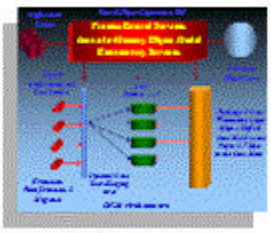
EIS



DKMS Briefs

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DKMS Brief No. Eight: Enterprise Information Portals And Enterprise Knowledge Portals

EIPs

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 [1, 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 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 [1, 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 [2, 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.

Here are the essential characteristics of EIP's according to Shilakes and Tylman [1, P. 10-13]:

- EIPs use both "push" and "pull" technologies to transmit information to users through a standardized web-based interface;
- EIPs provide "interactivity" – the ability to " 'question' and share information on" user desktops;
- EIPs integrate disparate applications including Content Management, Business Intelligence, Data Warehouse/Data Mart, Data Management, and other data external to these applications into a single system that can "share, manage and maintain information from one central user interface." An EIP is able to access both external and internal sources of data and information. It is able to support a bi-directional exchange of information with these sources. And it is able to use the data and information it acquires for further processing and analysis;
- EIPs exhibit the trend toward "verticalization" in application software. That is, they are often "packaged applications" providing "targeted content to specific industries or corporate functions."

Content Management Systems process, filter, and refine "unstructured" internal and external data and information contained in diverse paper and electronic formats, archive and often restructure it, and store it in a corporate repository (either centralized or distributed). Business Intelligence tools access data and information and through Querying, Reporting, On-Line Analytical Processing (OLAP), Data Mining, and Analytical Applications provide a view of information both presentable and significant to the end user. Data Warehouses and Data Marts are integrated, time-variant, non-volatile collections of data supporting DSS and EIS applications, and, in particular business intelligence tools and processes. And Data Management Systems "perform ETL tasks, clean data, and facilitate scheduling, administration and metadata management for data warehouses and data marts."

From these descriptions of EIP component applications, one can see that EIPs may be viewed as an expansion of current trends in Data Warehousing (DW) Systems. DW systems now contain, and also amalgamate and integrate, Web-based interactive Querying and Reporting, BI, Data Warehouses and Data Marts, and Data Management applications. Data Warehousing as a field has also exhibited a strong trend toward vertical market applications. And indeed, among the first entrants into the EIP space are corporations previously active in the BI, DW and Data Management segments. So what are the differences between current Web-accessed DW Systems and EIPs?

Differences between EIPs and Data Warehousing Systems

The big differences between EIP and current Data Warehousing/Data Mart System applications are:

1. the integration of Content Management Systems,
2. the increasing emphasis on exchange of data with external data stores and applications,
3. the emphasis on sharing data and information among users,
4. the renewed emphasis on data mining and analytical applications, and, above all,
5. the emphasis on integration of the disparate applications and data sources into a single, integrated, EIP application.

Integrating Content Management leads to an explosion of potential data and information sources for EIPs. Whereas DW systems have dealt mainly with structured legacy systems generally dealing with On-Line Transactional Processing (OLTP), EIPs will integrate and amalgamate data and information from such diverse sources as web documents, research reports, contracts, government licenses, brochures, purchase orders, data warehouses, data marts, and other DSS/EIS systems, legacy systems, enterprise application servers (e.g., SAP, Baan, KDD/Data Mining Servers, Stock Transaction Servers), and any document with content relevant for some corporate interest.

A focus on such documents, applications, and data stores and the problem of capturing them, and extracting

and analyzing information contained in them, also means a focus on technologies that have never been important to the field of DW. Technologies such as Imaging and Scanning, Document Management, Work Flow and GroupWare, COLD Storage, Business Process Automation, Key Word, Phrase, or Concept-based Searching, Text Mining, OODBMSs, and Video Streaming now become important to EIP. Other technologies such as Intelligent Agents which have played a role in DW Systems now attain major importance because of their important roles in optimizing focused acquisition, retrieval, analysis, and transmission of content.

The increased emphasis on exchange of data with diverse internal and external sources means that connectivity to a variety of servers is even more important in EIPs than in DW systems. In EIPs the problem is not just one of establishing connectivity to legacy systems, flat files, relational, and multi-dimensional databases. Instead, generalized connectivity to any data, application, or content source that is of interest to a user is the ideal for EIPs. This means that the EIP products with the broadest range of connectivity to data, information, and knowledge stores, and to diverse applications will be favored as this market develops.

The emphasis on sharing ideas and information among users reinforces the concern in EIPs with Work Flow and Business Process Automation Technologies. Data Warehousing Systems have not emphasized Business Process Automation and Support. In particular, the DW approach to Collaborative Corporate Planning has been somewhat informal and ad hoc. An EIP planning process, in contrast, would be much more focused on systematic work flow and Group Collaboration assisted by Intelligent Agents.

The renewed emphasis on data mining in EIPs comes from different elements in the EIP idea. First, data mining has not grown as rapidly as it might have in the DW Systems context. Part of this is that data mining has not generally been available through web interfaces, as it will more frequently be in the EIP context. Another reason is that data mining has not been fully integrated in the DW context. It has been a "sister application," generally resident in a proprietary application. While it exchanges data with DW data stores, its integration with them is loose and constitutes a barrier to the use of data mining applications. The increased integration of the components of EIP systems, as well as the availability of web interfaces should act as a spur to data mining.

A second spur to data mining in EIP systems will come from their emphasis on text mining in content management. Text mining will produce structured data, which can then be data mined. So, the availability of new categories of structured data that have never been mined before will serve as a spur to data mining.

A third spur to data mining in EIPs comes from their overall emphasis on the full spectrum of BI applications. In DW systems the emphasis is on Querying and Reporting and traditional "slice-and-dice" OLAP. Sometimes data mining applications are developed. But DW Systems have not emphasized analytical applications such as simulation and forecasting. They have not emphasized validation of patterns developed in data mining. The emphasis in EIP on the full spectrum of BI, highlights the status of data mining as part of a broad knowledge production process that includes data mining as a stage, but not as the be-all and end-all of the process. By placing data mining in a more meaningful context, and lessening the skepticism about its legitimacy, the EIP orientation could, paradoxically, increase the use of data mining.

Finally, **the explicit emphasis in EIPs on integration of disparate applications and data sources,** along with the amalgamation of content management and the production of new structured data from content, mean that EIP applications will require a higher order of integration than has been characteristic of DW Systems. The biggest selling point of EIPs is their ability to present information from diverse sources through a common interface. Consequently, the most visible integration requirement for EIPs is to provide an integrated web interface-based view of all (whether data store, content, or application server-based) of the information resources of the enterprise and external information resources that are the target of the EIP application.

To this aspect of front-end integration, EIPs add the need for integration in the face of rapid change in EIP objects, data, and components. This is the Dynamic Integration Problem (DIP) in EIPs. I’ve previously pointed

out the increasing importance of the DIP in Data Warehousing Systems as complexity in those systems has increased [3][4]. With the further complexity of content management, application, and queryable data stores of diverse formats added to create EIPs, the need for integration and coordinated evolution in the face of change is further exacerbated by the sheer number information-related entities subject to change. Without this coordination and integration, inconsistencies in data and information, business rules and methods, and metadata would be prevalent in an EIP, and its usefulness as an authoritative enterprise source would be severely compromised.

Note that an EIP is very different from a consumer web portal in this respect. In MyYahoo, 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 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 [3][5]. 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.

EKPs

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 management focused on enterprise business processes, e.g., sales, marketing, and risk management, [6] 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) [5][6], 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 knowledge and knowledge management processes because of its explicit goal direction toward optimizing these processes, it can also be expected to produce increased competitive advantage and ROI in comparison with an EIP, because decisions based on knowledge provide a better basis for 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.

EIP Products

The Merrill Lynch Report [1] provides brief surveys of companies and products in one or another segment of the EIP, but doesn't distinguish companies and products that offer EIP development tools or products that address the EIP segment as a whole. The absence of actual EIP products in the report was probably due to their absence in November 1998, the time of publication of the report. Since then however, the proverbial flood of EIP announcements has been forthcoming, and there are now some 20 companies in the EIP space with many more to come.

These EIP products vary a good deal in their features. Of course, all reflect the idea that a single web interface should provide access to diverse enterprise information stores, but beyond that, the products differ according to whether they

- are general purpose (e.g. Viador, MyEureka, Autonomy), or have a vertical market focus (SageMaker),
- emphasize capability in Content Management and Text Processing (e.g., Autonomy, Plumtree), or excel in providing DSS through an emphasis on management, storage, and analysis of structured data (e.g. Sqribe, Viador, MyEureka),
- provide comprehensive integration services that synchronize change in data, application server and content-based resources throughout the EIP system (MyEureka, Viador), or give little attention to the DIP (Autonomy, Glyphica).

Lastly, the distinction between Enterprise Information Portals and Enterprise Knowledge Portals is not made in most current products. But there are two straws in the wind. First some of Microsoft's recent announcements use the term "knowledge portal" to describe forthcoming capabilities. And second, in its recent announcement of its pending acquisition of the PCDOCS Group, Hummingbird Communications [7] asserts that its goal is to produce Enterprise Knowledge Portals, and claims the capability to produce portals that are equally strong along both the Content Management and Structured Data manipulation dimensions. As the EIP field develops both EKP and EIP products that are well-balanced across all aspects identified in the Merrill Lynch report will become commonplace.

The EIP, The AKMS, and the DKMS

In previous Papers and Briefs I've given a lot of attention to defining and characterizing Artificial Knowledge Management Systems (AKMS) [6][5][4], and Distributed Knowledge Management Systems (DKMS) [8] [9] [10]. The AKMS is the more general formulation and refers to an enterprise wide conceptually distinct integrated component produced by the Natural Knowledge Management System (NKMS) of an enterprise: whose components are computers, software, networks, electronic components, etc., whose components and interaction properties are determined by design, and whose overall purpose is to support the Knowledge and Knowledge Management processes of the NKMS. The DKMS is a specific type of AKMS designed to manage the integration of distributed computer hardware, software, and networking objects/components into a functioning whole supporting enterprise knowledge production, acquisition, and transfer processes. It is the concrete manifestation of the AKMS given current technology.

So how is the EIP related to the DKMS/AKMS concepts? The answer is that to the extent that EIPs provide comprehensive dynamic integration services through an integrative object layer, they are instances of the DKMS. In [3], [11], [12], and [6], I've developed DKMS/AKMS architectural concepts and related those to the characteristics of the Artificial Knowledge Manager (AKM), the integrative layer in the DKMS. An EIP shares the DKMS's complexity with respect to diversity of data and information stores and application servers. It shares the Dynamic Integration Problem with the DKMS. If it handles the DIP through an AKM it is an instance of the DKMS/AKMS construct. And conversely, if one wants to construct an integrated EIP, one can approach it by viewing the EIP as a DKMS with a single, browser-based client interface. Figure One illustrates such an EIP.

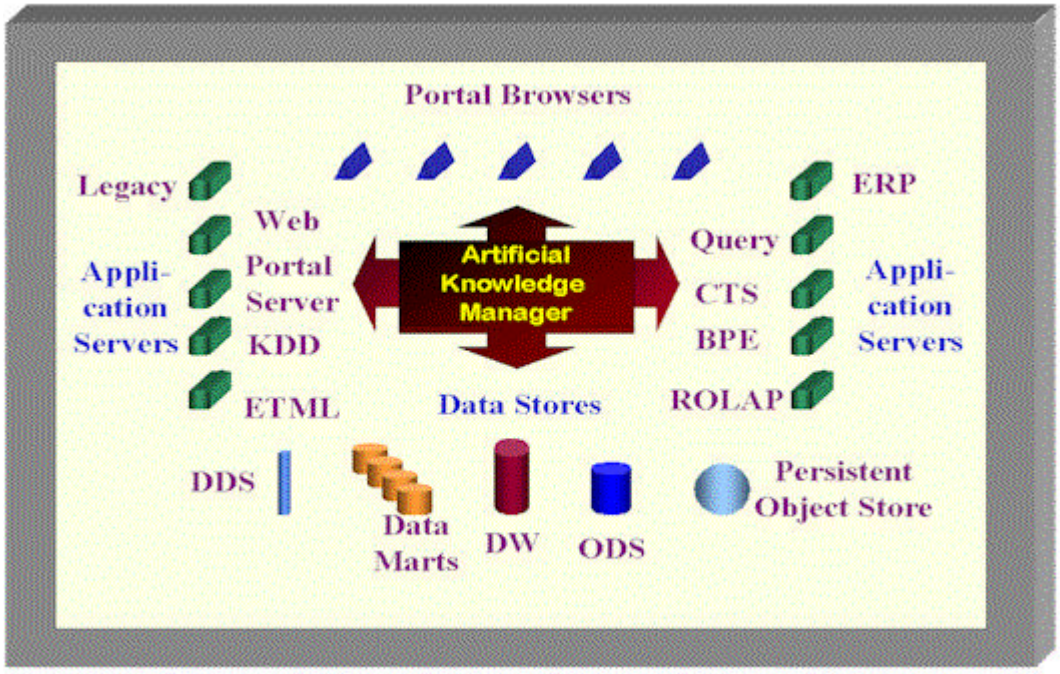

Figure One -- The EIP As a DKMS

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, 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.

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BIOGRAPHY

Joseph M. Firestone is an independent Information Technology consultant working in the areas of Decision Support (especially Enterprise Knowledge Portals, Data Warehouses/Data Marts, and Data Mining), Knowledge Management, and Database Marketing. He is developing an integrated Knowledge Discovery in Databases (KDD) /data mining approach incorporating a fair comparison methodology for evaluating data

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