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- Methodological Guidelines for Ontology Specification
- Quick Search of Existing Knowledge Resources
- Guidelines for Ontology development project Planning
- Methodological Guidelines for Non Ontological Resource Reuse and Reengineering
- Methodological Guidelines for Ontology Reuse
- Creating the final Ontology Model

Ontology Specification.

SEEMP Ontology Requirement Specification Document

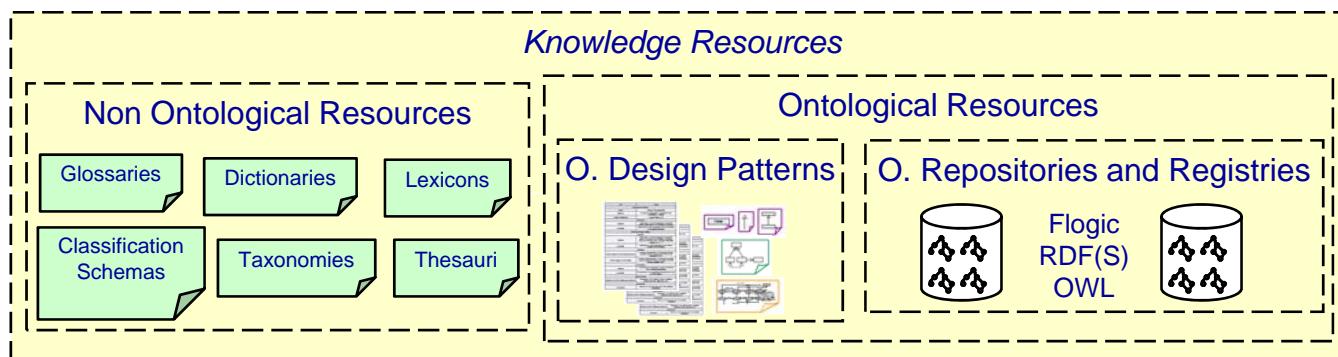


SEEMP Reference Ontology Requirements Specification																																														
1 Purpose	The purpose of building the Reference Ontology is to provide a consensual knowledge model of the employment domain that could be used by public e-Employment services (PES).																																													
2 Scope	The ontology has to focus just on the ICT (Information and Communication Technology) domain. The level of granularity is directly related to the competency questions and terms identified.																																													
3 Level of Formality	The ontology has to be implemented in WSML language																																													
4 Intended Users	User 1. Candidate who is unemployed and searching for a job or searching another occupation for immediate or future purposes User 2 User 3																																													
5 Intend	User 4. User 5. 7 Pre-Glossary of Terms <table border="1"> <thead> <tr> <th>Terms</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>a. Job Seeker</td><td>27</td></tr> <tr><td>b. CV</td><td>2</td></tr> <tr><td>c. Personal Information</td><td>3</td></tr> <tr><td>d. Name</td><td>5</td></tr> <tr><td>e. Gender</td><td>1</td></tr> <tr><td>f. Birth date</td><td>1</td></tr> <tr><td>g. Address</td><td>2</td></tr> <tr><td>h. Nationality</td><td>1</td></tr> <tr><td>i. Contact (phone, fax, mail)</td><td>4</td></tr> <tr><td>j. Objective</td><td>3</td></tr> <tr><td>k. Job Category</td><td>6</td></tr> <tr><td>l. Job Offer</td><td>27</td></tr> <tr><td>m. Employer Information</td><td>1</td></tr> <tr><td>n. Vacancy</td><td>1</td></tr> <tr><td>o. Activity Sector</td><td>1</td></tr> <tr><td>p. Location</td><td>3</td></tr> <tr><td>q. Work Condition</td><td>3</td></tr> <tr><td>r. Contract Type</td><td>3</td></tr> <tr><td>s. Salary</td><td>3</td></tr> <tr><td>t. Education</td><td>3</td></tr> <tr><td>u. Work Experience</td><td>3</td></tr> </tbody> </table>		Terms	Frequency	a. Job Seeker	27	b. CV	2	c. Personal Information	3	d. Name	5	e. Gender	1	f. Birth date	1	g. Address	2	h. Nationality	1	i. Contact (phone, fax, mail)	4	j. Objective	3	k. Job Category	6	l. Job Offer	27	m. Employer Information	1	n. Vacancy	1	o. Activity Sector	1	p. Location	3	q. Work Condition	3	r. Contract Type	3	s. Salary	3	t. Education	3	u. Work Experience	3
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6 Groups of Competency Questions		
CQG1. Job Seeker (16 CQ)	CQ1. What is the Job Seeker Name? CQ2. What is the Job Seeker nationality? CQ3. When is the Job Seeker birthdate? CQ4. What is the Job Seeker contact information? CQ5. What is the Job Seeker current job? CQ6. What is the Job Seeker desired job? CQ7. What are the Job Seeker desired working conditions? CQ8. What kind of contract does the Job Seeker want? Job Seeker	CQ9. How much salary does the Job Seeker want to earn? CQ10. What is the Job Seeker education level? CQ11. What is the Job Seeker work experience? CQ12. What is the Job Seeker knowledge? CQ13. What is the Job Seeker expertise? CQ14. What are the Job Seeker skills? CQ15. What publications does the Job Seeker have? CQ16. What hobbies does the Job Seeker have?
CQG2. Job Offer (10 CQ)	CQ17. What is the employer information? CQ18. What kind of job does the employer offer? CQ19. What kind of contract does the employer offer? CQ20. How much salary does the employer offer? CQ21. What is the economic activity of the employer? Job Offer	CQ23. What is the work condition of the job offer? CQ24. What is the required education level for the job offer? CQ25. What is the required work experience for the job offer? CQ26. What is the required knowledge for the job offer?
CQG3. Objects (28 CQ)	Objects in the universe of discourse, which are instances of: <ul style="list-style-type: none"> Job Category <ul style="list-style-type: none"> O1. Computer System Designer O2. Computer System Analyst O3. Programmer O4. Computer Engineer O5. Computer Assistant O6. Computer Equipment Operator O7. Industrial Robot Controller O8. Telecommunication Equipment Operator O9. Medical Equipment Operator O10. Electronic Equipment Operator O11. Image Equipment Operator Nationality <ul style="list-style-type: none"> O12. Austrian O13. Belgian O14. Danish O15. Estonian O16. Finnish O17. French O18. German O19. Greek O20. Italian Activity Sector <ul style="list-style-type: none"> O21. Telecommunication O22. Justice and Judicial O23. Public Security and law O24. Manufacture of machine tools O25. Research and Development O26. Hardware Consultancy O27. Software Consultancy and Supply O28. Data processing 	<ul style="list-style-type: none"> Education <ul style="list-style-type: none"> O29. Life Science O30. Mathematics O31. Computer Science O32. Computer Use O33. Statistics O34. Physics O35. Network Administration Languages <ul style="list-style-type: none"> O36. Swedish O37. Spanish O38. Slovenian O39. Portuguese O40. English O41. French O42. German Currency <ul style="list-style-type: none"> O43. Euro O44. Krone O45. Great British Pound O46. Złote O47. US Dollar O48. Franc Location <ul style="list-style-type: none"> O49. Austria O50. Belgium O51. Denmark O52. Estonia O53. Finland O54. France O55. Germany O56. Greece

Searching Resources

- Use the terminology from the ORSD
- Find resources covering the terminology

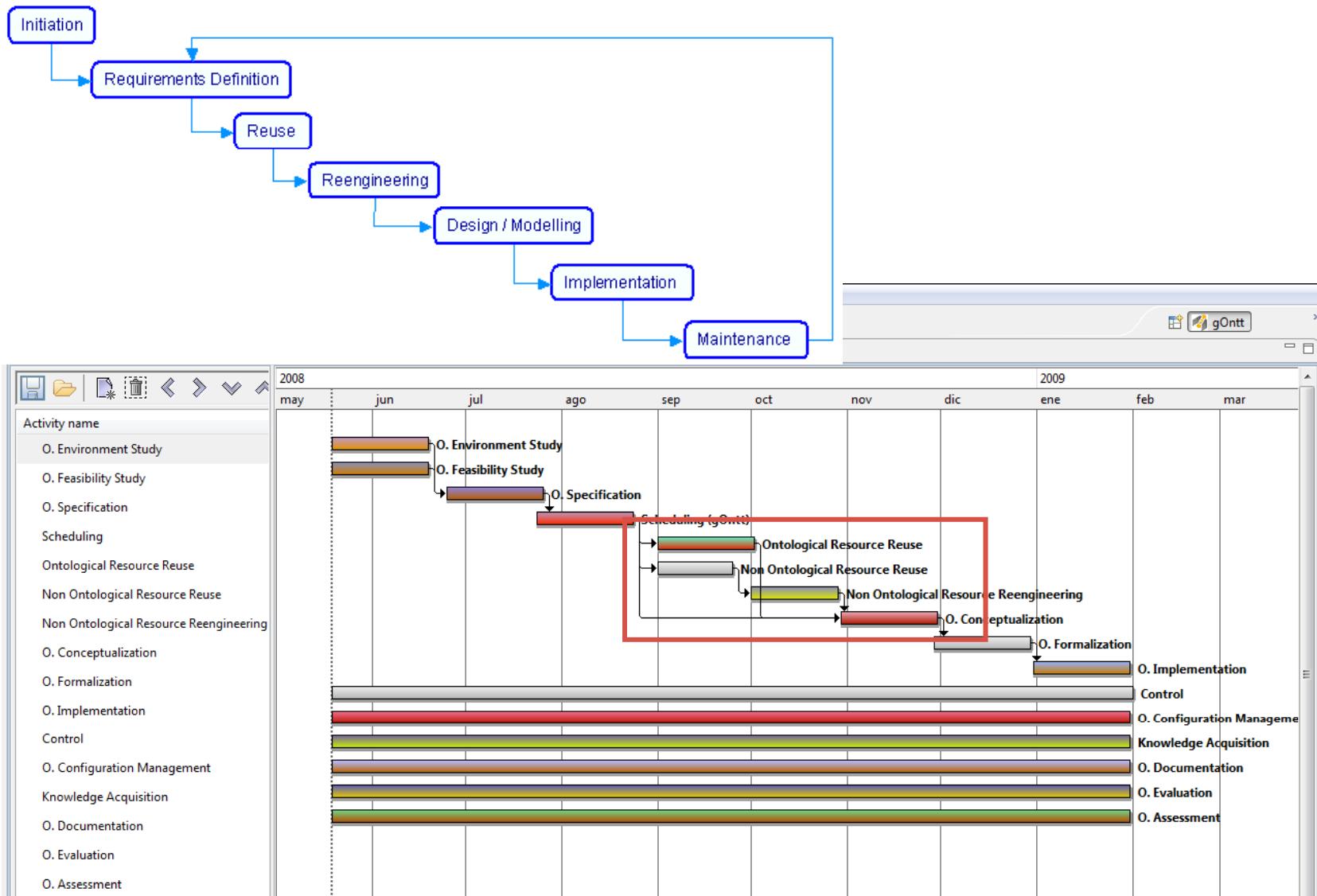


Objects
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- Where:
 - Internet
 - Standardization bodies (ISO,...)
 - Intranet of the organization
 - Ontology Registries



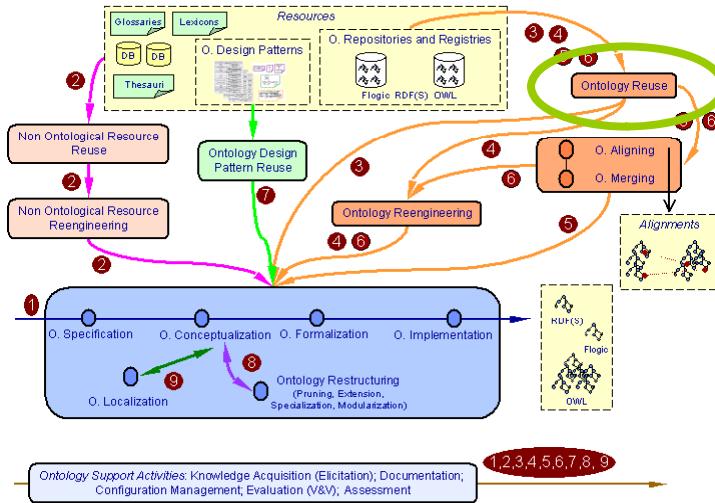
Reuse and Re-engineering + Waterfall



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Ontological Resource Reuse Process

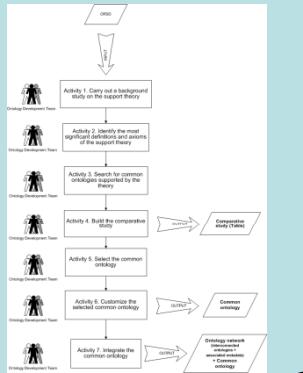
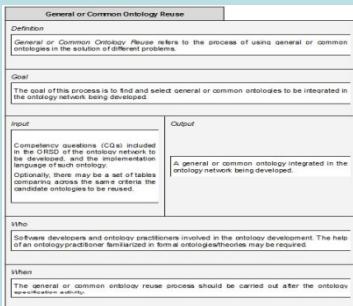


- **Ontological Resource Reuse** is defined as the process of using available ontological resources (ontologies, modules, statements) in the solution of different problems.

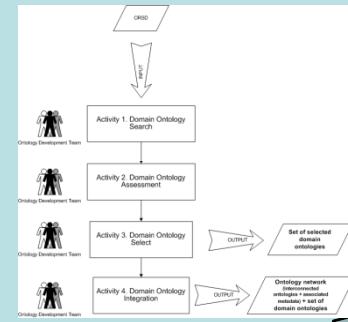
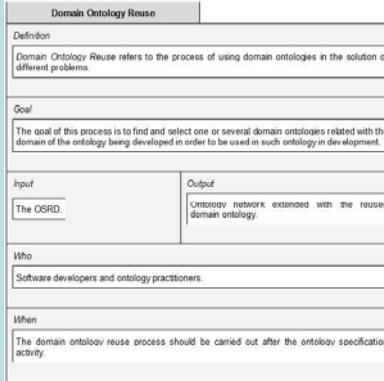


Detailed descriptions in D5.4.1

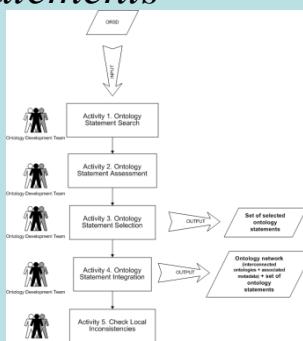
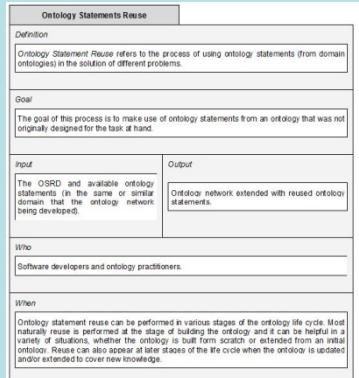
Reuse Common Ontologies



Reuse Domain Ontologies

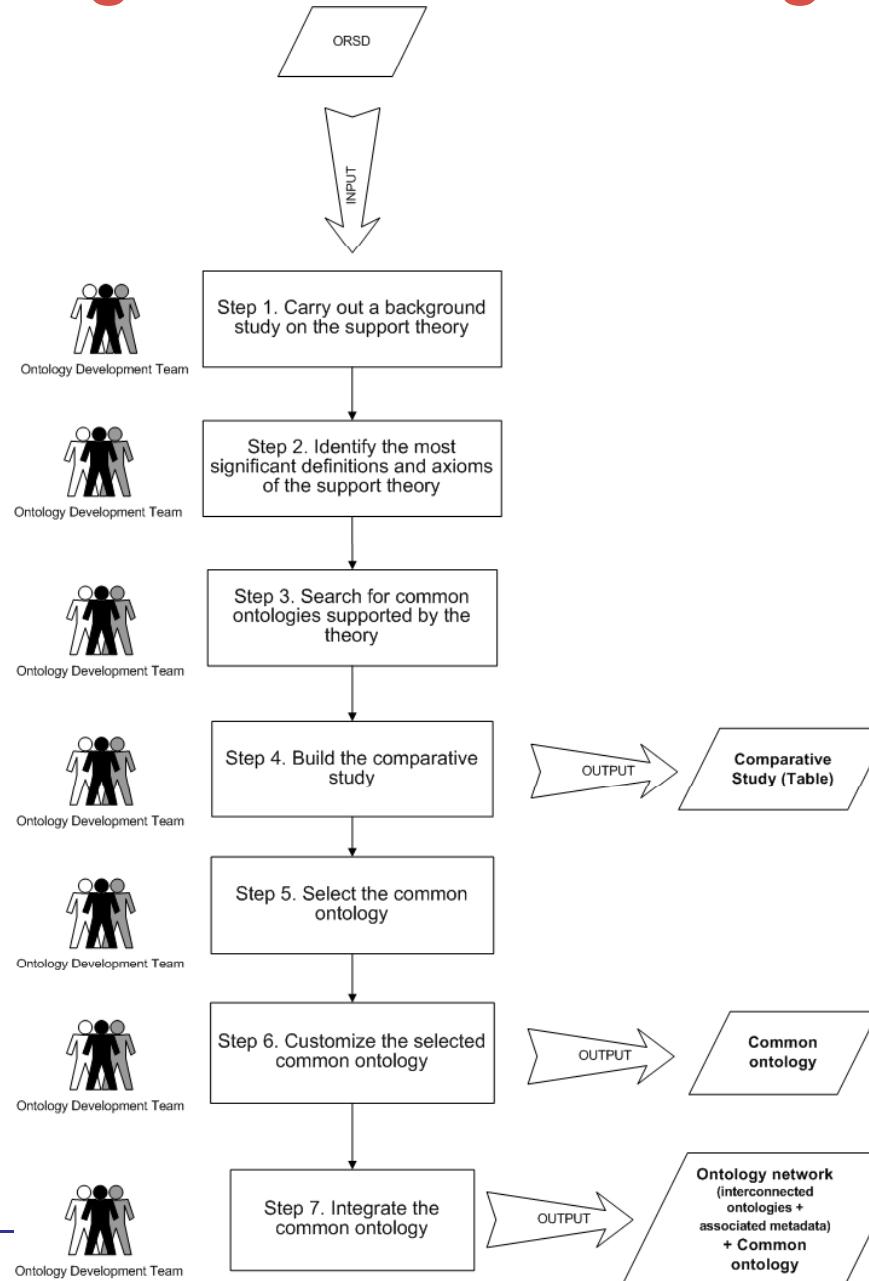
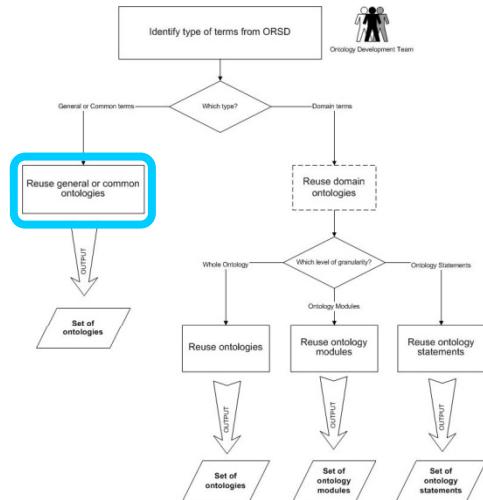


Reuse Ontology Statements



Watson plug-in

Reusing Common Ontologies



3 examples:

- SEEMP Project
- Invoice Use Case
- Nomenclature Use Case

Reusing Common Ontologies. Identification of Features

Steps 1 and 2. Carry out background study and identification of features.



Time Points	Distinction between open and closed intervals
Time Interval	Explicit modeling of proper intervals
Absolute and Relative Time	Concatenation of intervals
Relations between time intervals	Different temporal granularities
Convex and non convex intervals	

Reusing Common Ontologies.

Comparative Study

Step 3 and 4. Search for common ontologies and build the comparative table.

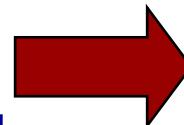
	Cyc's Upper Ontology	Unrestricted Time Ontology	Simple Time Ontology	Reusable Time Ontology	Kestrel Time Ontology	SRI's Time Ontology	SUMO Time Ontology	DAML Time Ontology	AKT Time Ontology
Time Points	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time Interval	✓				✓	✓	✓	✓	✓
Absolute and Relative Time			✓	✓				✓	✓
Relations between time intervals					✓		✓	✓	
Convex and non convex intervals				✓				✓	
Distinction between open and closed intervals				✓			✓	✓	
Explicit modeling of proper intervals								✓	
Concatenation of intervals								✓	
Different temporal granularities	✓					✓	✓	✓	✓
Provides axioms		✓	✓	✓			✓	✓	

Reusing Common Ontologies.

Ontology Selection

Step 5. Select a common ontology:

- Checking which temporal properties are needed for answering the Competency questions
 - a. When the job seeker completed his/her first degree?
 - b. Is the job seeker older than 30 years?
 - c. How much time did the job seeker spend completing his/her first degree?
 - d. How long is the duration of the contract?
 - e. Which job offers were posted in last 24 hours?
 - f. Which job offers were posted in last 7 days?
 - g. Which job offers were posted in last month?
 - h. Was the job seeker unemployed?
 - i. Was the job seeker a student between 1995 and 2000?



Time Points	a
Time Interval	b, c
Absolute and Relative Time	a,d,f,g
Relations between time intervals	
Convex and non convex intervals	h
Distinction between open and closed intervals	a,d,f,g
Explicit modeling of proper intervals	i
Concatenation of intervals	
Different temporal granularities	a,d,f,g

Reusing Common Ontologies.

Ontology Selection

	Cyc's Upper Ontology	Unrestricted Time Ontology	Simple Time Ontology	Reusable Time Ontology	Kestrel Time Ontology	SRI's Time Ontology	SUMO Time Ontology	DAML Time Ontology	AKT Time Ontology
Time Points	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time Interval	✓			✓	✓	✓	✓	✓	✓
Absolute and Relative Time	✓					✓	✓	✓	✓
Relations between time intervals	✓			✓				✓	✓
Convex and non convex intervals	✓			✓			✓	✓	
Distinction between open and close intervals	✓			✓			✓	✓	
Explicit modeling of proper intervals								✓	✓
Concatenation of intervals	✓					✓	✓	✓	✓
Different temporal granularities		✓	✓	✓		✓	✓	✓	✓
Provides axioms	✓		✓	✓			✓	✓	

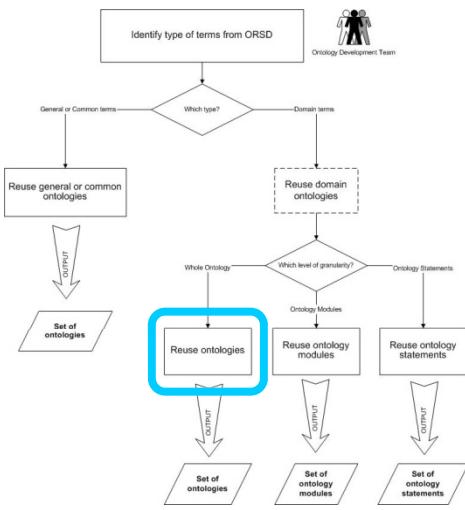
Reusing Common Ontologies. Ontology Customization and Integration

Step 6. Customize:

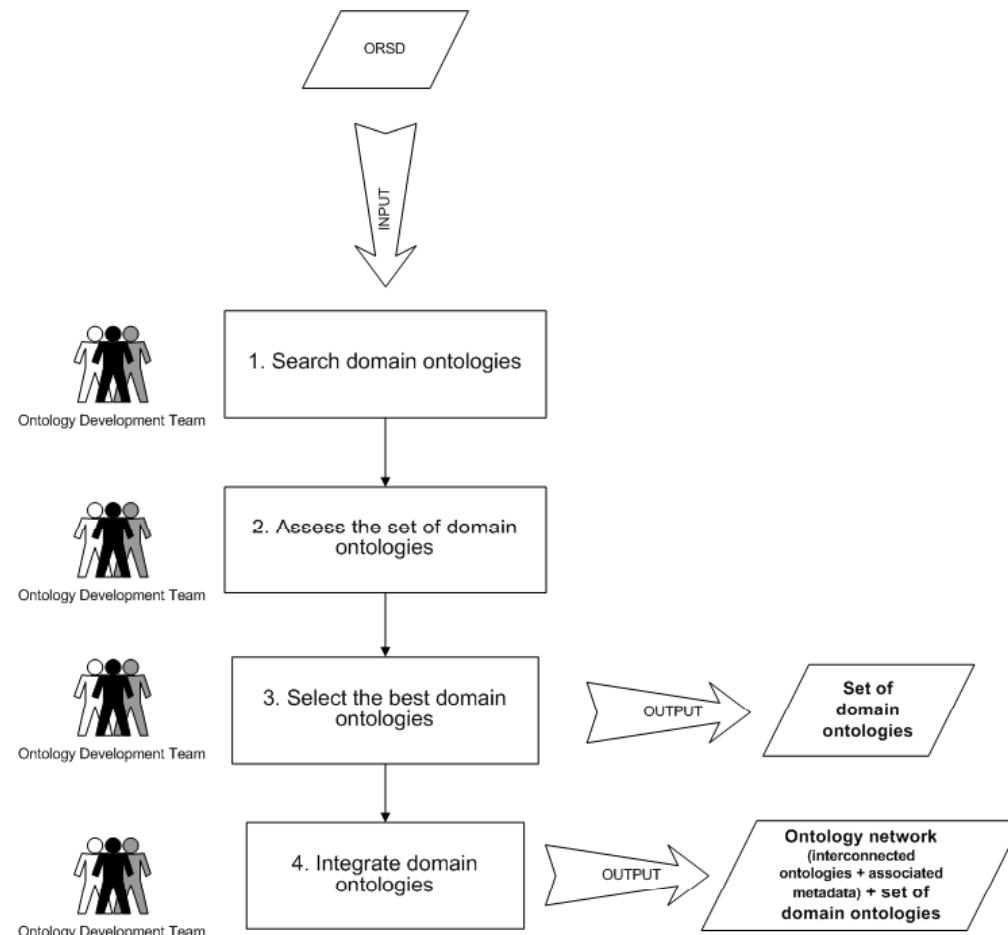
- *Prune the reused ontology according to the features that are really necessary (e.g. convex and not convex intervals).*
- *Enrich the ontology (not needed in time ontology).*
- *Translate (e.g. from KIF to OWL).*
- *Evaluate the obtaining ontology.*

Step 7. Integrate

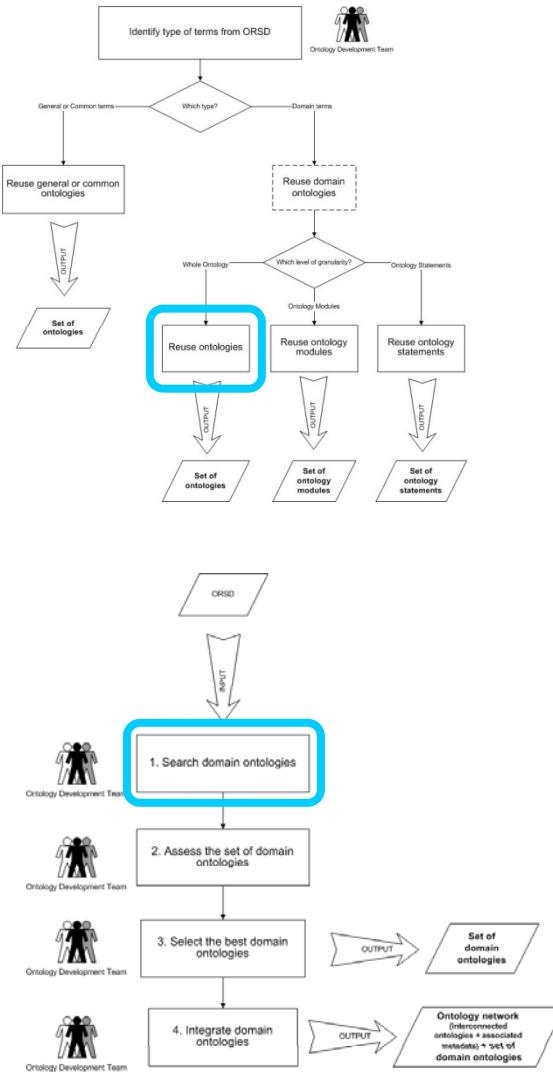
Reusing Ontologies as a Whole



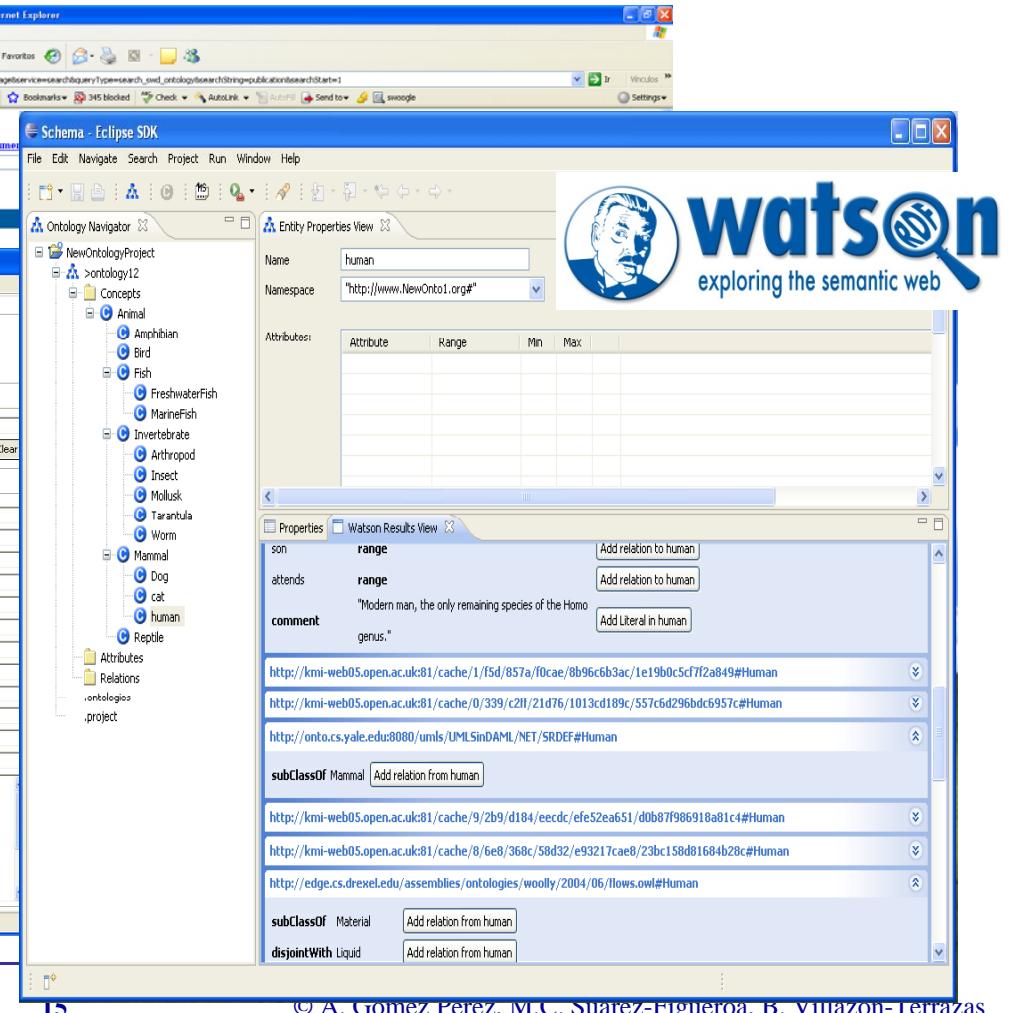
Ontology Reuse is redefined as the activity of using ontologies (in this case domain ontologies) in the solution of different problems.



Reusing Ontologies as a Whole. Domain Ontology Search

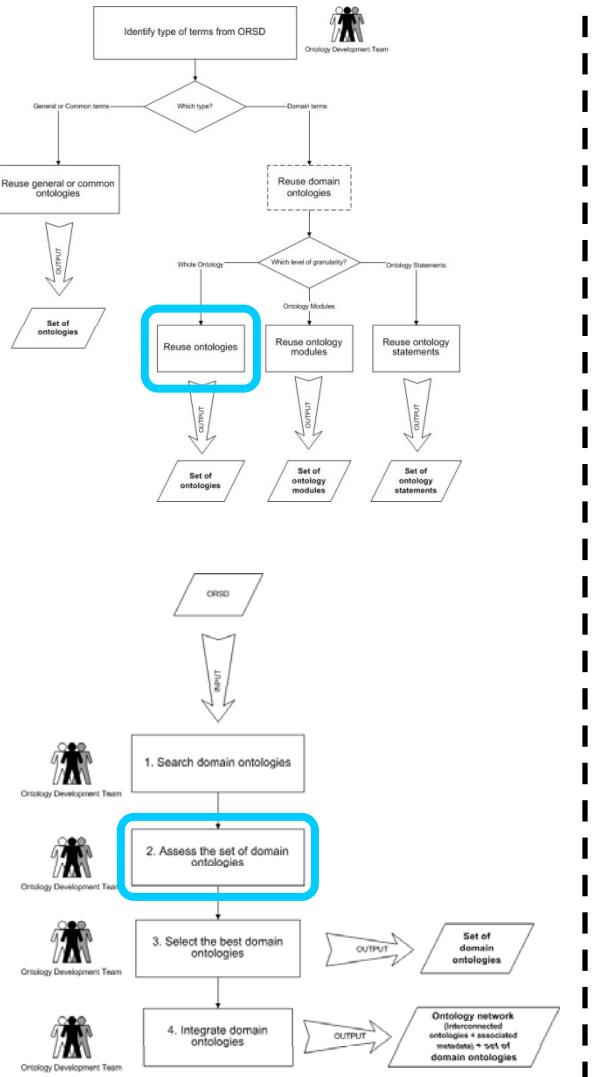


Use ontology libraries and ontology repositories to search domain ontologies, using those terms that have a high frequency in the ORSD.



Reusing Ontologies as a Whole. Domain Ontology Assess

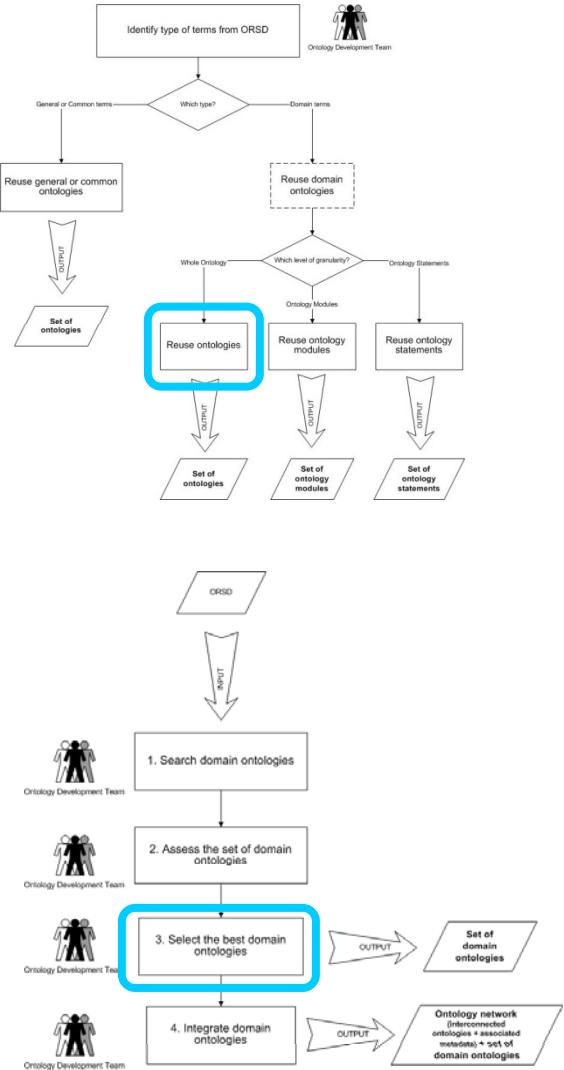
The question here is: **Are the found ontologies useful?**



- Ontology requirements, such as ontology language (Syntactic Level), if terms are from standards, if multilinguality is needed, etc.
- Checking the CQs with respect to the found ontologies:
 - Terminological Level: using the terminology from CQs.
 - Precision
 - Recall
 - Semantic Level: answering the CQs.

		Publication Ontology 1	Publication Ontology 2	Publication Ontology 3
		Ontology Requirements		
	From the ORSD			
O. Language	OWL-DL	OWL-DL	KIF	OWL-DL
Standards	No needed	--	--	--
Multilinguality	Yes	Yes	Yes	Yes
		Checking CQs		
Terminological Level	Precision	80%	90%	80%
	Recall	100%	90%	100%
Semantic Level: answering CQs		Yes	Yes	Yes

Reusing Ontologies as a Whole. Domain Ontology Select

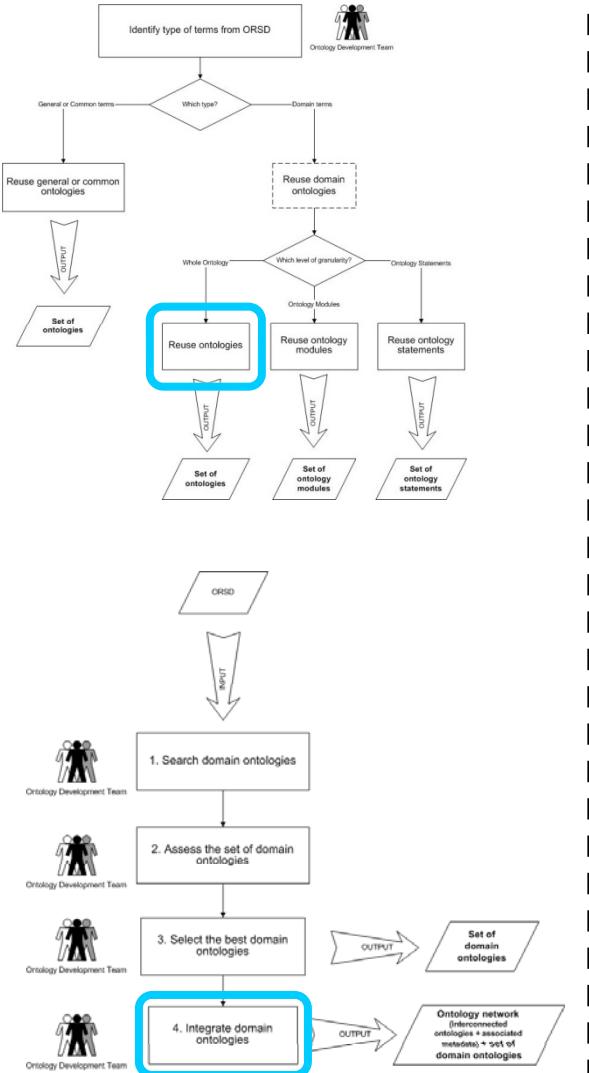


The question here is: **Which ones are the best?**

- Good documentation of the ontology.
- Ontology is good modularized.
- Integration effort is low.
- Ontology is reused by others.
- If the ontology used naming conventions.
- If the ontology have been evaluated.

	Publication Ontology 1	Publication Ontology 3
Documentation	Good	Good
Modularized	Yes	Yes
Integragion Effort	Low	Low
Naming Conventions	Yes	No
Evaluated	Yes	Yes

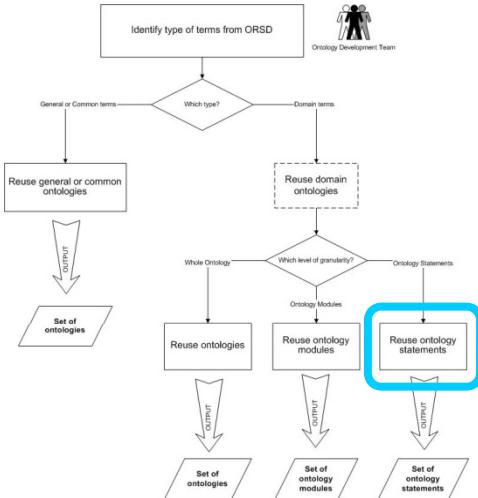
Reusing Ontologies as a Whole. Domain Ontology Integrate



Integrate the selected ontologies. There are three different possibilities:

- The selected ontology will be reused as it is.
- The ontology reengineering activity should be carried out with the selected ontologies.
- Selected ontologies will be merged to obtain a new ontology network.

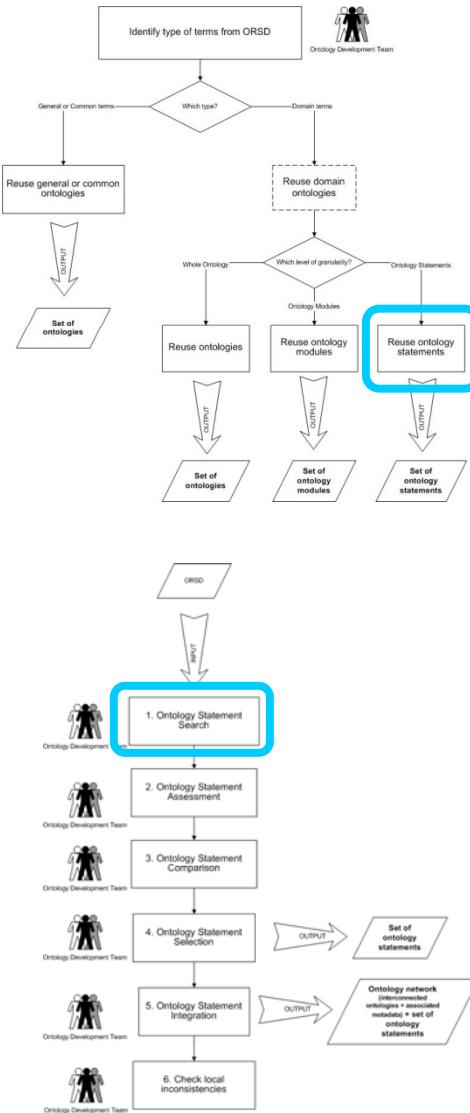
Reusing Ontology Statements



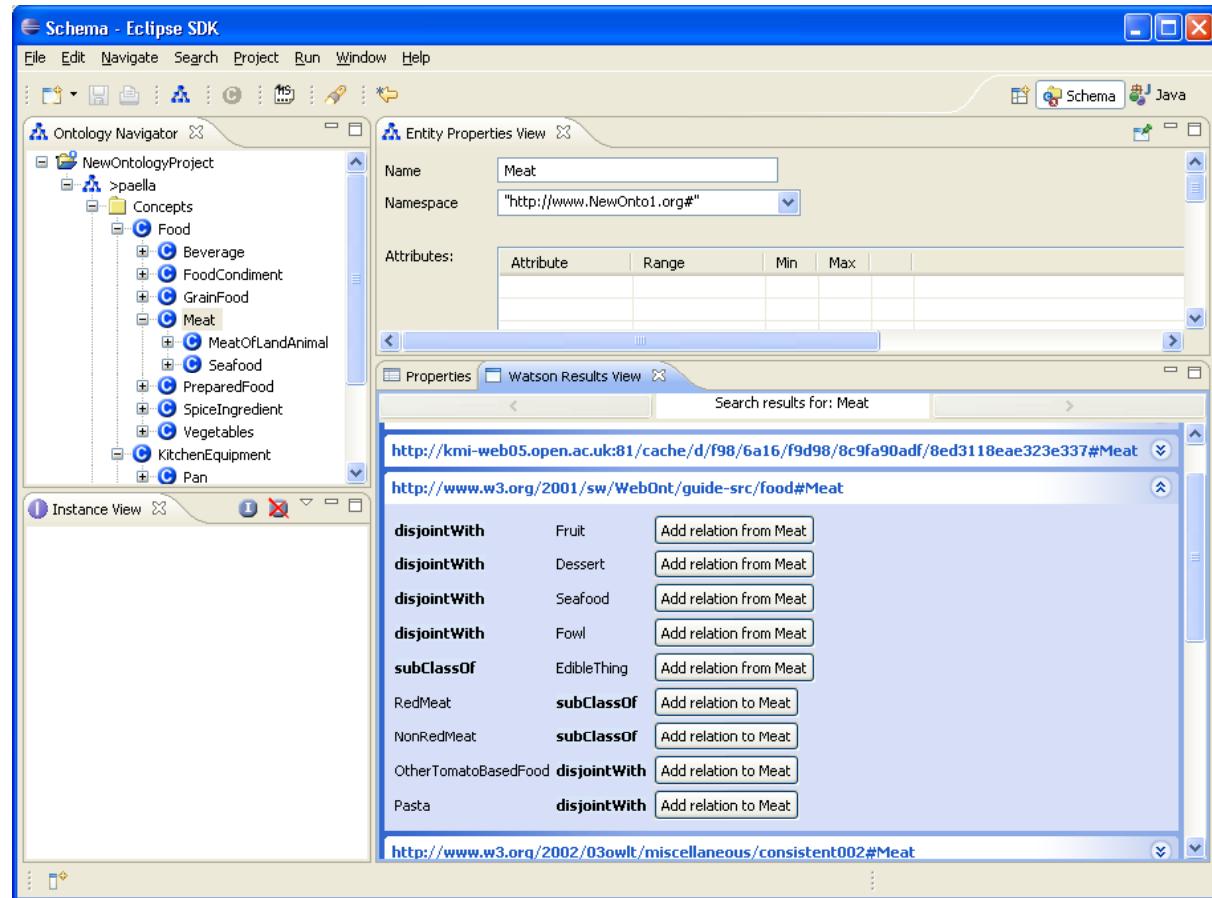
Ontology Statement Reuse is defined as the activity of using ontology statements in the solution of different problems.



Reusing Ontology Statements. Ontology Statement Search

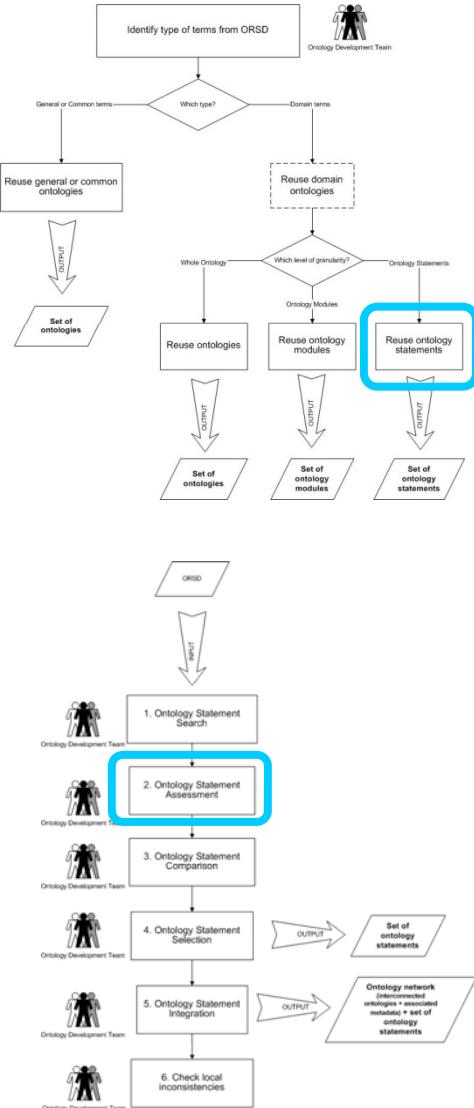


Use **WATSON** (<http://watson.kmi.open.ac.uk/WatsonWUI/>)



Reusing Ontology Statements.

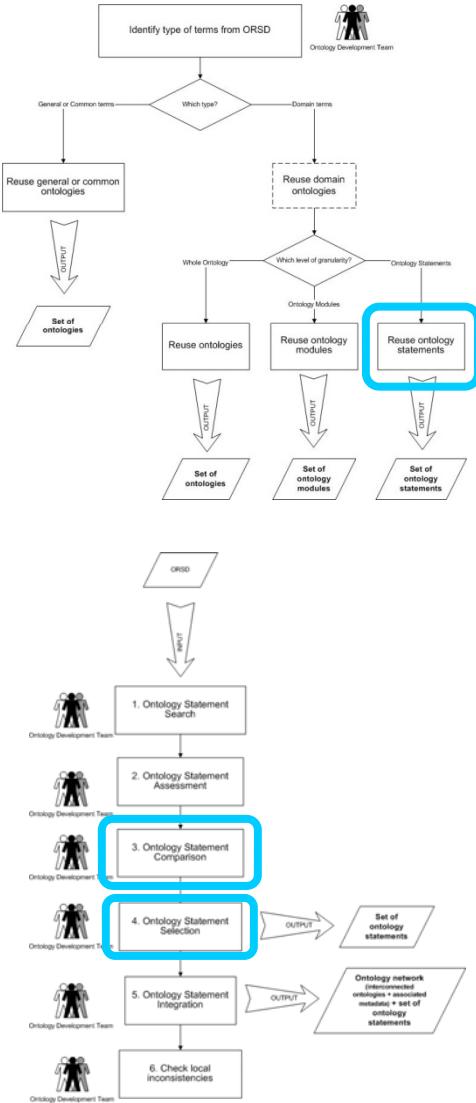
Ontology Statement Assessment



The question here is: **how to decide if a concrete ontology statement is useful or not for the ontology network being developed.**

- Check scope.
 - “Meat subclass of ‘_anon699’”
- Check purpose.
 - “Seafood is subclass of Root”
- Check clarity.
 - “Conference is subclass of Pear” (conference = conferencePear)
- Check information content.
 - “Fruit is subclass of FruitSalad” (subclass of = part of)
- Assess the correctness from a (formal) modeling perspective.
 - Check that the naming reflects the intended meaning.
 - “Conference is subclass of Pear” (conference = conferencePear)
 - Check if the ontology statement is not invalid from a formal perspective.
 - “Fruit is subclass of FruitSalad” (subclass of = part of)

Reusing Ontology Statements. Ontology Statement Comparison and Selection



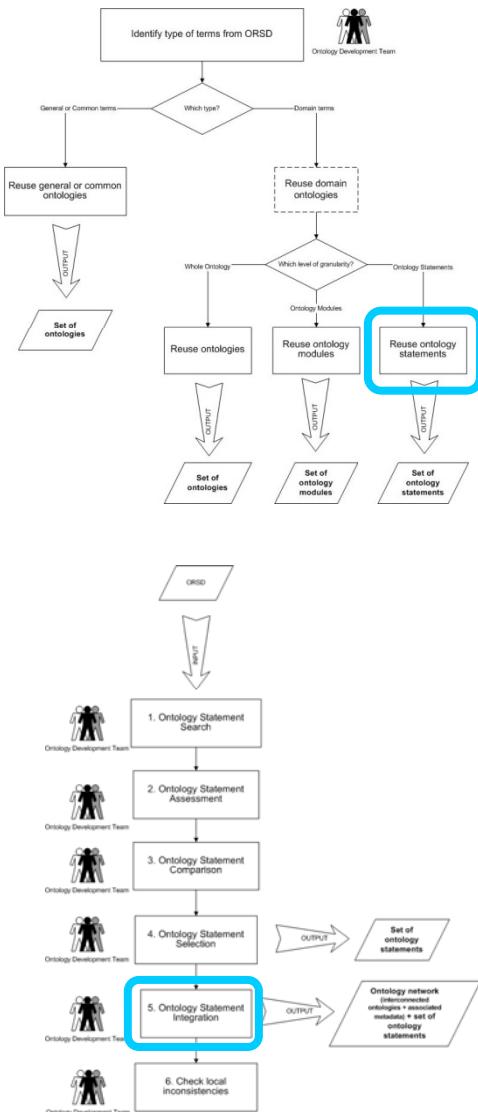
The question in this case is: **how to decide between the useful ontology statements which ones are the best / the most convenient for the ontology network being developed.**

- ❑ Reuse one using the same naming convention as you, for avoiding the work of adapting the statement to your ontology network.

Ontology Statement	Same Naming Convention
“ReadMeat is subclass of Meat”	Yes
“Read-Meat is subclass of Meat”	No
“Read_Meat is subclass of Meat”	No

Reusing Ontology Statements. Ontology Statement Integration

The question here is: **how to reuse the selected ontology statements.**



There are three modes:

- Import the selected ontology statements.
- Copy the selected ontology statements.
- Map the selected ontology statements.

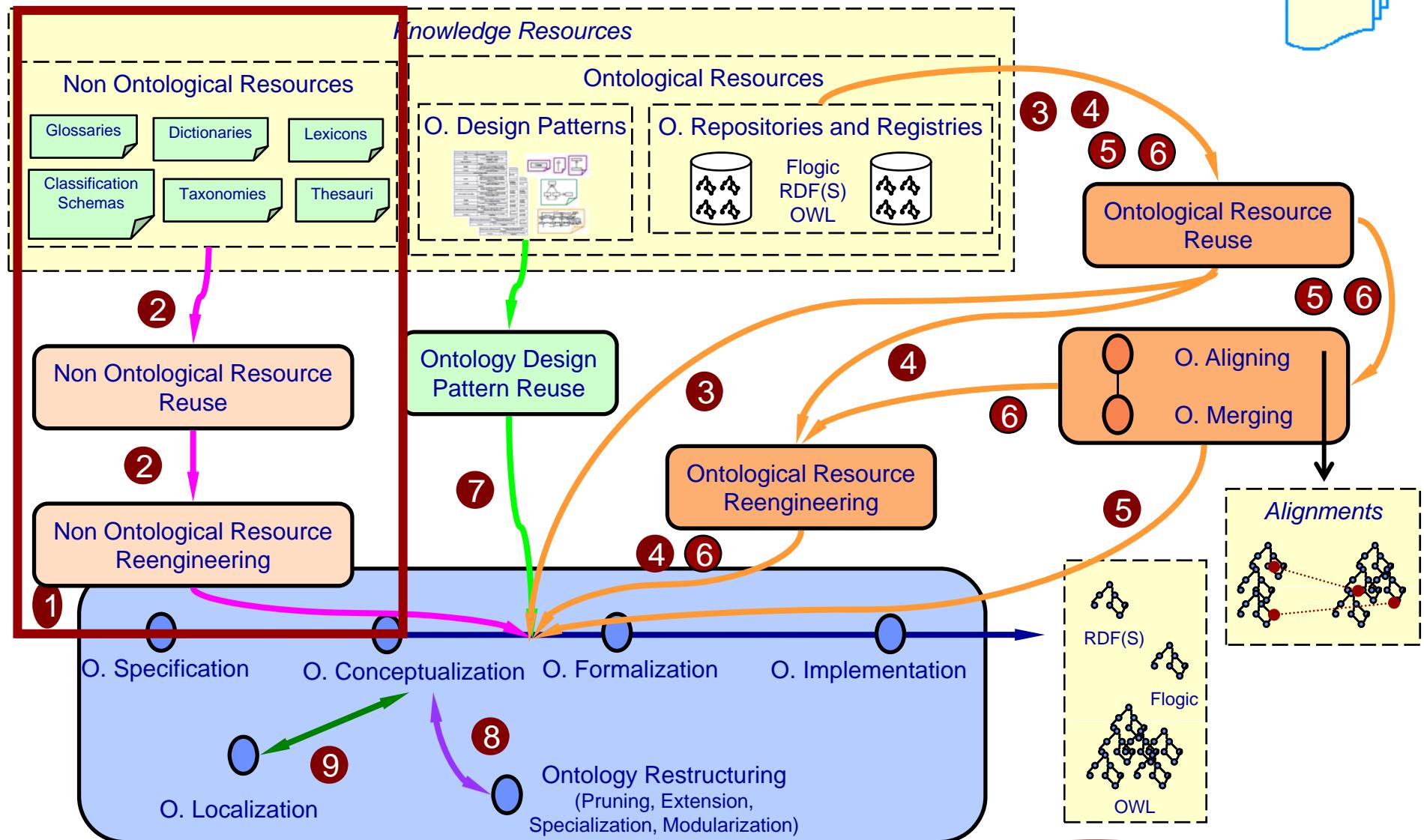
After reusing an ontology statement, the following work must be probably done:

- changing names (concepts, properties) to adapt them to the naming conventions used in the ontology network being developed.
- adding range in properties; and changing cardinalities.
- restrictions should be added too.
- check local inconsistencies in the ontology network.

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NeOn Scenarios

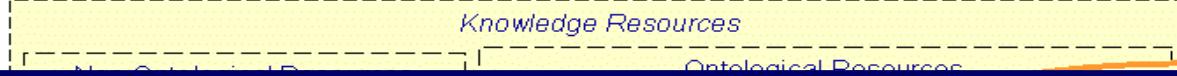


Ontology Support Activities: Knowledge Acquisition (Elicitation); Documentation; Configuration Management; Evaluation (V&V); Assessment

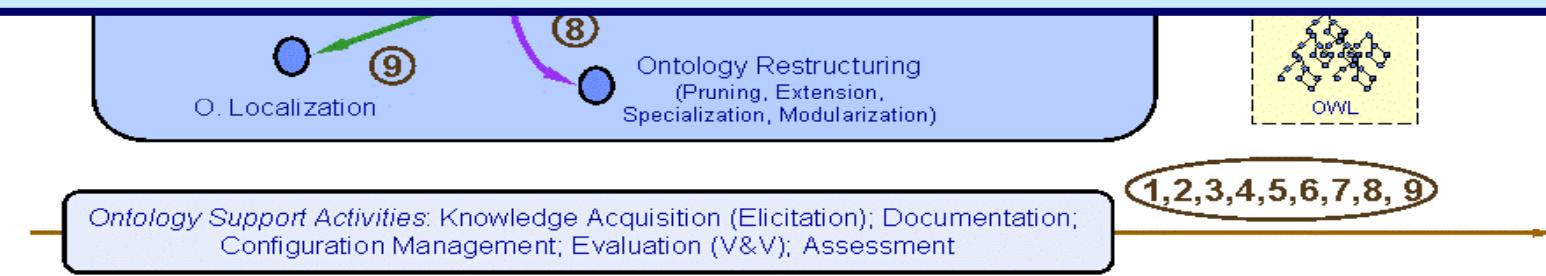
1,2,3,4,5,6,7,8, 9

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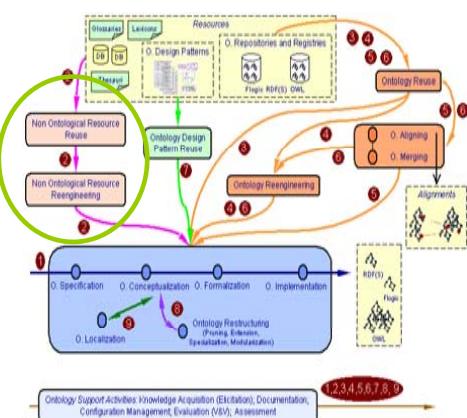
- Introduction
- A proposal for classifying/categorizing Non-Ontological Resources
 - Classification scheme
 - Thesaurus
- Method for Re-engineering Non-Ontological Resources
- PR-NORs



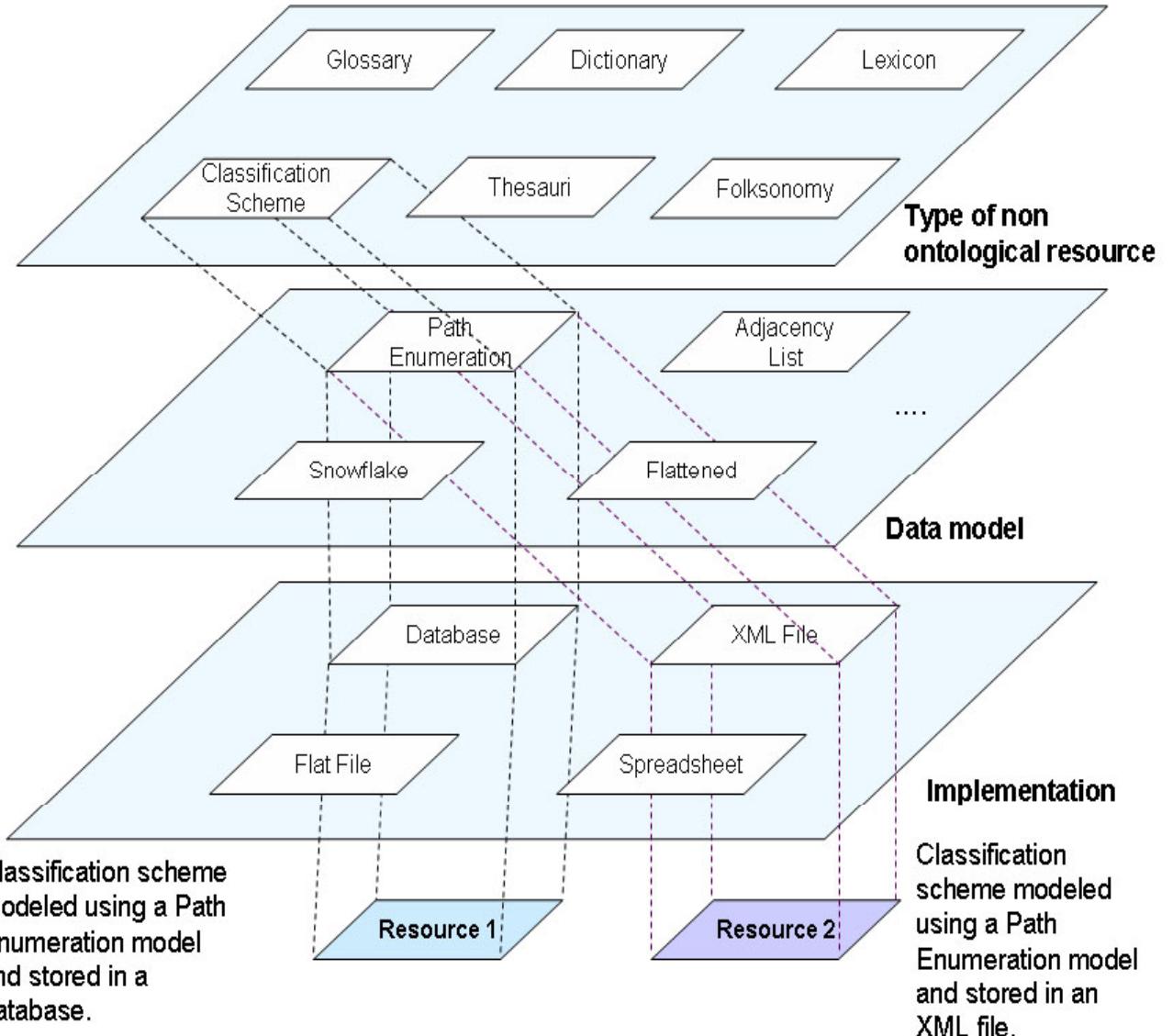
- **Non-Ontological Resource (NOR)** is an existing knowledge-aware resource whose semantics has not been formalized yet by an ontology.
- **Non-Ontological Resource Re-engineering** refers to the process of taking an existing non-ontological resource and transforming it into an ontology.



Types of non ontological resources



Non-Ontological Resources are knowledge resources whose semantics have not been formalized yet by means of an ontology

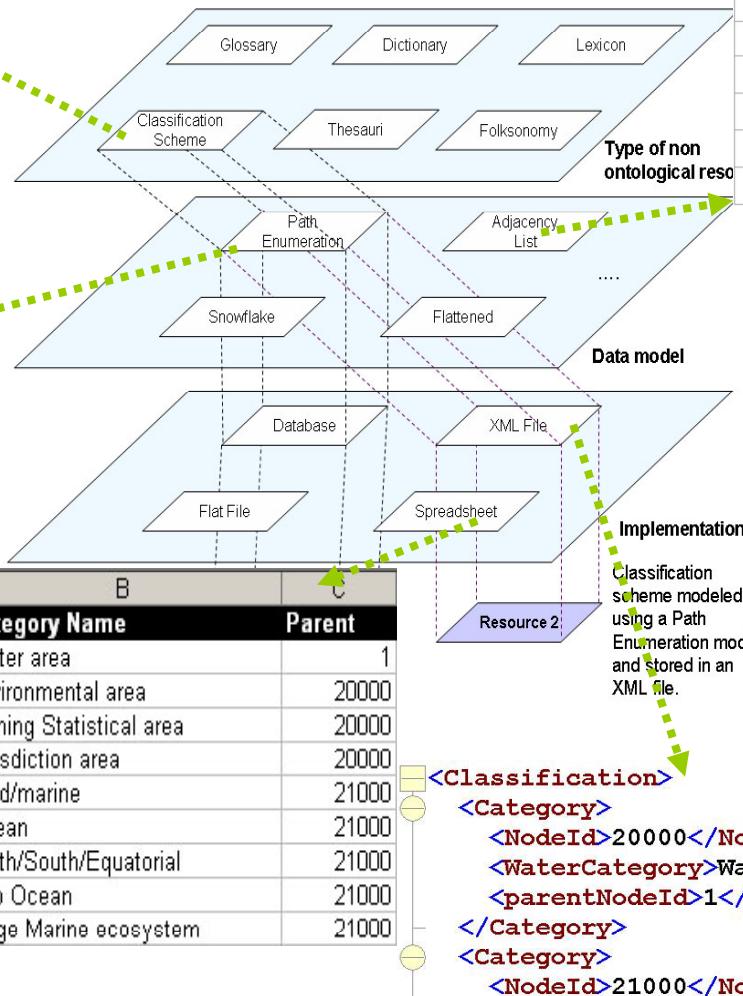


Types of non-ontological resources

●	Water area
□	Environmental area
□	Inland/marine
□	Ocean
□	North/South/Equatorial
□	Sub-Ocean
□	Large Marine Ecosystem
□	Fishing Statistical area
□	Jurisdiction area
□	Fishery Management area
□	Reporting area

Id	Category Name
20000	Water area
20000. 21000	Environmental area
20000.22000	Fishing Statistical area
20000. 24020	Jurisdiction area
21000.21001	Inland/marine
21000.21002	Ocean
21000.21003	North/South/Equato
21000.21004	Sub Ocean
21000.21005	Large Marine ecosys

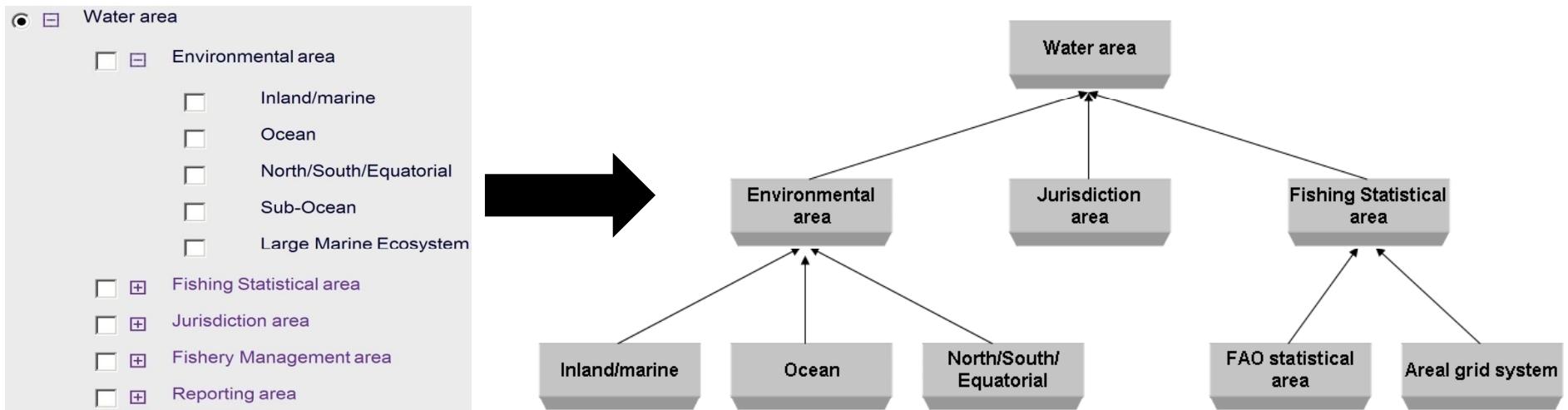
A	B		C
1	Id	Category Name	Parent
2	20000	Water area	1
3	21000	Environmental area	20000
4	22000	Fishing Statistical area	20000
5	24020	Jurisdiction area	20000
6	21001	Inland/marine	21000
7	21002	Ocean	21000
8	21003	North/South/Equatorial	21000
9	21004	Sub Ocean	21000
10	21005	Large Marine ecosystem	21000



Id	Category Name	Parent
20000	Water area	1
21000	Environmental area	20000
22000	Fishing Statistical area	20000
24020	Jurisdiction area	20000
21001	Inland/marine	21000
21002	Ocean	21000
21003	North/South/Equatorial	21000
21004	Sub Ocean	21000
21005	Large Marine ecosystem	21000

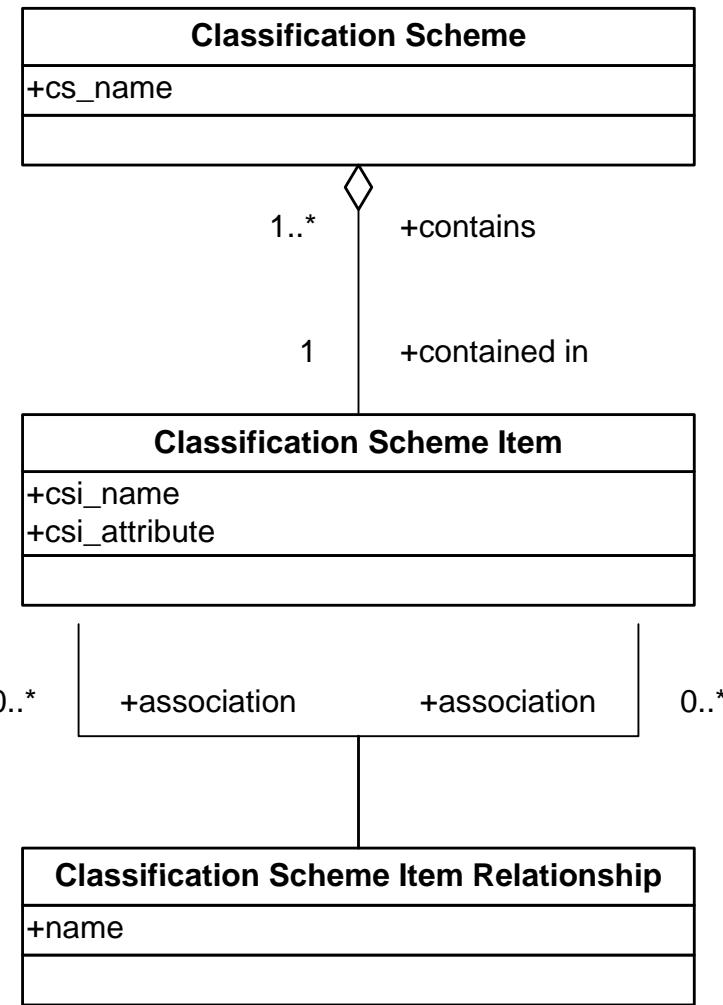
Classification Scheme

- A classification scheme¹ is the descriptive information for an arrangement or division of objects into groups based on characteristics, which the objects have in common.
E.g. water area classification scheme².



1. International Standard Organization (ISO). Information technology - Metadata registries – Part 1: Framework, 2004. Report ISO/IEC FDIS 11179-1.
2. <http://www.fao.org/figis/servlet/RefServlet>

Classification Scheme Components



1. International Standard Organization (ISO). Information technology - Metadata registries – Part 1: Framework, 2004.
Report ISO/IEC FDIS 11179-1.

Classification Scheme Data Models (I)

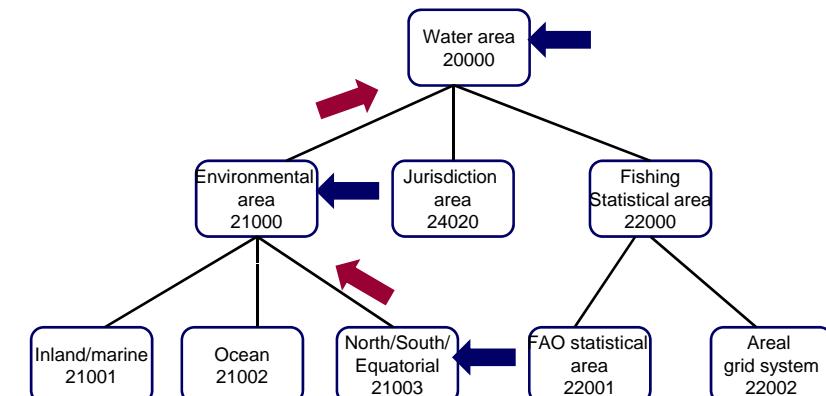
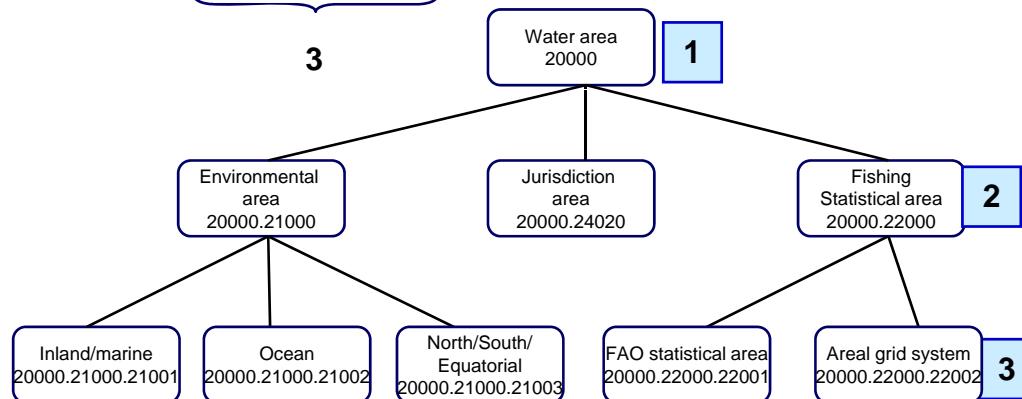
- **Path Enumeration Data Model** is defined as a model that stores for each node the path (as a string) from the root to the node.

ID	CSI_Name
20000	Water area
20000.21000	Environmental area
20000.24020	Jurisdiction area
20000.22000	Fishing Statistical area
20000.21000.21001	Inland/marine
20000.21000.21002	Ocean
20000.21000.21003	North/South/Equatorial
20000.22000.22001	FAO statistical area
20000.22000.22002	Areal grid system

1
2
3

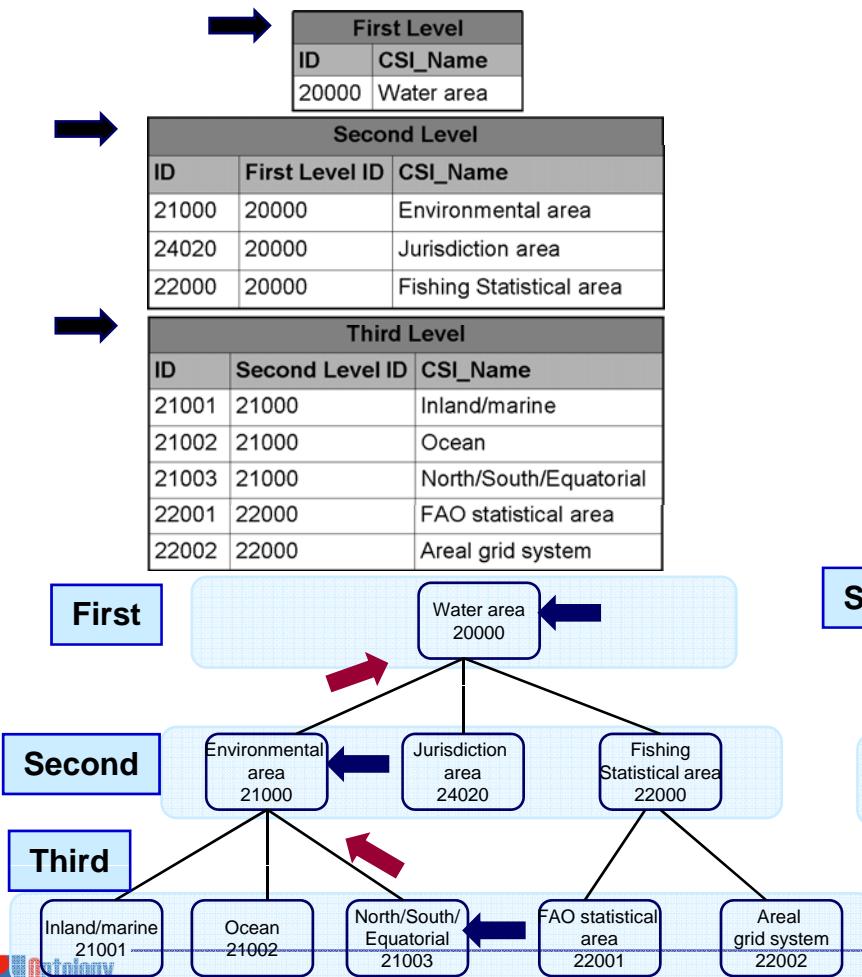
- **Adjacency List** is a recursive structure for hierarchy representations that comprises a list of nodes with a linking column to their parent nodes.

ID	CSI_Name	Parent
20000	Water area	
21000	Environmental area	20000
24020	Jurisdiction area	20000
22000	Fishing Statistical area	20000
21001	Inland/marine	21000
21002	Ocean	21000
21003	North/South/Equatorial	21000
22001	FAO statistical area	22000
22002	Areal grid system	22000

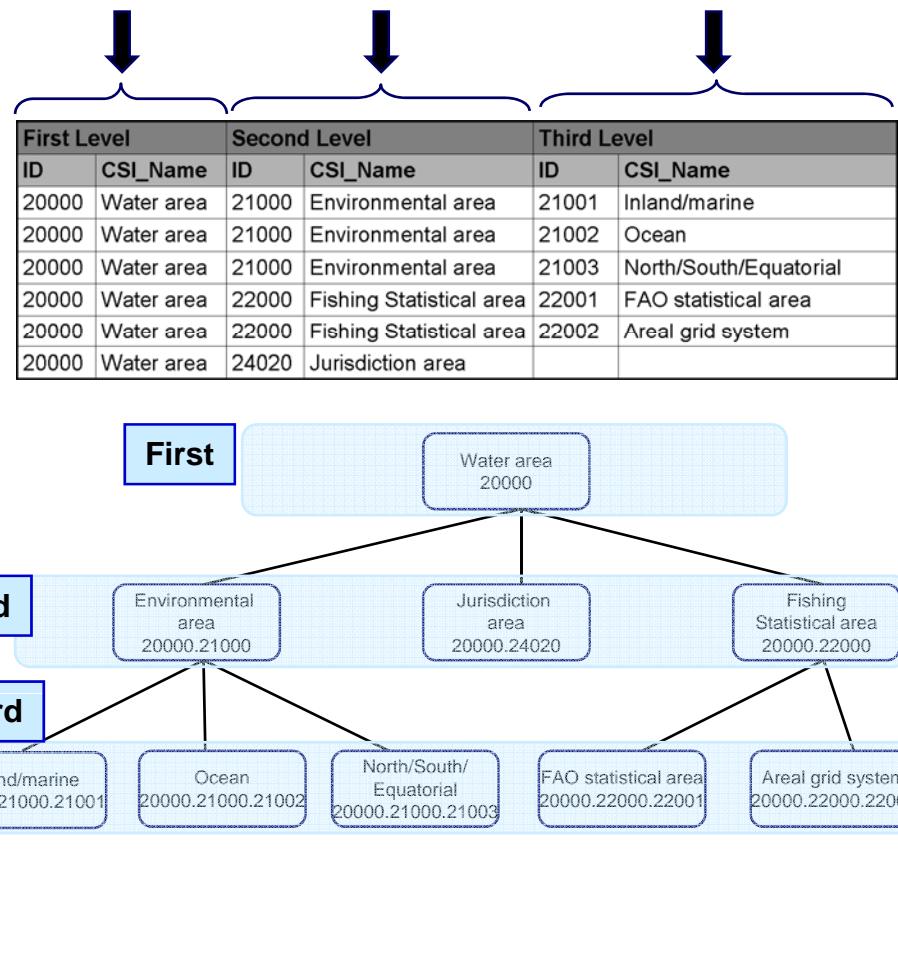


Classification Scheme Data Models (II)

- **Snowflake Data Model** is a normalized structure for hierarchy representations. For each hierarchy level a entity is created. In this model each hierarchy node has a column linked to its parent node.



- **Flattened Data Model**, is a denormalized structure. The hierarchy is represented with an entity where each hierarchy level is stored on a different column.



Example - FAO Water Areas Classification Scheme

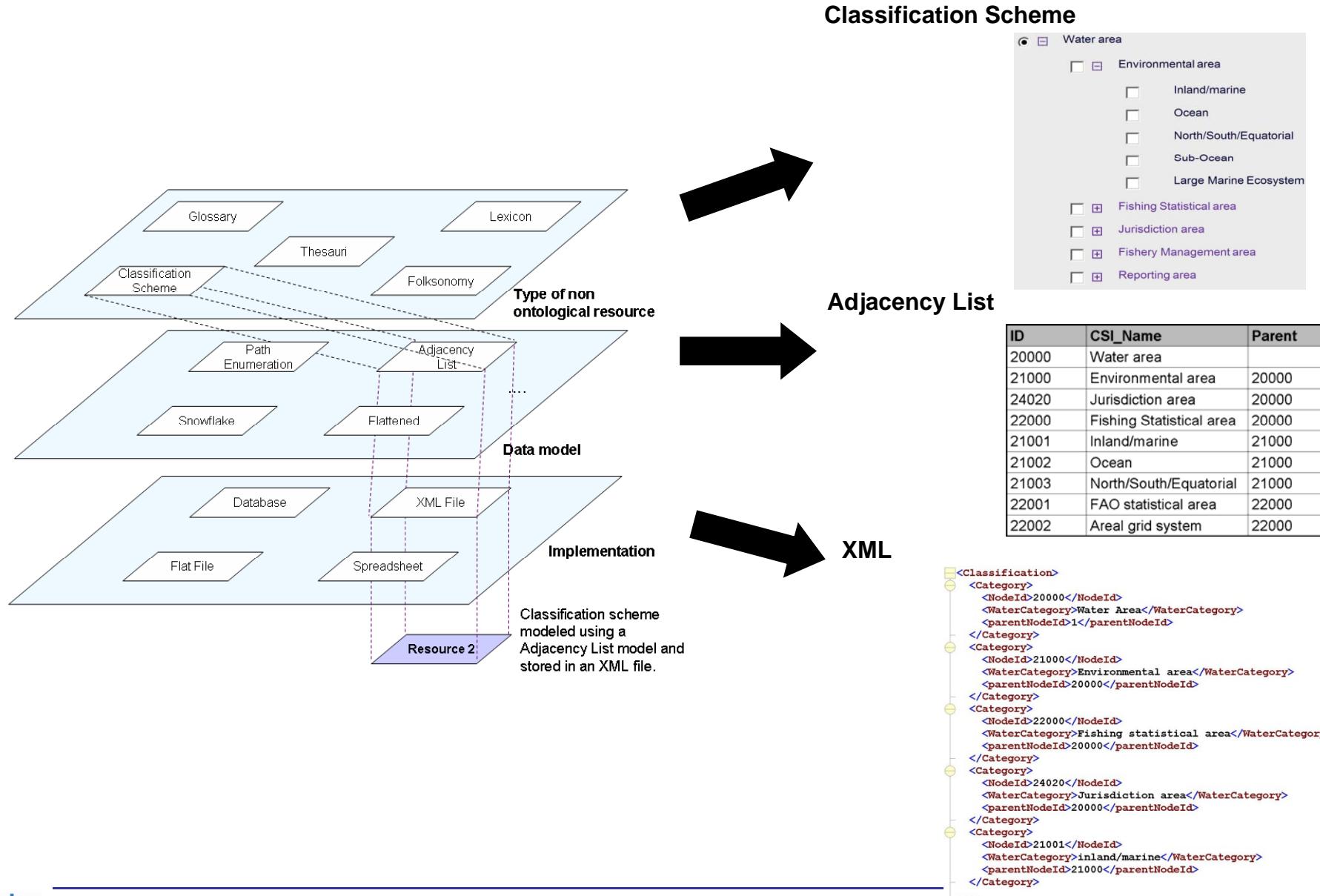


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- Introduction
- A proposal for classifying/categorizing Non-Ontological Resources
 - Classification scheme
 - Thesaurus
- Method for Re-engineering Non-Ontological Resources
- PR-NORs

Thesaurus

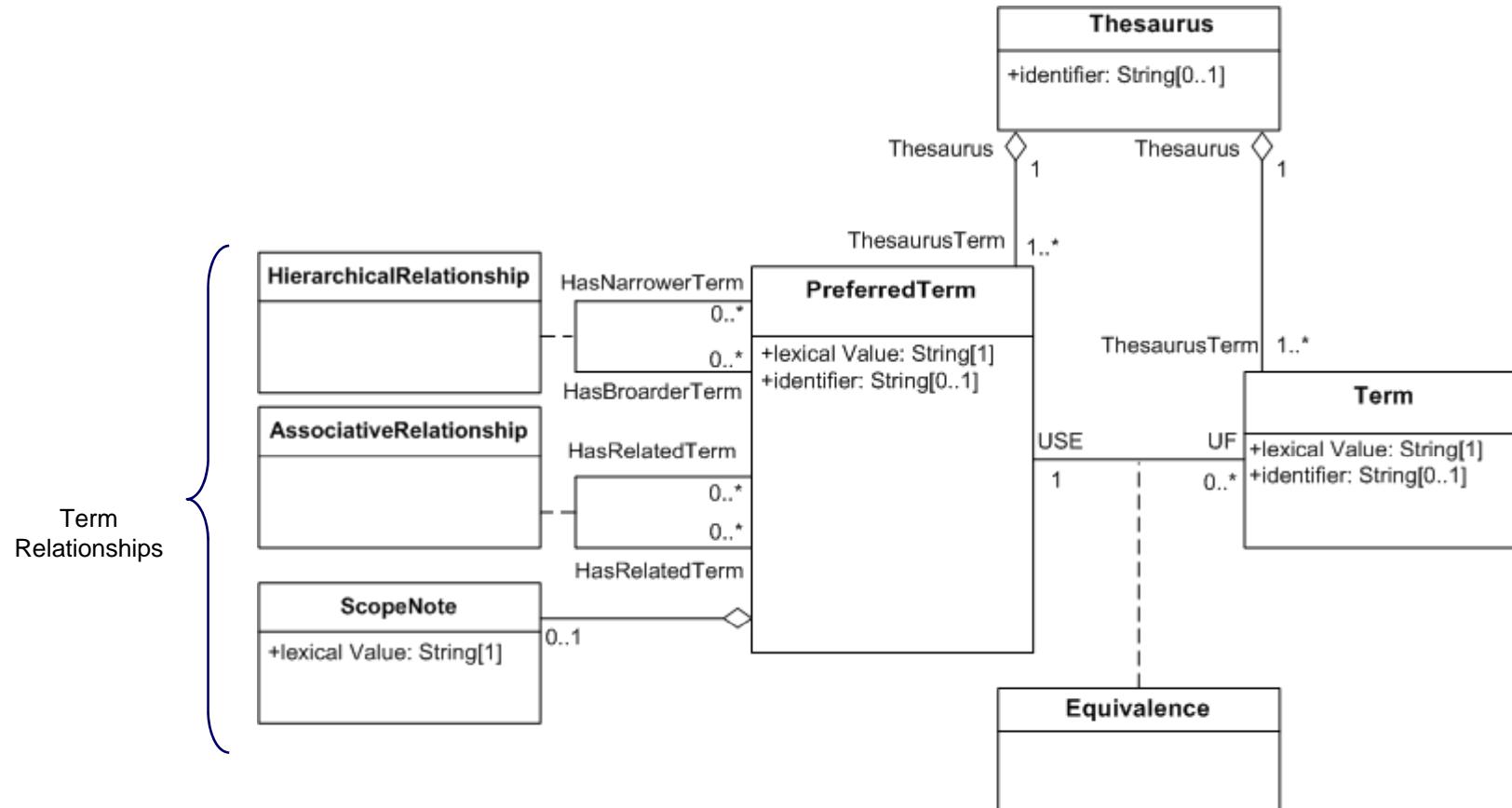
- Thesauri¹ are controlled vocabularies of terms in a particular domain with hierarchical, associative and equivalence relations between terms. Thesauri are mainly used for indexing and retrieving of articles in large databases. An example of thesaurus is the AGROVOC² thesaurus.

EN : Oryza	BT (subclassOf) : Poaceae NT (hasSubclass) : Oryza sativa NT (hasSubclass) : Oryza perennis NT (hasSubclass) : Oryza rufipogon NT (hasSubclass) : Oryza longistaminata NT (hasSubclass) : Wetland rice NT (hasSubclass) : Oryza glaberrima NT (hasSubclass) : Upland rice NT (hasSubclass) : Oryza punctata RT : Rice fields RT : Cereal crops RT : Rice
EN : Rice	BT (subclassOf) : Cereals NT (hasSubclass) : Broken rice NT (hasSubclass) : Basmati rice RT : Rice straw RT : Oryza RT : Rice flour UF : Paddy



1. International Standard Organization (ISO). Documentation – Guidelines for the establishment and development of monolingual thesaurus, 1986. Report ISO 2788.
2. <http://www.fao.org/agrovoc/>

Term-based thesaurus



1. International Standard Organization (ISO). Documentation – Guidelines for the establishment and development of monolingual thesaurus, 1986. Report ISO 2788.

Record-based data model for a term-based thesaurus

EN : Oryza	BT (subclassOf) : Poaceae NT (hasSubclass) : Oryza sativa NT (hasSubclass) : Oryza perennis NT (hasSubclass) : Oryza rufipogon NT (hasSubclass) : Oryza longistaminata NT (hasSubclass) : Wetland rice NT (hasSubclass) : Oryza glaberrima NT (hasSubclass) : Upland rice RT : Rice fields RT : Cereal crops RT : Rice
EN : Rice	BT (subclassOf) : Cereals NT (hasSubclass) : Broken rice NT (hasSubclass) : Basmati rice RT : Rice straw RT : Oryza RT : Rice flour UF : Paddy

Term	BT	NT	RT	UF
Rice	Cereals	Broken rice Basmati rice	Rice straw Oryza	Paddy
Oryza	Poaceae	Oryza sativa Oryza perennis Oryza rufipogon Oryza longistaminata Wetland rice Oryza glaberrima Upland rice Oryza punctata	Rice fields Cereal crops Rice	

Relation-based data model for a term-based thesaurus

EN : Oryza	BT (subclassOf) : Poaceae NT (hasSubclass) : Oryza sativa NT (hasSubclass) : Oryza perennis NT (hasSubclass) : Oryza rufipogon NT (hasSubclass) : Oryza longistaminata NT (hasSubclass) : Wetland rice NT (hasSubclass) : Oryza glaberrima NT (hasSubclass) : Upland rice RT : Rice fields RT : Cereal crops RT : Rice
EN : Rice	BT (subclassOf) : Cereals NT (hasSubclass) : Broken rice NT (hasSubclass) : Basmati rice RT : Rice straw RT : Oryza RT : Rice flour UF : Paddy

(1) Term Entity	
TermCode	Term
1001	Term1
1002	Term2
1003	Term3
1004	Term4
1005	Term5

(2) Term-Term Relationship Entity		
TermCode1	TermCode2	RelID
1001	1003	10
1003	1004	20
1002	1005	10
1003	1005	30

(3) Relationship Entity		
RelID	RelDesc	RelAbr
10	Broader Term	BT
30	Related Term	RT
20	Used For	UF

Example - FAO Agrovoc thesaurus

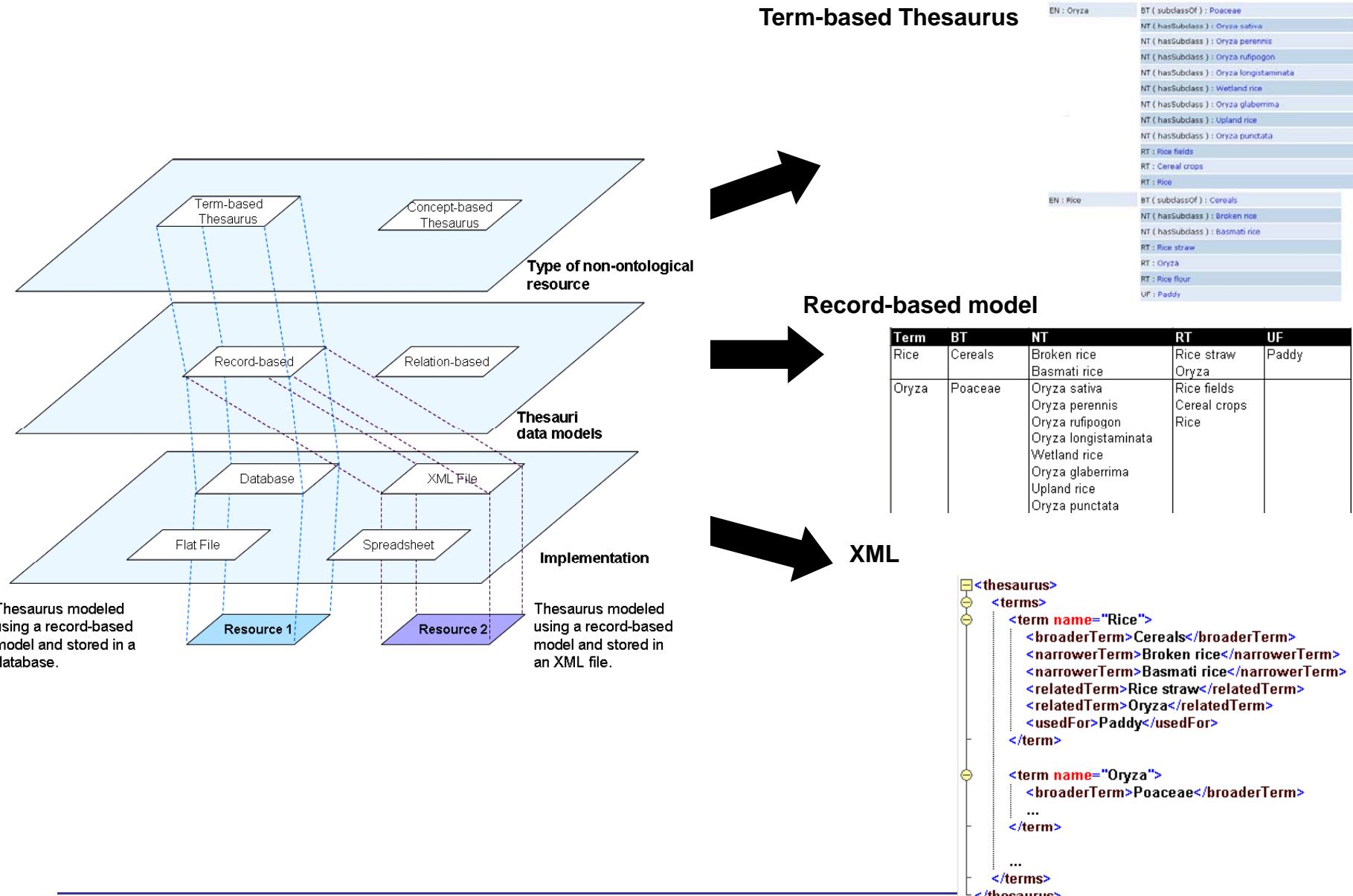
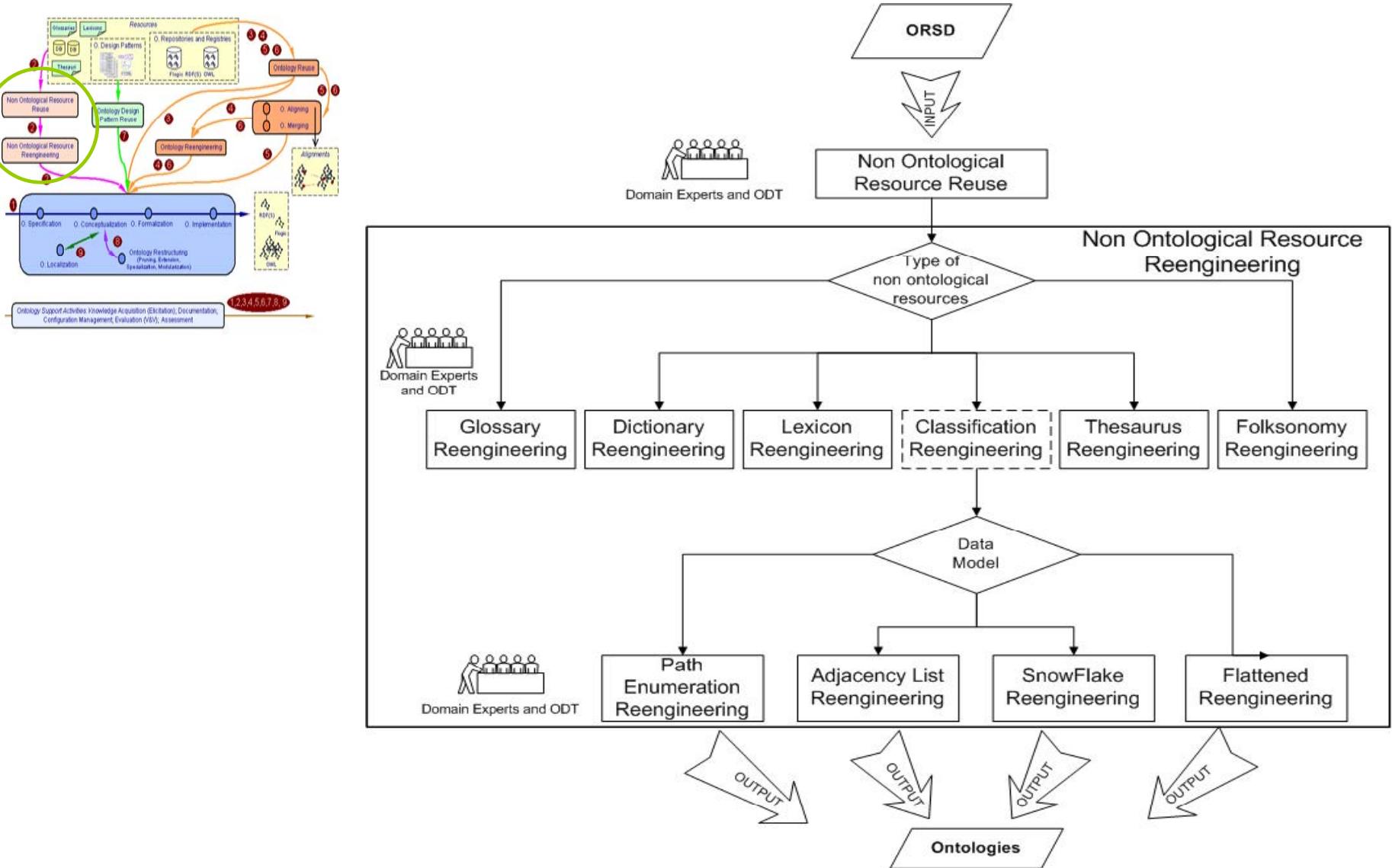


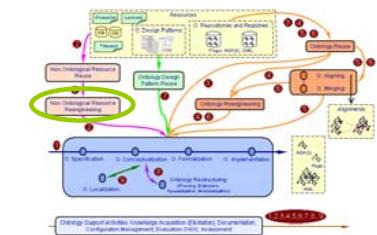
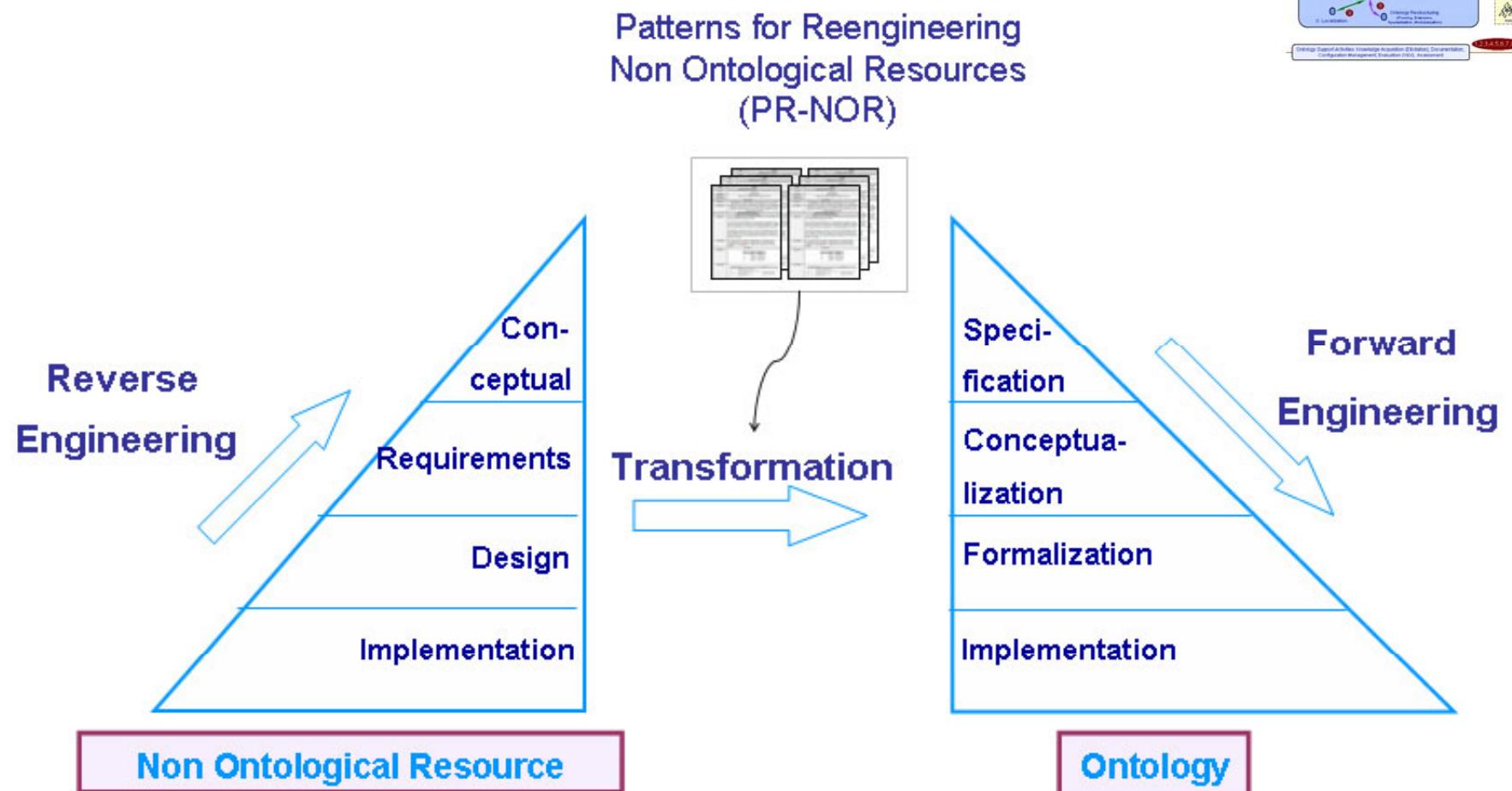
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- PR-NORs

The resource type and its data model influence the re-engineering process



Approach for Re-engineering Non-Ontological Resources



Patterns for Re-engineering Non-Ontological Resources (PR-NOR)

- PR-NORs define a procedure that transforms the non-ontological resource components into ontology representational primitives.
- These patterns will generate the ontologies at a conceptualization level, independent of the ontology implementation language.
- Advantages:
 - embody expertise about how to guide a re-engineering process,
 - improve the efficiency of the re-engineering process,
 - make the transformation process easier for both ontology engineers and domain experts
 - improve the reusability of non-ontological resources.

PR-NOR Template

Slot	Value
General Information	
Name	Name of the component
Identifier	An acronym composed of: component type + abbreviated name of the component + number
Component Type	Pattern for Re-engineering Non-Ontological Resource (PR-NOR)
Use Case	
General	Description in natural language of the re-engineering problem addressed by the pattern for re-engineering non-ontological resources.
Example	Description in natural language of an example of the re-engineering problem.
Pattern for Re-engineering Non-Ontological Resource.	
Resource to be Re-engineered	
General	Description in natural language of the non-ontological resource.
Example	Description in natural language of an example of the non-ontological resource.
Graphical Representation	
General	Graphical representation of the non-ontological resource
Example	Graphical representation of the example of non-ontological resource.
Designed Ontology	
General	Description in natural language of the ontology created after applying the pattern for re-engineering the non-ontological resource.
Graphical Representation	
(UML) General Solution Ontology	Graphical representation, using the UML profile BH06 , of the ontology created for the non-ontological resource being re-engineered.
(UML) Example Solution Ontology	Example showing a graphical representation, using the UML profile BH06 , of the ontology created for the non-ontological resource being used.
How to Re-engineer	
General	Description in natural language of the general re-engineering process, using a sequence of activities.
Example	Description in natural language of the re-engineering process applied to the non-ontological resource example, using the above sequence of activities.
Implementation (Optional)	Link to a website which holds the code for an implementation, in a particular programming language, of the re-engineering process.
Relationships (Optional)	
Relations to other modelling components	Description of any relation to other PR-NOR patterns or other design patterns.

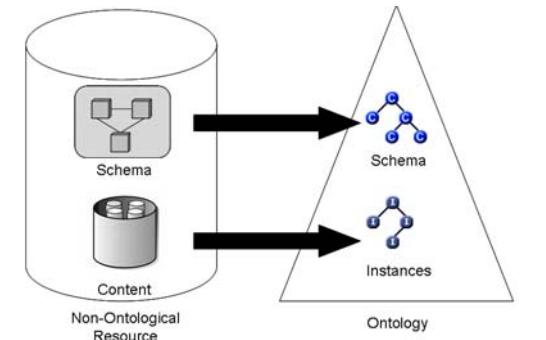
INPUT:Non-Ontological Resource

OUTPUT: Ontology

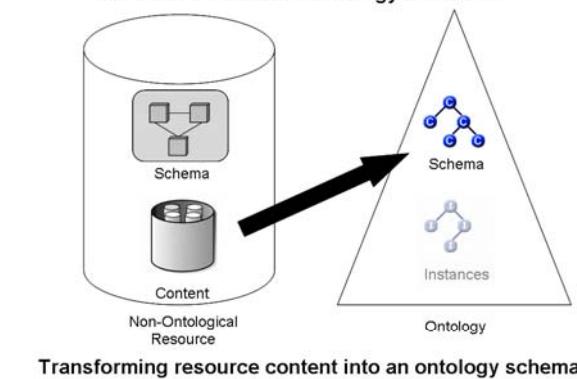
PROCESS: How

PR-NOR Transformation Aproaches

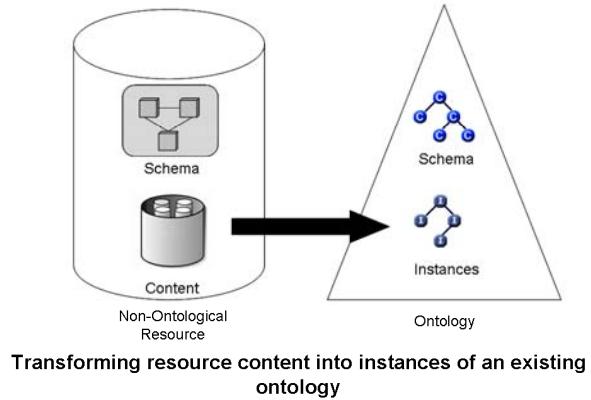
- ABox Transformation



- TBox Transformation



- Population



PR-NOR Example

resource

ID	CSI_Name	Parent
20000	Water area	
21000	Environmental area	20000
24020	Jurisdiction area	20000
22000	Fishing Statistical area	20000
21001	Inland/marine	21000
21002	Ocean	21000
21003	North/South/Equatorial	21000
22001	FAO statistical area	22000
22002	Areal grid system	22000

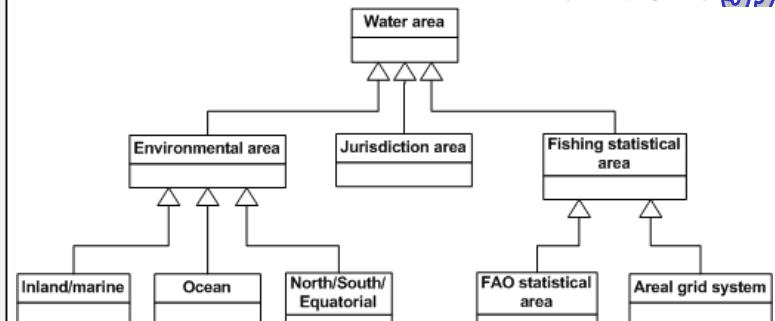
Algorithm

1. Create the Water area class.
2. Create the Fishing Statistical area class, and set up the *subClassOf* relation between the Fishing Statistical area class and the Water area class.
3. Create the Environmental area class, and set up the *subClassOf* relation between the Environmental area class and the Water area class.
 - 3.1. Create the Inland/marine class, and set up the *subClassOf* relation between the Inland/marine class and the Environmental area class.
 - 3.2. Create the Ocean class, and set up the *subClassOf* relation between the Ocean class and the Environmental area class.
 - 3.3. Create the North/South/Equatorial class, and set up the *subClassOf* relation between the North a South a Equatorial class and the Environmental area class.
 - 3.4. Create the Sub Ocean class, and set up the *subClassOf* relation between the Sub Ocean class and the Environmental area class.
 - 3.5. Create the Large Marine ecosystem class, and set up the *subClassOf* relation between the Large Marine ecosystem class and the Environmental area class.
4. Create the Jurisdiction area class, and set up the *subClassOf* relation between the Jurisdiction area class and the Water area class.

I want to transform my adjacency list-based classification scheme into an ontology



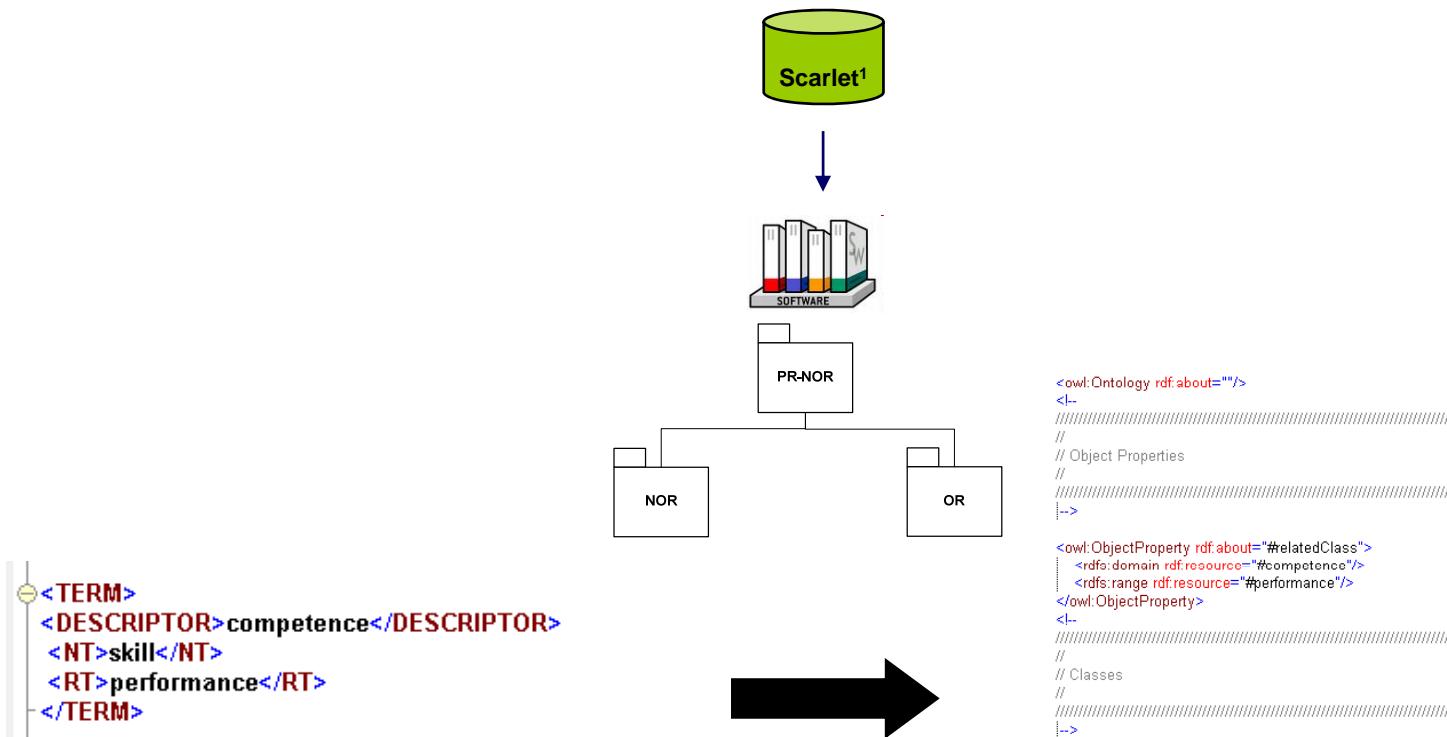
(UML)
Example Solution
Ontology



ontology

Software libraries

- We include software libraries in a framework which implements the transformation process.
- Addition of external resources to disambiguate the semantic relationships among NOR elements.



1 <http://kmi.open.ac.uk/technologies/name/Scarlet>

How to use the software library?

- There are 3 configuration files:
 - nor.xml, for describing the non-ontological resource.
 - prnor.xml, for describing the pattern for re-engineering.
 - or.xml, for describing the ontology generated.
- There is a batch file
 - prnor.bat, for performing the transformation
- Requirements
 - Java runtime environment (tested in 1.5)
 - You should set the JAVA_HOME to the location of the installation directory.

Example: Transform the ASFA thesaurus

- non-ontological resource: asfa
 - Type: term-based thesaurus
 - Datamodel: record-based
 - Implementation: XML

 asfa_xml_20060522.xml

2.780.181 21/10/2009 01:36

```
<THESAURUS>
<TERM>
<NON-DESCRIPTOR>AAS</NON-DESCRIPTOR>
<USE>Absorption spectroscopy</USE>
<STA>Approved</STA>
<TYP>Non-descriptor</TYP>
<INP>2006-05-22</INP>
<UPD>2006-05-22</UPD>

</TERM>

<TERM>
<NON-DESCRIPTOR>Abalone fisheries</NON-DESCRIPTOR>
<USE>Gastropod fisheries</USE>
<STA>Approved</STA>
<TYP>Non-descriptor</TYP>
<INP>2006-05-22</INP>
<UPD>2006-05-22</UPD>

</TERM>

<TERM>
<DESCRIPTOR>Abdomen</DESCRIPTOR>
<UF>Peritoneum</UF>
<BT>Body regions</BT>
<RT>Digestive system</RT>
<STA>Approved</STA>
<TYP>Descriptor</TYP>
<INP>2006-05-22</INP>
<UPD>2006-05-22</UPD>
|</TERM>
```

Example: Transform the ASFA thesaurus

```
<Nor type="Thesaurus" name="ASFA">
  <Schema>
    <SchemaEntities>
      <SchemaEntity name="Term">
        <Attribute name="Identifier" valueFrom=" DESCRIPTOR" type="string"/>
        <Relation name="NT" using="RecordBased" valueId="NT" destination="Term"/>
        <Relation name="BT" using="RecordBased" valueId="BT" destination="Term"/>
        <Relation name="RT" using="RecordBased" valueId="RT" destination="Term"/>
        <Relation name="UF" using="RecordBased" valueId="UF" destination="NonPreferredTerm"/>
      </SchemaEntity>
      <SchemaEntity name="NonPreferredTerm">
        <Attribute name="Identifier" valueFrom="NON-DESCRIPTOR" type="string"/>
      </SchemaEntity>
    </SchemaEntities>
  </Schema>
  <DataModel>
    <RecordBased>
      <Entity>TERM</Entity>
    </RecordBased>
  </DataModel>
  <Implementation>
    <Xml xmlFile="nors/thesauri/recordbased/asfa_xml_20060522.xml" xsdFile="nors/thesauri/recordbased/asfa.xsd"/>
  </Implementation>
</Nor>
```

Example: Transform the ASFA thesaurus

- prnor.xml, description of the pattern
 - Transformation approach: TBox
 - Term -> Class

```
<Prnor identifier="PR-NOR-CLLO-10" transformationApproach="TBox">
  <Class from="Term" identifier="[[Identifier]]">
    <ObjectProperty from="NT" to="NT"/>
    <ObjectProperty from="RT" to="RT"/>
    <ObjectProperty from="BT" to="BT"/>
    <ObjectProperty from="UF" to="rdfs:label"/>
  </Class>
</Prnor>
```

- or.xml, description of the ontology generated

```
<Or name="ASFA Ontology" ontologyURI="http://droz.dia.fi.ump.es/ontologies/asfa.owl" ontologyFile="asfa.owl" implementation="OWL" alreadyExist="no">
</Or>
```

Example: Transform the ASFA thesaurus

- Run the transformation

```
C:\prnor>prnor  
Starting ...  
Running ...  
Done  
  
C:\prnor>_
```

- Wait until it finishes, and check the ontology.

 asfa owl 3.170.728 03/11/2009 00:05a--

```
<!-- http://droz.dia.fi.ump.es/ontologies/asfa.owl#Absorption_spectroscopy -->  
<owl:Class rdf:about="#Absorption_spectroscopy"/>  
<!-- http://droz.dia.fi.ump.es/ontologies/asfa.owl#Abalone_fisheries -->  
<owl:Class rdf:about="#Abalone_fisheries"/>  
<!-- http://droz.dia.fi.ump.es/ontologies/asfa.owl#Abdomen -->  
<owl:Class rdf:about="#Abdomen"/>  
<!-- http://droz.dia.fi.ump.es/ontologies/asfa.owl#Enzymes -->  
<owl:Class rdf:about="#Enzymes"/>
```

Exercise 1

- La práctica comienza el 25 de noviembre 2009. La información y recursos necesarios estarán disponible en el wiki.
- Se proporciona a los estudiantes un classification scheme, de un determinado dominio, implementado en una base de datos.
- Los estudiantes crean el modelo conceptual utilizando el classification scheme.
- Los estudiantes entregan el modelo conceputal creado (30 de Noviembre de 2009).
- Se proporciona a los estudiantes de la librería de software.
- Los estudiantes generan la ontología utilizando la librería de software y el classification scheme.
- Los estudiantes rellenan dos cuestionarios.
- Los estudiantes entregan la ontología generada, y los cuestionarios. (2 de diciembre de 2009)

Exercise 2

- La práctica comienza el **25 de noviembre 2009**. La información y recursos necesarios estarán disponible en el wiki.
- Se proporciona a los estudiantes un tesauro, de un determinado dominio, implementado en un xml.
- Los estudiantes crean el modelo conceptual utilizando el tesauro.
- Los estudiantes entregan el modelo conceptual creado (**30 de Noviembre de 2009**).
- Se proporciona a los estudiantes de la librería de software.
- Los estudiantes generan la ontología utilizando la librería de software y el tesauro.
- Los estudiantes rellenan dos cuestionarios.
- Los estudiantes entregan la ontología generada, y dos cuestionarios (**2 de Diciembre 2009**).