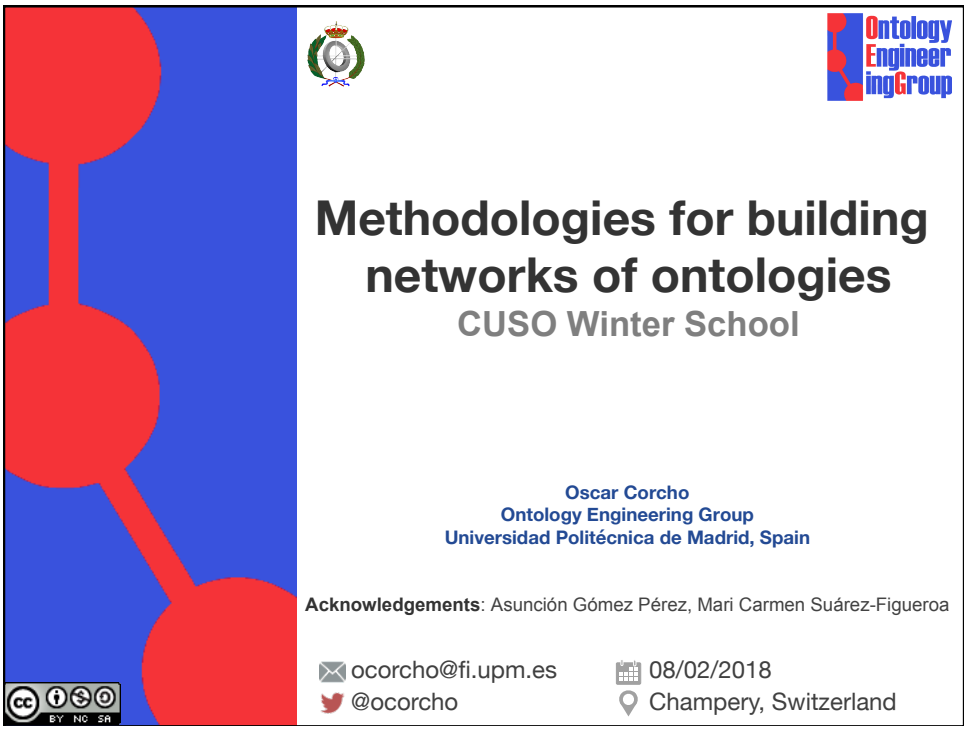

Methodologies for building networks of ontologies

CUSO Winter School

Oscar Corcho
Ontology Engineering Group
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Acknowledgements: Asunción Gómez Pérez, Mari Carmen Suárez-Figueroa

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08/02/2018
Champery, Switzerland

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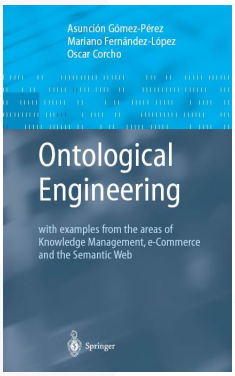
About all the material that we will use

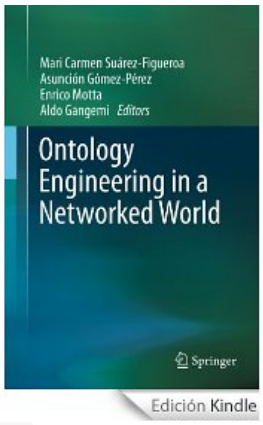
- The material used in these sessions has been compiled by Oscar Corcho by reusing existing materials from several OEG members:
  - Asunción Gómez-Pérez
  - Mari Carmen Suárez de Figueroa Baonza
  - María Poveda
  - Mariano Fernández-López
  - etc.

Ontological Engineering

- It refers to the set of activities that concern
  - the ontology development process,
  - the ontology life cycle,
  - the methods and methodologies for building ontologies,
  - the tool suites
  - and languages that support them

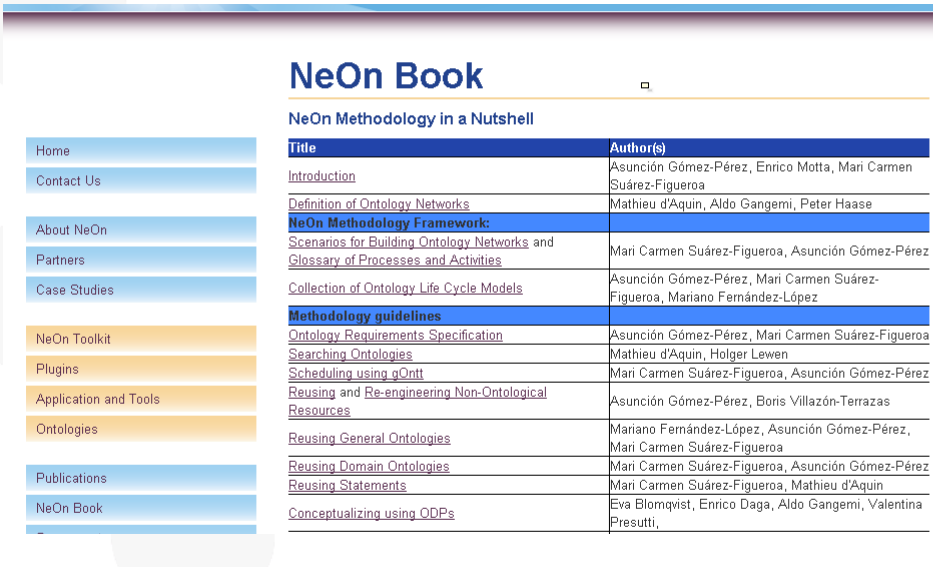
References



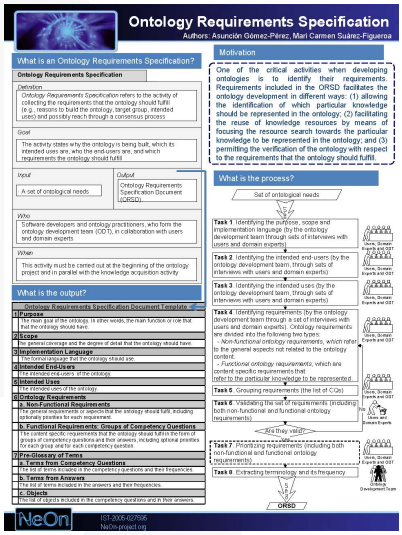


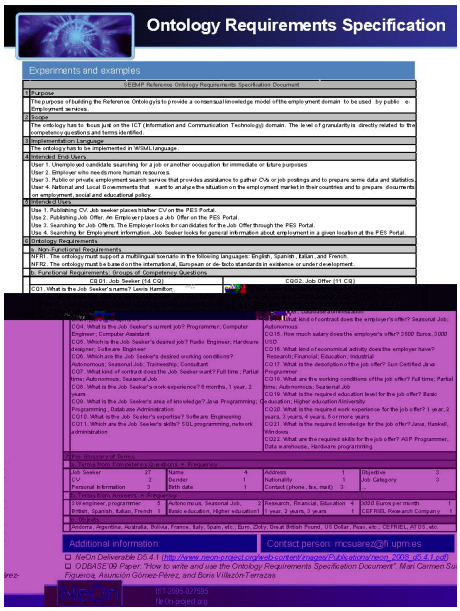
- **NeOn Methodology**
  - The NeOn Methodology framework: A scenario-based methodology for ontology development. Suárez-Figueroa , Mari Carmen | Gómez-Pérez , Asunción | Fernández-López , Mariano. Journal: Applied Ontology, vol. 10, no. 2, pp. 107-145, 2015
- **Glossary of terms**
  - Lights and shadows in creating a glossary about ontology engineering. Mari Carmen Suárez-Figueroa, Guadalupe Aguado-de-Cea and Asunción Gómez-Pérez. Terminology 19:2, 2013. iv, 165 pp. (pp. 202–236)
- **Example of use of the NeOn methodology**
  - A network of ontology networks for building e-employment advanced systems. Boris Villazón-Terrazas, Jaime Ramírez, Mari Carmen Suárez-Figueroa, Asunción Gómez-Pérez. Expert Systems with Applications. Vol 38. Issue 11. October 2011, Pages 13612–13624.
- **NeOn Book summaries:**
  - http://www.neon-project.org/nw/NeOn_Book

http://www.neon-project.org/nw/NeOn_Book



NeOn Methodology factsheets





Index

Building ontologies in the 90s

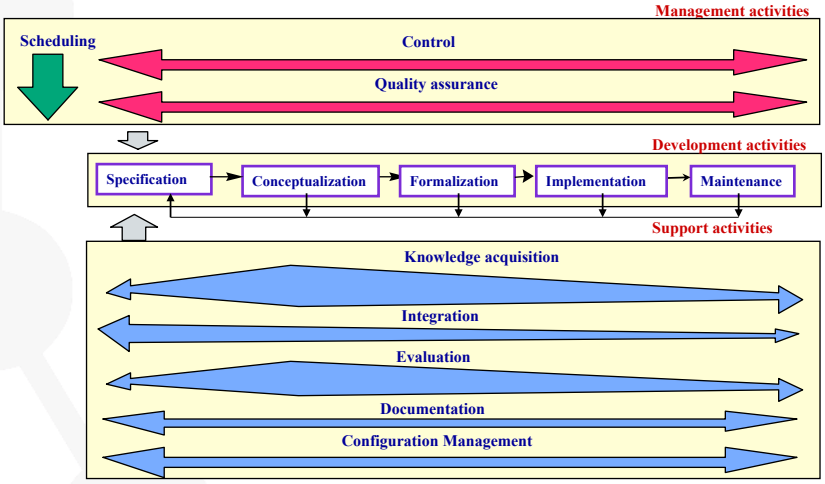
Methodologies for building single ontologies

- Uschold and King's method
- Grüninger and Fox's methodology
- KACTUS approach
- METHONTOLOGY
- SENSUS method
- On-To-Knowledge
- DILIGENT

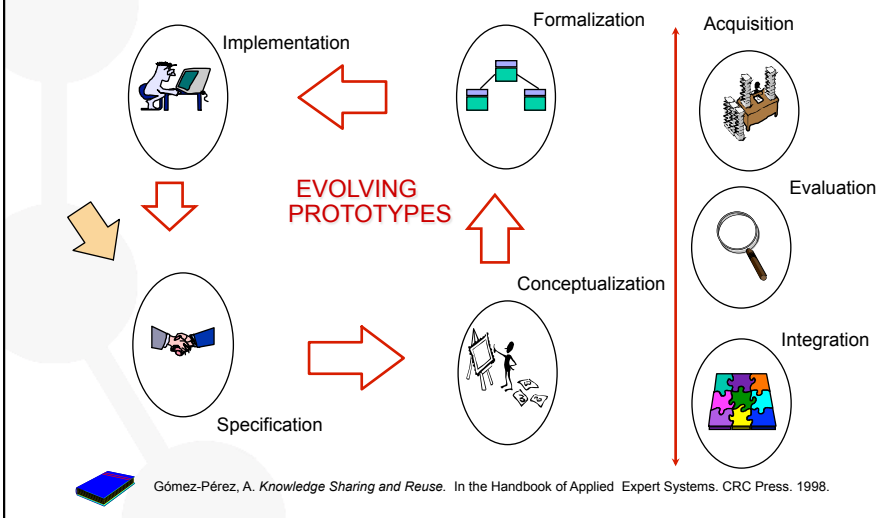
Some ontology learning approaches

- Not integrated with existing methodologies
- Mainly from non-structured data using NLP techniques

Methontology: Ontology Development Process (II)



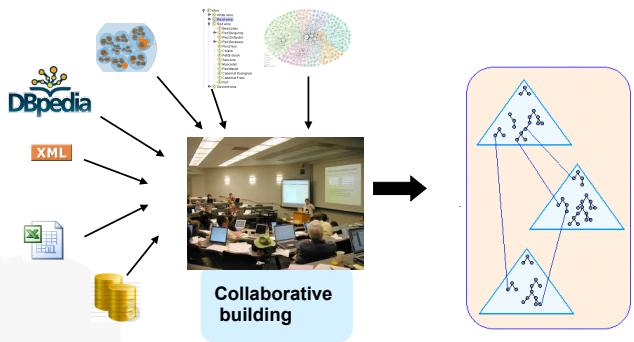
Methontology: Ontology Life Cycle



Gómez-Pérez, A. *Knowledge Sharing and Reuse.* In the Handbook of Applied Expert Systems. CRC Press. 1998.

Current situation

- We want to reuse existing knowledge-aware resources
- Ontologies are usually built collaboratively
- Ontologies are usually interconnected



Dbpedia ontology

Ontology Classes

http://wiki.dbpedia.org/Ontology

- owl:Thing
  - Activity (edit)
    - Game (edit)
      - BoardGame (edit)
    - Sport (edit)
      - Athletics (edit)
      - Boxing (edit)
        - BoxingCategory (edit)
        - BoxingStyle (edit)
      - HorseRiding (edit)
  - Agent (edit)
    - Deity (edit)
    - Family (edit)
      - NobleFamily (edit)
    - Organisation (edit)
      - Band (edit)
      - Broadcaster (edit)
        - BroadcastNetwork (edit)
        - RadioStation (edit)
        - TelevisionStation (edit)
      - ClericalOrder (edit)
      - ComedyGroup (edit)
      - Company (edit)
        - Airline (edit)
        - Brewery (edit)
        - BusCompany (edit)
        - LawFirm (edit)
        - Publisher (edit)
    - Person (edit)
      - Ambassador (edit)
      - Archeologist (edit)
      - Architect (edit)
      - Aristocrat (edit)
      - Artist (edit)
        - Actor (edit)
          - AdultActor (edit)
          - VoiceActor (edit)
        - Comedian (edit)
        - ComicsCreator (edit)
        - Dancer (edit)
        - FashionDesigner (edit)
        - Humorist (edit)
        - MusicalArtist (edit)
          - BackScene (edit)
          - ClassicalMusicArtist (edit)
          - Instrumentalist (edit)
            - Guitarist (edit)
          - MusicDirector (edit)
          - Singer (edit)
        - Painter (edit)
        - Photographer (edit)
        - Sculptor (edit)
        - Writer (edit)
          - MusicComposer (edit)
          - PlayWright (edit)
          - Poet (edit)
          - ScreenWriter (edit)

Schema.org

schema.org

Search

Home Schemas Documentation

defined as two hierarchies: one for textual property values, and one for the things that they describe.

in schema.org hierarchy: a collection of types (or "classes"), each of which has one or more parent types. Although a type may have more than one super-type, here we s
the tree only. There is also a parallel hierarchy for

ary view:
bulary Core plus all extensions

ension vocabularies

Action
- AchieveAction
  - LoseAction
  - TieAction
  - WinAction
- AssessAction
  - ChooseAction
    - VoteAction
  - IgnoreAction
  - ReactAction
    - AgreeAction
    - DisagreeAction
    - DislikeAction
    - EndorseAction
    - LikeAction

schema.org

Search

Home Schemas Documentation

Person

Canonical URL: http://schema.org/Person

Thing > Person

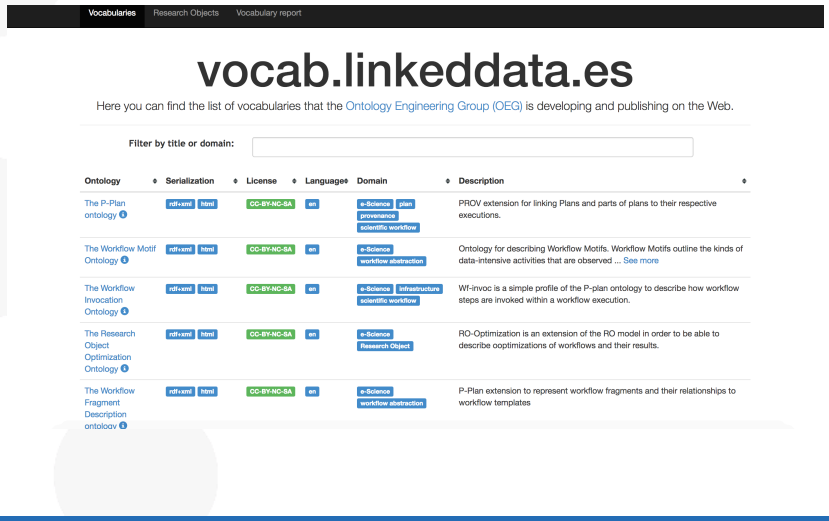
A person (alive, dead, undead, or fictional).

Usage: Over 1,000,000 domains

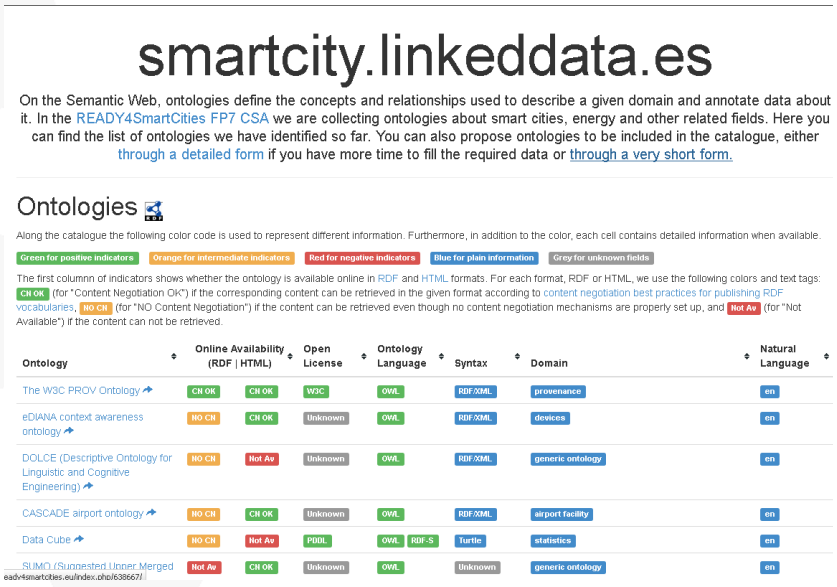
[more...]

Property	Expected Type	Description
Properties from Person		
additionalName	Text	An additional name for a Person, can be used for a middle name.
address	PostalAddress or Text	Physical address of the item.
affiliation	Organization	An organization that this person is affiliated with. For example, a school/university, a club, or a team.
alumniOf	EducationalOrganization or Organization	An organization that the person is an alumni of. Inverse property: alumni.

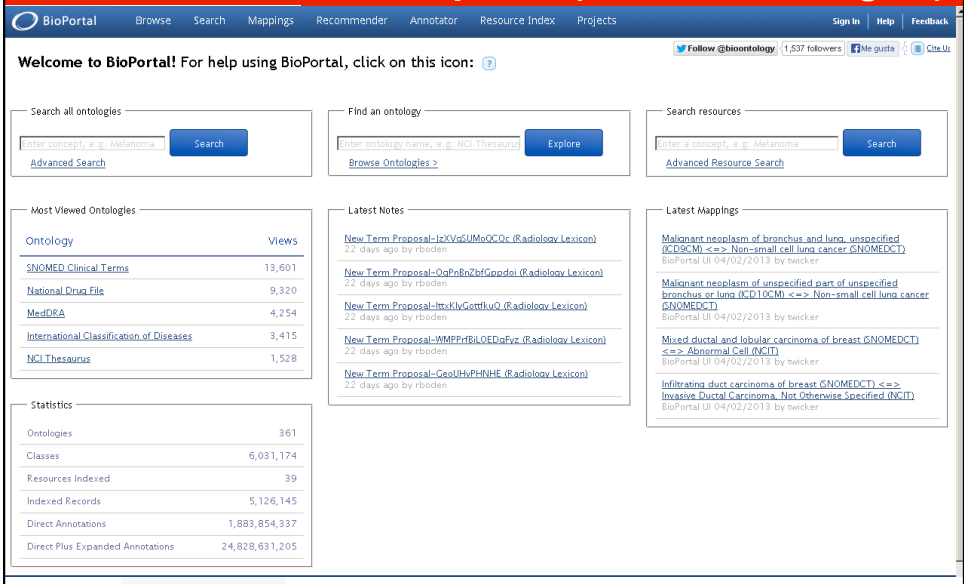
Portals for organisations



Domain-specific portals (e.g. smart cities)



Bioportal (medical ontologies)



Salvadores, M., Alexander, P. R., Musen, M. A., & Noy, N. F. (2009). Bioportal as a dataset of linked biomedical ontologies and terminologies in RDF. Semantic Web.

Index

- Motivation
- State of the art and new trends
- **The NeOn Methodology**
  - Glossary of activities
  - Scenarios
  - Lifecycle models

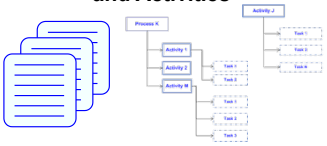
I want to build my ontology

- Which are the key processes and activities in ontology development?
- Which activities do I need in my development?
- When should I carry out each activity?
- Where is the relationship of one activity with the others?
- How do I collect the requirements of my ontology?
- Where can I find ontologies with the goal of reusing them?
- How can I reuse exiting knowledge resources?
- ...

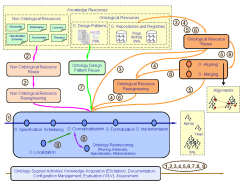
NeOn Methodology

Framework: NeOn Methodology for Building Ontology Networks

NeOn Glossary of Processes and Activities



Scenarios for Building Ontology Networks



Scenario Description:
Assumptions
Prerequisite resources
Sequence of processes and activities
Main outcomes

Set of Ontology Network Life Cycle Models

Waterfall Model

Iterative-Incremental Model

Methodological Guidelines

Process and Activity Description:
General Introduction
Filling Card
Workflow
Examples

Processes and Activities Covered:
- Ontology Requirements Specification
- Scheduling
- Reuse of General Ontologies
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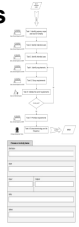
- Reuse of Ontology Statements



The NeOn Glossary of Activities

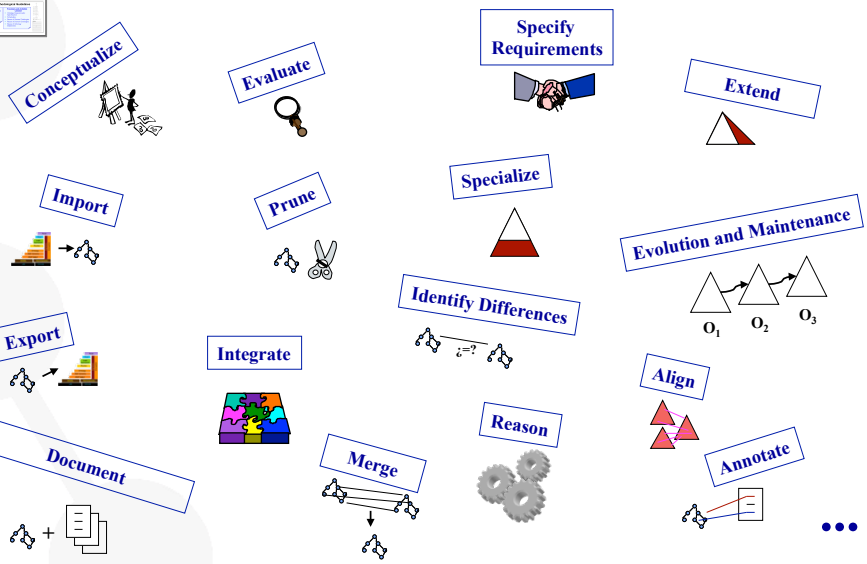
- The *NeOn Glossary of Activities* identifies and defines 55 activities that are carried out when ontology networks are collaboratively built
- Published in the NeOn website
- Consensuated by *all NeOn* partners
- On-going procedure for getting feed-back from the community

NeOn Glossary of Activities

- Ontology Alignment / Aligning
- Ontology Articulation
- Ontology Assessment
- Ontology Combining
- Ontology Conceptualization
- Ontology Configuration Management
- Ontology Coordination
- Ontology Diagnosis
- Ontology Documentation
- Ontology Elicitation
- Ontology Enrichment
- Ontology Evaluation
- Ontology Evolution
- Ontology Extension
- Ontology Formalization
- Ontology Implementation
- Ontology Integration
- Knowledge Acquisition for Ontologies
- Ontology Learning
- Ontology Localization
- Ontology Mapping
- Ontology Matching
- Ontology Mediation

http://www.neon-project.org/

Activities for Building Ontologies



Lights and shadows in creating a glossary about ontology engineering. Mari Carmen Suárez-Figueroa, Guadalupe Aguado-de-Cea and Asunción Gómez-Pérez. Terminology 19:2. 2013. iv, 165 pp. (pp. 202–236)

"Recommended and If-Applicable" Activities

- For each activity included in the NeOn Glossary of Activities, the table identifies which activities are required and which activities are optional (can be carried out or not, depending on the case)during the ontology network building process.

	Required	*If Applicable*
Ontology Conceptualization	X	
Ontology Evaluation	X	
Ontology Integration	X	
Knowledge Acquisition for Ontologies	X	
Ontology Learning		X
Ontology Localization		X
Ontology Matching		X
Ontology Search	X	
Ontology Specification	X	

Lights and shadows in creating a glossary about ontology engineering. Mari Carmen Suárez-Figueroa, Guadalupe Aguado-de-Cea and Asunción Gómez-Pérez. Terminology 19:2. 2013. iv, 165 pp. (pp. 202–236)

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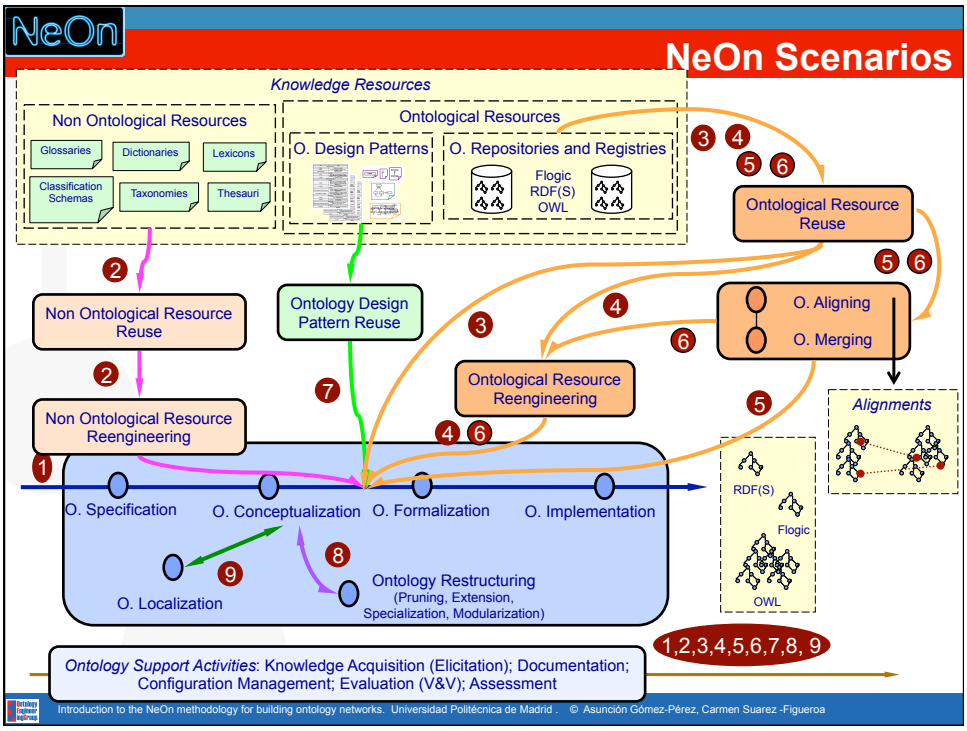
Many activities to be used … Do I need all?
Non-Ontological Resource Reuse
Merging Ontological Resources
Ontological Resource Reuse
Localizing Ontological Resources
Reusing Ontology Design Patterns
.....
Ontological Resource Re-engineering
Restructuring Ontological Resources
Non-Ontological Resource Re-engineering
Classical
1
Introduction to the NeOn methodology for building ontology networks. Universidad Politécnica de Madrid . © Asunción Gómez-Pérez, Carmen Suarez -Figueroa


NeOn
NeOn Scenarios
Knowledge Resources
Non Ontological Resources
Glossaries
Dictionaries
Lexicons
Classification Schemas
Taxonomies
Thesauri
Ontological Resources
O. Design Patterns
O. Repositories and Registries
Flogic
RDF(S)
OWL
Ontological Resource Reuse
Non Ontological Resource Reuse
Ontology Design Pattern Reuse
O. Aligning
O. Merging
Ontological Resource Reengineering
Non Ontological Resource Reengineering
Alignments
RDF(S)
Flogic
OWL
O. Specification
O. Conceptualization
O. Formalization
O. Implementation
O. Localization
Ontology Restructuring
(Pruning, Extension, Specialization, Modularization)
1,2,3,4,5,6,7,8, 9
Ontology Support Activities: Knowledge Acquisition (Elicitation); Documentation; Configuration Management; Evaluation (V&V); Assessment
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Scenarios

The NeOn Methodology framework: A scenario-based methodology for ontology development. Suárez-Figueroa , Mari Carmen | Gómez-Pérez , Asunción | Fernández-López , Mariano. Journal: Applied Ontology, vol. 10, no. 2, pp. 107-145, 2015

1. Building ontology networks from scratch without reusing existing resources.
2. Building ontology networks by reusing and reengineering non ontological resources.
3. Building ontology networks by reusing ontologies or ontology modules.
4. Building ontology networks by reusing and reengineering ontologies or ontology modules.
5. Building ontology networks by reusing and merging ontology or ontology modules.
6. Building ontology networks by reusing, merging and reengineering ontologies or ontology modules.
7. Building ontology networks by reusing ontology design patterns.
8. Building ontology networks by restructuring ontologies or ontology modules.
9. Building ontology networks by localizing ontologies or ontology modules.

NeOn Methodology

Framework: NeOn Methodology for Building Ontology Networks

NeOn Glossary of Processes and Activities

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Introduction to the NeOn methodology for building ontology networks. Universidad Politécnica de Madrid . © Asunción Gómez-Pérez, Carmen Suarez -Figueroa

Life Cycle Models for Ontology Networks

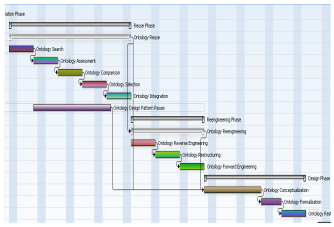
- **Ontology network life cycle model**: a model to describe how to develop (and maintain) an ontology network project.

Set of Ontology Network Life Cycle Models

Waterfall Model

Iterative-Incremental Model

- The **ontology life cycle** is the specific sequence of activities that the ontology practitioners carry out for developing an ontology.



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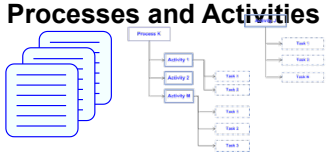
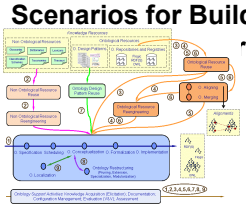


Scenarios for Building Ontology ...ks



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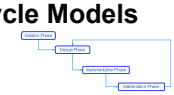

Iterative-Incremental Model

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NeOn Methodology

Process and activities covered:

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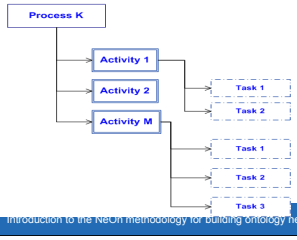
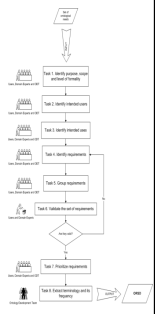
- Scheduling
- Non Ontological Resource Reuse
- Non Ontological Resource Reengineering
- Reuse General Ontologies
- Reuse Domain Ontologies
- Reuse Ontology Statements
- Reuse Ontology Design Patterns



All processes and activities are described with:

- A filling card
- A workflow
- Examples



Process or Activity Name	
Definition	
Goal	
Input	*Output*
Who	
When	