GoodRelations
The Web Ontology for E-Commerce

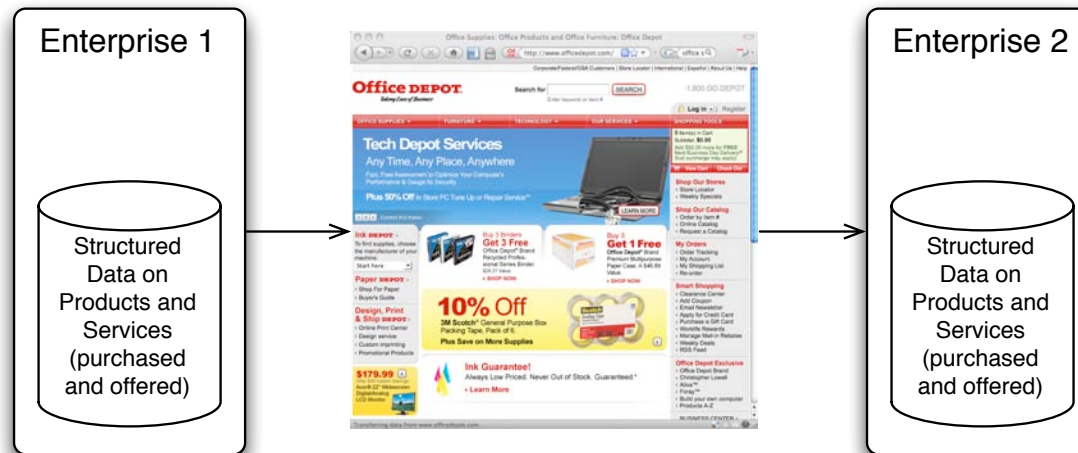# The GoodRelations Ontology: Making Semantic Web-based E-Commerce a Reality

http://purl.org/goodrelations/

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E-Commerce on the Web

World Wide Web

Enterprise 1

Structured
Data on
Products and
Services
(purchased
and offered)

Enterprise 2

Structured
Data on
Products and
Services
(purchased
and offered)

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E-Commerce on the **Semantic** Web

World Wide Web

Enterprise 1		Enterprise 2
Structured Data on Products and Services (purchased and offered)		Structured Data on Products and Services (purchased and offered)

Product Specifications: Type of Product, Features etc.
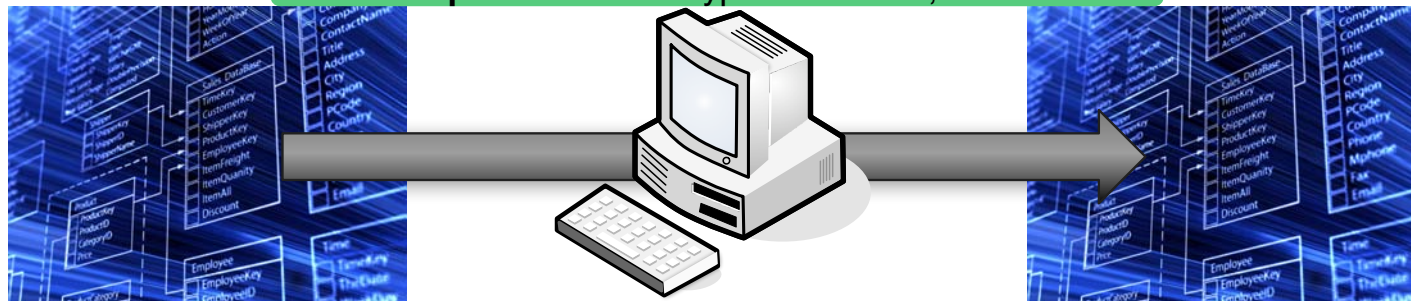
Details of the Offering: Price, Eligible Regions, etc.

2001-2008:
Semantic Web & E-Commerce:
Lots of Papers, Limited Impact

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Use Cases

- Commodity offers

- Services offers

- Product model data interchange

Required Ontologies

- An ontology for **product types and features**

  - by function, usage, or nature

- An **ontology for offer specifications**

- An offer is basically a relation between

  - an agent,

  - a set of objects,

  - a set of property rights,

  - an audience, and

  - a set of terms and conditions.

eClassOWL

The Products and Services Ontology

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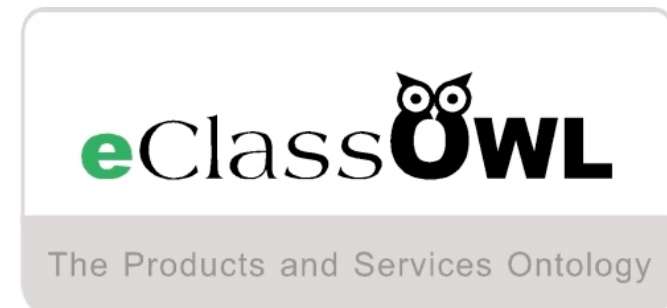
eClassOWL and GoodRelations

eClassOWL
The Products and Services Ontology

- **eClassOWL**
  foo:myTVSet instanceOf eclassowl:TVSet

GoodRelations
The Web Ontology for E-Commerce

- **GoodRelations**
  foo: MillerInc goodrelations:offersToSell foo:myTVSet

Competency Questions

CQ1: Which retrievable Web Resources describe an offer

- {to sell | to provide the service of | to repair | to maintain | to lease out | to dispose}
- {a concrete individual | some unknown individuals} of
- a {given good | given service | spare part for a given good | consumables and supplies for a given good} described by a {type of good | specific make and model}
- that meet certain requirements on {properties | intervals for properties}
- for which the offering party accepts a given method of payment and
- provides a certain method of delivery
- to {consumers | retailers}
- in a given {country | region}?

+ Upper Ontology Part

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Requirements / Features

- Support for ranges and units of measurements
- Support for all common business functions, like sell, lease, dispose, repair, etc.
- Compatible with eclassOWL and unspscOWL
- Supports all ISO 4217 currencies
- Supports defining eligible regions
- Suits both for explicit instances, product models, and anonymous instances
- Supports common delivery and shipping methods
- Supports accepted payment methods
- Offerings can be constrained to certain eligible business entities
- A warranty promise, i.e., its duration and scope can be specified
- Different prices for different types of customers or for different quantities can be expressed
- Charges for certain payment or delivery options can be specified; the latter also individually per region.
- Support for product bundles, for all kinds of units of measurements (2 kg butter + 2 cellphones for € 99 would be no problem).
- Compatible with international standards: ISO 3166, ISO 4217, UN/CEFACT, eCl@ss, and UNSPSC
- Minimal requirements on reasoner support - any RDF-S-style reasoner, OWL DLP, DL, or ter Horst reasoner will work.
- Supports price ranges, list prices, time-zones, EAN/UCC/UPC codes, GLN/ILN, and DUNS

Data, Standards, Ontologies

Ontology

Data → Web of Data → Popular Systems

Popular Exchange Standards

Proprietary Systems

Bottleneck 1: Can we derive instance data according to the structure of the ontology?
→ ideally, no manual intervention

Bottleneck 2: Can we convert instance data into common target structures?
→ sufficient level of detail for rule-based transformation

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Core Conceptual Structure

- Business Entities

- Offerings

- Products and Services

- Web Resources

Domain Capture

GoodRelations Domain Capture 01.08.2008 17:28
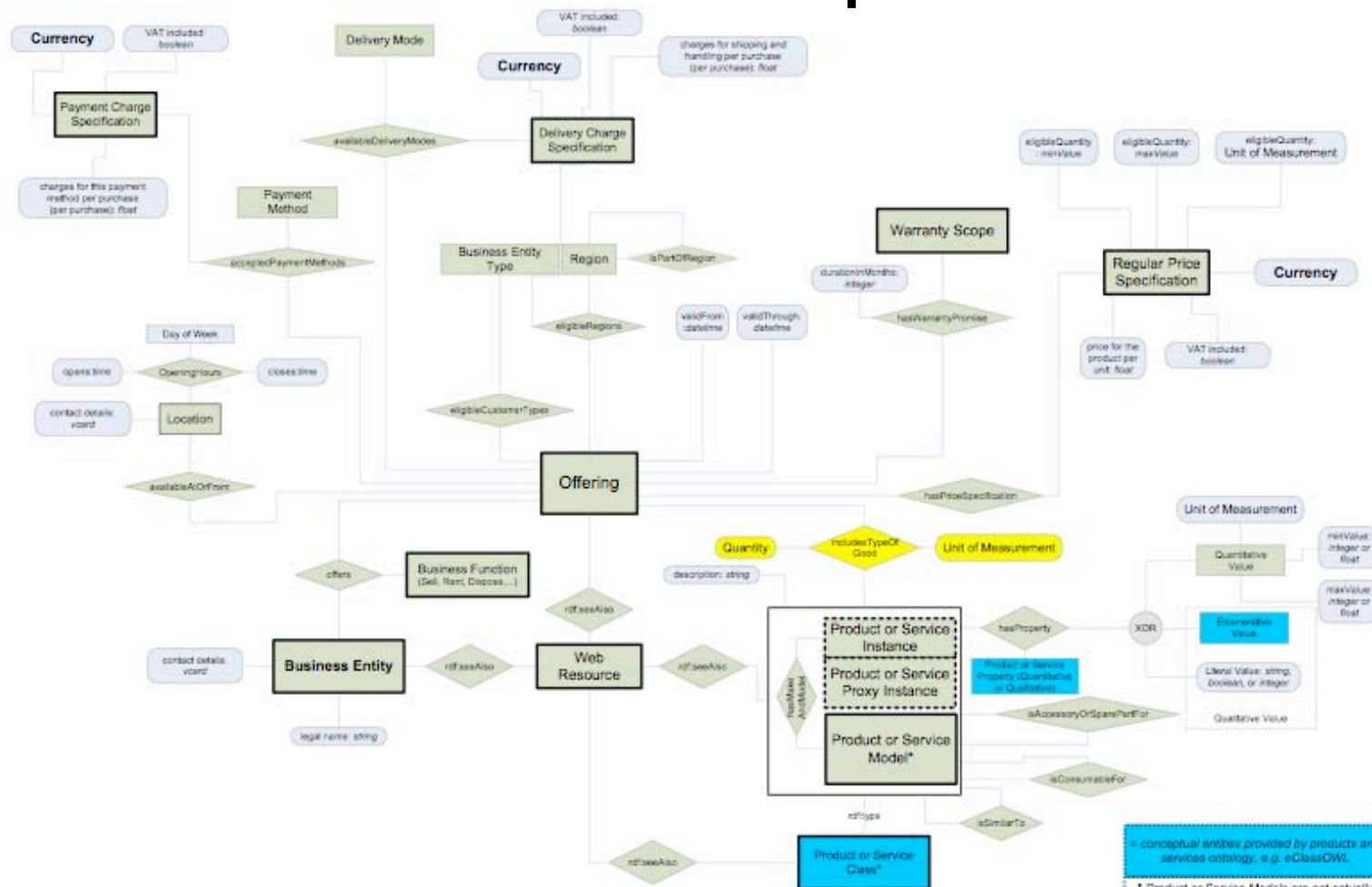
Design Considerations

- Suitable Ontology Language

- Ranges and Intervals; Datatypes

- Models, Classes, Instances

- Existential Quantification

- N-Ary Relations

- Licensing

Suitable Ontology Language

Requirements:

- Must work with Semantic Web infrastructure as available **today**

- Must work with lightweight, RDFS-style reasoners

- Combining the ontology with ontologies or knowledge bases in OWL DL should not lead to a model beyond DL (e.g. OWL Full)

- Avoid layering problems between RDFS and OWL

Approach: Use OWL DL syntax for RDF-S elements, i.e. a subset of the closure of OWL DLP:

```
owl:Ontology
owl:Class
owl:ObjectProperty
owl:DatatypeProperty
rdfs:subClassOf
rdfs:subPropertyOf
rdfs:comment
rdf:datatype
rdf:type
```

Ranges and Intervals
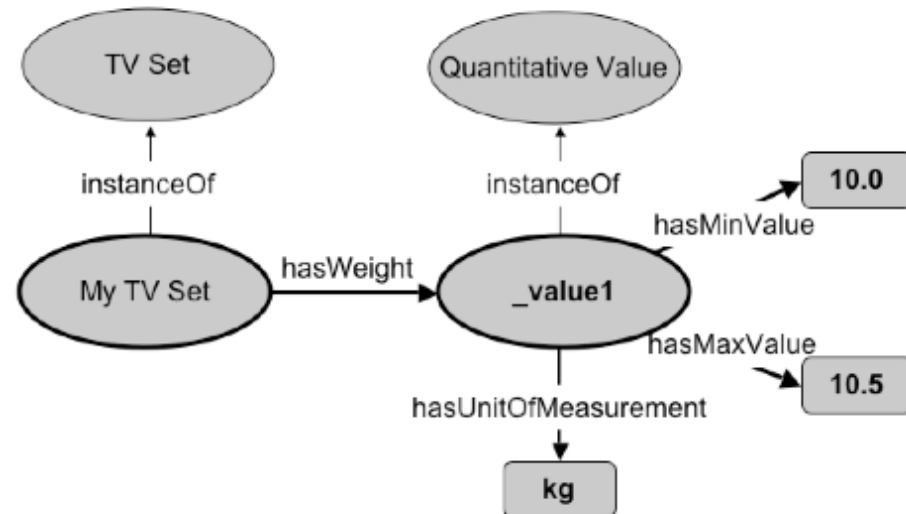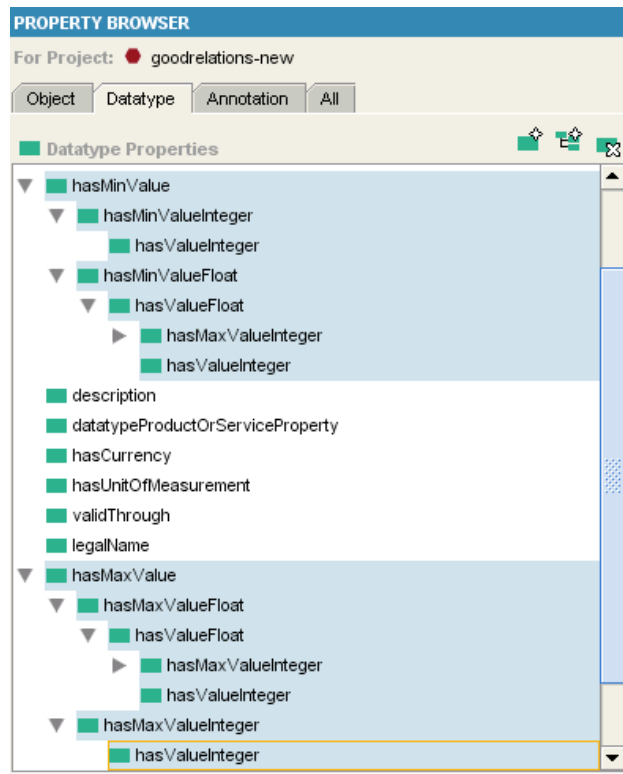
hasValue rdfs:SubPropertyOf hasMaxValue, hasMinValue

Models, Classes, Instances, and Existential Quantification
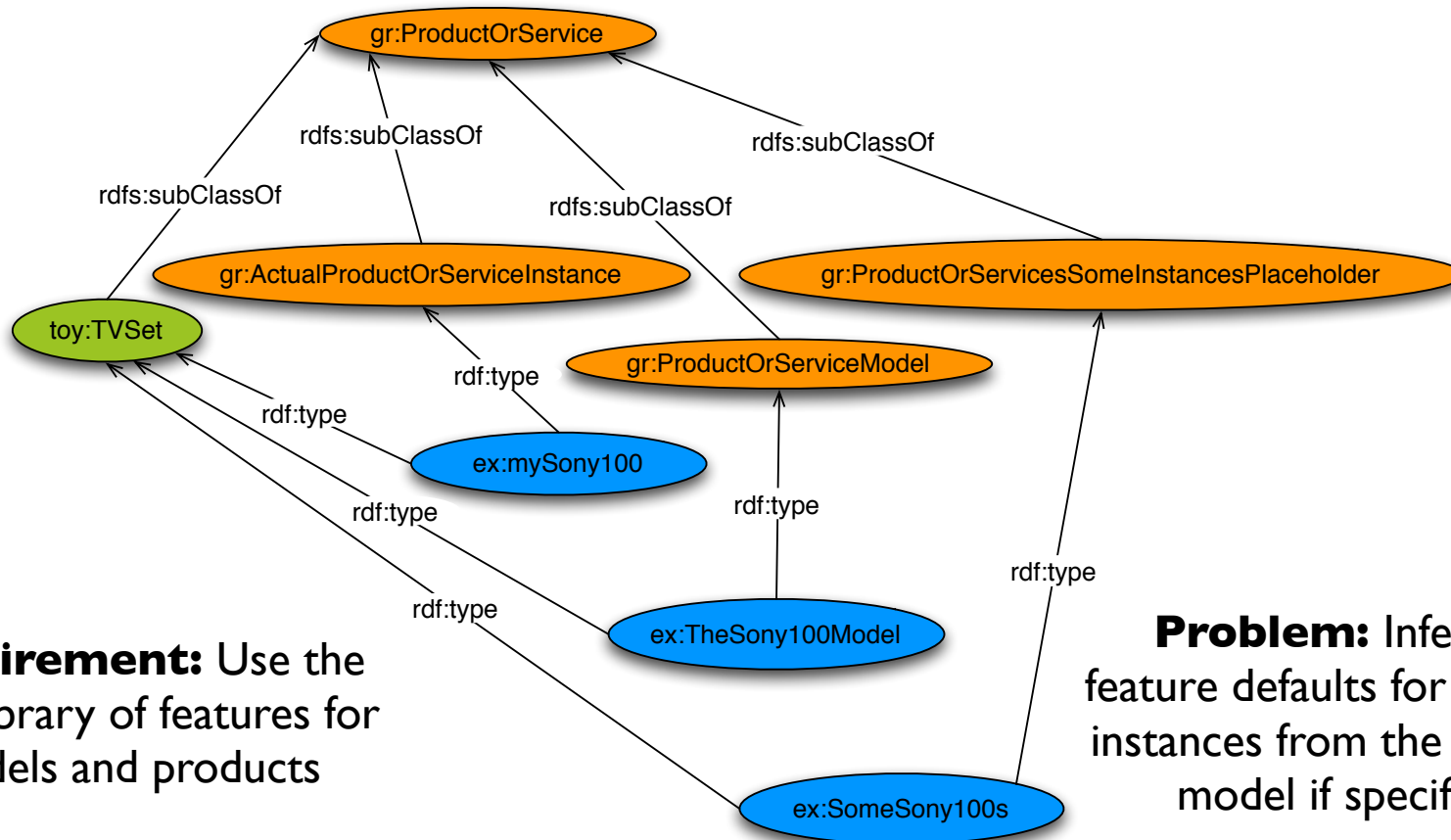
Requirement: Use the same library of features for models and products

Problem: Inferring feature defaults for product instances from the product model if specified.

Product Bundles

N-Ary Relationships

ProductOrServiceInstance

typeOfGood

Offering — includesObject — TypeAndQuantityNode — amountOfThisGood → Quantity

hasUnitOfMeasurement

Unit of Measurement
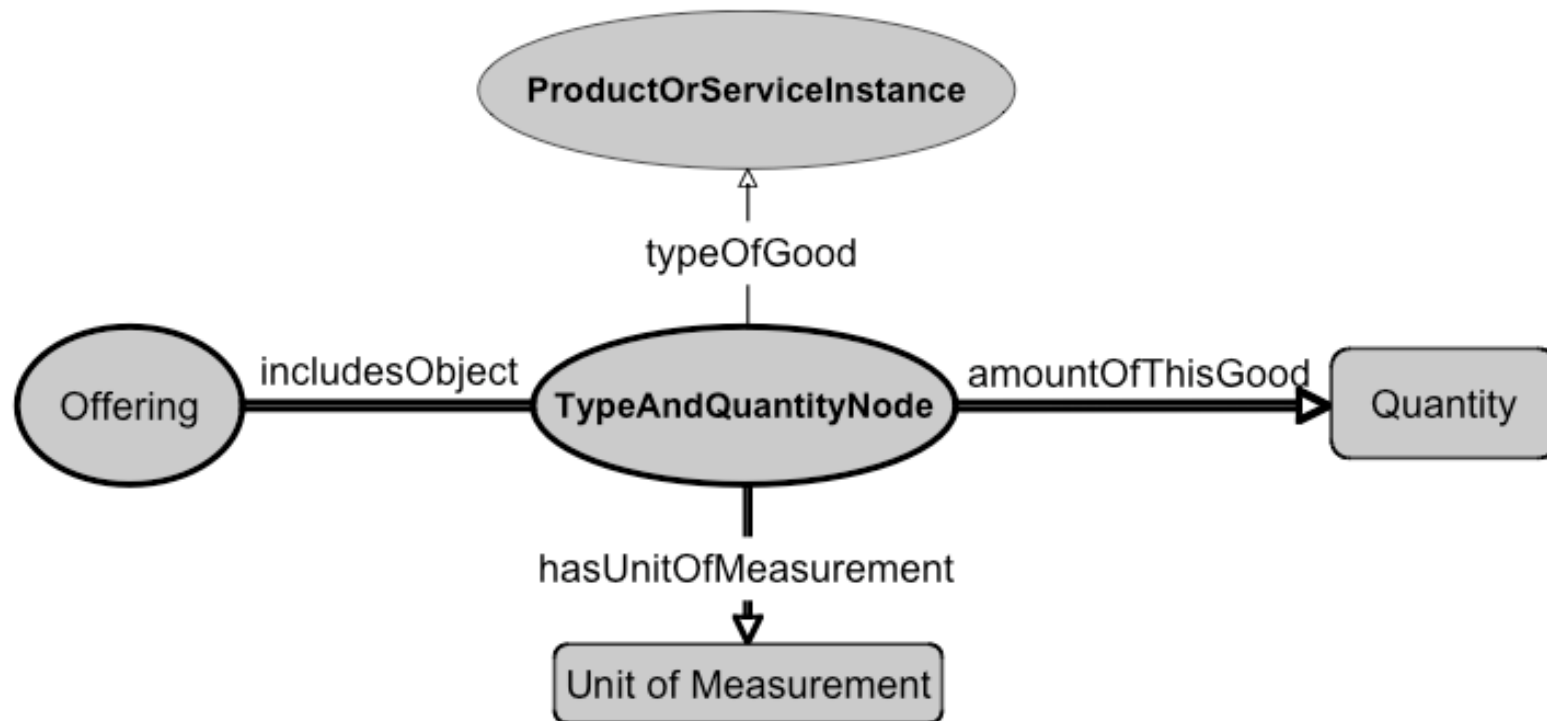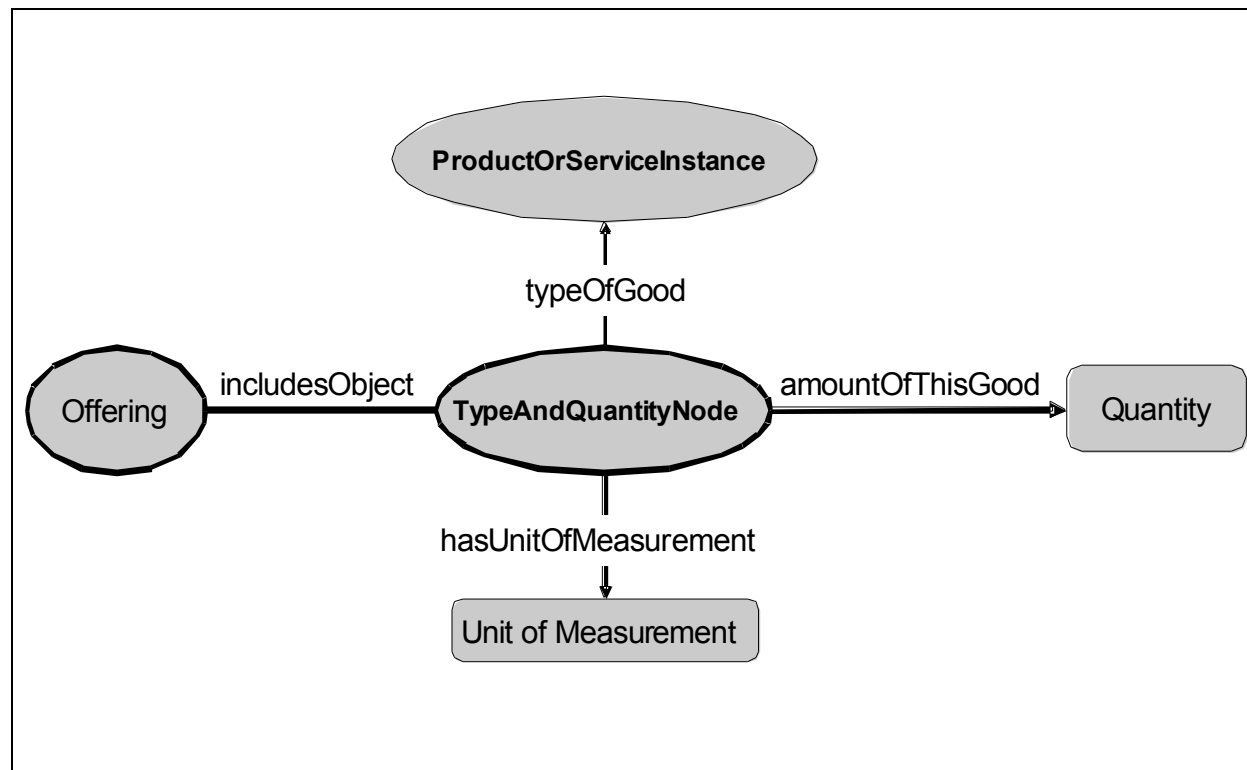
License

- **Goal:** Give adopters certainty about permanent, royalty free access to the ontology

- **Approach:** Creative Commons Attribution 3.0 license.

Reusing Existing Consensus

- Lot of pre-existing consensus

  - Countries

  - Currencies

  - Locations

- Two basic approaches for reuse

  - As ranges for literal values

  - Replication as ontological instances

Minimal Example
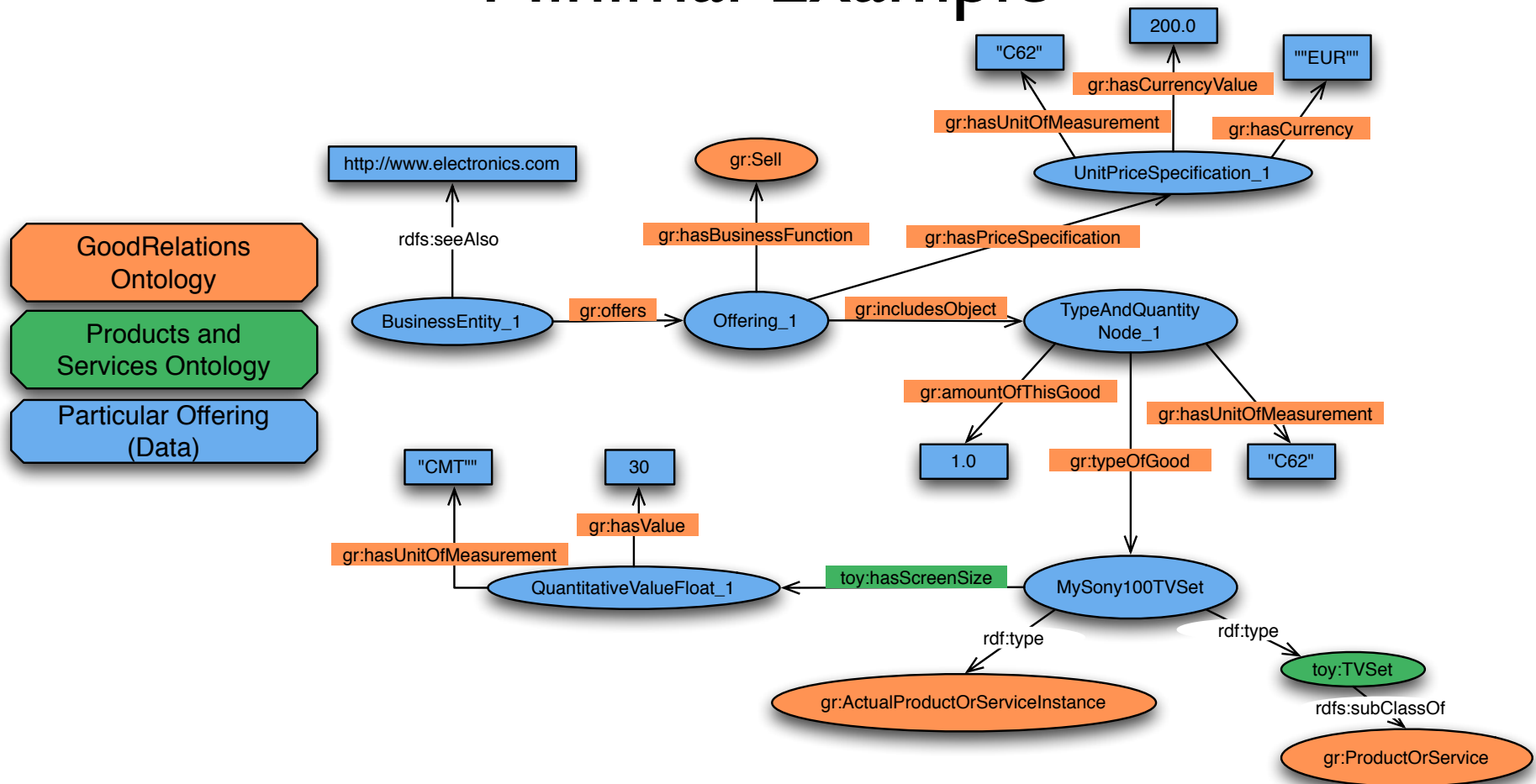
Legend:
- GoodRelations Ontology
- Products and Services Ontology
- Particular Offering (Data)

"C62"

200.0

""EUR""

gr:hasCurrencyValue

gr:hasUnitOfMeasurement

gr:hasCurrency

http://www.electronics.com

gr:Sell

UnitPriceSpecification_1

rdfs:seeAlso

gr:hasBusinessFunction

gr:hasPriceSpecification

BusinessEntity_1 — gr:offers — Offering_1 — gr:includesObject — TypeAndQuantityNode_1

gr:amountOfThisGood

gr:hasUnitOfMeasurement

1.0

gr:typeOfGood

"C62"

"CMT""

30

gr:hasValue

gr:hasUnitOfMeasurement

QuantitativeValueFloat_1 — toy:hasScreenSize — MySony100TVSet

rdf:type

rdf:type

gr:ActualProductOrServiceInstance

toy:TVSet

rdfs:subClassOf

gr:ProductOrService

Pick-up in Industry and Academia

- Smart Information Systems

- ebSemantics

- Yahoo! SearchMonkey

- Virtuose Sponger Catridges for Amazon, eBay, and others expected

- etc.

Diffusion Strategy

- Make Creating GoodRelations Data **Easy**

  - GoodRelations Annotator and Validator

  - Exporters for popular Web Shops (using Triplify)

  - Converters for Catalog Data Interchange Standards

  - Recipes and Patterns

- Make Creating GoodRelations Data **Attractive**

  - Search Engine Vendors

  - Recommender Systems

- Foster the Development of **Compatible Vocabularies**

  - eClassOWL

  - ebSemantics

  - myOntology

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Client-side Rendering vs. Content Negotiation

Discussion and Future Extensions

- Richer Axiomatisation?

  - Disjointness Axioms etc.

- Microformats Variant?

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Additional Information

- Web Page
  - Ontology
  - Language Reference
  - Primer
  - Recipes
  - Wiki

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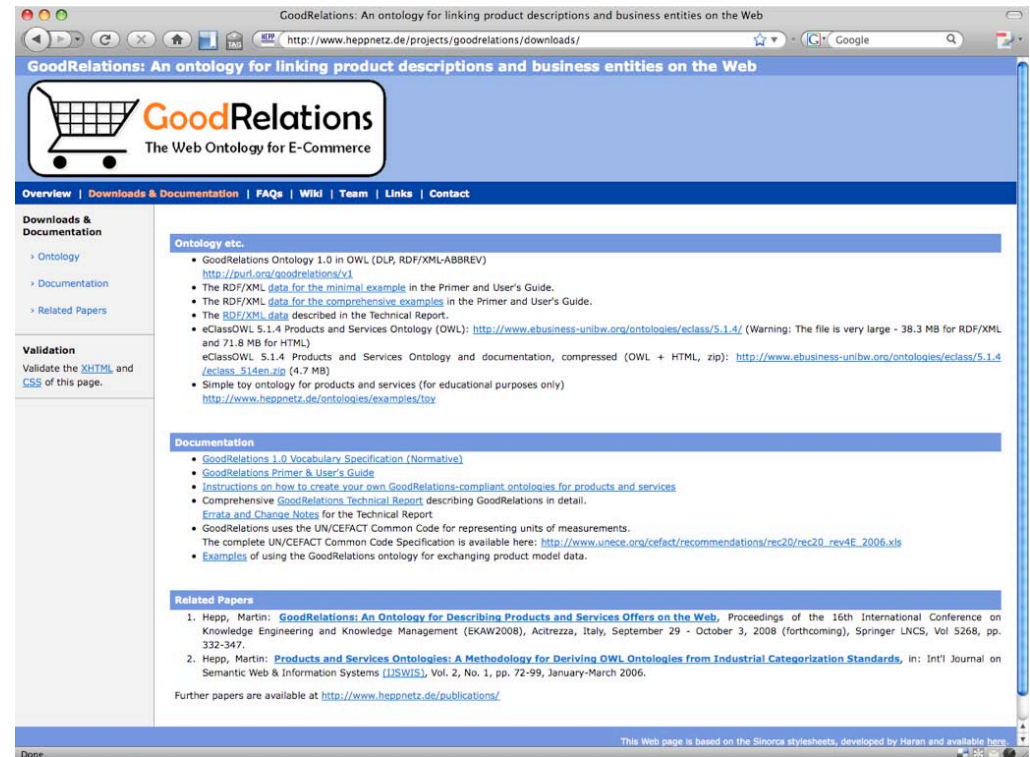
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These and other papers are available at http://www.heppnetz.de/publications/

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