

OOGO

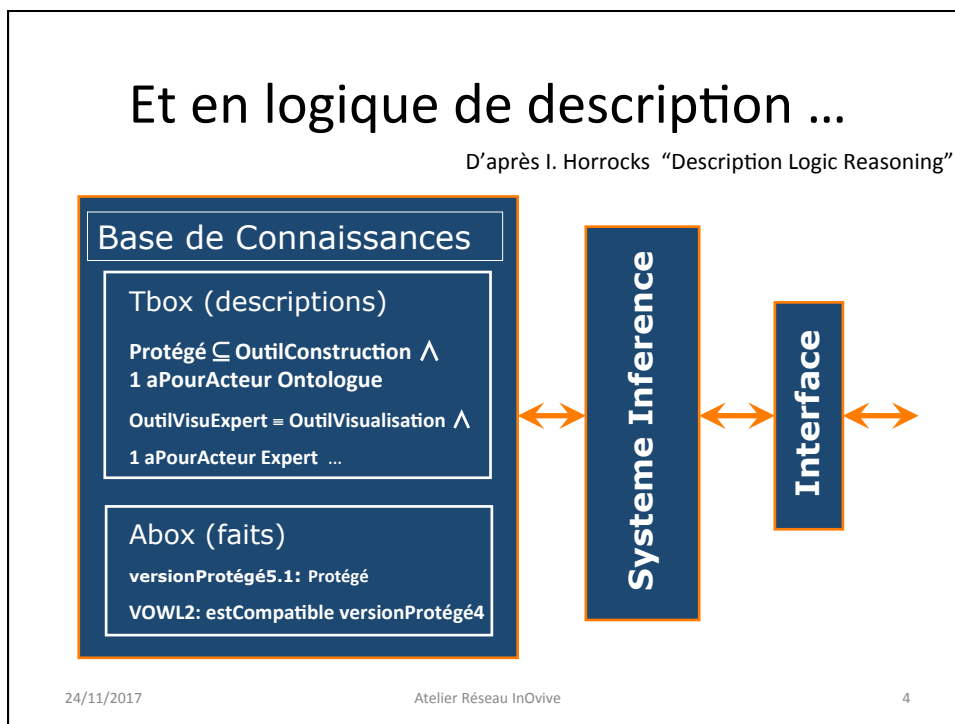
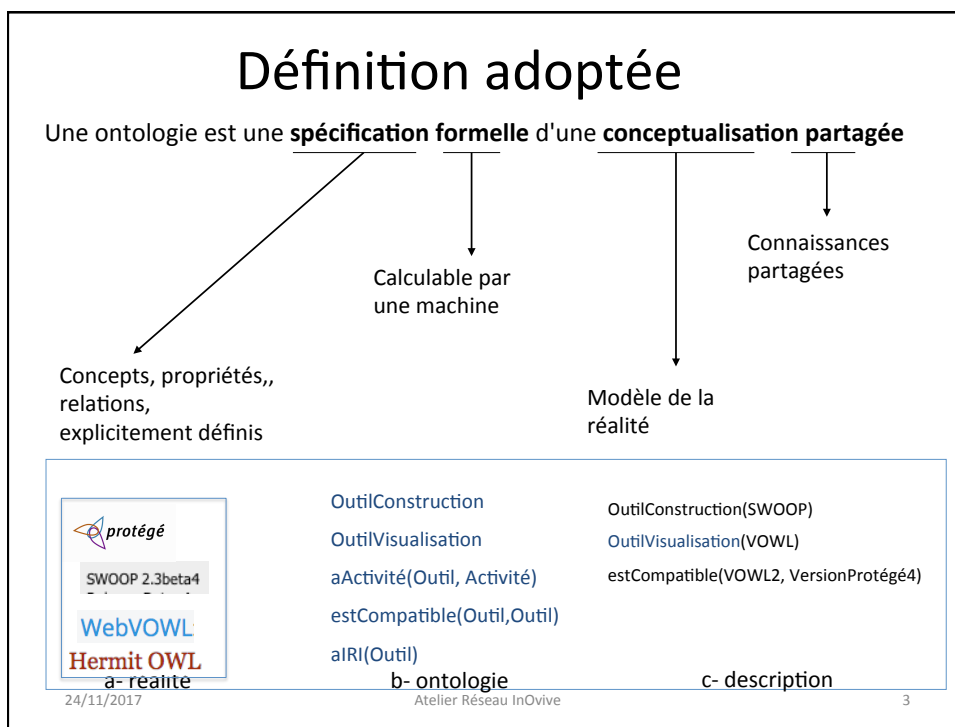
Une Ontologie des Outils utiles à la Gestion d'Ontologies

Sylvie DESPRES
sylvie.despres@univ-paris13.fr



Définitions

- Gruber 1993
Une ontologie est une spécification **explicite** d'une conceptualisation
- Borst 1997
Une ontologie est une spécification **formelle** d'une conceptualisation **partagée**
- Studer, Benjamin et Fensel 1998
Une ontologie est une spécification **formelle explicite** d'une conceptualisation **partagée**



Et maintenant

https://baojiebaojie.files.wordpress.com/2011/04/semantic_web_technology_stack.png

DL Expressivity
ALCHO(D)

Symbol key

Attributive language. This is the base language which allows:

- Atomic negation (negation of concepts that do not appear on the left hand side of axioms)
- Concept intersection
- Universal restrictions
- Limited existential quantification (restrictions that only have fillers of Thing)

AL

FL⁻ A sub-language of AL, which is obtained by disallowing atomic negation

FL_o A sub-language of FL⁻, which is obtained by disallowing limited existential quantification

C Complex concept negation

S An abbreviation for AL and C with transitive properties

H Role hierarchy (subproperties - rdfs:subPropertyOf)

O Nominals. (Enumerated classes or object value restrictions - owl:oneOf, owl:hasValue)

I Inverse properties

N Cardinality restrictions (owl:Cardinality, owl:minCardinality, owl:maxCardinality)

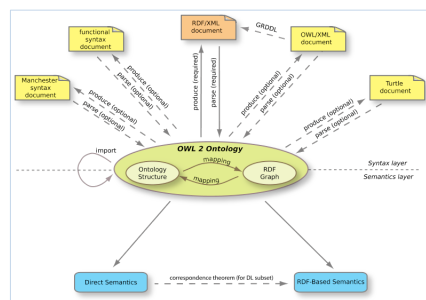
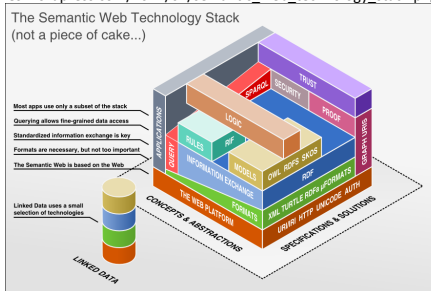
Q Qualified cardinality restrictions (available in OWL 1.1)

F Functional properties

E Full existential quantification (Existential restrictions that have fillers other than owl:Thing)

U Concept union

(D) Use of datatype properties, data values or datatypes



<https://www.w3.org/TR/owl2-overview/>

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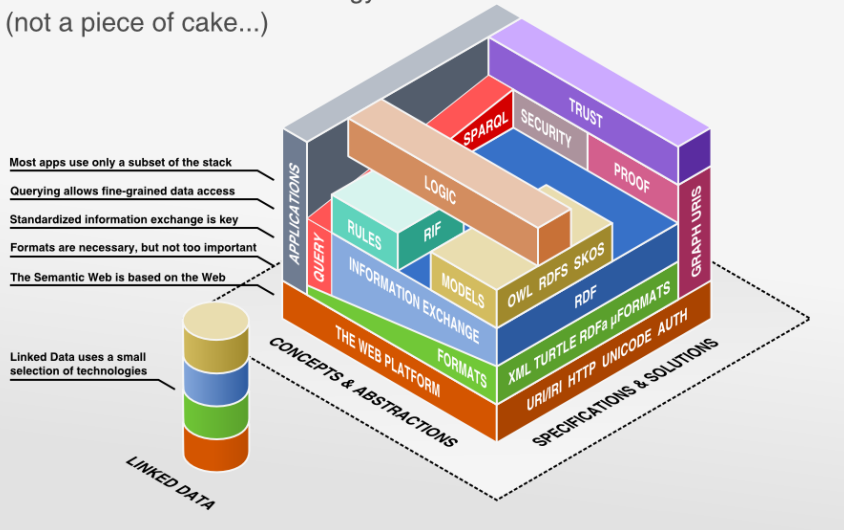
(D) Use of datatype properties, data values or datatypes

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https://baojiebaojie.files.wordpress.com/2011/04/semantic_web_technology_stack.png

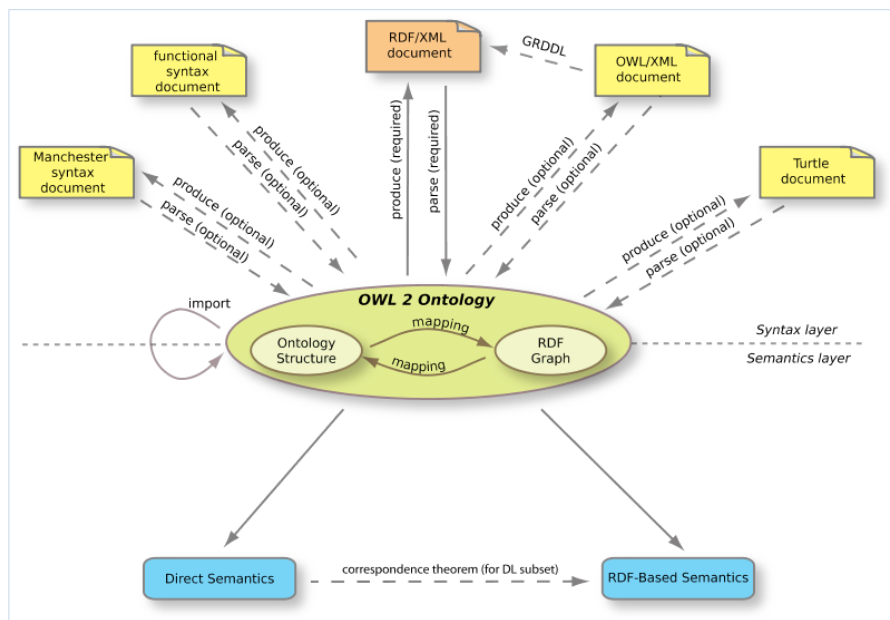
The Semantic Web Technology Stack (not a piece of cake...)



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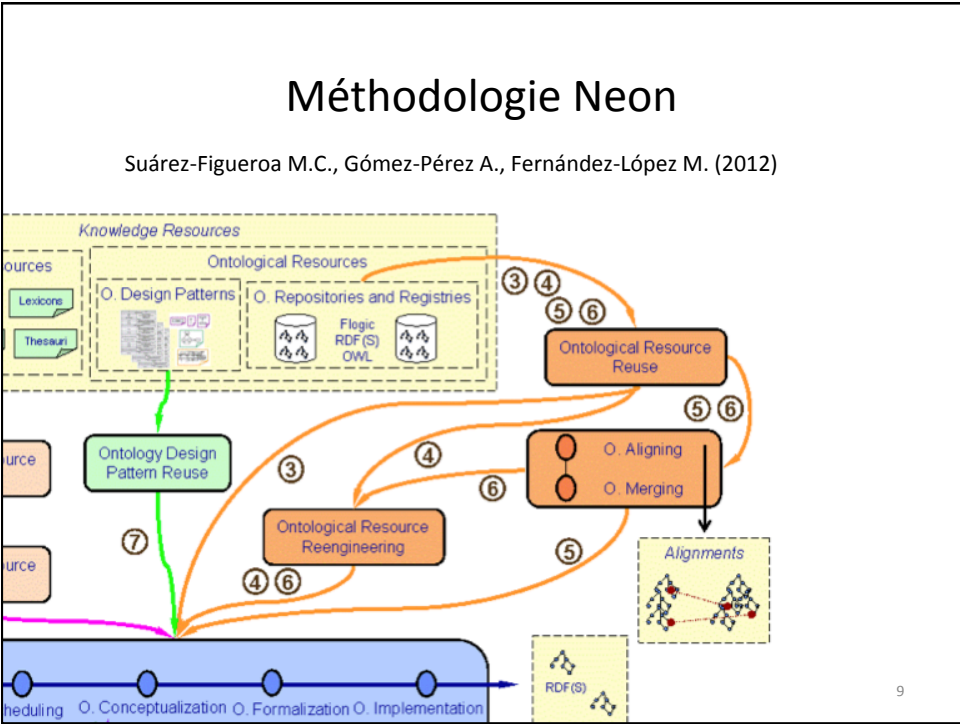


<https://www.w3.org/TR/owl2-overview/>

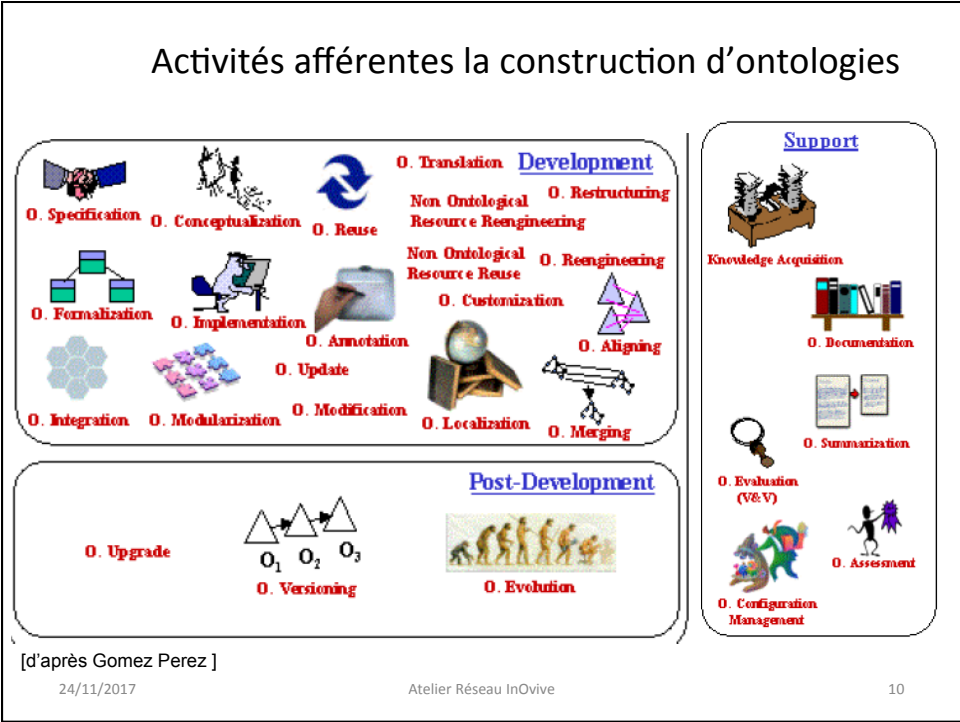
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Outil Conceptualisation



- Outil de modélisation
- Outil de construction / édition

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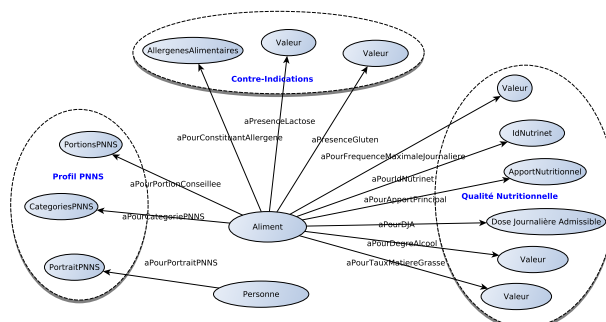
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Editeur de graphe



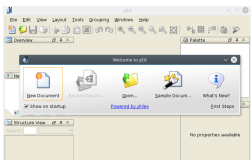
- YED
 - Outil de bas niveau
 - Open source - Multiplateforme
 - Personnalisable par programme



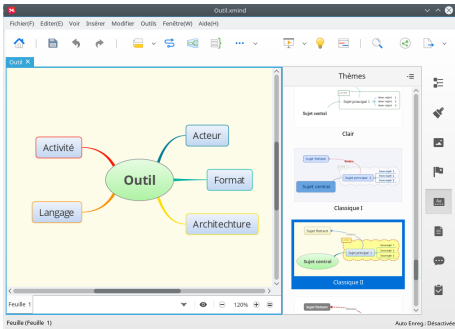
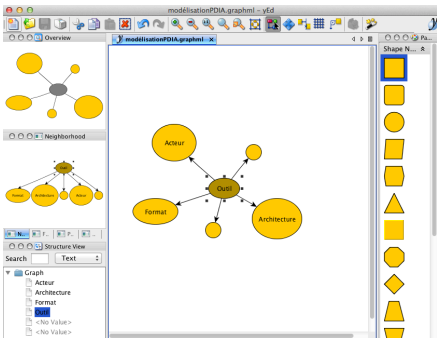
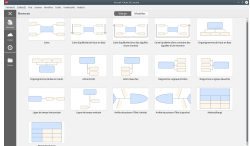
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Outils de modélisation



XMind

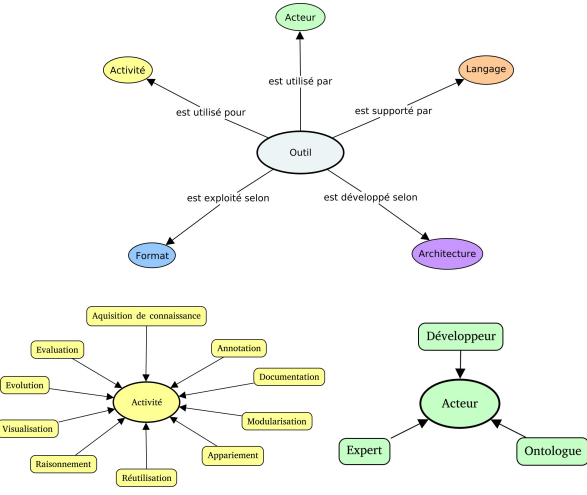
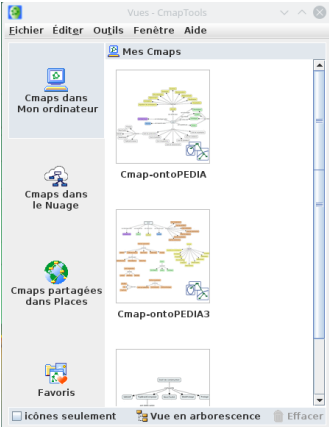


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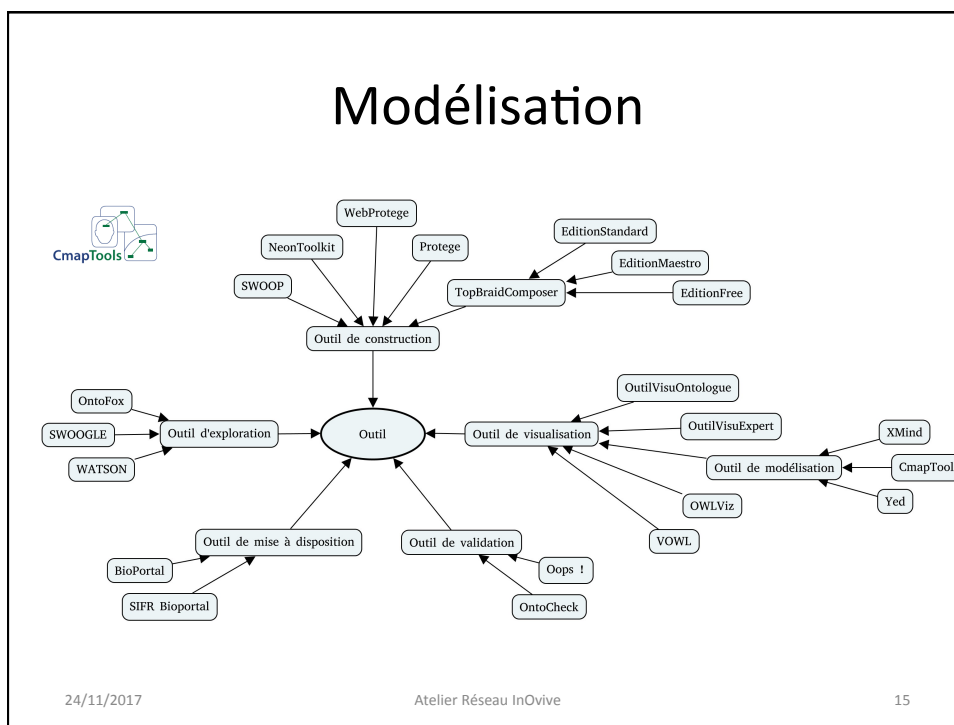
Outil sélectionné



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Outil de construction

- https://www.w3.org/wiki/Ontology_editors
 - <http://protege.stanford.edu/>
 - <http://neon-toolkit.org/>
 - <http://www.mindswap.org/2004/SWOOP/>
 - http://www.topquadrant.com/products/TB_Composer.html

SWOOP 2.3 Beta 4

The screenshot displays the SWOOP 2.3 Beta 4 application window. The main area shows the 'OWL Ontology: PDIA2017' with various statistics:

- Total Number of Classes: 73 (Defined: 72, Imported: 0)
- Total Number of Datatype Properties: 4 (Defined: 4, Imported: 0)
- Total Number of Object Properties: 14 (Defined: 14, Imported: 0)
- Total Number of Annotation Properties: 1 (Defined: 1, Imported: 0)
- Total Number of Individuals: 138 (Defined: 138, Imported: 0)

Below these statistics is a table of 'Advanced Ontology Statistics' with three columns: General Statistics, Property Tree Statistics, and Satisfiable Class Tree Statistics. The 'New Entity' dialog boxes are open, showing options to add an OWL Property, an OWL Individual, or an OWL Class.

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protégé Version 5.2

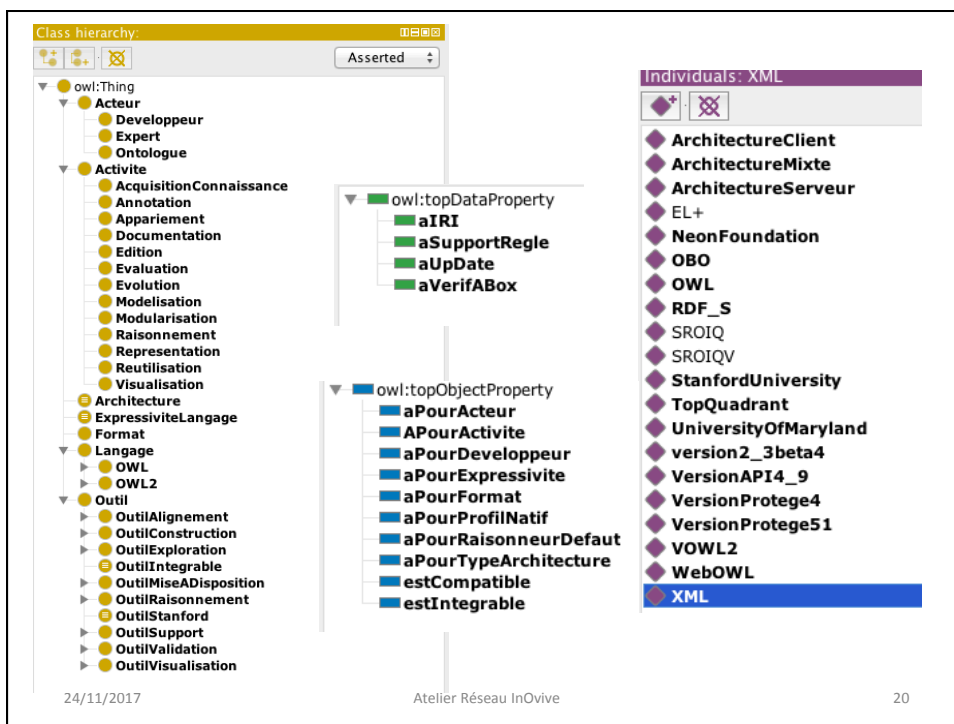
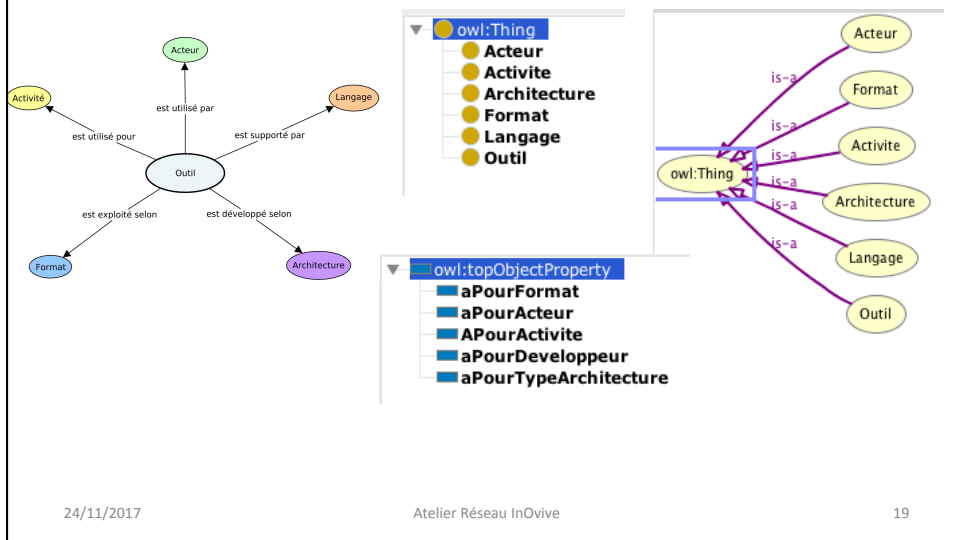
The screenshot shows the protégé Version 5.2 interface. The main window displays the 'Class hierarchy: Outil' for the ontology 'PDIA2017'. The class hierarchy is as follows:

- owl:Thing
 - Acteur
 - Activite
 - Architecture
 - ExpressiviteLangage
 - Format
 - Langage
 - Outil

The 'Description: Outil' panel on the right shows the class is disjoint with 'Activite, ExpressiviteLangage, Langage, Acteur, Format, Architecture'. The bottom status bar indicates 'Reasoner active' and 'Show Inferences' is checked.

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Modélisation -> Formalisation



Architecture

Description: Architecture

Equivalent To +

- {ArchitectureClient, ArchitectureMixte, ArchitectureServeur}

SubClass Of +

General class axioms +

SubClass Of (Anonymous Ancestor)

Instances +

- ArchitectureClient
- ArchitectureMixte
- ArchitectureServeur

Target for Key +

Disjoint With +

- Activite, ExpressiviteLangage, Langage, Outil, Acteur, Format

OutilAlignement

Description: AlignementAPI

Equivalent To +

SubClass Of +

- OutilAlignement

General class axioms +

SubClass Of (Anonymous Ancestor)



- APourActivite some Appariement

Instances +

- VersionAPI4_9

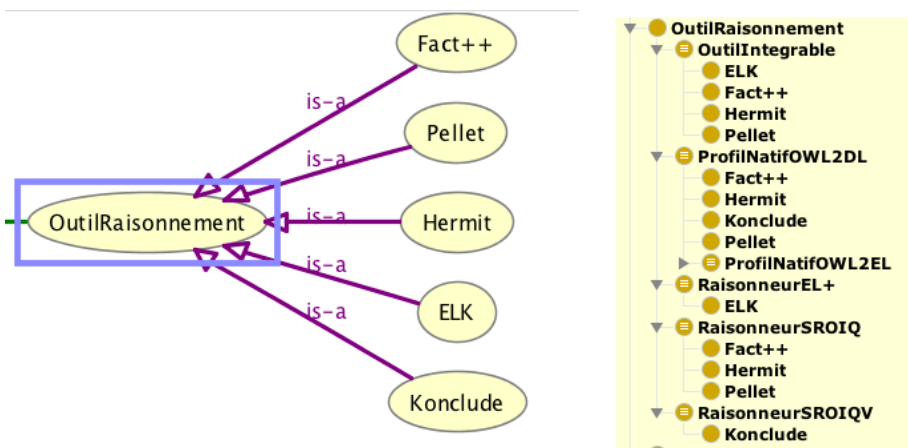
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En OWL 2 ...



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Outil de raisonnement



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SWOOP - Utilisation de Pellet

The screenshot shows the SWOOP 2.3beta4 application window. The main area displays the 'OWL-Class: OutilStanford' with the following details:

- Intersection of:**
 - Outil (Why?)
 - (\exists PaPourDeveloppeur . (StanfordUniversity))
- Subclass of:**
 - Outil (Why?)
- Superclass of:**
 - Protege (Why?)
 - WebProtege (Why?)
- Instances:**
 - VersionProtege4 (Why?)
 - VersionProtege51 (Why?)

Two 'Explanation' windows are open, showing the axioms causing the inference. The first window shows the axiom: $OutilStanford \sqsubseteq Outil$. The second window shows the axiom: $VersionProtege4 \text{ rdf:type } OutilStanford$.

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The screenshot shows the Pellet ontology editor interface. On the left, the 'Class hierarchy' pane shows the 'OutilRaisonnement' class and its subclasses. The right pane shows the 'Class hierarchy (inferred)' for 'OutilRaisonnement', listing subclasses like 'OutilIntegrable', 'OutilAlignement', 'OutilConstruction', etc. The bottom pane shows the 'SubClass Of' property for 'OutilRaisonnement', with the value '(aPourDeveloppeur value StanfordUniversity)'. The bottom right pane shows instances of 'VersionProtege4' and 'VersionProtege51'.

Protégé - Utilisation de Pellet

Outil de Visualisation

- **DomaineVisualisation**
 - **AspectVisualisation**
 - Sphere
 - GraphePlanaire
 - Arbre
 - ListeIndentation
 - Table
 - EspaceAffichage
 - 2D
 - 3D
 - StructureVisualisation
 - StructureGraphe
 - Hierarchie

- aPourStructVisu
- aPourEspaceVisu
- aPourAspectVisu
- aPourActeur

WebVOWL

SubClass Of +

- aPourActeur some Ontologie
- APourActivite some Visualisation
- aPourAspectVisu some Cercle
- aPourEspaceVisu some 2D
- aPourStructVisu some StructureGraphe
- aUpdate value "2016/11/06"
- Outil

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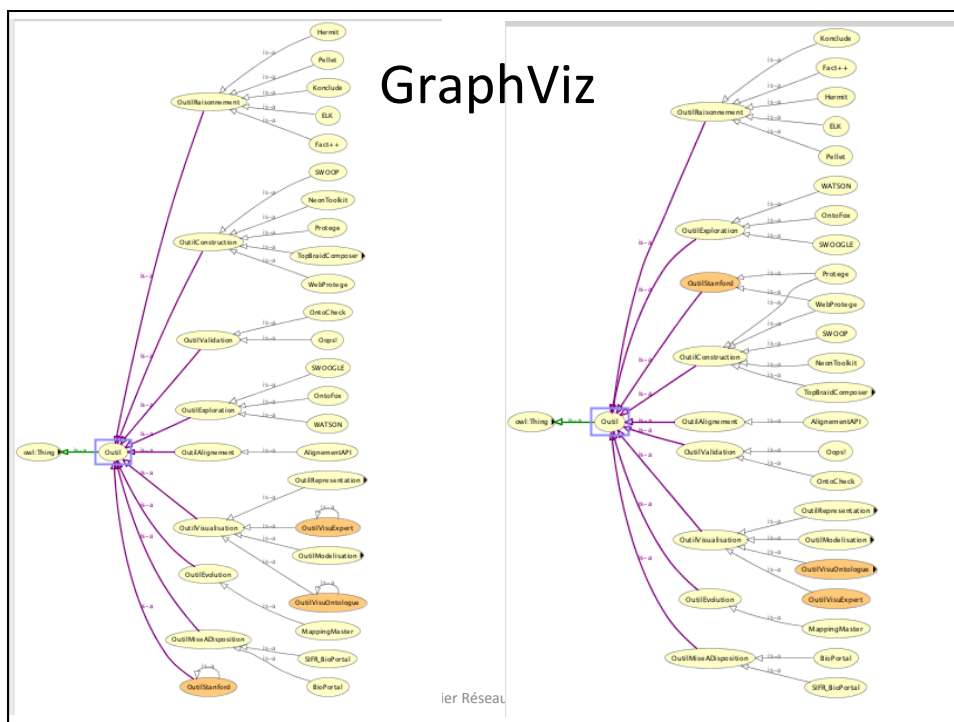
Visualisation d'ontologies

- GraphViz
 - Plugin éditeur
 - Dédié ontologue utilisable pour dialoguer avec l'expert
- WebVOWL
 - <http://visualdataweb.de/webvowl/#ontovibe>
 - Dédié ontologue

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Property Matrix

Object property matrix | Data property matrix

Object property matrix:

Fit columns to content | Fit columns to window

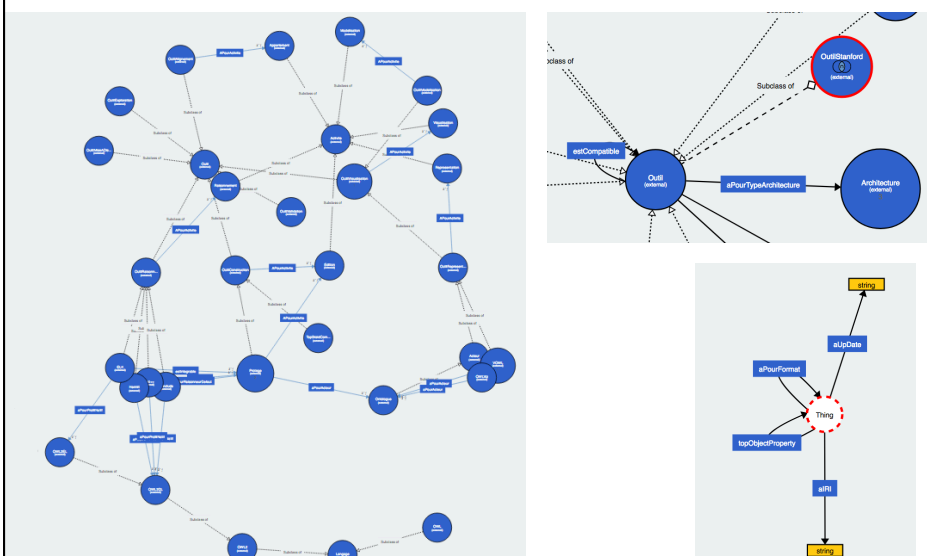
Object Property	Func	Sym	Inv Func	Trans	ASym	RefI	Irrrefl	Domain	Range	Inverse
owl:topObjectProperty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
aPourRaisonneurDefault	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	OutilConst...	OutilRaiso...	estIntegra...
aPourFormat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outil	Architecture	
aPourTypeArchitecture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	OutilRaiso...	Langage	
aPourProfInatif	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	OutilRaiso...	Expressivi...	
aPourExpressivite	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outil	Developp...	
aPourDeveloppeur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outil	Acteur	
aPourActeur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outil	Outil	
estCompatible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outil	Activate	
aPourActive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outil	Activate	aPourRais...
estIntegrable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

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WebVOWL 1.0.4



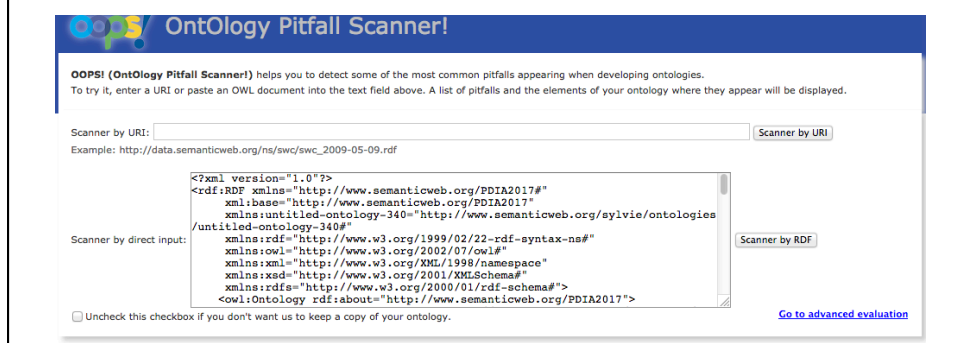
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Outil de validation

- OOPS! - Ontology Pitfall Scanner !
 - Poveda-Villalón, M., Suárez-Figueroa, M. C., et Gómez-Pérez, A. (2012)
 - Outil indépendant de tout éditeur d'ontologies
 - Utilisation en ligne uniquement



Ontology Pitfall Scanner

OOPS! (Ontology Pitfall Scanner) helps you to detect some of the most common pitfalls appearing when developing ontologies. To try it, enter a URI or paste an OWL document into the text field above. A list of pitfalls and the elements of your ontology where they appear will be displayed.

Scanner by URI: Scanner by URI

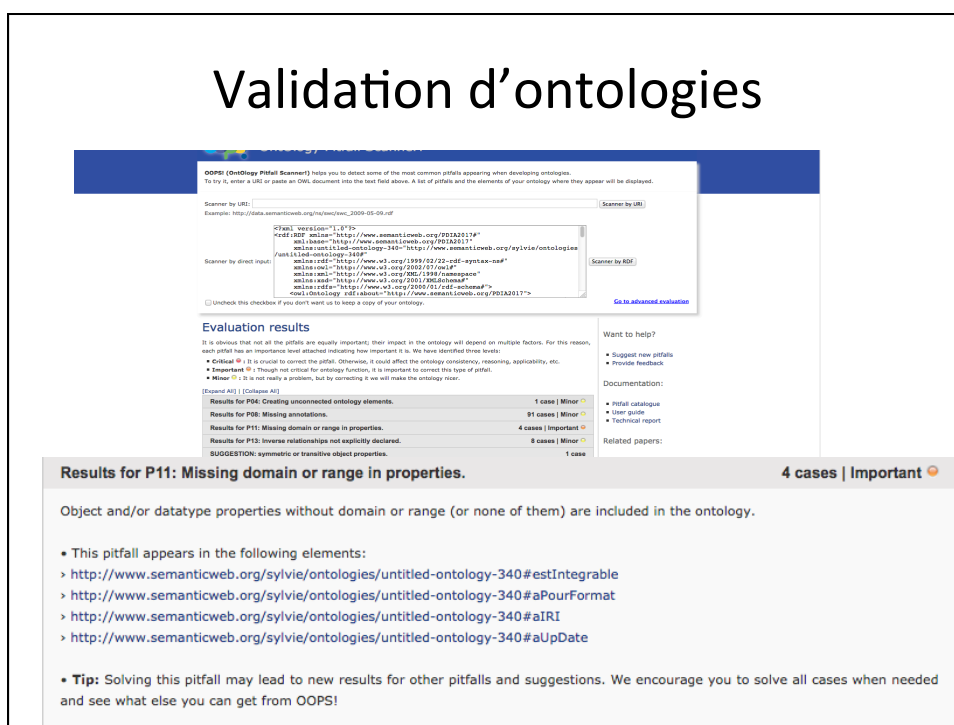
Example: http://data.semanticweb.org/ns/swc/swc_2009-05-09.rdf

Scanner by direct input: Scanner by RDF

```
<?xml version="1.0"?>
<rdf:RDF xmlns="http://www.semanticweb.org/PDIA2017#"
  xml:base="http://www.semanticweb.org/PDIA2017#"
  xmlns:untitled-ontology-340="http://www.semanticweb.org/sylvie/ontologies/untitled-ontology-340#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  <owl:Ontology rdf:about="http://www.semanticweb.org/PDIA2017">
```

Uncheck this checkbox if you don't want us to keep a copy of your ontology. [Go to advanced evaluation](#)

Validation d'ontologies



OOPS! (Ontology Pitfall Scanner) helps you to detect some of the most common pitfalls appearing when developing ontologies. To try it, enter a URI or paste an OWL document into the text field above. A list of pitfalls and the elements of your ontology where they appear will be displayed.

Scanner by URI: Scanner by URI

Example: http://data.semanticweb.org/ns/swc/swc_2009-05-09.rdf

Scanner by direct input: Scanner by RDF

```
<?xml version="1.0"?>
<rdf:RDF xmlns="http://www.semanticweb.org/PDIA2017#"
  xml:base="http://www.semanticweb.org/PDIA2017#"
  xmlns:untitled-ontology-340="http://www.semanticweb.org/sylvie/ontologies/untitled-ontology-340#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  <owl:Ontology rdf:about="http://www.semanticweb.org/PDIA2017">
```

Uncheck this checkbox if you don't want us to keep a copy of your ontology. [Go to advanced evaluation](#)

Evaluation results

It is obvious that not all the pitfalls are equally important; their impact in the ontology will depend on multiple factors. For this reason, each pitfall has an importance level attached indicating how important it is. We have identified three levels:

- **Critical** (C): it is crucial to correct the pitfall. Otherwise, it could affect the ontology consistency, reasoning, applicability, etc.
- **Important** (I): though not critical for the ontology function, it is important to correct this type of pitfall.
- **Minor** (M): it is not really a problem, but by correcting it we will make the ontology nicer.

(Detailed list) | [Collapse all](#)

Results for P04: Creating unconnected ontology elements.	1 case Minor
Results for P08: Missing annotations.	91 cases Minor
Results for P11: Missing domain or range in properties.	4 cases Important
Results for P13: Inverse relationships not explicitly declared.	8 cases Minor
SUGGESTION: symmetric or transitive object properties.	1 case

Results for P11: Missing domain or range in properties. 4 cases | Important

Object and/or datatype properties without domain or range (or none of them) are included in the ontology.

- This pitfall appears in the following elements:
 - > <http://www.semanticweb.org/sylvie/ontologies/untitled-ontology-340#estIntegrable>
 - > <http://www.semanticweb.org/sylvie/ontologies/untitled-ontology-340#aPouFormat>
 - > <http://www.semanticweb.org/sylvie/ontologies/untitled-ontology-340#aIRI>
 - > <http://www.semanticweb.org/sylvie/ontologies/untitled-ontology-340#aUpDate>
- **Tip:** Solving this pitfall may lead to new results for other pitfalls and suggestions. We encourage you to solve all cases when needed and see what else you can get from OOPS!


Want to help?

- Suggest new pitfalls
- Provide feedback

Documentation:

- Pitfall catalogue
- User guide
- Technical report

Related papers:



Outil d'exploration

- **Ontofox ontofox.hegroup.org**



1. Data input using web forms:

(1) Select one ontology:

(2) Term specification:

(3) Include low level source term URIs:

(4) Include top level source term URIs and target direct superclass URIs:

(5) Select a setting for retrieving intermediate source terms:

2. Data input using local text file:

Upload input file:

3. Remote Ontofox access without using the Ontofox web page:

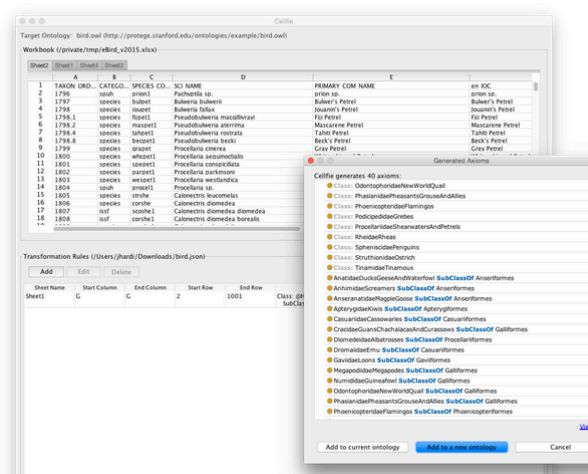
Please Cite Publication: Xiang Z, Courlet M, Brinkman RR, Ruttenberg A, He Y. [OntoFox, web-based support for ontology reuse](https://doi.org/10.1093/nar/nkx100). BMC Research Notes 2016; 3:175.

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Mapping Master

Outil de support

A Protégé Desktop plugin for mapping spreadsheets to OWL ontologies.



Transformation Rules (Users/Hand/Downloads/bird.json)

Sheet Name	Start Column	End Column	Start Row	End Row	Class
Sheet1	G	G	2	1001	Class: SKCS

Plugin protégé Cellfie

Points forts

- Pouvoir d'expression de la Manchester Syntax
- Bonne intégration dans Protégé

Points faibles

- Mapping à réaliser manuellement pour chaque feuille Excel
- Modification de la feuille => Modification du mapping

<https://github.com/protegeproject/cellfie-plugin>

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Interrogation DL Query de l'ontologie

DL query: ⌵ ⌵ ⌵ ⌵

Query (class expression)

Outil

Query results

Instances (6 of 6)

- ◆ **VOWL2** ?
- ◆ **VersionAPI4_9** ?
- ◆ **VersionProtege4** ?
- ◆ **VersionProtege51** ?
- ◆ **WebOWL** ?
- ◆ **version2_3beta4** ?

Query for

- Direct superclasses
- Superclasses
- Equivalent classes
- Direct subclasses
- Subclasses
- Instances

Interrogation DL Query de l'ontologie

DL query: ⌵ ⌵ ⌵ ⌵

Query (class expression)

aPourDeveloppeur value StanfordUniversity

Query results

Instances (2 of 2)

- ◆ **VersionProtege4** ?
- ◆ **VersionProtege51** ?

Query for

- Direct superclasses
- Superclasses
- Equivalent classes
- Direct subclasses
- Subclasses
- Instances

Interrogation DL Query de l'ontologie

DL query: ⌵ ⌵ ⌵

Query (class expression)

aPourDeveloppeur **some** owl:Thing

Query results

Subclasses (10 of 10)

● EditionFree	?
● EditionMaestro	?
● EditionStandard	?
● NeonToolkit	?
⊖ OutilStanford	?
● Protege	?
● SWOOP	?
● TopBraidComposer	?
● WebProtege	?

Query for

- Direct superclasses
- Superclasses
- Equivalent classes
- Direct subclasses
- Subclasses
- Instances

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Parmi les accessoires manquants?

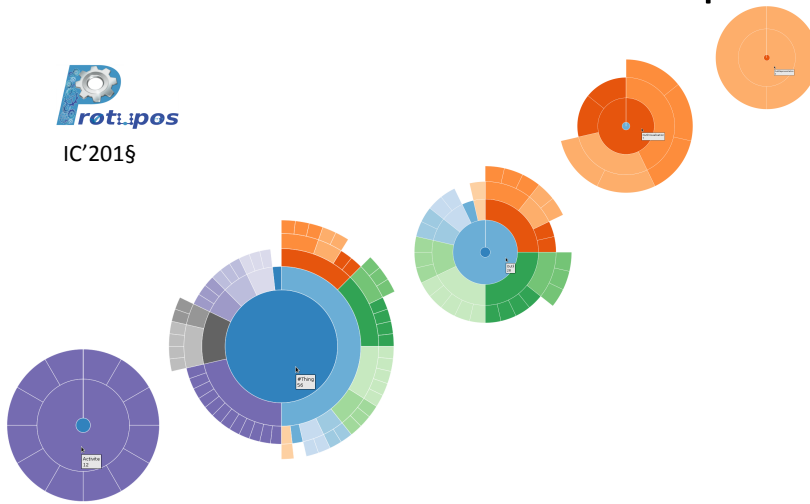
- Outil de visualisation dédié expert
- Outil supportant l'échange entre ontologie et utilisateur

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Visualisation centrée expert

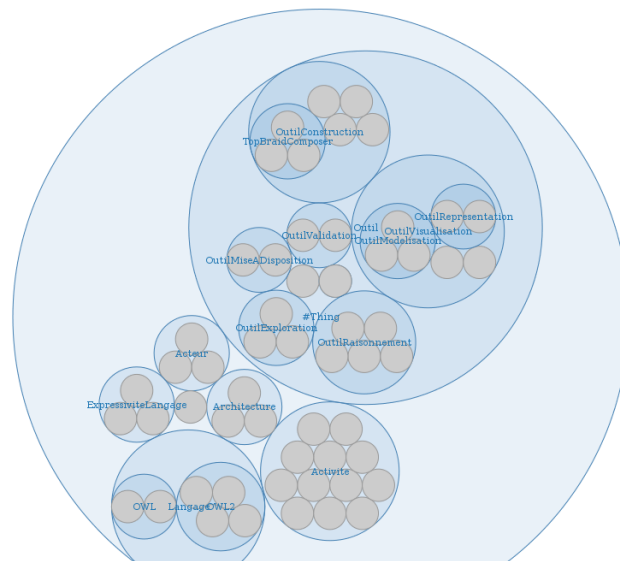
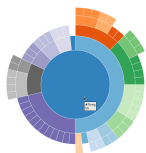


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Visualisation centrée expert



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Formules de base

- Créer, modifier, détruire ou renommer

- Classes

- Hierarchies de classes

- Propriétés

- Individus

- Ajouter ou modifier des annotations

- Labels, altLabels, commentaires, definition, etc..

- Ajouter ou modifier des restrictions

- setObjectProps, setDataprops, etc.

USE()	aliment.matériel.cuisine		
CREATEIND/RAW()	200 g de carotte	Ingredient	Carotte200g
CREATEIND/RAW()	\$ carotte	Carotte	Carotte-i
CREATEIND/RAW()	\$ gramme	Gramme	Gramme-i
SETOBJECTPROPI()	Carotte200g	aPourConstituant	Carotte-i
SETOBJECTPROPI()	Carotte200g	aPourUnité	Gramme-i
SETDATAPROPI()	Carotte200g	aPourQuantité	200
SETOBJECTPROPI()	Recette de blanquette de veau	aPourIngredient	Carotte200g
USE()	matériel		
SETOBJECTPROPI()	broche	aPourMatiere	metal.bois.verre

Formules d'export (exemples)

- Exporter des entités choisies et leurs attributs dans la feuille active ou dans une nouvelle feuille

- Sélecteurs d'entités

- Sélecteurs d'attributs

	Sélecteur d'entités		Filtre d'attributs	
NEWDUMPF()	USE()	sensoriel	aPourSavoir:INHERITED	aPourCouleur:INHERITED
	CLASS.TREE	courgette	aPourSavoir	aPourCouleur
		OU		
Courgette	Courgette	Courgette		CouleurVert.CouleurJaune.CouleurBlanche
	CourgetteBlancheDeVirginie	CourgetteBlancheDeVirgi		CouleurBlanche
	CourgetteGoldsuah	CourgetteGoldsuah		CouleurJaune.CouleurBlanche
	CourgetteGrisetteDeProvence	CourgetteGrisetteDeProv		CouleurVert.CouleurBlanche
	CourgetteRondeDeNice	CourgetteRondeDeNice		CouleurVert.CouleurBlanche
	CourgetteTrompette	CourgetteTrompette		CouleurVert.CouleurBlanche

- Lors de l'export des formules de modifications sont produites à la demande

- L'export peut aussi être réalisé dans une nouvelle feuille

	USE()	sensoriel	aPourSavoir:INHERITED	aPourCouleur:INHERITED	
NEWDUMPF()	CLASS.TREE	courgette	aPourSavoir	aPourCouleur	
		OU			
Courgette	Courgette	SETOBJECTPROPI()	aPourSavoir	SETOBJECTPROPI()	aPourCouleur
	CourgetteBlancheDeVirginie	SETOBJECTPROPI()		SETOBJECTPROPI()	CouleurVert.CouleurJaune.Cou
	CourgetteGoldsuah	SETOBJECTPROPI()		SETOBJECTPROPI()	CouleurBlanche
	CourgetteGrisetteDeProvence	SETOBJECTPROPI()		SETOBJECTPROPI()	CouleurJaune.CouleurBlanche
	CourgetteRondeDeNice	SETOBJECTPROPI()		SETOBJECTPROPI()	CouleurVert.CouleurBlanche
	CourgetteTrompette	SETOBJECTPROPI()		SETOBJECTPROPI()	CouleurVert.CouleurBlanche

Conclusion

- Première version de OOGO
 - reste à la compléter ...

Metrics	
Axiom	692
Logical axiom count	325
Declaration axioms count	189
Class count	147
Object property count	16
Data property count	5
Individual count	21
DL expressivity	ALCHO(D)

Conclusion

- Merci
 - A Rahma Dandan et Jérôme Nobecourt du LIMICS pour leur contribution à ce travail
 - Réalisation des cartes conceptuelles
 - Visualisation avec PROTUPOS

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