

Research Article

Intelligence Application for University Resources Automation and Actors Management

Latifa Oubedda

University Ibn Zohr, Agadir, Morocco

Corresponding author: Latifa Oubedda; E-mail: l.oubedda@gmail.com

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Abstract: The objective of this work is to develop a decisional information system for the operation Model comprising the key employees of the university (teachers, administrators). This system is based on the relationship between actors and their activities that depend on their degree and their aggregations at a graduate level. It aims to make available to managers of the university a set of dashboards able to implement a data warehouse of university resources. The principle is based on semantic annotation of the real needs of human resources at facilities of each university and the available budget items to automate the recruitment process provided. We begin by modeling the actors up and study processes on their specific organizations, their activities and their aggregations.

Keywords: Information System; Decision Support Information System; Data Warehouse Databases.

1. Introduction

Business intelligence is one of the areas of computer that is experiencing an exemplary development today. Indeed, business managers, faced with increasingly unstable environments, are expected to take the most effective decisions based on reliable data. The current problem is not to have better decision-making tool, but to structure upstream data that will feed not to be ineffective. Thus, the design of information systems tailored and scalable decision is a hot topic for all organizations around the world. In what follows, we propose an approach based on semantic annotation of documents to automate the process of e-recruitment. The basic idea is to model the semantic content of the real needs to establishment and budget items available in a formal, explicit, simple and accurate, based on a common ontology. The concepts in this ontology are inspired by the most significant parts of these documents and the competence is considered crucial in the proposed modeling.

2. Hypotheses

We start by modeling [4] upstream actors taking into account the specifications and expectations of each of them, namely:

- From motivation to job involvement: motivation
- * Thus appears as part of a directed behavior and completed (goal oriented).

- Training required by the actors in institutions during the academic year.
- Etc.....

Given this situation, it is necessary to correlate between the needs of university actors [1], [2] those of teachers, and those of the administration staff. In fact, we are faced with a situation of looking for satisfaction with a specific university. Indeed for a university, it is more about positioning and visibility of the organization. The company seeks a positioning performance level of its capital and the university aims to achieve quality and high ranking at the national and international levels. Companies seek customer satisfaction; universities seek its stakeholders' satisfaction. Customer satisfaction in business is formalized in terms of costs. Satisfaction of university actors is obtained by meeting their needs.

3. Context

The main objective of this work is to provide a simple, detailed, and comprehensive to meet the real needs of university decision-maker (in [5], [6]). This is done in terms of human resource management elements so necessary to process semantic annotation and automatic matching on needs and priorities of the indicator, using the technologies offered by the semantics application and making the results of existing work in this area. The outcome of this objective is the result of an increase in the achievement of objectives under the following:

1. Propose a rich, expressive and clear structure for each type of document (needs and priorities of the indicator) and their codification in XML (standard data exchange on the Web) with the elements necessary for their presentation.
2. Construction and implementation of ontology for modeling the semantic content of documents in terms of their acquired or required, by limiting itself to a particular field. This ontology provides the user with an annotation feature which allows management and skills underlying the documents based on a model relevant to the concept of "competence."
3. Proposal of a process of semantic annotation of documents, based on the exploitation and instantiation of the built ontology.

4. Proposed System Architecture

We apply the principle of annotation and semantic matching, as shown in (Fig. 1). It consists of the following components:

1. Ontology-HRM: Ontology built for Human Resource Management. It consists of several interlinked sub-Ontologies and its instantiation generates metadata.
2. The document server XML / HTML: Allows storage and document management to annotate (recruitment needs defined by each institution of the university and priority indicator)
3. The Interface system: it has two functions: the annotation interface gives the user the ability to annotate a document based on the instantiation and operation of the ontology-HRM.

4. The matching component: This component allows the interpretation of user requests and the calculation of degrees of semantic matching, superficial and based competence.

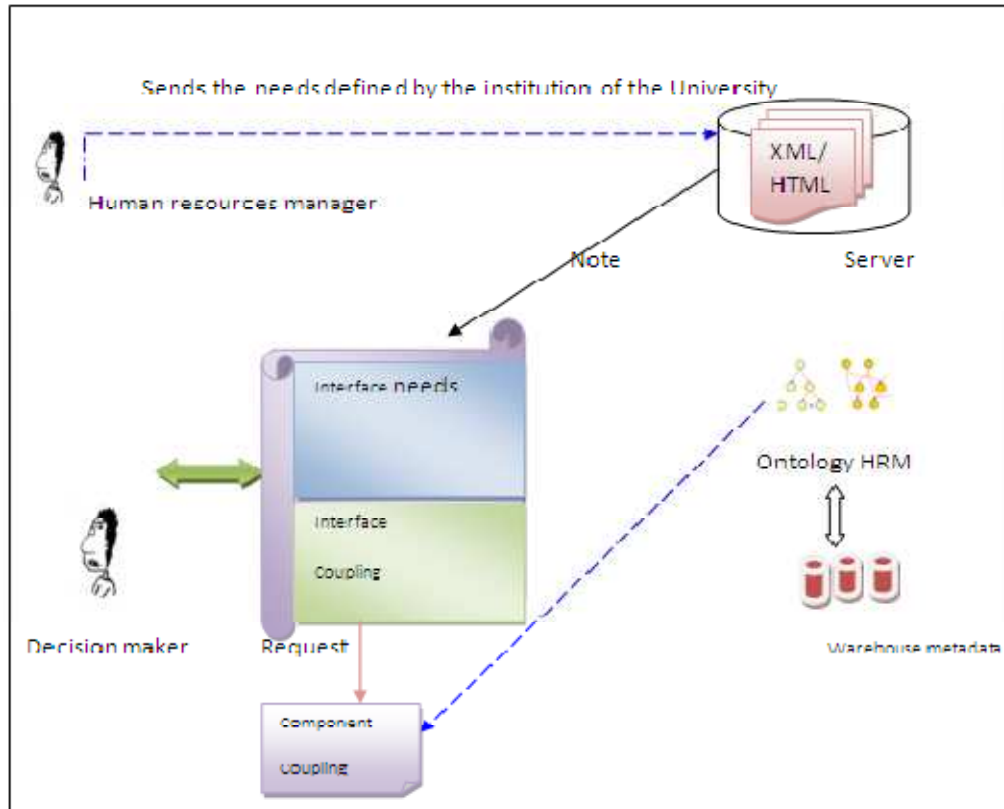


Figure 1: Architecture of our model

4.1 Actors Modeling based on Semantic Annotation

For Human Resource Management Application used to create positions or jobs from the university allocated budget (state budget), or from self resources (services with job programs, contracts). Budget items are defined according to the needs identified by each institution. These self resources are defined by assimilation to the corresponding official body. To better meet the needs of decision makers [7] [8] of the university, we develop a model of data representation (MR) as follows:

$$RM = (AC, C, AG).$$

This abbreviation refers to the following: AC: Activity actor by grade and specialty at the beginning of each academic cycle, C: actor category defined degree obtained for the actor and specialty A: Aggregation defines the need to recruit actor by importance, so we had to use standards to normalize their modeling. The syntactically, document coding in XML (extensible Markup Language), considered as the transport layer syntactic Web, can benefit from all of the technologies developed around it. As for the semantic aspect, the goal of semantic annotation is to enrich the syntactic structures of Web documents with their semantic content-based Ontologies. In what follows, we describe the elements needed to generate documents to be annotated, the description

of the model adopted for the notion of "competence" and the detailed description of the ontology built to model the semantic content of documents with the corresponding annotation process.

4.2 The Model of Competence

The human resources management is based partly on the knowledge of individuals and their skills; and secondly, the knowledge of the organization and its business. This is the matching of skills that can improve employment. This requires an explicit and formal representation of skills and, therefore, a model for this notion. Competence can be identified as a body of knowledge into action in the everyday tasks of each institution of the university. It manifests itself as a behavior, and can be scientific and technical (knowledge and know-how) or behavioral (the skills). The scientific and technical competence is specific when it is specific to a particular area; otherwise it is generally considered. It is important to note that there are other more accurate models for this concept «competence», as proposed in our project (in [3], [4]), based on the following definition: "A competency is to model a set of resources (knowledge, skills and behaviors), in a context given, to accomplish a particular goal." However, the use of such a model could complicate reconciliation services to reconcile between needs and available resources, because we must distinguish between the same sets of resources, mobilized in different environments (conditions and social, organizational, economic, physical, technological, etc.), or to achieve different objectives.

5. Experimental Phase

A. Building the Data Warehouse (ED)-based Ontology of Semantic Content:

The experiment highlights the technical and organizational difficulties involved in building a warehouse with taking into account the overall context of the university. We identify two levels to consider when designing a SID: modeling level, application level.

Ontologies are crucial in the context of e-recruitment because they allow recruiters and job seekers to share a common reference to describe the content of their documents so unambiguous, precise, and formal semantics. This repository will undoubtedly facilitate the annotation task of the user and allow enrichment with new knowledge, based on the concepts and relationships in this ontology [10].

The contribution of formalization is the ability to provide an automated reasoning for reconciliation between supply and demand of employment. The architecture of the proposed ontology is inspired by the most significant areas between the real needs [11] of each facility and makes budgetary positions at each degree level. These are some personal information, crafts, skills and diplomas acquired explicit (case of HP), or required (if the job offer). The trade or the diploma itself mobilizes a subset of basic skills [4], which made the crucial competence of our modeling. We used the method of ontology construction.

The domain of this ontology is "computer management and human resources." It consists of five sub-domain Ontologies:

1. The sub-ontology "PERSON" consists of a single concept "Person" which describes the most important personal characteristics, the recruiter may require, or that the candidate may have. These are: gender, age limit, nationality. In reality, "PERSON" is not a true sub-ontology because it consists of a single concept.
2. The sub-ontology "DIPLOMA" describes the concepts relating to qualifications which are: the degree of domain families "Famili Diplôme" diplomas valid field "Diploma" and a repository of certificates "Référentiel Diplomes". It is related to the sub-ontology "COMPETENCE" to certify the skills mobilized by a particular degree.
3. The sub-ontology "JOB": describes concepts related to the business area that are: families trade the domain "Famili Métier", the existing business area of "Job" and a repository of business inspired CIGREF [6] enriched "Référentiel Métiers Informatique ". It is related to the sub-ontology "COMPETENCE" to certify the skills mobilized by a particular trade.
4. The sub-ontology "COMPETENCE" to describe the competency model adopted and the hierarchy of topics ("Aspect Software" or "Theme") that can have the scientific and technical competence.
5. The sub-ontology "ANNOTATION": allows associating to each resource, all acquired / required corresponding to it. The concept "Resource" to describe the document to annotate through its URI (Unified ResourceIdentifier) and type (CV or offer / position), while the concept "AcquiRequi" specializes in components with which this resource can be annotated tee, which makes the link with other sub-Ontologies. The concept "Annotation" links the two previous concepts to annotate a resource with one or more acquired (if the CV) or required (supply case). The role of this sub-ontology can be replaced by a semantic annotation tool.

B. The University Actors

Given the scope of this university project which combines students, professors (in[1],[2]), administrative staff all of which improve and operate in various disciplines in terms of their thematic and structural information proposal, we base it on the model of a warehouse data, taking into account the different trades. For example a person may have different responsibilities: it can have the status of responsible teaching.

We discuss the data related to actors on different levels. We distinguish three levels: the actors' level, the administrative level and the educational level.

- Actor level allows for an initial typology of actors - around 3 classes, showing students, teachers and administrators.
- Educational level is used to identify bases 'referents' correlated with previously identified actors: foundation courses geared towards the students, baselines for serving teachers and basic rules and regulations for the administration of destination.
- Administrative level census data on the administrative situation of the student actor, data on the situation of the administrative actor and teacher data from

administrative and financial management of students, teachers and training relevant to the administrative actor. Is illustrated by a diagram of the data involved, supplemented by existing.

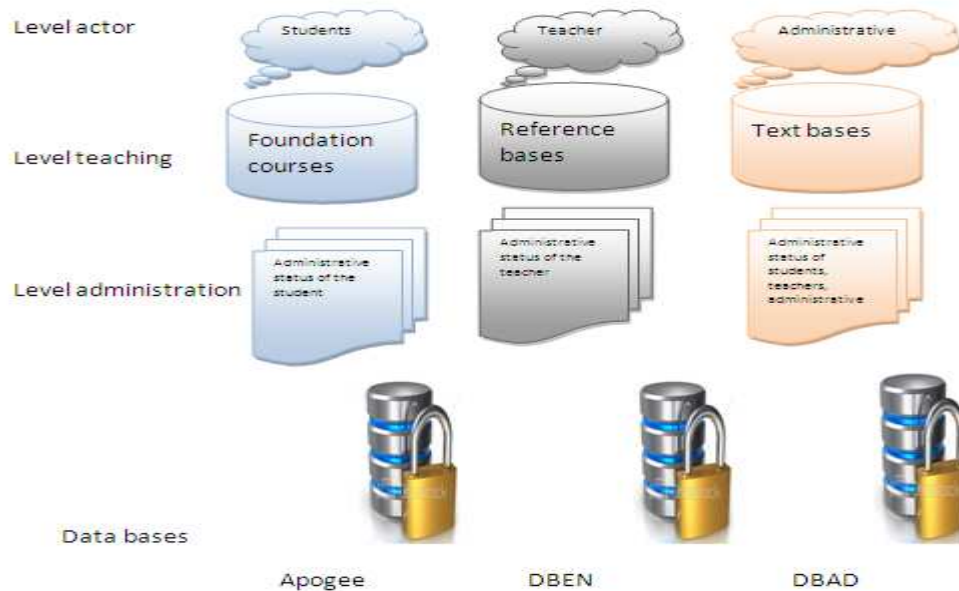


Figure 1: Data for actors

As seen in this figure, the information system provides relational database for each actor belongs to the university, aimed at reducing execution time and facilitate the parallel execution of queries to increase their efficiency in a domain. There are data sources for specific groups of actors. However, these sources are designed independently of each other. They are often fragmented, not necessarily consistent. Their corpus data can differ from one entity to another. Data representation is sometimes different. We may be dealing with databases unclean or useful to notice missing fields. Compared to new audiences, indexing is inappropriate and may use different codes. Becoming instruments of communication to other public, they must undergo adaptations. It is possible to export data from these databases in various formats, including plain text, and then build on it. File of students drawn from Apogee already allowed in 2005 (when the University Ibn Zohr), constitute the login so they can connect to workstations and data available for the student actor. A more sophisticated authentication system has been in place since then.

C. Contribution of each Actor Model

a. How to Think of a Model in Relation to the Actors of the University?

To answer this question, one has to think of a model of the actor in a constantly changing environment in terms of education reforms, current conformation and future university of information technologies, norms and standards. To review the players we observe them at an early stage in such a way to identify lanes that could be taken into account for the rest of our work.

Pour passer en revue les acteurs on les observe dans un premier temps de façon à repérer des pistes qui pourraient être prise en compte pour la suite de nos travaux.

b. Student Specific Processes:

These notions about the cognitive behavior of students, revealed by the observation should be taken into account in the development and urbanization of a university information system. This different mode of access to information gives students a new reading or rather a new way of messages. The cognitive development of students in game situations has lead us to propose a functional architecture based on various patterns, identified vocatives, and learning situations. These are:

- The process of observation,
- the process of knowledge acquisition,
- the process of applying knowledge
- the creative process

Pedagogic engineering whose role is the transmission is able to get an engineering learning by fostering. Learners can move products to consume creations services (in [9],[10]). This system makes students responsible and autonomous: it can be co-producer of the data warehouse system to increase the efficiency of the system.

c. Towards a Reflexive Teacher

The teacher is simultaneously placed in an innovation environment as well as in a regulated environment to which it must be complied. The teacher elaborates the course on the basis of the each application descriptions for certification industry.

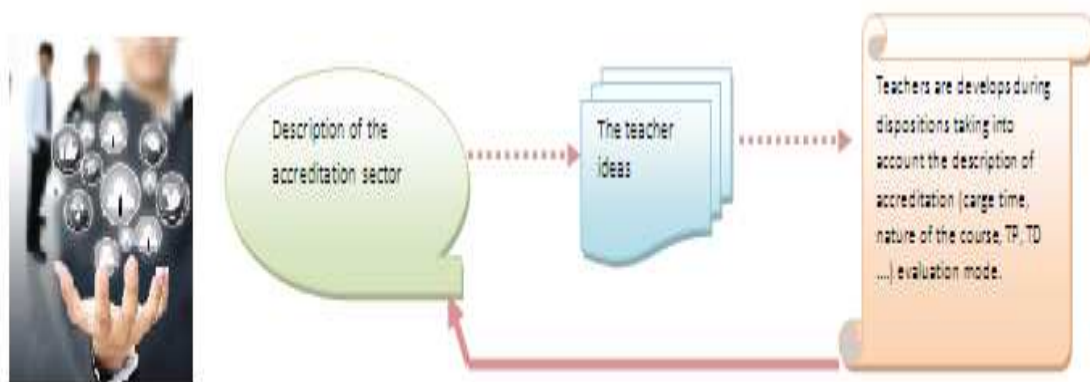


Figure 2: A sample scenario of a teacher during course creation

Moreover, students now have the opportunity to freely reach base courses available on the web. On a relational level, this leads to changes in the role of the teacher. He switches from the role of teacher to the role of author and hence an under production system player. He also finds himself reinforced in his role of expert who validates or

not the information found by the students themselves. These issues consideration is both the teacher specific needs and the head of upstream component revealed the design of the information system. This raises ideas around solutions for facilitating the implementation of processes specific to teachers or responsible.

d. Some Gained Insights

By cross-checking the information, the teacher can find descriptions CNPN accreditation (national educational specification standards) and courses in databases. We can offer an affiliate system that promotes a journey between accreditation and course descriptions. The enrichment of electronic documents using descriptors contributes to targeting prospective information.

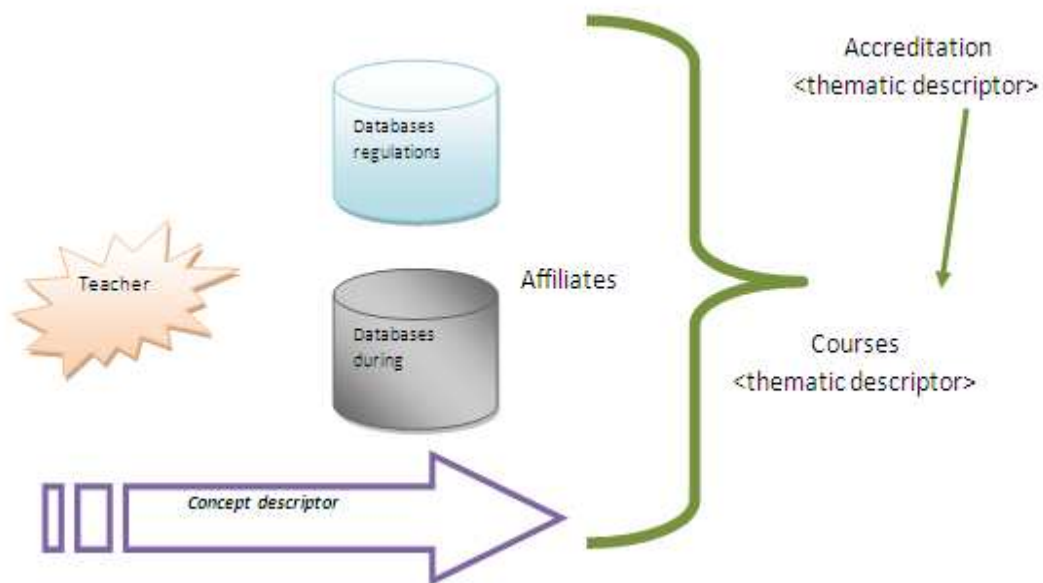


Figure 3: Relationship between descriptors and affiliation

This example shows the concept of data description, that is to say, given Meta. These Meta is given a lock as a bridge between electronic documents belonging to both the administrative and educational levels.

e. To the Administrative Operations

The university administrative staff is not limited to the use of information; it produces information; promotes exchange and perpetuates the capitalization of knowledge.

6. Conclusions

Our medium term perspectives concerning the format of the databases used in our application.

To summarize, in our proposed application only the "data analysis" is based on an analysis scheme in XMLA.

For all projects in Openi, we had to import our data into a SQL database so that data were available in XML!

That's why we have direct some of our research to enable an XMLA schema to make analyzes of data from databases in XML. University governance in the context of a strategic information system includes a data governance to support a business vocabulary essential to the coherence of the information system.

In this paper, an approach based on semantic annotation to format a Web-based information system to automate decision-making.

This is simple and completes enough, in the sense that it covers almost all points of the issue of e-recruitment: from generation, to documents annotation, to the application of semantic reconciliation services. Reconciliation between the actual needs of the university budget of each institution and the available posts. It is characterized by modeling the semantic content of documents based on a common ontology to recruiters and job seekers. The architecture of the ontology is built based on the common, the most significant. It also allows management skills through formal modeling.

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