Ontologies in Portal Design

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INTRODUCTION

Portals are becoming more and more ubiquitous on the Internet and that is why their architecture is a topic of concern among domain stakeholders. In order to ensure a solid architecture in portal design, ontologies must be considered as a necessary agent of design. An ontology provides a classification system for all the data and metadata in a domain. Ontologies supply metadata in order to bring about a streamlined delivery of information to users. While portals exist in order to assist users gain access to information, ontologies enhance portals by providing access to relevant information.

WHAT IS AN ONTOLOGY?

Ontologies are used to define the common words and concepts that describe an area of knowledge. By defining common terms and ideas, ontologies are applied in sharing information about a domain or a particular area of knowledge. This information becomes re-usable when ontologies encode knowledge in a domain and also knowledge that goes beyond domains (Fensel, 2003, p. 4).

Ontologies are able to function by classifying information into a schema of metadata, which includes general and particular concepts and linking them to each other by defining their relationships. So, while portals are doorways to information, ontologies are the door attendants that ensure proper traffic through those doorways. Ontologies link concepts and ideas, which are related to each other in order to deliver relevant information to users. Because most users have different behavior in querying, ontologies are important in determining what a user is really seeking. Ontologies perform artificially intelligent *Reference Interviews* (see glossary).

HOW ONTOLOGIES BOLSTER PORTALS

In the reference interview, there is face-to-face human interaction, but with seeking information in a portal, users rely on artificial intelligence. The lack of human intuition in portals creates the need for ontologies to deliver relevant information. In order to begin to break down a query so that the portal understands what is truly being asked, ontologies first provide a clear meaning of the relationship among data. Relationships that are intuitive in human terms are classified and made formally explicit in an ontology so they can be processed by a machine (Uschold, 1996).

Because the goal of an ontology in portal design is to produce relevant information to users, the ontology must be developed to include certain principles that will help achieve that goal. Among these principles is extendibility, which means that new terms can be added without creating a need to re-write the entire ontology to include their relationship to other concepts (Gruber, p. 907). This allows for a dynamic and evolving portal, which users find to be more amenable than those that are static.

In addition to the inclusion of the principle of extendibility for internal reasons (namely, the proper function of the portal), the principle of extendibility also applies to external conditions, that is, the undefined behavior of users. In order for users to obtain the relevant information they are seeking, ontologies ought to be created with room to evolve by distinguishing user behavior. With a dynamic schematic for information delivery, users will be able to get the most out of a portal.

Ontologies ought to be created dynamically so that there is room to evolve as more is known about user behavior. An intelligent ontology can be manipulated to draw not only from a user's preference (Stojanovic, p. 172), but also it should be periodically reviewed by a human eye in order to refine its ability to deliver pertinent information to the user.

Intelligent ontologies offer users options after an initial query that will help to refine it (Stojanovic, p. 173). An example of this is found in many search engines (especially those that use cluster technology) that will offer alternative queries at the top of a results page. These alternatives can be in the form of a "did you mean" statement, or simply a grouping of links for alternative query terms the user can choose to narrow his search.

APPLICATION OF ONTOLOGIES IN PORTALS

Ontologies play a vital role in the portal designs. Figure 1 illustrates the application of ontologies in portal design with the following elements:

- **Information:** Before it travels through a portal, information is unstructured and undefined. This is raw information, not suited for the user at this point.
- **Ontology:** Surrounding the portal is the ontology, shaped like a bubble to illustrate that it is analogous to an idea, invisible to the user.
- **Portal:** Portals filter relevant information, inside the engineering of the ontology, in order to take a large amount of information and siphon out a small amount of relevant information.
- **Relevant Information:** The siphoned information which is structured and meaningful to the user.
- **Users:** The entity which uses a portal to obtain relevant information from raw information.

THE BENEFITS OF ONTOLOGIES IN PORTAL DESIGN

The Law of Least Effort

In seeking information, it is human nature to use as little time as possible. This is what librarians call the "law of least effort." Users will typically look at only the top ten results of a search (Stojanovic, p. 172), and even then they are likely to give up if they do not find what is relevant to them, or, they will use information, which might not best apply to their query. If a user cannot find what he is looking for in his first two attempts, he will move onto another platform altogether. Ontologies go beyond the capabilities of manual searching through the automated schema of linking data and metadata. Ontologies provide relevant information and allow users to explore further by presenting related information.

In any portal, the information architecture should be designed in such a way that users should reach the required file/information within *two-to-three clicks* of navigation. If this goes beyond three clicks then the user may become irate and lose interest. At this point, the user will exit the portal.

If, however, an efficient ontology is in place in a portal, then users will spend less time searching through data as the ontology combats the irrelevant data to deliver only what is relevant to the user. By determining a set of definitions of concepts present in a portal's data, ontologies differentiate between what a user does and does not need to see after submitting a query. Thus, keeping these aspects in mind, a portal should be designed with a proper architecture that employs the use of ontologies to come out of these hurdles.

Appropriate Information Delivery

Portals without ontologies offer a centralized system of information, which is not organized to fit the needs of individual users. Often, this centralized system creates a bottleneck of information and requires frequent internal maintenance (Haibo, p. 3). Though it is possible for users to retrieve appropriate information from such a portal (with extra work), if the system is down and users cannot begin a search, then not only are the users missing appropriate information, but they are missing any and all information.

Because ontologies link related information, the information delivered creates a comprehensive tableau of a topic, which users can use to narrow their initial query. Users can retrieve and share information with the terms defined by the ontology. Rather than providing a free-text search, ontologies can offer multidimensional searching, thus providing access to a richer and more relevant amount of information. Also,

Figure 1. Application of ontology in portals