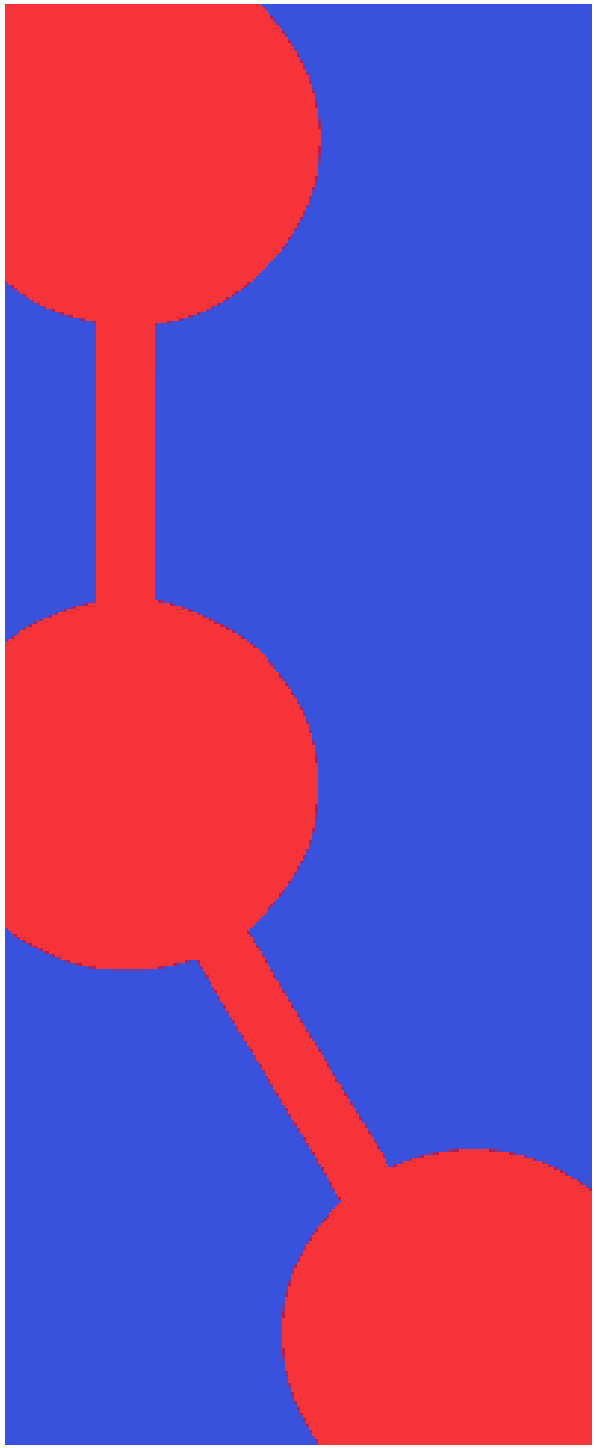

Approach based on LSPs for the development of ontologies. Hands-on Activity

Guadalupe Aguado de Cea, Elena Montiel-Ponsoda, Mari Carmen Suárez-Figueroa

Ontology Engineering Group
Facultad de Informática
Universidad Politécnica de Madrid
Campus de Montegancedo s/n
28660 Boadilla del Monte, Madrid, Spain

http://www.oeg-upm.net

{lupe, asun, emontiel, mcsuarez}@fi.upm.es
Phone: 34.91.3363670
Fax: 34.91.3524819

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Motivation (2): Ontology modelling initiatives aimed at untrained users

- Controlled Languages (CL) were created to palliate non-logicians difficulties in understanding the OWL syntax, and help them in the development of ontologies
- CL are defined as *engineered subsets of natural languages (NL) with explicit constraints on grammar, lexicon, and style* **[Schwitter et al., 2008]**

CLOnE

Manchester Syntax

Attempto Controlled English

Rabbit Syntax

Sydney OWL Syntax

CL BENEFITS	
✓ modelling needs expressed following syntactic rules in NL	✓ users obtain in return an ontology that represents their modelling needs
CL DRAWBACKS	**HOW TO OVERCOME THEM?**
➢ not based on consensual modelling solutions, i.e., ODPs	?
➢ users need a training period to learn CL rules	
➢ all based on the English grammar	
➢ resulting sentences are rather artificial	

Our approach

- Identification of linguistic structures that correspond to the ontological structures represented by **ODPs**

Lexico-Syntactic Patterns (or LSPs)

- **LSPs-ODPs repository**
  - Examples of linguistic structures that correspond to the ODP for Part-Whole relation
  - *Proteins form part of the cell membrane*
  - *Water is made up of hydrogen and oxygen*

Aguado De Cea, G., Gómez-Pérez, A., Montiel-Ponsoda, E., and Suárez-Figueroa, M.C. 2008. **Natural Language-Based Approach for Helping in the Reuse of Ontology Design Patterns**. In *Proceedings of the 16th International Conference on Knowledge Engineering (EKAW)*, pp. 32-47.

LSPs Examples

Example 1: *Non-opioid agents differ from opioid agents*

Disjoint classes ODP

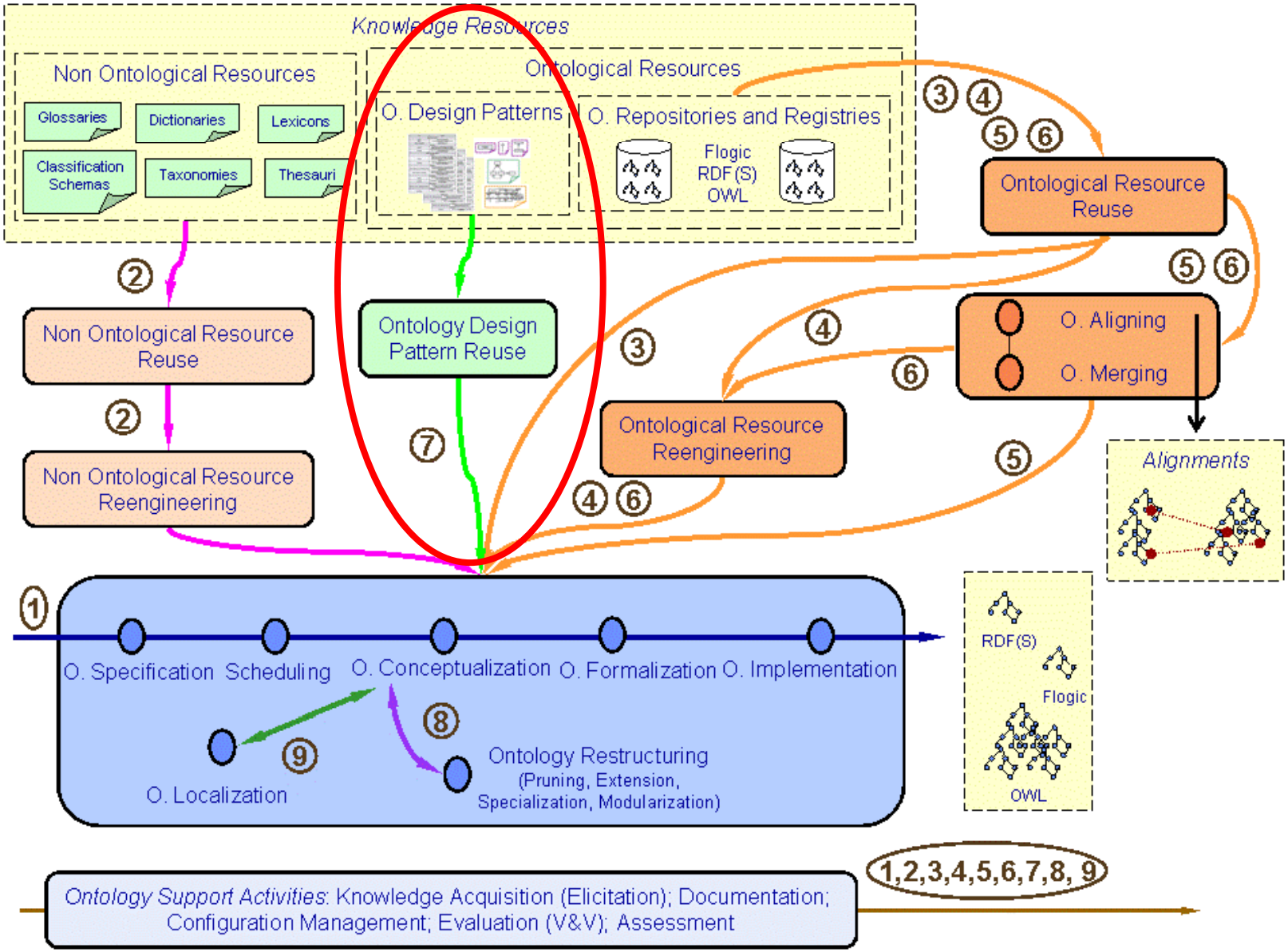
Example 2: *Animals are either vertebrates or invertebrates*

Subclass-of relation ODP
Disjoint classes ODP

Example 3: *Birds have feathers*

Object Property ODP
Datatype Property ODP
Part-whole ODP

Methodological framework: Scenarios of the NeOn Methodology



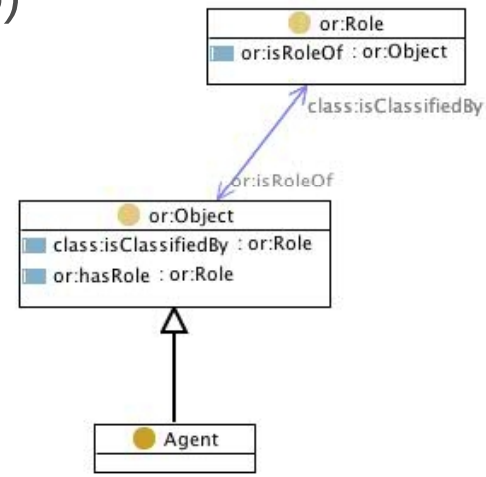
What are Ontology Design Patterns?

- What?

Ontology Design Patterns (ODPs) are defined as *archetypal solutions to design problems* (Gangemi,2005)

ODPs are contained in repositories

***Agent-Role* Content** ODP from www.ontologydesignpatterns.com online repository



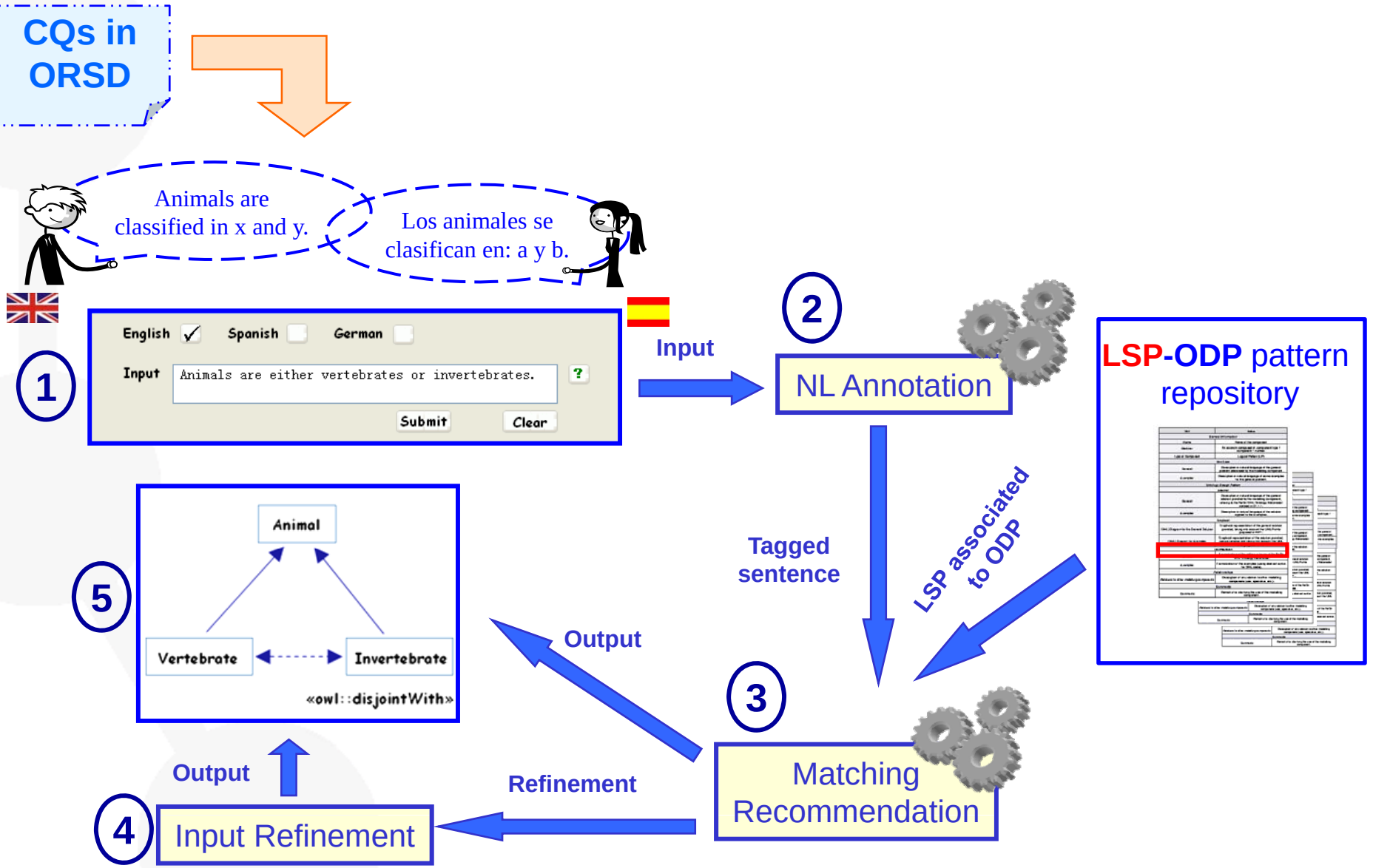
- Why?

Because they encourage users the reuse of best practices and speed up the ontology development process

- PROBLEM in their reuse:

Users find difficulties in selecting the most appropriate pattern for their modelling needs

S.O.S.: *System for Ontology Design Pattern Support*



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Description of the Setting

- Let’s imagine that you want to develop an ontology of the **Olympic Games** domain

- Following the NeOn Methodology you have already performed the activity of:
  - Ontology Requirements Specification (CQs)
- Taking the CQs as background documentation, you **formulate a set of sentences that you would introduce in the S.O.S. system**, so that it helps you recognize the corresponding ODPs

Recommendations
1. Express one topic or idea per sentence. *Falls are types of incidents, which can happen in hospitals.* *Falls are types of incidents. Falls happen in hospitals.* 
2. Include in each sentence subject, verb and object **(SVO)** (Do not use pronouns instead of nouns!) *They receive assistance.* *Patients receive assistance.* 
3. Avoid using neither interrogative nor negative sentences. *Chairs are not considered mobility aids.* *Mobility aids are walking sticks, walking frames, crutches, wheelchairs, walking tripods, callipers, orthotics, and prosthetic devices.* 

Recommendations
4. Avoid coordination of phrases, and use only when necessary. Falls are types of incidents, and can be cause by different factors or hazards. Falls are types of incidents. Falls are caused by different factors.
5. Avoid including redundant or unnecessary information that does not add new content to the idea. According to many people, medications can cause falls. Medications cause falls.
6. End up each sentence with full stop.
7. In enumerations, use comas to separate elements. Examples of “Fall Minimation Strategies” are restraint, safety devices, protocols, intervention, and procedures.

CQs of the Olympic Games domain to be used in this hands-on

Number	Competency Questions (CQs) -	Answers
CQ1	Which are the types of Olympic Games?	Summer Olympic Games and Winter Olympic Games
CQ2	Which are the sports that make up the Summer Olympic Games?	Aquatics, Athletics, Gymnastics, Judo, Archery, Taekv
CQ3	In which summer sports can women participate?	Aquatics, Athletics, Gymnastics, Judo, Archery, Tenni
CQ4	Which summer sports are only for men?	
CQ5	What is the difference/relation between sports and disciplines?	
CQ6	Which are the disciplines included in the Aquatics sport?	Diving, Swimming, Waterpolo, Synchronized swimming
CQ7	Which are the types of disciplines into which volleyball is divided?	Volleyball or Beach volleyball
CQ8	Who are the people that form part of the jury?	Peter Parker, John Doe, Mery Green
CQ9	Who are the members of a team?	
CQ10	Who are the winners in a discipline?	Nadia Comaneci, Jesús Carballo, Michael Phelps, Rafa
CQ11	Who are the participants in a discipline?	Nadia Comaneci, Jesús Carballo, Michael Phelps, Rafa
CQ12	Which is the name of the participant?	Nadia Comaneci, Jesús Carballo, Michael Phelps, Rafa
CQ13	Which is the age of the participant?	
CQ14	Which is the identification number of the participant?	
CQ15	Which is the country of origin of the participant?	United States, Finnland, Germany, Greece, France, Sp
CQ16	Which participant participates in more than one discipline?	
CQ17	Where are Olympic Games organized?	Beijin, Torino, Athens, Salt Lake, Sydney, Nagano, Atl
CQ18	Which are the types of medals?	Gold, Silver, Bronze.
CQ19	How many medals did a participant win?	
CQ20	Which are the events or ceremonies that the Olympic Games consist of?	Opening Ceremony, Closing Ceremony, Medal present
CQ21	Which are the constituents of the Olympic Movement?	National Olympic Committees (NOC), International Oly

Your Turn!

- Work in pairs
- Having in mind the CQs provided, write sentences in NL expressing what you need to model in an ontology of the Olympic Games as if using the S.O.S. system
- Fill in the questionnaire
- You have 40 minutes
- Good luck ☺

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