Agronomic taxon

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► To cite this version:

Catherine Roussey, Jean-Pierre Chanet, Vincent Cellier, Fabien Amarger. Agronomic taxon. 2. International Workshop on Open Data (WOD'2013), Jun 2013, Paris, France. pp.4, 10.1145/2500410.2500415 . hal-02747247

HAL Id: hal-02747247

<https://hal.inrae.fr/hal-02747247>

Submitted on 3 Jun 2020

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Agronomic Taxon

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Wokshop Open Data

Pour mieux
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ses missions,
le Cemagref
devient Irstea

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Use Case: Ontologies on agriculture

Problem:

Many resources in agricultural domain

- Thesaurus/ classification/ Taxonomy: Agrovoc, TaxRef
- Data base : e-phy, EPPT
- XML Schema : AGROXML, GIEA
- Collection of Documents: Bulletin de santé du végétal
- Forum/web site: wikipedia, wikispecies
- Ontologies/ dataset RDF: biotop, plant, oboe

Open Linked Data for agriculture ?

Use Case: Annotations of BSV

BULLETIN DE SANTE DU VEGETAL

French report on observations of crop development and pest attacks

BSV are created by French Regions

BSV are published on the web (pdf)

BSV are focus on one crop type (wheat, corn)

Different authors

Different presentation style

Different content

How to annotate with semantic technologies these reports?

Build a data set about pest attacks on crop production

How to build an ontology?

Follows good practices : reused as much as possible

- Top level ontology: Dolce Ultra Light (DUL)
- Ontology Design Patterns
- NeOn methodologie
- Modularity : (Alan Rector)
- Validation: hierarchies validated by reasoner
- Goal: build a network of ontology modules for agriculture

Modular Ontologie

Ontology is a network of modules

Pick up the module focus on your use case

Easy to maintain

Module characteristics:

- small
- limited coverage focus on one topic
- autonomous
- coherent
- reusable

Example of a Modular Ontology

SEMANTIC SENSOR NETWORK ONTOLOGIES

Ontology Design Pattern

Ontology Design Pattern (ODP)

Modelling solution that allows solving recurrent knowledge modelling problem (Presutti et al. 2012)

Content Ontology Design Patterns (CP)

domain-dependent conceptual models

most of the work done on ontology design patterns

FAO propose several CP in agriculture

Ontology Design Pattern example

OBSERVATION-SENSOR-STIMULUS

Reusing Ontology Design Patterns

NEON METHODOLOGIE

8 activites

1. Project Initiation and scoping
2. Identifying ODP catalogues
3. Collecting requirement stories
4. Eliciting requirement
5. Matching and selection ODP
6. Reusing and integrating ODP
7. Testing module
8. Releasing Module

Project Initiation and scoping

ACTIVITY 1

Modular ontology to :

- Annotate the collection of BSV
- Scheme to store data about the observations about crop development and pest attacks (Space and time observations)

Ontology developers

Domain experts: INRA agronomist, irstea farmer

Wiki agriontology for project development

Identifying ODP Catalogues

ACTIVITY 2

1. Ontology Design Pattern (ODP) Wiki
2. Linked Open Vocabularies (LOV)
3. OBO Foundry

Collecting requirement stories

Several stories

1. Description of living organism using agronomic taxa
2. Description of varieties
3. Description of crop
4. Description of pests

First Module: Agronomic Taxon

Description:

Module used to define agronomic classifications (or taxonomies) and describe organisms using taxa.

Several datasets about life science taxonomies are already published on the web of data (wikispecies, DBPedia, geospecies). This module should be compatible with these datasets.

Priority: High

Eliciting Requirements

Description:

Taxa of well known classification (APGIII or Cronquist)
agronomists and farmers share common classification

Specifying cultivar

Reasoning

1. Automatic classification
2. Find all the parent taxa
3. Create the organism's name based on the specie's name

Competency Questions

- CQ1: Which Kingdom (class or family) has this living organism?
- CQ2: What is the scientific name of this plant?
- CQ3: What are the vernacular names of this plant?
- ...

Contextual Statement

A living organism should be associated to at least one taxon

Matching and selecting ODP

W3C recommendation

- [SKOS](#)

LOD vocabularies about agronomic description of living organism

- [Biological Taxonomy Vocabulary](#)
- GeoSpecies Knowledge base / TaxonConcept Ontology
- Wildlife Ontology
- TaxMeOn
- TDWG / Darwin Core

ODP

- [Classification pattern](#)
- [Linnean Taxonomy pattern](#)

Reusable: small, well documented, downloadable

Reusing and integrating ODP

Build Defined Classes dedicated to our use case

Plant $\equiv$ LivingOrganism and isClassifiedBy value regne_plantae

Property chains:

isClassifiedBy $\equiv$ isClassifiedBy o hasHigherRank ->isClassifiedBy

SWRL rules that duplicate species taxon name in organism's name

Species(?s), LivingOrganism(?o), isClassifiedBy(?o, ?s),
hasVernacularName(?s, ?label) -> hasVernacularName(?o, ?label)

Testing and releasing Module

Populate ontology for testing purpose:
durum wheat taxa knowledge base

Test reasoning requirements

- a new version of the module with inferred axioms
- a wiki page describing unitary tests

Test competency questions

- a new version of the module with queries
- a wiki page explaining the SPARQL queries

Wiki page describes the module

- OWL files are downloadable

Conclusion and Futur Works

Creation of a first module

Populate it with data sources from the LOD → PhD Thesis

Aligning the module to others datasets

Evaluate the clarity of this module

Go on with the creation of the pest attacks dataset

At least 5 more modules are needed

more on [googlesite agriontology](#)