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Toward a Semantic Proposal for Open Education in e- University

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TOWARDS A SEMANTIC PORTAL FOR OPEN EDUCATION IN E-UNIVERSITY

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***Abstract:** The rapid development of educational technologies, combined with the Internet boom at a worldwide level, gives rise to favorable conditions for the establishment of e-University as one of the paradigms which are implemented to provide learning materials as well as all university services and functions on the Internet. In this paradigm, existing learning interoperability standards have to face with the challenge of providing integrated access to a huge number of heterogeneous and autonomous information resources. This context has urged the use of Semantic Web technologies as a potential solution of both schema heterogeneity and semantic heterogeneity. Motivated by the emerging need for effective interoperability in e-University environments, in this paper, we introduce a knowledge-based approach in which Semantic Web technology has become the core of an semantic information portal that can integrate different kinds of information and knowledge resources, available in the educational institution. Moreover, a detailed description of an ontology-based framework that enables the successful implementation of a reliable semantic portal is also presented. Thus, the outstanding potentials of Semantic Web in developing e-University environment can be emphasized.*

***Keywords:** e-University, semantic portal, open source, open standards, interoperability, Semantic Web, ontology, framework*

1. Introduction

The rapid rate of technological change and the rapidly growing number of institutions now embarking on Internet-based delivery means that more institutions are involved in distance education than at any other time in history [18]. In that context, the exploitation of the recent Internet capabilities in the area of education is increasingly becoming an integral part of the operational model of educational institutions. Not only that many traditional higher education institutions have started offering courses online, but also new educational institutions, called themselves as e-Universities, have started to exist, somewhat competing with traditional institutions [14].

Unlike a traditional university, e-University calls for a new paradigm of higher education, improving the quality of higher and continuing education, making University information and services more flexible and accessible by involving technological solutions, allocating resources in the best possible way and creating more opportunities for international cooperation [22]. More specifically, e-University is defined to be the infrastructure for providing students with a learning experience and related support services

to complete a degree program partially or totally online and for providing faculty members with resources for teaching and doing research effectively online [19].

From this perspective, the major challenge that e-University must face is the provision of necessary resources to students, faculty, and administrators. Over the past few years, portals were described as a promising technology that tends to help universities in transforming their legacy systems towards integrated, user-centric information systems. Portal-based solutions have become very popular among higher-education institutions as a single, personalized interface through which users access all information resources and services in a secure, consistent and customizable manner [7]. However, typical educational organizations often comprise several subsystems, applications, tools, and legacy systems. Since in most cases, due to the fact that in the past not much effort was spent on integration, these components are rarely integrated and often do not provide any means to communicate among each other. As a result, e-University requires systemically integrated information systems that improve the information exchange and the quality of services for realization of an open education and bringing up human resources [1]. Hence, the need for better accessibility, maintenance, organization and preservation for managing these repositories has turned to be an urgent requirement

In the past several years, higher education institutions have initiated the creation of open source applications such as course management systems and electronic portfolios. These applications initiatives are initial steps higher education is taking to move away from proprietary software toward open source [2]. Moreover, many well-defined and documented standards that support sharing information such as SCORM [23], IMS [29], Dublin Core [26], etc have been developed. As a result, technologies have been rather successful in improving the interoperability within institutional systems [6]. However, the current approach still has to face with several critical drawbacks, such as missing documentation, difficult organizational structures, lacking usability and a very technology-driven process [12]. To face those challenges, technological, conceptual and user-oriented perspectives have to be equally taken into account [5]. This is especially true in the interdisciplinary field of e-University, where people with different backgrounds work together on the design of educational environments. Meanwhile, Semantic Web [20], through ontology, offers powerful technologies to help in creating and reusing content or developing e-University modules up to open standards. In this context, semantic portals emerged as a natural extension of traditional portals and they have been attracting researchers and enterprise attention as a new way to provide information.

The main contribution of this paper is to focus on the need for an innovative virtual study environment through providing a strategy and technological framework to support open education developed in accordance with the Semantic Web idea. The e-University strategy is to help the universities to effectively apply current technologies and best practices for a modern and productive academic and administrative environment. Also in this paper, we will give an overview of a semantic information portal and highlight its potential uses for sophisticated open education in e-University, i.e. the dissemination of information, communication, collaboration and access to the University services [16]. Furthermore, a conceptual architecture of semantic portal that mainly addresses tasks of content management of e-courses and integrates different information and knowledge resources of the educational institution is described.

The rest of this writing is organized as follows: section 2 introduces some approaches related to our work; section 3 gives a description of the major areas of focus of the new e-

University, and presents directions of a unified e-Learning strategy in e-University; in section 4, the benefits of openness in e-University are described by presenting the growing adoption of open source software, open standards and open content, also in this section, the origin and the potentials of a semantic information portal in an open e-University is highlighted, hereafter, the portal components and its architecture in the context of e-University is described in detail. At last, section 5 gives a summary of what have been achieved and future works.

2. Related works

In this section, we will review works relating to our approach, including research within the area of e-University issues and the uses of web portal in Higher Education in the context of the wide open source software, open standards as well as open content movement, and especially the state of the art on the application of Semantic Web to web portals.

In the conditions of a rapid introduction of information and communication technologies, a natural necessity arises for reorganization in education and creation of new educational institutions [22]. Among the variety of modern trends in educational technology development, the application of e-University research is probably one of the most fashioned and rapidly evolving. There are many studies on various aspects of e-University, such as underlying infrastructures [21], challenges [4] and development models [16, 19], have been introduced. Moreover, many projects applying e-University in universities and institutions have been implemented [22], in which e-University supports its research, education and administrative activities via the Internet that overcomes the boundaries of time and space.

As in many areas, portals have also become of interest in higher-education institutions. Almost all universities are either developing or purchasing portal solutions for their needs [1]. A good example is the Portal Framework Project funded by Java Special Interest Group (JA-SIG) [7], which joins over 20 universities and colleges with an aim to develop a free, sharable portal for higher education institutions. However, current Web technologies employed to build up these portals present serious limitations regarding information search, access, extraction, interpretation and processing. In this context, the Semantic Web enable new approaches to the design of such portals, in which information portal can exploits semantic technologies in providing and accessing information at a portal as well as constructing, maintaining and improving structure, extensibility, customization and sustainability. A number of Web portals that apply Semantic Web technologies to enhance their information sharing capabilities can be identified, e.g. SEAL [10], Ontoweb [15], especially academic portals such as Onto Web – Edu [15].

Motivated by the needs for improving the integration of e-University resources, in our work, we present how Semantic Web can be applied in evolving current institutional portals into semantically enhanced web portals [17]. Thus, this paper highlights the improvements achievable by the use of Semantic Web technologies in bringing e-Universities an opportunity to unlock all forms of internally and externally stored information and provide all members of the community with a single gateway to access e-University information [7].

3. e-University : A critical approach

The rapid advances in Information Technology have dramatically changed the learning and teaching process, and have expanded new learning opportunities and access to educational resources beyond those traditionally available. This has led to the development of the e-University initiative. This section is to introduce an overarching framework within which the most recent directions and best practices in information technology can be applied, especially in the area of e-Learning, to establish a necessary strategy required for the transitions of traditional universities to e-University environments [22].

Nowadays, it is timely to consider the need to support the sector further in taking best advantage of these developments, as it moves to: meet the greater diversity of student needs (relevance), increase flexibility of provision (access), meet the demand for high quality resources and service provision (quality). e-University initiative aims to develop or improve a web-based environment for supporting and enriching the access to the university systems and services [21]. In this context, our strategic objective of e-University is to become a development center for higher education [22], where by using higher education innovative and effective technological solutions to effectively carry out its mission for teaching, research and social contribution. Therefore, although institutions focus on the learner and the learning experience, we need to make broader connections to other aspects of policy and practice [22]. In our approach, there are three main areas of focus that are included in the framework: promoting the effective use of Information Technology in all areas of teaching and learning practice (e-Learning), developing systems and processes that support the research activity of organizations and individuals (e-Science) and developing systems and processes that provide high quality support to the learning process, teachers, learners and institutions (e-Management).

Within the scope of this paper, we focus on a unified e-Learning strategy in e-University ensuring the full value of e-Learning is achieved and the right support is in place for universities [12]. In e-University, a strategic approach to e-Learning allows improved flexibility over time, place and mode of study, and makes learning resources, peer and tutor group interaction, and universities themselves more accessible. A coherent e-Learning framework, with enhanced links between colleges and universities and online learning, can smooth the path of student progression and lifelong learners. Moreover, a strategic approach to e-learning also keeps academic staff in touch with relevant technological advances, while identifying and sharing best practice in curriculum design, teaching, learning and assessment, research, helping to manage innovation and technological risk. For university leaders, an e-Learning strategy engages effective support for staff development, change management, and sustainable resourcing to keep up with user demands, improving organizational efficiency and enabling inter-operability [13].

The vision to become an e-University aims at improving the quality of higher and continuing education, making University information and services more flexible and accessible, allocating resources in the best possible way and creating more opportunities for international cooperation. Therefore, in the unified e-University strategy, the main issue is to provide the right knowledge to the right person at the right time, engaging the challenge of interoperability and providing support to guide and encourage the development of innovative online environments fit for diverse purposes.

4. Semantic information portals – New gateway to better interoperability in e-University

This section proposes a framework for a scalable and reliable semantic portal based on ontology in e-University environment and describe its semantic mechanisms. In this framework, ontology plays a role of establishing the semantic foundation that exploits semantics for providing and accessing information at a portal as well as constructing and maintaining the portal. Thus, the semantic portal is developed as an architecture for providing and accessing distributed information resources in e-University. To further support the interoperability of information resources, the emerging trends of open source software, open standards and open content in e-University is introduced. Thereafter, the outstanding potentials of semantic portal in the context of e-University are described. Finally, the architecture and core components of our framework will be represented.

4.1. After Open source software and Open standards, there's Open content : Strategies for Electronic Learning and Knowledge

In e-University environment, an electronic operation platform is an elementary requirement for handling all institutional information resources, administrate students, support staff, and manage tutoring as well as communication, etc. In this context, the popularity of open source software (in which the source code is available under one of a variety of free licenses) [24, 30] and the associated collaborative development methods for education has grown dramatically [3]. The benefits of the open source model can include increased quality, greater stability, superior performance, and improved functionality. Reusability, reduced costs, reliability, and rapid fixes to bugs/problems are among other benefits open source model can offer [2]. There was the wide open source software movement specifically targeting learning, such as the Open Knowledge Initiative at MIT [32], Caroline [25], EduZope [27], OpenOffice [35] and Moodle [31].

However, to create a holistic approach to e-University, we need to look across the entire spectrum from learning management, performance management, content management and human capital management. Consequently, e-University platform is claimed to be flexibility, adaptability and scalability. Meanwhile, the approach to open source software development in e-University context must face a critical challenge, i.e. a lack of interoperability. In this context, the future development of e-University tools and platforms should be guided by an architecture based on open standards, forming the basis of interoperability. From attempts to create open standards for learning software and content [8], the educational technology standardization movement, driven by specification organizations such as IMS Global Learning Consortium [29], and ADL [23], and relevant committees of international standards bodies such as the IEEE LTSC [28], has also developed to provide standardized technologies for learning applications. .

Open source software that is available for inspection and adaptation while conforming to relevant open standards are rather successful in improving the interoperability. This has given rise to favorable conditions for the development, use and reuse of freely available high-quality academic content, such as free, extensive materials for all of institutional courses. Additionally, other forms of open knowledge materials have also been supported, including full courses, components of courses such as modules and learning objects, library collections, and research data. A number of open content-related projects have been supported, including Open Course [33], and MIT Open CourseWare [34].

However, e-University systems must face the challenge that learning systems, including learning and teaching, research and administration, can no longer be done in isolation, but must be done in a global context as part of a university, containing many categories of data. This potentially takes us into a requirement for web portal – a *single, personalized interface through which users access all information resources and services in a secure, consistent and customizable manner* [7] and *connect users not only with everything they need, but also with everyone they need, and provide all the tools they need to work together* [7].

4.2.Semantic information portal: Portals for Integrated, User-Centric University Information System

As emphasized before, portals were described as a promising technology that tends to help universities in transforming their legacy systems towards integrated, user centric information systems. Information portals are believed to bring universities an opportunity to *unlock all forms of internally and externally stored information and provide all members of the community with a single gateway to access information* [7]. More specifically, information portals provide collections of relevant information on specific topics, group and structure the information, and support the user in retrieving, selecting and accessing electronic information.

In the institutional context, portals are indeed an important technical and visual superstructure for organizing online resources and services. Portals are considered to be a critical layer of so-called middleware that enables users of the institutional web to customize, personalize, and tailor resources and services in ways that fit the users’ needs and preferences.

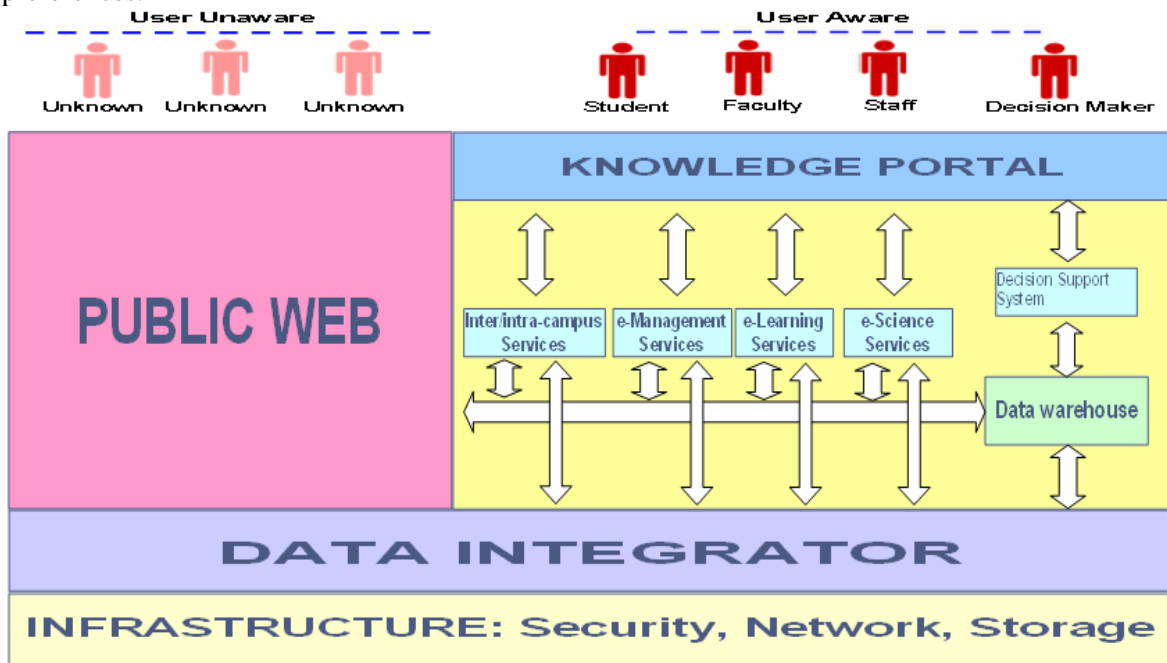


Figure 1. Information portal in e-University environment

In this view, portals bring an opportunity for academic environments to transform themselves more effectively, using existing systems as providers of the functionality, which is offered to the academic community through a single secure and personalized gateway. The systems integration, utilization of e-Business technology, and the wider use of data and

services that are typically available through various non-integrated and legacy university subsystems seem to be the key to the use of portals in academic environments. Of primary importance is the development of a decision support system to support and enhance the operational, evaluation, research, and planning functions within the institution.

However, not many Information Technology environments are as complex as those found in colleges and universities. These are typically large and decentralized, including administrative systems, e-Learning platforms, library and research systems, etc. The major difficulty is that data at multiple information resources tends to be formatted in various, complex, changing and incompatible ways [4]. Moreover, the same word may have different meanings and the same meaning may be expressed by different words. This implies syntactic and metadata standards face disabilities in providing enough semantics for all potential integration. There arise requirements for an information technology framework supporting better implementation of an e-University portal structure. Current Web technologies employed to build up these portals present serious limitations regarding facilities for searching, accessing, extracting, interpreting and processing for information. Therefore, current traditional portals are neither able to share information with other portals, nor to present an efficient information retrieval strategy and metadata maintenance.

Semantic technologies empower three classes of enterprise and web applications involving heterogeneous content [9]: (a) semantic search and browsing, (b) semantic integration, and (c) knowledge discovery and semantic analytics. As a result, the idea of the Semantic Web as a layered architecture for realizing machine understandable meaning of Web resources holds particular new ways for building information portals. Semantic portals utilize semantic technology to provide semantic search, browsing, and integration of content, aiming at using ontology to provide more semantic expressivity to its information contents, as well as to improve some of its functionalities, as the search mechanism.

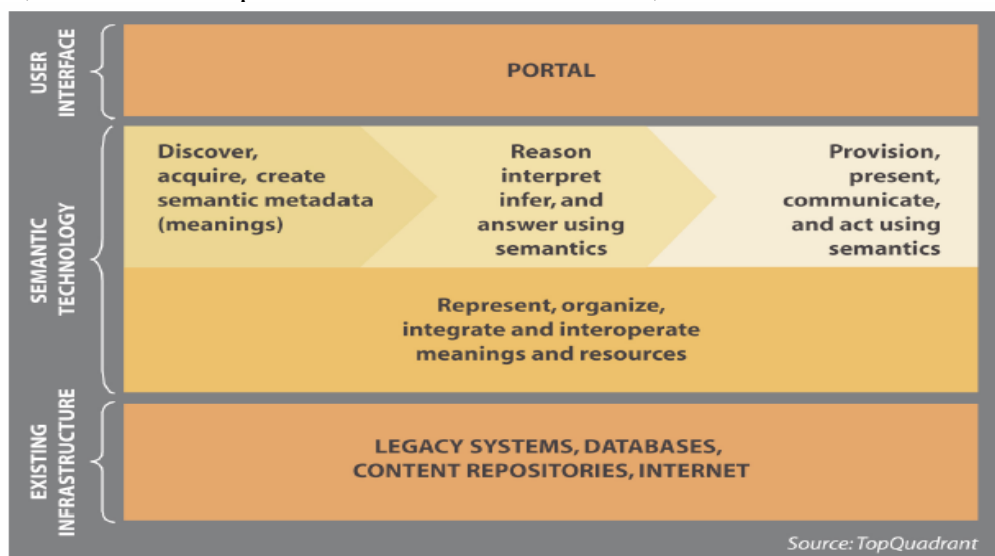


Figure 2. Information portal enhanced with semantic technologies [20]

Based on semantic technology, especially the explicit, shared domain ontology, semantic information portal can offer semantic services including multidimensional classification, semantics-based browsing, semantic search and smart question answering. *Semantic browsing* locates metadata and assembles point-and-click interfaces from a combination of relevant information [9]. *Semantic search* enhances current search engines

with semantics, it goes beyond superficial keyword matching by adding semantic information, thus allowing easy removal of non-relevant information from the result set [9]. *Smart question answering* is the technique of providing precise answers to a specific question. All these services would be built on top of functionality such as machine access to semantic information. Moreover, Semantic Web can help in extending the information model [17], by supporting adding data in a new format, without invalidating existing data, in such a way that both original and extended formats can be used interchangeably.

Furthermore, semantic portals can reason about the - now machine readable - semantic of Web resources [15], can search for relevant information in a more focused way by considering explicit semantic information, and can extract, rate and combine information resources in an advanced manner. In particular, the realization of user-adapted, personalized views on the data can profit from the provision of machine readable semantics, as user requirements can be more precisely considered in the retrieval, selection and presentation processes.

Up to existing open standards and Semantic Web, one of the main achievements of our approach is the ability to enhance the interoperability in e-University systems. In the following section, we will present a detailed architecture for semantic portal in e-University with its specifications. The proposed architecture is aimed to provide efficient approach from knowledge perspective using specialized ontologies as a semantic foundation for the effective integration and management of distributed and heterogeneous information resources in e-University.

4.3. A Framework for Scalable, Reliable Semantic Portals in e-University

This section presents a conceptual architecture of ontology-based institutional portal using Dublin Core in the standardization of metadata and keywords describing information content. Key features of this approach are to design a specified structure based on ontology and use its *content*, *context* and *structure* model to support search and navigation through heterogeneous information resources in e-University systems, i.e. administrative systems, e-Learning systems, and research systems. Our framework with core components is represented in figure 3.

- The **data sources** layer represents operational systems designed to record, retrieve and manage large amount of real-time transaction data of interest. By its very nature, data from multiple sources tends to be distributed, heterogeneous, volatile, interrelated, and focused around topics and organizations [11].

- o **Metadata** are data about data that help us to retrieve better information. Metadata are understood as a solution to facilitate the use of the learning objects, describe the learning assessments and objectives. To be available, metadata are stored in different kinds of repositories on the Web called metadata repository.

- **Knowledge warehouse** as a repository of facts and concepts in the form of Description Logics statements [11]. It is a repository where ontologies, metadata, inference rules, information resources and course descriptions, user profiles are stored. The knowledge warehouse states concepts and relations in terms of Description Logics and therefore it is very flexible concerning about the change and evolution of the ontology. In the context of e-University systems, agents with semantic foundation can collect the facts and therefore direct access to semantic knowledge in the knowledge warehouse,

- o The ontology includes three models: **Context model** describes various contexts or various presentation contexts to enables context-relevant searching for

information according to the preferences of the user. **Content model** defines the content of information objects in process of providing as well as accessing to specific information resources. Content model can also be used in navigating information resources through defining special relations that are not mentioned in context model, such as synonyms, abbreviations, different languages...[11] **Structure model** defines dynamic logical structure of information depending on user's preferences and the relationships between different information objects by means of identified structuring relations.

- Based on Description Logic inference engine, the **data integrator** is responsible for extracting knowledge from given facts and background knowledge. The inference engine receives, evaluates queries and input data and returns the results derived from the combination of facts and concepts in the knowledge warehouse (knowledge bases, ontology) and queries. In essence, the integrator is where the differences across information sources are specified, where relationships among data at multiple sources are defined, where duplicates and inconsistencies are detected, and where it is determined how information will be integrated into the systems.

- Community users and general users can access information contained at the portal. Two forms of accessing are supported: navigating through the portal by exploiting hyperlink structure of documents and searching for information by posting queries.

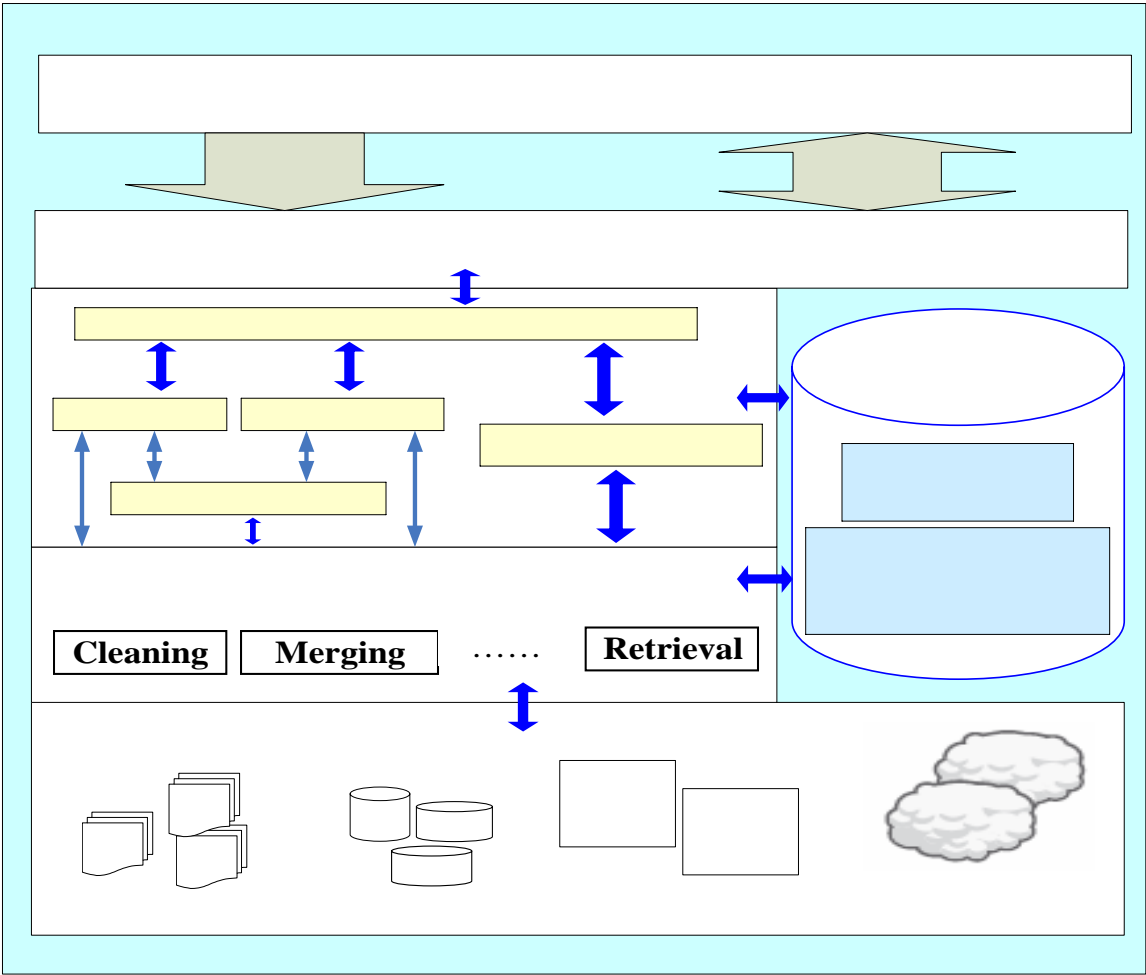


Figure 3. The architecture of ontology-based framework

○ **Navigation** enables complex semantic linking, based on relations between concepts in content and context ontologies following the structure defined in the structure ontology and the rules in the context ontology, which define how to organize the information objects in a suitable structure.

○ **Query:** Description Logic inference engine identifies semantically links for the information objects corresponding to the relations in ontology. Two pieces of information objects relevant with two concepts related in the ontology are linked to each other in the user interface. Moreover, query module also provides an API with methods for querying the knowledge base.

- **Services:** Different semantic services are offered, e.g. personalized searches, notification service, information annotation, etc. For example, each information object is described with the **semantic annotation** such as: what the information is about (content annotation), which context of the information (context annotation) and how it is connected to other information (structure annotation). The information is integrated with *the content, context, structure* ontology and is stored in the metadata repository. Or **semantic personalization** can be realized by using ontological information, a simple but effective personalized user awareness support: the visitors of a portal are grouped according to their relation to the beholder: currently interested in similar topics (e.g. is the information they are currently viewing on similar topics), or normally have similar interests (e.g. are they working on similar topics as the beholder)

One of major approach is to use various characteristics of ontologies (content, context and structures model), such as their structure, concept names and natural-language descriptions, definitions of concepts, class hierarchy; property definitions (domains, ranges, restrictions); instances of classes, as a knowledge foundation can provide a predefined set of terms and a conceptual structure for exchanging information and defining similarities [11]. This approach tends to rely on features of concept definitions or on explicit semantics of these definitions. In this context, the expressive power of ontology languages provides the opportunity for representing mappings themselves in more expressive terms [5]. Therefore, we follow the approach based on the notion of Description Logic OWL [20] enabling management of the relationships between definitions, aggregation hierarchies and mappings.

The road towards interoperability of e-University environment depends on creating a semantic foundation that will explicitly declares the semantics and concepts used in annotating information. Ontologies are used as a conceptual backbone for providing, accessing and structuring information in a comprehensive approach for building and maintaining knowledge portals. Realizing semantic information portals using recent semantic Web technologies brings new and fascinating possibilities for improving personalized access to e-University resources [7]. It goes without saying that on the basics of semantic technologies, semantic portal can most certainly handle data quality processing, including checking for valid values, ensuring consistency across values and data formats, removing unneeded attributes and duplicates, checking whether complex business rules have been enforced and combine data from multiple sources. Therefore, successful e-University portal on the basis of ontology-driven framework is a blueprint for the success of an e-University system, thus ensuring the successful transitions of traditional universities to e-University environments.

5. Conclusions and Future works

The motivation for this work has come from the field of e-University, in which information integration of distributed and heterogeneous information resources is seen important, but in which existing information resources are both numerous and complex. With a formal, logic-based semantics and the basic reasoning services, our proposed framework has been considered as a starting point for developing semantic educational portal. The main contribution of this paper is an analysis of how the choice of Semantic Web influences the accessibility and semantic integration of information resources in e-University portal. Consequently, semantic portals bring an opportunity for academic environments to transform themselves more effectively, improving the quality of higher and continuing education, making University information and services more flexible and accessible as well as building lasting relationships with their research staff, students, administration staff, faculty and public members [1].

Clearly, a lot of work remains to be done for the completion of our research approach. The main challenge is the practical application of this disciplined approach in real world cases and its further tuning to accommodate extra practical problems. For the near future, Description Logics [2], a formal language for representing knowledge in a structure and formally well-understood way and reasoning about it, will be studied and integrated into our framework. Thus, the reasoning support over the conceptual representation can be implemented with formal, logic-based semantics, enabling a step further in providing intelligent means for providing semantic portal, e.g. semantic annotation framework and semantic extraction, intelligent navigation, personalization, or summarization. Along with the development of the University portal, there comes the opportunity for potential re-engineering of the key academic processes and the possibility to focus on integration in e-University environment.

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TOWARDS A SEMANTIC PROPOSAL FOR OPEN EDUCATION IN E-UNIVERSITY

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Agenda

- e-University : Benefits and challenges
- IT Strategy and Development for e-University - Hue University approach
- Semantic information portals – New gateway to better interoperability
- Conclusions

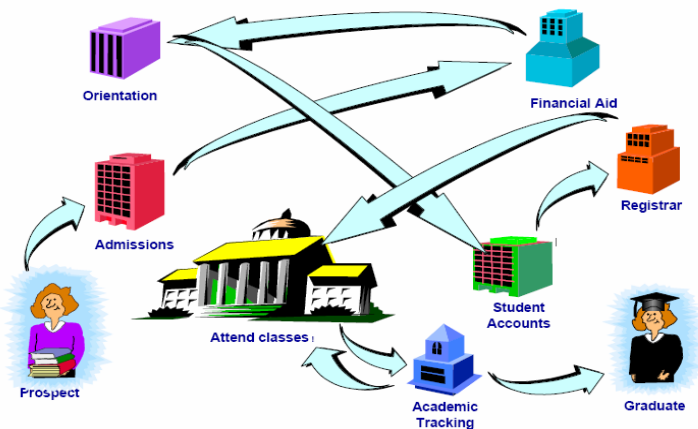


e-University : A critical approach

- Motivation of e-University
- e-University Portals
- Integration and Interoperability
- Our Approach

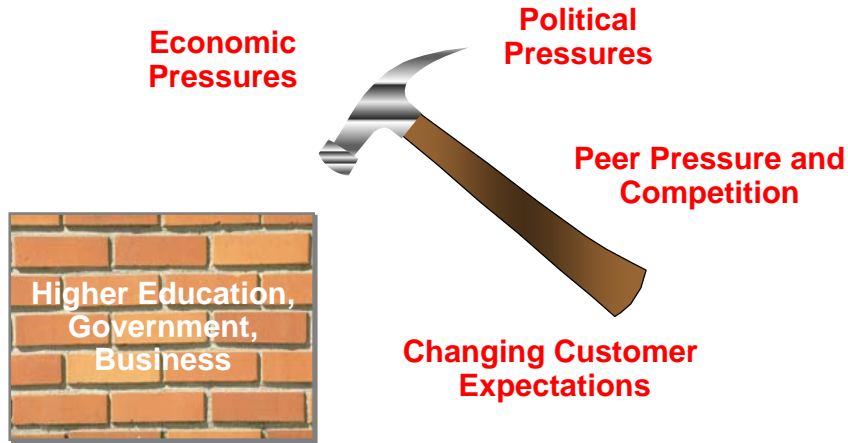


From Traditional University..





Increasing pressures



New University model can ...

- Improve the quality of University Services
 - meet the greater diversity of student needs (relevance)
 - increase flexibility of provision (access)
 - meet the demand for high quality resources and service provision (quality)
- Reduction of Costs
- More sophisticated ways of doing business
- Enhance collaborative research
- Provide a campus portal for students to obtain various services



... to e-University



The Goals of e-University

- Improving the quality of higher and continuing education,
- making University information and services more flexible and accessible,
- allocating resources in the best possible way,
- and creating more opportunities for international cooperation.

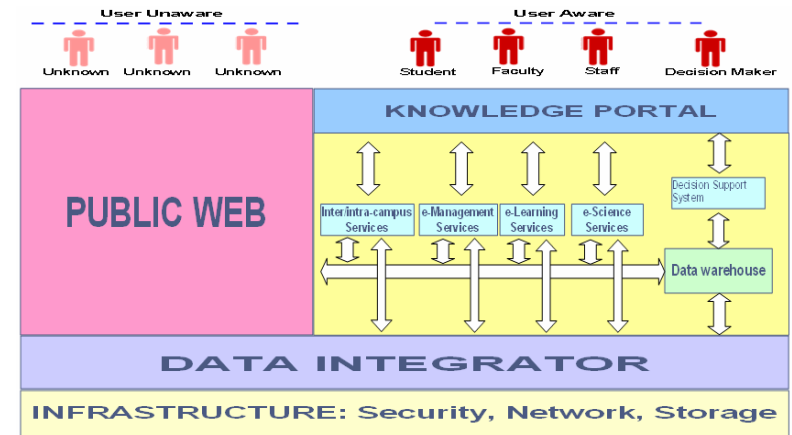


Key use of e-University Portals

- Provision of information, collaboration and access to the University services
- Provision of an efficient Communication channel
- Provision of up-to-date information in a timely manner
- Systems integration,
- Utilization of e-Business technology,
- Development of a decision support system



Information portal in e-University



Open source software, Open standards, and Open content

- **Open source software**
 - increased quality, greater stability, improved functionality, reusability, and reduced costs
 - Open Knowledge Initiative at MIT, OpenOffice and Moodle, ...
- **Open standards**
 - The basis of interoperability, flexibility, adaptability and scalability
 - SCORM by ADL, IMS, Dublin Core, LOM by IEEE, ...
- **Open content (also called Open course)**
 - Sharing and cross-pollination,
 - Content needs to be free,
 - Content can be modified and improved,
 - Focused collaboration and community
 - Open Course, and MIT Open CourseWare, ...
- **Open source Portal**
 - uPortal, ...



Why difficult: Heterogeneity

- Provide the right knowledge to the right person at the right time, engaging the challenge of interoperability
- Syntactic and metadata standards face disabilities in providing enough semantics for all potential integration
 - Lack of capabilities to search and browse
- Two problems must be dealt with:
 - **structural heterogeneity**: concerns the representations of information
 - and **semantic heterogeneity**: concerns the intended meaning of described information



Emergent technologies

A new form of Web content that is meaningful to computers will unleash a revolution of new possibilities

- Tim Berners-Lee, Scientific American

- The Semantic web
- Machine-to-machine communication
- Underpinned by XML and Web Services



Advancing E-Business Standards Since 1993



Our approach

- **Knowledge perspective** – use of specialized domain ontologies for e-University framework
 - as a semantic foundation
 - as an important way for the standardization of terminology in e-University domains
 - facilitating sharing and reuse distributed information resources in e-University
- Provides a framework for integrating data across disparate information systems
 - utilizes the advantages of *ontology-based* and *standard-based* organization
- Enhance the interoperability in e-University systems
 - Consistent and accurate data sharing across campus
 - Open, interoperable digital campus for unlimited connectivity
 - Extensional value of current and future technology investment



IT Strategy and Development for Hue University – approaching to e-University Portal

- Hue University
- IT Strategy and development
- Where are we ?
- What Next ...?



Hue University

Foundation Date: March 1, 1957

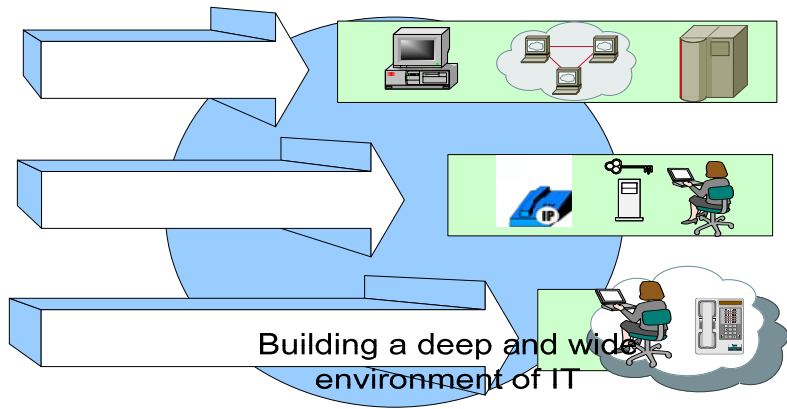
One of the biggest centers for training, research, as well as cultural, scientific and educational exchanges in Central Vietnam



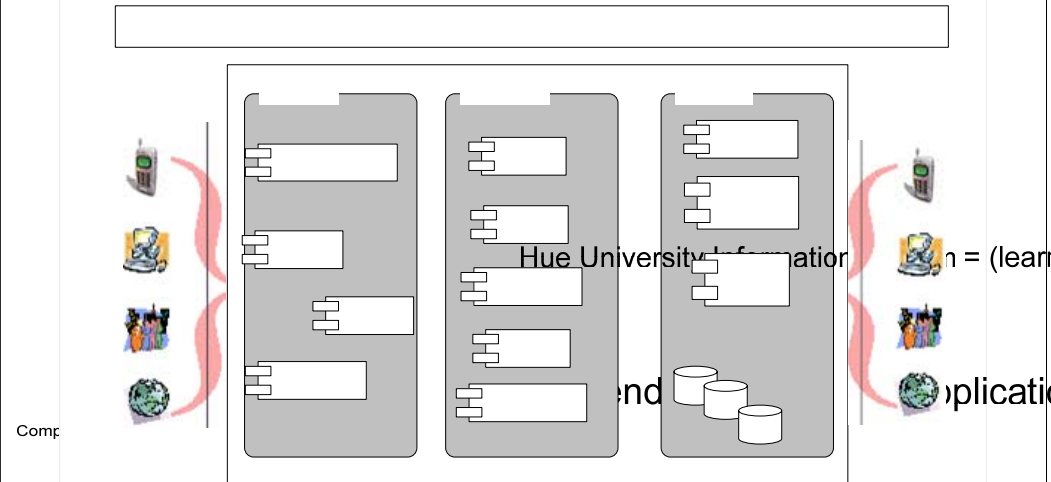
A multi-field University includes

- **7 Affiliated colleges**
- College of Sciences
- College of Pedagogy
- College of Agriculture and Forestry
- College of Medicine
- College of Arts
- College of Economics
- College of Foreign Languages
- *Learning Resource Center*
- *Center for Distance Training*
- *Center for Information Technology*

Strategy of IT development



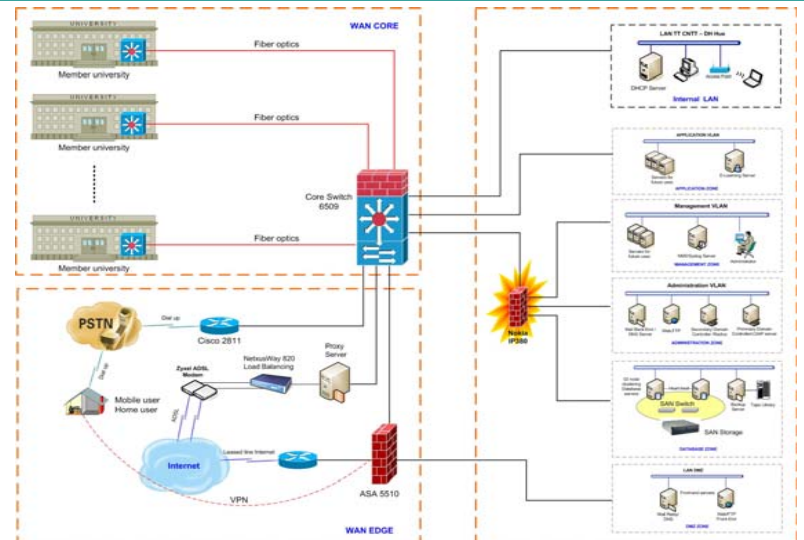
Hue University Information System



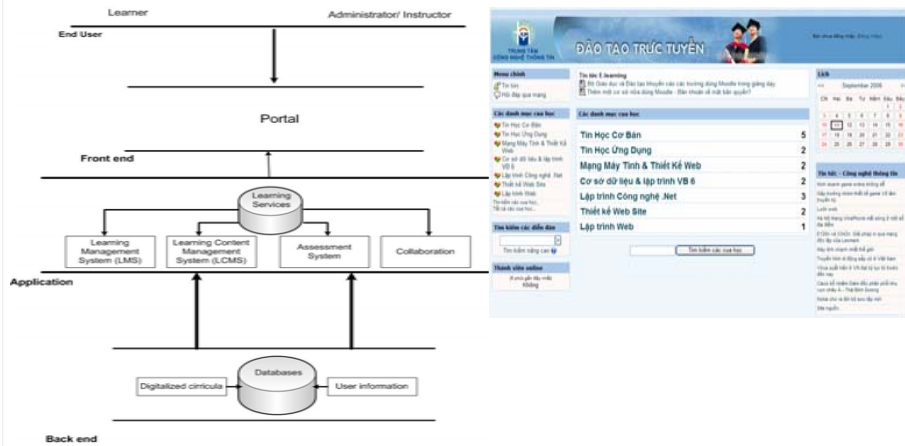
Developing IT applications to training, research and management

Where we are now ?

IT Infrastructure



E-learning Platform



Administrative System



(XEM BẢO CÁO CHI TIẾT)

Theo dõi kinh phí KHCN năm 2003 (17/01/2006)

BẢNG THEO DÕI KINH PHÍ KHCN NĂM: 2003

TT	Mục chi	Năm 2000	Năm 2001	Năm 2002	Năm 2003
1	Bê ta cấp nhà nước (Đạch M)	1304.0	727.0	1594.0	1494.0
2	Hỗ trợ các hoạt động KHCN cấp Bộ	1946.0	1576.0	1480.0	1956.0
3	Hội nghị, Hội thảo	70.0	170.0	50.0	70.0
4	Đầu tư nâng lực nghiên cứu	2400.0	2000.0	2100.0	0.0

TỔNG HỢP KINH PHÍ HOẠT ĐỘNG KHCN NĂM 2003

TT	Mục chi	BHH	KH	SP	NL	Y	NT	KT	TEPT	TN	MT	GDOP	GDTC
1	Bê ta độc lập cấp Nhà nước (Đạch M)		456.0										
2	Các hoạt động KHCN (cấp Bộ)	160.0	363.0	370.0	48.0	18.0	102.0	0.0	0.0				
3	Hội nghị, Hội thảo (Trần Nhân Tông)		70.0										
4	Chuyển giao công nghệ cho												

Research Management System

Tìm kiếm - Sự hiện

Giới thiệu »

Tin Khoa học Công nghệ »

Hoạt động KH - CH »

Văn bản pháp quy »

Tạp chí khoa học »

Hội nghị - Hội thảo »

Thông báo »

HCKH Sinh Viên »

Đăng ký nhiệm vụ KH »

Thiết bị »

ĐỀ XUẤT IBIEM VU KHOA HỌC CÔNG NGHỆ

1. Họ và tên cá nhân đề xuất:

2. Đơn vị:

3. Tên đề tài, dự án:

Thuộc chương trình dự án (đánh dấu vào ô tương ứng):

Dự án nâng cao năng lực nghiên cứu:

Đề tài độc lập cấp Nhà nước:

Đề tài trong điểm cấp Bộ:

Dự án SXTH cấp Bộ:

4. Mục tiêu của đề tài:

5. Nội dung chủ yếu của đề tài:

6. Dự kiến sản phẩm của đề tài:

7. Khả năng và địa chỉ áp dụng:

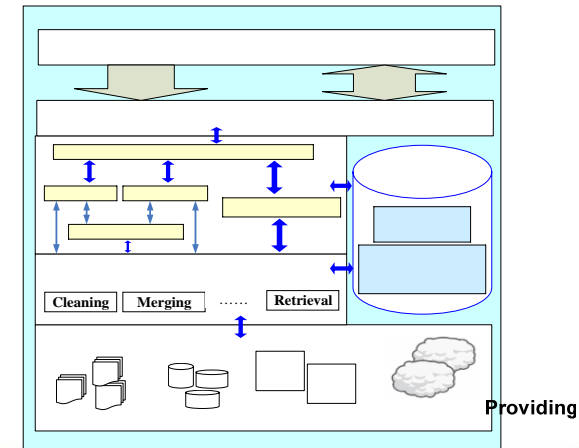
8. Nhu cầu kinh phí để thực hiện đề tài:

Semantic information portals – Gateway to better interoperability

A semantic approach

- Semantics can be used to:
 - infer information based on background knowledge of the domain.
 - Integrate and reuse information resources from different domains
- e-University Information Portal should be further enhanced by providing ontology-based knowledge
 - provide semantic search, browsing, and integration,
 - use ontology to provide more semantic expressivity to its information contents,
 - as well as to improve some of its functionalities,
 - as the semantic search and browsing mechanism,
 - semantic integration,
 - and knowledge discovery and semantic analytics

Semantic Information portal - An ontology-based framework



USER INT

KNOWLEDG

Personalization, Authentication

Conclusions

Conclusions

- e-University is a key element for the next generation of University Systems.
- Presented Hue University Information Technology Strategy and Development to fulfill e-University requirements as well as some implementation results
- Propose a framework based on ontology facilitating
 - providing and accessing information at the portal
 - developing as well as maintaining semantic educational portal

Ann

text



THANKS FOR YOUR ATTENTION !