Ontology Engineering Group

Shifting from smart cities to smart communities using Web technologies

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W3C Workshop on Smart Cities

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AURORAL

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From smart cities to Smart Communities

Smart cities

Rural areas

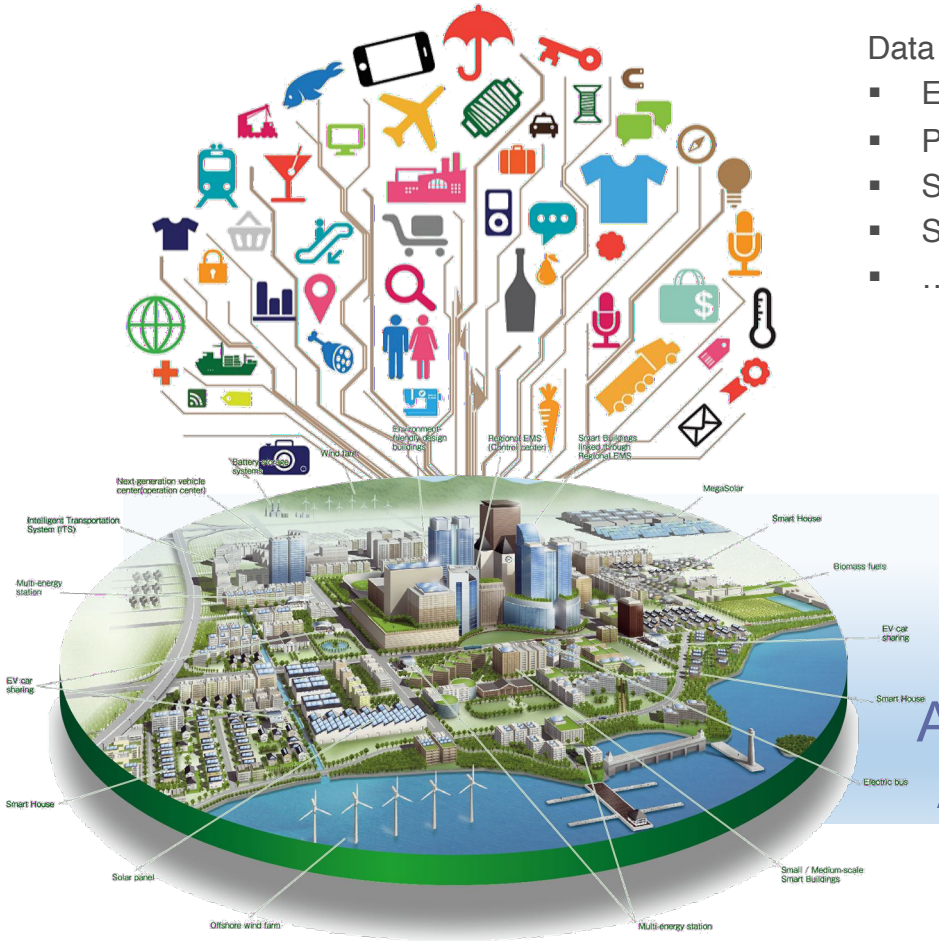
Smart Communities

Images source: VectorStock®

Smart communities: a multi-domain and cross-infrastructure data environment

Data domain:

- Government
- Energy Efficiency
- Transport
- Industry
- Social Media and News
- Food and Agriculture
- Air quality
- Finance
- Universities
- Research
- Libraries
- …



Data producers/consumers:

- Entities
- People
- Sensors
- Smart objects
- …

Any where
Any one
Any time
Any technology
Any language

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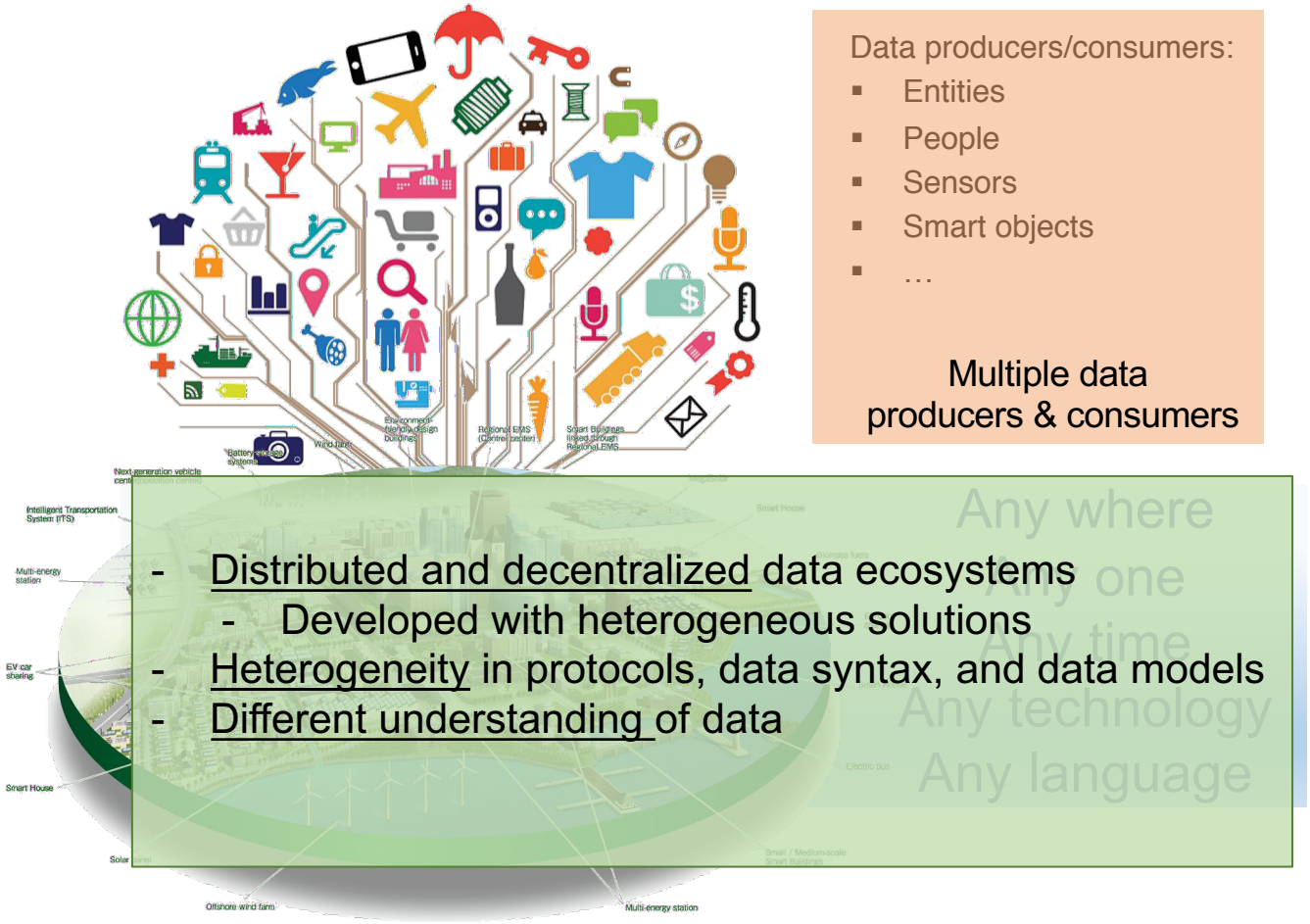
Multiple data-domains



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Multiple data producers & consumers

- Distributed and decentralized data ecosystems
  - Developed with heterogeneous solutions
- Heterogeneity in protocols, data syntax, and data models
- Different understanding of data

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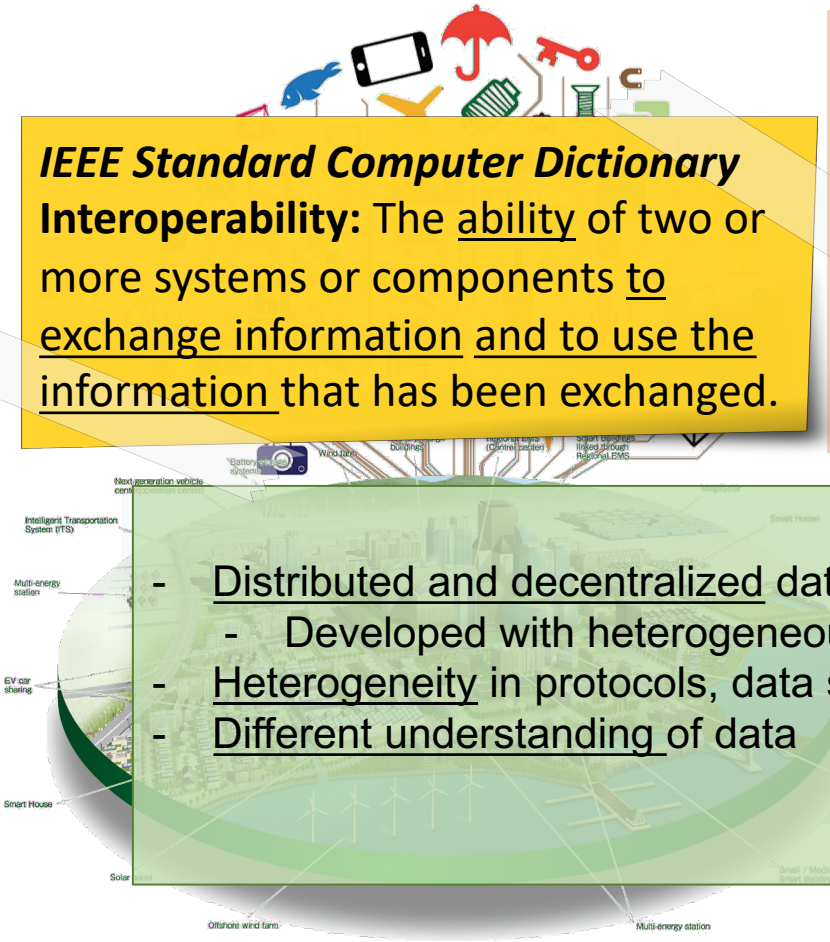

IEEE Standard Computer Dictionary
Interoperability: The ability of two or more systems or components to exchange information and to use the information that has been exchanged.

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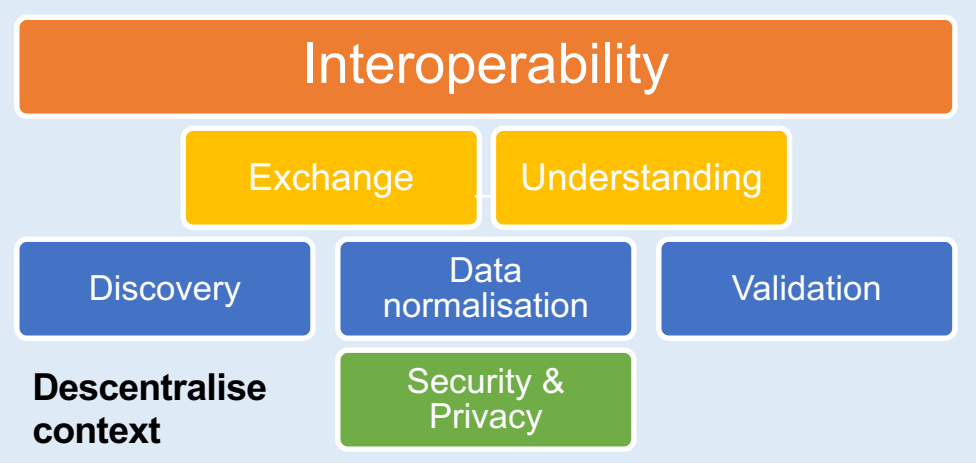
Interoperability enables the **collaboration**
between networks of **cross-domain** devices and services



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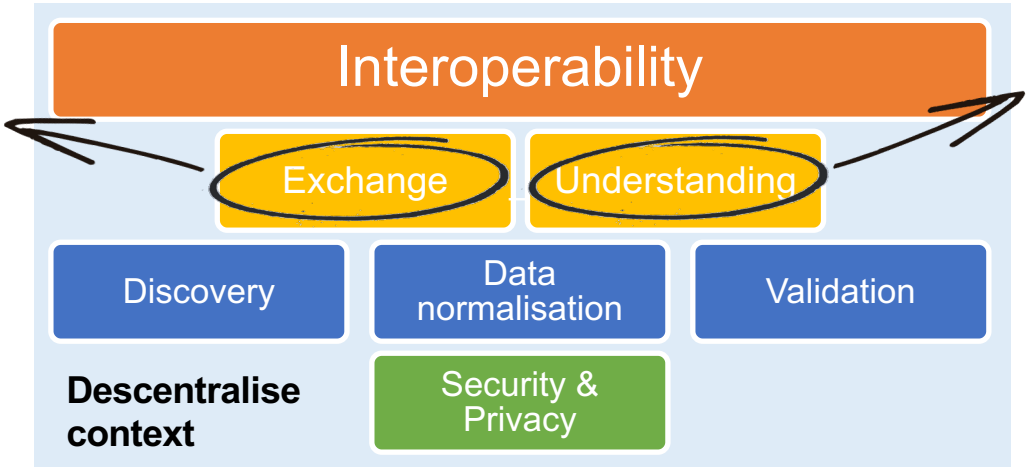
Data (syntax)
- Context
- Content



Ontologies (model)
- Common vocabulary
- Express shared meaning
- Ensure consistency
- Enable a common understanding

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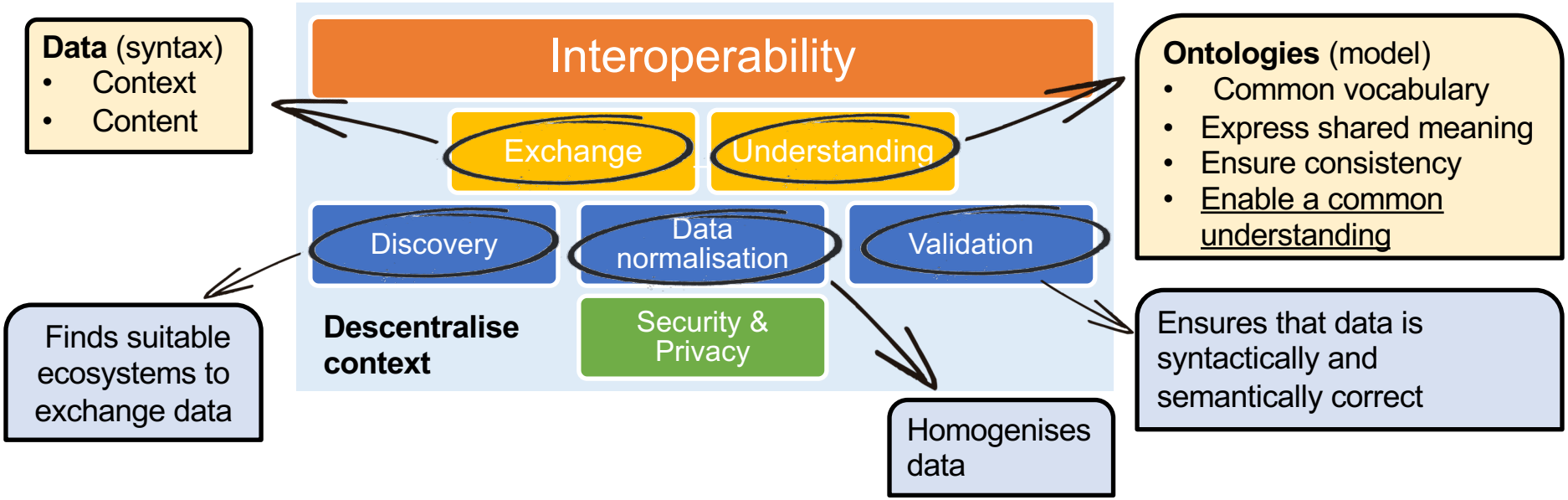

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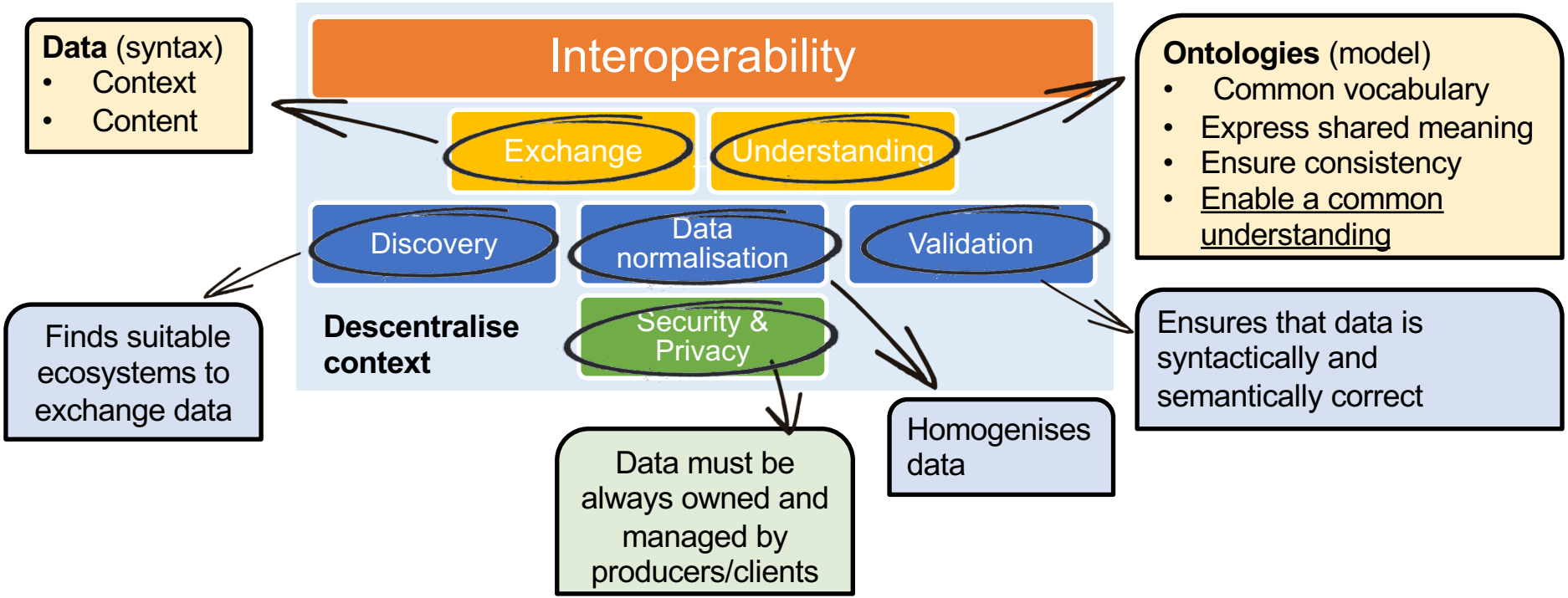

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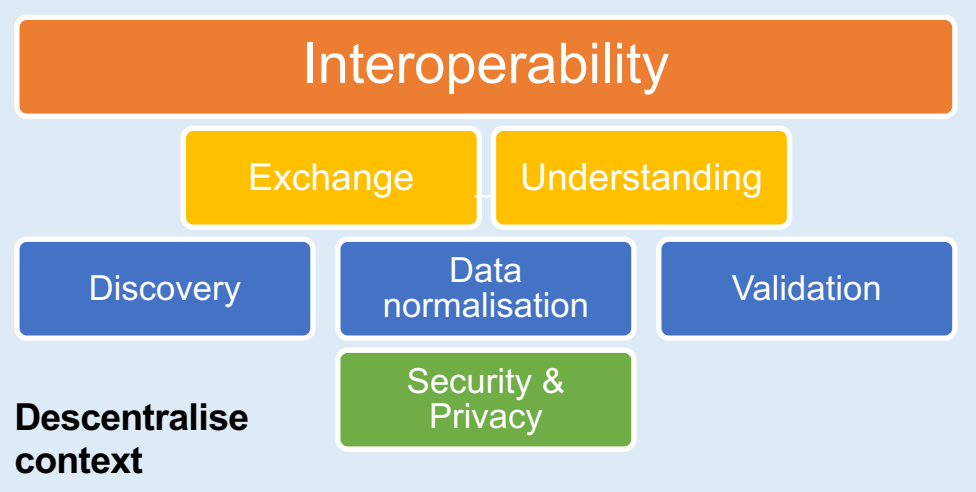

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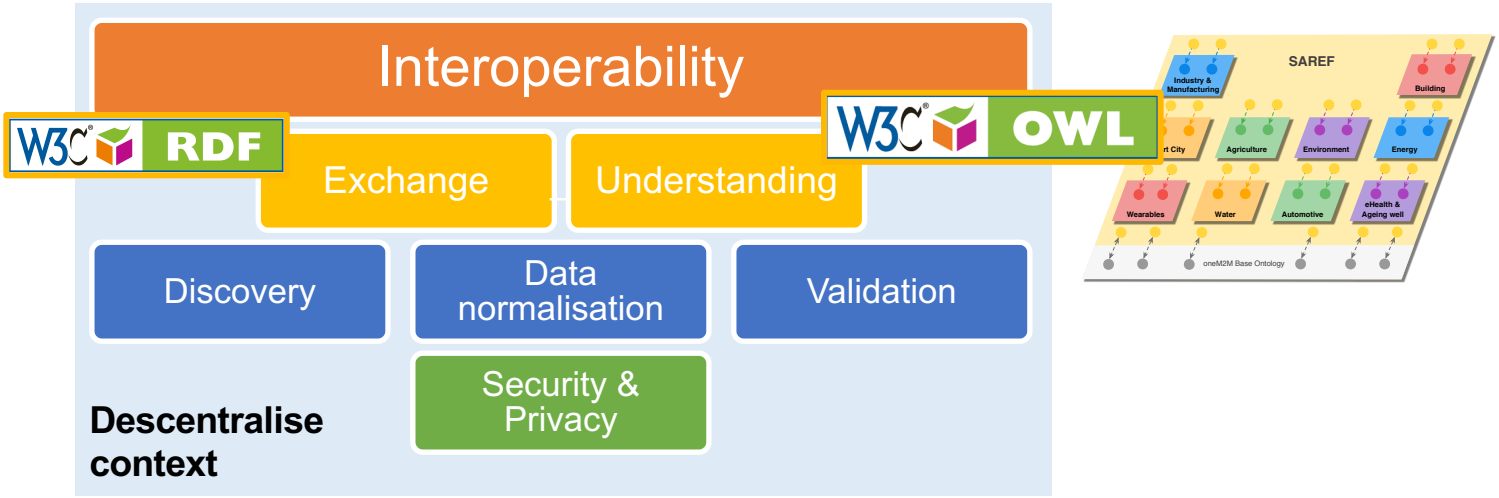

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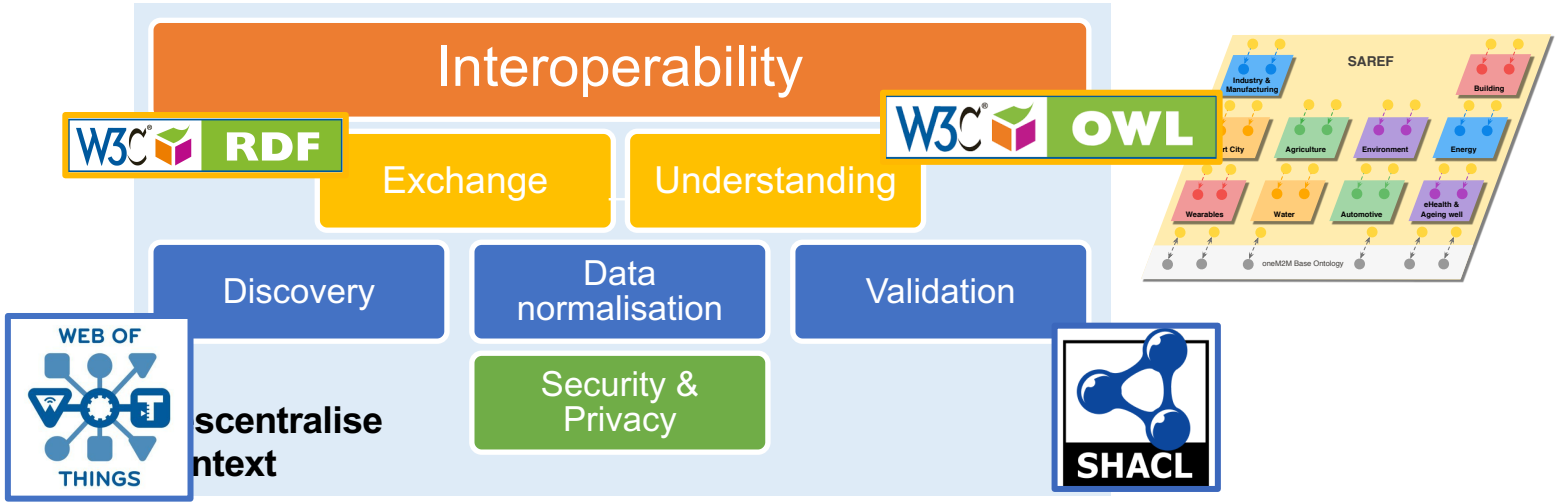

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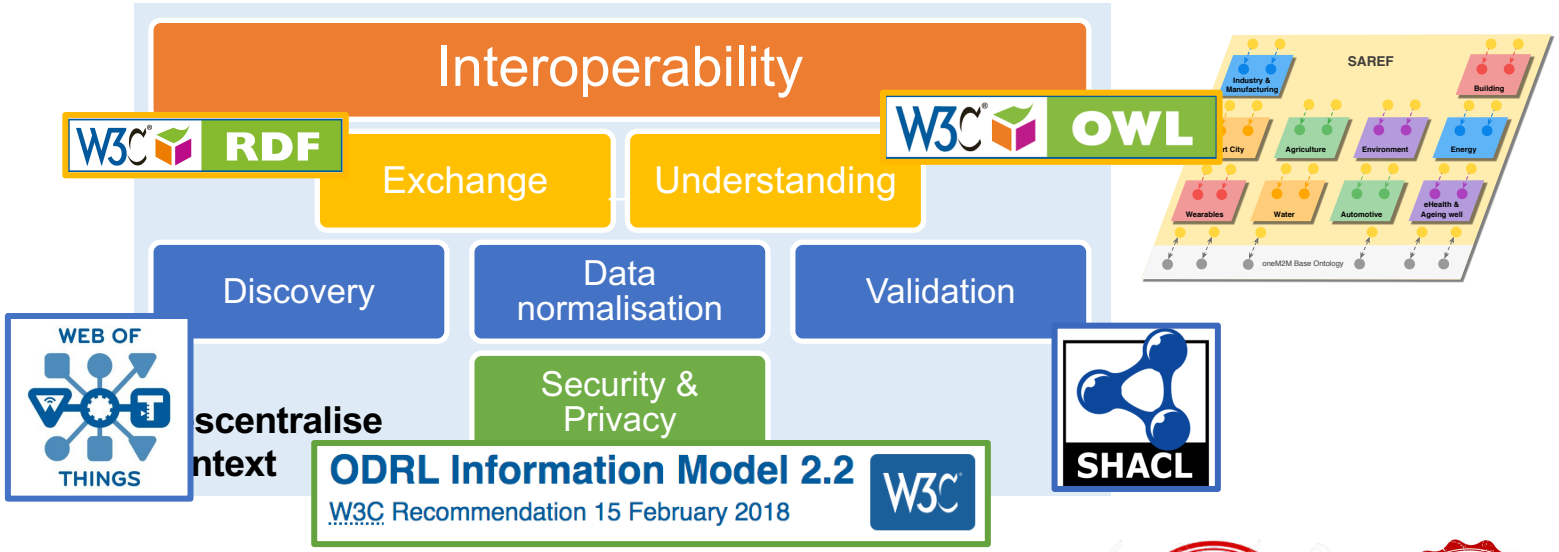

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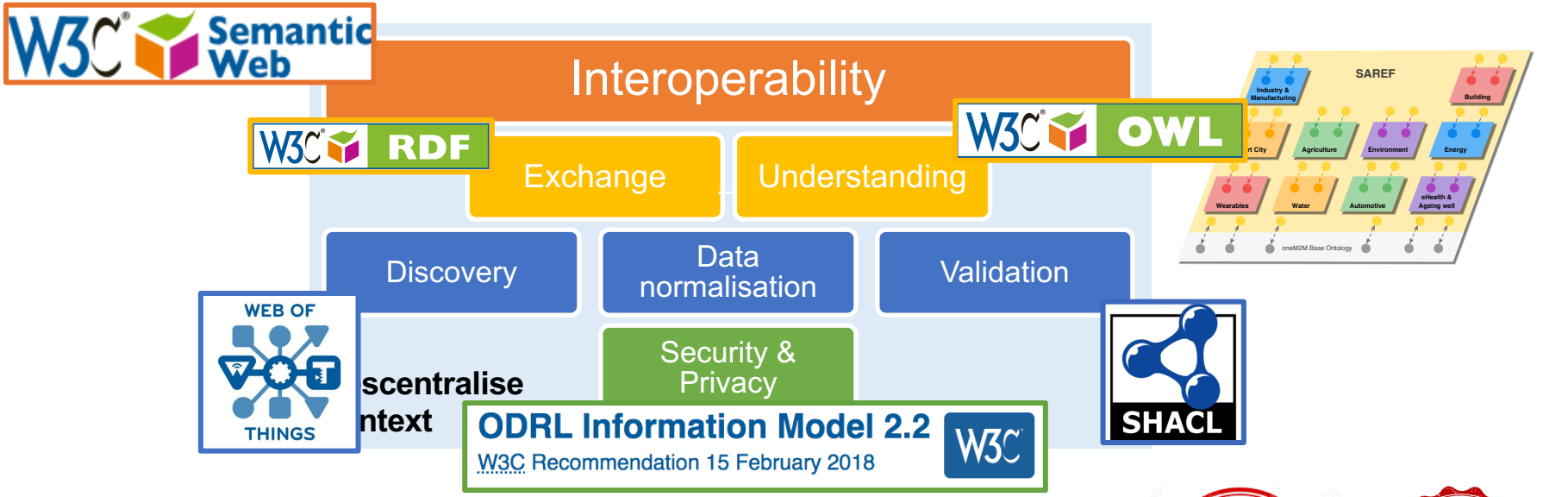

Not in a so distant future…

Heterogeneous API, format, model

Interoperability node

Heterogeneous API, format, model

Interoperability node

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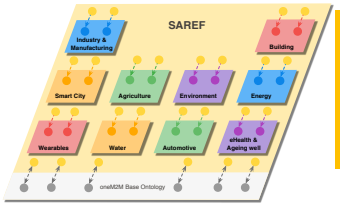
Interoperability node



Semantically interoperable data exchange layer

W3C OWL

W3C RDF

Interoperability node

Interoperability node

Security & Privacy

ODRL Information Model 2.2 W3C Recommendation 15 February 2018

Data exchange module

Discovery Module

WEB OF THINGS

Validation Module

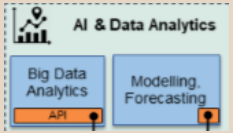
SHACL

Data normalisation module

Interoperable node

Heterogeneous API, format, model

Heterogeneous API, format, model



Heterogeneous API, format, model

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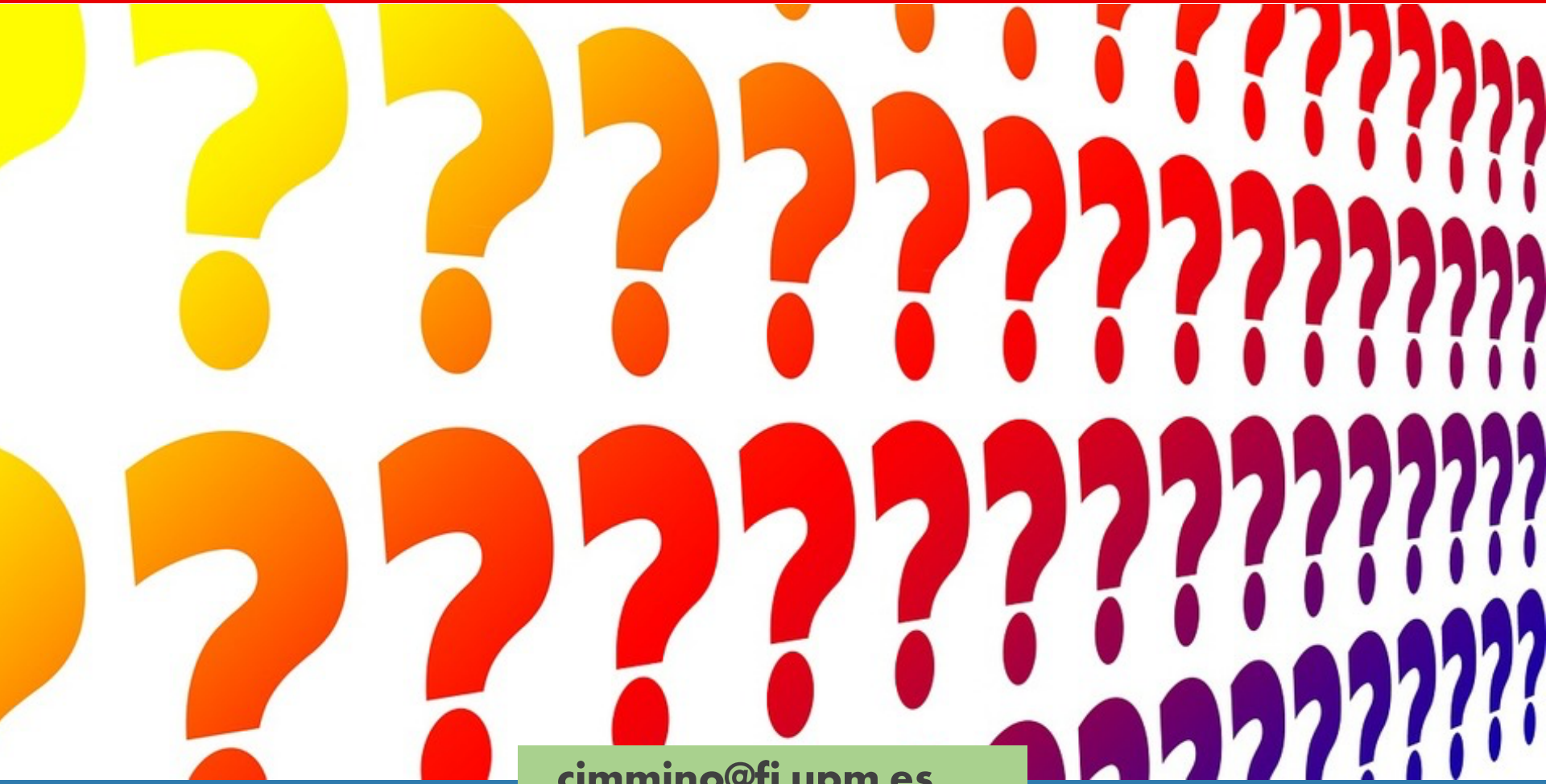
Summing up!

- Smart communities require semantic interoperability to exploit their maximum value
- Semantic interoperability must be by design
  - Using open standards
  - Taking into account legacy systems
- Tasks related to semantic interoperability:
  - Data exchange → RDF
  - Data understanding → OWL, ETSI SAREF ontologies
  - IoT + Discovery → Web of Things
  - Data normalisation → No existing standard, several methods (e.g., RDF materialisation)
  - Validation → SHACL Shapes
  - Security & Privacy → ODRL

Questions?



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