Construction of a Core Ontology of Endogenous Knowledge on Agricultural Techniques: OntoEndo

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Abstract. Several resources have been identified on endogenous agro-sylvo-pastoral techniques, but some of them remain unformalized data. In a context of climate change (CC), it is essential to take into account this endogenous knowledge on agricultural techniques as an adaptation measure. We propose in this paper to build an ontology of this endogenous agricultural knowledge. Our methodology identifies the terms on agricultural techniques that will be formalized and used to build the OntoEndo ontology. OntoEndo will allow the construction, co-construction and sharing of agricultural techniques for climate change adaptation.

Keywords: Methodology · Ontology · Endogenous knowledge · Climate change

1 Introduction

In a context of climate change where rainfall is disrupted from one area to another, the adaptation of populations to climate change, with its socio-environmental impacts, is essential. The most effective and sustainable adaptation measures are often those taken at the local level and directly involving the populations concerned.

As a result, farmers are adopting certain strategies to adapt and reduce their vulnerability to the consequences of the rainfall variability they have observed by using different techniques. One of these strategies is the use of endogenous agricultural knowledge. These are techniques that are very easy to appropriate and have very low costs. It is becoming a priority that this knowledge be formalized and popularized through a platform for sharing it with the populations who need it.

In [1] and [2], we propose an architectural approach for a Social and Semantic Web platform that will formalize this knowledge and facilitate the sharing of these endogenous agricultural techniques. This platform will federate the data already existing on the web and then offer solutions for the discovery of new induced knowledge.

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The architecture of the platform is structured in five main layers of which the persistence layer describes the storage of data and is composed of endogenous (tacit) and scientific (explicit) knowledge bases.

It is essential that the set of data on endogenous agricultural knowledge to be identified, described and put in a format that is understandable, readable and exploitable by the Wiki.

In [3], we propose a state of the art on termino-ontological resources in the agro-sylvo-pastoral domain. This allowed us to make an inventory of existing terminological resources in the sector and of existing ontological resources in the same domain that could be identified.

Once these resources have been identified and categorized, it is important to choose a methodology for ontology engineering. An overview was made of the existing ontology engineering methods in the field of ontology construction. Considering the nature of the existing terminological resources on endogenous knowledge in the field of agriculture in various formats, our methodological choice was the NeON method [4], a more complete method that provides all the alternatives for ontology construction organized in scenarios. Thanks to these use case scenarios, NeON offers the possibilities of ontology construction either from scratch, or through reuse, reengineering or alignment, etc.

In this work, we will identify the scenarios of the NeON method to be used for the construction of the ontology of endogenous techniques.

The article is structured as follows. In the second section, we will give a brief description of the NeOn methodological framework chosen for the construction of the ontology, the third section will focus on the ontological engineering process that will allow us to obtain the core ontology of endogenous knowledge that we call OntoEndo. We end with a last section that deals with the conclusion and perspectives.

2 Methodological Approach

The state of the art on termino-ontological resources [3] in the field of endogenous agro-silvo-pastoral techniques has shown the existence and abundance of resources available and exploitable for the construction of the ontology. These resources have been grouped into two classes: Non Ontological Resources (NOR) and Ontological Ressources (OR).

The heterogeneous nature of the resources justifies our choice to use NeOn [4] for the construction of OntoEndo. It provides a more comprehensive set of methods described that range from creation, reuse and management of ontology dynamics. The methodology includes the following (Fig. 1):

- The NeOn Glossary, which identifies and defines the processes and activities potentially involved in building the ontology network;
- A set of nine scenarios to facilitate the construction of ontologies and ontology networks. Each scenario is decomposed into different processes and activities also described in the NeOn glossary;
- Two lifecycle models specify how to organize the processes and activities of the NeOn glossary into several phases;

- A set of prescriptive methodological guidelines for processes and activities.

So, for implementation of OntoEndo, we will apply the different steps of scenario 1 in conjunctly with the reuse of the termino-ontological resources identified in [3] and the ontology design pattern OntCLUVA [5] and the OWL model [6] based on AGROVOC. Scenario 1 allows the construction of ontologies from scratch by respecting the steps defined in this scenario:

- The specification: the construction of the ontology is guided by the objective of supporting a social and semantic wiki for the sharing and co-construction of endogenous knowledge on agro-sylvo-pastoral techniques. The purpose of OntoEndo is to annotate the resources of collaborative work in the community working on endogenous adaptation strategies to the effects of climate change;
- Acquisition: this task is realized through interviews with experts in the respective domains;
- Modeling: consisted in the realization of conceptual models for the structuring of knowledge and will serve as a support for the evaluation conducted with experts in the field;
- Formalization and implementation: the logical level required to reason about ontology is first order logic. The use of the Protégé editor, which produces the formal representation and proposes a saving of the model in a machine-readable ontology representation language, frees us from the implementation stage;
- Evaluation: This is done in 3 phases. The first phase is done during the conceptualization by having the content of the ontologies validated by the experts. It is essentially based on the validity and coherence of the knowledge represented. The second phase consists of consistency tests using the reasoners included in the Protégé editor. The third phase of the validation consists of testing the operationality of the ontology deployed and measuring its contribution to the study domain.

The RNO reuse process is considered in scenario 2 and will facilitate the construction of the ontology from resources such as texts. The RO reuse process is considered in scenario 3 and will allow the reuse of ontologies such as OntoCLUVA [5], a climate change ontology pattern, the OWL model [6] based on AGROVOC for the creation of ontologies in the field of agriculture and FOAF[1], an ontology used to de-escalate people and social relations on the Web.

3 Ontology Construction by the Scenario 1

This step of ontology building refers to the development of ontologies by applying the main activities of scenario 1 and then reusing non-ontological resources and ontological resources.

3.1 Requirements Specification

The starting point for any ontology development is the definition of the requirements that the ontology must fulfill [4]. The objective of this phase is to start from the needs

[1] About: http://fr.dbpedia.org/resource/FOAF.

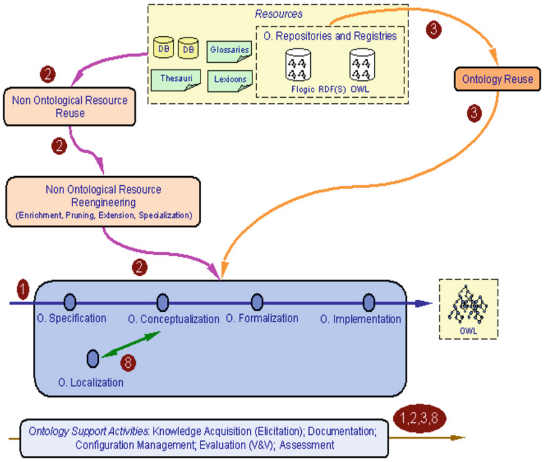

Fig. 1. Sequencing of scenarios NeOn [4]

that motivate the creation of the ontology, to define the intended uses of the ontology, to identify the end-users and to describe the set of requirements that the ontology must fulfill in the form of competence questions (CQ). This will be summarized in a document called the Ontology Requirements Specification Document (ORSD). While taking inspiration from the algorithms proposed in [7], we summarize the different steps of this specification phase according to NeOn through the following algorithm.

Specification algorithm
Input
Need motivating the creation of OntoEndo
Output
Breakdown into sub-domains
Pre-glossary of terms
Begin:

T1. Start from the ontology creation objectives and determine the most appropriate RTOs
T2. Identify the CQs that describe the ontology requirements from the RTOs
T3. Breakdown into sub-domains
T4. Extract high frequency terms
T5. Create the pre-glossary of terms
End.

This algorithm takes as input the requirements motivating the creation of OntoEndo and as output we obtain the pre-glossary of terms and then the Ontology Requirements Specification Document (ORSD).

Task 1 (T1) of the specification algorithm defines the objective, scope and formality level of the ontology to be created. This ontology aims at providing a consensual knowledge model through the construction, co-construction and sharing of endogenous knowledge for the adaptation of agricultural techniques in a climate change context. The ontology takes into account the good practices of endogenous knowledge in the field of agriculture taking into account the hazards of climate change and it will be defined in an ontological formalization language OWL.

Thanks to the different meetings and interviews, it was possible to identify and determine the main users and uses of the ontology. Indeed, while referring to the section on the architectural approach that we had proposed in our previous work [2], a layer dedicated to the future users of the Semantic Wiki platform is planned, including the Knowledge Base that will be proposed from the ontology to be built. This user layer gathers all the actors (technicians, engineers of the agro-sylvo-pastoral domain or experts of the domain, knowledge experts, researchers, etc.) who can interact on the knowledge base. These same actors will also be able to create new knowledge, make annotations on the Knowledge Base, etc. This corresponds to task 2 (T2) of our algorithm.

For task 3 (T3), based on the guidelines given in the NeOn approach [4], the identification of ontology requirements uses techniques known as "natural language requirements writing techniques in the form of so-called competency questions (CQ)". Different approaches to identify competence questions exist. There are so-called top-down techniques (starting with complex questions and then decomposing them into simpler questions), bottom-up techniques (starting with simple questions and then composing them to create more complex questions), and finally so-called middle techniques (simply starting to write important questions that can be composed and decomposed later to form abstract and simple questions, respectively).

By adopting the bottom-up approach, we were able to identify about thirty competency questions that correspond to the requirements of the core ontology and of which an extract is represented in Table 1.

These questions were formulated for the domain experts and any resource person during the interviews conducted in the framework of this research work and will be used for the validation of the ontology later on. The analysis of this series of questions and the answers given by the different actors and taking into account the resources identified in the work on the state of the art carried out in [3], allowed us to propose an organization of the study domain into sub-domains as shown in Fig. 1. This division takes into account the one proposed by the work of DIOP and his colleagues [5] for the construction of an ontological pattern of the domain of climate change, to which we have integrated the consideration of endogenous knowledge as also being solutions for adaptation to climate change.

The goal of task 4 (T4) of our algorithm is to extract high frequency terms from the CQs. Therefore, it is possible to use terminology extraction techniques thanks to dedicated tools such as AntCon [8], UNITEX [9], TermoStat Web[2], TermoStat Web, TERMINAE [10], Sketch Engine [11]. We chose Sketch Engine because it can integrate any source of information and any format, and is available online.

Indeed Sketch Engine [11] is a leading corpus tool, widely used in lexicography. It is a mature software that not only offers many ready-to-use corpora, but also integrates features that allow users to create, download and install their own corpora. Sketch Engine supports several languages (English, French, German, etc.) and gives the possibility to

[2] http://termostat.ling.umontreal.ca.

integrate corpora from different sources (from the Internet or added by the user) and in different formats (txt, pdf, xml, docx, etc.). After the term extraction process, Sketch Engine displays the extracted terms in different ways (single word, compound word, etc.) on its interface just by changing the option. It also offers the user the possibility to build a corpus and store it in a drive space or to download it. It exists in a downloadable version but also a version that can be used online.

By exploiting with this tool the whole corpus formed by the RNOs identified in [3] with the CQs and the related answers, we obtain a list of terms with a view on their frequencies and their scores for each extracted term. This allowed us to establish a pre-glossary of terms, an extract of which is shown in Table 2.

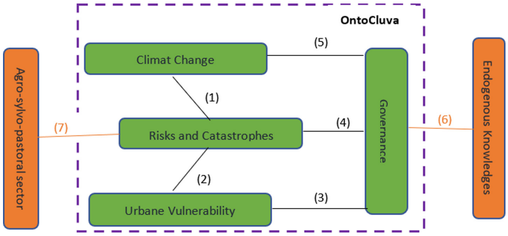

Fig. 2. Breakdown into sub-domains

Table 1. Questions and Answers Table (QR)

N°	Competency Questions	Answers
QC1	What are the characteristics of a good practice?	common name, local name, category, adapted agro-ecological zone, description of the human environment, type of soil, types of land use, description, objective, type of land degradation problem concerned, level of technical knowledge required for its implementation, cost of implementation, literature reference
QC2	What are the different categories of good practices	sustainable water management, land use planning, agricultural techniques, forestry and agroforestry, pastoral resource management, natural resource management, fisheries improvement
QC3	What are the good practices for sustainable water management?	grass strips, ridging, partitioning, stony cordons, filter dikes, earthen dikes, dune fixation, subsoiling, vegetation of earthen dikes, mechanical zaï, scarification, plowing

Table 2. List of extracted terms

Item	Frequency (focus)	Frequency (référence)	Score	Item	Frequency (focus)	Frequency (reference)	Score
soudanien	106	456	674.628	noms	55	10110	150.934
ligneux	162	6760	553.052	scarification	22	12	149.874
sahélien	127	4163	535.980	compost	105	26234	147.507
zaï	77	598	480.963	bas-fond	38	5211	146.830
inera	64	102	428.467	sawap	21	2	143.316
sorgho	96	4120	406.892	arbollé	21	13	143.086
diguettes	61	142	406.091	infiltration	116	30841	143.020
niébé	53	680	327.729	transhumance	39	6272	138.492
agro-écologique	62	2531	307.575	agroforestiers	22	710	136.028
burkina	360	48084	304.953	bounou	20	47	135.647
hydrique	120	11874	304.262	mil	78	19924	135.471
faso	306	41336	297.846	fourrage	64	15548	132.932
anti-érosif	41	117	294.865	erosion	22	947	131.891
poquet	43	657	274.249	sp-conedd	19	1	129.781
ruissellement	102	11532	266.880	herbacé	54	13736	122.088
demi-lune	58	3978	257.936	mouhoun	20	934	120.181
fertilité	156	23935	249.306	ravine	32	5863	117.388
défens	37	596	235.414	gurunsi	17	20	115tabl.903
pierreux	48	3311	231.652	sarclage	18	574	113.503
pluviométrie	63	6995	219.988	soil	21	1833	113.079
fumure	38	2243	211.726	mooré	17	414	109.613
paillage	58	7670	194.779	lobi	17	437	109.267
npk	30	852	185.896	zougmoré	16	59	108.527
fourrager	58	8239	181.748	ravinement	17	651	106.147
jachère	51	6597	178.884	urée	26	4649	105.563
fertilisation	64	10099	176.569	dégradation	234	97984	103.653

3.2 Conceptualization

According to NeOn, the conceptualization phase consists in structuring the domain knowledge obtained in the specification phase. We summarize the activities of this phase in an algorithm presented as follows, inspired by the one proposed by [7]:

Algorithm Conceptualization
Input
Pre-glossary of terms
Output
Informal representation model
Begin:
T1 Group concepts and create a class dictionary:
T1 Group concepts and create a class dictionary
T2 Create an array of binary relations
T3 Create an array of attributes
T4 Create an array of instances
T5 Build informal representation models by sub-domain (with reuse of existing models)
T6 Integrate the different models into a global model

End.

Starting from the sub-domain breakdown of the proposed field of study (Fig. 2), we note that the sub-domains of climate change, risk and disaster, urban vulnerability and governance are taken into account in the work of I. DIOP [12]. Therefore, only the two sub-domains "**endogenous knowledge**" and "**argo-sylvo-pastoral sector"** will be modeled in this conceptualization phase.

This will be followed by an approach that will allow the reuse of the models resulting from the work of I. DIOP's work according to scenario 3 concerning the RO reuse process. Thus, the dictionary of classes, sub-classes, relations and inverse relations will be created to allow the representation of informal models.

- Construction of informal representation models by sub-domain

  These representations will be realized thanks to task 5 of our algorithm.

  For this representation, we propose to use a representation by UML class diagrams. UML (Unified Modeling Language) is an object-oriented modeling language. The future vision of the Web in which the information would be explicit in order to allow its automatic treatment by machines is the Semantic Web. Many applications are already modeled in UML. However, there is no specific modeling language to model a knowledge base. We can then extend the use of UML, in particular the class diagrams, to this purpose. As announced above, we propose diagrams for the sub-domains "endogenous knowledge" and "agro-sylvo-pastoral sectors". The diagrams for other sub-domains dealing with climate change will be imported from I. DIOP's work through the RO reuse process.

Figure 3 is a representation of the informal conceptual model of the endogenous knowledge sub-domain and Fig. 4 is a representation of the agro-sylvo-pastoral sector sub-domain.

For each model there is a connection point with another model. In the next section on integration, we explain how this integration is done between the different models.

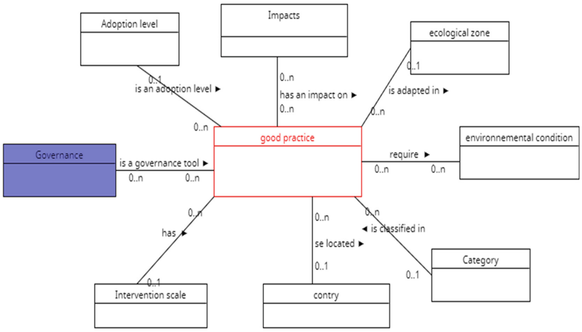

Fig. 3. Informal conceptual model of the endogenous knowledge subdomain

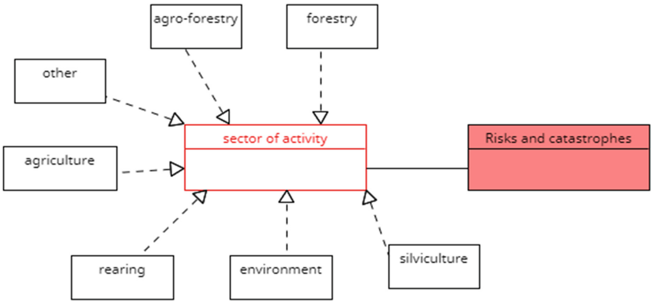

Fig. 4. Informal model of the agro-sylvo-pastoral sector sub-domain.

- Reuse of NOR by scenario 2

Let us recall that in the work of I. DIOP [5], the sub-domains involved in the construction process of the ontological pattern on climate change were taken into account in the conceptualization phase. Therefore, we limit ourselves to the two sub-domains “endogenous knowledge” and “agro-silvicultural-pastoral sector” in our work.

With the non-ontological resources already identified and the set of CQs with the elements of answers obtained from the domain experts, we used terminological extraction tools to generate a list of terms (concepts, relationships, attributes, instances, etc.): the pre-glossary of terms (see Sect. 3.1).

Thus, tasks 1, 2, 3 and 4 of our algorithm consist in grouping concepts (or classes), sub-class and finally instances. This allowed us to obtain the dictionary of which an extract is given in Table 3 and which will be used as a basis for the representation of the different models.

Table 3. Dictionary of concepts, sub-concepts, relationships (or roles).

Classes principales	Sous-classes	Classes intermédiares	Rôles	Rôles inverses
Bonnepratique				
Secteuractivite		Bonnepratique_Secteuractivite	est_pratique_dans	se_pratique
Typeacteur		Bonnepratique_Typeacteur	concerne	s_interesse
Conditionenvironnementales		Bonnepratique_conditionenv	necessitecondition	sont_requises
Objectifs		Bonnepratique_Objectifs	a_pour_objectif	est-atteint_par
Exploitants		Bonnepratique_Exploitants	s_adresse	sont_interesses_par
Communautescibles		Bonnepratique_Communautescibles	cible	vise
Typesutilisationterre		Bonnepratique_Typeutilisationterre	sapplique_sur	utilise
Structurederattachement	Strucutrephysique Structuremorale	Bonnepratique_Struturederattachement	est_decrite_par	decrit
Typesol		Bonnepratiqu-Typesol	convient_sur	est_propice_a
CategorieBP		Bonnepratique_CategorieBP	est_de_categorie	regroupe
Problemevise		Bonnepratique_Problemevise	solutionne	est_solutionner_par
Echelleintervention		Bonnepratique_eEchelleintervention	est_pratique_dans	se_pratique
Zoneclimatiuqe	Zonesahelienne Zonesoudanosahelienne Zonesoudanaise	Bonnepratique_Zoneclimatique	est_localiser	existe
Imageillustrative		Bonnepratique_imageillustrative	se_presente	represente
Impact	Impactsocioeconomique Impactenvironnemental Impactclimatique	Bonnepratique_Impact	a_pour_impact	est_impacter_par
Paysdepratique		Bonnepratique_Paysdepratique	existe	se_pratique
Niveauadoption		Bonnepratiqur_Niveauadoption	a_pour_niveau_adoption	est_atteint
TypeBP		Bonnepratique_TypeBP	est_de_type	est_classe_parmi
Effect		Bonnepratique_Effet	a_pour_effet	
Avantage		Bonnepratique_Avantage	a_pour_avantage	est_resultat_de

3.3 Formalization et Implementation

To facilitate the exploitation of the ontology by the software agents, it must be represented in a knowledge representation formalism. This activity consists in formalizing the conceptual models obtained previously according to a knowledge representation paradigm as summarized in the algorithm above.

Algorithm Formalization & Implementation
Input
Informal representation model
Output
The OntoEndo ontology
Begin:
T1. Describe the formalization language
T2. Describe the formalization rules
End

Task 1 of the formalization algorithm is to define the formalization language to be used in the construction of ontologies which is based on formal languages. An ontology language allows to signify the membership of an object to a category, to declare the generalization relation between categories and to type the objects that link a relation [13].

In this respect, RDFS and OWL are considered as the most adequate languages because they are derived from W3C consortium recommendations and benefit from an expressiveness adapted to the needs of each. Both are based on the XML markup language, a fundamental element of the Semantic Web. OWL is an evolution of the DAML + OIL Web language which is based on RDFS. It was designed "to explicitly represent the meaning of terms, vocabularies, and the relationships between these terms" [14].

OWL surpasses RDFS in its ability to represent an ontology that is automatically interpretable. It introduces the possibility for a machine to reason about the knowledge base, allowing it to infer implicit knowledge and detect possible inconsistencies. Moreover, the vocabulary of OWL is richer than that of RDFS because it adds relations between classes, cardinality and equality properties, and class definition by enumeration. OWL also allows to manage different levels of complexity through three sub-languages of increasing expressiveness:

- OWL Light, a minimal subset intended for the construction of taxonomies,
- OWL DL (Description Logics), which is much more expressive than OWL Light and guarantees the completeness and decidability of the calculations,
- OWL Full with the syntactic freedom of RDFS but without the completeness of calculs.

In order to benefit from the full semantic richness of OWL and to anticipate the future use of reasoners, we have chosen to focus on the different ways of modeling the terminology part of an OWL-DL RTO.

In any UML to OWL model transformation process, transformation rules are used.

UML diagrams are known as a generic formalism for modeling applications in most domains, but the semantics of this formalism are not described in a declarative way. This prevents the development of inferences that allow the detection of formal properties of UML class diagrams.

There is a set of mapping (conversion) rules for transforming the objects stored in the UML class diagram into an OWL ontology. While exploiting the works [15, 16], we propose in Table 4 some rules for the transition from UML to OWL.

3.4 Implementation

Finally, comes OntoEndo implementation phase. Different ontology editors are currently proposed, in particular, Protégé 2000, OntoEdit OILEd [16] are two editors that integrate the OWL language.

For the implementation of our ontology, we chose Protégé which is an open source solution and easy to master. This allowed us to implement our ontology while applying the transformation rules from UML to OWL.

Also, some concepts from the AGROVOC thesaurus have been reused. For example the terms "**forestry**" and "**agroforestry**" also exist in AGROVOC. For the purpose of linking to these terms, we use their URIs already defined in AGROVOV.

For example:

Forestry: http://aims.fao.org/aos/agrovoc/c_3055.

Agroforestry: http://aims.fao.org/aos/agrovoc/c_207.

Table 4. UML-OWL transformation rules

Rule	UML Objets	OWL Code	Description
R1	UML Class	<owl: class rdf:ID = “#class_name"/>	each class is converted into an OWL concept with the same name
R2	inheritance between classes	<owl/Class rdf: ID = ‘’#parent_class_name”/> <rdf/subClassof rdf:resource = ”#subclass_name»/> </owl/Class> //balise de fermeture	Each subclass is represented by a subclass which necessarily inherits from its parent class which also inherits from the Object class (OWL: thing)
R3	Attributes	<owl:DatatypeProperty rdf:ID = “#attribute_name” > <rdf:domain rdf/resource = ”#class_name”/> <owl:DatatypeProperty rdf:resource = “XMLSchema#string"/> *// le type* <owl/DatatypeProperty> *// balise de fermeture*	A class attribute with a UML primitive type is mapped to the property data type defined using the Property class data type (DatatypeProperty)
R4	Identifiant	<owl:DatatypeProperty rdf:ID = “#attribute_name”> <rdf:type rdf:resource = “#FunctionalProperty"/> <rdfs:domain rdf:resource = “#class_name"/> <rdfs:range rdf:resource = “XMLSchema#string"/> *// le type* </owl:DatatypeProperty> *// balise de fermeture*	The class identifier is considered as a simple attribute and is converted into a data type property (DatatypeProperty)

3.5 Evaluation

The evaluation of an ontology is defined as the activity of checking the technical quality of an ontology against a reference framework.

As announced in the description of the methodological approach, the evaluation starts from the conceptualization phase until the implementation phase where the consistency is tested using the reasoner.

Thus, the different semi-formal conceptual models proposed have been verified and validated with domain experts.

In the functional requirements specification phase, competency questions were formulated. it is a question of testing and verifying whether the ontology satisfies these requirements.

We verify here the capacity of the ontology to make reasoning deduction and to answer the functional requirements by testing a SPARQL query.

- Ontology consistency check

  This consists in checking if OntoEndo does inferential deduction with satisfaction. To check the consistency, we start from the following example case.

  We define an example equivalence rule between subclasses as follows: "Any technique used for soil fertilization can also be used for sustainable land management". We create three individuals such that the technique of "Zaï" is used for Sustainable Land Management, "association_sorgho_niébé" is used as a technique in soil fertilization and finally " construction_of_water_retainers" is also a technique for soil fertilization. as shown in Fig. 5.

  The reasoner can detect that "zaï" is also a technique for soil fertilization and the individuals "association-sorgho-niébé", "construction-de-retenue d'eau" are also techniques for sustainable land management (Fig. 6).
- Verification of requirement specifications by QC

  The aim is to test if the QCs initially formulated at the requirements specification stage are answered by the ontology. Therefore, we will query the ontology using the SPARQL query language integrated in the Protégé editor.

  We take the example of question 5 of the CQ list.

Competency Question
CQ5 what are the categories of good practices

SPARQL query

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

PREFIX owl: <http://www.w3.org/2002/07/owl#>

PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

SELECT ?subject ?object

WHERE { ?subject rdfs:subClassOf ?object }

ORDER BY DESC (?object)
```

Returned Answer

Foresterie	Bonne_pratique
Agroforesterie	Bonne_pratique
'conservation en eau'	Bonne_pratique
'Fertilisation des sols'	Bonne_pratique
'ressource naturelle'	Bonne_pratique
Gection_durable_des_terres	Bonne_pratique

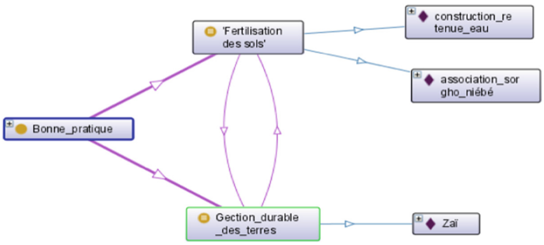

Fig. 5. Creation of individuals in the two subclasses

Fig. 6. Deduction of reasoning by inference

4 Conclusion and Perspective

After identifying, analyzing and categorizing the TORs on agro-silvo-pastoral knowledge in our previous work [3], the aim of this paper is to move towards the construction of a core ontology of knowledge on endogenous techniques in this domain. The methodological approach we used is the NeOn one which gives guidelines and is organized in scenarios. We mainly used scenario 1, the main scenario in the ontology building process which provides for the specification, conceptualization, formalization and implementation phases. Also, scenarios 2 and 3 have been implemented and exploited in the process. Indeed, for each phase, we summarized the main tasks through an algorithm. By unrolling these algorithms in the different phases, we arrived at the construction of a core ontology.

Once the core ontology is obtained, the aim is to be able to exploit this core ontology through a semantic wiki platform that will allow to enrich it with other concepts thanks to the domain experts. The semantic wiki platform will allow the construction, co-construction and sharing of knowledge on endogenous agro-sylvo-pastoral techniques for a better adaptation of cultivation techniques in a context of climate change.

These are the perspectives for our future work in this research study.

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