Electronic Commerce:
A Killer (Application) for the Semantic Web?

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1 Semantic Web Technology

- I will skip this chapter

2 Web-based Electronic Commerce

Currently, *electronic commerce* is seriously hampered by the lack of proper standards:

- HTML does neither provide syntax and semantics of information.
- Existing standards like EDIFACT are isolated, cumbersome, and costly.

==> However, there is the largest economic potential of on-line technologies (80%).

Web-based Electronic Commerce: XML

Currently, XML takes over this market place: XML-based solutions for B2B have the following advantages:

- Understandability, i.e., human readability,
- Integration in other document exchanges,
- Maintenance is cheaper,
- and general tool support developed for all document processes can be applied to B2B EC.

2.1 Web-based Electronic Commerce: Business Documents and Product Catalogues

- ebXML provides a comprehensive set of standardized XML document formats, allowing buyers, suppliers, and service providers to integrate their existing systems into electronic marketplaces.
- xCBL provides a comprehensive set of standardized XML document formats, allowing buyers, suppliers, and service providers to integrate their existing systems into electronic marketplaces.
- cXML provides a comprehensive set of standardized XML document formats, allowing buyers, suppliers, and service providers to integrate their existing systems into electronic marketplaces.

Web-based Electronic Commerce: Business Documents and Product Catalogues

- For example, the cXML standard contain one single 46 KB DTD to specify 27 documents used for B2B information exchange.
- The xCBL standard provides automation for the same business processes, but offers 594 DTDs with total size of 571 Kb to specify up to 40 documents.
- ... and there are much more.

2.2 Web-based Electronic Commerce: Product Standards

- UNSPSC: A five level hierarchy of around 15,000 concepts to classify products.
- UCEC: It enriches UNSPSC by attributes to describe products.
- ecl@ss: An alternative descriptive classification, however, mainly used in Europe only.
- RossettaNet
- ... and there are much more vertical and horizontal standards.

2.3 Web-based Electronic Commerce: Company Descriptions

- UDDI: The Universal Description, Discovery and Integration (UDDI) project creates a framework for describing services, discovering businesses, and integrating business services using the Internet.[1]

- WSDL: The Web Service Description Language is an XML format for describing interfaces to business services registered with a UDDI database.

1. Microsoft, IBM, Ariba

2.4 Web-based Electronic Commerce: Open Problems

- There are more “standards” than you would like to have.

==> Serious translation effort to make E-Commerce working.

- All of these “standards” are based on semi-formal descriptions of content.

==> Identification of products, services, and the execution of business processes require the human in the loop.

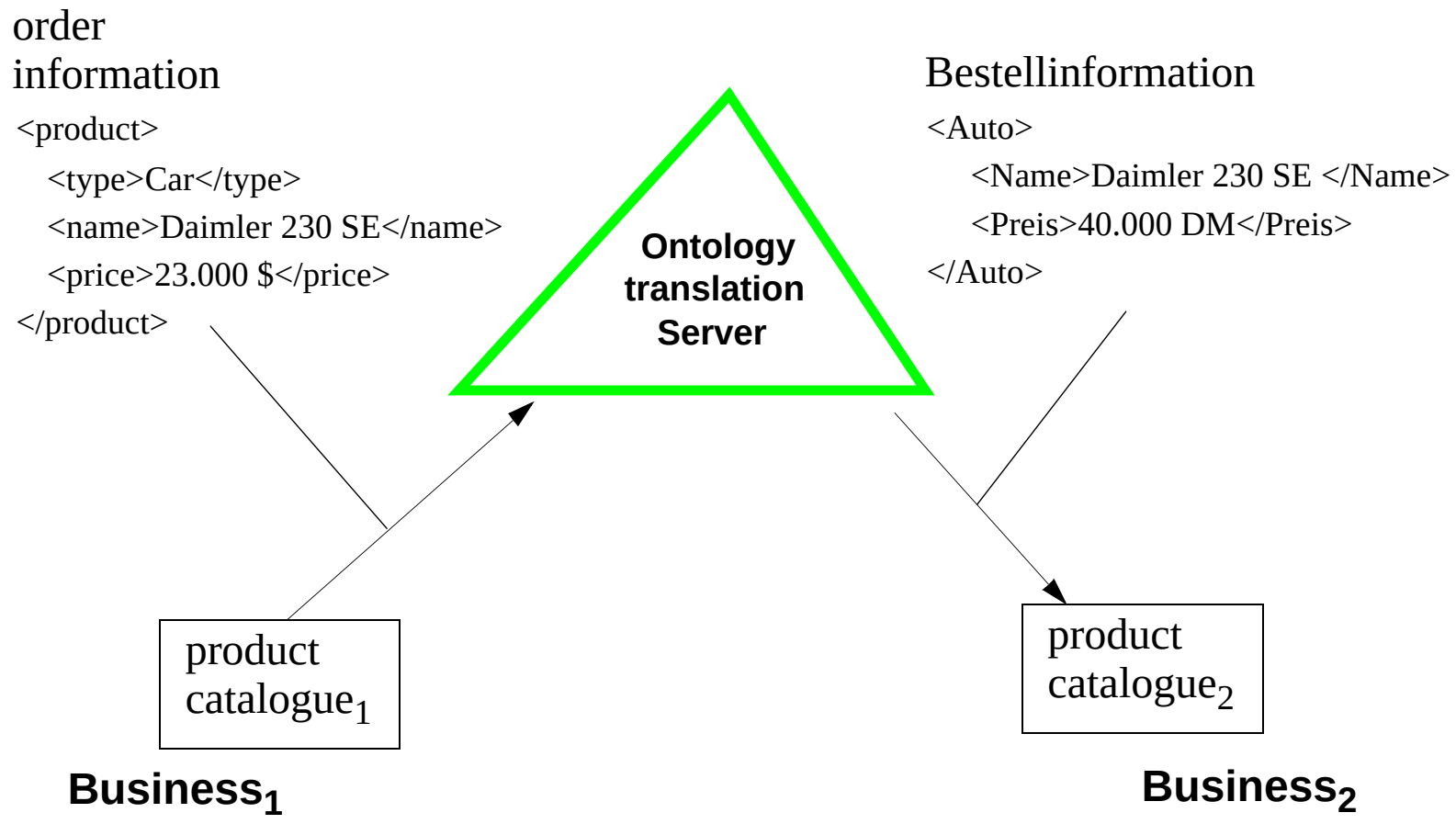
3 Semantic Web and Electronic Commerce

Currently many people in E-commerce view XML as the end of the process.

However, there are two angels where semantic web technology beyond XML can provide a significant contribution:

- Mapping between different “standards”, i.e., dealing with the problem of lacking standardization.
- Automizing business processes based on the formal semantics of descriptions.

3.1 Semantic Web and Electronic Commerce: Mapping and Integration

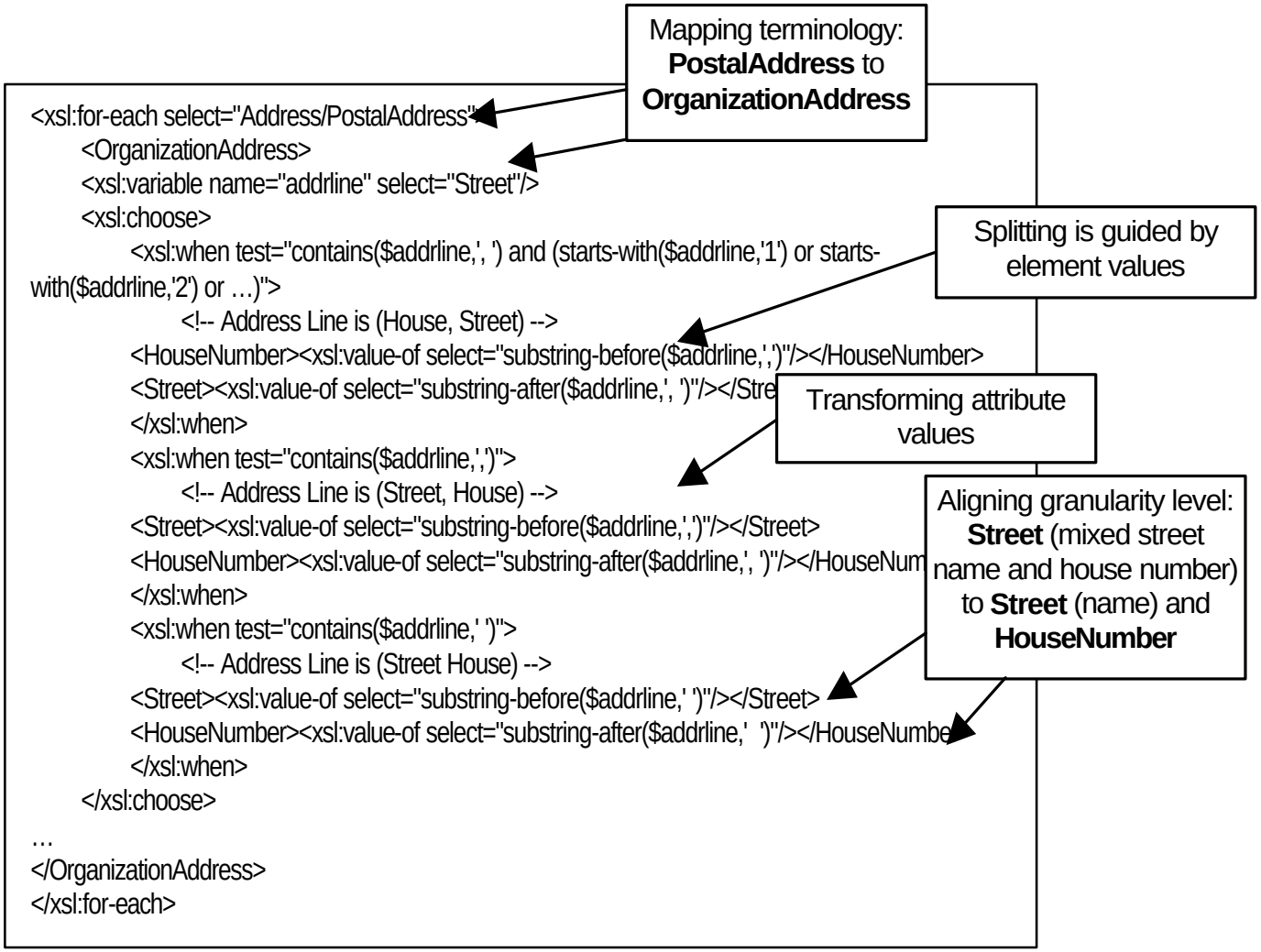


Semantic Web and Electronic Commerce: Mapping and Integration

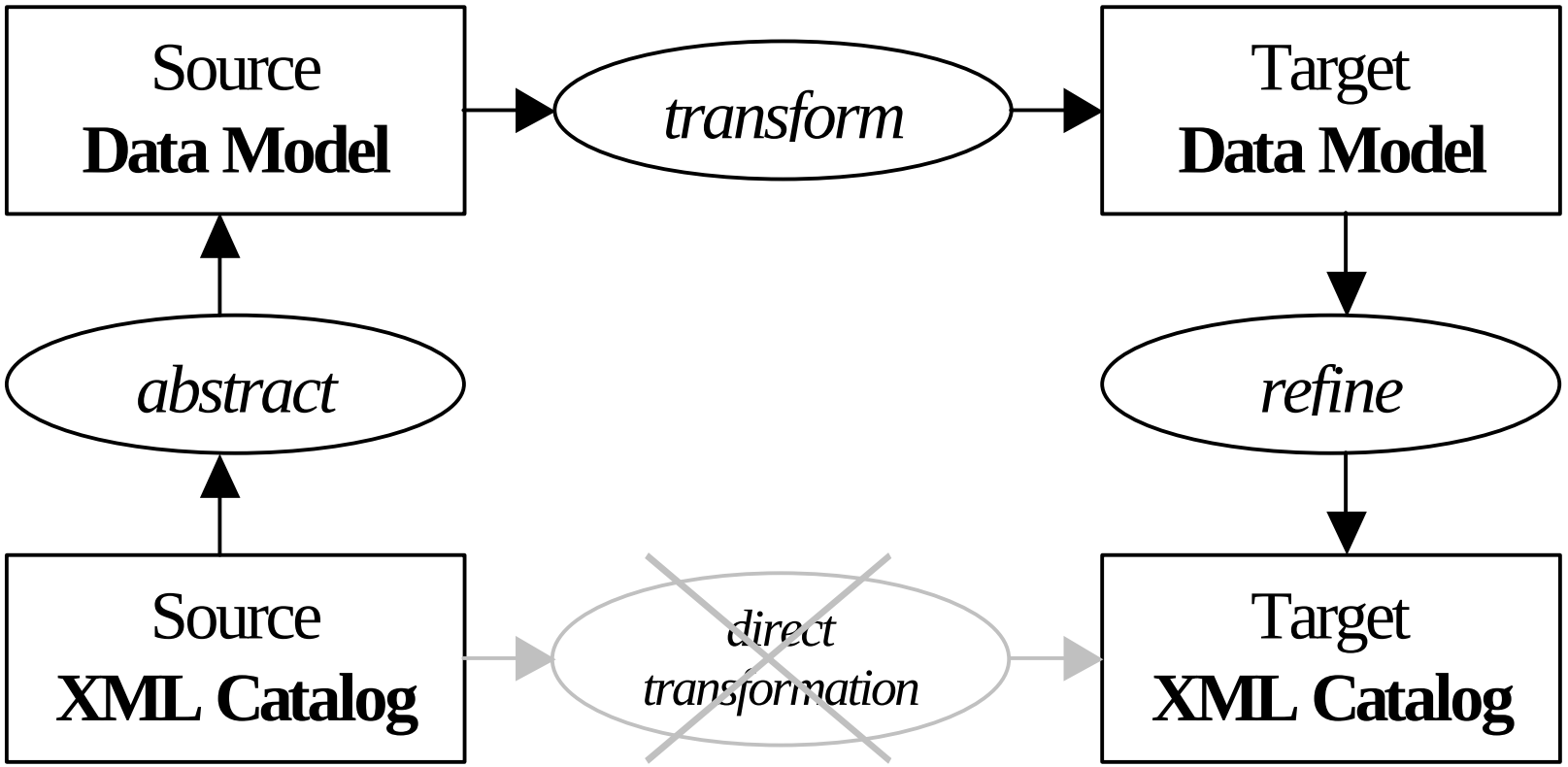
- It would be naturally to write XSL-T rules to translate between various formats required by B2B market place.
- However, XSL-T Mapping rules become highly complex.
  - Difficult and expensive to program
  - Difficult and expensive to maintain
  - Nearly no reuse of implemented mappings.

==> This is caused by the fact, that these direct mappings interweave several different aspects into one transformation step.

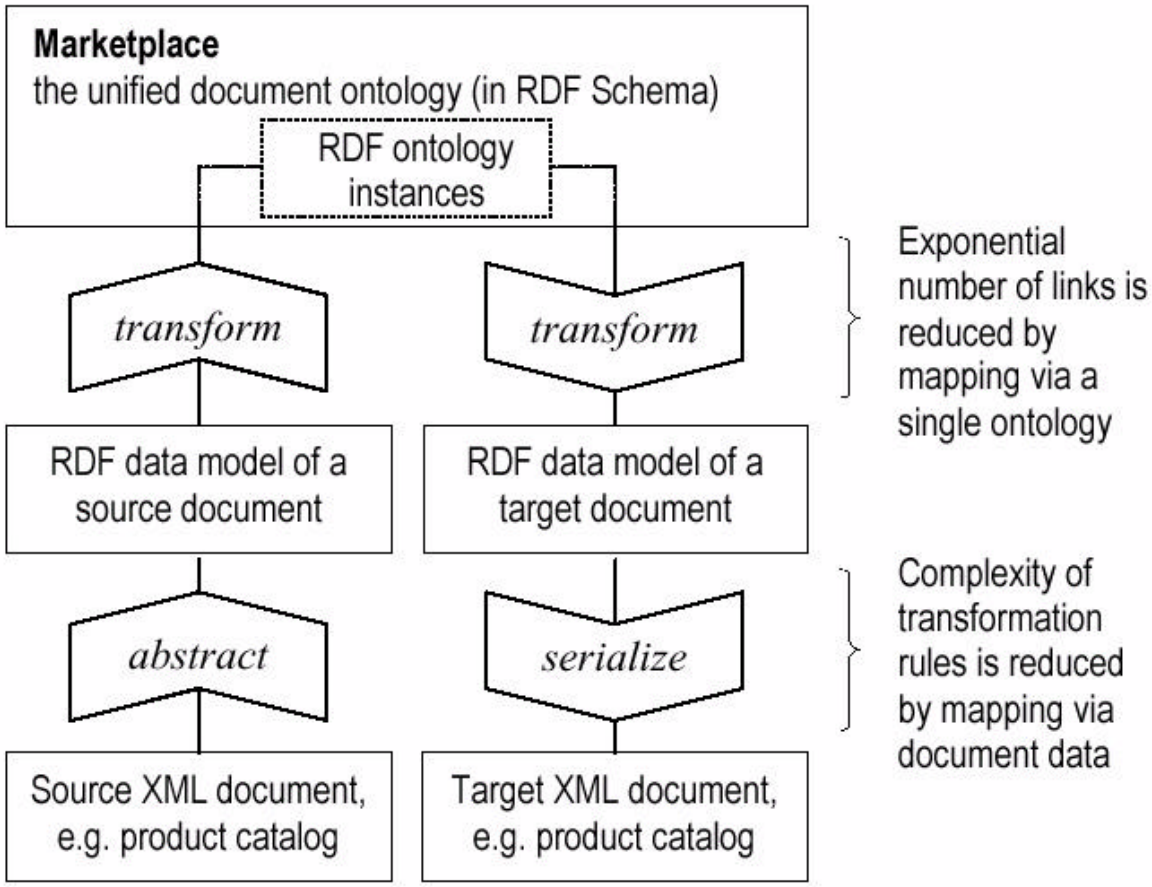
Semantic Web and Electronic Commerce: Mapping and Integration



Semantic Web and Electronic Commerce: Mapping and Integration



Semantic Web and Electronic Commerce: Mapping and Integration



Semantic Web and Electronic Commerce: Mapping and Integration

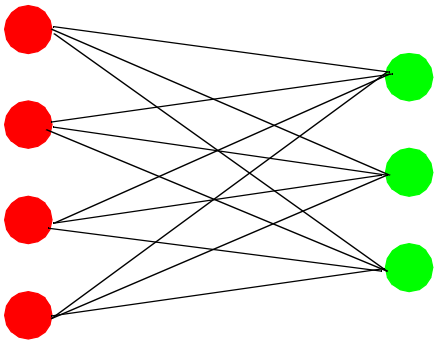
- We abstract from syntactical XML variations and extract the information provided by the document.
- The information mapping is executed at the RDF and RDF Schema level.
- The simple object, property, value data model of RDF is used to represent the information.

==> Complex XSL-T rules are replace by a short sequence of simple and reusable mapping rules.

==> We are currently developing and implementing RDFS-T to express these mappings.

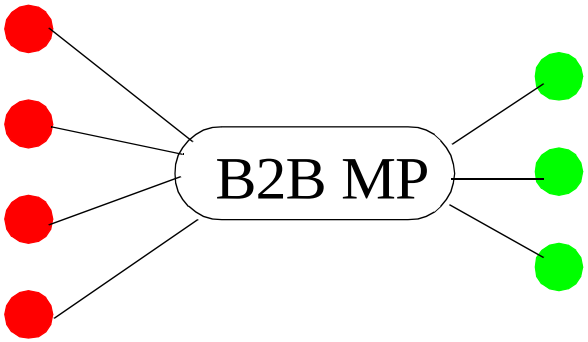
Semantic Web and Electronic Commerce: Mapping and Integration

Direct communications between *m* suppliers and *n* customers = *n* * *m* mappings.



Chaos ... and ...

Mediated communications between *m* suppliers and *n* customers = *n* + *m* mappings.



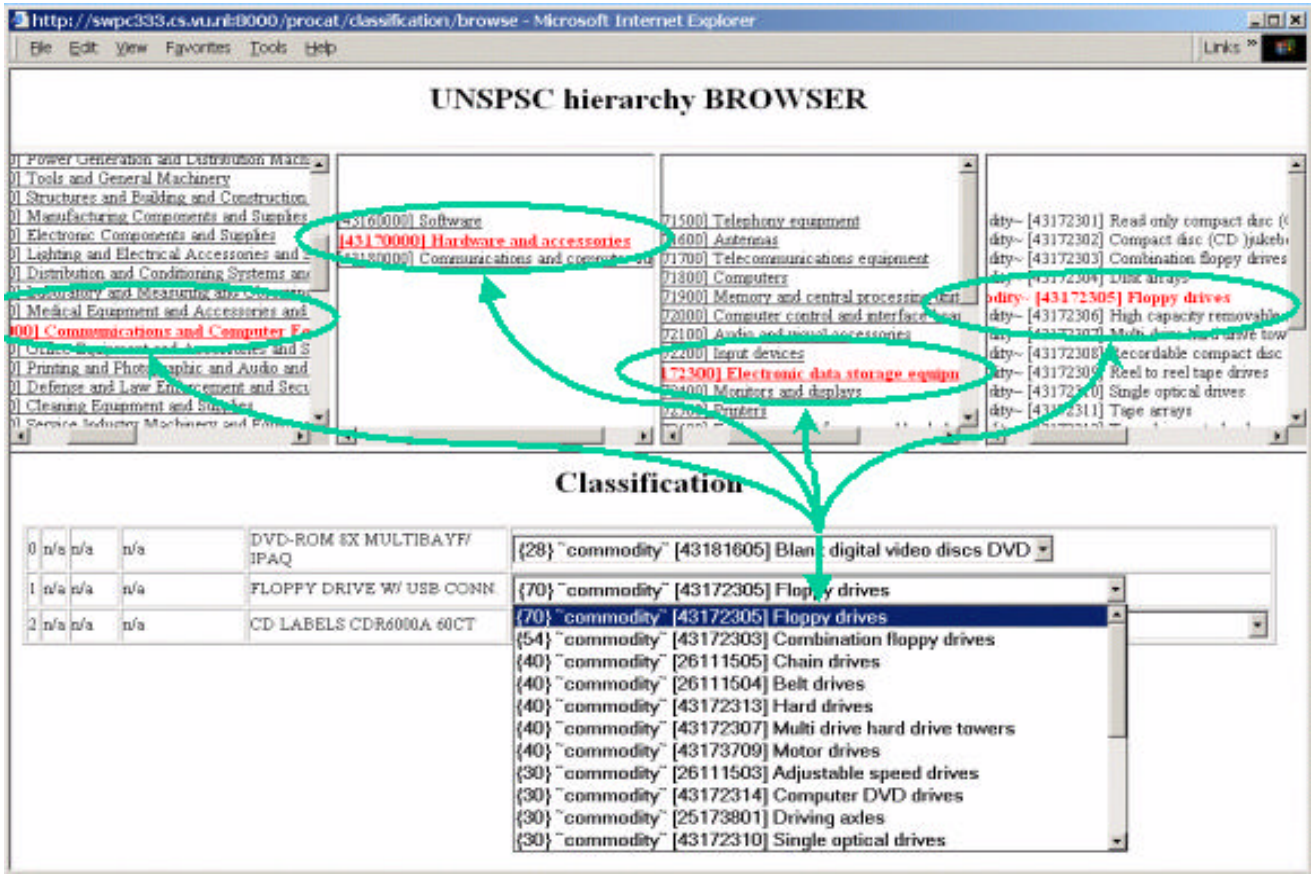
... order

- RDF Schema is used to represent an intermediate ontology.

==> It reduces the number of mappings from n*m to n+m.

Semantic Web and Electronic Commerce: Mapping and Integration

GoldenBullet



3.2 Semantic Web and Electronic Commerce: Mechanization

- Currently all elements of Ecommerce are based on using XML to semi-structure natural language descriptions.
- Description of Products, Services, and Vendors are not machine processable and require the human in the loop.

==> This seriously limits the potential use of Ecommerce.

==> Semantic Web technology beyond XML can make it to a different story.

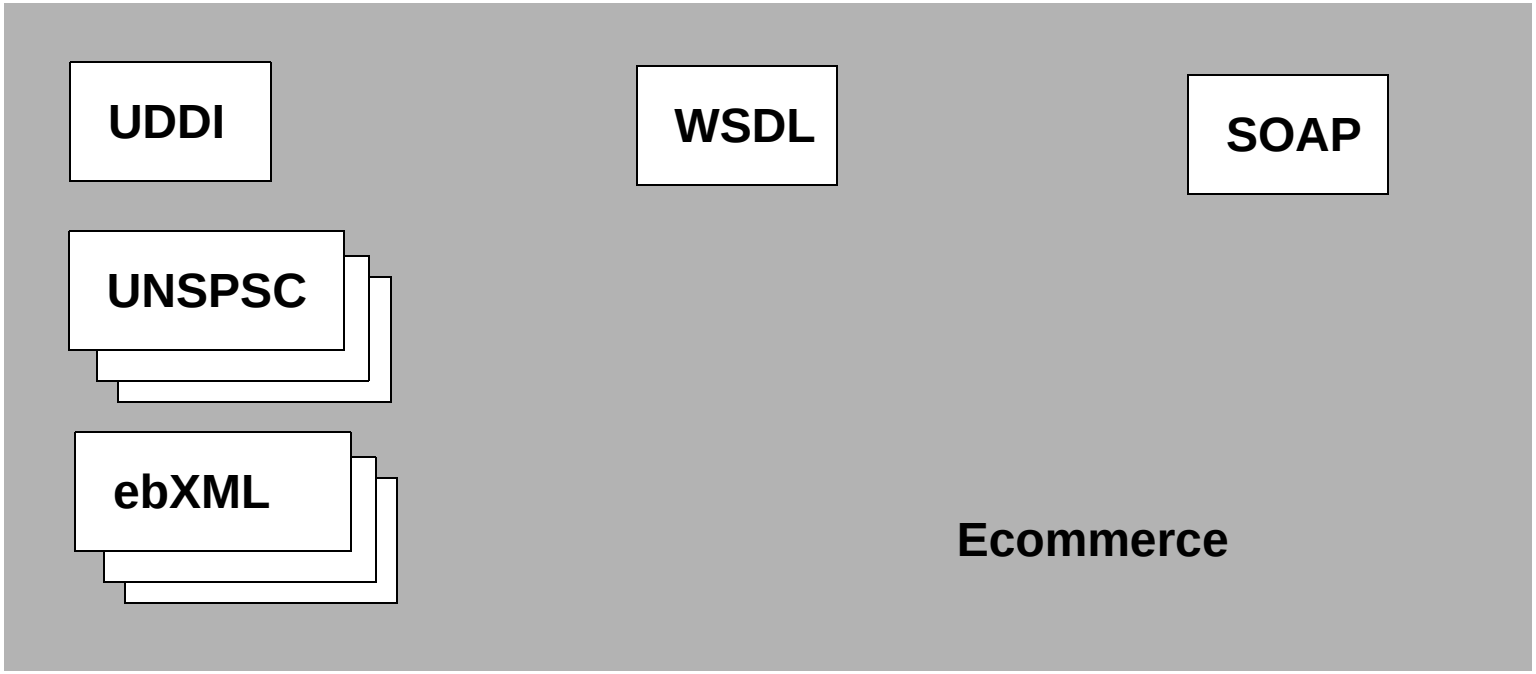
Semantic Web and Electronic Commerce: Mechanization

Services offered by advanced semantic web technology:

- Automatic vendor recognition.
- A*utomatic product and service recognition.*
- *Price and quality comparison.*
- Automatic negotiation protocols.
- Automated coalition forming of vendor groups.

Semantic Web and Electronic Commerce: Mechanization

Semantic-Web enabled Ecommerce:
Automated support in product and service recognition, vendor selection, virtual enterprise formulation, information transformation and mapping, and automized price negotiation.



4 Conclusions

- Currently, semantic web technology beyond XML cannot provide many applications.
- Most of them are topic map like stuff in information access, i.e., in knowledge management.
- The web used in Ecommerce is completely organized around XML.
- This is a danger for the semantic web, however, there is also an interesting challenge.
- Automatization in business processes and efficient integration service require semantic web technology beyond XML.