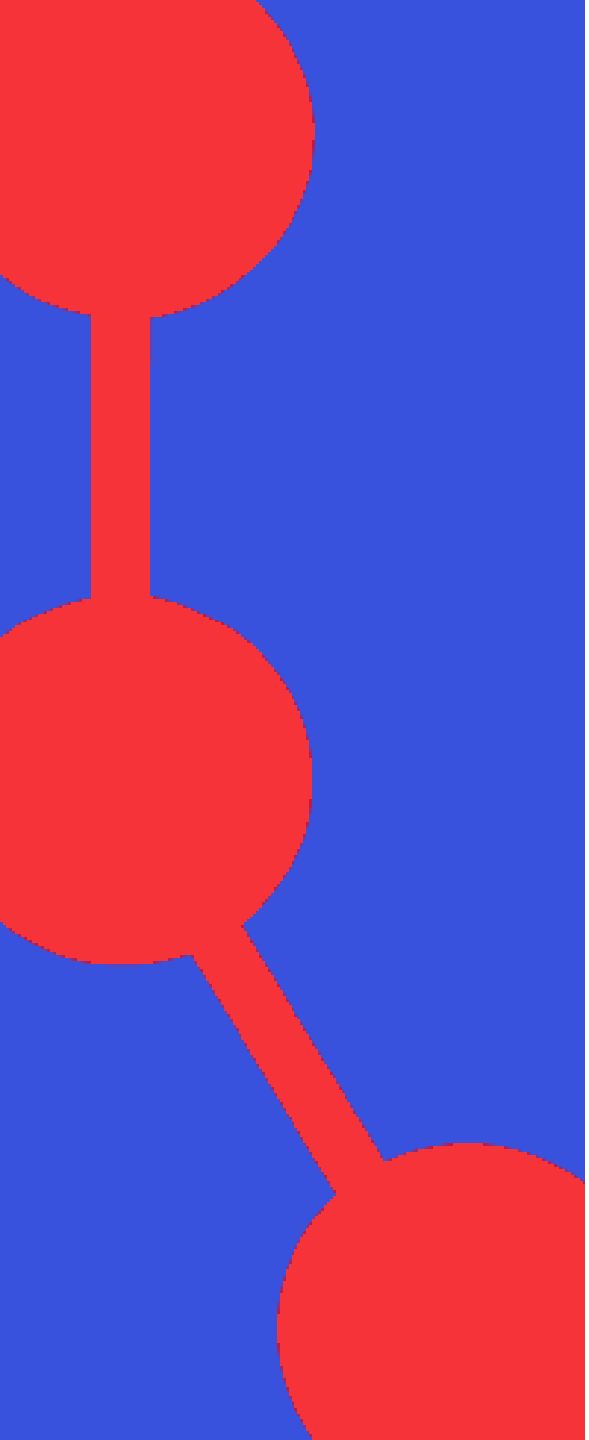


NeOn Methodology for Building Ontology Networks

Asunción Gómez-Pérez

Mari Carmen Suárez-Figueroa

{asun, mcsuarez}@fi.upm.es

Ontology Engineering Group. Departamento de Inteligencia Artificial

Facultad de Informática

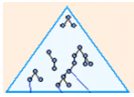
Universidad Politécnica de Madrid

New Trend in Ontology Development

The development of ontologies in different international and national projects have revealed that **there are different alternative ways to build ontologies**.

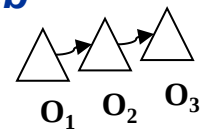
Esperonto

From Scratch



Knowledge Web

Ontology Design Patterns



O. Versioning

O. Alignment

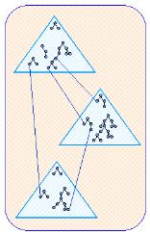
SEEMP & UMLS Project

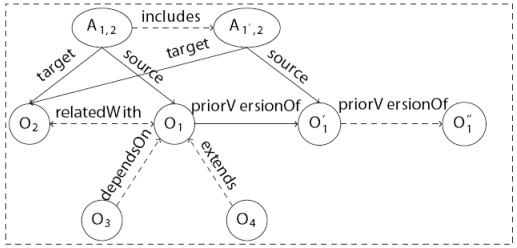
Non-Ontological Resource Reuse

SEKT

Argumentative Development

The Semantic Web of the future will be characterized by using a very large number of **ontologies embedded in ontology networks** built by distributed teams in a collaborative way.





Thus, it is not premature to affirm that a **new trend in ontology development is starting**, whose emphasis is on the ***reuse and possible subsequent reengineering of knowledge-aware resources***, the ***collaborative and argumentative ontology development***, and the ***building of ontology networks***.

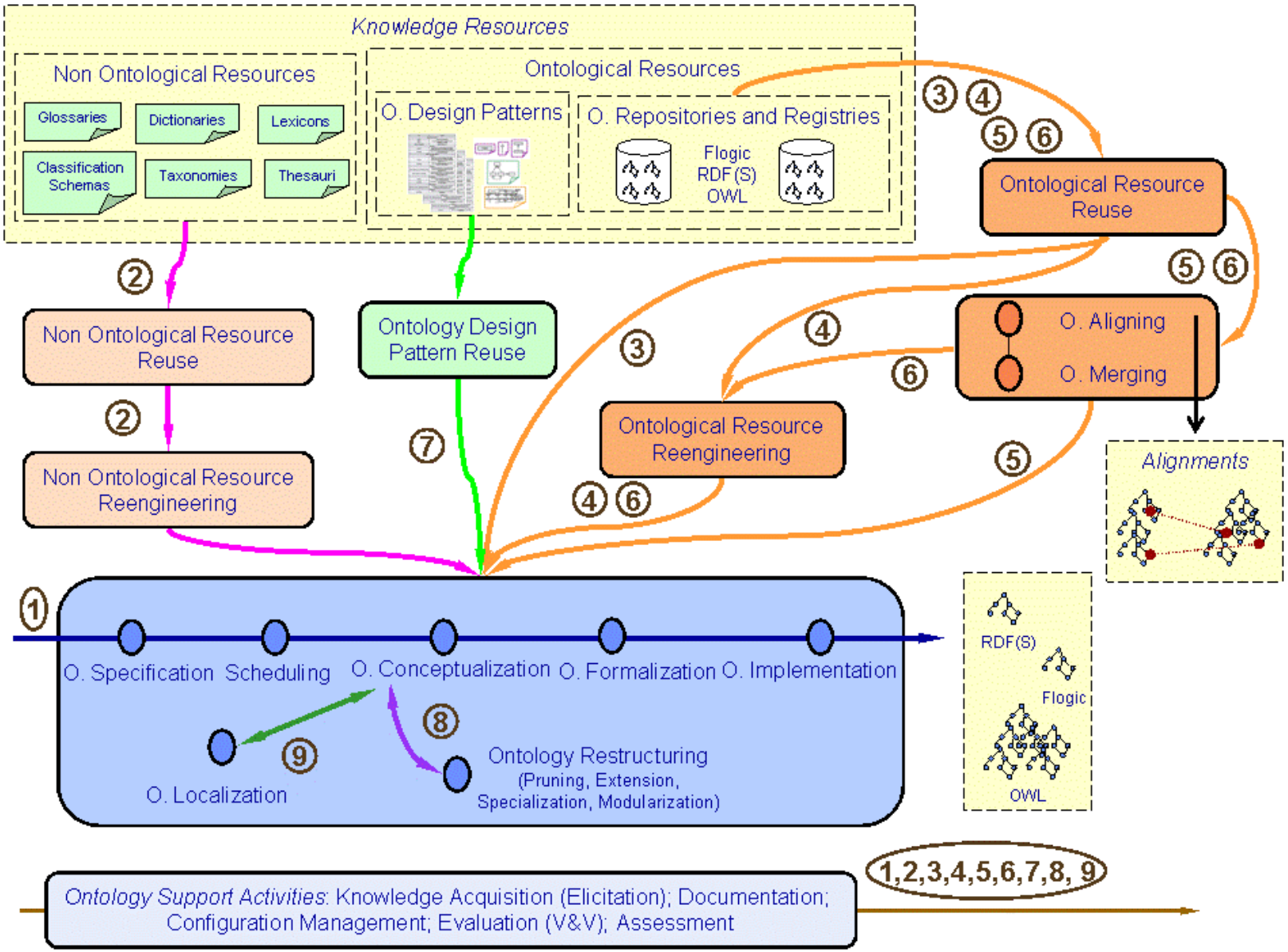
Our Aim: The NeOn Methodology Framework

To create the ***NeOn Methodology for Building Ontology Networks*** to support both the collaborative aspects of ontology development and the reuse and dynamic evolution of networked ontologies.

We have identified a set of ***nine scenarios for building ontologies and ontology networks***

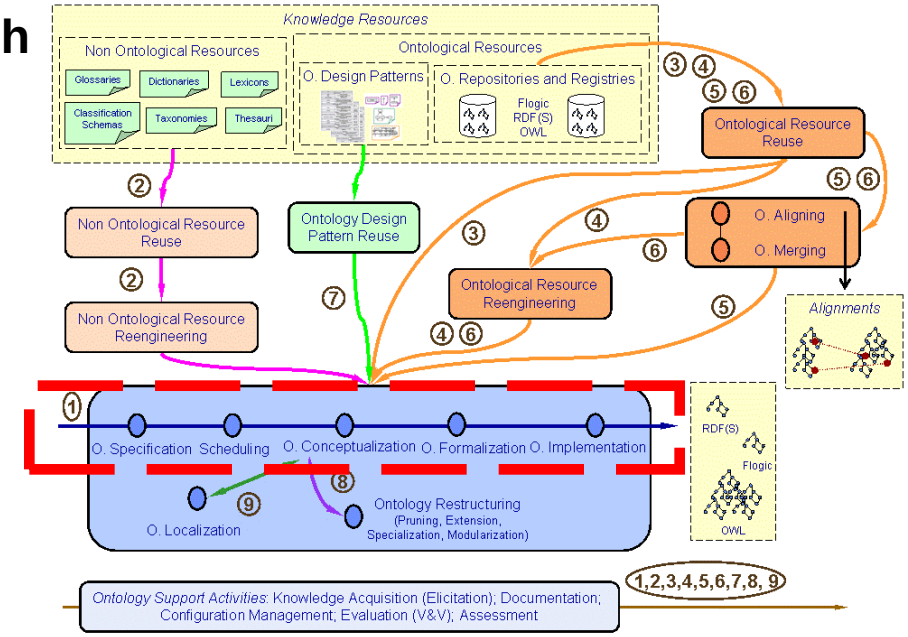
- emphasizing the reuse of existing knowledge resources (ontological and non-ontological),
- generalizing from previous experiences,
- covering the drawbacks of the existing methodologies, and
- taking into account the new trends based on collaboration, context and dynamism.

9 Scenarios for Building Ontology Networks



Scenario 1: From Specification to Implementation

Develop the ontology network from scratch

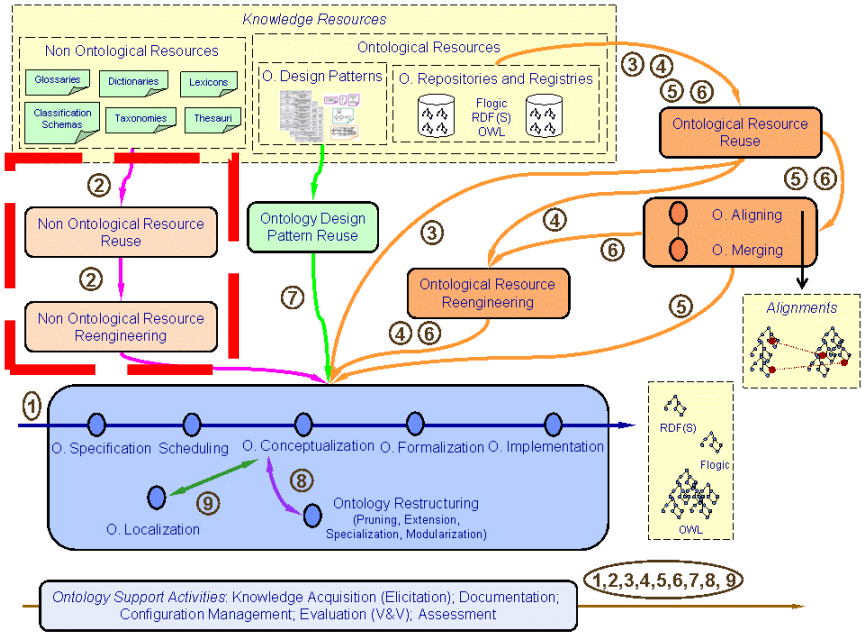


- ***Ontology requirements specification activity***, whose objective of this activity is to output the ontology requirements specification document (ORSD).
- A *quick search* for knowledge-aware resources using the terms appearing in the ORSD as input. The search results allow knowing which types of resources are available for a possible reuse during the ontology network development.
- ***Scheduling activity*** using the ORSD and the results of the quick search.
- After this activity, the ontology developers should carry out the ***ontology conceptualization***, the **ontology formalization**, and the ***ontology implementation activities*** following METHONTOLOGY or On-To-Knowledge.

Scenario 2: Reusing and Re-engineering Non-ontological Resources

Reusing existing non-ontological resources (NOR) for speeding up the ontology building process

- ***Non-ontological resource reuse process*** for deciding, according to the requirements specified in the ORSD, which existing NORs can be reused to build the ontology. The activities to be performed during such a process are
  - to search non-ontological resources,
  - to assess the set of candidate non-ontological resources, and
  - to select the most appropriate non-ontological resources.



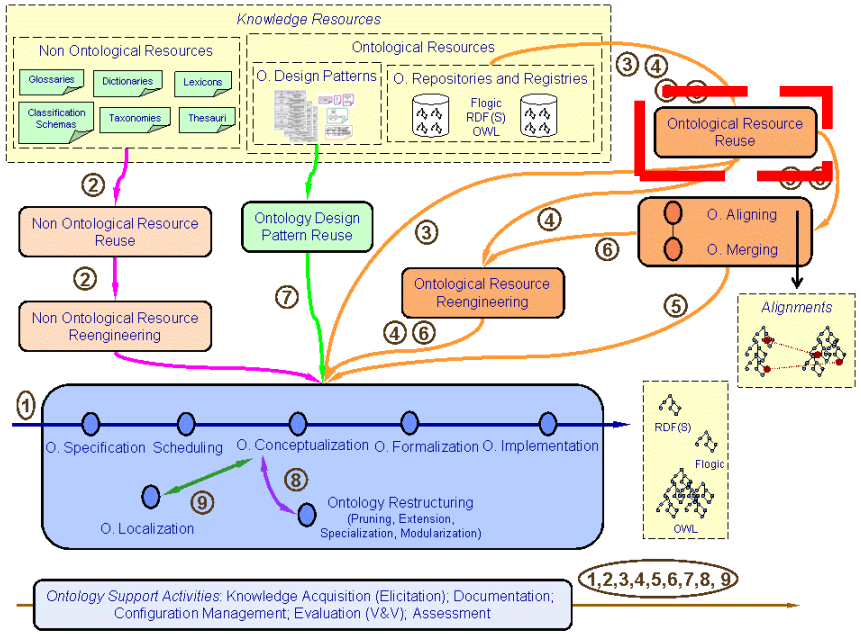
- ***Non-ontological resource re-engineering process*** The activities to be performed during such a process are: non-ontological resource reverse engineering, transformation, and ontology forward engineering.

Scenario 3: Reusing Ontological Resources

Use existing ontological resources for building ontology networks

Different **ways of reusing ontological resources**:

- ontologies can be reused *as a whole*;
- only one part or *module* can be reused; and
- *ontology statements* can be reused.



For **integrating the ontological resources to be reused**, ontology developers can decide:

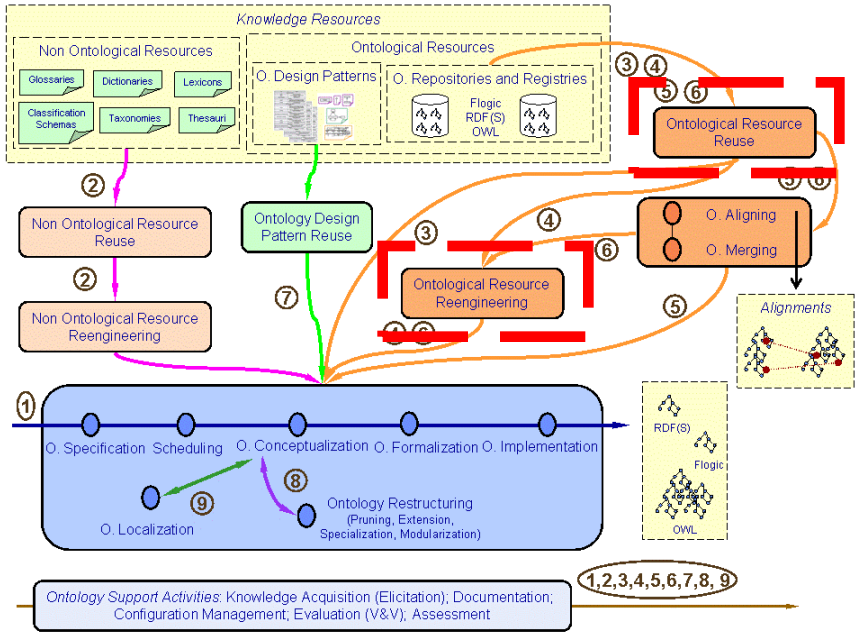
- to reuse them such as they are in the ontology network being developed following the activities of Scenario 1
- to perform a re-engineering process following Scenario 4
- to merge several ontological resources to obtain a new ontological resource following Scenarios 5 or 6.

Scenario 4: Reusing and Re-engineering Ontological Resources

Reuse existing ontological resources and re-engineer them before their integration in the ontology network.

The ***ontological resource re-engineering process*** is composed of the following activities:

- *ontological resource reverse engineering*
- *ontological resource restructuring*
- *ontological resource forward engineering*.



These activities might be carried out at four different levels, depending on the needs of each particular case:

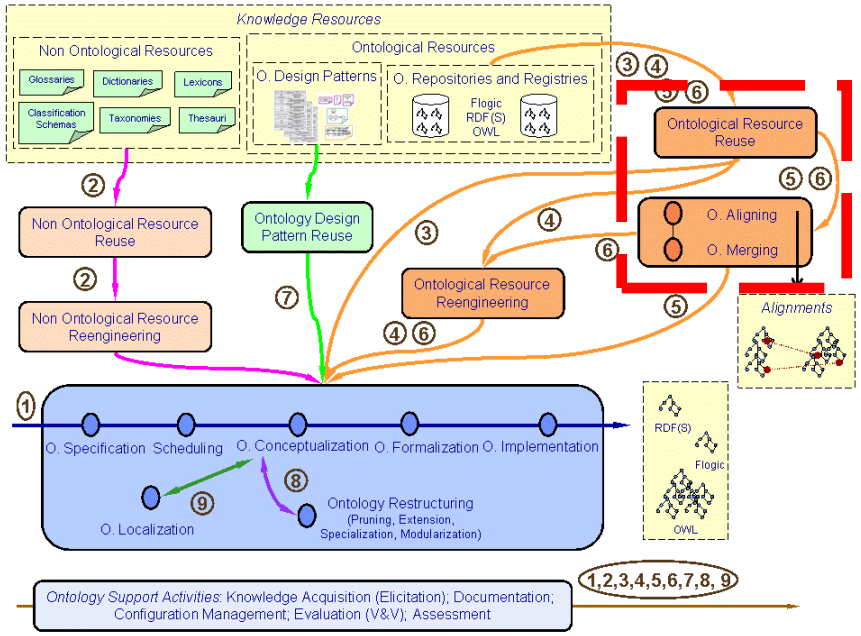
- at the specification level,
- at the conceptualization level,
- at the formalization level, and
- at the implementation level.

Scenario 5: Reusing and Merging Ontological Resources

Reuse and merge existing ontological resources in the development of the ontology network.

First, ontology developers should carry out the ***ontology aligning activity*** and obtain a set of alignments among the selected ontological resources.

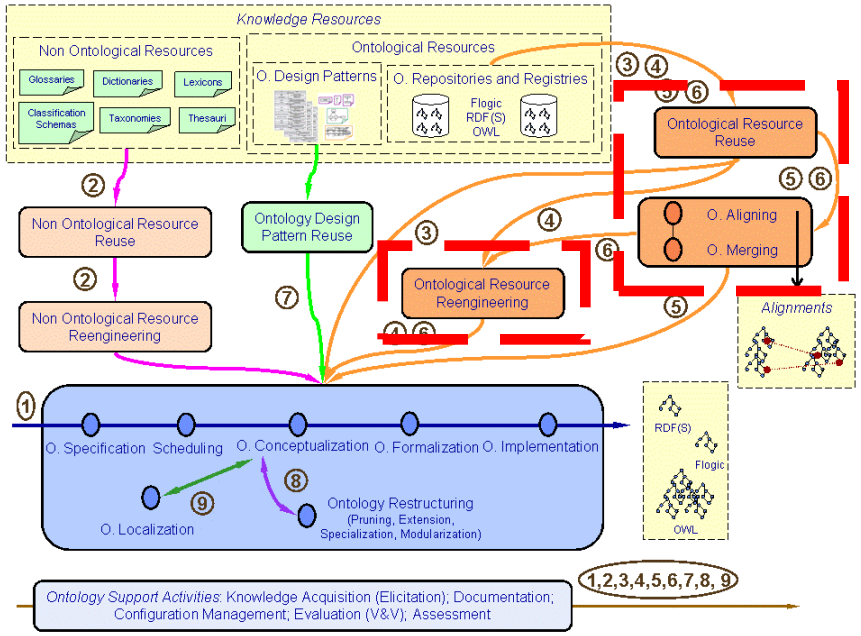
Once the ontology alignments have been established, ontology developers can ***merge*** the ontological resources using such alignments to obtain a new ontological resource.



Scenario 6: Reusing, merging and re-engineering ontological resources

Ontology developers reuse, merge, and re-engineer existing ontological resources in the ontology network building.

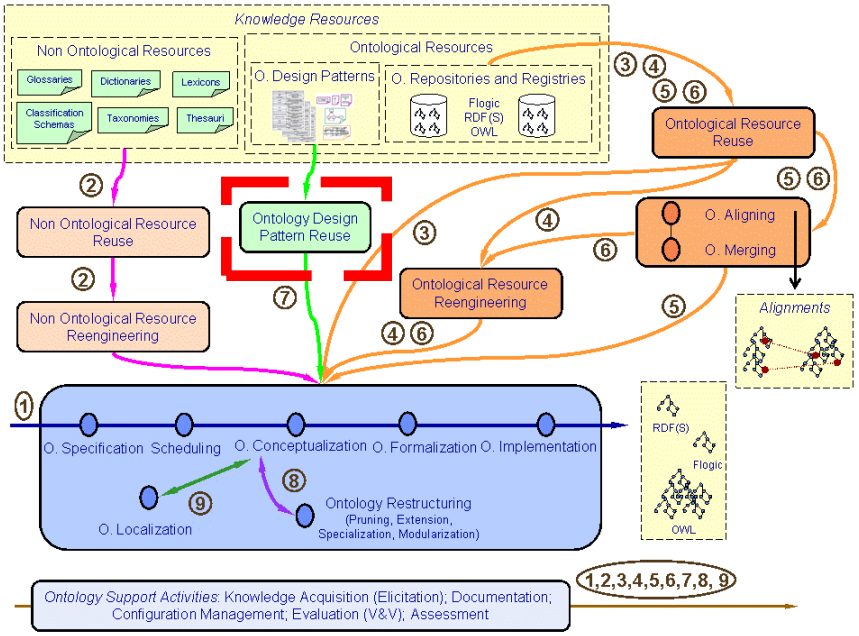
This scenario has the same sequence of activities as Scenario 5; however, here ontology developers can decide not to use the set of merged ontological resource such as it is, but to ***re-engineer*** it.



Scenario 7: Reusing ontology design patterns

Access ODPs repositories to ***reuse ODPs*** for different purposes:

- to reduce modeling difficulties,
- to speed up the modeling process, or
- to check the adequacy of modeling decisions



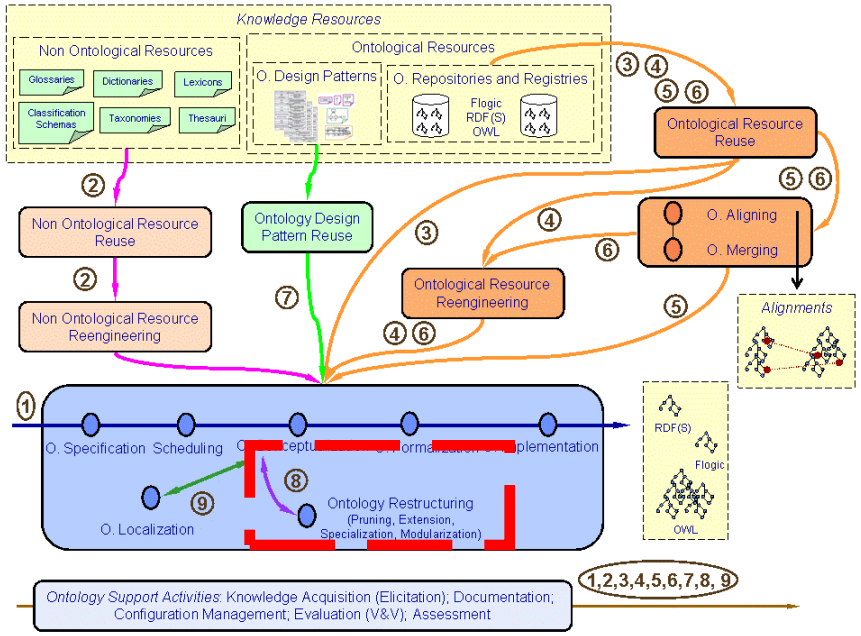
http://ontologydesignpatterns.org

Scenario 8: Restructuring ontological resources

Restructure ontological resources to be integrated in the ontology network being built.

The **ontology restructuring activity** can be performed in the following ways:

- modularizing the ontology in different ontology modules;
- pruning the branches of the taxonomy not considered necessary;
- extending the ontology including (in width) new concepts and relations; and
- specializing those branches that require more granularity and including more specialized domain concepts and relations.

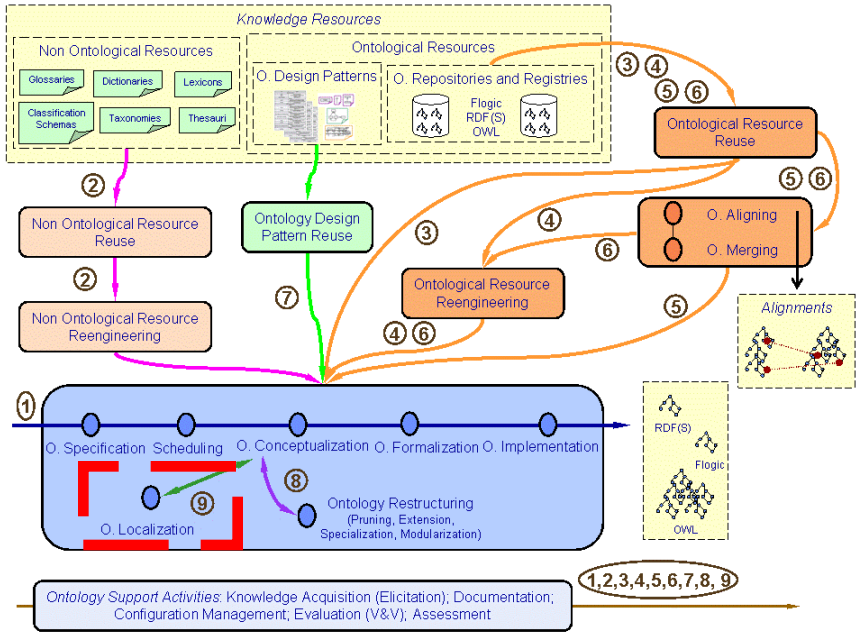


Scenario 9: Localizing ontological resources

Ontology developers adapt an existing ontology to one or various languages and culture communities, obtaining as a result a multilingual ontology.

Once the ontology has been conceptualized, its ***adaptation to a particular natural language*** different from the language used in the conceptualization can be required.

Such an adaptation requires the ***translation*** of all ontology labels into one or several natural languages, being these languages other than the original language of the conceptualization.



9 Scenarios for Building Ontology Networks

In the framework of the NeOn Methodology there are ***prescriptive methodological guidelines for carrying out processes and activities*** involved in

- Scenario 1 (ontology requirements specification and scheduling),
- Scenario 2,
- Scenario 3,
- Scenario 7,
- Scenario 8 (ontology modularization), and
- Scenario 9; and also
- for ontology evaluation and ontology evolution.