

OntoLife: An Ontology for Semantically Managing Personal Information

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Scope of this work

- Explore role of ontologies in semantically managing personal knowledge
- An ontology for modeling the domain of biographical events is proposed and evaluated

Introduction: Personal Knowledge Management and the Semantic Web

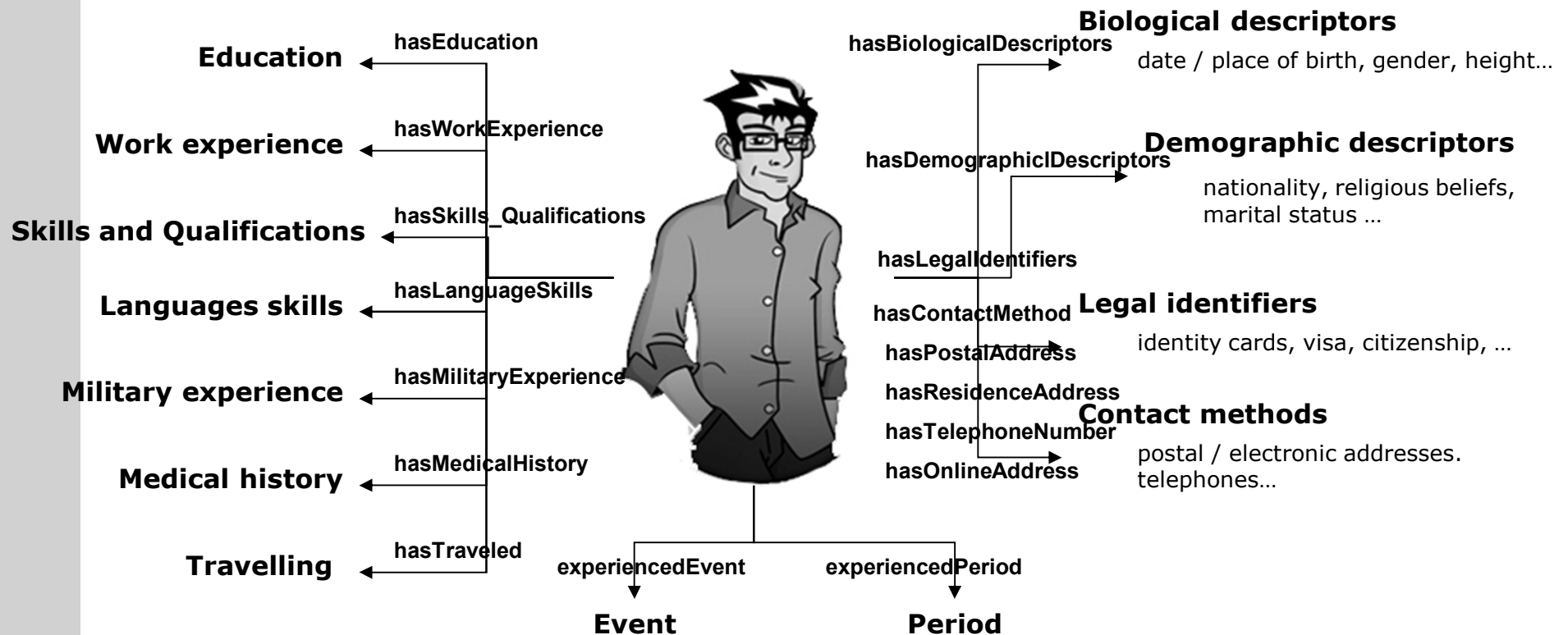
- Need to organize a huge volume of personal information. The various software tools provide isolated solutions.
- A unified way for managing personal information is necessary.
- Ontologies are used to structure and semantically annotate raw information, to allow its interoperability, reuse and effective search by non-human agents
- Formalisms to model the domain of biographical events:
 - FOAF
 - ResumeRDF
 - HR-XMLNone is wide enough to be suitable to serve our purposes.

Proposed ontology: OntoLife

- Name: OntoLife
- Scope: model life by describing a person's
 - characteristics
 - relationships
 - experiences
- Compatible with: OWL Full
- Developed with: Protégé ontology editor

OntoLife: Person

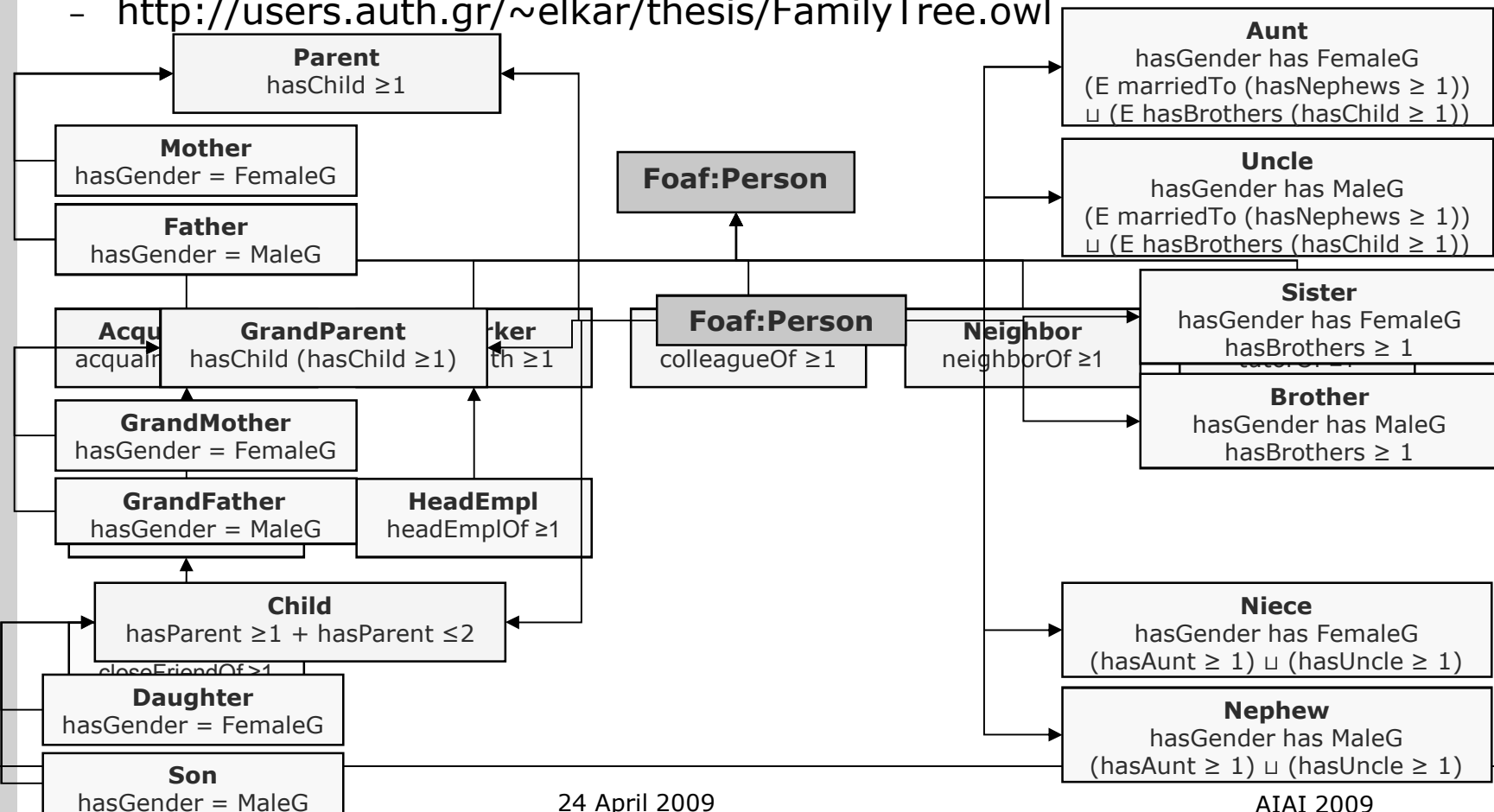
- Basic entity: Person
 - Based on Foaf: Person (Friend Of A Friend, <http://xmlns.com/foaf/spec/>)
 - Extended with additional properties



OntoLife: Subclasses of Person

External ontologies:

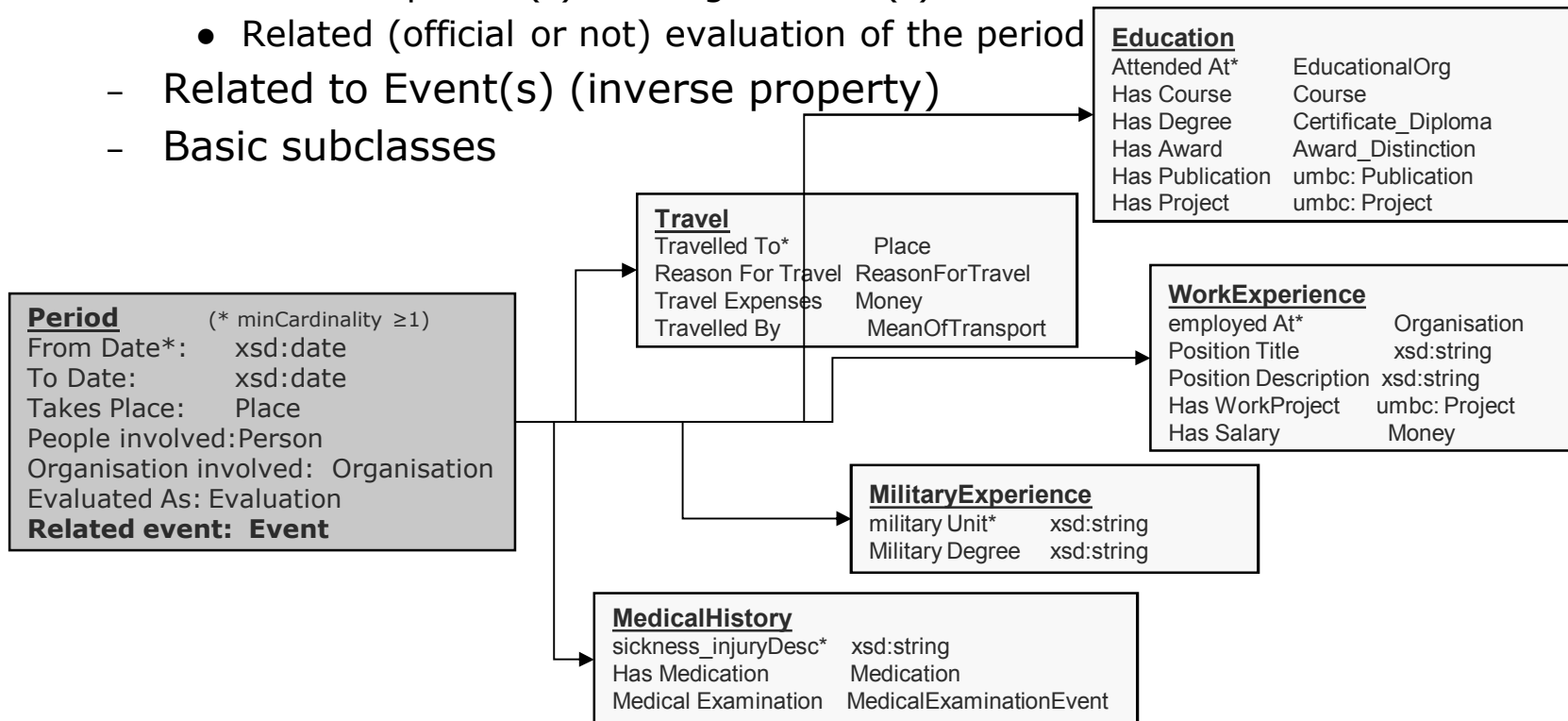
- <http://vocab.org/relationship/>
- <http://users.auth.gr/~elkar/thesis/FamilyTree.owl>



OntoLife: Period

Time periods in the life of a person

- Includes
 - Place(s) where it took place and duration date(s)
 - Involved person(s) and organisation(s)
 - Related (official or not) evaluation of the period
- Related to Event(s) (inverse property)
- Basic subclasses



OntoLife: Event

Events in a person's life

- Includes
 - Place(s) where it took place, date it occurred, weather conditions
 - Involved person(s) and organisation(s)
 - Its scope and (possible) periodicity
 - Related (official or not) evaluation(s)
- Related to Period(s) (inverse property)
- Basic subclasses

Event	
Specific Date	xsd:date
End Date	xsd:date
Has Weather	WeatherObservation
Has Scope	EventScope
People Involved	Person
Organisation Involved	Organisation
Evaluated As	Evaluation
Is Periodical	TimeInterval
During Period	Period

PurchaseEvent	
Shipped By	CompanyOrg
Shipped To	Person
Bill To	Person
hasItems*	ItemsCollection
Shipment Date	xsd:date
discount	Money
Purchased Event Number	xsd:int
Total Price	Money

FamilyEvent	
People Involved	<i>some-values-from</i> Family
hasScope	<i>has-value</i> Family_EventScope

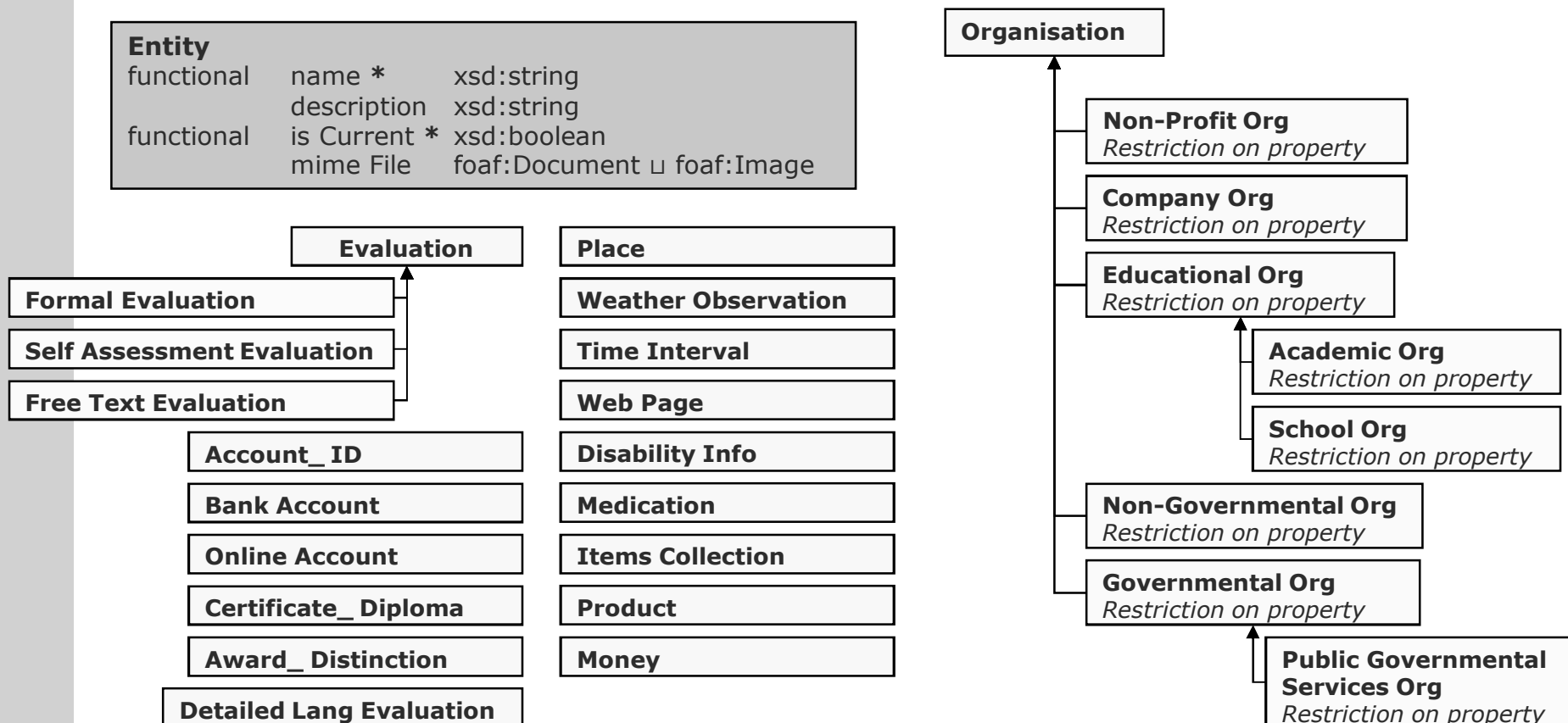
MedicalExaminationEvent	
Type Of Examination	xsd:string
Pathological Area	xsd:string

OntoLife: Resource and rest of subclasses

Basic class: Resource

- Name, description, timeliness, related file
- The rest classes are subclasses of this main class

Entity		
functional	name *	xsd:string
	description	xsd:string
functional	is Current *	xsd:boolean
	mime File	foaf:Document ∪ foaf:Image



OntoLife: Auxiliary Enumeration classes

owl:Thing Enumeration Classes

Reason For Travel

{Business, Pleasure,
MiscPersonalArrangement}

Mean Of Transport

{ Foot, Bicycle, Motorcycle,
Automobile, Train, Airplane, Ship }

Precipitation

{Snow, Rain, Fog, Thunderstorm,
Sleet, Drizzle, Hail}

Event Scope

{ Personal, Family, Regional,
National, Global }

Public Sector Scope

{ Regional, National, European,
International }

Educational Level

{ Elementary, Secondary, Higher }

Marital Status

{ Single, Married, Divorced,
Widowed }

Tel Type

{Landline, Mobile, Fax, Pager}

Contact Usage

{Personal, Professional}

Contact Availability

{on24_7basis , OfficeHours,
Evenings }

Gender

{Female, Male}

OntoLife: Imported Classes

Imported classes for external ontologies

- ISO 3166, ISO 639 OASIS (Organization for the Advancement of Structured Information Standards)
 - Countries: <http://psi.oasis-open.org/iso/3166>
 - Languages: <http://psi.oasis-open.org/iso/639>
- UMBC eBiquity Research Group - Computer Science and Electrical Engineering of the University of Maryland, Baltimore
 - Publications: <http://ebiquity.umbc.edu/ontology/publication.owl>
 - Projects: <http://ebiquity.umbc.edu/ontology/project.owl>

iso: country

Code-a2
Code-a3

iso: language

Code-a2
Code-a3t
Code-a3b

umbc:Publication

editor, abstract, edition, chapter, series,
pages, volume, number, note, address,
organisation, journal, book title, school,
institution, publisher, counter,
google Key, google Citations

umbc:Project

tag, description, title, Logo URI,
Start Date, End Date, Associated With,
Related Publication, Related Resource,
Related Research Area

Ontology Evaluation: Criteria-based evaluation

Methodology:

1. Specific requirements that the ontology needs to satisfy are defined.
2. Each requirement is mapped to a criterion.
3. Suitable measures are selected and related to each criterion to quantitatively assess each requirement.

Ontology Evaluation: Criteria-based evaluation

Requirements:

1. "Real-life" terms for class names.
2. Balanced number of subclasses (facilitate effective annotation, prevent confusion).
3. Richness of attributes and relationships.
4. Cycles and other errors should be avoided.

Ontology Evaluation: Criteria-based evaluation

Req	Criterion	Measures
1 st	Semantic Quality	<p><i>Interpretability , Concept Paths</i></p> <p>Interpretability: $(c1 \times 0 + c2 \times 0.5 + c3 \times 1) / c = 66\%$ <i>c1: no of classes whose sense is not listed in WordNet, c2: no of classes with a sister/ synonym term c3: no of classes with a sense listed in WordNet, c: total no of defined classes</i></p> <p>Concept Paths: $(p1 \times 0 + p2 \times 0.5 + p3 \times 1) / p = 60\%$ <i>p1: no of concept paths not depicted by WordNet p2: no of concept paths partially depicted by WordNet p3: no of concept paths depicted by WordNet, p: total no of concept paths</i></p>
2 nd	Expandability/Coverage	<p>Class tree depth, breath and branching factor</p> <p>Tree Depth <i>Max. Depth of Class Tree: 4, Min. Depth of Class Tree: 1, Avg. Depth of Class Tree: 1.9</i></p> <p>Tree Breadth <i>Max. Breadth of Class Tree: 33, Min. Breath of Class Tree: 1, Avg. breadth of Class Tree: 25</i></p> <p>Tree Branching factor <i>Max. Branching Factor of Class Tree: 47, Min. Branching Factor of Class Tree: 1 Avg. Branching Factor of Class Tree: 6.6</i></p>

Ontology Evaluation: Criteria-based evaluation

Req	Criterion	Measures			
3 rd	Ontology richness criterion	Attribute and relationship richness			
	<table border="1"> <tr> <td>Attribute richness</td> </tr> <tr> <td><i>No. Attributes in all classes / No. classes = 85%</i></td> </tr> <tr> <td>Relationships richness</td> </tr> <tr> <td><i>No. Relations / (No. Subclasses+No. Relations) = 68%</i></td> </tr> </table>		Attribute richness	<i>No. Attributes in all classes / No. classes = 85%</i>	Relationships richness
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<i>No. Attributes in all classes / No. classes = 85%</i>					
Relationships richness					
<i>No. Relations / (No. Subclasses+No. Relations) = 68%</i>					
4 th	Minimal Ontological commitment criterion	Use of ontology validators			
	Ontology was identified as OWL Full compatible, while no errors were indicated.				

Conclusions and Future work

Conclusions

- Ontologies can support Personal Knowledge Management tasks.
- Proposed ontology is rich, simple and straightforward.

Future Work

- Revision of ontology with newer version of FOAF
- Combination of proposed ontology with Semantic Wikis in order to:
 - evaluate how efficiently they can incorporate and represent the proposed ontology
 - see how effectively they can support users when annotating content

Thank you for your attention!

