CEF Digital
Connecting Europe

ETSI ISG CIM Specifications

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ETSI ISG CIM

ETSI ISG CIM specifications to manage context information and interoperability across vertical domains

20 April 2020

ETSI ISG CIM Deliverables (with links)

See: https://portal.etsi.org/tb.aspx?tbid=854&SubTB=854

- MI/CIM-001-AB (MI) Annotated Bibliography (ETSI members only)
- GR/CIM-002-UC Use Cases → published v1.1.1 HERE
- GS/CIM-006-MOD0 Information Model(s) → published v1.1.1 HERE
- GR/CIM-007-SEC Security and Privacy
- GR/CIM-008-NGSI-LD-Primer for Developers published v1.1.1 HERE
- GS/CIM-009-NGSI-LD-API → published v1.2.2 HERE and new version soon

- Whitepaper explains main concepts of NGSI-LD
- Open Area for further materials

MISSION

ETSI ISG CIM: Mission

Make it easier

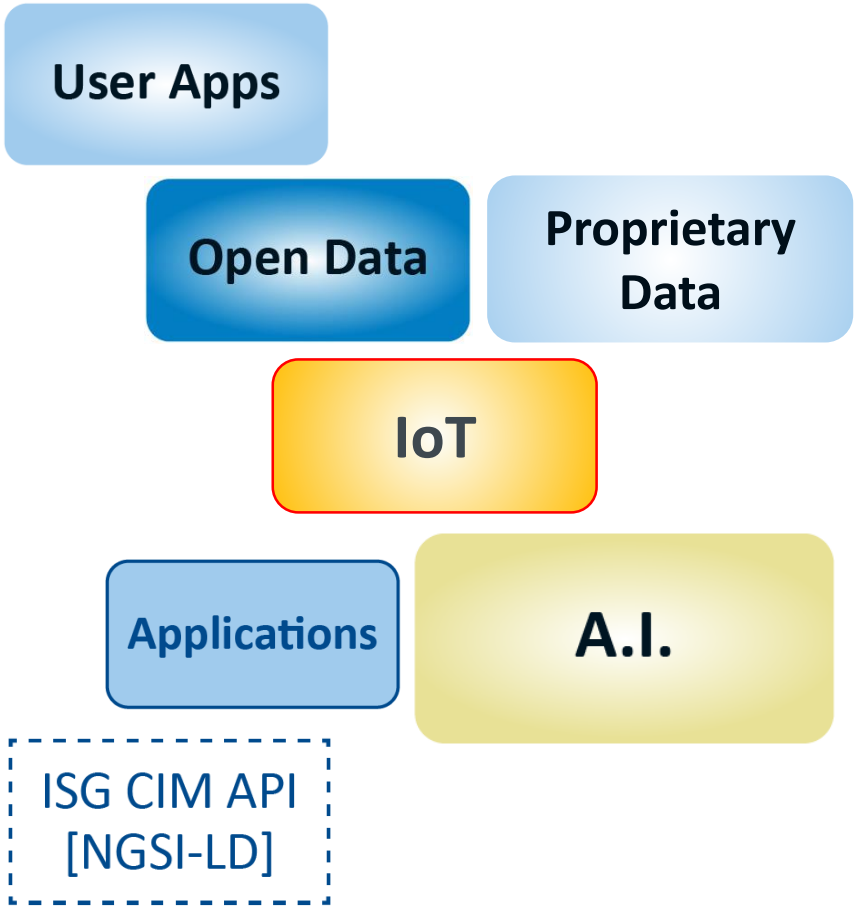
for END-USERS

and CITY DATABASES

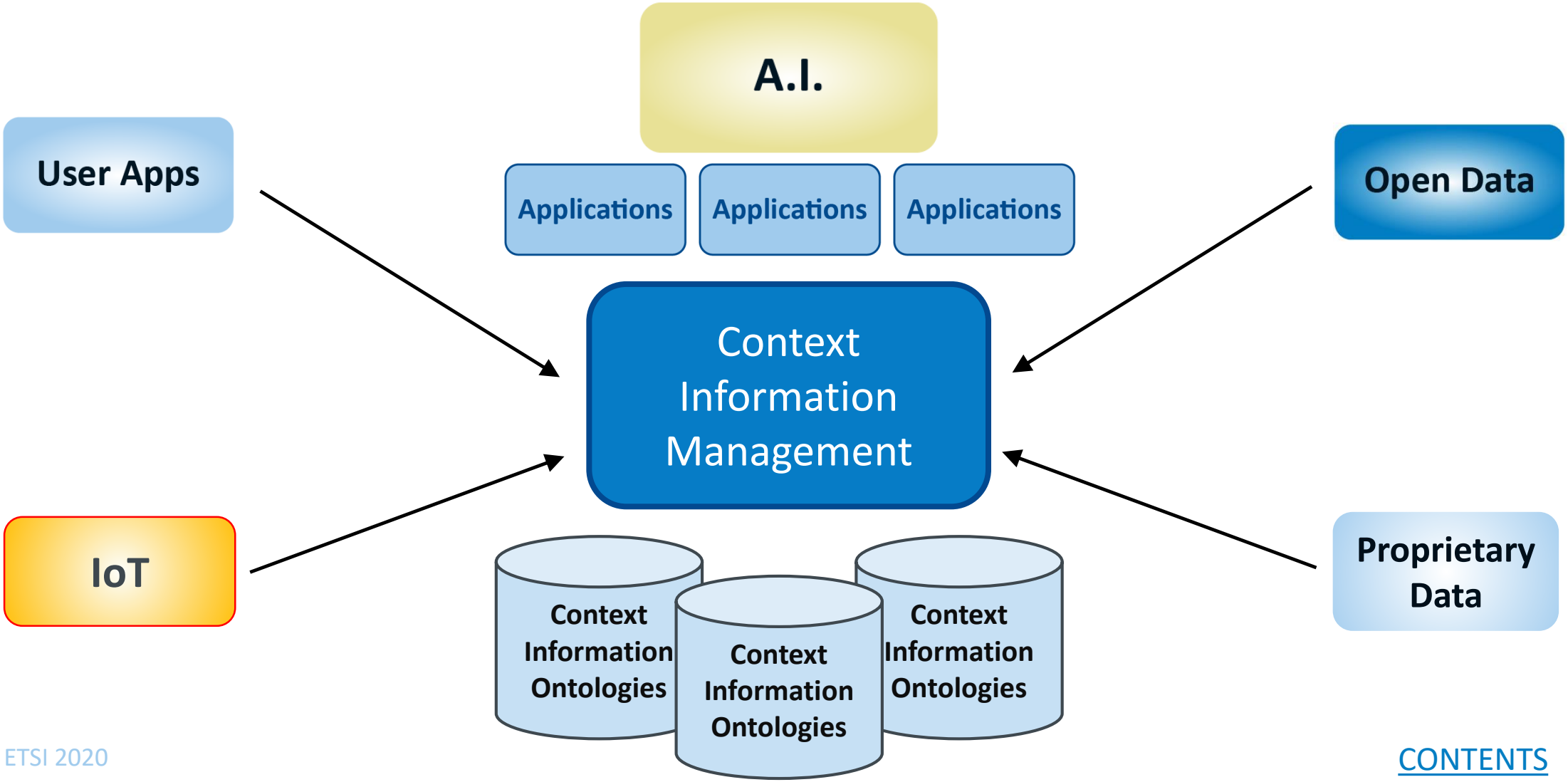
and IoT internet-of-things

and third-party APPS

to exchange KNOWLEDGE



Important issues in sharing data



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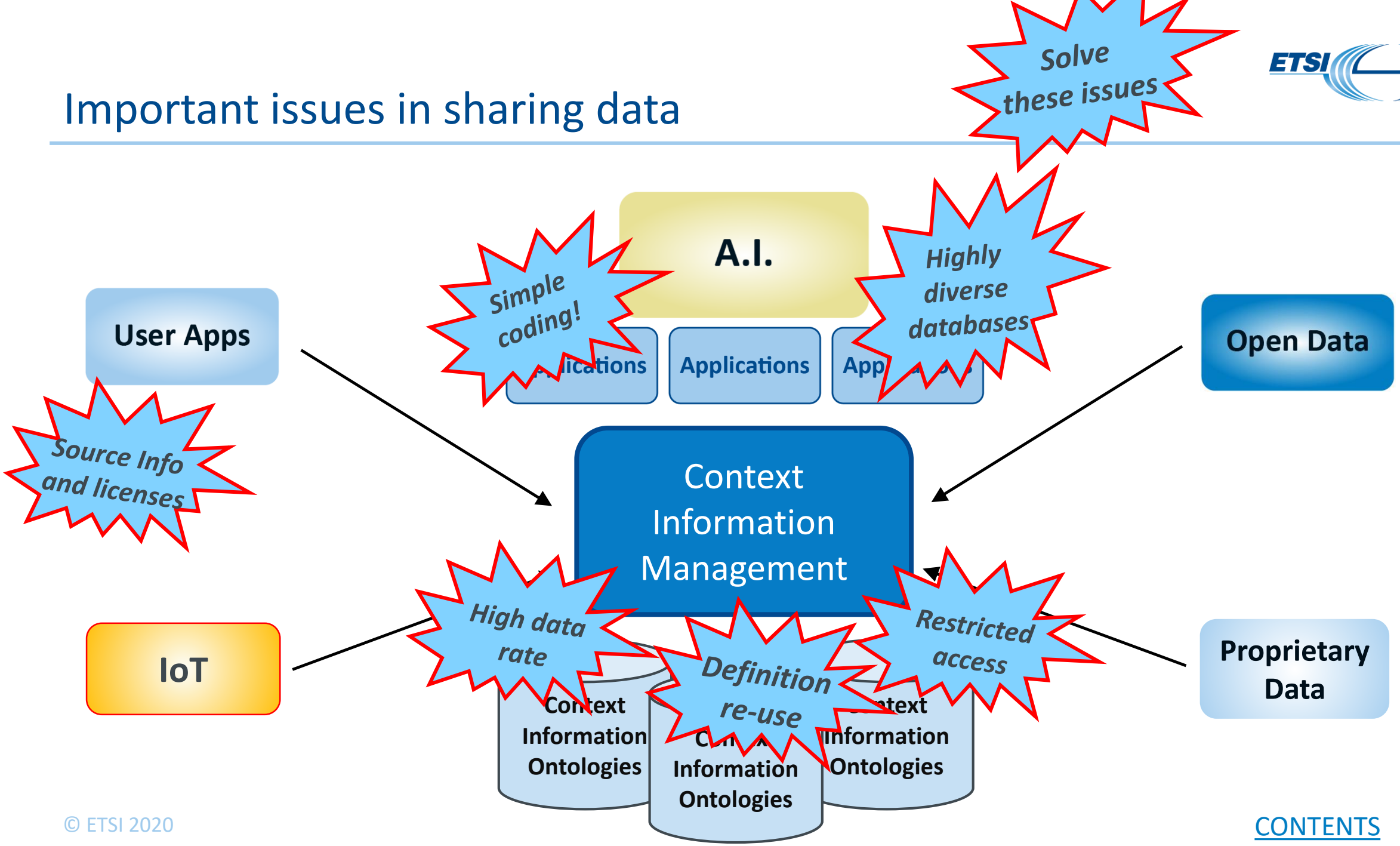


MISSION TASKS #1 .. #6

#1: Use Open Data 5 Star Model

#2: Make the Components “Smart”

#3: Keep it simple

#4: Adapt to Local, Central or Federated Sources

#5: Be flexible to model real world

#6: Build on past experience and user expertise (timeline)

#1: use Open Data 5 Star Model (W3C, Berners-Lee)

Open Data

The World Wide Web Consortium (W3C) has developed a five star model to describe different characteristics of open data, and its usefulness for people wishing to reuse it. It is being used globally as a model for assessing data readiness for re-use.

The 3-star level is considered the **minimum standard for release of government's public** data of **single agencies** for re-use.

The 4/5-star level is considered required for **multi-agency / multi-city** scenarios

*	**Data is visible**, **licensed** for reuse (CC), but requires considerable effort to reuse.
**	Data is visible, licensed, and **easy to reuse**, but not necessarily by all.
***	Data is visible and easy to **reuse by all** (not restricted to using specific software).
****	Data is visible, easy to use and **described (with meta data)** in a **standard fashion**.
*****	Data is visible, easy to use, described in a standard fashion and **meaning is clarified** by being **linked to a common definition (i.e. Ontology).**

Adapted from: www.slideshare.net/FI-WARE/fiware-global-summit-ngsild-ngsi-with-linked-data

#6: Build on past experience and user expertise (timeline)

Specifications

Specifications

Open Source Software

2009-10: OMA NGSI

2012: NGSI v1

2015-16: NGSI v2

2017-20: NGSI LD

JSON-LD

JSON

RDF

RDFS

Defined abstract Context API (no protocol binding)

FI-WARE EU Project develops HTTP/XML binding based on OMA NGSI

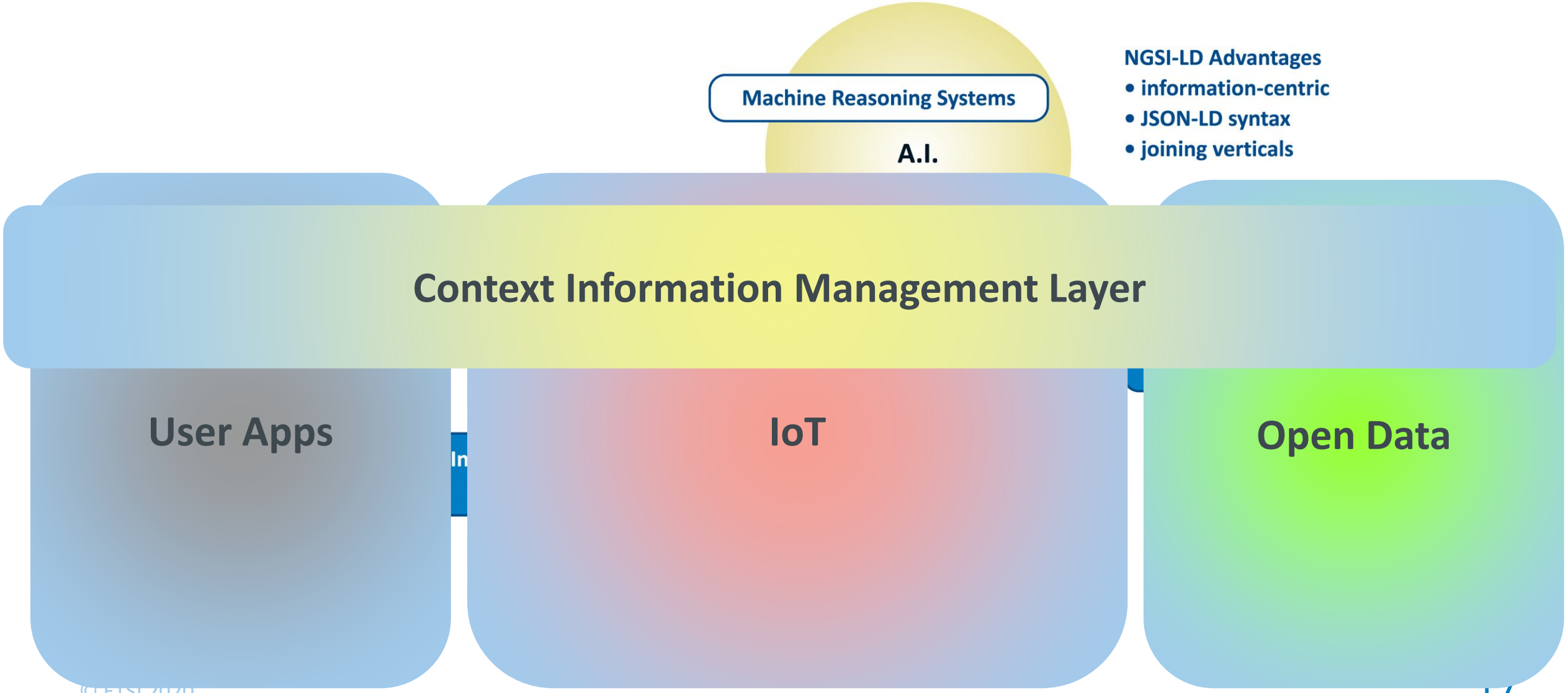
FIWARE develops new version with JSON binding

Evolution in ETSI ISG CIM specification using JSON-LD, which has migration path for NGSIv2

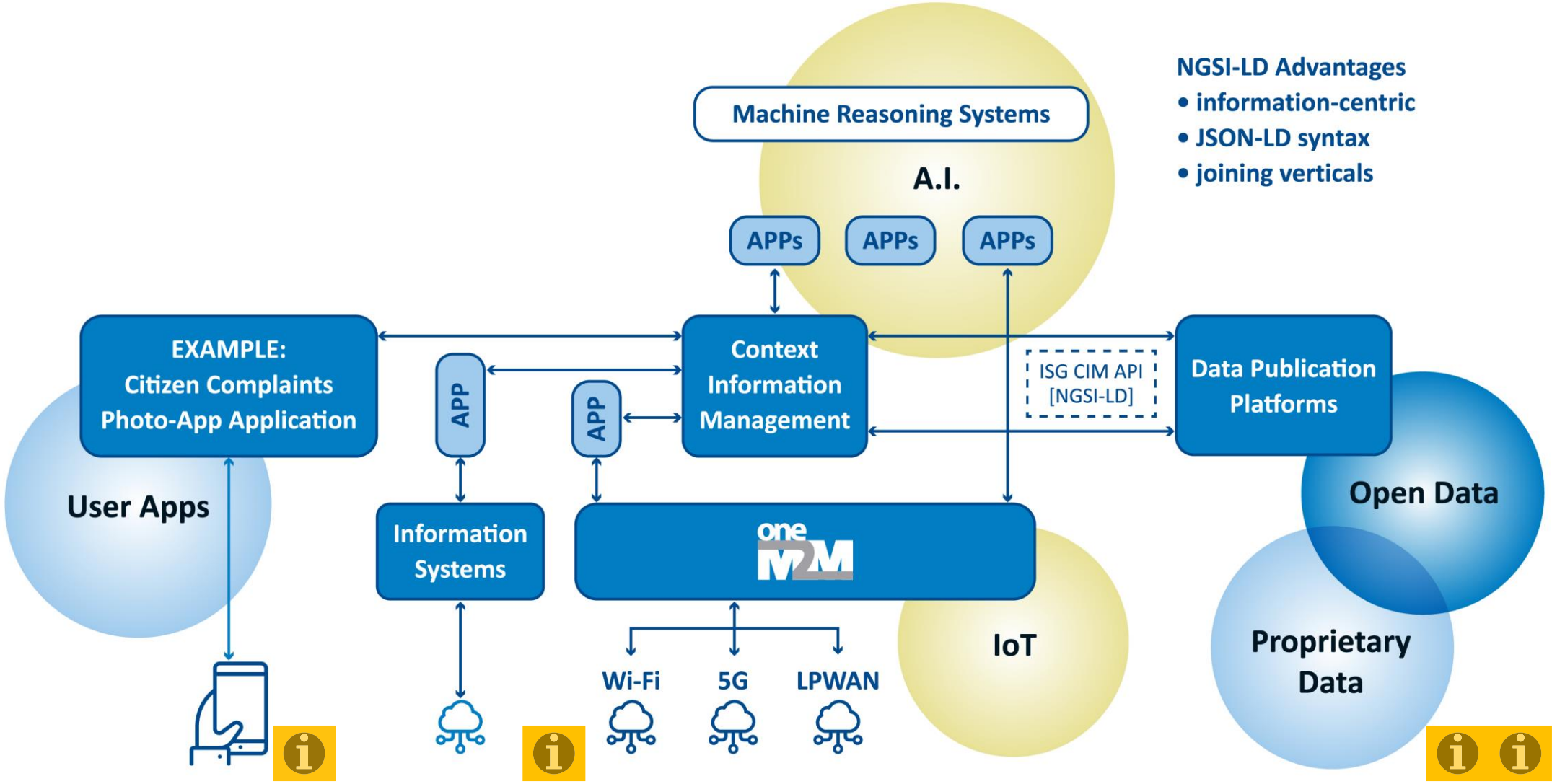
Property Graphs explosion in ICT

ARCHITECTURES

Information-centric with developer-friendly NGSI-LD



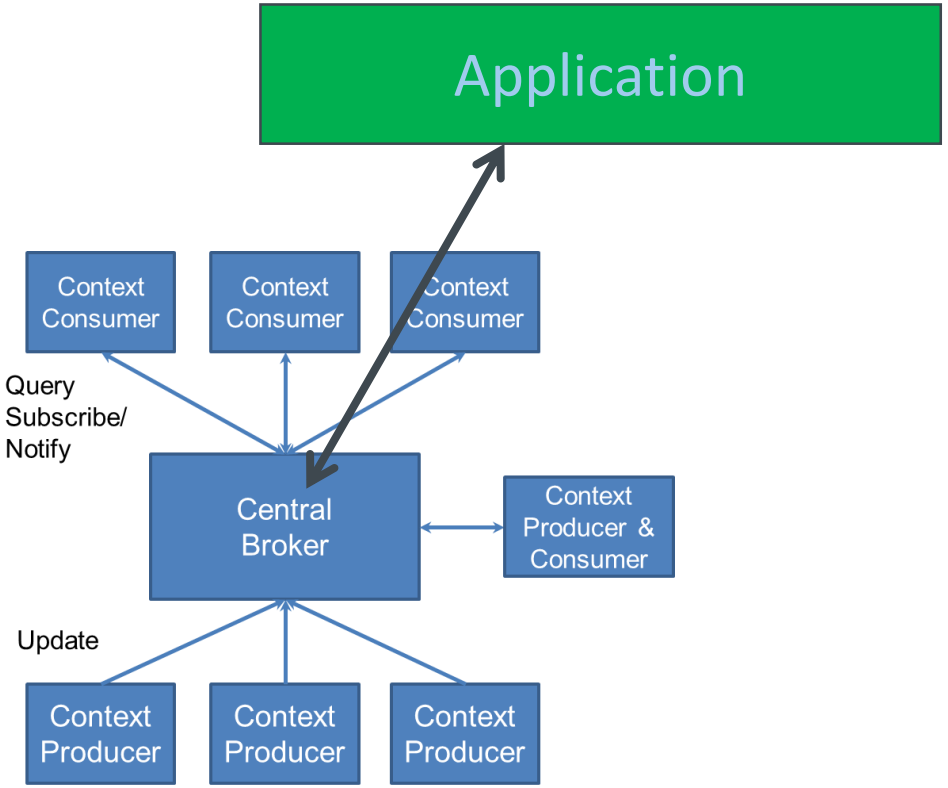
Information-centric with developer-friendly NGSI-LD



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

Various Architectures possible

NGSI-LD API

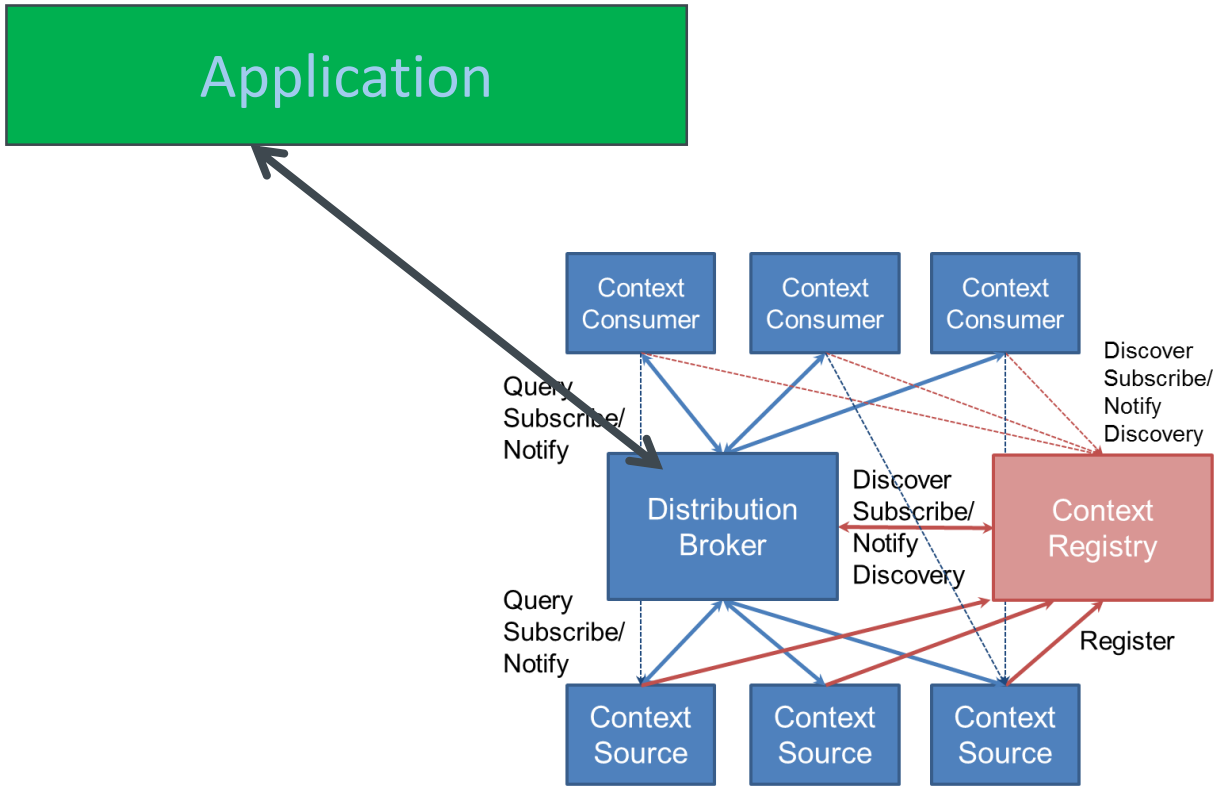


Centralised **Distributed** **Federated**

Simplicity

Various Architectures possible

NGSI-LD API



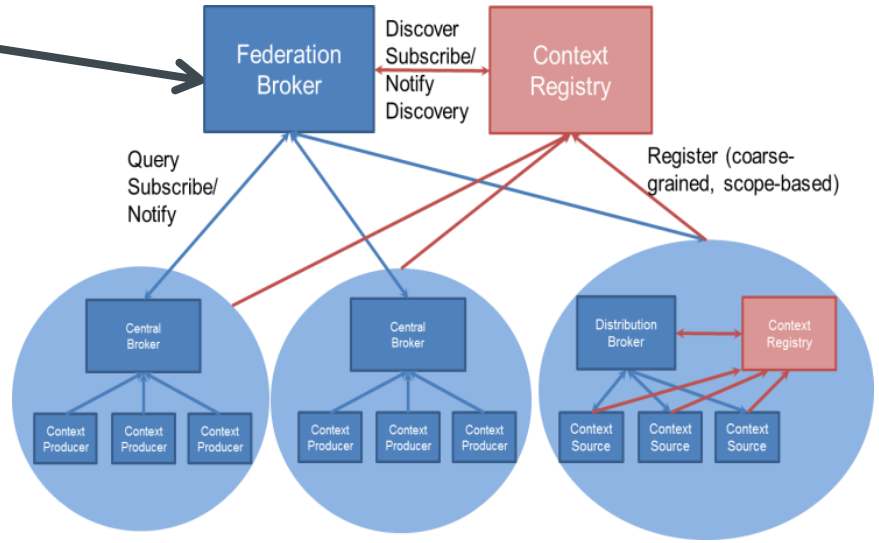
Centralised **Distributed** **Federated**

More flexibility

Various Architectures possible

Application

NGSI-LD API



NOTE: functionality of Context Broker or Context Registry is described in a separate presentation. Their roles are to allow discovery and authorised access to repositories of Context Information, as well as scaleable execution of Queries.

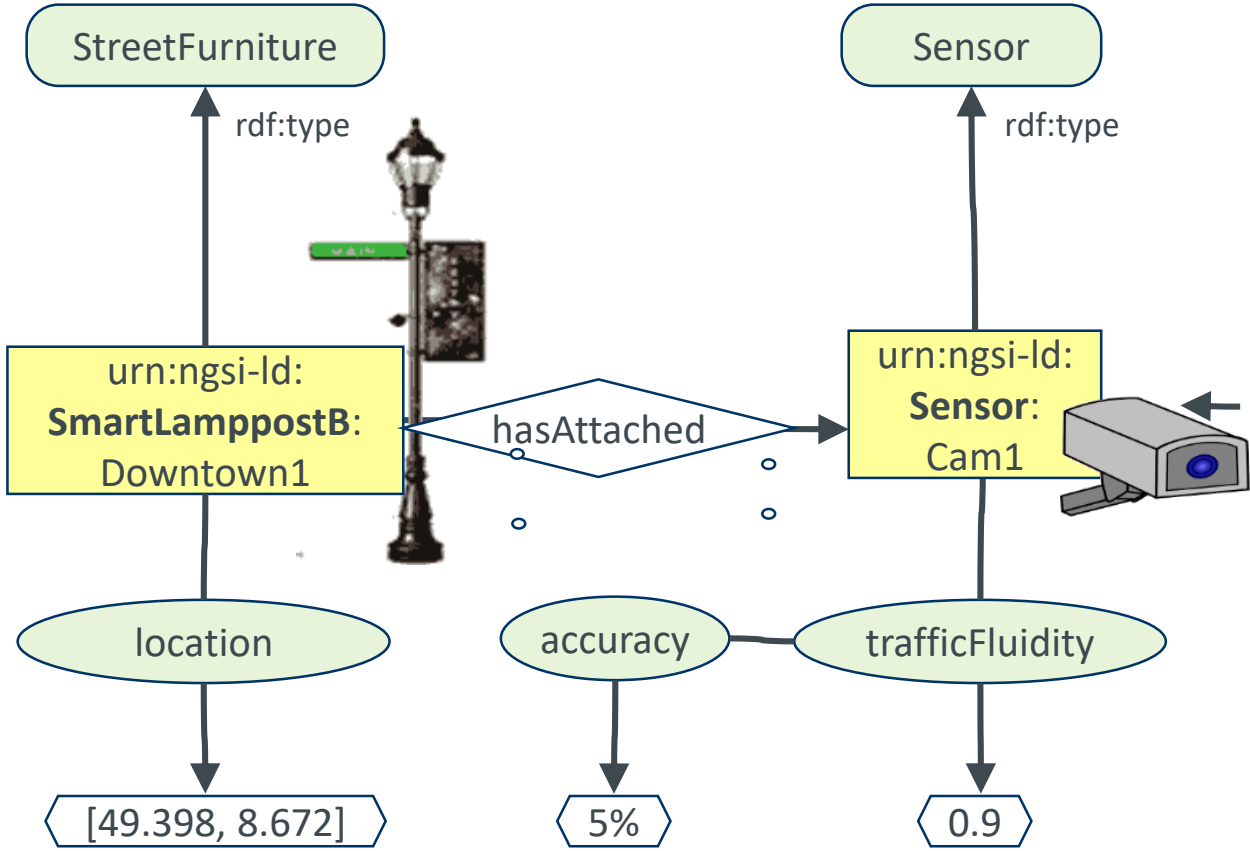
Centralised **Distributed** **Federated**

Integration of multiple Systems

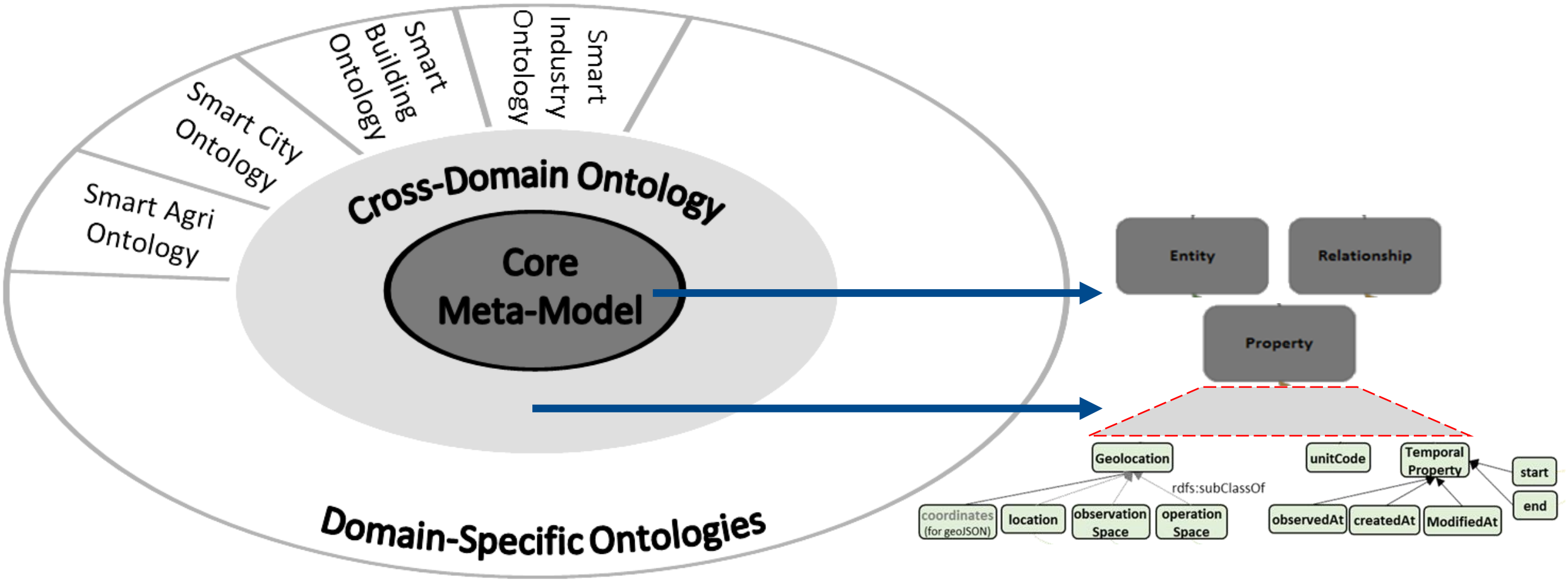
NGSI-LD INFORMATION MODEL

Example Data Model: Smart Lampposts in a city

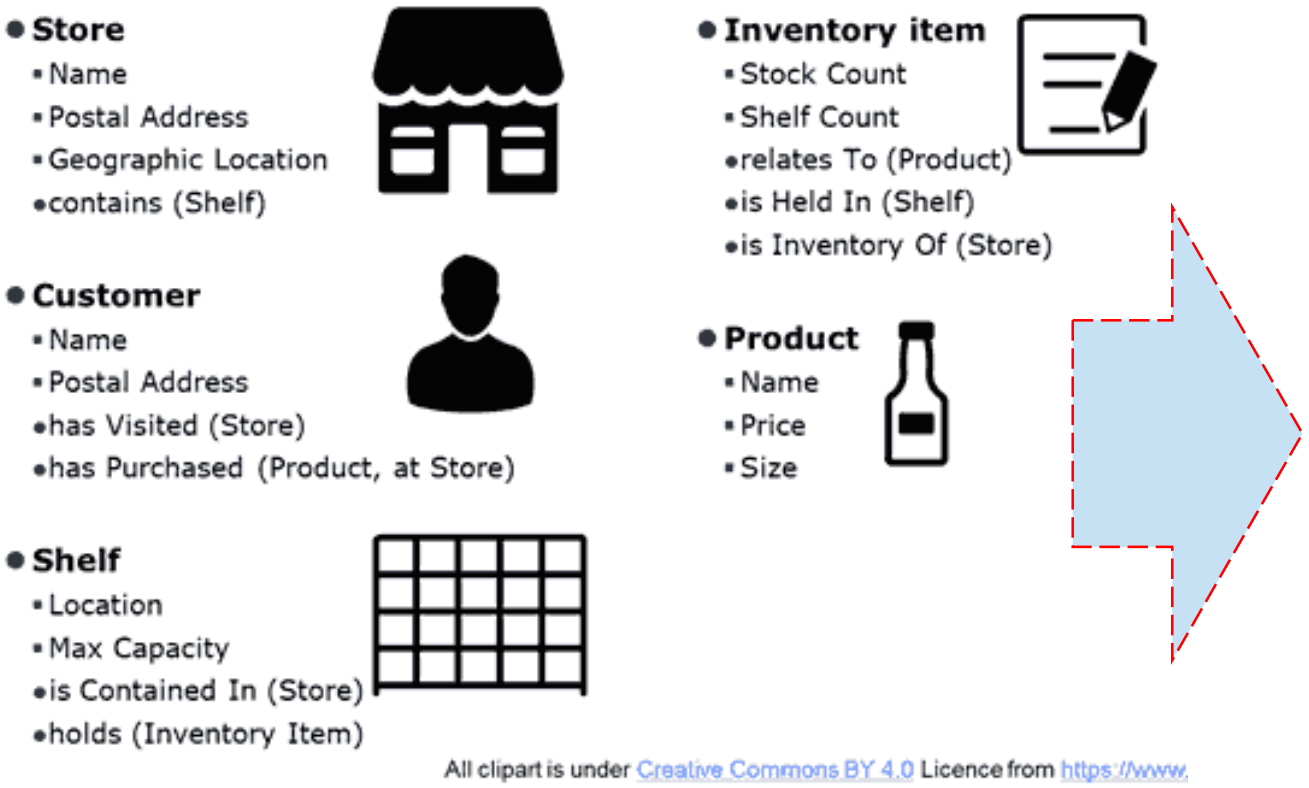
The townhall database has locations and functions of its smart lampposts



NGSI-LD Information Model



Example Data Model: Grocery store (from NGSI-LD Primer)



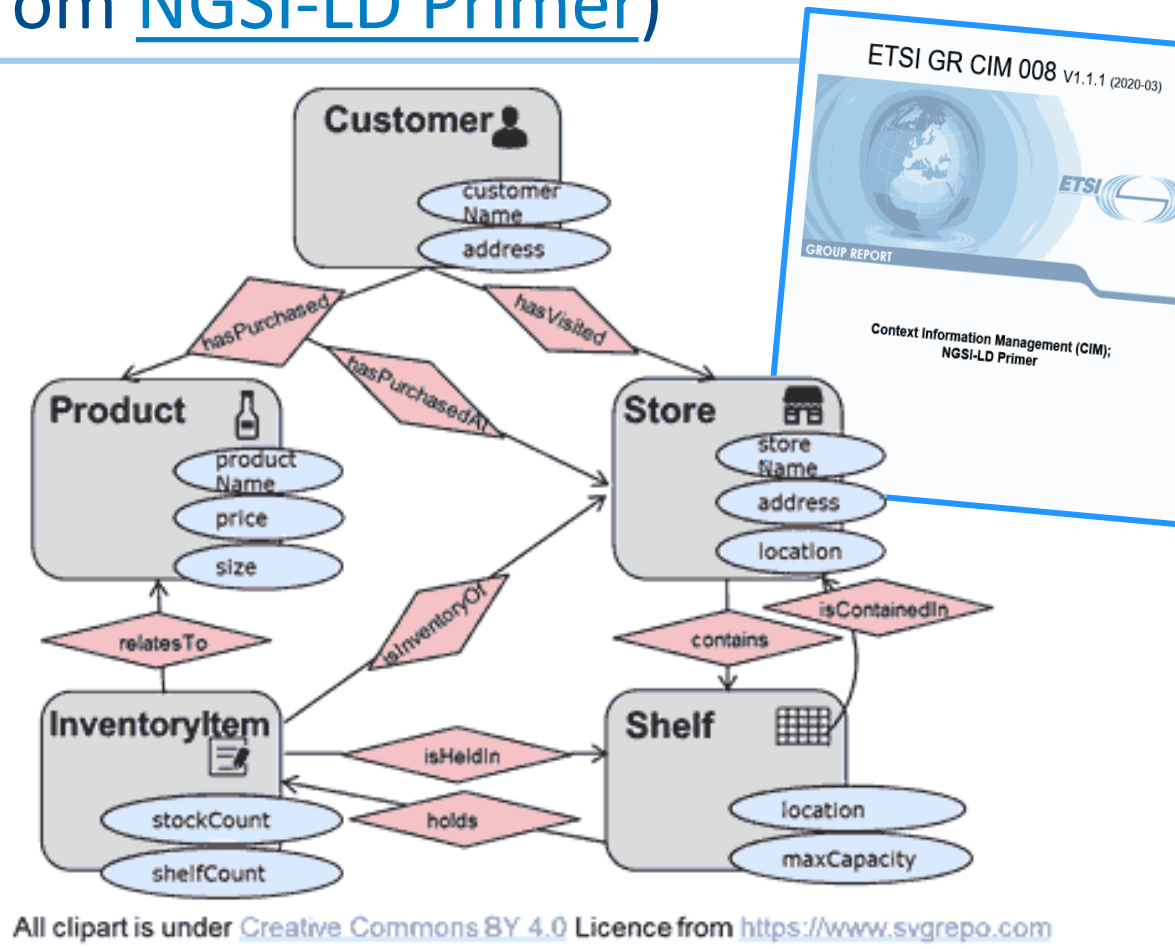


Figure 4.2: Entity types, relationships and properties of use case

Figure 6.2: Entity types, properties and relationships

Source: https://www.etsi.org/deliver/etsi_gr/CIM/001_099/008/01.01.01_60/gr_CIM008v010101p.pdf

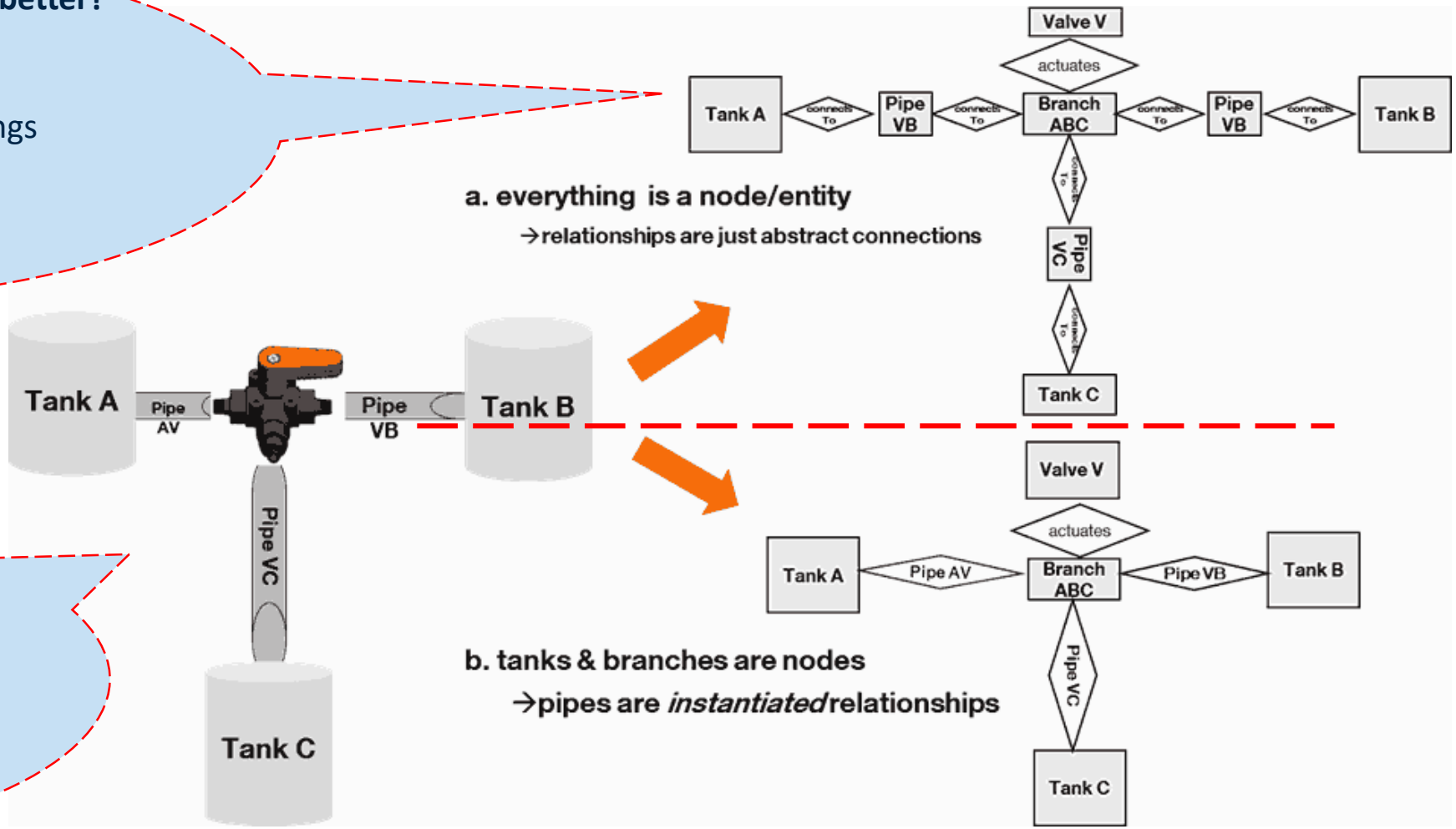
Example Data Model(s) for Water: which is better ??

BUT for <u>which</u> purpose is one way better?

a) Import of legacy data (even from paper forms!)

b) Easy search for specific types of things (from an existing inventory)?

c) Modelling of data history for maintenance reasons?



Water Networks are examples for MANY network problems (including telecom networks, energy grids, road transportation, waste collection networks, railway networks, logistical networks, etc)

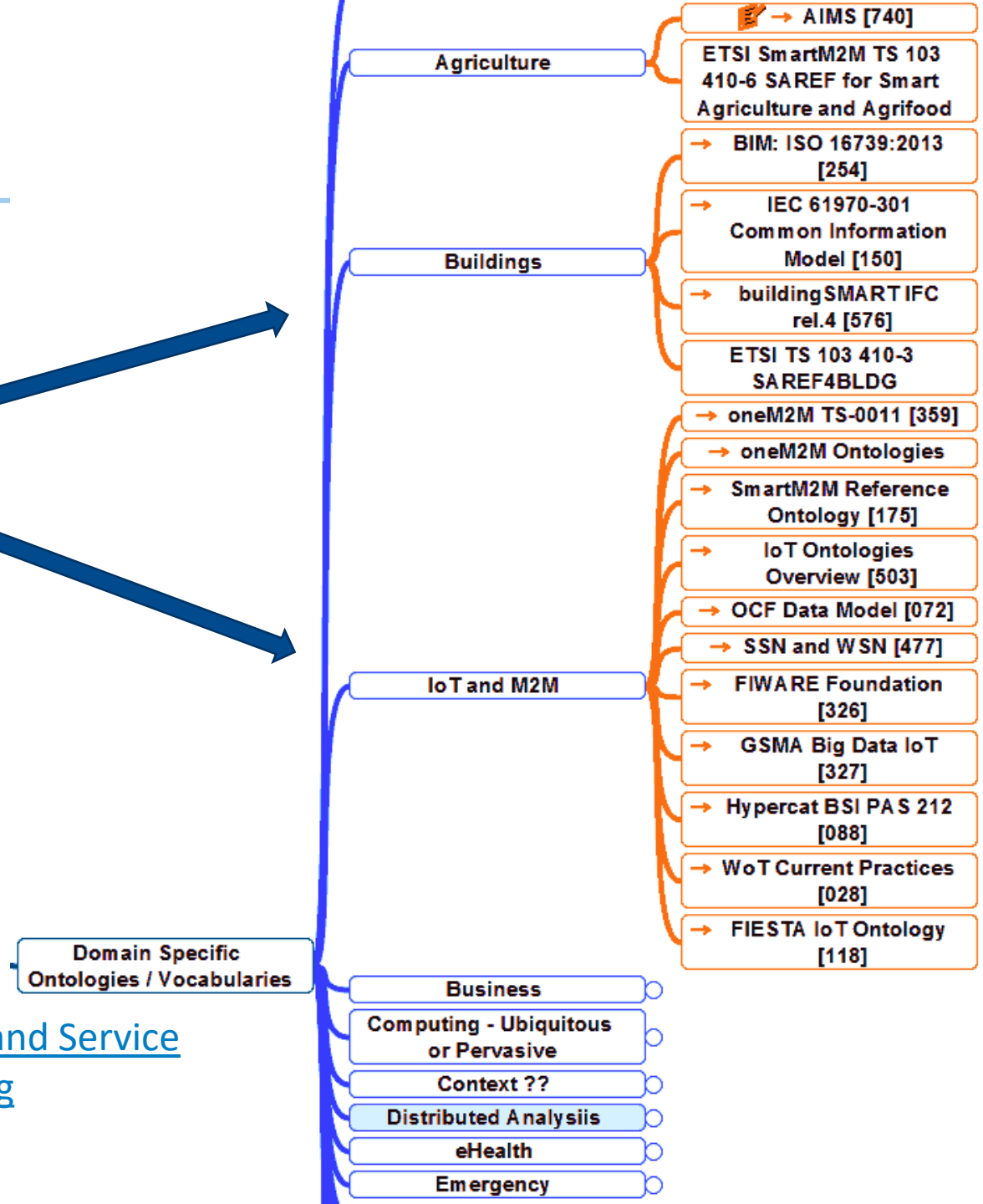
PROBLEM: A BABEL OF ONTOLOGIES

Issue: Lack of Domain Consensus

Need consensus in each domain
e.g. Here we see 4 in Buildings
e.g. Here we see dozens in IoT ??

EC has begun regulating to reduce these barriers to trade / efficiency !
e.g. INSPIRE Directive (deadline 2019)

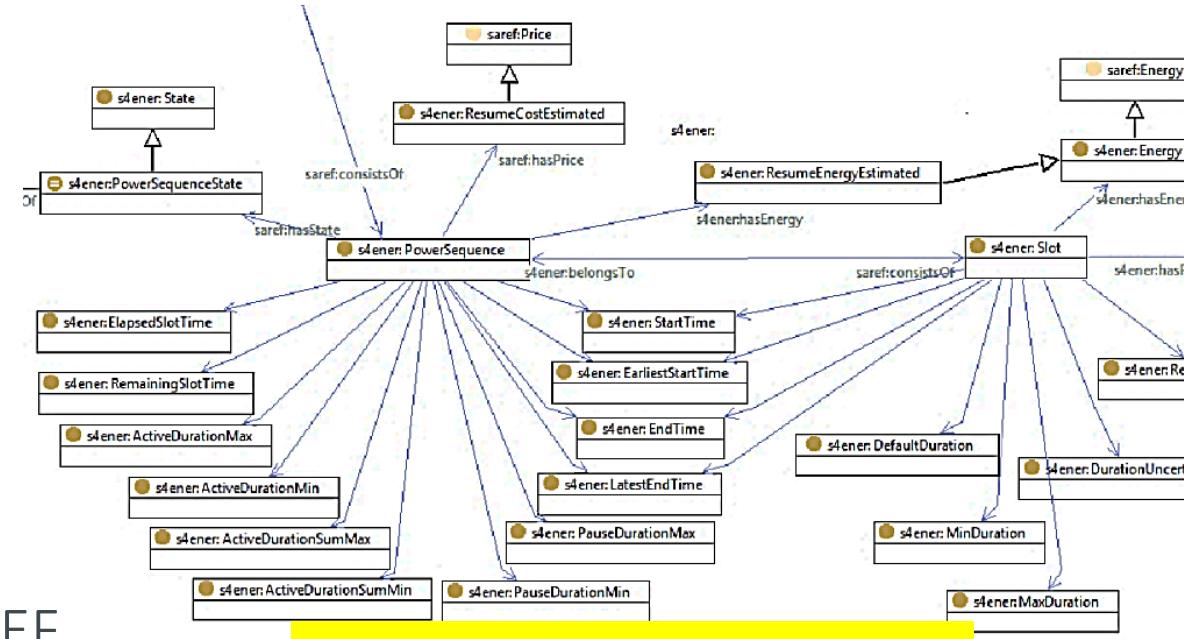
„To ensure that the spatial data infrastructures of the Member States are compatible and usable in a Community and transboundary context, the INSPIRE Directive requires that common implementing Rules (IR) are adopted …" Metadata, Data Specifications, Network Services, Data and Service Sharing, Spatial Data Services, Monitoring and Reporting



SAREF: Smart Applications Reference Ontology (ongoing work within ETSI SmartM2M)

Methods:

- Analysis of nn semantic assets in the domain
- Selection of a short list (nn assets) to use for the reference ontology
- Translation of each of the nn semantic assets into OWL ontology http://saref.etsi.org/core/
- Mapping between semantic assets using SAREF



small extract as example

SAREF4CITY ONTOLOGY

See https://ec.europa.eu/digital-single-market/en/news/etsi-releases-three-new-saref-ontology-specifications-smart-cities-industry-40-and-smart

NEWS ARTICLE | 12 July 2019

ETSI releases three new SAREF ontology specifications for smart cities, industry 4.0 and smart agriculture

ETSI SmartM2M Technical Committee has just released three new specifications for smart cities, industry and manufacturing, and smart agriculture and food chain domains. This follows the first version of the SAREF (Smart Appliances REFerence ontology) standard from 2015; the subsequent second modular version (Smart Applications REFerence ontology) and first three extensions for energy, buildings and environment in 2018.

The SAREF family of standards enable interoperability between solutions from different providers and among various activity sectors in the Internet of Things (IoT) and therefore contribute to the development of the global digital market. These standards are designed to run on top

About Smart cities

- Policies
- Blog posts
- News +
- Events
- Projects
- Funding

https://saref.etsi.org/saref4city/
http://saref.etsi.org/core/

The SAREF4CITY specification, ETSI TS 103 410-4, has been developed with the stakeholders who would need ontology such as other standardization bodies, associations, IoT platforms and European projects (including SynchroniCity, ESPRESSO and the Smart City Lighthouse projects) and initiatives. Use cases include eHealth and smart parking, air quality monitoring, mobility and street lighting. SAREF4CITY provides a common core of general concepts for smart city data for the IoT.

CONCLUSIONS

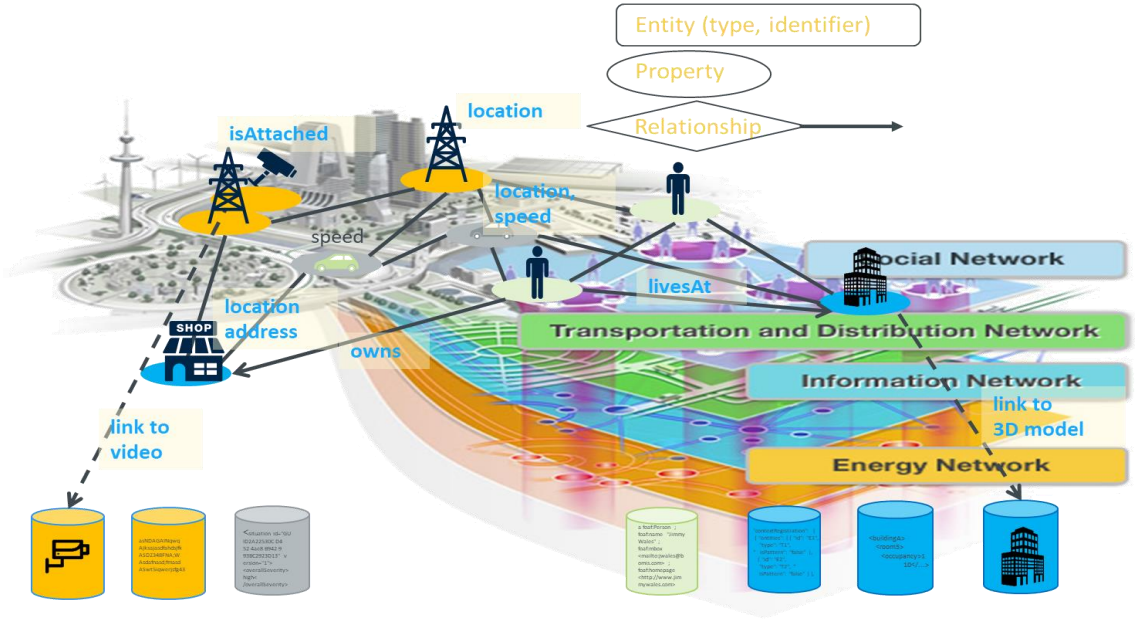
Conclusions

NGSI-LD enables sharing of real world knowledge

- Many implementations; one ETSI spec for API for accessing relevant knowledge
- Model knowledge based on chosen abstraction
  - Knowledge graph with entities, properties, relationships and related meta information
- Find and Access relevant knowledge
  - Search for entity identifier or entity type
  - Filter results according to desired properties and relationships
  - “Navigate” along relationship links (FOAF)
  - Restrict results to a geographical location
  - Immediate results or asynchronous (subscriptions & notifications)
- Supports different deployment architectures
  - Centralized, distributed and federated

NGSI-LD can reference existing info

- Familiar entities represented by URIs
- Ontologies/Taxonomies linked as URIs
- Sensor data as historical series



Thank You !

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Open pages for consensus material:
https://docbox.etsi.org/ISG/CIM/Open
+ visit at: https://portal.etsi.org/CIM

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