



Corporate portals: a literature review of a new concept in Information Management

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Abstract

Review of literature on corporate portals, whose main purpose is to provide easy access to enterprise digital information. Corporate portals use metadata and eXtensible Markup Language to integrate unstructured data to structured data from enterprise operational databases, supplying access to corporate information through a personalized interface, available over the internal hypertext network—the Intranet. A corporate portal functions as a single gateway to all information and knowledge resources in an enterprise. At the beginning, the author describes the improvements in information management, going through different stages—from physical control of information containers to corporate portals. This paper presents definitions, concepts, main components of corporate portal architecture, and different kinds of corporate portals found in specialized literature. The author also points out the potential benefits of this technology to enterprise business. © 2001 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Due to technology advances and the wide dissemination of information, many institutions suffer from information overload and need to apply information management to deal with this information chaos in the digital world. Most of the time, this information is stored in computer hardware in a unorganized way, spread in databases, rendering access to relevant knowledge difficult, and compromising employees' productivity on their daily activities. Consequently, many modern enterprises lack a global view of their own data and information.

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Recently, a new concept appeared. The corporate portal, this uses metadata¹ and eXtensible Markup Language² (XML) to integrate unstructured data to structured data from operational databases, supplying access to corporate information through a personalized interface, available over the internal hypertext network—the Intranet. For Collins (1999), the corporate portal is the most important business information management project of the next decade. As an evolutionary step from data warehouses³, the corporate portal extends its application to the Intranet and becomes a single gateway to all information and knowledge resources in an enterprise.

This paper presents information management evolution, concepts and components of corporate portals, different types of portals identified in literature, portals' basic features and potential benefits.

2. Information management evolution

Since the end of the 19th century, information management has tried some conceptual and practical changes. According to Horton (1986), until the 1980s, information management has passed seven different stages. In the first period, the concern was the physical control of information containers that, after the turn of the century, tended to mechanization, simplification, and replication of these containers, originating the first efforts to control the proliferation of information containers, essentially on paper.

In the 1920s and 1930s, the third stage came with records management, focusing on information containers management in a more organized and wider perspective. With the advent of the computer, began the fourth stage, represented by the management of automated information technologies. The fifth phase was characterized by information explosion and use of computers and other technologies such as microfilms, microfiches, and optical devices.

At the end of the 1960s, the idea of management information systems evolved and constituted the sixth stage of information management. Defined by Oliveira (1996) as “a transformation process of data into information used by the decision hierarchy of an enterprise”, management information systems (MIS) are able to supply more consistent information to decision-making, providing a contextual view of the present and the past, and allowing top managers to elaborate more realistic prognostics. Oliveira adds that MIS can improve productivity and quality; reduce operational costs; decentralize decision-making process; and facilitate information access, among other benefits (Oliveira, 1996).

In the 1970s, information management started to be called information resources management, a new strategy for managing all necessary information in an enterprise. Most of the modern companies are experiencing this seventh stage of information management, although a new concept has already appeared recently—knowledge management—the eighth stage of information management (Chen, 1998).

¹Description of the structure, content, index and other characteristics of data.

²Subset of SGML—Standard Generalized Markup Language, developed by the International Organization for Standards (ISO). XML was designed to facilitate the communication between Internet applications, providing an easy way to define metadata associated to web resources contents.

³Data repository whose purpose is to support enterprise decision-making.

Cronin and Davenport (1991) in their book “Elements of Information Management”, describe that information management relies on codified knowledge (symbols, standards, and algorithms) to represent information entities that allow process automation, decision-making, information retrieval, etc.

Taylor and Farrell (1992) comment that there is a growing perception that information management is able to identify, coordinate and exploit information entities in an organization, using the characteristics of these entities to add value to existing information and to gain competitive advantage over competitors.

In some papers, information management is used as a synonym for information systems, information technology, data management, systems engineering, among other expressions. In fact, information management is more than that. Modern information management uses information technology, cybernetics, systems engineering, concepts of information and computer sciences, management information systems, engineering, office automation, business and management principles, to plan, manage and control one of the most important resources for survival of an enterprise on the current market—Information.

Butcher and Rowley (1998) consider information management a discipline that includes organization-wide information policy planning, development and maintenance of integrated systems and services, optimization of information flows, and harnessing of leading edge technologies to end-users requirements, regardless of their status or role in the organization.

From this basic idea, Butcher and Rowley (1998) proposed the “7 R’s model of information management”. In this model, the R’s represent the information cycle, from information reading to recognition, reinterpretation, reviewing, release, restructuring, and finally, retrieval (Fig. 1).

This cycle may be observed in any information environment, including the digital world. The corporate portal, in its wider conception, is considered a tool that satisfies the whole information management cycle, because it incorporates technologies which are able to implement, individually, each one of the functions mentioned, from information reading to information retrieval.

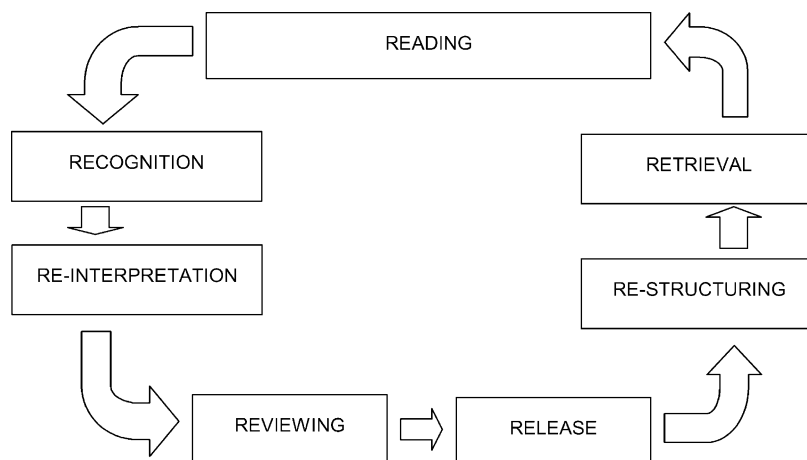


Fig. 1. The information management cycle (adapted from Butcher & Rowley, 1998).

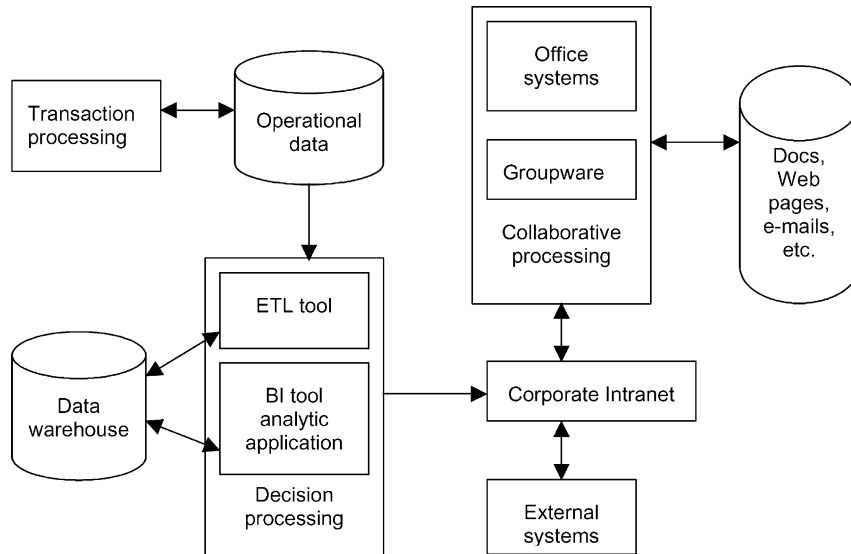


Fig. 2. Business information supply chain (adapted from White, 1999c).

Fig. 2 represents the business information supply chain related to corporate portal components.

The first process of the information management cycle occurs when a person reads and acquires relevant knowledge recorded electronically in documents, e-mails, web pages, reports, and presented by the corporate portal web interface on the computer screen. Once read, this knowledge becomes information and is absorbed into the cognitive framework of each person. Information is then converted into subjective knowledge, when the contents of the document read match the user's concepts during the cognitive process (recognition phase).

Reinterpretation occurs when subjective knowledge is transcribed to another document, becoming public. This transcription, in the digital world, can be done by word processors, spreadsheets, presentation software, etc., which are stored in or retrieved by the collaborative processing component of the portal.

The following phase, the reviewing, is the validation or evaluation of what was transcribed by an individual, and may be done through office automation and groupware systems—software especially designed to facilitate the communication and the collaborative work among members of a group. Groupware users are able to suggest changes, correct mistakes, cite other authors, establish links to other documents that deal with the same subject, etc.

Once validated by the group, knowledge reaches public domain during the release phase, that is, it becomes widely available to any person of that community. This knowledge release or distribution, inside the enterprise, may be conducted through its internal communication network or Intranet, e-mails, virtual journals, electronic news bulletins, etc. When using a corporate portal, the release stage takes place via its personalized web interface available through the Intranet.

The enterprise that maintains this knowledge domain certainly needs to manage this set of resources, selecting, collecting and providing access to the information considered relevant for its

business goals. In a medium-size or large enterprise, besides textual documents, it is usual to generate and store the daily information manipulated by enterprise personnel in operational databases, using different kinds of systems, applications and transactions. For business decision-making, however, the information considered relevant and strategically is extracted from these operational databases and loaded into the decision processing system, that is, it is reorganized or restructured, by extraction, transformation and load tools into the data warehouse.

The data warehouse is a great repository of data, whose purpose is to support the strategic decision-making process in the enterprise. According to Inmon and Hackathorn (1997), precursors of this technology, the data warehouse is a subject-oriented, integrated, time-variant, and non-volatile collection of summary and detailed data used to support management decisions. Its main goal is to satisfy the users' needs, storing useful and relevant information for business management.

Finally, the retrieval of relevant knowledge to each user, available on this collection or repository, may be done by ordinary retrieval tools; by customized tools, focusing the real needs of the users; by tools that use metadata and XML; or still by business intelligence⁴ or analytical tools that compose the portal decision processing system, capable of generating reports and analyses to be distributed to users through corporate network, e-mail or portal web interface. After that, the information cycle provided by the corporate portal can be restarted.

From this explanation of the information cycle in a corporate portal, it is evident that portals are found, in some previously known technologies, such as office automation, groupware, databases, data warehouse, Intranet, e-mail, metadata, and intelligence business systems. The corporate portal's advantage, however, is founded exactly on its power to integrate and personalize these technologies in a single business management tool.

3. Corporate portal definitions

Three or four years ago, what is now called a portal was referred to as a search engine, whose main goal was to facilitate access to information contained in documents spread throughout the Internet. Initially, search engines enabled Internet users to locate documents with the use of Boolean operators or associative links between web pages. To reduce even more the searching time and to help inexperienced users, some search engines have included categories, that is, they started to filter sites and documents in preconfigured groups, according to their contents—sports, meteorology, tourism, finances, news, culture, etc. The succeeding steps were the integration of other functions, such as virtual communities and real time chats; the ability to personalize search engine interfaces (My Yahoo, My Excite, etc.); and to access specialized and commercial contents. This new concept of search engine is now called a portal.

Reynolds and Koulopoulos (1999) identify the following phases of web portal development: Boolean search, categorized navigation, personalization and, finally, integration of additional features providing direct access to other specialized information and commercial worlds. This web (or public) portal evolution impressed the corporate community, which viewed the possibility to use the same technology to manage, structure and facilitate the task of accessing the company's internal information.

⁴Intelligent systems that help companies in their strategic planning process.

Considering its recent nature, the terminology related to the corporate portal has not been settled yet. The terms “corporate portal”, “corporate information portal”, “business portal” and “enterprise information portal” are used, some times, interchangeably as synonyms. According to Firestone (1999c), the process of definition of corporate portals, as any other business-oriented strategy, is a political process, that is, an attempt to persuade the user community and the information technology (IT) investors that one definition is more adequate than another one, favoring the interests of one consultant or vendor over his competitors. The general acceptance of a definition made by one vendor may suggest that his competitor’s portal, for lacking this or that feature, is not really a corporate portal, for example. Leaving apart this political aspect among competitors and emphasizing the inherent characteristics of each term, the definitions considered relevant for this review will be commented on and grouped in the next paragraphs.

The term “enterprise information portal” was defined for the first time in a Merrill Lynch report, elaborated by Shilakes and Tylman (1998):

“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”. (Shilakes and Tylman (1998)).

In this report, the enterprise information portal (EIP), is considered “an emerging market opportunity, 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 and mart and data management applications.)” (Shilakes and Tylman, 1998). Despite the amplitude of this definition, sufficient to unite two functions of corporate portals (decision-making support and collaborative processing), the report, as a whole, does not emphasize the collaborative character.

In agreement with the first definition by Shilakes and Tylman, White (1999c) views the EIP as a tool that “provides business users with a single web interface to corporate information scattered throughout the enterprise”. In this more generic concept, White points out the two previously mentioned functions, classifying EIPs into two main categories: “decision processing EIP” and “collaborative processing EIP” (White, 1999c).

For White, the decision processing EIP helps executives, managers and analysts access the necessary information for making business-oriented decisions, while the collaborative processing EIP organizes and shares workgroup information, such as e-mail, reports, and memos.

Eckerson (1999b), on the other hand, uses another term—“business portal”—and defines it as an application able to provide business users with one-stop shopping for any information they need inside or outside the enterprise. Eckerson compares the business portal with a “shopping mall for knowledge workers”, explaining that many consumers prefer shopping at malls because they are certain to find there everything they need, instead of going to successive stores in different locations (Eckerson, 1999b). His view differs from that of White and that of Shilakes and Tylman, as he imparts little or almost no emphasis on the collaborative aspect, limiting the portal concept to a gateway to structured and unstructured information, through a web browser.

A slightly different argument, defended by Murray (1999), considers the corporate portal more than a gateway to corporate information. Murray states that portals that focus only on content are inadequate for the corporate market and that “corporate portals must connect us not only with everything we need, but with everyone we need, and provide all the tools we need to work

together” (Murray, 1999). Murray identifies four distinct types of enterprise portals: “enterprise information portals”, “enterprise collaborative portals”, “enterprise expertise portals”, and “enterprise knowledge portals”. The information portals connect people with information; the collaborative portals provide collaborative features of all kinds; the expertise portals connect people, based on their experiences, abilities, and interests; and, finally, the knowledge portals combine all of the previously mentioned features (Murray, 1999).

Considering this classification, Murray seems to be more interested in a portal that may fulfill all expectations of corporate users, supporting their job activities, and not only a gateway to content or decision support.

Where Murray emphasizes the collaborative character of portals, Reynolds and Koulopoulos (1999) view the portal as a user-centric information system, able to integrate and deliver knowledge and experiences of individuals and teams, in order to achieve the “knowledge-centric” patterns of today’s work world. For these authors, the corporate portal is able to unite the explicit knowledge contained in files, databases, e-mails, web pages, and enterprise applications, with the tacit knowledge of project teams, professional heuristics, and communities of practice.

Just like IT consultants and market analysts, software vendors also define corporate portals taking into account different perspectives, according to each product’s approach, and emphasizing features related to decision support and/or collaborative processing. As competitors, each vendor stresses, in its definition, the qualities of its own product. In the following paragraphs, some portal definitions, made by three well-known vendors, will be presented and discussed.

Viador defines enterprise information portals as “applications that enable companies to provide access to internally and externally stored information, and offer users within and external to the enterprise a single window to personalized information needed to make informed business decisions” (Viador, 1999). Although Viador uses the same expression “EIP”, considered more generic, its definition clearly accentuates the decision-making support as portal’s main function.

On the other hand, based on the Patricia Seybold Group’s requirements considered essential for corporate portals, Brio (2000a, b) defines its enterprise information portal as a tool that provides users with broad access to information, no matter where it is stored, and enables information delivery to all users, wherever they work. Brio’s use of the term “EIP” is compatible with enterprise information portals defined by White, and Shilakes and Tylman.

Plumtree Software (2000), from another standpoint, defines its corporate portal as a system which is able to bring together in one simple, personalized web page, all the information and productivity tools relevant to corporate users, hosting dynamic applications, such as online reports, e-mail, schedules, calendars, and business services. Combining collaborative applications and a portal’s intrinsic capacity to provide access to corporate content, Plumtree Software’s portal seems to have a wider character, that is, a portal able to support collaborative processing as well as decision processing. The expression “corporate portal” demonstrates Plumtree Software’s concern to distinguish its product from public portals, like Yahoo! and Excite.

Due to the diversity of expressions and definitions related to portals, it is convenient to classify them into categories to better understand their features and each consultant or vendor’s approaches.

4. Different types of portals

There are two ways of classifying portals: one related to their environment (public or corporate) and another one related to their functions (decision support and/or collaborative processing). Since the concern of this literature review is the corporate portal, the functional classification will take into account only the corporate environment.

4.1. *Portal environments*

Despite technological similarities, public and corporate portals have completely different purposes for different users.

4.1.1. *Public portal*

The public portal, also called Internet portal, web portal or consumer portal, provides a single interface to the immense network of Internet servers. Its purpose is to attract the Internet community. The larger the number of visitors, the greater the probability of establishing virtual consumer groups that will potentially buy what portal advertisers want to sell. Similar to television, radio and the press, the public portal establishes a unidirectional relationship with its visitors and has become a new marketing media.

According to Eckerson (1999c), since the middle 1990s, public portals have experienced three different stages of evolution, referential, personalized and interactive.

4.1.2. *Corporate portal*

In the institutional world, the portal's purpose is to display and supply business-specific information, in a certain context, helping users of corporate information systems find the information they need to face their competitors (Reynolds & Koulopoulos, 1999). The corporate portal is considered by Reynolds and Koulopoulos an evolution from Intranets, incorporating, to this technology, new tools that enable identification, capture, storage, retrieval and distribution of great amounts of information from multiple internal and external sources, useful for enterprise individuals and teams.

Corporate portals have also followed the same evolutionary stages experienced by public portals, though in a shorter period of time (Table 1). Eckerson (1999c) identifies four generations of corporate portals and considers that, in 1999, the corporate portals available on the market jumped from the first to the third generation. Moreover, Eckerson believes that corporate portals have a potential to extend beyond the capabilities offered by public portals.

4.2. *Portal functions*

The most important functions of a corporate portal are decision support and collaborative processing. Some authors and vendors emphasize more one function than another, and are used to call portals in accordance with their main function in the company. The usage of certain expressions, however, may lead to misinterpretations of the actual features of a certain portal product.

Table 1
Generations of corporate portals (adapted from the generations identified by Eckerson, 1999c)

Generation	Category	Corporate portals
First	Referential	Search engine, with hierarchical index of web content. Each index entry contains a description of the content object and a link to it. This generation emphasizes content management, mass dissemination of corporate information and decision support.
Second	Personalized	Through identification and a password, users create a personalized view of portal contents, known as “Mypage”. This view shows just the categories each user is interested in viewing. The portal can notify users when new content is added to categories they have previously selected. Users can publish documents to the corporate repository so that other users may view them. This generation privileges content customized distribution.
Third	Interactive	The portal embeds applications that improve employees’ productivity, such as e-mail, workflow, project management, expense reports, calendars, schedules, etc. This generation adds the collaborative character to corporate portals, providing multiple types of interactive services.
Fourth	Specialized	Portals based on professional roles, for managing specific corporate functions, such as sales, human resources, finances, etc. This generation connects corporate applications with the portal, allowing users to execute transactions, read, write and update corporate data.

4.2.1. *Portals with emphasis on decision support*

Portals with emphasis on decision support help executives, managers and analysts gain access to corporate information in order to make consistent business decisions. Because of their little or almost no emphasis on collaborative processing, Murray’s information portal, Eckerson’s business portal and White’s decision processing EIP may be included within this category. Taking into consideration the features pointed out by Viador (1999), in its white paper, its enterprise information portal may be considered an example of portal with emphasis on decision support.

4.2.1.1. Information or content portal. Murray (1999) states that the information portal is the one able just to organize large collections of content based on the subjects they contain, connecting people with information. Within this category Murray includes search engines and public portals. In this type of portal there is no concern for interactivity or collaborative processing between users and experts. For Murray, in the institutional environment, the implementation of a content portal would be insufficient to reach enterprise business goals.

White (1999a) calls this basic form of corporate portal an “Intranet portal”, which includes links to information and web sites within and outside the company. Like Murray, White considers the Intranet portal analogous to public portals.

4.2.1.2. Business portal. Eckerson (1999b) employs the term “business portal” as the corporate counterpart of Internet commercial portals, such as Yahoo! and Excite. The main purpose of this type of portal is to support business decision-making, keeping necessary information, such as reports, queries, text documents, spreadsheets, e-mail messages, web pages, and videos, available for corporate users. In Davydov’s (2000) opinion, the business portal is the central launching

point for corporate decision processing and content management applications, connecting users with structured and unstructured information relevant to them.

4.2.1.3. Decision processing portal. For White, the “decision processing EIP helps users organize and find corporate information in the set of systems that constitute the business information supply chain”. (White, 1999c). This type of portal applies business intelligence tools and analytic applications to capture information stored in operational databases, in the corporate data warehouse or still in external systems, and to create reports and business analyses to be electronically delivered to different levels of decision-makers in the company. The information supplied by a decision processing portal may be displayed as reports, graphs, performance indicators, etc., and may be summarized or detailed depending on the decision maker’s strategic, tactical or operational level.

4.2.2. Portals with emphasis on collaborative processing

Portals with emphasis on collaborative processing, similar to groupware and office automation systems, deal with information from the traditional supply chain, stored and manipulated by corporate applications, as well as information produced by groups or individuals out of this chain. Reynolds and Koulopoulos’s collaborative portals, White’s EIPs for collaborative processing, and Murray’s collaborative and expertise portals fit within this category.

4.2.2.1. Collaborative portal or portal for collaborative processing. This type of portal uses collaborative groupware tools and workflow systems to provide access to information produced by individuals or workgroups. The information managed by this type of portal is generally unstructured, customized and displayed as texts, memos, graphs, e-mail messages, news bulletins, web pages, and multimedia files.

4.2.2.2. Expertise portal. In Murray’s opinion, any portal solution would be incomplete without the ability to connect and match people on the basis of their expertise and skills (Murray, 1999). This is the proposal of the expertise portal—a communication means to exchange expertise, allowing real time communication and distance learning, among other capabilities.

4.2.3. Decision support and collaborative processing portals

The general portals able to integrate both decision support and collaborative processing functions not only connect decision-makers to all digital information available, but also to everyone they need, in order to accomplish their business goals. In a single environment, the general portal gathers content management and decision processing applications, groupware, workflow systems, e-mail, business intelligence tools, expert systems, etc. This category has, as examples, the EIP originally defined by Shilakes and Tylman, White’s EIP, and Murray’s knowledge portal. Considering the features described by their vendors and their potential connectivity with other applications, Plumtree Software’s corporate portal and Brio’s EIP may be considered examples of this category.

4.2.3.1. Knowledge portal. In fact, Murray's (1999) knowledge portal is a convergence point of the information, collaborative and expertise portals. It is able to implement everything that the other types of portals do, and to offer personalized content based on each user's job role.

4.2.3.2. Enterprise information portal. The enterprise information portal uses metadata and XML to integrate unstructured data, kept in text files, reports, e-mail messages, graphs, pictures, etc., to structured data from data warehouse databases, providing access to corporate information through a personalized Intranet interface (Fig. 3).

The EIP unites characteristics from both collaborative and decision support portals. Firestone (1999c), taking into account Shilakes and Tylman's almost explicit intention to relate their EIP to collaborative and interactive applications to manage knowledge repositories, considers their enterprise information portal similar to Murray's knowledge portal. This similarity, however, depends on the degree of collaboration implemented by EIP tools and on their capability to promote interaction among experts.

In the next topics of this literature review, to prevent any terminological misunderstandings, the term "corporate portal" will be used in opposition to "public portal", since there is no interest in establishing differences related to functions of each type of portal described earlier.

5. Architecture

Each product available on the corporate portal market, when compared to its competitors has its own characteristics, distinct structure or additional components, presented as competitive advantages. However, the basic architecture of every corporate portal mainly follows the model described by White (1999b). The major components of a corporate portal are the information assistant, provided by a web browser⁵, the business information directory, the search engine, the metadata crawler, the publishing and subscription facilities, and the import/export interfaces, integrated in a web server⁶ (Fig. 4). The corporate portals available on the market may be either independent products or embedded in other tools, such as groupware, business intelligence systems, and content management software.

5.1. Business information directory

The business information directory is a repository that maintains metadata about any type of information scattered throughout the enterprise: data warehouse tables; word processing documents, web pages or any documents produced by the collaborative processing system; graphs, queries, analyses and reports produced by the decision processing system; or objects and files proceeding from external systems. This directory functions as an indexed catalogue of the

⁵ Software that interprets and presents web pages on the computer screen.

⁶ Computer in a client-server network, responsible for Internet/Intranet services.

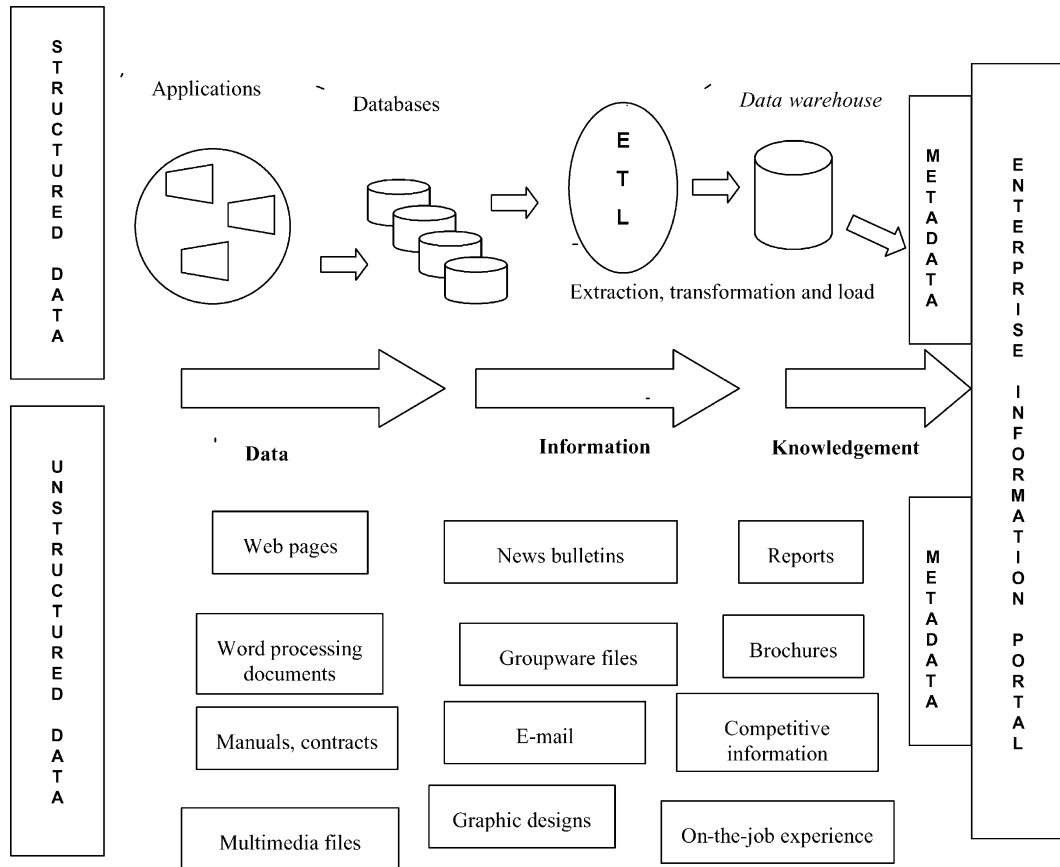


Fig. 3. Elements of a conceptual model of enterprise information portal—adapted from Shilakes and Tylman (1998).

organization’s information originated by the publishing facility, selected by the metadata crawlers, or loaded by the import interface from other internal or external systems. Using this directory, the company registers, organizes and identifies the location of all corporate information relevant for its business. This feature is, therefore, the core of the corporate portal.

Besides being a content management tool, this directory also controls user profiles, which define the types of information that may be accessed and which portal tools that may be employed by a user or user group associated to each profile.

5.2. Search engine and metadata crawlers

The search engine of corporate portals locates information for the business information directory, or for the information assistant, in the same way public portals do. The metadata crawlers, in addition, regularly scan selected web servers, in search of new and relevant information for the business information directory.

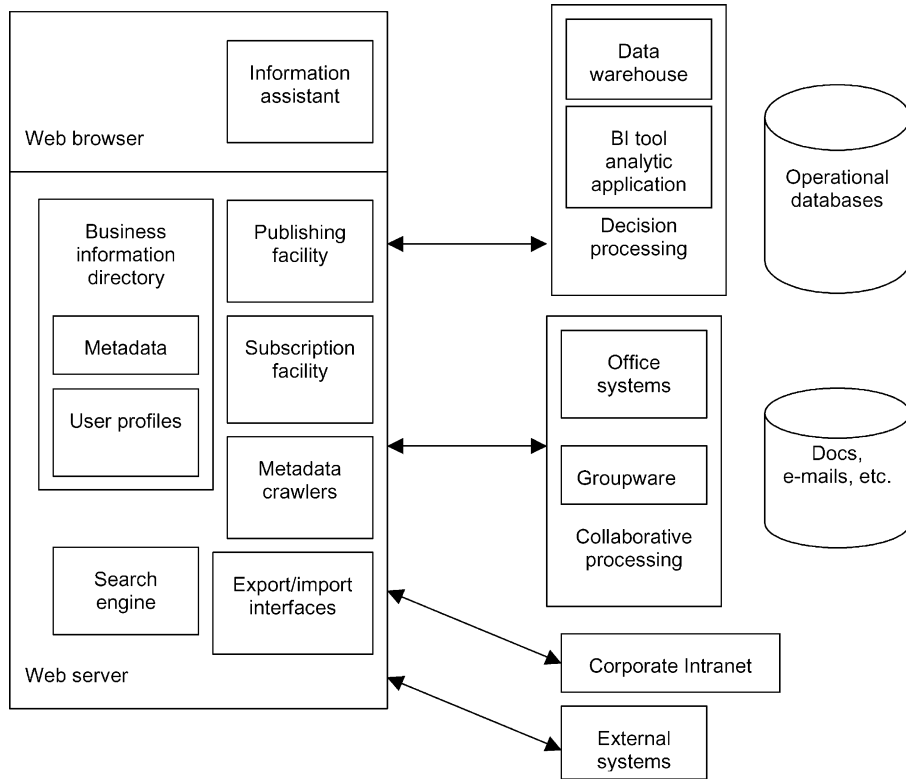


Fig. 4. The main components of a corporate portal—adapted from White (1999b).

5.3. Publishing facility

The publishing facility enables users to produce, register and index information, such as tables, databases, word processing documents, graphs, web pages, and spreadsheets, which may be stored in corporate repositories, shared and protected by security devices.

5.4. Import/export interfaces

The import/export interface promotes information exchange between the corporate portal and other internal or external systems. This interface should be well documented in order to allow external products to access and maintain metadata in the information business directory.

5.5. Subscription facility

The subscription facility notifies and distributes, on a regular basis, information considered relevant for its users (subscribers), and also process information useful for decision-making. The information may be delivered on demand, automatically distributed according to the user profile, or dispatched by the occurrence of events or dates previously established by the user. The user

may also schedule the running of decision processing objects such as reports, queries, and analyses created by business intelligence tools.

5.6. *Information assistant*

The information assistant is the portal component responsible for the single web interface between corporate information and corporate users. This assistant uses the services of the search engine to process user requests and queries on the business information directory and presents a summary of reports, documents or other information objects requested by the user. Its interface, provided by a web browser, may be customized to suit the needs of different users, depending on the user profile defined in the business information directory and the type of task being performed.

6. Major characteristics of a corporate portal

Since corporate portals integrate some well-known technologies, such as intelligence business tools, document management, office automation, groupware, data warehouse, and Intranet, some suppliers of products on these areas have also positioned themselves as corporate portal vendors. At the same time, small companies have viewed the great market opportunity of corporate portals and have announced new portal products. Besides, some big computer companies have established technical and/or commercial alliances to provide joint solutions and to suit specific needs of their customers. Therefore, the selection of a particular corporate portal, amongst all products available on the market today, is not an easy task.

To assist top managers choose the right product for their enterprise, some market analysts have published papers and reports with rules or key requirements for corporate portals (Eckerson, 1999a; White, 1999a). Some vendors, such as Plumtree Software, Brio and Viador, have used these reports to show that their products meet the essential requirements mentioned (Brio Technology, 2000a, b; Eckerson, 1999b).

Eckerson's fifteen rules given in Table 2, summarize the main features that a corporate portal should have.

Beyond these features, the following ones may also be added:

- the ability to manage the information life cycle, establishing storage hierarchical levels and discarding unnecessary information or documents;
- the ability to locate experts in the organization, in accordance with the type of knowledge demanded for a particular task;
- the ability to satisfy the information needs of all types of corporate users;
- the possibility of information exchange among customers, employees, suppliers and resellers, providing an information infrastructure suitable for electronic commerce.

7. Benefits

Although the corporate portal is a very recent technology, several benefits associated to its implementation are claimed by vendors and consultants.

Table 2
Major characteristics of a corporate portal

Characteristic	Description
Easy to use	Users should easily locate and access the right information, with minimum training, wherever the information is stored. Finding business information through the portal should be as simple as using a web browser.
Intuitive classification and searching	The portal should be able to index and organize the corporate information. Its search engine should refine and filter information, support Boolean operators and keywords, and present the search results in intuitive categories.
Collaborative information sharing	The portal should allow users to publish, share and receive information from other users. When publishing into the corporate repository, the user should be able to specify which users and groups may access his documents/objects.
Universal connectivity to information resources	The portal should provide wide access to every information resource, and connect to heterogeneous systems, such as e-mail, databases, document management systems, web servers, groupware, audio and video systems. It must be able to manage different formats of structured and unstructured data.
Dynamic access to information resources	The portal should allow dynamic access to information and objects created by business intelligence and document management systems. It should always provide up-to-date information.
Intelligent routing	The portal should be able to automatically distribute reports and documents to selected users.
Integrated business intelligence tool	To fulfill user information needs, the portal should integrate search, report and analysis capabilities in its business intelligence component.
Server-based architecture	In order to support a great number of users, high volumes of information, simultaneous services and sessions, the portal should be based on a client-server architecture.
Distributed services	For load-balancing purposes, the portal should distribute its application services across multiple computers or servers.
Flexible permission granting	Portal administrators should be able to define permissions for users and groups within the company, through flexible user profiles.
External interfaces	The portal should be able to communicate with other applications and systems.
Programmatic interfaces	The portal should also provide programmatic interfaces (API—Application-Programming Interface) in order to be “callable” from other applications.
Security	For security purposes, the portal must support cryptography, authentication, firewalls, etc. to safeguard corporate information and prevent unauthorized access.
Easy deployment and maintenance	The portal should provide an easy and centralized way to manage all corporate information and to monitor portal’s functioning. It should be easy to install, configure, and maintain.
Customization and personalization	Administrators should be able to customize the portal according to enterprise policies and expectations. It should be allowed that individual users personalize their interfaces as well.

7.1. *Structured access to enterprise information*

The corporate portal “provides a single point of entry to any piece of business information, regardless of where it resides” (White, 1999a). For Shilakes and Tylman (1998), the portal’s ability

to use both pull (information publishing) and push (information subscription) technologies guarantees that “the right information is available or distributed to the right people at the right time”. This corporate portal’s capacity, allied to its easy to use web interface and its wide connectivity to heterogeneous systems and data formats, results in its main benefit: to promote an easy access to the information distributed and scattered throughout the corporate systems, files, and databases.

Firestone (1999b) takes exception to this argument declaring that the mere access to information is not itself a benefit. Unorganized information access may cause information overload. Firestone adds that, to be a real benefit, the universal access to enterprise resources, without its side effect of information overload, depends on individual portal implementation.

7.2. Common and personalized view of enterprise information

In White’s opinion, all corporate portal users, including external users such as commercial partners and customers, share the same view of business information, which provides a common understanding of enterprise business operations (White, 1999a). In agreement with White’s idea, Shilakes and Tylman (1998) consider the accessibility of information to all users (employees, customers and suppliers) as a critical element to the success of corporate portals.

The existence of this common view provided by the corporate portal is associated to positive results on the education of new employees as well as on the integration of widely distributed employees. Another positive argument is that the information sharing among employees, wherever they work, enables more conscious and independent decision-making (Firestone, 1999b).

Although agreeing that the common view of enterprise information may be a benefit provided by the corporate portal, Firestone (1999b) considers the favorable consequences of this common view plausible in theory, but vaguely stated, since they have not been subject to detailed study and to confirmation. Firestone believes that, until now, there is a lack of comparative studies, taking corporate portals and other information technologies, such as data warehouses, document management, and ERP (Enterprise Resource Planning)⁷ applications that, in theory, also provide a unified view of corporate information.

At the same time that it presents a common view of enterprise information, the corporate portal offers a perfectly adaptable interface to the information needs of its users. According to White (1999a), the information viewed through the portal interface is customized to match users’ roles in the organization, saving users’ time and providing security in such a way that they see only what interests them and what they are allowed to access.

7.3. High return on investment

The high return on investment (ROI) of the corporate portal is based on the argument that packaged portal applications are easier to maintain, faster to deploy, and cheaper than customized systems (Firestone, 1999b). Firestone, however, states that this argument should be taken with certain criticism, since the adoption of packaged applications is not exclusive to

⁷Systems that automate internal business processes, including manufacturing, financials and human resources.

corporate portals. Content management, knowledge management and ERP systems, for example, may offer packaged solutions without necessarily being part of a corporate portal architecture.

Plumtree Software (2000), in its promotional material, justifies the high ROI by the improvement on employees' productivity, effectiveness and strategic cohesion, when using the corporate portal to complete their work.

On the contrary, Firestone (1999b) once more remarks on the lack of empirical studies able to confirm productivity and financial gains derived from the usage of corporate portals. The reduction of time expended on daily information searching through the portal may be observed and verified. However, the time savings cannot be directly translated into actual financial benefits, since it is difficult to say whether the time freed up was used for a productive purpose, resulting on more effective tasks.

7.4. *Competitive advantage*

Shilakes and Tylman (1998) consider that the corporate portal provides companies with competitive advantage, since it is able to unlock valuable and strategic information, for a long time hidden in the enterprise systems. Having this integrated information system, companies become more proactive, agile, competitive and capable of executing better performance analysis, market segmentation studies, forecasting, etc.

This argument, however, is considered by Firestone (1999b) too generic and abstract, since even before corporate portals, there were other applications, such as data warehouses, ERPs, content management, and business intelligence tools that also “unlock” strategic information. Firestone concludes that, to establish competitive advantage as a key benefit for implementing a corporate portal, a more detailed analysis would be needed to compare corporate portals and other IT alternatives from a benefit/cost viewpoint (Firestone, 1999b).

8. Conclusion

Corporate portals, whose “ancestors” are the decision support and the management information systems, are the next step into modern design of user interfaces to corporate information. Adapting the enterprise environment to suit users' needs and optimize the interaction, distribution and management of internal and external information resources, the corporate portal allows users to access corporate information in an easier and customized way, resulting, theoretically, in reduced costs, increased productivity and competitiveness.

When analyzing these benefits, however, it is evident that there is still no scientific argument to prove them. Until now, most part of the claimed benefits are intuitive. A more rigorous methodology is needed to verify these benefits through real case studies.

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