

Guiding the Evolution of a Multilingual Ontology in a Concrete Setting

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Outline

1 Motivations and Context for Multilingual Ontology Evolution

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- 2 The Method: Multi-Role and Scenario-Based

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- 2 The Method: Multi-Role and Scenario-Based
- 3 The Tool: How to Support the Method in Practice

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- 2 The Method: Multi-Role and Scenario-Based
- 3 The Tool: How to Support the Method in Practice
- 4 Evaluation of Method and Tool

Context

- Ontologies are nowadays used for several tasks besides the classic domain representation:
 - resource annotation;
 - information retrieval;
 - ...
- Recently, the use of multilingual ontologies has significantly grown.
- A concrete experience: the Organic.Lingua EU Project.

Organic.Lingua Project

- Aim: to build a multilingual portal on organic agriculture.
- Resources are annotated with an external multilingual ontology that evolves through the time.
- The ontology does not evolve only by performing operations on the entities, but also by changing their translations.
- The changes of the ontology should not affect the effectiveness of the other components deployed on the platform.

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Novel

- The editing of the multilingual with-a-purpose ontology:
 - multilinguality increases the collaborative aspect;
 - consider the purpose of the ontology.

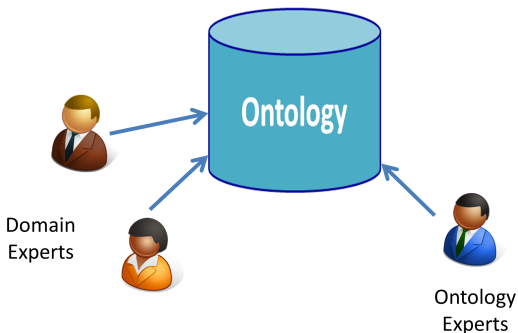
Goals

- Provide method for evolving different layers of the ontologies (conceptual and linguistic¹) that takes into account collaboration and purpose of the ontology.
- Provide a tool that is able to support such a method in an effective way.

¹As “linguistic” we mean the translation of the ontology in different languages, not different conceptualization in the different languages

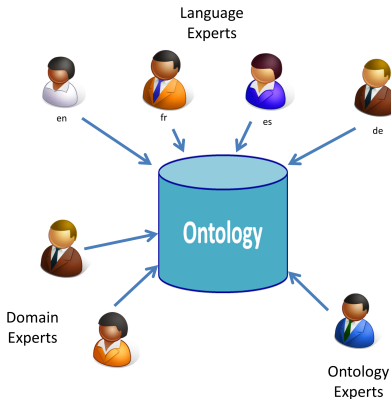
The Multi-Role Aspect

Collaboration in ontology editing is a well-known problem in ontology engineering.



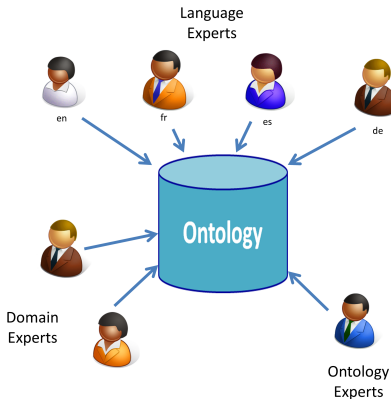
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This problem is amplified in the case of multilingual ontologies.



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We have to define a method for supporting them working together

The Ontology Usage Aspect

- The evolution of the ontology is not only triggered by domain changes.
- In our context we have to manage the evolution of an ontology-with-a-purpose.



Changes on the ontology are triggered by its usage.

Solution: Scenarios for Guiding the Users

Scenarios have been defined based on how the ontology is used:

- Entity deprecation.
- Ontology mapping.
- Ontology enrichment.
- Entity specialization.
- Entity generalization.
- Entity translation.

The Entity Specialization Scenario in Action

Auto-translate Off English ▾

Results 1 - 10 of 396 Results per page: 10

4th Congress Of The European Project Quality Low Input Food
 This resource is in English

The fourth annual scientific congress of the QLIF project took place during 19-20 June 2008 at the occasion of the 16th IFOAM Organic World Congress in Modena, Italy, where ISOFAR also organized their 2nd Scientific Conference. During the Organic World Congress QLIF offered a series of five outstanding workshops where central organic themes were highlighted during a synthesis paper written by a team of QLIF authors. Subsequently, the workshops made room for an exhaustive, moderated discussions.

Typical age range context: 18-U Rate: 4.0 (10 votes)

Keywords: IFOAM, organic project, low input food, food quality, ISOFAR, QLIF More Info

Abstract's Language: English (human) Improve translation

A Comparative Analysis of Organic and Conventional Farming through the Italian FADN

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From the usage...

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ICTPSP

ORGANIC CONNET OUTLOOK EVOLUTION SCENARIOS

Scenario 1: Challenge: Intensive Agriculture

Background Information: The number of impacts in the ontology is 500 according to the data set used and represented in a cloud of those impacts. An example of the scenario is e.g. 2000, Organic... (some examples are available released from the ontology).

Task: Develop a scenario about intensive agriculture.

Scenario:

- 1. **Background:** Intensive agriculture is a farming system that uses high levels of chemical fertilizers and pesticides to maximize yields. It is characterized by monoculture and high inputs of water and energy.
- 2. **Impact:** Intensive agriculture leads to soil degradation, water pollution, and loss of biodiversity.
- 3. **Scenario:** Intensive agriculture is a farming system that uses high levels of chemical fertilizers and pesticides to maximize yields. It is characterized by monoculture and high inputs of water and energy.

Conclusion: Developing a scenario about intensive agriculture through the ontology involves several steps, including the selection of relevant impacts, the identification of relationships, and the development of a narrative.

Entity
Specialization
Scenario

From the usage...

... to the scenario.

The Entity Specialization Scenario in Action

Background information: Some ontology terms in the ontology have been used to annotate an excessive number of educational resources in the portal: some terms qualify to 300 learning objects or more. This is not useful as the ontology is used in searched so these terms do not help users to narrow down results.

Task:

Revise the list of concepts in Organic.Lingua ontology and find new / refined terms for those concepts that retrieve more learning resources.

Participants:

- Babis Thanopoulos [Domain experts coordinator]
- Domain experts from all institutions in the consortium
- One ontology expert

Procedure:

- Use the excel file with information about concepts and resources annotated to guide the work in this scenario
- Start by the terms annotating more than 300 learning objects
- Find more refined terms for each of the identified concepts to refine
- Discuss in MoKi about the appropriateness of including each new concept in the ontology

To remember:

New concepts will be part of the revised ontology so they will need to be defined (agreed definition in English) and translated into all languages.

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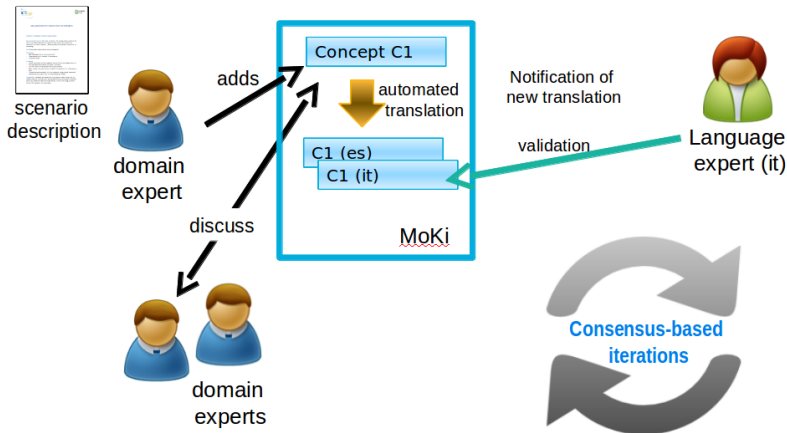
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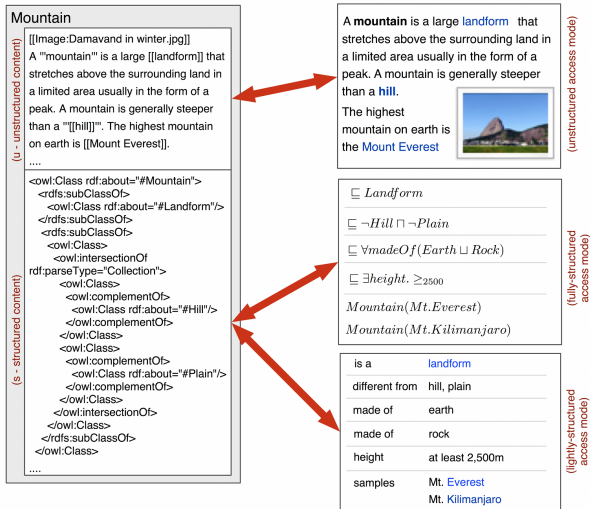
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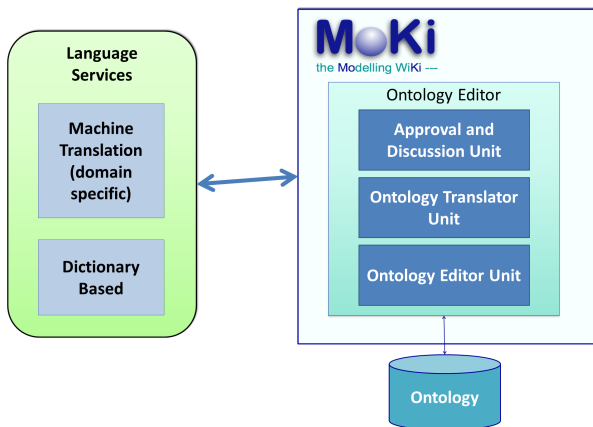


Support the Method With a Tool: MoKi



- Based on MediaWiki
- One page - One entity
- Unstructured / structured content
- Different access modes
 - for KEs
 - for DEs
- Collaborative wiki-based editing of content

Customization of the MoKi



Customization of the MoKi Interface

Lightly-structured Access Mode: OrganicFarming

Pending approvals:

#	Request date	User	Group Manager	Description	Sign
1	28/05/2013	Admin	t_admin	The Italiano translation of the concept name has been changed.	Sign
2	28/05/2013	Admin	t_admin	The Italiano translation of the concept description has been changed.	Sign
3	28/05/2013	Admin	k_engineer	The following parent have been added: AgriculturalMethod.	Sign
4	28/05/2013	Admin	k_engineer	The following properties have been added: isAffectedBy (range: PestControlTechnique).	Sign

is a

Every OrganicFarming is a

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OrganicFarming

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Subject

OrganicFarming

Multilingual component

Select language:

Translation in the language: **English**

Concept name: agricultural method

Concept description: Practices used to enhance crop and livestock health and prevent weed, pest or disease problems without the use of chemical substances.

Customization of the MoKi Interface

Lightly-structured Access Mode: Org

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Translation in the language:

Concept name

Concept description

Talk:BiologicalFertilizer

[\[new\]](#)[\[edit\]](#)[\[reply\]](#) Revision of sub-concepts -- **Vassilis** 12:33, 4 December 2012 (UTC)

The "BiologicalFertilizer" concept includes "GreenManure", "Manure-animal" and "manure" sub-concepts. Due to the fact that there are these specialized terms already, I would suggest the renaming of "Manure-animal" to "AnimalManure" and the removal of the "manure" sub-concept. There are 91 resources tagged with "manure", which we will need to check if they refer to green or animal manure.

[\[new\]](#)[\[edit\]](#)[\[reply\]](#) **Re: Revision of sub-concepts -- Prof. Zeynel Cebeci, Çukurova Univ., 01330 Adana, Turkey 12:55, 4 December 2012 (UTC)**

You are right but animal manure, green manure, compost and organic byproducts are sisters. Please note that this to arrange the hierarchy under biological fertilizer.

English

agricultural method

Practices used to enhance crop and livestock health and prevent weed, pest or disease problems without the use of chemical substances.

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List all Concepts

Number of concepts in the Domain Model: 62

Select language: English

Select language: Italiano

Concept	Description	Concept translation	Description translations
Activity	A type of action performed by an agent in general sense.	attività	
agricultural method	Practices used to enhance crop and livestock health and prevent weed, pest or disease problems without the use of chemical substances.	agrario metodo	 
european agricultural method	Agricultural techniques used in Europe.	metodo agricolo europeo	 
animal origin processed product	Any product of animal origin canned, cooked, frozen, concentrated, pickled or otherwise prepared to assure its preservation in transport, distribution and storage, but does not include the final cooking or preparation of a food product for use as a meal or part of a meal such as may be done by restaurants, catering companies or similar establishments where	animale sorgente processed prodotto	

Cebeci,
(UTC)

sters. Please note

On the Backend... the Ontology Translator Component

- Background component for invoking external translation services.
- Translations are considered as suggestions for the Language Experts.
- Supports both SOAP and RDF interfaces for connecting it with translation services.

Evaluation

- Evaluating the Method (RQ1).

Is it useful guiding step by step through tasks and scenarios the different experts involved in the collaborative evolution of a multilingual ontology?

- Evaluating the MoKi Tool (RQ2).

Do the MoKi functionalities provide an effective support to the collaborative evolution of a multilingual ontology?

Evaluation Procedure

- Quantitative Evaluation: based on log analysis about tool usage.
- Qualitative Evaluation: based on users perception.

Permits to evaluate all aspects from different point of views.

Evaluation Procedure

- 11 people involved in the ontology evolution activity.
- 3 KEs, 4 DEs, 4LEs.
- A training and a hands-on session have been provided.
- After the evolution activity, a questionnaire has been submitted to the users.

Questions for...

- Collecting information on the experts background.
- Having feedbacks about how the provided method supported them in the ontology evolution.
- Evaluating MoKi and the role of its different functionalities for accomplishing the scenarios tasks.
- Retrieving information, impressions, and questions related to the work performed for the ontology evolution.

The usefulness of each functionality has been judged, for each scenario, on the 1 to 5 Likert scale.

Quantitative Evaluation Results

Usage of the MoKi functionalities per category of experts and topics of discussions:

MoKi Functionality Group	DEs	KEs	LEs
Discussion and Approval	46.4%	21.6%	31.4%
Browsing	39.2%	15.3%	45.5%
Multilingual	33.7%	3.4%	64.2%
Editing	61.4%	7.8%	30.8%
Visualization	42.7%	29.7%	45.8%

Most discussed tasks	Percentage
<i>Specialization</i>	35.5%
<i>Mapping to external KBs</i>	22.6%
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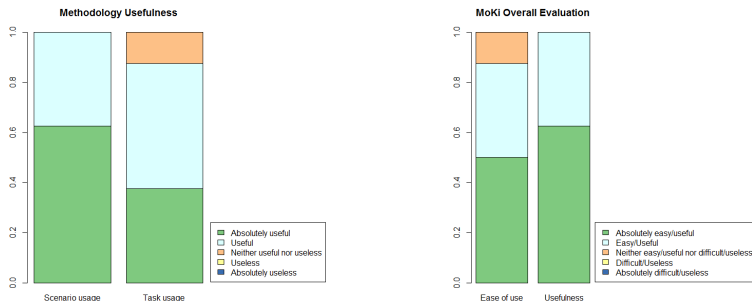
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Qualitative Evaluation Results



Functionality typology	Scenarios					
	Ontology enrichment	Entity deprecation	Entity Specializ	Entity Generaliz	Ontology Mapping	Entity Translation
Discussion and Awareness	<i>Absolutely effective</i>	<i>Absolutely effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Absolutely effective</i>
Browsing	<i>Absolutely effective</i>	<i>Absolutely effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Neither effective nor ineffective</i>	<i>Effective</i>
Multilingual	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Absolutely effective</i>
Editing Visualization	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>	<i>Effective</i>

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Method + Tool

=

A step in the right direction for addressing the complexity of the evolution of different layers of ontologies.



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