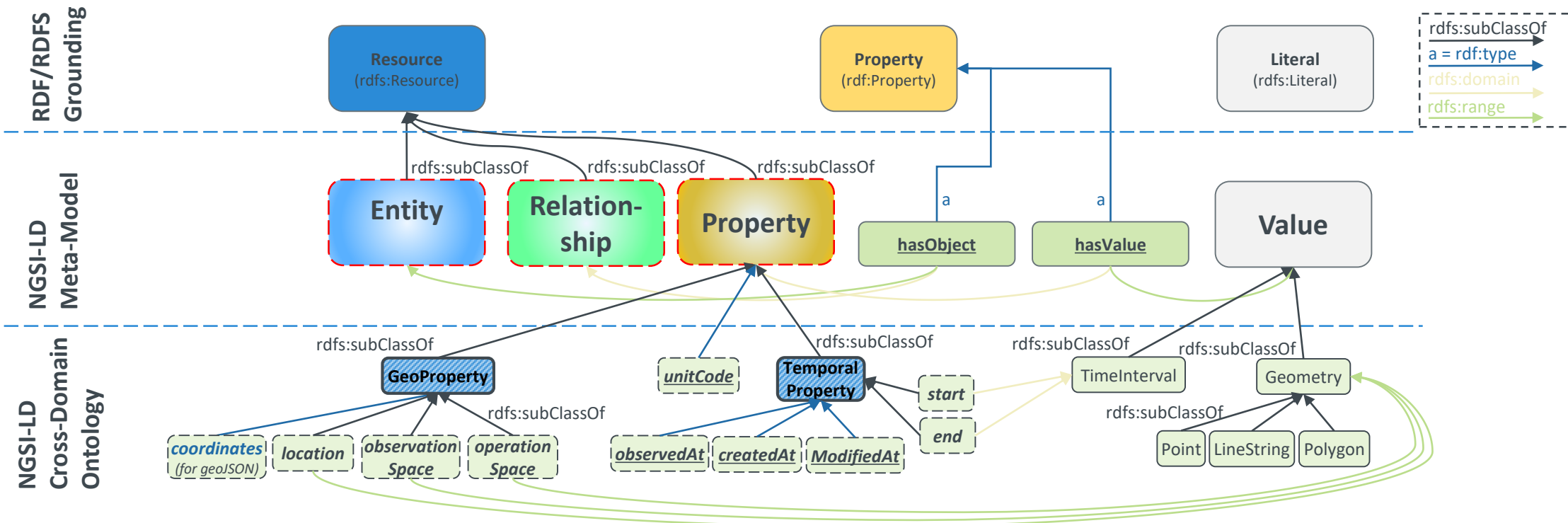
Interworkable records: NGSI-LD Information Model



+

ANY ONTOLOGY (CONTEXT) YOU NEED
(but don't multiply complexity!)

Interworkable records: NGSI-LD Information Model



UNDER CONSTRUCTION




WEB OF THINGS



THINGS

...

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NGSI-LD Information Model

NGSI Entity → Physical or virtual object.

- ✓ It has (one) Entity Type.
- ✓ Uniquely identified by an Entity Id (URI)

Entity has zero or more attributes identified by a name

- ✓ Property --> Static or dynamic characteristic of an entity
 - ✓ GeoProperty (geospatial context)
 - ✓ TemporalProperty (time context)

Relationship → Association with a Linked entity (unidirectional)

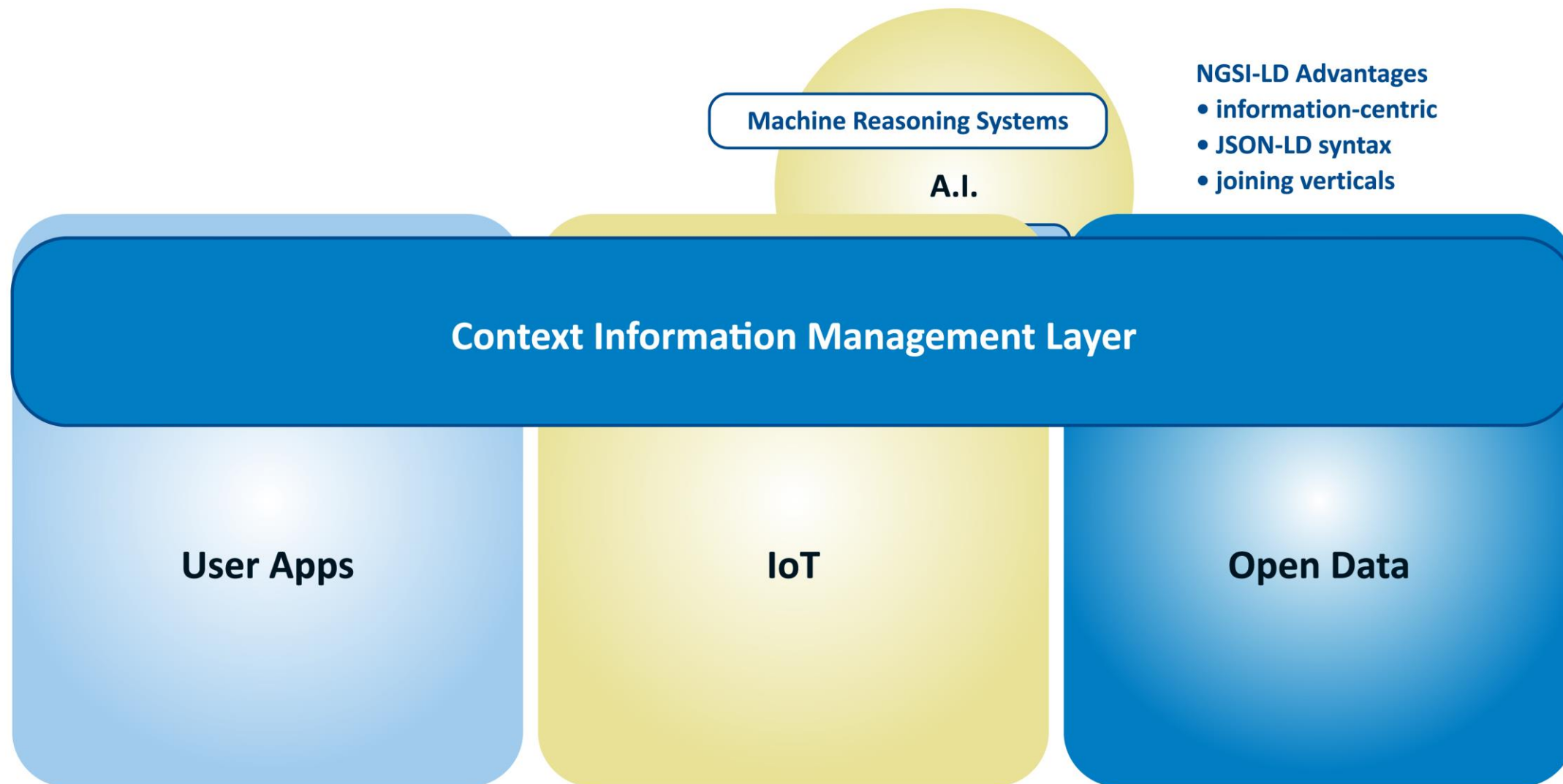
Properties have a value

- ✓ Can be a single value (Number, String, boolean), or complex (Array, Structured Value)

Relationships have an object

- ✓ URI pointing to another entity (target of relationship).

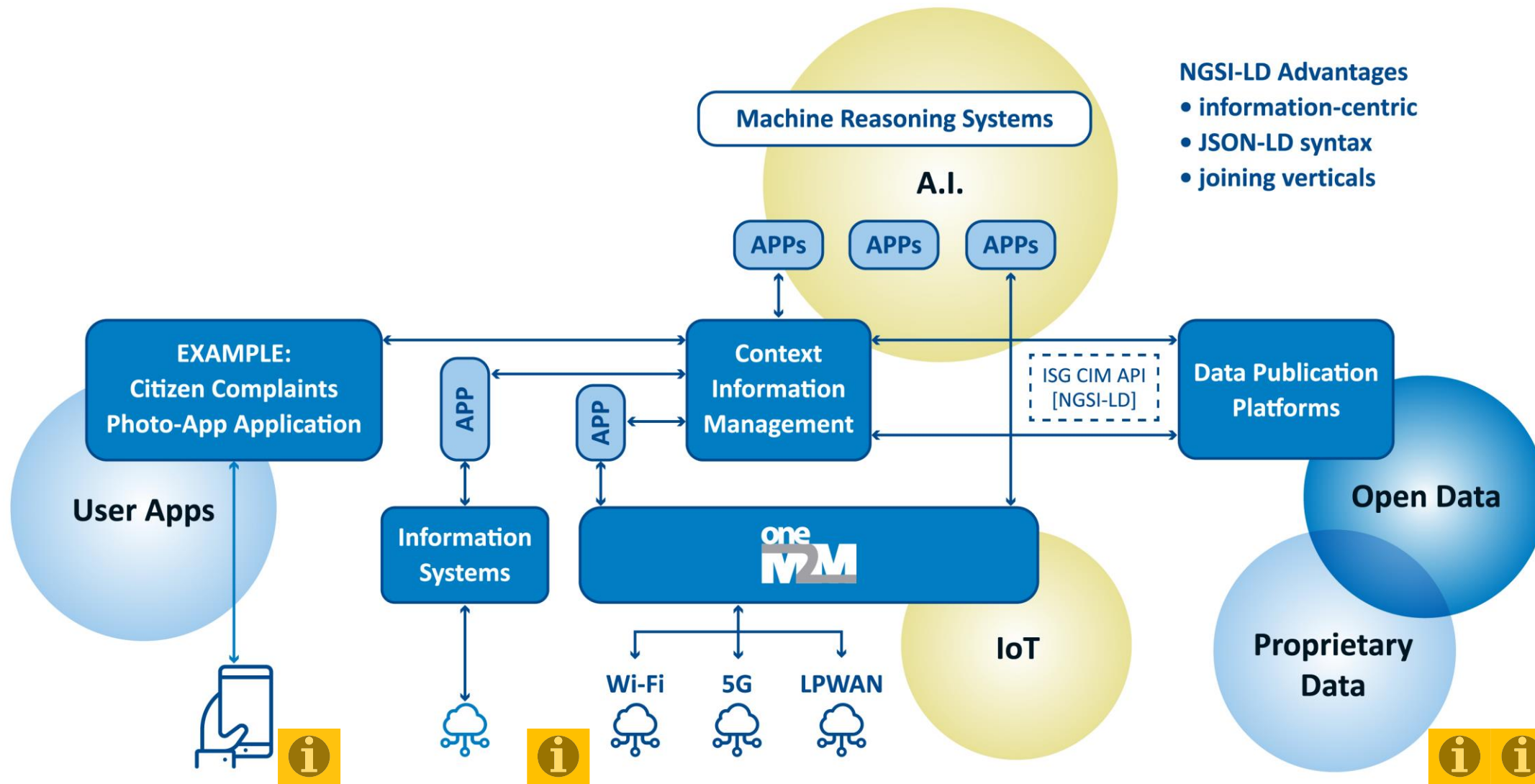
Information-centric with developer-friendly NGSI-LD



NGSI-LD Advantages

- information-centric
- JSON-LD syntax
- joining verticals

Information-centric with developer-friendly NGSI-LD



- NGSI-LD Advantages**
- information-centric
 - JSON-LD syntax
 - joining verticals

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"
]

```

Info can be sent using NGSI-LD messages

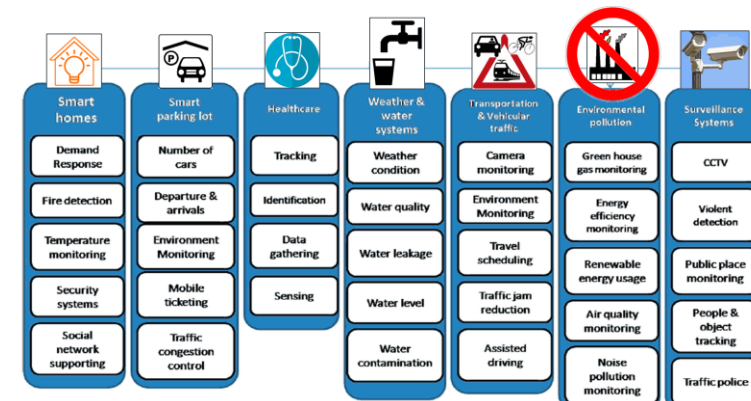
Conclusions re Information Management

So many Smart City services

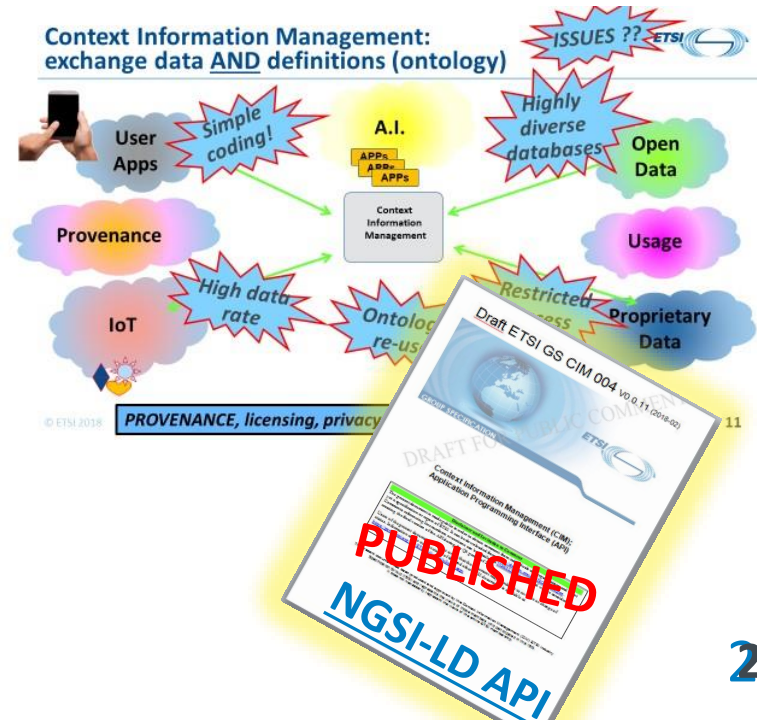
So many issues in enabling exchange of meaningful, usable information

Do not wait for perfection ...

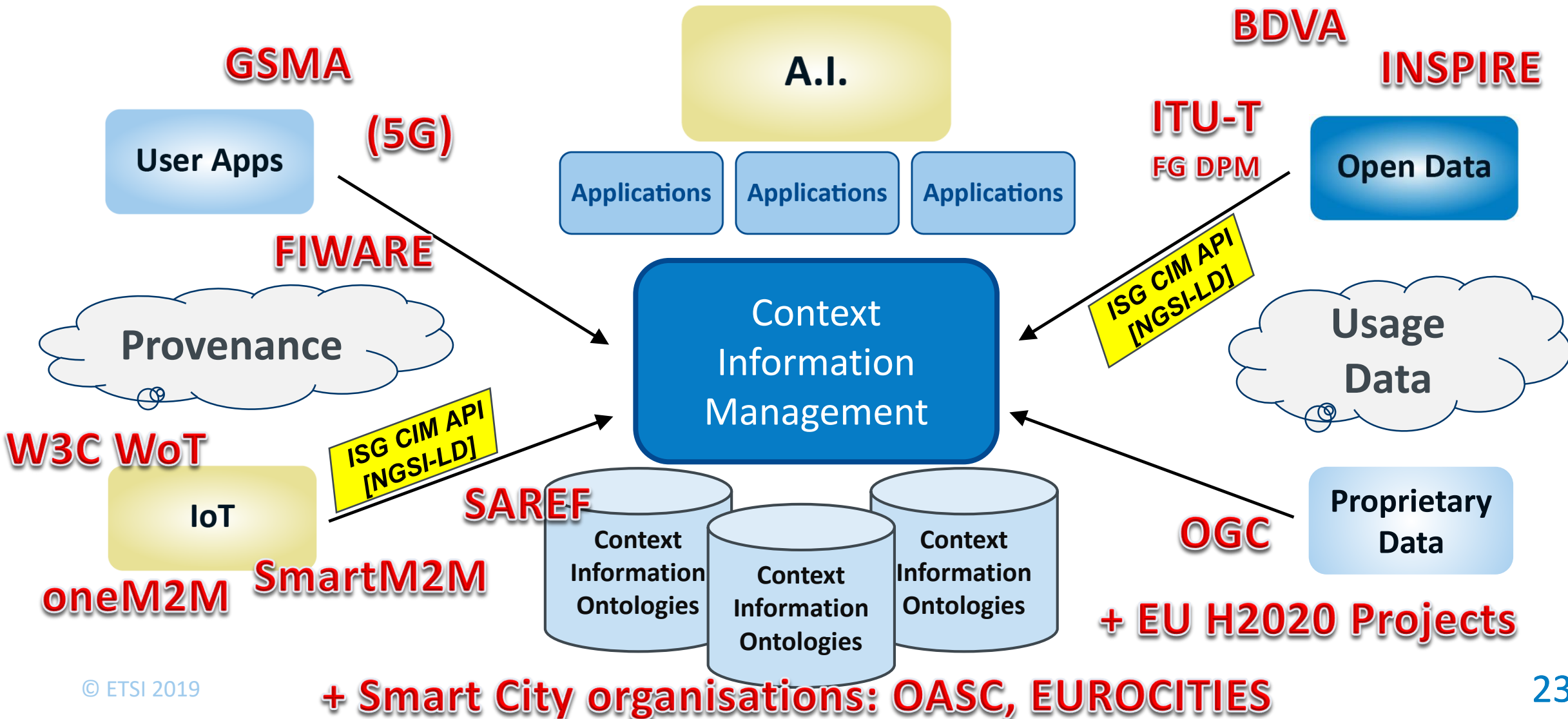
Get started,
standardise,
collaborate ...



"Review of Smart Cities based on IoT", <https://pdfs.semanticscholar.org/3f4b/5b92464281610010c0c4264462893567e03c.pdf> Energies 2017, 10, 421



Collaborations for Smart Cities and Information Management



Dr. Lindsay Frost
Chief Standardisation Eng.,
NEC Labs Europe GmbH
Lindsay.Frost@neclab.eu

ETSI ISG CIM Chairman
(Industry Specification Group
[Context Info Management](#))

ETSI Board Member

ETSI Delegate for:

CEN/CENELEC/ETSI SF-SSCC
([Sector Forum on Smart and Sustainable Cities and Communities](#))

CEN/CENELEC/ETSI CG-Smart Energy Grid

CEN/CENELEC/ETSI CG-Smart Meters

CEN/CENELEC/ETSI CG-Smart Manufacturing



**Thank
you!**