SEPA
SPARQL Event Processing Architecture

Enabling distributed, context aware and interoperable Dynamic Linked Data and Web of Things applications

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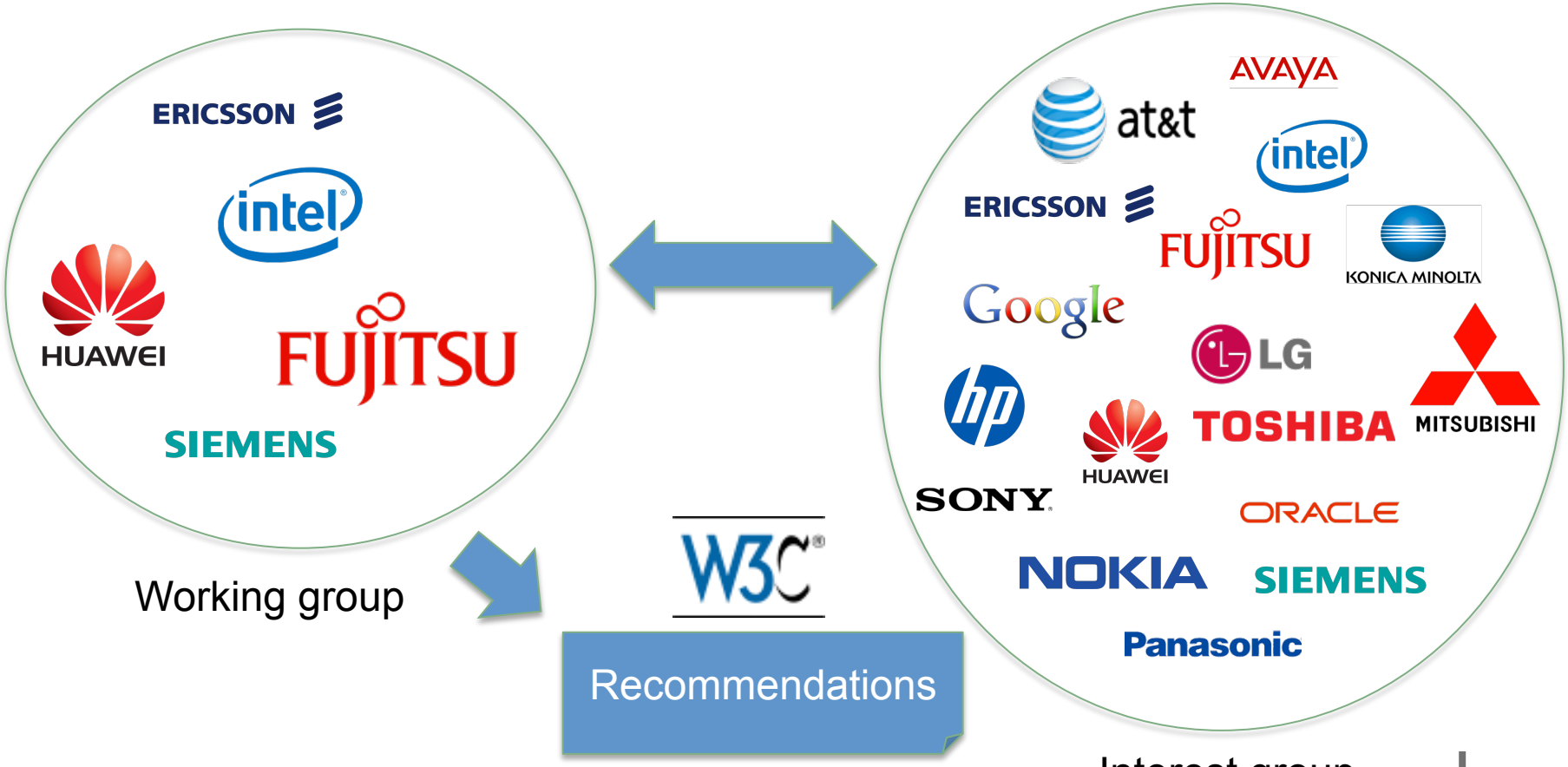
Web of Things: members

"*W3C Begins **Standards** Work on Web of Things to Reduce IoT Fragmentation*"

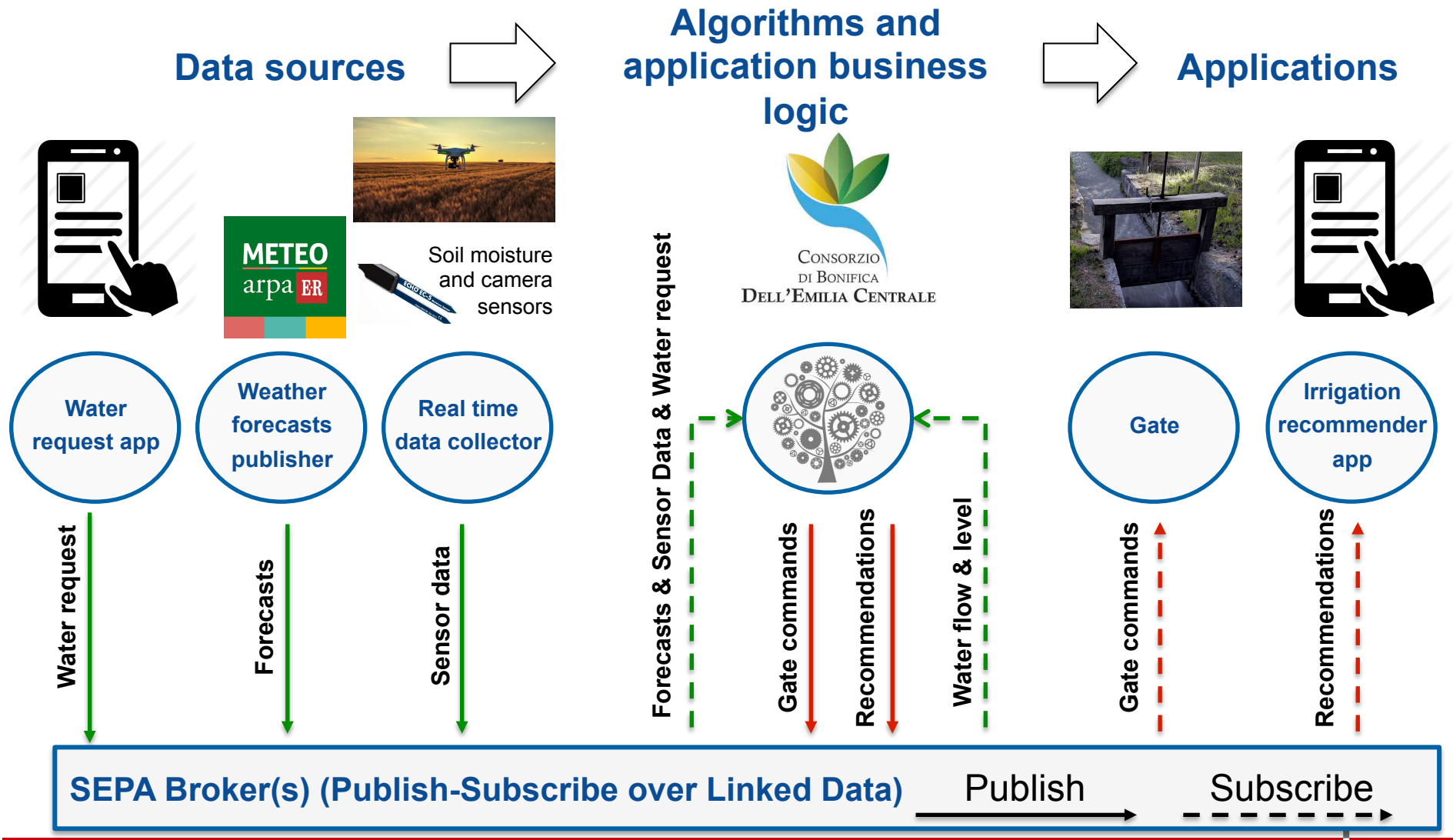


Web of Things: mission

"The Internet of Things (IoT) suffers from a lack of **interoperability** across platforms…before the Internet when there were competing non-interoperable networking technologies…rich metadata that describes the data and **interaction models** exposed to applications, and the **communications** and **security** requirements for platforms to communicate effectively…enable platforms to share the **same meaning** when they exchange data…building upon W3C's extensive work on **RDF** and **Linked Data**…**direct access to IoT sensors and actuators from the browser**… **gateways that use IoT protocols to access embedded/constrained devices, and web protocols to expose them to service platforms**…"Things" in the Web of Things are not limited to connected devices…**people** and **places**, and **abstract ideas**, such as **events** (e.g. a concert), **organizations**, and **time periods** (e.g. the 70s)…"

From the Web of Things main page (https://www.w3.org/WoT/)

Smart Water Management



Semantic Web

"Most of the Web's content **today** is designed for humans to read, not for computer programs to manipulate meaningfully"

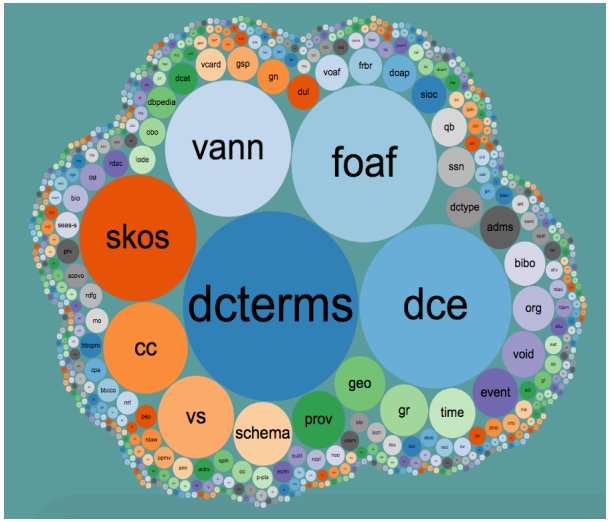
T. Berns-Lee, J. Hendler, and O. Lassila, "The semantic web," *Scientific American*, vol. 284, pp. 34-43, **2001**

WIKIDATA

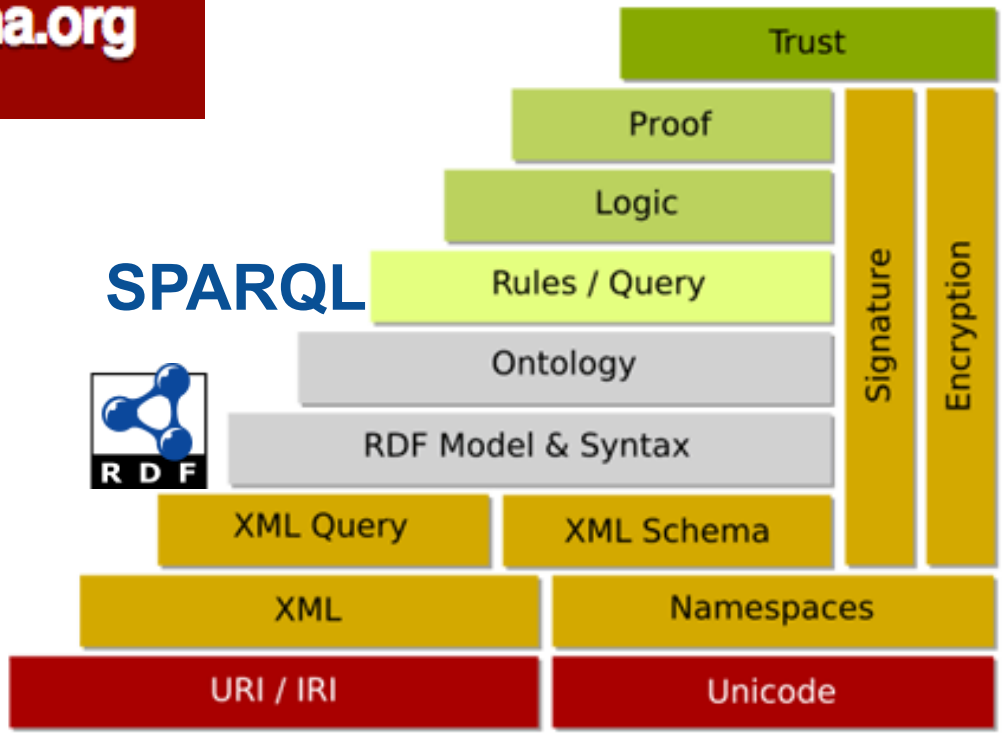
DBpedia

schema.org

Linked **O**pen **V**ocabularies



SPARQL



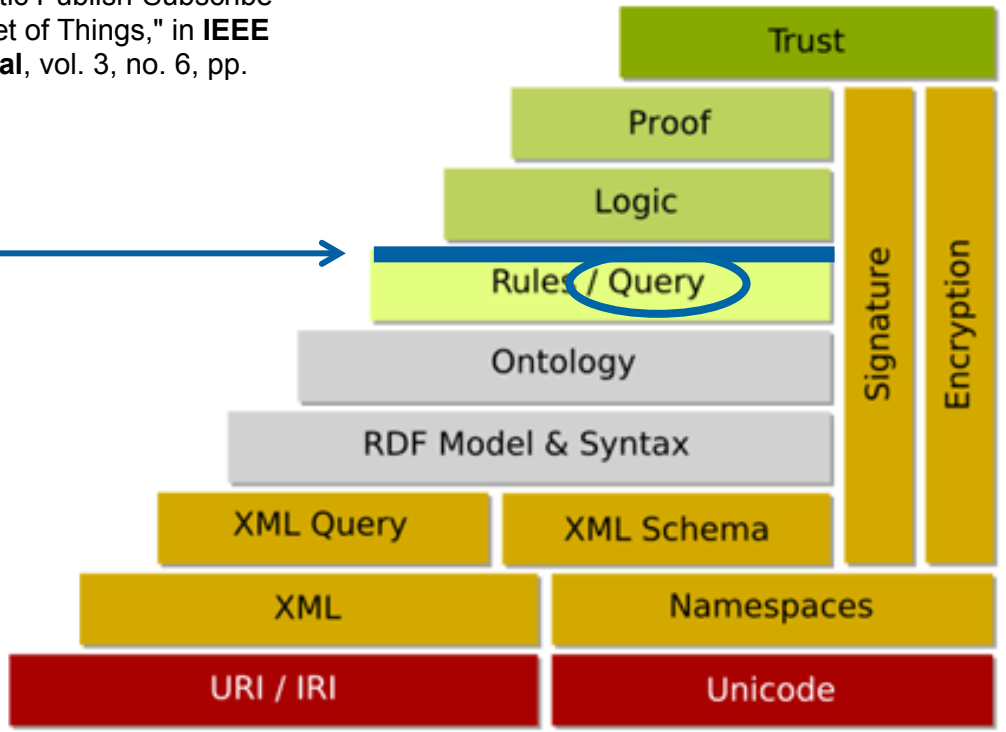
Dynamic Linked Data

"The main drawback of Semantic Web technologies concerns the low level of performance that makes it difficult to achieve **responsiveness** and **scalability** required in many *IoT* applications…Semantic Web technologies have been designed to process data sets consisting of **big amounts** of Resource Description Framework (RDF) triples **that evolve constantly but at a much slower rate** compared to the rate of elementary events occurring in the physical environment."*

*L. Roffia et al., "A Semantic Publish-Subscribe Architecture for the Internet of Things," in **IEEE Internet of Things Journal**, vol. 3, no. 6, pp. 1274-1296, Dec. **2016**.

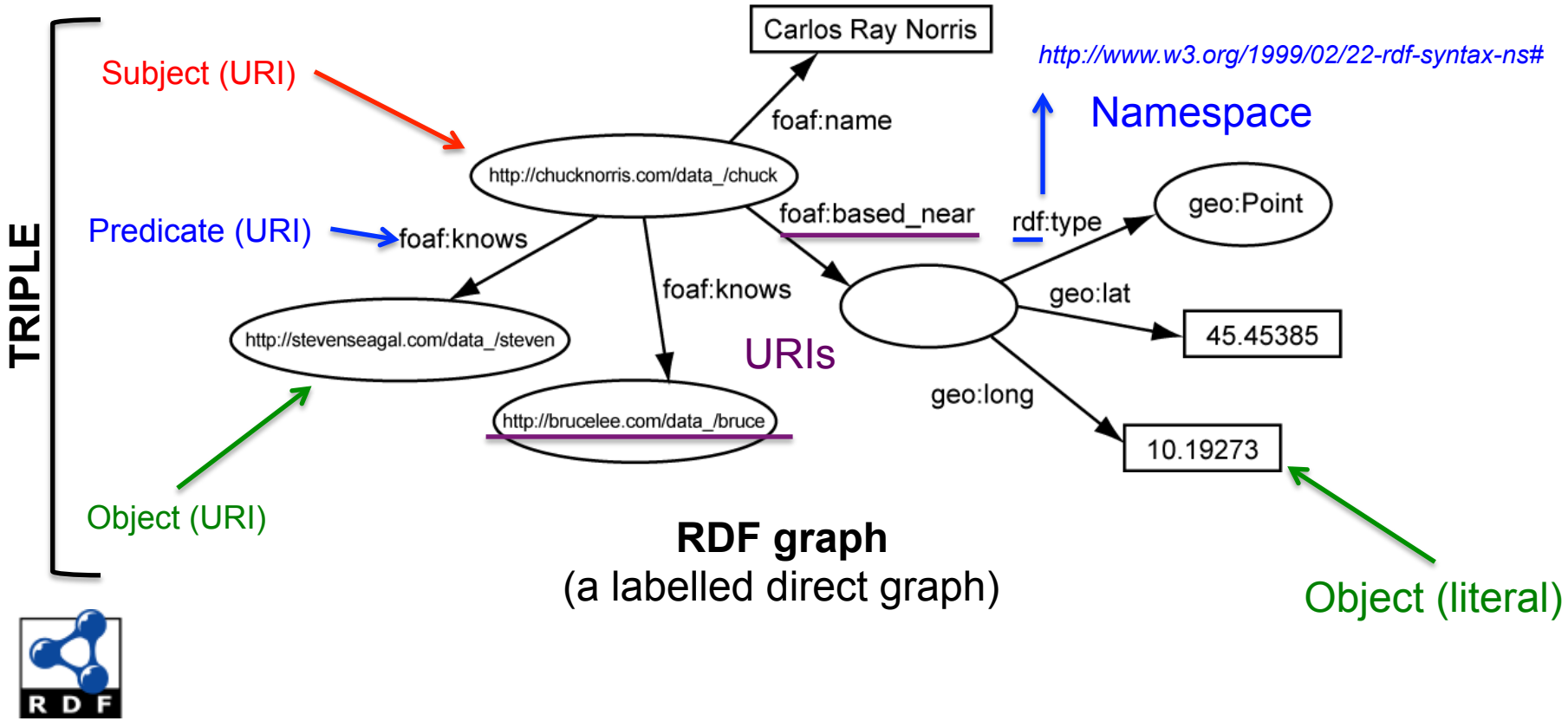
SEPA (**S**PARQL **E**vent **P**rocessing **A**rchitecture) enables the detection and notification of *changes over the Web of Data* by means of a **content-based publish-subscribe** mechanism**

Roffia, L.; Azzoni, P.; Aguzzi, C.; Viola, F.; Antoniazzi, F.; Salmon Cinotti, T. Dynamic Linked Data: A SPARQL Event Processing Architecture. Future Internet 2018**, 10, 36.

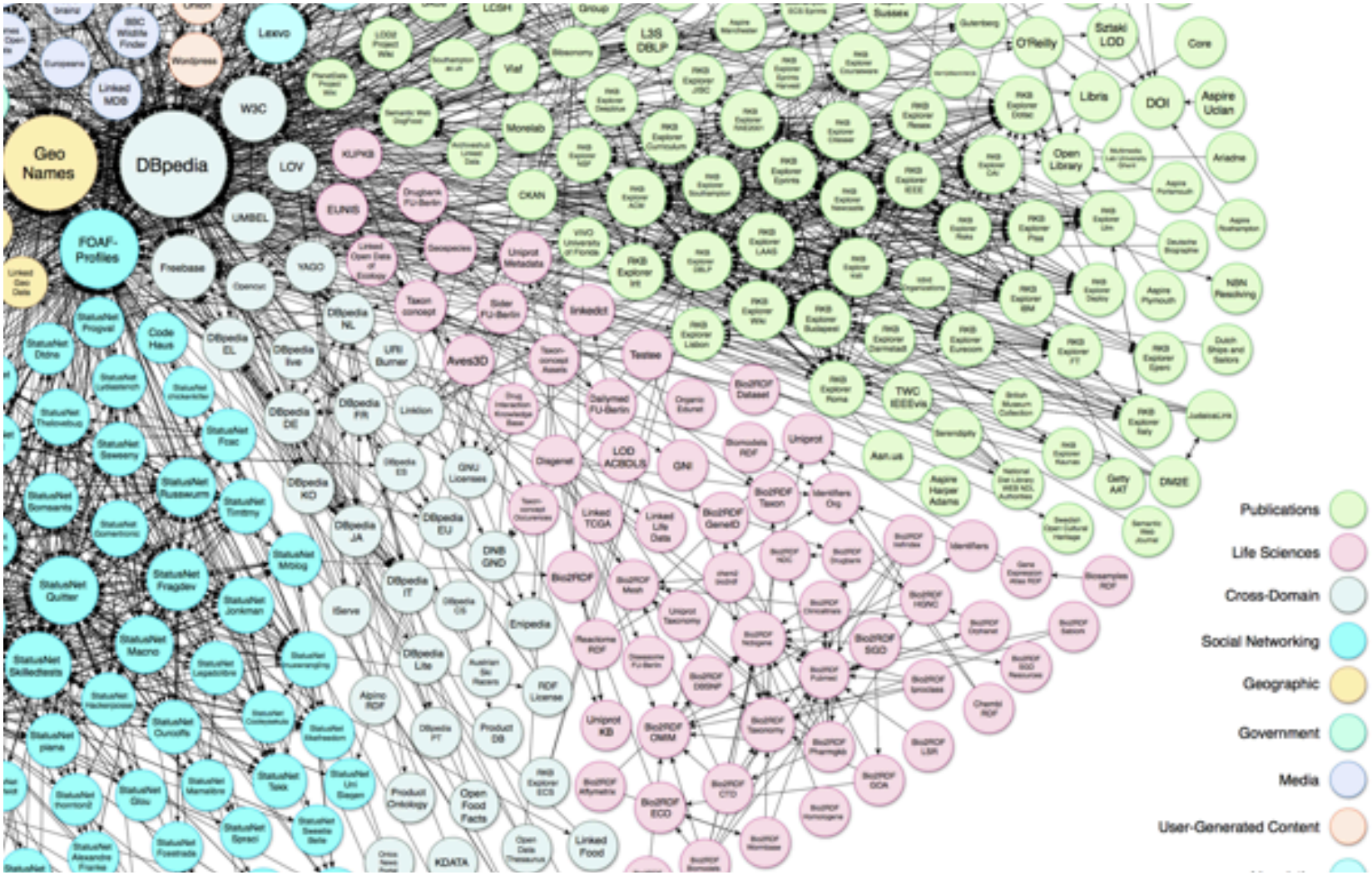


Linked Data Notifications, W3C Recommendation 2 May **2017** https://www.w3.org/TR/ldn/

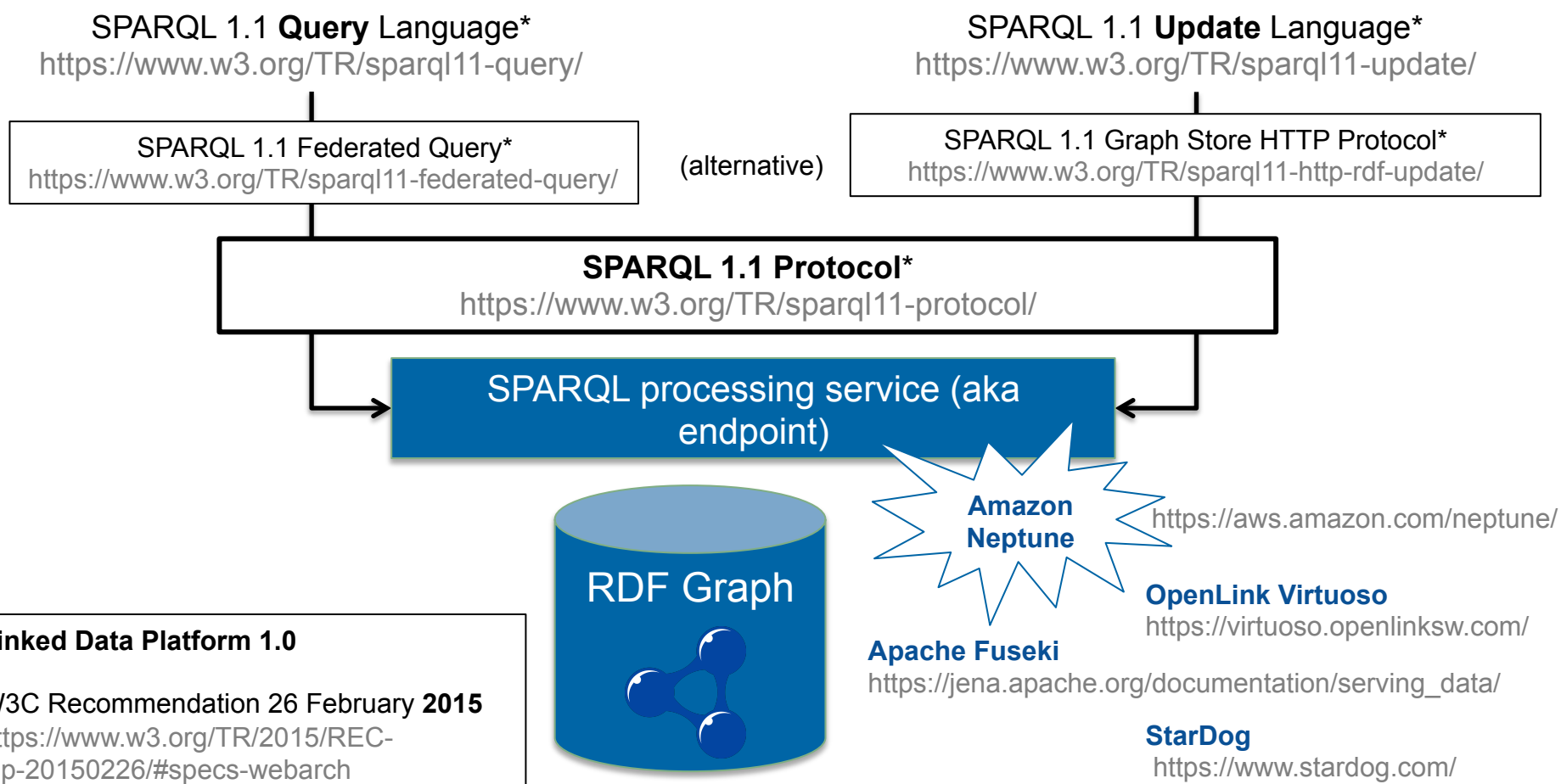
RDF data model



Open Linked Data Project



Standards: formats and protocols



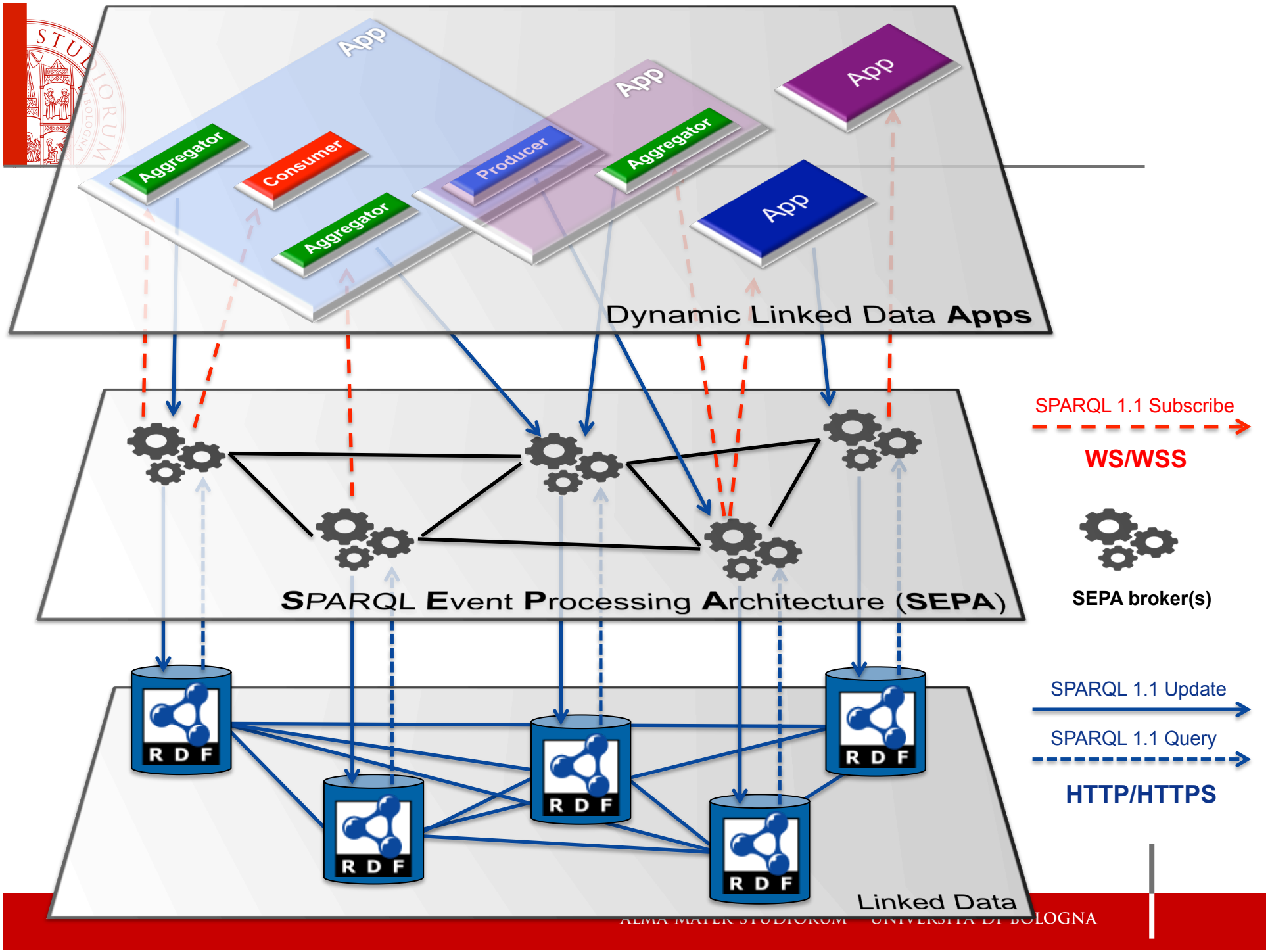
Linked Data Platform 1.0

W3C Recommendation 26 February **2015**
https://www.w3.org/TR/2015/REC-ldp-20150226/#specs-webarch

*W3C Recommendation 21 March **2013**

W3C Recommendation 25 February **2014

RDF 1.1** https://www.w3.org/TR/2014/REC-rdf11-concepts-20140225/
RDFS 1.1** https://www.w3.org/TR/2014/REC-rdf-schema-20140225/


App
Aggregator
Consumer
Aggregator
App
Producer
Aggregator
App
App
Dynamic Linked Data Apps
SPARQL Event Processing Architecture (SEPA)
RDF
RDF
RDF
RDF
RDF
Linked Data
SPARQL 1.1 Subscribe
WS/WSS
SEPA broker(s)
SPARQL 1.1 Update
SPARQL 1.1 Query
HTTP/HTTPS

References

- GitHub https://github.com/arces-wot
- Web https://site.unibo.it/wot/en
- Drafts
  - SPARQL Event Processing Architecture
    http://mml.arces.unibo.it/TR/sepa.html
  - JSON SPARQL Application Profile (JSAP)
    http://mml.arces.unibo.it/TR/jsap.html
  - SPARQL 1.1 Secure Event Protocol
    http://mml.arces.unibo.it/TR/sparql11-se-protocol.html
  - SPARQL 1.1 Subscribe Language
    http://mml.arces.unibo.it/TR/sparql11-subscribe.html