



**Enterprise Information Portals vs. Enterprise knowledge Portals .....Dr/.Maaradj houari & Dr kamel rezig.**

**ENTERPRISE INFORMATION PORTALS VS.  
ENTERPRISE KNOWLEDGE PORTALS**

Dr.Maaradj **HOUARI**<sup>1</sup>

Dr. Kamel **REZIG**<sup>2</sup>

**ENTERPRISE INFORMATION PORTAILS VS.  
CONNAISSANCE DES ENTREPRISES PORTAILS**

**Résumé:**

On appelle "**portail d'entreprise**" une plate-forme **intranet** donnant accès à des données de l'entreprise ainsi qu'à des ressources du système d'information regroupées au sein d'une interface unique.

Le portail d'entreprise est ainsi la porte d'entrée vers les données du système d'information de l'entreprise pour l'ensemble du personnel et éventuellement les partenaires. L'enjeu du portail est de chercher à centrer l'utilisateur au sein du système d'information.

Ce article a pour principal objectif de dresser un panorama complet et équilibré des technologies de portail d'information d'entreprise et de gestion de la connaissance, tout en montrant en quoi celles-ci sont susceptibles de renforcer la productivité et d'accélérer l'innovation dans l'entreprise. Hummingbird espère ainsi vous aider à identifier un grand nombre des technologies qui sous-tendent la gestion de la connaissance, tout en vous procurant un

---

<sup>1</sup> : Dr Maaradj HOUARI is currently maitre de Conferences at Ghardaia University, Algeria Email: [m\\_houari@yahoo.fr](mailto:m_houari@yahoo.fr)

<sup>2</sup> : Dr Kamel Rezig is currently maitre de Conferences at Blida University, Algeria.



## Enterprise Information Portals vs. Enterprise knowledge

Portals .....Dr./Maaradj houari & Dr kamel rezig.

maximum d'éléments d'appréciation pour appuyer votre processus décisionnel.

**Mots clés: Connaissance Portails, Enterprise Information Portals, Intelligence d'Entreprise, Organisation des connaissances, Business Challenge. Code JEL : M15**

بوابات لمؤسسات المعلومات، بوابة مؤسسات المعرفة نموذجا

الملخص:

تعد بوابة للمؤسسة " منبرا للشركات الوصول إلى الشبكة الداخلية للبيانات ونظام معلومات الموارد معا في مكان واحد. فهي بوابة لنظام المعلومات للمؤسسة لجميع الموظفين والشركاء. و مسألة البوابة هو السعي الى التركيز المستخدم داخل النظام. تهدف هذه المقالة لتقديم لمحة عن كيفية تطوير شامل ومتوازن لبوابة تكنولوجيا المعلومات وإدارة الأعمال والمعرفة، في حين تبين الكيفية التي من المرجح أن تعزز الإنتاجية وتسريع الابتكار في مجال الأعمال التجارية. الكلمات الدالة: بوابات المعرفة، بوابات المعلومات، المؤسسات الذكية، مؤسسات المعرفة ، وتحديات منظمات الأعمال.

Code JEL : M15

### **ENTERPRISE INFORMATION PORTALS VS. ENTERPRISE KNOWLEDGE PORTALS**

**Abstract:**

An "enterprise portal" a platform intranet access to corporate data and system resources information together in one place. The enterprise portal is the gateway to the information system of the enterprise for all staff and eventually partners. The issue of the portal is to seek to focus the user within the system The enterprise portal is the gateway to the data system This article's main objective is to develop a comprehensive and balanced overview of the technology information portal and business management knowledge, while showing how they are likely to enhance productivity and accelerate innovation in the enterprise. Hummingbird hopes to help you identify many of the technologies that underpin the management of knowledge,



**Enterprise Information Portals vs. Enterprise knowledge**

**Portals .....Dr/.Maaradj houari & Dr kamel rezig.**

**while giving you a maximum elements to support your decision-making process.**

**Key words : Knowledge Portals, Enterprise Information Portals, Intelligent Enterprise Organizational Knowledge, Business Challenge.**

**Code JEL : M15**

**INTRODUCTION : THE BUSINESS CHALLENGE**

The nature of portals has changed dramatically over the past five years. First generation portals essentially delivered collections of passive pages, comprised of news snippets, static report views, links to external sites, and emulators of business applications that demanded spawning new windows and were typically not well integrated with the portal itself in terms of cross-application and content functionality.

Over time, second and third generation portals began delivering on the promise of creating a truly sophisticated business platform. This new breed of portal evolved to include capabilities such as allowing organizations to securely expose critical applications and content for casual and remote knowledge workers, to house a unified repository for information search and retrieval, provide rich user personalization, and offer extensive configurability for form and function of the portal. Most importantly, though, portals began justifying their cost through usage metrics, returns on maintenance and development costs, and other tangible and readily defensible elements of return on investment.

Even with the advances made over the past few years, the full potential of portals remains largely unrealized. New challenges have rendered existing portals incapable of maintaining the competitive advantages they traditionally delivered. Increasing regulatory compliance issues, the need to create the “real-time enterprise” in order to maximize business agility, a growing pervasiveness of mobile workers, changing business relationships that demand enhanced collaboration, and the ever mounting generation of content to access, store, manage, and leverage for competitive advantage. Add to this the requirement to control costs associated with custom development and IT spending as a whole and the challenges escalate.

Organizations need a true portal framework that delivers not only the benefits offered by third generation portals but also provides native tools



## Enterprise Information Portals vs. Enterprise knowledge

### Portals .....Dr/.Maaradj houari & Dr kamel rezig.

for advanced content and knowledge management and supports open standards to generate a feature rich environment for the enterprise.

#### **1- DEFINING ORGANIZATIONAL KNOWLEDGE**

Before we can actually begin an organized discussion of EKM, its important to define what knowledge is and how it can be captured and leveraged. There are three types of knowledge with any organization, individual, group and enterprise, and that knowledge can be generally classified along the lines of being explicit, embedded, and tacit. The overall challenge that many organizations face today is identifying where that knowledge resides and how to leverage it across the enterprise, group and/or individual. The majority of KM initiatives today usually revolve around identifying/discovering, classifying and indexing explicit knowledge in information systems, such as an enterprise document management system, and/or business content management system. In many cases KM systems also include access to structured information found in databases.

##### **1.1- Explicit Knowledge:**

knowledge represented in documents, books, e-mail and Databases.

##### **1.2- Embedded Knowledge:**

organizational knowledge found in business processes, Products and services.

##### **1.3 Tacit knowledge:**

undocumented knowledge that is captured during business Processes by knowledge workers.

Combining true knowledge management with the latest in portal technology, the next wave in information access is here. Far beyond simple data archives and streamlined access, enterprise knowledge portals represent the future of corporate information management. Seamlessly interweaving three essential principles—people, content, and technology—an effective portal is the ultimate roadmap to every conceivable permutation of the components in a business’s landscape.[2]

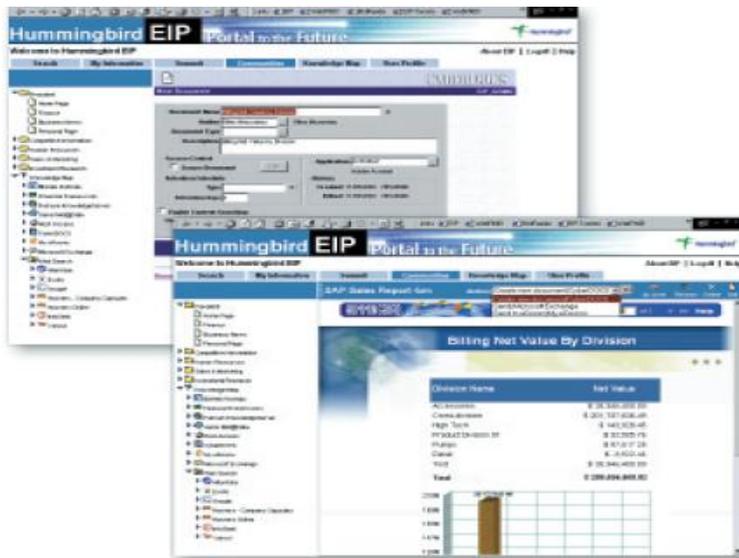
#### **2- KNOWLEDGE PORTALS AND THE INTELLIGENT ENTERPRISE**

Enterprise information portals are bringing together the worlds of business intelligence and knowledge management into a new, centralized desktop environment—the knowledge portal. In the future, the knowledge portal will play a key role in empowering the virtual enterprise and employees by providing a personalized single point of access to all relevant information— enabling better, faster-decision

**Enterprise Information Portals vs. Enterprise knowledge Portals .....Dr/.Maaradj houari & Dr kamel rezig.**

making. EIPs, or knowledge portals, are also beginning to help organizations capture and leverage their intellectual assets by facilitating assembly of communities of interest, best practice, and expert systems within a single, intuitive, Web-based user interface. The EIP should be viewed as an evolving technology platform, and in the future EIPs will incorporate streaming video and audio to include e-learning and e-training components, thereby potentially reducing overall organizational training costs.[3]

Figure N°01: Knowledge Portals and the Intelligent Enterprise



**3- ENTERPRISE INFORMATION PORTALS**

In November of 1998, a new "investment space" called **Enterprise Information Portals (EIPs)**, was declared by Christopher Shilakes and Julie Tylman of Merrill Lynch's Enterprise Software Team [4, P. 1]. "Enterprise Information Portals are applications that enable companies to unlock internally and externally stored information, and provide users a single gateway to personalized information needed to make informed business decisions. " They are: " an amalgamation of software applications that consolidate, manage, analyze and distribute information



## Enterprise Information Portals vs. Enterprise knowledge

### Portals .....Dr/.Maaradj houari & Dr kamel rezig.

across and outside of an enterprise (including Business Intelligence, Content Management, Data Warehouse & Mart and Data Management applications.)"

Merrill Lynch sees EIPs as the next big investment opportunity in the IT sector and believes the EIP space will eventually reach or exceed the size of the Enterprise Resource Planning Market. Indeed, Merrill Lynch estimates the 1998 total EIP market at \$4.4 billion, and forecasts "that revenues could top \$14.8 billion by 2002, approximately 36% CAGR for this sector."

This growth, according to Shilakes and Tylman, is being driven by three basic benefits provided by EIP systems [4, P. 9]. The first benefit is "competitive advantage" derived from the "competitive potential lying dormant in the information stored" in enterprise systems. The second benefit is that "packaged" EIP systems lead to increased ROI because they are less expensive, easier to maintain, and easier to deploy than customized systems. They also generate revenue through the well-informed actions they support. And the third is that "EIP systems provide access to all" in a convenient, reliable, and inexpensive delivery vehicle.

A slightly different point of view on benefits is provided by Plumtree Software [5, P. 9]. It sees EIPs as increasing employee productivity by decreasing the amount of time employees spend searching the web, increasing effectiveness by providing needed information that helps decision making, and decreasing overall cost of information by lowering the cost of its delivery.

Note that an EIP is very different from a consumer web portal in this respect. In My Yahoo, the responsibility for making sense of inconsistencies, conflicts, and incommensurabilities in queries, reports and results can be left to the user. In an EIP though, if its integrative services are inadequate, and we query two different sources and they incorporate different meanings for the same term, (for example, "Customer") or different business rules for calculating losses, the results of our query may be at best deceptive, and at worst meaningless nonsense. In the context of maintenance and evolution of EIPs, the DIP problem is three-fold:

First, an integrated view of all enterprise server-based assets relevant to the EIP application is needed;

Second, flows of data, information, and knowledge throughout this system need to be monitored and managed to maintain the common view



## Enterprise Information Portals vs. Enterprise knowledge

### Portals .....Dr/.Maaradj houari & Dr kamel rezig.

of enterprise resources in the face of change in the form and content of any resource, and to distribute the system's data, information, and knowledge bases as required, and

Third, such management needs to occur automatically and without centralizing the system so that the authority and responsibility for adding new data and information to the system is distributed.

To solve the three-fold DIP, EIPs need an integrative software layer (i.e. an Artificial Information Manager or AIM) to perform (dynamic) integration in the face of change in data stores and applications in communication with the EIP. This integrative software layer could be implemented with metadata and procedural code, or it could be implemented much more easily with object technology that encapsulates both metadata and methods (including business rules) in objects [6][7]. Those EIP products that are implemented with an O-O integrative layer will have a competitive advantage in the process of EIP development and evolution.

On (March 20, 1999) Joseph M. Firestone introduced the concept "Enterprise Knowledge Portal" (in "Enterprise Information Portals and Enterprise Knowledge Portals," [9]) to the IT world by defining it and distinguishing it from the Enterprise Information Portal (EIP). The term had been used earlier (March 5, 1999) by Hummingbird Communications, in a press release [10] announcing their impending acquisition of the PC DOCS group, and in an article in DataPro Industry News by Karen Shegda and Allan Tiedrich [11] entitled "Knowledge Management = Access + Collaboration + Retrieval + Analysis. But they declined to define or characterize the EKP except to say that it would integrate structured and unstructured content, and provide a single point of access to all relevant enterprise information. On March 25, IDC published its "Sourcebook for Knowledge Superconductivity" [12]. In this report Gerry Murray, then IDC's Director of Knowledge Management Technologies (currently, IDC's Vice President of Business Strategy and Development) distinguishes four types of corporate portals, including EKPs and offers some definitions.

In spite of the initial failure of the EKP to grab mind share in the portal space, the future is bright for it because a number of the claims of primary benefits of EIPs, such as ROI, competitive advantage, increased effectiveness, and accelerated innovation, assume that information delivered by EIPs is correct information. But the risk associated with



## Enterprise Information Portals vs. Enterprise knowledge

### Portals .....Dr/.Maaradj houari & Dr kamel rezig.

EIPs is that if that's not the case, these four benefits are lost. An overriding justification for implementing an EKP, rather than an EIP, is to secure these four benefits and to minimize decision making risk by increasing the quality/validity of information supplied by the portal. To see this clearly, we need to examine the idea of the EKP.

#### **4- ENTERPRISE KNOWLEDGE PORTALS**

To understand the concept fully, it is best to begin with definitions of business and enterprise information portals. According to Wayne Eckerson [1] a Business Portal is an application that "provides business users one-stop shopping for any information object they need inside or outside the corporation." It also provides shared services such as "security, metadata repository, personalization, search, publish/subscribe," etc., as well as a common look and feel to the portal gateway.

According to Merrill Lynch's Shilakes and Tylman [4]: "Enterprise Information Portals are applications that enable companies to unlock internally and externally stored information, and provide users a single gateway to personalized information needed to make informed business decisions.

Enterprise Information Portals (EIP):

- Use "push" and "pull" technologies to transmit information through a standardized web interface;
- Provide "interactivity" -- the ability to " 'question' and share information on" user desktops;
- Exhibit a trend toward verticalization in applications including packaged applications with targeted content toward industries or corporate functions;
- Integrate disparate applications and data/content stores into a single system;
- Access both external and internal sources;
- Support bi-directional information exchange from sources;
- Use data and information acquired for further processing

An Enterprise Knowledge Portal (EKP) is a type of EIP. It is an EIP that:

- is goal-directed toward knowledge production, knowledge acquisition, knowledge transmission, and knowledge



## **Enterprise Information Portals vs. Enterprise knowledge**

### **Portals .....Dr/.Maaradj houari & Dr kamel rezig.**

management focused on enterprise business processes, e.g., sales, marketing, and risk management, [8] and also

- focuses upon, provides, produces, and manages information about the validity of the information it supplies.

Knowledge Portals, in other words, provide information about your business, and also supply you with meta-information about what information you can rely on for decision making. EKPs, therefore, distinguish knowledge from mere information. And they provide a facility for producing knowledge from data and information, in addition to providing mere access to data and information. EKPs, moreover, orient one toward producing, acquiring and transmitting knowledge as opposed to information. Intrinsically then, they provide a better basis for making decisions than do EIPs generally. Those who have knowledge, have a competitive advantage over those who have mere information.

Since EKPs are types of EIPs, they share with them all of the differences distinguishing them from DW systems. In the case of EKPs however, the renewed emphasis on data mining and analytical applications will be particularly strong since these have a critical role in producing new knowledge.

In addition, the integrative layer in the EKP is different from that in the EIP. In the EIP, the AIM has no intrinsic requirement to manage or implement criteria used to test and validate information that is produced or acquired. In the EKP, in contrast, the integrative layer, called The Artificial Knowledge Manager (AKM) [7][8], will place a heavy emphasis on criteria used to test and validate the knowledge produced or acquired by the EKP, because it is these criteria and their application that distinguish the AKM for the AIM, and derivatively, the EIP from the EKP.

There are no EKP products yet, but we can still project what their benefits would be based on the definition of an EKP. EKPs have the same benefits for the enterprise as EIPs, but they also provide a sharper focus for many of these benefits. Thus, the competitive advantage provided by EIP systems exists only because some of the information produced by such systems is valid information – that is, knowledge. If a particular EIP transmitted only invalid knowledge it would decrease and not increase competitive advantage.

So insofar, as an EKP can be expected to improve the efficiency and effectiveness of decisions based on knowledge provide a better basis for



## Enterprise Information Portals vs. Enterprise knowledge

### Portals .....Dr/.Maaradj houari & Dr kamel rezig.

successful competition and higher ROI than decisions based on mere information. Again, the benefit of increased effectiveness can be expected to increase for EKPs because acting on the basis of knowledge identified as such by EKP metadata and meta-information, is more likely to be effective than acting based on unvalidated or invalidated information.

#### **4.1- EKP ARCHITECTURE AND COMPONENTS**

The EKP provides a:

- Knowledge worker-centric, knowledge work flow-oriented, single point of access to enterprise data and content stores, and applications supporting knowledge production, knowledge integration, and knowledge management;
- Personalized desktop browser-based portal that with the assistance of an integrative, logically centralized, but physically distributed Artificial Knowledge Manager (AKM), composed of distributed Artificial Knowledge Servers (AKSs) and intelligent mobile agents, is connected to all enterprise mission critical application sources and data and content stores;
- secure, seamless, single-logon capability for all network, application, and service resources.

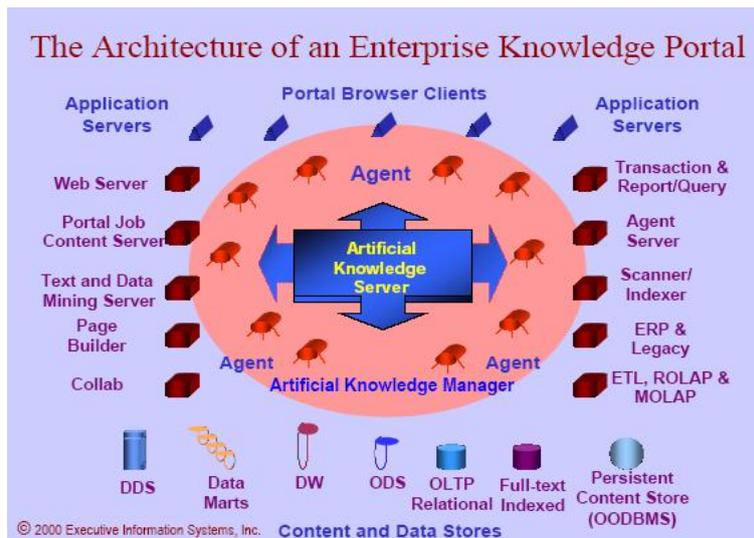
The distributed AKM balances processing loads across the enterprise and provides for dynamic integration of the portal system in the face of change. The AKM's ubiquitous intelligent agents serving all application servers, data and content stores, and clients in the enterprise manage the EKP system, in part. The EKP system, provides a new work environment for enterprise knowledge workers, one that is aligned with, and supports and partially automates, their individual and collaborative work flow in creating, distributing and using data, information, and knowledge, and in making and implementing decisions and actions.

More specifically, the EKP in operation provides: a wide range of functionality (including structured data management, unstructured content management, collaborative processing, information processing, information management, knowledge processing, and knowledge management); a wide range of data and content stores as sources of previously developed information and knowledge; and an integrative object/component-based portal architecture. Here is an introduction to knowledge portal architecture and components.

**Enterprise Information Portals vs. Enterprise knowledge Portals .....**  
**Dr/.Maaradj houari & Dr kamel rezig.**

The following Figure presents an overview. Note the complexity of the EKP system with respect to diversity of data and information stores, and application servers, the presence of structured data and unstructured content sources, the publication and agent capabilities, the web server and portal capabilities, the text and data mining capabilities, the collaborative capabilities, and the dynamic integrative capabilities provided by the AKM with its agents and logically centralized but physically distributed AKS servers and intelligent agents. Note also, that this view of the EKP does not emphasize its front-end aspects or format. In the EKP the action is in the middleware and in how it functions to support knowledge production, knowledge integration and knowledge management.

Figure N°02: The Architecture of an Enterprise Knowledge Portals



**4.2- Legend for the Above Figure**

ETL = Extraction, Transformation, and Loading  
 DDS = Dynamic Data Staging Area  
 DW = Data Warehouse  
 ODS = Operational Data Store  
 ERP = Enterprise Resource Planning  
 Query = Query and Reporting Server  
 OODBMS = Object-Oriented Database Management System  
 OLTP = Online Transaction Processing  
 MOLAP = Multi-dimensional Online Analytical Processing  
 ROLAP = Relational Online Analytical Processing



## Enterprise Information Portals vs. Enterprise knowledge Portals .....Dr/.Maaradj houari & Dr kamel rezig.

Though the above figure illustrates the diversity of components that may enter an EKP, it does not specify its necessary generic components. These are:

- Browser and e-mail clients
- The Avatar -- a client-based intelligent agent
- The portal application server(s),
- The access management system
- Knowledge Claim Objects
- The enterprise Artificial Knowledge Server(s) (AKSs),
- Complex adaptive system (cas) intelligent agent platform
- The formal knowledge production application server(s) and its associated clients supporting analytical and statistical modeling, KDD and Data Mining, Text Mining, Simulation, impact analysis and forecasting,
- The collaborative processing application server, and
- A persistent storage component.

Among these components, the avatar, knowledge claim objects, the AKS, the cas agent platform, and the collaborative processing application server are all unusual and deserve further analysis in specifying EKP architecture.

### **4.3- The Essence of The EKP**

Every individual, team, or group within the enterprise encounters problems in the course of the workday. Every problem has alternative solutions. And every alternative solution is subject to criticism and to replacement if it performs less well than its competitors. The best problem solution is the competitive alternative that best survives criticism. And it is that alternative that is the enterprise's best knowledge at any given moment.

The set of problem-solving interactions in an enterprise constitutes a continuous, dynamic "swirl" from which knowledge is produced and integrated with the business processes of the enterprise. The essence of the EKP is its support for facilitating this knowledge "swirl" and its management. The EKP supports every phase of the KLC and every KM activity. It supports business processes with new knowledge production and integration. It supports collaboration focused on knowledge production by providing the history of knowledge-validating activities in the enterprise. It also supports knowledge production through automated arbitration between local knowledge claims and regional and global



## Enterprise Information Portals vs. Enterprise knowledge

### Portals .....Dr/.Maaradj houari & Dr kamel rezig.

knowledge claims. But most of all by supporting every phase of the KLC, and by subjecting knowledge claims to competition more efficiently than ever before, it subjects them to evolutionary forces, and thus supports the acceleration of innovation, the growth of knowledge, in the EKP-supported enterprise.

#### **5- CONCLUSION**

The Enterprise Knowledge Portal is an application on the verge of development. The technology it requires is in existence now. The cost of its development is low as software applications go, since its implementation is largely a matter of systems integration. On the other hand, the benefits associated with the EKP are great. They are nothing less than realization of the promise of the EIP to achieve increased ROI, competitive advantage, increased effectiveness, and acceleration of innovation.

As we indicated previously, EIPs are risky because (neglecting data quality applications which involve relatively superficial quality issues) they fail to evaluate the information they produce and deliver for quality and validity. Nothing, including EKPs, can ensure certainty about information, models, or knowledge claims. But EKP applications incorporate a systematic approach to testing and validation that produces quality assured information. In the category of portal technology they, not EIPs, are the best we can do. They, not EIPs, are the future of portal technology.

#### **5.1- The Future is the EKP**

The new investment space of the EIP is not sharply enough focused. While portal applications are certainly appropriate and ought to be pursued, it is hard to see the point of focusing on the general category of Enterprise Information Portals, rather than the more specific category of Enterprise Knowledge Portals.

This is not just a matter of semantics and labeling. It's important that we don't return to the goals of mere information processing and information management. We already have too much information overload, we don't cure that problem by providing access to more information, or even by improving our efficiency in generating information. We cure it by managing information in the service of producing, acquiring, transmitting and managing knowledge. It is not information we're interested in. It's knowledge. It's knowledge that provides competitive advantage, increased ROI, increased effectiveness,



## Enterprise Information Portals vs. Enterprise knowledge

### Portals .....Dr/.Maaradj houari & Dr kamel rezig.

and a sound basis for decision. So as the EIP space grows and matures, expect it to trend toward its subset, the EKP space. The future is EKP, not EIP.

#### **5.2- E-Business Knowledge Portals**

Portal technology is currently in full migration to the field of e-business. EIP technology is equally applicable to trading communities, trans-enterprise and externally-facing enterprise applications of all types. Eventually when true EKP products and solutions are implemented, they too will be used in e-business. Especially in trading communities, and in communities of practice in medicine, pharmacology, architecture, engineering, science, more generally, and in other areas where the distinction between true and false information is central.

#### **REFERENCES**

- [1] **Wayne Eckerson**,1999. "Business Portals: Drivers, Definitions, and Rules," The Data Warehousing Institute, Gaithersburg, MD.
- [2] Heidi Collins,2003. "Enterprise Knowledge Portals" American Management Association, 1st edition, ISBN: 0814407080
- [3] Hummingbird Communications, Inc. Whitepaper on Enterprise Information Portals available at: <http://www.hummingbird.com/>
- [4] Christopher C, Shilakes and Julie Tylman,1998. "Enterprise Information Portals," Merrill Lynch.
- [5] Plumtree Software, Inc., "Corporate Portal," Plumtree Software, nd.
- [6] Joseph M. Firestone,"Architectural Evolution in Data Warehousing," available at [http://www.dkms.com/White\\_Papers.htm](http://www.dkms.com/White_Papers.htm)
- [7] Joseph M. Firestone," The Artificial Knowledge Manager Standard: A Strawman," available at [http://www.dkms.com/White\\_Papers.htm](http://www.dkms.com/White_Papers.htm)
- [8] Joseph M. Firestone, "Enterprise Knowledge Management Modeling and Distributed Knowledge Management Systems," available at [http://www.dkms.com/White\\_Papers.htm](http://www.dkms.com/White_Papers.htm).
- [9] Joseph M. Firestone,1999. "DKMS Brief No. Eight: Enterprise Information Portals and Enterprise Knowledge Portals," Executive Information Systems, Inc. available at [http://www.dkms.com/White\\_Papers.htm](http://www.dkms.com/White_Papers.htm).
- [10] Hummingbird Communications,1999. Inc. Press Release on pending acquisition, March 5, 1999, available at <http://www.hummingbird.com/press/1999/pdocs.html>.
- [11] Karen Shegda and Allan Tiedrich, "Knowledge Management = Access + Collaboration + Retrieval + Analysis," DataPro Industry News,



**Enterprise Information Portals vs. Enterprise knowledge  
Portals .....Dr/.Maaradj houari & Dr kamel rezig.**

1999, available at

<http://gartner5.gartnerweb.com/public/static/datapro/industry/indnews28.html>.

[12] "Enterprise Knowledge Portals to Become the Shared Desktop of the Future," IDC Press Release March 25, 1999

<http://www.idc.com/Data/Software/content/SW032699PR.htm>.

[13] Joseph M. Firestone, "Defining Enterprise Information Portals," Executive Information Systems, Inc., 1999, available at [http://www.dkms.com/White\\_Papers.htm](http://www.dkms.com/White_Papers.htm).