

Understanding Corporate Portals: Key Knowledge Management Enabling Applications

Discusses Corporate Portal's in relation to specific KM processes: personalization and search; access to information sources in a web-friendly environment (from highly unstructured to highly structured digital data; internal and external information); communications and collaboration; and ease of publishing and access to a vast amount of data, information and knowledge.

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Corporate Portals, Collaboration Capabilities and Knowledge Management

There are no standard definitions about which collaboration capabilities a CP platform should include (Collins, 2001; DavyDov, 2001; and PriceWaterhouseCoopers & SAP, 2001). At the end of 2001, there are numerous software vendors providing portal solutions (from very large software companies to start-ups). Indeed, because of the modular nature of standard Internet development, many companies are relying on a number of software vendors to integrate into a portal solution. Consequently, the description of a CP platform for this research paper is not based on any standard vendor solution. Rather, it is based on our understanding of the overall software market and our selection of collaboration capabilities that are relevant for deploying Knowledge Management initiatives. We are also aware that technology is changing rapidly and that many new CP solutions will emerge. There

are a number of key software capabilities that are integrated into a CP architecture. These are grouped according to the following:

- ✓ The Presentation and Personalization Layer defines how the users see and customize information delivered or accessed via the portal. The intuitive solutions offered allow users to access information in more relevant, context-centric environments. This is key for KM efforts;
- ✓ The Search Solution determines how easy it will be for users to find relevant information based on a set of search criteria. This is a core functionality that has improved significantly over the last few years. At the same time that it has evolved to integrate various different information sources, it has also become much more sophisticated, intuitive and adaptable to different organizational needs;
- ✓ Web Applications for the enterprise have evolved from “green fields” and also from existing legacy

systems. While many applications were developed to leverage the web (often based on B-to-C examples), most legacy systems have developed an Internet front-end (while maintaining a legacy architecture). Sophisticated portal platform solutions provide a number of resources that make it very easy to seamlessly integrate both sorts of applications. In the case of more traditional systems, the integration, at the presentation layer, is being facilitated by the use of standard Application Program Interfaces (API)s developed by the portal vendors and/or the users' community. These APIs allow access to structured (data warehouses, ERP, CRM, etc) and unstructured information (Web, Desktop Applications, Content Management Systems, etc) called "Connectors", "Web Parts", "Gadgets", etc.

Indeed, CPs can integrate an almost unlimited number of applications. Therefore, in this research paper, we will focus on applications closely related to KM, and collaboration capabilities. We will, particularly, highlight the recent developments that help employees collaborate:

- ✓ Finding explicit knowledge;
- ✓ Codifying and Publishing their Knowledge;
- ✓ Collaborating Online.

Finding Explicit Knowledge

A well-implemented CP simplifies access to information, knowledge, and highlights important internal and

external knowledge sources relevant for specific audiences. CPs are the latest access solution for an ongoing trend in business towards making information more easily accessible to management. Prior to the Internet, much of the focus was on the deployment of "Enterprise Information Systems" (EIS) and "Decision Support Systems" (DSS). These efforts were very expensive and aimed at helping employees find answers and information about the performance of firms. However, due to the high cost and complex and specific nature of most of these systems, very few employees were allowed to use them, and typically only senior management had access, reducing their collaboration value. Few employees with access had the time or necessary training to properly learn how to use these systems. Importantly, usage was further impeded by the fact that the interface and navigation tools of these early systems were not as intuitive as the web-based tools currently available. The technical and economic barriers remained an important obstacle. Finally, the hierarchical, and bureaucratic reality in many organizations decision-making did not help increasing accessibility to organization information and knowledge.

Unlike EIS and DSS, CPs allow a diverse spectrum of employees to access pre-defined and pre-scheduled reports, as well as customize and develop ad hoc reports, without the help of the Information Technology department. The most advanced CKPs make it easy to leverage "Business Intelligence" (BI) and data-warehousing solutions to allow

employees to customize their reports. These customized reports can be based on pre-parameterized value ranges and formats or be completely new reports based on employees' personalized formats/views and sophisticated queries and data mining. The recent and rapid migration of traditional BI/ERP software to the web environment demonstrates the importance being placed on helping a large number of employees use and interpret the results from these applications. In addition to allowing access to web-based reports from BI or ERP software packages, CPs provide employees, partners and clients, a web-based interface to access all types of information.

This trend is in line with one of the core management practices supported by the KM literature: multi-dimensional analysis and ease of access to information. The BI and ERP systems no longer require end-users to know any query language to define how they want to analyze the data. These types of systems allow for web-based analysis and facilitate employees' understanding of the correlation between the variables that affect their business. This is particularly important as KM is also related to efforts to measure business results from various perspectives and to disseminate those results throughout the organization. The current findings and insights of many authors and companies engaged in assessing various dimensions of intellectual capital and company performance is reinforced in the literature (Kaplan & Norton, 1992 & Edvinsson & Malone, 1997). One of the key research findings is to help employees quickly understand the

drivers of intellectual value and the inter-connection of results from different areas of the organization reinforcing the strategic importance of collaboration linked to corporate growth

In most cases, CP platforms provide integration of the systems discussed above only at the interface or publishing level through Application Programs Interfaces (APIs). Different vendors use different names for these APIs: adapters, connectors, gadgets, modules, portlets, web parts, etc. Often, when applications are integrated at the portal, only small pieces are integrated (e.g. reports from the ERP system).

Most of the relevant and strategic information in organizations, however, includes unstructured information that before the web-based applications was hard to publish widely and even much harder to find. This is changing now in a CP environment. In order to understand how employees can more easily and efficiently find this kind of information, it is necessary to examine collaboration technology developments in: (i) Categorization and Taxonomy; (ii) Search Engines; and (iii) Personalization Engines.

Categorization and Taxonomy

In order to simplify searches and navigation, organizations need to develop information structures and categories that make sense to their own businesses and specific communities that will be using the system. Regardless of the power of the search engine deployed and the number of functionalities implemented,

any organization will need to deal with the issue of categorizing and organizing information. Categorization adds fundamental indexing information to documents, in order to make it easier to find them later on. Taxonomies are high-level rules for organizing and classifying information. Although very relevant for the web environment, the discipline of taxonomy is not new. It has always been at the core of library sciences. However, it has become even more important as new software tools for automatic categorization have emerged and improved.

Taxonomies are also necessary to tag (information about the information) the documents created. The tagging is an important step to ensure that search engines will find required documents and also for the distribution of documents based on personalization rules. Metadata, which is defined as information about information and a core feature of HTML and XML files, is at the center of the Internet revolution. It provides the necessary context for information making documents easily located by search engines regardless of any previous information to their physical location. Metadata also plays an important role by allowing different documents to be grouped together easily. The capture of metadata should ideally occur right after content creation. Increasingly, this occurs through a combination of automatic (typically author, name, date, etc) and manual processes (keywords, category, etc).

The taxonomy should make it intuitive for employees to browse for specific information and “bump” into related,

but not anticipated topics or categories. Employees should find common names, categorizations and signals that are familiar to them. In this respect, the online experience should not be much different from the offline experience. Good taxonomies also make it much easier to search for documents by allowing searches to be conducted based on various different criteria (e.g. author, date, file format, knowledge domain, etc). There is, however, no scientific way to find out whether the chosen taxonomy really works. There are a few rules of thumb (such as categories with too many or too few documents will probably not work), but, ultimately, it will be the users that need to tell whether it makes sense or not (Can they find the required information with only a few clicks?).

Automated categorizations based on frequency of words may not provide good results. Some new software solutions allow automatic re-categorization of schemas based on user feedback. Preferably, building a taxonomy should start with some inputs developed jointly by content “owners” or domain experts and information architects. In many cases, this is an important collaboration because many experts are not too concerned about how their knowledge is organized, classified and linked in meaningful ways to other codified knowledge, experts and communities.

Taxonomies and categorizations are usually hierarchical. However, new forms that are more visual, for instance, spatial or hyperbolic trees, are becoming more common. Some CPs also import the category

hierarchies from existing applications, such as ERP or CRM. This can make the transition to a web environment easier for users already familiar with the existing applications. Ultimately, the true test of any taxonomy is the efficiency that it provides to the group of users it was designed for: Are the users able to find meaningful and relevant information in a time-efficient manner?

Search Engines

If one of the objectives of KM and CPs is to make it easier for employees to find relevant information and knowledge sources, then search engines are an important enabling tool. The goal of a search engine is to provide relevant results (not the highest number of results) for a query, in the least amount of time. However, in many cases, users may need assistance defining exactly what they want. Documents also frequently refer to similar subjects using different terms in varied levels of depth. This may generate results that are not very precise (too many, very few results or irrelevant ranking). To respond to these various individual circumstances and the exponential growth in the amount of information and types of data and knowledge sources, there have been advances in search mechanisms.. Many search options, features and levels of sophistication are now available. They include the following (from the most common to the more sophisticated or specific):

- ✓ Keyword and Exact Phrase Searches are very common search features available in most search engines that list results based on

the occurrence of chosen words or phrases. These types of search engines have been used extensively in libraries and allow for users to target their search to specific areas of documents, such as the title, keywords and author. Such search engines now often include URL and existing links as well;

- ✓ Boolean Searches return results based on the use of logical operators such as AND, OR and NOT;
- ✓ Bayesian Inferencing Searches present results based on the frequency with which the chosen words appear in each document;
- ✓ Concept Searches return results in which the most relevant documents shown may not necessarily contain the chosen keywords. This is because the search mechanism looks for additional words that are related to the chosen keywords based on a thesaurus or statistical approach;
- ✓ Context Searches: certain engines can be calibrated to understand the researchers' context and show search results accordingly. This is useful when words can have very different meanings, depending on context (e.g. the word "SAP" can mean "the fluid of a plant" or refer to the ERP software company SAP);
- ✓ Natural Language Searches. This type of search engine is exemplified by AskJeeves in the consumer market. This natural language based software engine allows users to post queries using plain English (or any other

- language). More sophisticated solutions, however, are being developed that include agents that mimic real, intelligent human conversations (as provided, for instance, by MangoMoon);
- ✓ Knowledgebase Searches: these kinds of search engines are closely related to the “natural language search engines”. They are able to automatically build structured cases that let users tap into previous responses to similar questions. These engines learn every time a new interactive “Q & A” session occurs. If the searcher does not find the appropriate answer they can be programmed to direct the user to talk to a person who will try to answer the question (this is being deployed particularly in call centers);
 - ✓ Popularity-Based Searches automatically change the ranking of links that are displayed, based on various types of algorithms that aim to evaluate users’ own perspective of the document or site. It may, for instance, consider the number of times that previous users have checked the link or information source or how many other users link to that specific site (the popular site google.com uses this technology). It may also display documents based on users’ direct and pro-active evaluation of the document or site;
 - ✓ Collaborative Filtering Searches are based on the idea that individuals that share similar interests will also find similar documents relevant. Amazon’s suggestions of books exemplify this type of search mechanism;
 - ✓ Affinity Searches are similar to collaborative filtering searches. However, they take the idea of linking people and documents even further. It discovers many levels of commonalities amongst different kinds of documents, based on the people who author, read or update them. They can be particularly useful for very large organizations that want to link people with similar interests and competencies;
 - ✓ Visual Mapping Searches allow users to see the results of their searches in a more graphical manner. Documents are aggregated and linked according to categorization algorithms that allow users to easily navigate through clusters of related information;
 - ✓ Peer-to-Peer Searches allow searches within a self-selected community without the need of any centralized document index. The emerging enterprise solutions are based on the consumer models originally developed by companies such as Napster and Gnutella;
 - ✓ Personalized Agents have strong dynamic learning capabilities based on each user’s pattern of searches and choices of documents. Advanced agents combine concept and context search concepts (discussed above) to build relevant users’ profiles.

Personalization Engines

The CP in its various facets and applications has to make sense for each individual and be clearly linked to

specific business processes and goals. It must not be only about information sharing, since information overload can have a very negative impact on employees' creativity and productivity. Most people, especially those working in fast-paced wired environments, are increasingly swamped with irrelevant information, reinforcing the time-starved reality of most organizations today. If CPs are to be successful and become a fundamental tool for employees' work,

approach is to have the site personalized by web administrators, according to employees' profile (role, location or access rights). The more sophisticated push approach includes dynamic personalization or personalization "on the fly". This refers to personalization that is based on a number of sources of accumulated or real-time information, including the navigation path, device used for access, current location of user and available bandwidth, etc. The

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they need to allow employees, regardless of location and means of access to personalize their access to vast volumes of information/assets stored in the companies disparate databases and digital formats. Ideally, CPs should allow employees to seamlessly explore, in the same browser window, information generated internally and externally.

Personalization, or tailoring content, specific applications (or chunks of it) and/or individual experiences based on implicit and explicit data and information should appear transparent to users by incorporating them into regular browsing paths that minimize effort. The most advanced sites combine a "pull" and "push" approach to personalization. The "pull" approach means that the content and display of the site is dependent on choices made by the user. The "push" approach can be quite simple or quite sophisticated. The simple and most common "push"

personalization engines use such information to make intelligent predictions about users' preferences and display content based on individuals' stated preferences, employees' roles and location, and behavior during visits to the portal.

Codifying and Publishing Knowledge – Value of Content Management Systems

One important goal of any CP solution and/or KM initiative should be to empower employees to easily input information and knowledge and have access in a timely and effective manner for the targeted group or even the whole enterprise and its customers. Hence, Content Management System's (CMS) (associated with a CP implementation) represent a significant opportunity and challenge for organizations and consultants in the KM field. The processes related to CMSs are closely associated to those of KM. These

processes include the creation, publishing, reuse and storage of content (or information). In that respect, good CMSs can play a very important role by making it much easier for knowledge holders to codify and distribute part of their knowledge and information sources. This is, of course, very relevant for experts that tend to be bombarded with the same questions repeatedly.

CMSs, although initially developed for large online publishing operations, are, clearly, knowledge-sharing tools and should be treated as such. The most advanced CMSs allow for the seamless and dynamic integration of very structured data (from back-office systems) and unstructured data (input by individuals within and beyond the enterprise). They can also be deeply integrated with electronic workflow applications and other collaboration and project-management tools. A standard CMS process generally involves the following steps: 1) Document Creation; 2) Document Review; 3) Quality Assurance; 4) Publishing; and 5) Document Archiving or Document Deletion.

CMS deployments can play a critical role in the implementation of CPs. They provide the technical infrastructure and core processes that ensure that the correct, updated and timely content is available for those who need it. Although straightforward, at a conceptual level, the CMS platforms can be quite different in terms of their many technical features. Some of the features found in the most advanced CMS solutions include, but are not limited to, the following list:

Design and Authoring Features

- ✓ There are very few layout and design limitations;
- ✓ Content is separated from format;
- ✓ They include graphical and intuitive tools to build a workflow;
- ✓ They allow users not only to post information/content, but also to customize the interface of their postings;
- ✓ They make it easy for non-technical people to continue to work with their desktop applications;
- ✓ They include sophisticated tools for template development;
- ✓ They allow the creation of XML-based documents by users with no knowledge of XML;
- ✓ They make it easy for users to organize, classify and cross-reference content that is being publishing;
- ✓ They allow users to easily associate search terms (keywords) to their created content;
- ✓ They support the publishing of many content file types (e.g. audio, video, image, presentations, HTML code, Java components, ZIP files for download, etc);
- ✓ They allow content creators to include priority levels on the document that are going to be published or distributed to selected groups.

Rules-Setting Features

- ✓ They allow easy changes of rules for authoring, editing, approval, publishing and removal of content;

- ✓ Ordinary users can also easily define or change business processes and workflows;
- ✓ They allow documents to be checked in and out by users;
- ✓ Individual employees and/or webmasters can easily manage roles and access rights;
- ✓ They allow both public and privately-controlled publishing (i.e., the users control who has access to their published pages);

Version & System Administration Control Guidelines

- ✓ They provide many options for version control;
- ✓ They allow the addition of comments to revised documents;
- ✓ Pre-built interfaces are easily modified;
- ✓ They allow roll-back published items if necessary;
- ✓ They allow the view of the “change history” of any given item that has been published;
- ✓ They automatically generate attributes associated with each published document (creation date, creator, document size, new item indicator, updated item indicator, etc); and
- ✓ They offer many pre-built choices in terms of deletion/purging policies.

Collaborating Online

The Internet provides both synchronous and asynchronous opportunities for individuals to meet, share information/knowledge, make presentations, and collaborative on real-time decisions such as voting on line or utilizing synchronous tools such

(electronic meeting systems, electronic whiteboards, conferencing, and chat tools) which allow two or more people to work together simultaneously, whether they are together in the same place or in different places. These tools enhance collaboration and make meetings more effective. Asynchronous tools permit people to work together at different times (e-mail, knowledge repositories, document and content management systems and workflow tools). Asynchronous tools are particularly helpful for people who have busy schedules and participate in multiple projects. With asynchronous tools, it does not matter when or where a person is working; the tools replace meetings and may make them unnecessary for certain types of collaboration. Each type of tool has its place.

Some of the most sophisticated digital workplace tools provide a seamless integration of structured and unstructured data and information, voice and synchronous and asynchronous groupware tools. It is clear that many of the tools that are now being implemented at the enterprise level have their roots traced back to the consumer sites, in particular large-scale portals that provided web-based discussion, communications and community tools. In fact, some of the software vendors now tapping into the enterprise market still have those mass-market portals as their flagship clients. Other software solutions were developed specifically for the corporate market: from low-end ASP solutions for small companies to robust enterprise-level solutions. Some of the most recent

solutions are leveraging P2P platforms and also include wireless applications to keep members constantly connected to the community. In essence, many of these collaboration tools are integrated and customized to specific organizational environments; there is a set of functionalities related to five core areas:

1. Synchronous and Asynchronous On-line Discussions Capabilities

- Threaded and streaming (based on chronology) discussion databases;
- Discussion threads shown according to user profile or choices;
- Chats and instant messaging;
- Ability to work offline;
- Ability to target questions to groups or sub-groups;
- Ability to easily set-up group, sub-group or private interaction environments;
- Electronic meeting places with advanced presentation features: web tours, whiteboards, conferences, etc;
- Audio and video streaming;
- Instant polling and rating features;
- Anonymous postings;
- Ability to mobile and remote users to participate; and
- Guided brainstorm applications.

2. Rich User Identification Capabilities

- Manual and/or automatic profiling of individuals (by moderators and/or users);
- Knowledge-mapping and affinity-building tools to help

people that share interests to meet;

- Ability for users to digitally express their moods and feelings through icons;
- Ability to easily assign and modify different roles for individuals of the community (e.g., administrator, moderator, core member, affiliate member, etc.)
- Tools for recognizing different levels of participation and for users to develop their individual digital reputation;
- Ability to create members' directories and sub-directories; and
- Ability for both administrators and individual users to define access rights to other members of the community; and
- Ability to personalize some elements of each group or community (e.g., color).

3. Knowledge-base Repositories

- Ability to upload, distribute and archive all kinds of document formats. In a way, including many of the advanced features of CMSs. These features were discussed in detail in the CMS section above;
- Ability to check same applications simultaneously (apps sharing). For instance, project plans, business intelligence, ERP, etc;

- Searchable databases of discussions and previous “Q & A” sessions; and
- Integrated search with the ability to search based on a number of criteria: author, date, subject, sub-groups, etc.

4. Events Management

- Invitation according to role and or choices;
- Notification according to role or choices;
- Calendar;
- Schedule;
- Inclusion of new members and groups;
- Site statistics (stats by users, location, topic, contributions, etc);

5. Administration Tools

- Online surveys;
- Ability to establish groups and communities that extend beyond the firewall;
- Ability to operate without client software;
- Ability to set up different levels and areas of site management;
- Ability to set up different access levels, etc.

Looking Ahead

This papers has highlighted the current state of the most sophisticated tools that have been only recently been integrated into portals in a corporate environment. Corporate Portals are, indeed, becoming more sophisticated in their capabilities, in terms of integrating a broad range of integrated applications and tools, ranging from content management

systems, categorization and taxonomy tools, search engine tools, collaboration online applications etc. Very importantly, these new applications strive to integrate and balance the structured flow of information with the unstructured and organic flow of knowledge.

The authors believe that many of these solutions will have an important impact on how organizations create, organize, provide access and reutilize knowledge. Many were transplanted from the publishing/media and other business-to-consumer (e.g. auctions) industries while others were created from the start to foster higher levels of collaboration across multiple constituencies within and outside the organization. Finally, it is important to highlight that contrary to previous IT waves, it is evident that this new breed of technologies are being developed with a strong social-technical perspective and taking into consideration many of the underpinnings of the Community of Practice theory (Wenger, 2000).

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