THE CAPLA MODEL FOR MULTI-CULTURAL ADAPTATION OF LEARNING RESOURCES FOR ALZHEIMER'S DISEASE

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Abstract: To share medical courses about Alzheimer's disease, used by French doctors, with Malian doctors, we have to perform cultural adaptation of the learning resources. We present the CAPLA model for adaptation. We introduce why cultural adaptation is indispensable to transform useful resources for France into useful resources for Mali. We introduce the notion of variability and why we think that the explicit knowledge of the variability is useful. We describe the typology of the variability for our medical and multi-countries e-learning situations and how it can help to index the variability of the content of the medical courses. Then, we use the notion of "documentarisation" and "re-documentation" issued from "socio-semantic web" concepts to describe the collective activity of adapting a course. Using the context is still difficult and we propose to detect the manifesting aspects of context, thanks to the variability knowledge. The Alois Software is described, it implements the CAPLA model, it helps to annotate the variability of a course. We show how we use the XML openDocument descriptions obtained from the presentation documents (Impress or Powerpoint) to help people to adapt their courses: thanks to the knowledge we have on the context and the variability, we can mark all the slides that need an adaptation and we can indicate the reason why this adaptation is needed. Next step is to use this knowledge for pervasive and ubiquitous learning.

1 INTRODUCTION

The production of learning resources is difficult and takes a lot of time, especially in the medical area where the quality is mandatory and where the knowledge evolves rapidly. Supplying everyone around the world with high quality information is essential. But it is also indispensable to provide information well suited for each specific context of use. This article presents a new approach for redesigning and adapting medical resources to different application domain. We focus on e-learning for Alzheimer disease. Some neurologists from Lille, a french city, were asked to share their courses about Alzheimer disease, to help doctors from Mali to dispose from numerous e-learning materials. These courses can be shared through the French Virtual Medical University (UMVF) which already proposes a portal that gathers medical learning resources from more than 30 universities (all the universities from France and some universities from French speaking countries). But without adaptations, courses that are created in France would be useless. For example as the care infrastructure is not the same, a RMI (nuclear Magnetic Resonance Imaging) should not be proposed in Mali as often as in France, or as the prevalence of a disease is not the same, clinical investigation could change. Even if the main ideas of a course remain the same, some parts of the course must be modified to correspond to actual care.

The Internet provides technologies and infrastructures for information sharing. The issue is now to provide pertinent information which depends on the context of use. Different axes of research deal with the semantic of the courses. The Semantic Web approaches as well as the use of domain ontologies are some of the promising research areas (Bouzeghoub, 2007). Meta descriptions of the documents are helpful to retrieve learning resources. The UMVF indexes the learning resources through metadata such as author, title, and so on, as proposed by the Dublin Core and through medical concepts thanks to the medical thesaurus Mesh. The resource manager workflow (Renard 2007) in the UMVF helps authors and librarians to enter such characteristics for each medical resources added to the French Virtual University. It informs about the

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medical area of each course, but even if some medical semantics is added, the granularity of the description is still global. It is not appropriate to adapt on the contents of the courses, taking into account their semantic and their cultural aspects. This issue is not faced when using other standards for educational purpose as LOM, or SCORM. We wanted to add some contextual indexes on the courses, so that we can adapt the information. In particular, cultural difference should be treated. Moreover, if we are able firstly to provide such indexes and secondly to capture the context of use for the resources, we can think about ubiquitous and pervasive learning resources, able to dynamically adapt themselves according to the settings in which they are used. This paper will present the CAPLA (Contextual Adaptation and Pervasive Learning for Alzheimer) model for adaptation. Our model is used to index the variability of the content of medical courses. This work is part of a French national project called p-LearNet (pervasive Learning Network) whose objectives are to explore the human learning potential, in the framework of pervasive communication and the use of Technology Enhanced Learning (TEL). Then will briefly describe the Alois Software which is proposed for indexing and re-creating the courses.

2 THE CAPLA MODEL FOR ADAPTATION

2.1 The CAPLA Needs for Adaptation

We notice there is room for a specific description of the *variability of the resources*. When we move from a context (e.g. Country=France) to another context (e.g. Country=Mali), pertinent adaptation of the content are often necessary. In this paper, we will illustrate it by the "vaccum-cleaner example": to detect Alzheimer, during cognitive tests it is not pertinent to propose to an individual living in the bush in Mali to recognize a vacuum-cleaner even if a French resource proposes to do so. The concept of "recognize a vacuum cleaner" as "an easy task to do" depends on culture. Introducing such a resource in a course induces cultural variability. In fact the need for adaptation is very frequent.

Two different notions must be distinguished.

- *Variability*: it describes criteria which induce change. For example, each time the notion of the prevalence of a disease appears in a course, it induces variability as the prevalence is not the same everywhere; the related information can depend on a geographic and/or epidemiological context.
- *Context*: it describes the environment: when, who, where an individual is producing/using a course are some of the obvious context knowledge. (Example of context description: a course, written for France, for a general practitioner, the teacher will use it in an amphitheatre equipped with a data projector and a PC with high speed broadband network).

We have made the following hypothesis to propose our model: (i)Indexing the resources with variability could help to explicit some knowledge on these resources (e.g. it's interesting to notice that "vacuum-cleaner" is not always easy to understand according to the culture); (ii) Once a resource is indexed with variability, it should ease the adaptation to another context (for example, someone from Senegal could benefit from the indexation made for Mali); (iii) The explicit knowledge of variability AND of context can help to propose a smart adaptation of the courses ("vacuum cleaner" as "culturally variable" will be changed for Mali but not for Belgium);. (iv) pervasive learning can use such models and be proposed as soon as we are able to detect the context.

2.2 Variability and Courses Re-Documentation

With the emergence of the Web2.0 applications, documents are more and more used in collective practice. Zacklad focuses on situations where documents serve to coordination (Zacklad, 2006), we use his work for our model.

Documentarisation can be made on this course, in our case through the annotation of the variability. "Documentarisation consists of endowing the substrates with specific attributes making it possible: (i) to manage them along with other substrates, (ii) to handle them physically, which is a prerequisite to be able to browse semantically among the semiotic content, and lastly, (iii) to guide not only the recipients, but also the producers themselves to an increasing extent, around the substrate by providing one or several maps of the semiotic contents" (Zacklad, 2006). It doesn't affect the document. We use some annotation of the variability to enrich the knowledge we have on the semiotic content of a document. In this paper, we focus on the specific area of our multi-countries e-learning application but other criteria can come from more general knowledge. We propose a first typology for the variability of the Alzheimer's disease domain,

thanks to different meetings with French doctors and Malian doctors.

Invariant: seems to be acceptable for everyone (Everyone accepts that a great number of people suffer from Alzheimer's disease in the world)

Non adaptable (Elderly people stay at home in Mali, specific French legislation for elderly medical houses is completely useless)

Adaptable: in that case we found the main following criteria justifying variability:

Environment: Epidemiology-Geography

Culture: Family or Patient-Health Professionals - Legislation

Care: Technical environment-Availability of medication - Infrastructure

Public: Skills -Objectives

The annotation with variability (e.g. "to use a vacuum-cleaner depends on culture") is then seen as a documentarisation of the document.

Redocumentarisation allows making a new documentarisation, the user can rearticulate the semiotics contents according to his own interpretation. One of the possible actions for the re documentarisation of a course is to display it with an easy-to-interpret representation of the variability: the proto document.

Redocumentation aims to rearrange the initial document, allowing to add or to delete some parts, to reformulate or to reorganise the document. The objective is then to rewrite the variable parts of the resources according to their future use.

2.3 The CAPLA Model of Context

Modelling and using context remains complex, even in the medical domain which is said to be a good area for context (Bricon-Souf , 2007). Lot of works have been done around context (Dey, 2001; Winograd, 2001). In particular, representing context with multiple points of view has been proposed (Kirsh-Pinheiro, 2004). Our model is able to detect that "*something is context because of the way it is used in interpretation*" as Winograd said.

We refer to Sato's work (Sato, 2004) who proposes the following definitions: *Manifesting aspects of context* take significant roles in forming situations for the current action; *latent aspects of context* become irrelevant to the current action. *Situation* is a collective condition at the scene of the interaction that is composed of relations among variables of conditions such as environmental states, contexts, systems and users' states. The analysis of the multicultural e-learning situation allows us to determine some main attributes for context such as user, pedagogic activities, device and localization. In order to detect which aspects of context are manifest, we use the variability mentioned on the documentarisation of the course. So, when part of the course is tagged as "variable due to environment", the aspects of context which are semantically linked with the notion of environment become manifest. For example, if a course item mentions a "vacuum cleaner" and is marked as depending on the culture (cultural variability), it is important to know if the course is used in a country with the same culture as the one in which it has been written : the Country aspect of context becomes manifest. Some rules are written to express the relations between variability and context. In the current state of work, we use simple rules which verify if the context of the initial course is the same as for the future adapted course. (e.g, as the context of "country" is manifest for the "vacuum cleaner" we will verify if the countries are the same).

3 IMPLEMENTATION

The Alois Software is written in java, it helps people (i) to annotate the variability of the courses; (ii) to generate the proto-course to make the actual adaptation of the course. The medical staffs provide us courses in Powerpoint or openOffice presentation format and we choose to use them through the XML provided by the openDocument description. When parsing such documents, we can extract enough information about the slides to feed the Alois tool. A MySQL database is used to index each slide of the courses, and to manage the information about the variability of each slide. Thanks to this database, the variability annotation part of the tool (Figure 1) proposes a representation of the existing slides, the current variability annotation already provided and proposes a user interface for the variability annotation (java, swing).

The proto-course generation tool (Figure 2) uses the variability information in order to generate an openDocument with: (i) an hyperlink to the original slide; (ii) a tag informing about the necessity of careful examination of the slide.

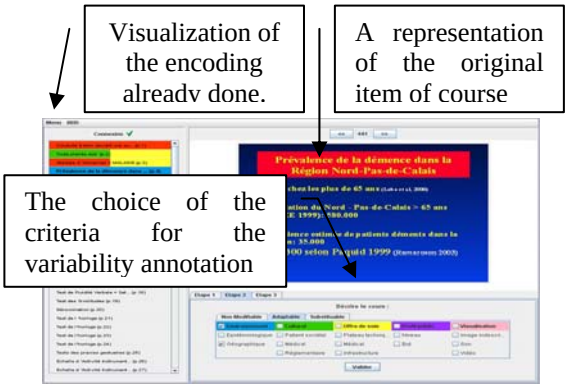

Figure 1: The Alois Tool.

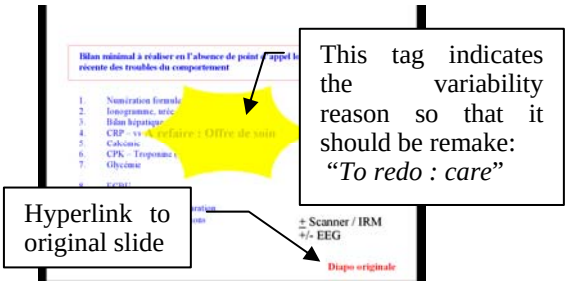

Figure 2 : This slide comes from the proto-document. The star shaped tag indicates why the author must look at this slide (in that case: care infrastructure should differ).

4 RESULTS AND CONCLUSIONS

Based on actual need for sharing learning materials on Alzheimer diseases, we propose a new approach for redesigning and adapting medical resources. We propose a model to take into account some semantic aspects of the learning contents that are often neglected. Using such explicit knowledge should help the adaptation. We mainly used PowerPoint presentations as courses and slides as items of courses, obviously courses are not limited to this and we will have to introduce in our model some more complex representation of learning resources as proposed in the literature. A Software has been proposed, it is currently in test for some adaptation of Alzheimer courses for Mali and for Chili.

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