Best Practices in Collaborative Ontology Engineering

The Service Ecosystem Ontology in the THESEUS/TEXO project

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SAP RESEARCH

THE BEST-RUN BUSINESSES RUN SAP™

Agenda

1. SAP Research

2. THESEUS/TEXO

3. Service Ecosystem Ontology

4. Conclusion

About SAP Research

Our Vision

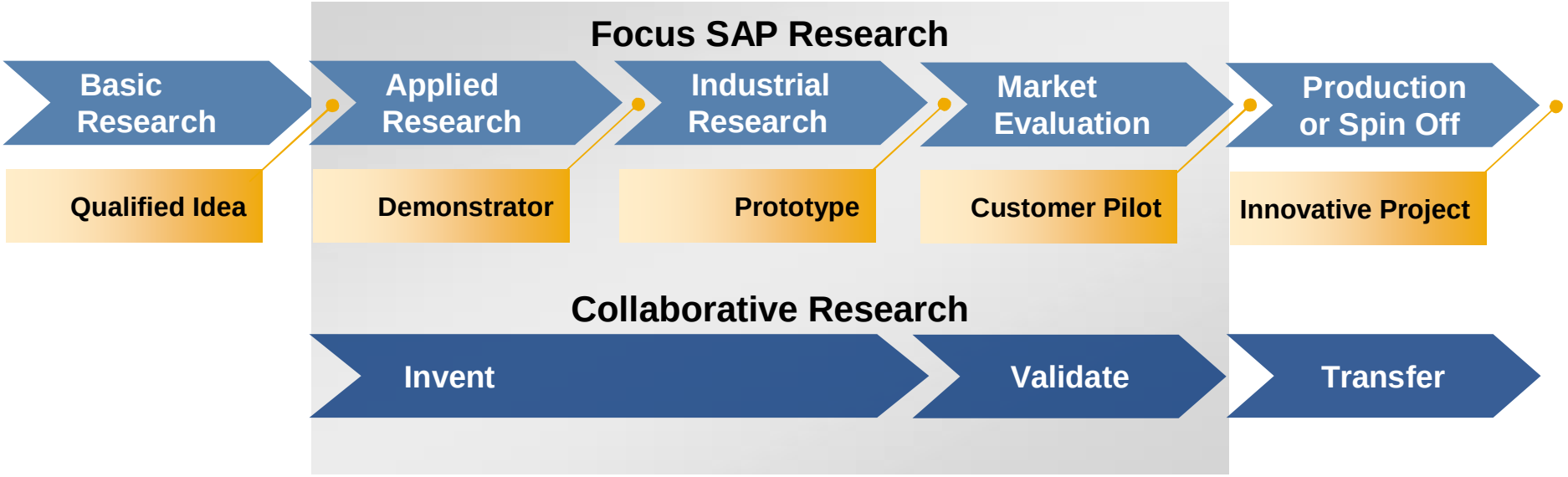
Be a world-class thought leadership partner to SAP and SAP's customers & partners

Our Mission

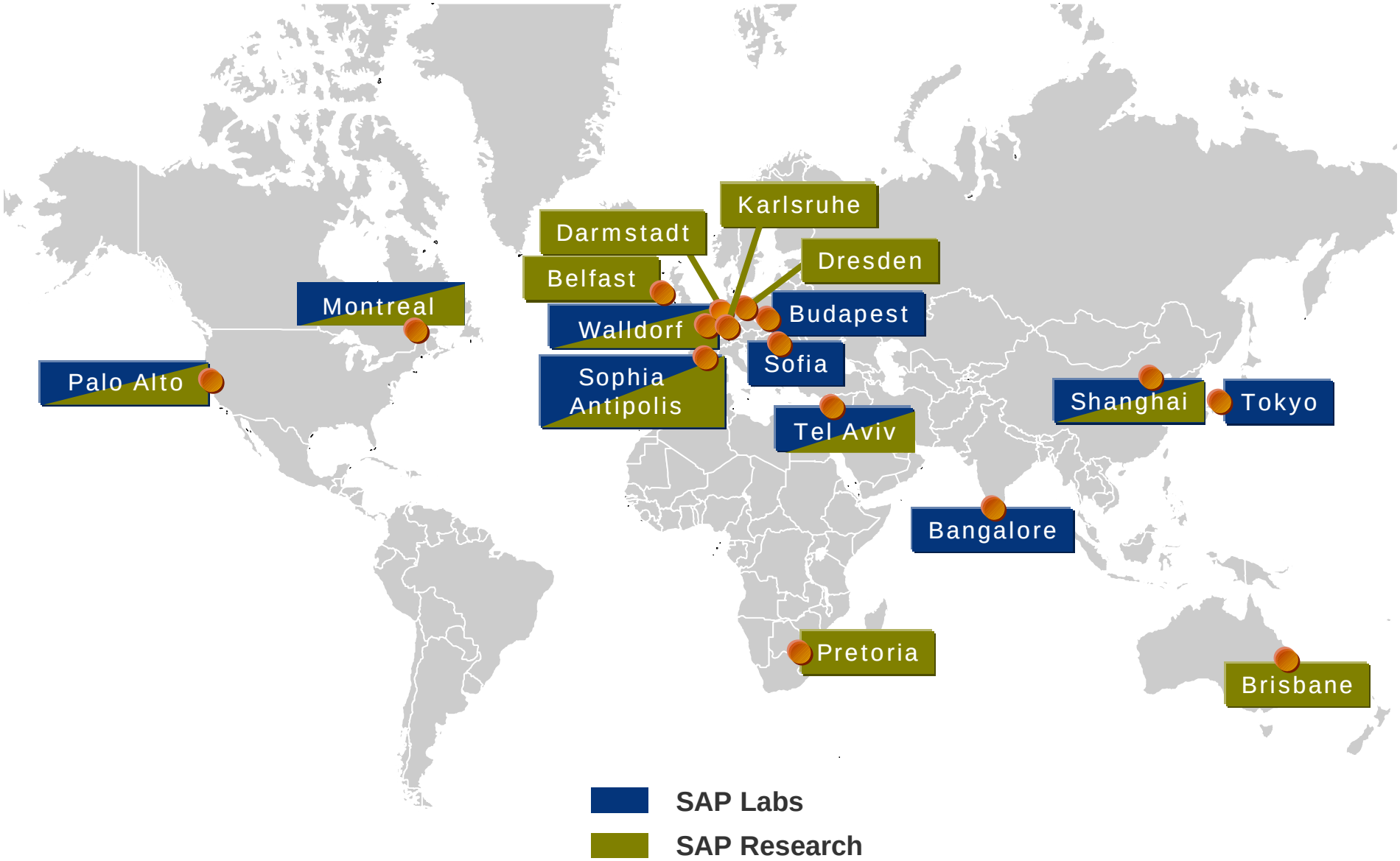
Prepare the groundwork for SAP's future growth

- **by acting as SAP's IT trend scout identifying emerging IT trends**
- **by researching and developing in strategically important SAP business areas as well as**
- **by leveraging entrepreneurial inventive talent**

SAP Research Process – From Idea to Innovative Product



SAP's Research & Development Network



The CEC Karlsruhe

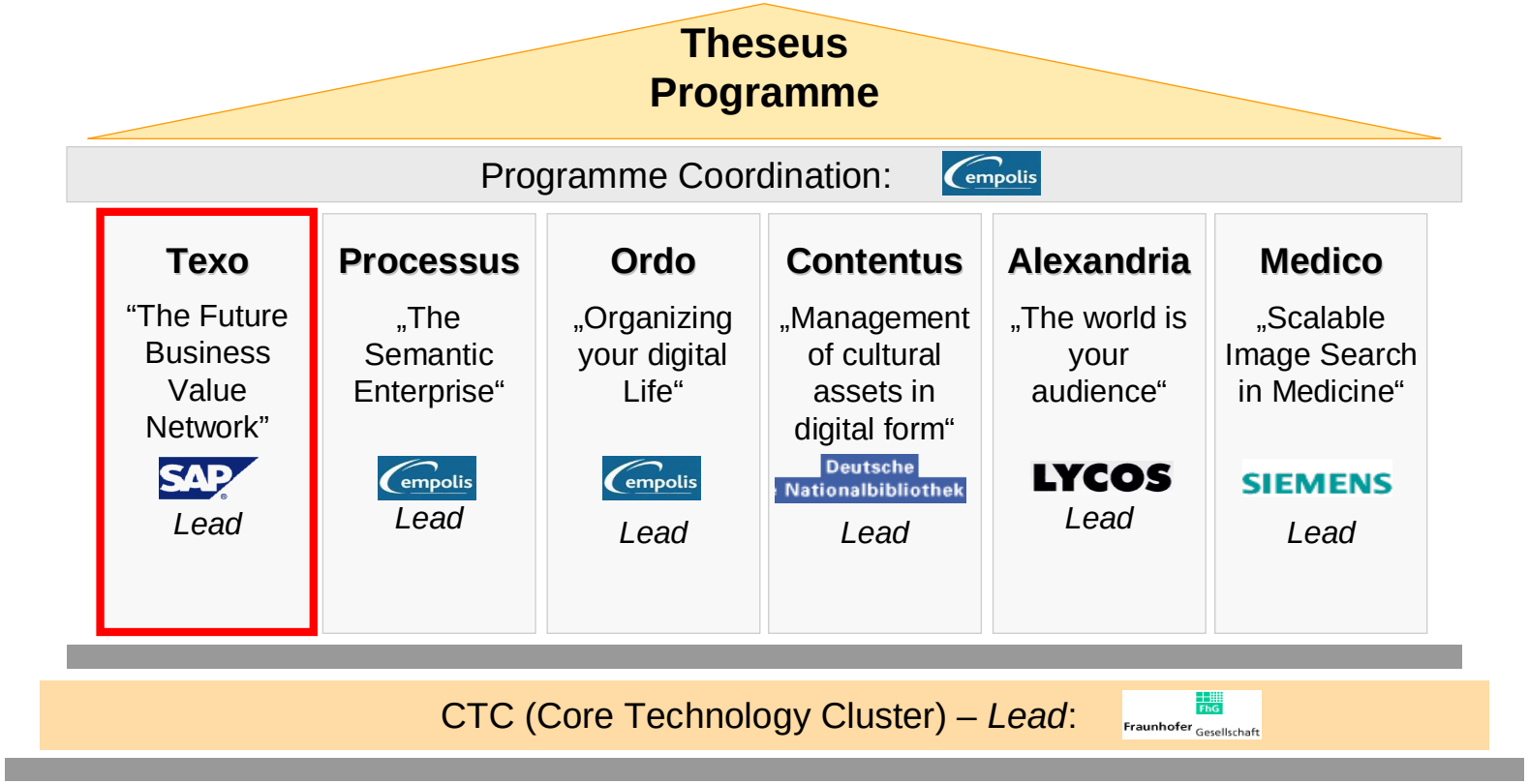
- Campus-based Engineering Center
- Since 1999
- Birthplace of SAP Research
- About 100 employees
  - (Senior) Researchers
  - PhD students
  - Students
- Interfacing with “Semantic Karlsruhe”
  - PhD supervision
  - Bilateral cooperation
  - Cooperation in publicly funded projects

Agenda

1. SAP Research
2. **THESEUS/TEXO**
3. Service Ecosystem Ontology
4. Headaches/Outlook

THESEUS Programme 2007-2011

Federal Ministry of Economics and Technology



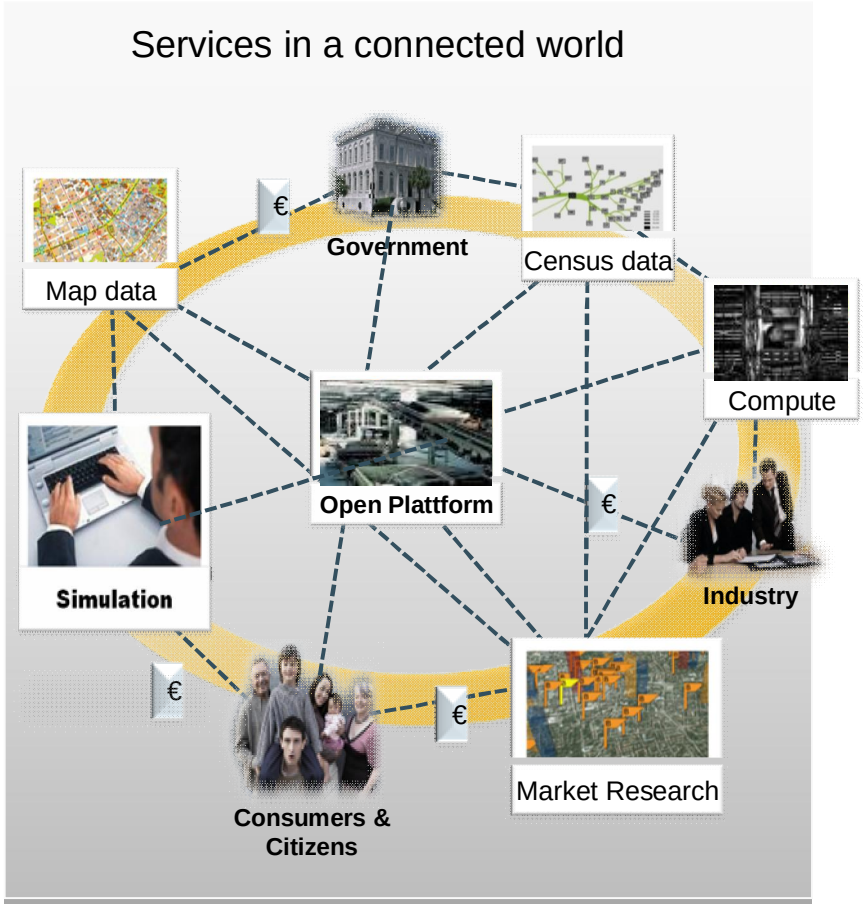
TEXO

Services will

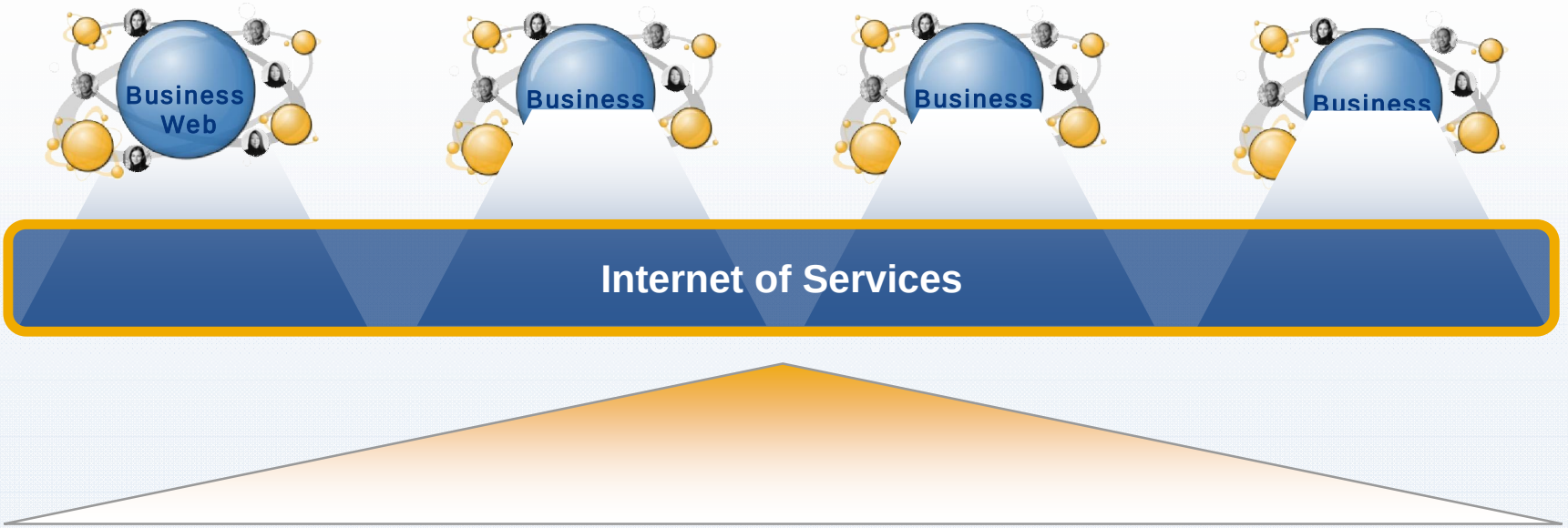
- become **tradable**
- **composed** of services of different providers
- be offered, delivered & executed automatically & **supported by IT**

Internet of Services

- Worldwide, trusted **Service Ecosystem** of Service Providers, Consumers and Brokers
- For **buying, selling, repurposing and composing services** for different needs
- New way of **organizing the interaction** between partner ecosystem & customer base



The Internet of Services and Business Webs



Business Services	Service Discovery	Information Integration
Application (de)composition	Rich service descriptions	Information mash-up
Service Architectures	Semantic Technologies	Web2.0

Technical Aspects

Innovation	Business Models
Network effects	Business collaboration
Attractiveness	Business Value

Business Aspects

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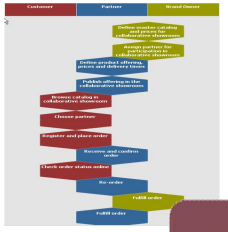
1. SAP Research

2. THESEUS/TEXO

3. **Service Ecosystem Ontology**
    1. **Motivation**
    2. **Walkthrough**
    3. **Collaborative Modeling**
    4. **Modeling Guidelines**

4. Conclusion

Motivation:
Comprehensive Service Description

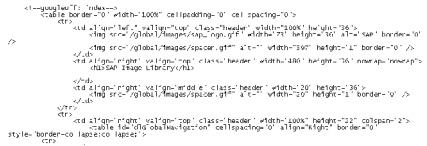


Business Model

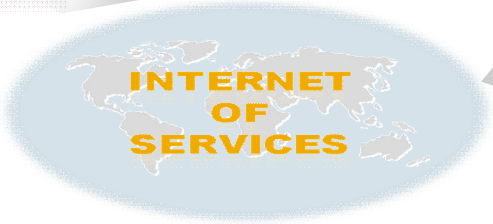
Legal

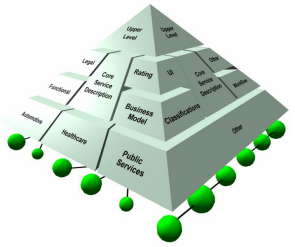
Feedback

Quality



Technical





Service Ecosystem Ontology

Upper Level

- Foundational Ontology
- Avoid modeling from scratch
- High-quality starting point
- Ontology Design Patterns

Choice of Upper Level

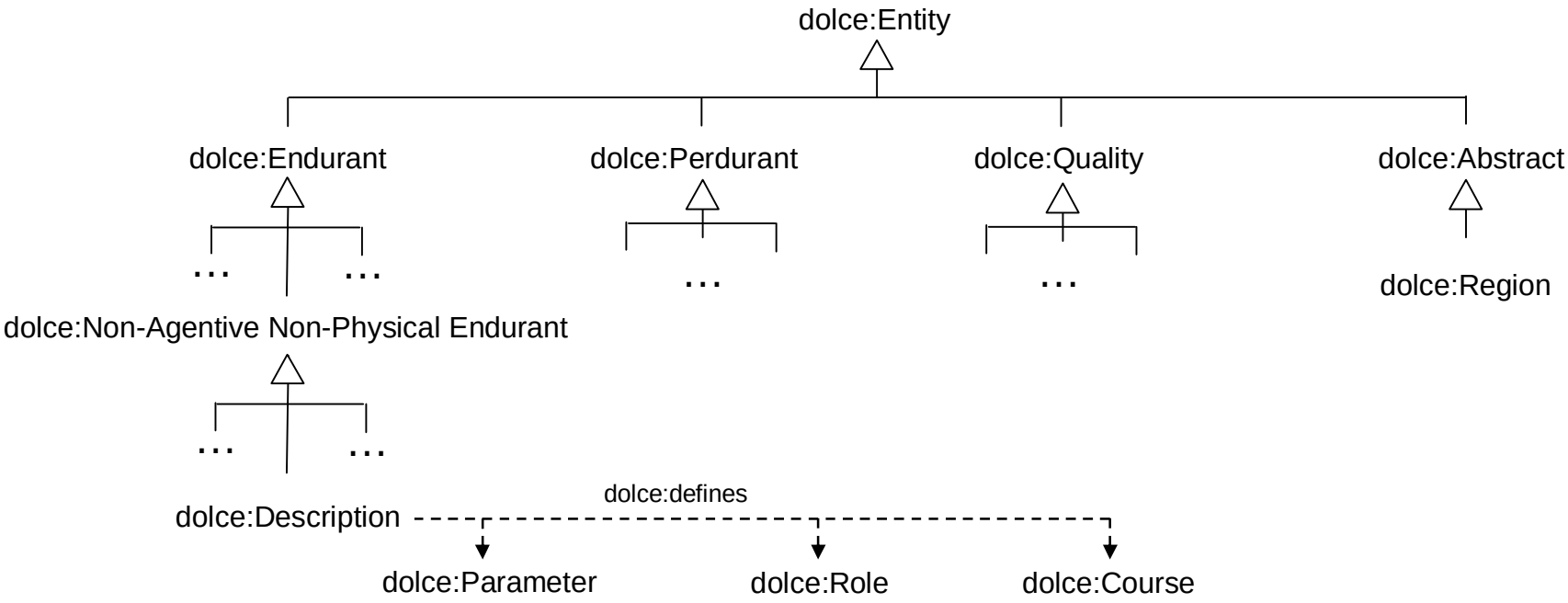
Ontological Choices

Requirement \ Alternative	BFO	DOLCE	OCHRE	OpenCyc	SUMO
Descriptive vs. revisionary	Revisionary	Descriptive	Revisionary	Descriptive	Unclear
Multiplicative vs. reductionist	Reductionist	Multiplicative	Unclear	Unclear	Unclear
Possibilism vs. Actualism	Actualism	Possibilism	Possibilism	Unclear	Unclear
Endurantism and **Perdurantism**	Both	Both	Perdurantism	Unclear	Unclear

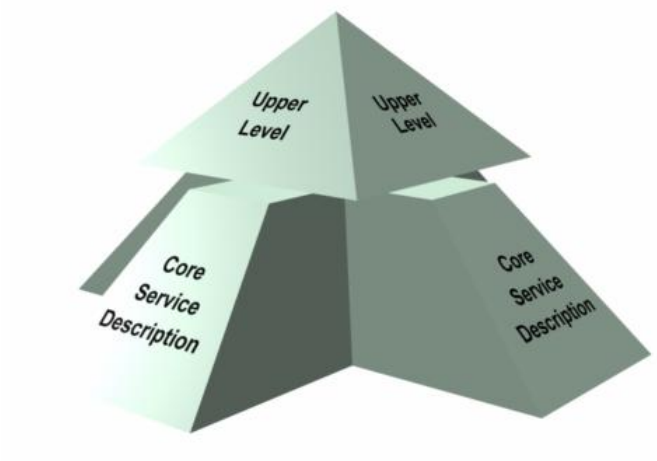
Extrinsic Properties

Requirement \ Alternative	BFO	DOLCE	OCHRE	OpenCyc	SUMO
OWL DL Version	Yes	Yes	Yes	Yes	Yes
Ontology Design Patterns	No	Yes	No	No	No
Modularization	Yes	Yes	Yes	Yes	Yes
Maturity	Yes	Yes	No	Yes	Yes

Upper Level - DOLCE

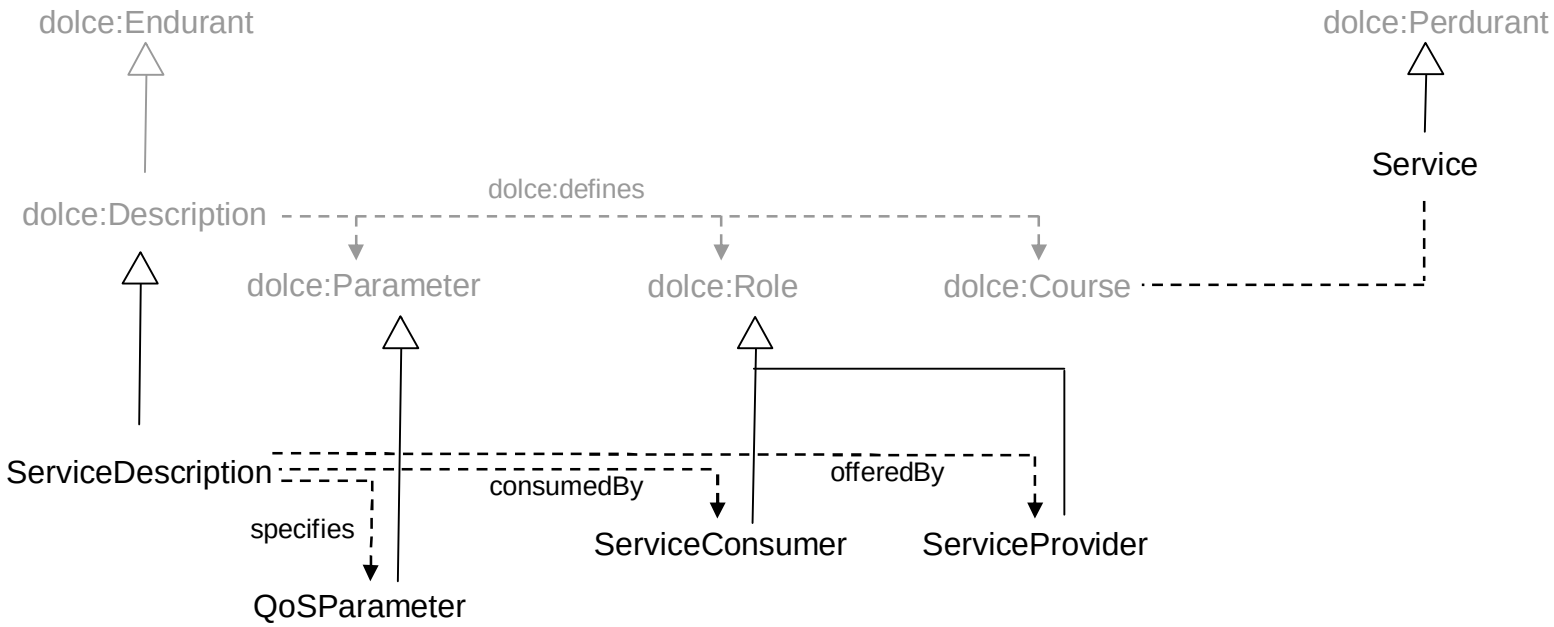


Core Service Description

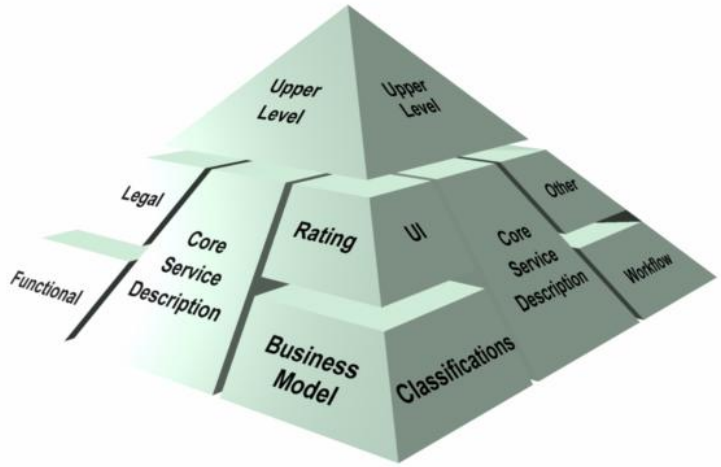


- Core Service Description module contains information common to every service
- Service, Service Description, Service Provider, Service Consumer, etc.
- Ontological Foundations of Service Science [Ferrario, Guarino 2008]

Core Service Description

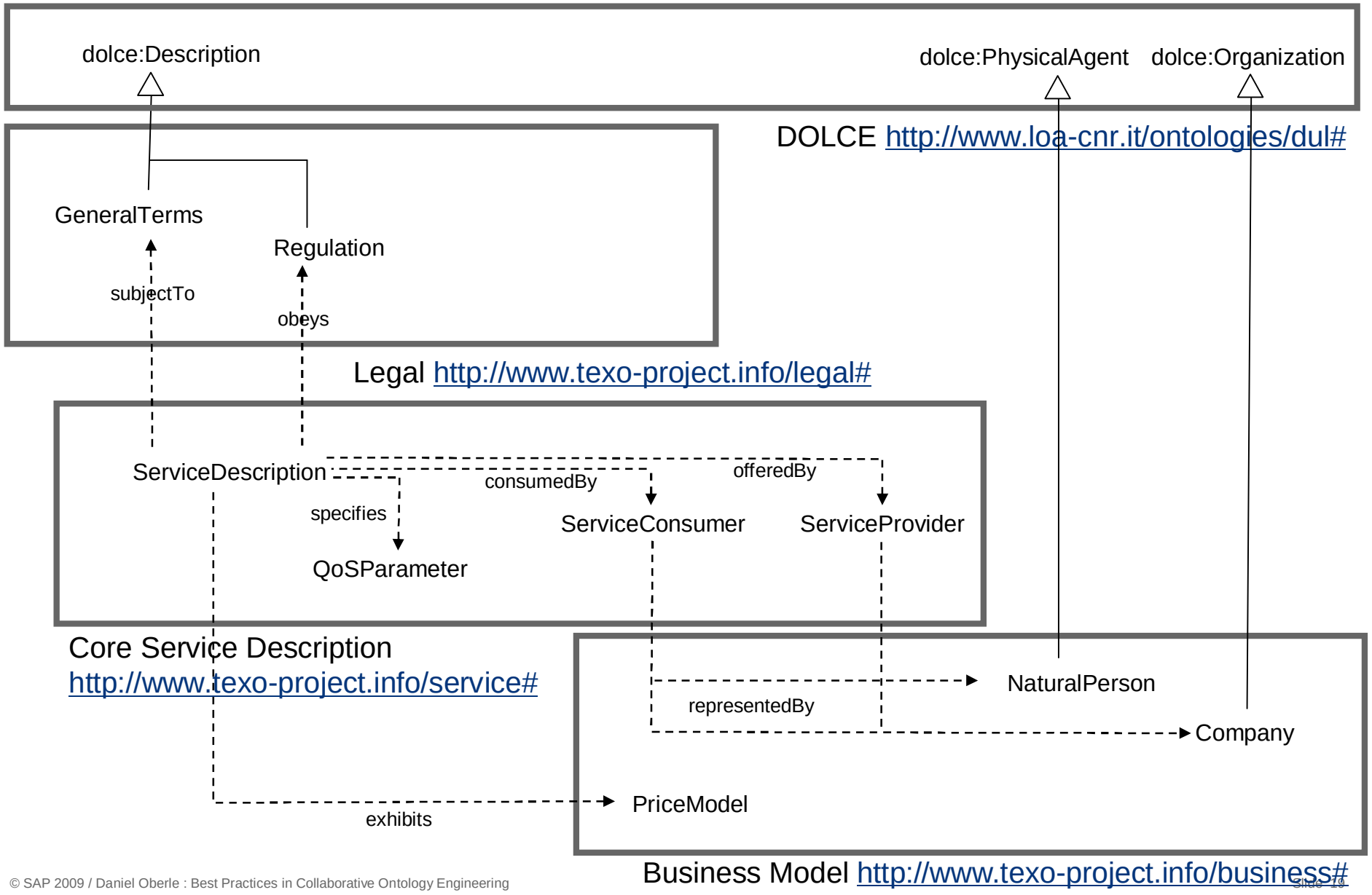


Core Modules

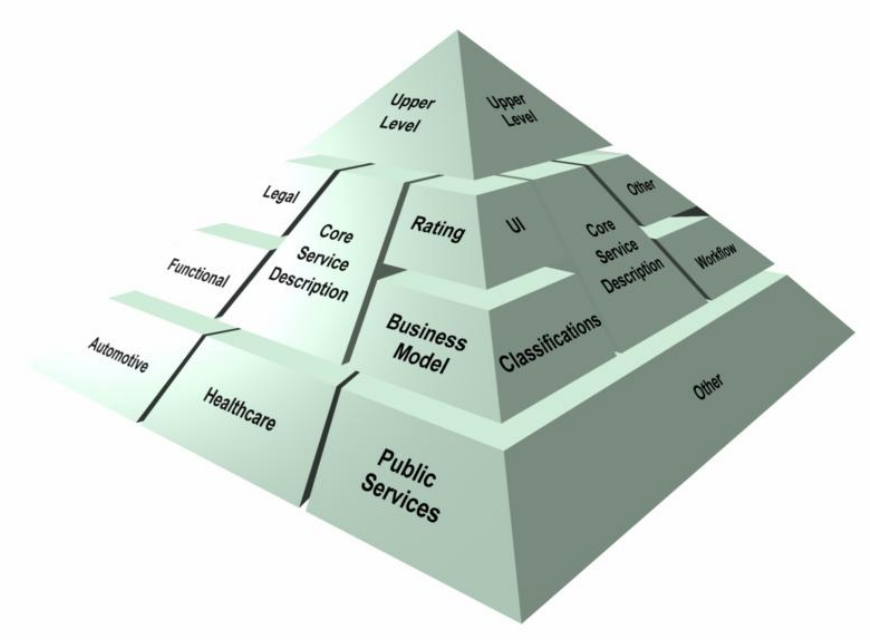


- Different aspects are devoted their own ontology module
- Each module is contributed by a different domain expert
- Modules import each other and can be omitted

Core Modules



Industry Modules

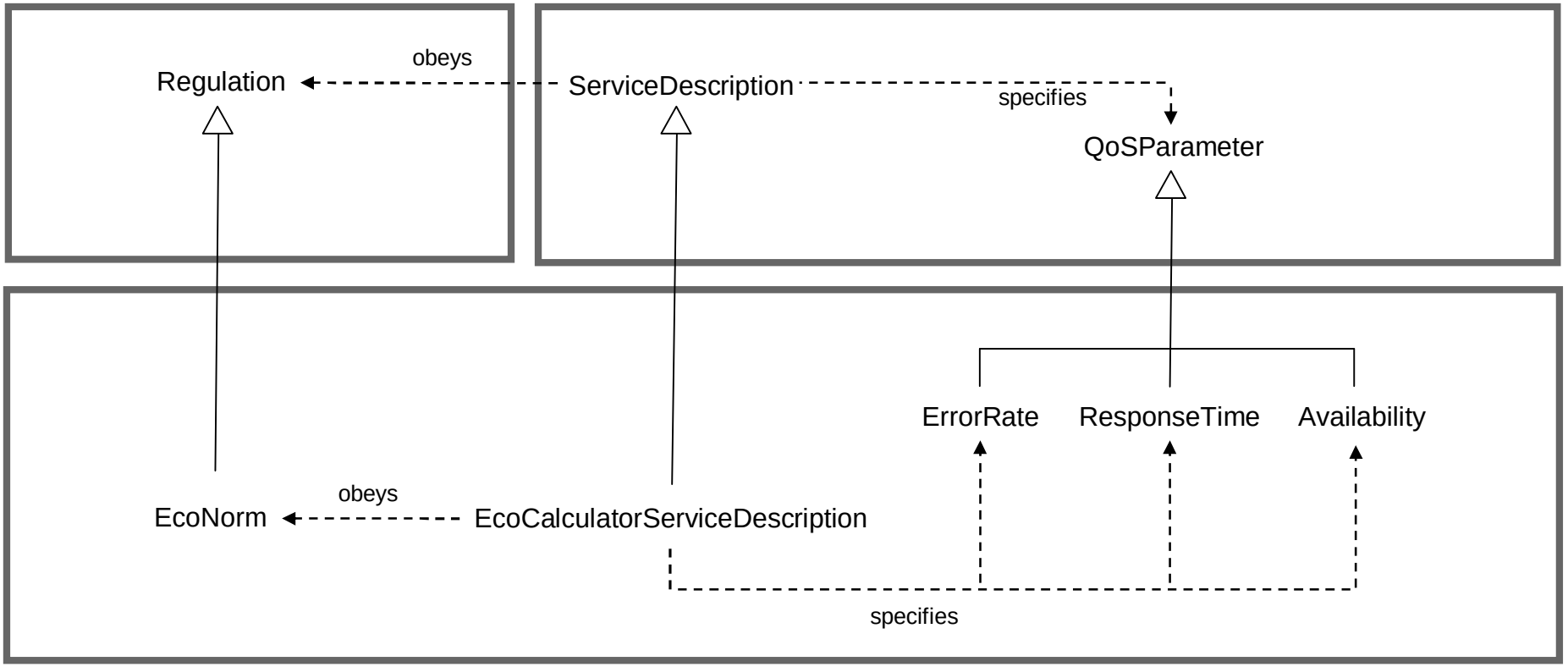


- Introduce industry-specific taxonomies of service categories
- Formal and natural language documentation

Industry Modules

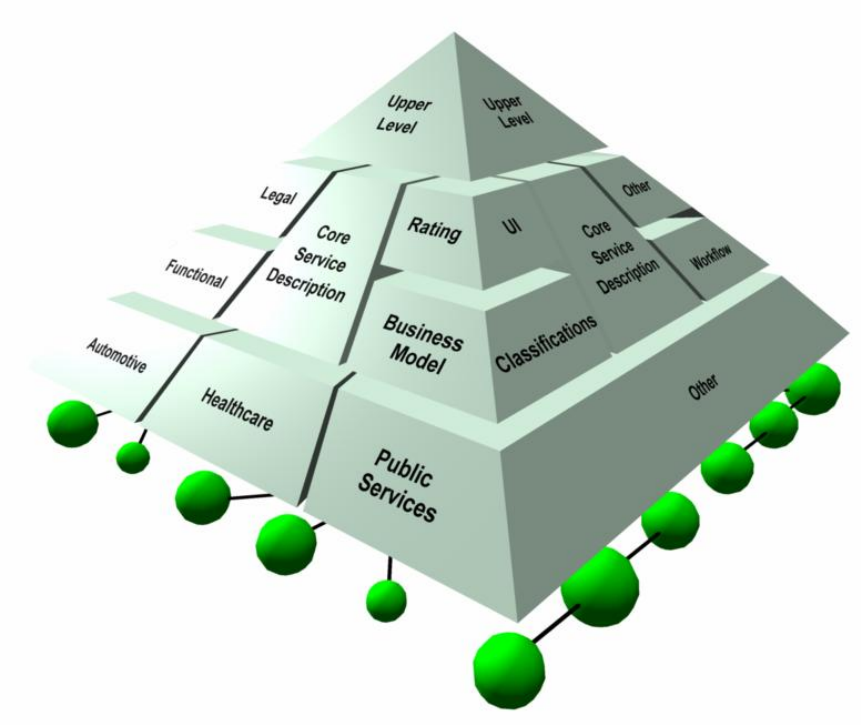
Legal
http://www.texo-project.info/legal#

Core Service Description http://www.texo-project.info/service#



Automotive Industry Module http://www.texo-project.info/industry/automotive#

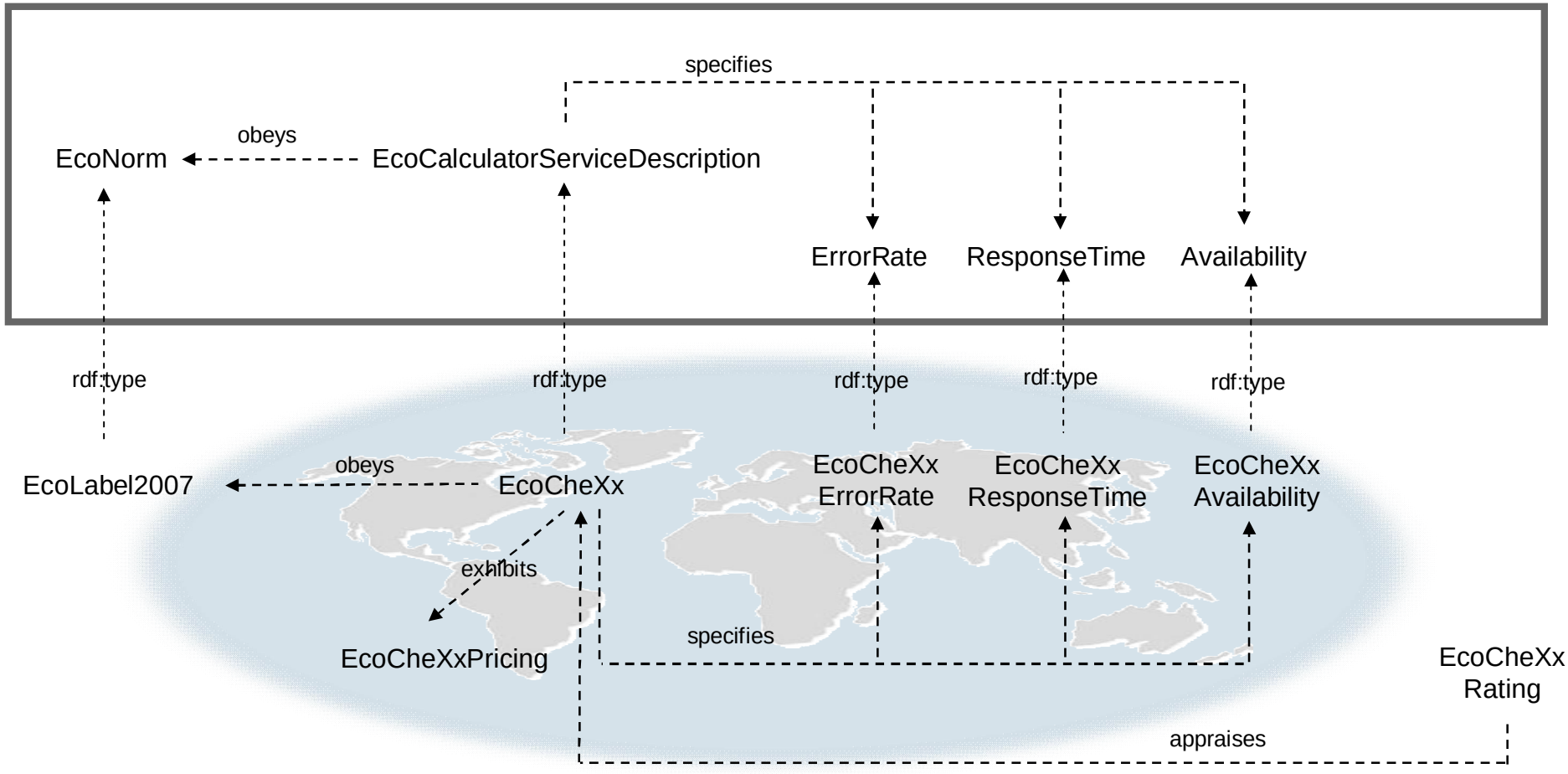
Instances



- Specific service descriptions are represented as instances
- Instances are created by service providers
- Instances can be spread and interlinked on the Internet of Services

Instances

Automotive Industry Module http://www.texo-project.info/industry/service#



http://eur-lex.europa.eu/ http://www.ecochexx.com http://www.broker.com http://www.ratings.org

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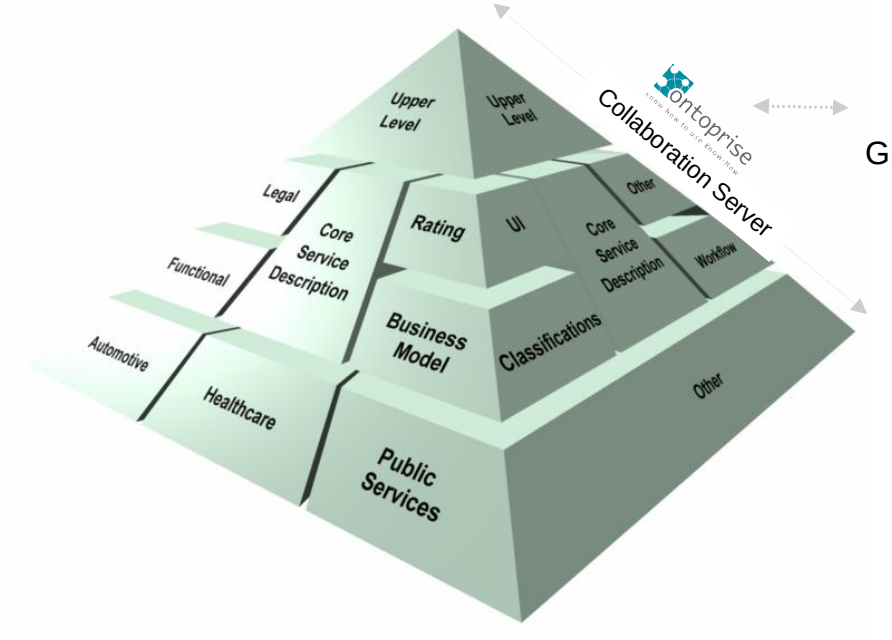
Collaborative Modeling



Governance Team

Content Mgmt Plug-In

NeOn Toolkit

Legal Expert

Content Mgmt Plug-In

NeOn Toolkit

Business Model Expert

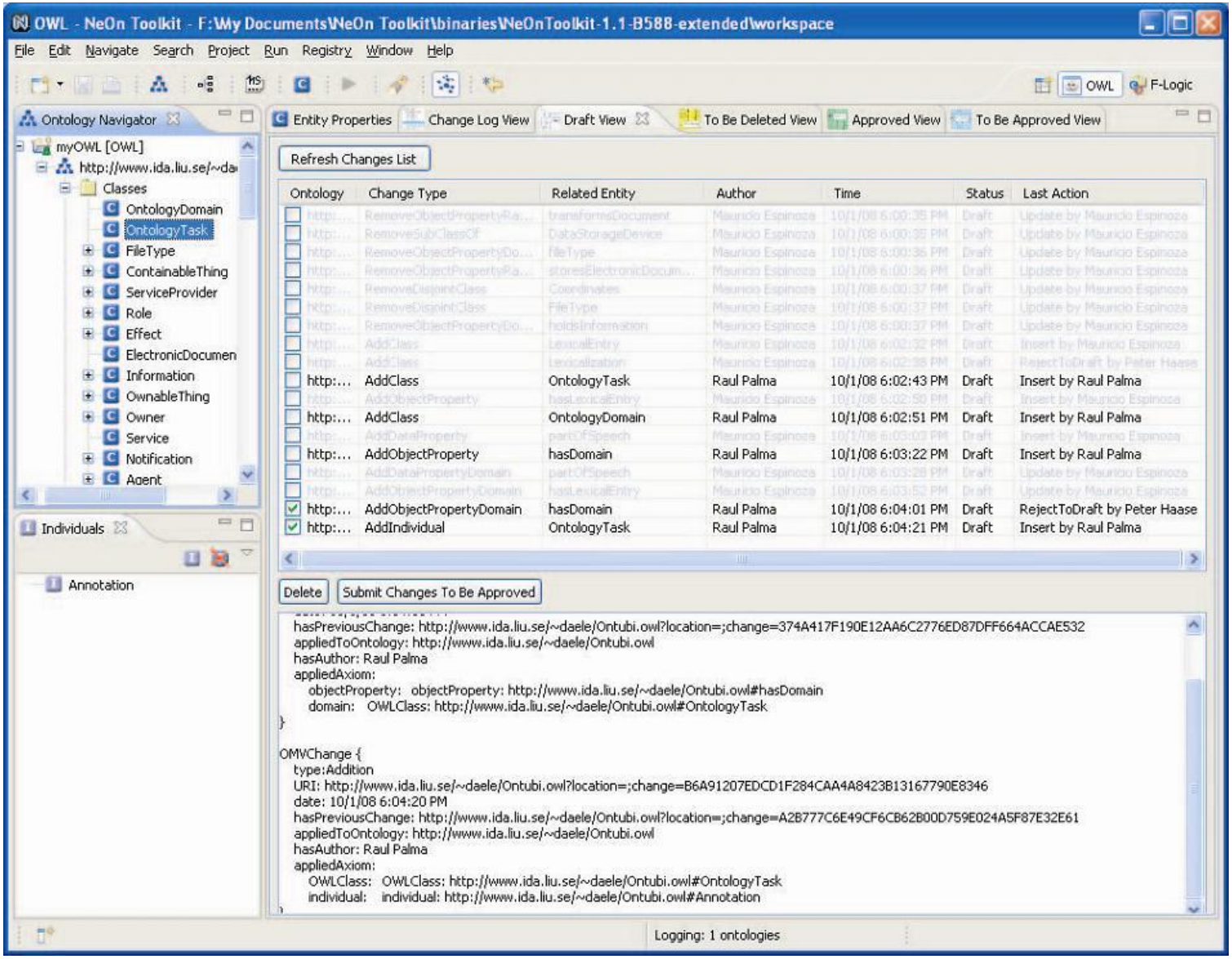
Content Mgmt Plug-In

NeOn Toolkit

Rating Expert

Modeling Task Force

Content Mgmt Plug-In



[*Palma, Haase, Corcho, Gómez-Pérez, Ji*: An Editorial Workflow Approach For Collaborative Ontology Development. ASWC 2008]

Modeling Guidelines – Naming conventions

- Classes must be named in English in CamelCase
  - e.g. *ServiceDescription*
- Relations must be named in English in CamelCase with non capital letter
  - e.g. *offeredBy*
- Descriptions for relations should be meaningful verbs
  - e.g., "*describes*," "*obeys*," etc.
- Model the inverse relation and declare the inversity in the editor
  - e.g., *offers* and *offeredBy*
- Classes and relations from imported ontology modules must be specialized with the current module's namespace. This is necessary to enable a sound modularization where the individual modules can also "live on their own" without the imported modules.

Modeling Guidelines – Documentation

- Explanatory and verbose descriptions must be provided in English and German for each class and relation in line with the formal axiomatization
- e.g. EcoCalculatorServiceDescription
  - rdfs:label de : Ökokalkulator
  - rdfs:label en : Eco-calculator
  - rdfs:comment en: “
    An Eco-calculator service description is a service description with the following constraints
    - it obeys an eco regulation
    - it specifies all of the following three quality of service parameters:
    - availability
    - response time
    - error rate”
  - rdfs:comment de: ‘…‘

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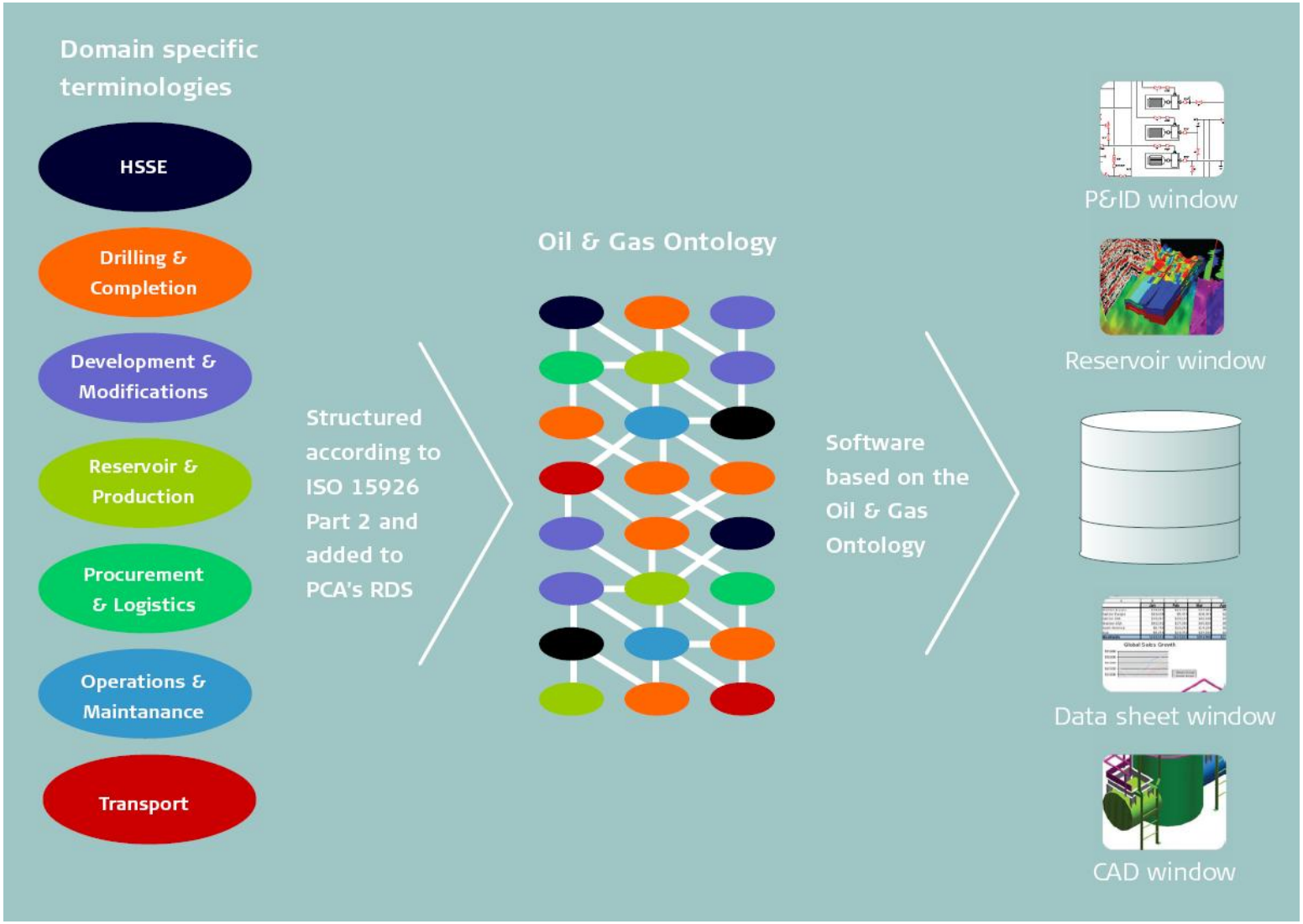
Why is this relevant to IOHN?



[Integrated Operations and the Oil & Gas Ontology, OLF + PCA]

Some Headaches ...

- Maturity of tools
- Expertise missing
- Modeling expensive
- Danger of over-engineering
- Experts do not really model
- Large effort to collaborate and streamline
- How to evaluate whether design is realistic?

Questions?

Thank you!