

Use of Ontologies In Modeling Persona

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Abstract—Semantic web combines the descriptive languages RDF (Resource Description Framework) and OWL (Web Ontology Language) with the data-centric customizable XML to provide descriptions of the content of web documents. The semantic Web constitutes a new vision of the Web, where resources are described by meta-data, using the conceptual vocabulary provided by ontologies , that permit software agents to help more effectively various types of users in their accesses to resources on the Web. Considering as a foundation FOAF (Friend Of A Friend) specification, we are using the semantic constructs (RDFa) in order to create a conceptual model (e.g., an ontology) regarding personas and their uses in the human-computer interaction context.

Keywords—*Semantic Web, FOAF, Persona, Vocabulary, Ontology.*

I. INTRODUCTION

Semantic Web Technologies include the key semantic knowledge technologies and research. The semantic Web associates the descriptive languages Rdf (Resource Description Framework) and OWL (Web Ontology Language), customizable XML to provide descriptions of the content of Web documents[1]. The Semantic Web is an extension of the current web in which information is given well-defined meaning, better enabling computers and people to work in cooperation[2]. The use of ontologies is the basis of all Semantic Web applications. Gruber proposed a conventional definition of the anthology as: "An ontology is an explicit and formal specification of a conceptualization of a domain of interest" [3]. In this paper we presented the notion of ontology, and several methods and tools for ontology engineering. In our study, taking into consideration the characteristics and advantages of ontologies, we focused on the ontology with a view to building a vocabulary persona.

Like many powerful tools, personas are simple in concept but must be applied with considerable sophistication. It is not enough a couple of user

profiles based upon stereotypes and generalizations, nor is it particularly useful to attach a stock photographs to a job title and call it a "persona". For personas to be effective tools for design, considerable rigor and finesse must be applied to the process of identifying the significant and meaningful patterns in user behavior and turning these into archetypes that represent a broad cross-section of users.

This definition focuses on two points, first, the conceptualization is formal and therefore allows for reasoning by the computer, and the ontology is designed to practice a particular domain of interest. Ontology consists of concepts (also known as classes), relations (properties), and instances and axioms. Therefore, a succinct definition was proposed as a 4-tuple $\langle C, R, I, A \rangle$, where C is a set of concepts ,R a set of relations,I a set of instances and A a set of axioms [4]. the effective implementation, information management, information integration and application require that all underlying information and processes are described and managed semanticall is that they are associated with description of the machine-processable meaning of their meaning. The fundamental idea behind the semantic Web became prominent at the very end of the 1990s [5] and in a more developed form in the early 2000s [6] . The last half decade has seen intense activity in developing these ideas,in particular under the auspices of the Word Wide Web Consortium (W3C)[7].Whilst the W3C has developed the fundamental ideas and standardized the languages to support the semantic Web, there has also been considerable research to develop and apply the necessary technologies. The mechanisms responsible for the creation of all components of ontology: concepts, instances, properties (or relations) and axioms can be provided by the OWL[8] language .OWL Lite offers a limited feature set, albeit adequate for many applications, but at the same time being relatively efficient computationally. The Resource Description Framework (RDF) [9] , which is essentially a data

modelling language, also defined by the W3C , forms the basis of OWL. RDF is graph-based, but usually serialised as XML. Essentially, it consists of triples : subject, predicate, object. Thus the Semantic Web is considered a suitable platform for implementing e-learning system, as long as it provides the means for developing ontologies for the annotation of learning materials.

II. ONTOLOGIES

Ontology is a structured representation of knowledge in a field, form a network of concepts connected by semantic links. Researches on ontologies are essential for the realization of the Semantic Web. Indeed, once constructed and accepted by a particular community, ontology must reflect a degree of consensus explicit and some level of sharing, which are essential to enable the exploitation of resources by different applications or Web agent software [10]. The W3C OWL has three sublanguages with increasing capacity of expression and it is as necessary that we choose the right language.

- OWL Lite: is the OWL language in the easiest, it is intended to represent hierarchies of simple concepts.
- OWL DL: is more complex than the previous one, it is based on description logic as its name (OWL Description Logics). It is suitable for reasoning, and it guarantees the completeness and decidability of reasoning.
- OWL Full: is the most complex version of OWL, intended for situations when it is important to have a high level of description capability, even if they can not guarantee the completeness and decidability of calculations related to the ontology [11].

Ontologies are formal and consensual specifications of conceptualizations that provide a shared understanding of a domain, an understanding that can be communicated across people and application systems[12]. The field of ontology draws attention because it provides: 1) a basic conceptual structure from which it is possible to develop knowledge-based systems that are sharable and reusable, 2) an interoperability between information sources and knowledge. It is necessary to consider the difference between two types of ontologies: an ontology-oriented Semantic Web and ontology-oriented concept. An ontology oriented concept addresses the fundamental concepts of the target world that need to be examined in depth while an ontology oriented Semantic Web is a computer-readable vocabulary which defines the meaning of metadata and is used primarily to achieve semantic interoperability between information resources

through metadata. Such ontologies can be described as ontology surface, since it does not necessarily deep conceptual structure of the target world. Figure 1 shows the relationship between these characteristics. The engineering knowledge (IC) has long been considered the favorite field of development of expertise in system design based on knowledge [10]. Some members of the intelligence community needed to pass an engineering based on more solid foundations theoretical and methodological, despite the fact that knowledge engineering has helped increase this expertise by organizing it in a computational perspective. This has the abjectif to improve the design of intelligent systems. Historically, ontological engineering (IO) emerged from the knowledge engineering, ontological engineering to specify the conceptualization of a system, ie , to provide a formal representation of knowledge to be acquired in the form of declarative knowledge exploitable by an agent [9]. Thus, the operating mechanism by inference, a type representation as declarative ontology, while following the inference rules defined in this ontology, is the source of the Intelligence system. The knowledge engineering has given rise to ontological engineering, where the ontology is the key object which must be addressed. The need for ontology and ontological engineering of knowledge-based systems beginning to be understood and accepted [14]. OWL ontologies are used to model domain knowledge[15].

OWL provides a built-in class whose members correspond to modular parts of a semantic model. It is customary for the URI of an Ontology to correspond to the URL of the file on the Web where the ontology is stored[21]. OWL extends the expressivity of RDFS with additional modeling primitives. For example, OWL defines the primitives owl: equivalentClass and owl :equivalentProperty[22].

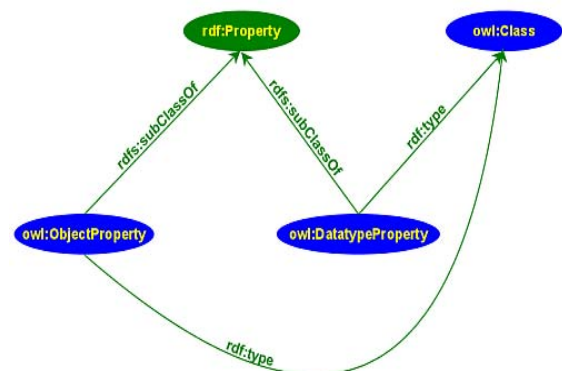


Figure 1. OWL properties, classes, relations[16]

A. FOAF Vocabulary and syntax

FOAF is not so much an application as an ontology used by many applications. Being one of the first to recognize the simple power of social networks, the FOAF project offers tools to relate people though o

model that contains typical social attributes such as a name, email address, interests, and the like. Tools that allow you to create a model describing yourself. The following code below is a FOAF file in TURTLE format[17]. The FOAF project[19] maintains the friend of a friend ontology, which expresses information relevant to sharing information about friends on the World Wide Web. The ontology contains classes and properties for capturing persona information, email addresses, online account and instant messaging information, as well as online documents and images. Following is a sample description of an individual using the FOAF ontology[18].The FOAF project aims to provide a means to capture your online life in an application-independent and website-independent manner in order to break down the walls that divide the various communities on the web. The example shows a declaration of a foaf: person, with some common properties about that individual including foaf: name, foaf: title, and foaf: homepage. Other properties that could be added to this entry are usernames for various messaging applications and

TABLE I. FOAF TERMS DIVIDED BY CATEGORIES[20]

Personal Info	Online Accounts / IM
weblog	OnlineAccount
knows	OnlineChatAccount
interest	OnlineEcommerceAccount
currentProject	OnlineGamingAccount
pastProject	account
plan	accountServiceHomepage
based_near	accountName
age	icqChatID
workplaceHomepage	msnChatID
workInfoHomepage	aimChatID
schoolHomepage	jabberID
topic_interest	yahooChatID
publications	skypeID
geekcode	
myersBriggs	
FOAF Basics	Documents and Images
Agent	Document
Person	Image
name	PersonalProfileDocument
nick	topic (page)
title	primaryTopic
homepage	(primaryTopicOf)
mbox	tipjar
	sha1
	made (maker)
	thumbnail
	logo
	Projects and Groups
	Project
	Organization
	Group
	Member

social-networking websites as well as links to other foaf: person instances that Zeus Crawford is friends with[]. In addition, efforts are underway to ensure the long-term preservation of the FOAF namespace, its xmlns.com domain name and associated documentation. Computer language (RDF / OWL) was used to write The FOAF Vocabulary definitions, presented here. What makes it easier for software to process some basic facts about the terms in the FOAF vocabulary, and consequently about the things described in FOAF documents. Unlike a traditional Web page, a FOAF document can be combined with other FOAF documents to create a unified database of information. FOAF is a system of linked data, in that it based around the idea of linking together a Web of decentralized description [18].

This specification serves as the FOAF "namespace document". As such it describes the FOAF vocabulary the terms (RDF classes and properties) that constitute it, so that Semantic Web applications can use those terms in a variety of RDF-compatible document formats and applications

III. PERSONA

Persona is a user-type (the famous archetype), a fictional representation of the target users, we can use to set priorities and guide our design decisions interface. The method is a technique PERSONAS centered design users, initiated by Alan Cooper in 1999. This method can provide a common and shared vision of the users of a service or product, focusing on their goals, their expectations and potential barriers, and offering a more engaging format Personas are fictitious persons employed in the development of computer software. It is possible archetypes of users of the application developed which designers can refer when designing the interface. Personas are built based on careful study of current and / or potential of a product (software or website), most often using data collected during individual interviews. Unlike the field of marketing, personas do not correspond to user profiles or segmentation marketing, they would rather a synthesis of data collected to develop several archetypes of users. Presented in a form, they include various information to identify them: name, age, occupation, skills, personality traits, environmental life / work, etc.. with a little personal history to give them a reality. All these features are related to the use of the product and must be reflected in product design[23].

The method aims to build personas archetypes of users of the application in the manner of characters in a film or a play, where designers can refer in their interface design. This unique method covers both phases of analysis and design. Because there is no average user and it is pointless to try to set up

the user, and yet that is what seems to propose the method of personas, this method only covers the two phases analysis and design. The method may seem surprising characters and misunderstood. indeed, personas are built on the basis of a specific study objectives and motivations of the population covered by the application. Ethnographic study will help to develop more user archetypes called personas. This latter do not correspond to user profiles or segmentation marketing. They result from the synthesis of data collected in an initial research phase. Personas are so reliable modeling of end users because they rely on evidence from a detailed study of the target population[23]. The FOAF-Persona ontology is composed of the following classes. Personas are a model used to describe users goals, skills, abilities, technical experience and context. They are detailed descriptions of archetypical users constructed out of well-understood, highly specific patterns of data about real people. A persona is not based on an individual - it is a construct developed through a detailed process, not the result of a search for the "right" individual. They are used by the design team (and larger project team) to describe, and keep front and center the user(s) for whom the system will be built[23].

IV. FOAF-PERSONA

A. *Persona Categories*

- Primary Persona

This persona is usually designated the primary persona. Indeed, each primary persona requires the presence of its own user interface in a particular application. Knowing that there will be more of a primary persona when their needs cannot be met by the same interface. The fewer the number of primary personas the better.

- Secondary Persona.

By focusing on the primary persona, the secondary persona's goals and needs can mostly be met. Nevertheless, there are a few needs specific to them that are not a priority for the primary persona. To meet the needs of a secondary persona, there may be small additions to the interface necessary. However, these additions should not negatively affect the experience of the primary persona.

- Supplemental persona

User persona which are neither primary nor secondary are called supplemental persona. The combination of primary and secondary personas represents completely supplemental persona's needs that are completely satisfied by the solution devised for one of our primaries.

- Customer persona

Customer personas match customer needs, as discussed by ((auteur) et al., (année)) and their treatment is similar to that of secondary personas.

- Served persona

Served persona some what differ from persona types discussed previously. Although they are directly affected by the use of the product, they are not users of the product at all.

- Negative persona

Negative persona they aren't users of the product, like served personas. They mediate between stakeholders and product team members by informing them that there are specific types of users that the product is not being built to serve[24].

V. PERSONAS CONSTRUCTION

The majority of studies that were performed on personas seem to focus on goals as part of what distinguish one persona from the other [25]. But with a narrative point of view goals are part of what makes the persona act in a given situation. What differentiate personas are, as in real life, the personal traits the persona posses (age, background, psyche etc.).

Personas Construction

As a rounded character [26], the persona can be characterized by the following elements, namely:

- Body – body constitutes a human being. Sex, age, look helps the designer emphasise the Persona
- Psyche – to understand motivations for actions we need to understand what lies behind the motivation, the personality.
- Background – job position, family, education, social- and cultural positions explain motivations for actions.
- Emotional state – to know the emotional state furthers engagement in the Persona [27]. Inner needs and goals, ambitions and wishes create a foundation for the emotional state.
- Cacophony – two oppositional character traits [28]. The oppositional traits are what constitute the difference between a stereotype and a rounded character.

The Persona is static but becomes dynamic when inserted into the actions of the scenario. In the scenario, the Persona will be in a context, in a specific situation, having a specific goal [29].

Persona Elements :

- Goals ,
- Attitudes (related to your context) ,
- Behaviors & Tasks (in your context) ,
- Name ,
- Photo ,
- Tagline ,
- Demographic Info (brief just to help "humanize" them) ,

- Skill level ,
- Environment ,
- Scenarios (not all but perhaps the highest priority, most common or most telling about their needs) [30].

Table II. full list of classes of the foaf-persona

afoaf:Persona	afoaf:Event
afoaf:Context	afoaf:Goals
afoaf:Application	afoaf:Practical
afoaf:Society	afoaf:Personal
afoaf:Place	afoaf:Business
afoaf:Country	afoaf:Person
afoaf:Organization	afoaf:Image
afoaf:ContactPoint	afoaf:Researcher_field
afoaf:PostalAddress	

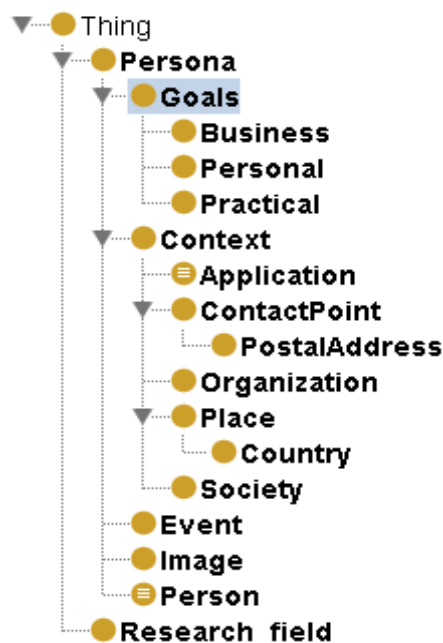


Figure 2 gives the list of classes in a hierarchical view.

B. Some examples of classes are:

a) Persona

The class Persona is one of the main classes. It is the class that collects the individual.

http://www.owl-ontologies.com/Afoaf.owl#Persona
sub-class of: http://www.owl-ontologies.com/Afoaf.owl#Thing

In OWL DL this will be expressed with the following syntax: `<!--http://www.owl-ontologies.com/Afoaf.owl#Persona -->
<owl:Class rdf:about="&Afoaf; Persona ">
</owl:Class>`

b) hasIdentity

hasIdentity this property connects indicates this relation between persona class and person class, and every person has identity includes a first and givenName, birthdate and other demographic.

http://www.owl-ontologies.com/Afoaf.owl#hasIdentity
domain: http://www.owl-ontologies.com/foaf.owl#Persona
range: http://www.owl-ontologies.com/foaf.owl#Person
In OWL DL this will be expressed with the following syntax for class person: <code><!-- http://www.owl-ontologies.com/Afoaf.owl#Person- > <owl:Class rdf:about="&Afoaf; Person "> </owl:Class></code>

c) hasContext

has context property indicates relation between Persona class and Context class, the Context class provides attributes for the details specification of a persona like (country, etc). The attribute details for this class are adapted a standard for storing electronic contact information.

http://www.owl-ontologies.com/Afoaf.owl#hasContext
Domain: http://www.owl-ontologies.com/Afoaf.owl#Persona
Range: http://www.owl-ontologies.com/Afoaf.owl#Context

d) hasAffiliation

hasAffiliation this property indicates relation between persona class and organization class, An organization that the persona is affiliated with. For example, a school/university, a club, or a team.

http://www.owl-ontologies.com/Afoaf.owl#hasAffiliation
Domain: http://www.owl-ontologies.com/Afoaf.owl#Persona
Range: http://www.owl-ontologies.com/Afoaf.owl#Organization

e) physicaladdress

physicaladdress this property indicates relation between Context class and ContactPoint class.

http://www.owl-ontologies.com/Afoaf.owl#physicaladdress
Domain: http://www.owl-ontologies.com/Afoaf.owl#Context
Range: http://www.owl-ontologies.com/Afoaf.owl#ContactPoint

f) *hasLocation*

hasLocation this property indicates relation between Context class and Place. used for annotating geographic real-world entities. To annotate Place objects with detailed geographic metadata, implementors should use the Country class.

http://www.owl-ontologies.com/Afoaf.owl#hasLocation
Domain: http://www.owl-ontologies.com/Afoaf.owl#Context
Range: http://www.owl-ontologies.com/Afoaf.owl#Place

g) *hasGoals*

hasGoals this property indicates relation between Persona class and Goals class, besides goals related to the application, it includes personal, business and Practical goals as well.

http://www.owl-ontologies.com/Afoaf.owl#hasGoals
Domain: http://www.owl-ontologies.com/Afoaf.owl#Persona
Range: http://www.owl-ontologies.com/Afoaf.owl#Goals

h) *hasAdopted*

hasAdopted this property indicates relation between Application class and Context class.

http://www.owl-ontologies.com/Afoaf.owl#hasAdopted
Domain: http://www.owl-ontologies.com/Afoaf.owl#Application
Range: http://www.owl-ontologies.com/Afoaf.owl#Context

This is the list of object properties:

birthdate
 additionName
 givenName
 email
 gender
 award
 streetAddress
 postOfficeBoxNumber
 addressLocality
 addressRegion
 addressCountry
 contactType
 url
 email
 faxNumeber
 telephone
 postalCode
 alumniOf
 worksFor
 affiliation
 memberof
 nationality

thumbnail
 height
 width
 caption
 representativeOfPage
 platform
 mobilphone
 hasIdentity
 hasGoals
 hasAffiliation
 hasContext
 hasDepiction
 attend
 hasAssociated
 hasAdopted

C. *The persona data model and the diagram*



Figure 3. Values of the instance with the name ingelo by proteger.

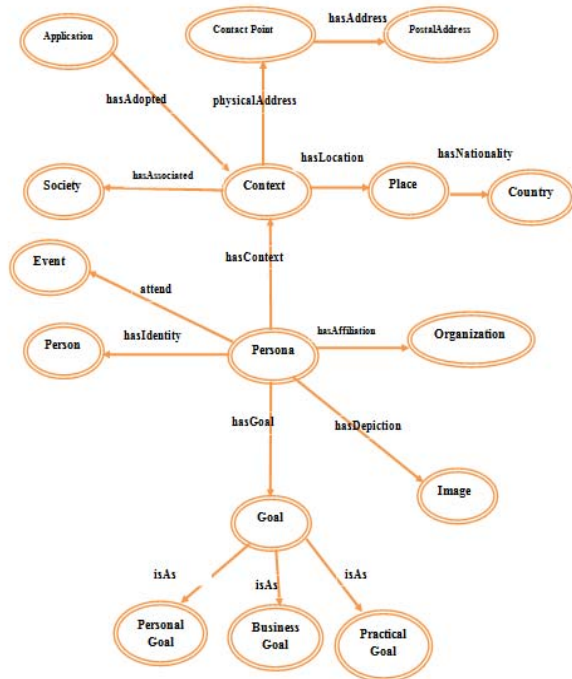


Figure4 : Relations between Persona class and all other defined classes.

As you can see, the model persona is centered on six classes: context, person, goals, image, organization and event.

The context class is extended by four subclasses: society, application, contact point, which is related to postal address, and place (country). Each person's persona must be identified by name, age and other demographic information. It has goals that are related to the application, and includes personal, business and practical goals as well. Every persona should have a picture that's including a photograph which fits with the name. It should have affiliation of organization which contains Knowledge and experience; including education, training, and specialized skills. This should not be limited only to the application. A persona should attend the event.

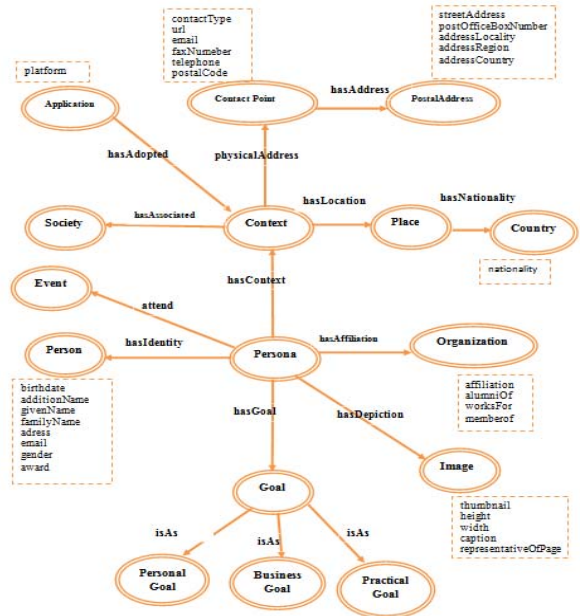


Figure 5: The complete class diagram of the Persona data model.

The Table Below summarizes all class relations in persona.

Subject Class	Verb	Object Class	Definition
Persona	hasIdentity	Person	indicates that persona is identified by demographic information for person
Persona	hasContext	Context	Indicates that Persona has specifically a context
Persona	hasGoal	Goals	Every Persona should have Goals
Persona	hasDepiction	Image	Every Persona should be pictured by Image
Persona	hasAffiliation	Organization	Persona has affiliated to Organizations
Persona	attend	Event	Persona should attend the Event
Context	hasLocation	Place	Place of the location.
Context	physicaladdress	ContactPoint	Indicates that Context has a Contact point
Application	hasAdopted	Context	Application has adopted Context

Context	hasAssociated	Society	Context has associated to Society
Contact Point	hasAddress	PostalAddress	ContactPoint has address in PostalAddress
Place	hasNationality	Country	Place has associated to Country by nationality
Goal	isAs	Practical Goal	Indicates that Goal are practical Goal efficiently
Goal	isAs	Personal Goal	Personal Goal should get an adequate amount of work done, be comfortable and fun
Goal	isAs	Business Goal	quality education is required for Business Goal , for example

VI. WHEN TO USE PERSONAS?

You can use personas when you want to:

- Make sense of research findings

For this purpose, you must analyze results and identify patterns across research and Capture most important information about who they are, what they need to accomplish, their skills, abilities and pain points, etc.

- Plan your product

For that, analyze competition through the eyes of your personas, brainstorm possible features using your personas and prioritize features using a persona-weighted feature matrix.

- Explore design solutions

You have to prepare Scenarios, Design Mapping, Mood boards and visual design explorations.

- Evaluate your solutions

You need to formulate cognitive walkthroughs, design reviews with personas, user testing, ongoing user research with personas, Quality Assurance (QA) testing and bug bashes (focus QA testing and create persona-based test cases, persona bug labeling (23 Joe bugs, 43 Susan bugs)).

- Support the release of your product

You will need to make documentation, training, support materials (personas can help focus instructional materials, guidebooks, and editorial

content), marketing and sales (tailor efforts based on personas, differentiate between users and customers (students versus IT, for example))

- Communicate with the project team and beyond

You have to share your learnings with the rest of the team, gain consensus of who you are designing for early on...before design happens, hang your personas around the project room to keep them in focus and Create a shared language & vision

Note: the goal of personas is to keep the user in view throughout the product lifecycle. Personas are not perfect for everything, but are very useful when utilized properly[31].

VII. CONCLUSIONS

In this paper we presented the notion of ontology, and several methods and tools for ontology engineering. In our study, taking into consideration the characteristics and advantages of ontologies, we focused on the ontology with a view to building a vocabulary persona.

Like many powerful tools, personas are simple in concept but must be applied with considerable sophistication. It is not enough a couple of user profiles based upon stereotypes and generalizations, nor is it particularly useful to attach a stock photograph to a job title and call it a "persona". For personas to be effective tools for design, considerable rigor and finesse must be applied to the process of identifying the significant and meaningful patterns in user behavior and turning these into archetypes that represent a broad cross-section of users.

Although there are other useful models that can serve as tools for the interaction designer, such as workflow models and physical models, we've found that personas are strongest, and it is possible to incorporate the best of other modeling techniques into a persona. This article focuses on personas and their goals. Other models are considered briefly at the end of this article.

This ontology, except having well defined terms, it is also reach of logical rules in order to generate more and more knowledge by the human, the machine too.

In addition, Ontologies have the potential of enabling true knowledge sharing and reuse among heterogeneous agents, both human and computer. One major open challenge is still the alignment of different ontologies in order to allow interoperation between heterogeneous agents. Considering that we managed to achieve party objectives in this paper, and we made the right choices concerning implementation tools, so our work will be a very good track for other future projects.

In perspective, we plan to enrich our study by using other technique, namely: first, the development of other ontologies and combine them with ours to

enrich the vocabulary used for annotation and search. Then, test the possibility of reasoning offered by OWL. Finally, the Reuse-ontology in a platform based on semantic web technologies: this ontology in the creation of a document editor.

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