

## A framework for designing the enterprise-wide e-commerce portal for evolving organizations

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**Abstract** The number of organizations offering e-commerce solutions is growing exponentially each year. Without a doubt, e-commerce will no longer be a choice for organizations rather it will be a competitive necessity to ensure business prosperity. Integral to the success of e-commerce is having good e-commerce software that can enable organizations to offer online products and services as well as integrate their business processes and supply chains within and with their collaborators or partners in a perfect, seamless manner. One of the main obstacles for adoption of e-commerce faced by many organizations; however, has been the lack of such proper integrated e-commerce software. There have been few ready-made software solutions offered by vendors, which can be customized for organizations' business models and processes, and these solutions are based on "piece meal" approaches and thus lack much of the enterprise capabilities organizations need to adopt. In this paper, we suggest a framework for developing an *enterprise-wide integrated e-commerce portal* for evolving organizations. Such a framework will help any organization to design a distributed, extensible, cross-platform, collaborative and integrated e-commerce portal.

**Keywords** e-commerce · e-business · Software design · Evolving organizations · Enterprise portals · Knowledge management

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## 1. Introduction

21st Century organizations need fast, efficient and flexible services to meet the external demands and challenges of today's business environment. The expectations of customers are increasing at the same rate as information and communication innovations in the marketplace. Traditional organization structures and business models no longer will be valid to deliver products and services. Organizations are frantically changing their design, business models and strategies to reach global customers [55]. Further, enterprises are challenged to do things faster, better, and more cost-effectively in order to remain competitive [19]. Today's new web technologies provide tools to employees as well as to customers and suppliers that facilitate easy access to information and knowledge stored in organizations' knowledge bases. As a result, there is a strong need to share knowledge in a way that makes it easier for individuals, teams, and enterprises to work together to effectively contribute to an enterprise's success in an increasingly global and competitive economy [19]. To be successful, evolving organizations need their information systems and knowledge management to work cohesively to offer e-commerce solutions. Many studies show that knowledge management has become crucial for evolving organizations [38]. One of the most valuable resources available to today's organizations are human skills, expertise, and relationships. Thus, organizations need to capitalize on this wealth of expertise that has accumulated within, but is mostly scattered throughout, in the form of knowledge. But to do so effectively, requires mechanisms to document knowledge and augment centralized knowledge bases [17]. Knowledge management (KM) is concerned with capitalizing on these precious assets [12]. But despite any organizations' willingness to embrace the necessary changes, key difficulties lie in the fact that required systems should be integrated into one. We believe at the root of this problem is the lack of an appropriate architecture for enterprise-wide e-commerce portals and thus we develop a framework which we are confident will address this important need.

## 2. Evolving organizations: information management to knowledge management information management

Information technological tools were first used by organizations for data processing and later these systems then developed to include information management. As part of an information management orientation, the systems main role was to record every bit of information that was used within the organization. Organizations performing information management services were always searching for ways to become better, faster, more efficient, and more competitive [3]. Information management is a concept that involves coordinating information from the time that it is created until it is eliminated. Information management functions include the creation, capture, entry, manipulation, exchange, and storage of information. During the last two decades organizations have tried to improve the performance of their enterprises by adopting an information management orientation. But most of these efforts were fragmented [26], and many of the technologies used were implemented to automate isolated functions within a business work process rather than to automate the company or enterprise as a whole [16]. IT has then been implemented primarily as "functionally-focused" computer systems that automate the preexisting functionally-focused paper-based systems (Huff, 1992). As a result of fragmentation, most systems were in essence "islands of automation", disjointed and dis-integrated (Koulopoulos, 1995). Many organizations still continue to use such fragmented systems without integration and now are finding it difficult to offer e-commerce solutions because paramount to successful e-commerce is integrated systems.

### 3. Knowledge management (KM)

As we move into the 21st Century, the need for rapid access to relevant knowledge has never been greater. The business world is increasingly competitive, and the demand for innovative products and services has yet to be satisfied. Knowledge management deals with the process of creating value from an organisation's intangible assets [54]. It is an amalgamation of concepts borrowed from artificial intelligence/knowledge based systems, software engineering, BPR (business process re-engineering), human resources management, and organisational behaviour [4]. Knowledge management can be viewed as turning data (raw material) into information (finished goods) and from finished goods into knowledge (actionable finished goods) [25]. It deals with conceptualization, review, consolidation and action phases of creating, securing, combing, coordinating and retrieving knowledge [4]. In essence then, knowledge management not only involves the production of information but also the capture of data at the source, the transmission and analysis of this data as well as the communication of information based on or derived from the data to those who can act on it [11].

The firm that knows more about its customers, products, technologies, markets and their linkages should perform better [56]. Many organisations are drowning in information overload, yet starving for knowledge [23]. Organizations struggle with the need to respond to customers whose level of sophistication and awareness grows every day [12]. Information centers, market intelligence, and learning are converging to form knowledge management functions [46]. Knowledge management is then a competitive necessity and vital for the success of 21st Century organizations (Wickramsinghe and Mills, 2001). The recently published report "Knowledge Management Software Market Forecast and Analysis", 2000/2004 estimated that the total KM software market will reach \$5.4 billion by 2004 (McDonough 2000). We believe that organizations that attempt to enter into the e-business/e-commerce abyss without first addressing the knowledge culture issues are doomed to fail. Although KM solutions are not a replacement for the functionality of today's corporate portals, they do add value to an enterprise's strategy by improving analysis of interdepartmental data, by providing dynamic, end-user-driven querying tools, and by delivering relevant enterprise data to a greater number of knowledge consumers. Further, KM solutions can extend enterprise knowledge beyond the firewall to improve customer service and partner relationships, and to create marketable knowledge products from an enterprise's own internal data [15].

### 4. Enterprise-wide integrated e-commerce portal

E-commerce isn't just a virtual storefront for online transactions anymore. We only need to look at the demise of the myriad of dot com companies as evidence. Today's e-commerce solutions need to have all facets of their businesses online, from customer interactions to extended supply-chain management with trading partners. A few years ago, e-commerce platforms were focused primarily on handling transactions and managing catalogs. Buying and selling over the Web was still a novel concept, and the e-commerce application providers offered limited functionality. Today, businesses are demanding more than just online transaction support. They need fully fledged e-businesses, and that means providing an enterprise-wide e-commerce portal that helps them build relationships with customers; be it in a business-to-business (B2B), business-to-consumer (B2C), or online marketplace model [33]. The corporation must have the enterprise portal, an integrated software which can house its databases, file servers, web pages, e-mails, ERP (enterprise resource

planning), and CRM (customer relationship management) systems accessible to all its constituents.

Developing such integrated enterprise-wide e-commerce portal to support B2C and B2B electronic business models is one of the major challenges for software developers. It requires integration of many technologies including web modeling languages, data content, interface tools, content delivery tools, messaging technologies etc. to combine in one integrated storefront [5]. The e-commerce portal should be able to support complete multimedia formats and should automatically be enabled for WAP (Wireless Application Protocol) to allow mobile shoppers to buy anytime, anywhere [47]. Further, it should support all web scripting languages. The e-commerce portal should have the ability for different users to access a wide range of information and services in a customized fashion between its employees, customers and partners; and where the content and services comprise the information resources, products, and services of the enterprise [37]. Currently, most applications do not communicate with each other, resulting in significant reduction in the flow of critical information which impacts productivity and ultimately the bottom line.

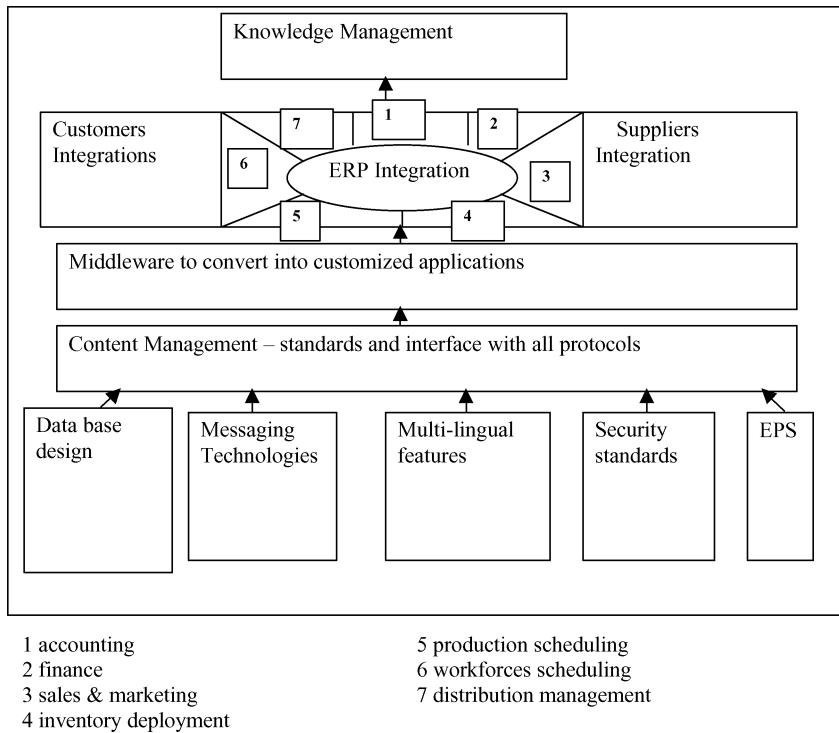
## 5. A framework for enterprise-wide e-commerce portal for evolving organizations

In order to address this current problem we propose a framework for developing the enterprise-wide e-commerce portal. Our framework specifically emphasizes integrating the many disparate e-commerce systems. Such an Enterprise-wide e-commerce portal is intended to offer a single focal centralized point for linking to a collection of applications, and a method for initiating processes that transcend multiple systems. In an integrated portal, users can go to one place and perform searches across disparate repositories such as a Lotus Notes database, Microsoft Exchange public folders, Web sites, file systems, databases, and a collection of other repositories. The portal's core functions include e-mail, group calendaring and scheduling, shared folders/databases, threaded discussions, and custom application development to support B2C and B2B business models.

We envision that the portal should include all of the following capabilities:

- Workflow and routing of documents;
- Discussion threads;
- User-chat sessions;
- a Dynamic group and team creation; and
- Interactive collaboration, including video, voice, and application sharing.
- Cross-repository searching
- Business intelligence
- CRM
- Discussion threads
- Document management
- E-mail
- ERP
- Online chats
- Personal and group calendar
- Reporting
- Sales-force automation

All of these capabilities can be grouped into broad categories such as database design, messaging technologies, supply chain, multilingual content, security solutions, electronic



**Fig. 1** Framework for enterprise-wide e-commerce portal for evolving organizations

payment systems, content management, middleware and knowledge management and thus the framework evolves as depicted in Figure 1.

## 6. Database design

Databases, not HTML files, are now at the heart of e-commerce applications. Numerous e-commerce applications demand databases to be large, flexible and have easy interfaces with up front and middleware applications [8]. Further, these databases should have the ability to handle larger amounts of data and users than before, and should have sophisticated support for an array of Internet standards, as well as the ability to work closely with application servers, other databases, old applications and 3rd-party e-commerce software (ibid). One of the greatest challenges facing organizations is the interoperability among many of these disparate IT systems. The software must be able to run in a multitude of environments—perhaps even within one implementation. Lastly, as the company changes, the solution must be flexible enough to change as well. In addition, the solution must have the proper fault tolerance and safety protocols [18].

The systems designed then, must be able to handle the deluge of customer interactions. Once organizations offer e-commerce, it is expected that the volume of electronic communications will grow exponentially between customers and suppliers. Many organizations find it difficult to cope with the volumes of data that they generate from customer interactions; also at times, the systems do not have sufficient scalabilities to grow, thus affecting or limiting their e-business.

## 7. Messaging technologies features

Most interactions between organizations now happen through the exchange of e-mails. E-mail offers organizations the opportunity to communicate with customers via a cost-reducing, modern interface. In fact, many would argue that e-mail is the Internet's only killer application. In customer-centered enterprises, managing mail and linking with transactions or databases would be the main priority to respond to customers in an effective manner. Further, customers' interactions and subsequent actions should get stored in a knowledge base. Such a system should have capabilities of message analysis, response methods, escalation and reporting techniques [24]. Appropriate software should include message analysis tools, a knowledge base, and comprehensive reporting tools as its components. Such features will not only provide the ability to track the flow of messages and documents between customers and systems but also will help to create an effective knowledge base to spot trends for better customer relationship management (CRM) (ibid). European Internet Banks and United States banks, for example, failed to respond to more than 50 percent of their e-mail messages within eight hours [18] and such poor responsiveness is likely to result in significant loss of business. Clearly, e-mail management is crucial and rapidly becoming a competitive necessity.

## 8. Supply chain integration

In offering e-commerce solutions, organizations face tremendous logistics and supply-chain challenges. With increasing pressures to get products to market faster and more efficiently than ever before, organizations need real-time, web-centric, collaborative logistics technology—to increase efficiency by connecting to all their supply-chain partners and thereby achieve the ultimate goal of maximizing shareholder value. Collaborative logistics is the new evolution in supply-chain management because it expands visibility and control beyond the walls of an organization by connecting the company to all elements of the supply chain [39]. The integration of the supplier into the organizational structure adds value to the organization's customers. As price competition ceases to be a global force, the supplier's role will be to add value not just to reduce costs. Customers and suppliers will work together and form inter-organizational teams that will facilitate improved communication between organizations and increase the rate of learning. Benefits will be gained from the effects of sharing mutual experience and knowledge that will result in the whole chain becoming better aligned with the final customer's requirements and objectives.

## 9. Multilingual content for e-commerce

The Internet may have created one giant global market for the sourcing and selling of goods and services, but trading with partners around the world brings its own set of problems—not the least being able to understand websites written in different languages. The idea that English is the language of the Internet, and hence of e-commerce, is clearly flawed. While as many as 98 percent of e-commerce sites are believed to be in English, over half the people using the web don't have knowledge of English. For example, within western Europe, only 15 percent of users have English as their first language, with just 28 percent speaking some English; It should come then as no surprise that many people click off much faster than they click on [29].

Firms wishing to trade globally should consider providing content in a number of languages (ibid). Providing multilingual content for e-commerce; however, is not easy. A firm wishing to trade with companies mainly within Europe, or countries speaking French, German or Spanish, could use a translator to create several versions when a website starts up, but what happens when the site needs updating or a supplier sends an e-mail query in their own language? In global business settings, the customer base is scattered all around the globe. Thus, the e-commerce portal should have the capacity to manage multiple languages concurrently and have features of customizing solutions in different languages.

## 10. Security technologies

One of the main concerns for most customers is security. Organizations need to be security conscious to safeguard the confidentiality of customer interactions. The security mechanisms implemented in the e-commerce portal should have a high level of security to ensure the privacy and authenticity of the information being exchanged. Public key infrastructure (PKI) and secure socket layer (SSL), SET all needs to be evaluated properly to offer easy and secured solutions.

E-commerce opens up unprecedented access to sensitive information. There have been plenty of instances where hackers have been able to download malicious code and hack sensitive data despite the efforts of leading-enterprise firewalls, Checkpoint; and RSA Security's SecurID token-based authentication system. Firewalls are electronic moats that are built around the enterprise castle. Yet these moats will provide only a false sense of security if they aren't properly configured or maintained, or if they are one-way systems that don't include controls for outbound traffic. E-business is now inviting foreign packets, and thus company firewalls are becoming increasingly overwhelmed by the task of sorting out everything. Security systems should have IPsec-standard VPN that can interoperate with the major corporate VPN gateways; content filtering software; antivirus software and digital certificates from VeriSign or any other agencies.

## 11. Support for different electronic payment systems

The primary payment mechanism for traditional commerce are cash, checks, credit cards, debit cards and electronic funds transfer. More and more payment options are becoming available to both businesses and consumers. Smart cards, electronic checks, electronic cash and many other electronic payment systems technologies are emerging and need interoperability across each other to support e-commerce. Right now many of these work in isolation and do require a standard for inter-operability.

## 12. Free formats for content management

Unlike standards that focus only on specific business units, elements, and/or proprietary solutions, the e-commerce portal architecture should provide a complete business process architecture, including data dictionaries, implementation frameworks, and business message schemes and process specifications, in robust, and open standards [39]. The front-end tools as well as the databases at the back end should be such that they have capabilities to interface with any heterogeneous environment [28]. Using open standards, e-commerce software should

provide a common e-business language, to offer a total solution. By providing standard processes for the electronic exchange of business information, companies, regardless of size, optimize their trading networks should realize the full potential of the digital economy [39]. HTTP and SMTP transfer protocols to accommodate e-markets, exchanges, portals, and other intermediaries that route information on behalf of buyers and sellers should be supported. In addition, the e-commerce portal should enable e-markets to organize commerce on a common platform and integrate with participants' internal systems. Using standards, software should have the ability to extend common processes to multiple trading partners and introduce flexible processes into their operations.

Software should be able to import structured data into XML from document archives, legacy report files, databases, spreadsheets or other applications. This would allow the use of available information from existing systems, rather than re-programming or replacement. Data converted into standard, self-defining XML can then be used in a grand variety of ways.

### 13. Middleware

The e-commerce middleware component of software would play a very important role to convert users requests of any format to applications specific formats. It should handle the function of three components; namely, (i) computer, portable units (terminals), either hand held or vehicle mounted, with bar code scanners, multi-line displays and memory, (ii) an access point that collects information transmitted from the portable units and transmits it to the company's computer networks and (iii) controller that handles the communications traffic between the various transmitting units and the computer [45]. The intelligent middleware approach can interface between the various terminals and the company's enterprise resource planning (ERP) or information management system resides on a separate server that could save a company tens of thousands of dollars in interfacing between varieties of equipment and software.

### 14. Information extraction (IE) software utility for KM

The E-commerce technologies have the potential to shift traditional economies to knowledge based economies. The new knowledge based economy would entirely depend upon information technology, sharing of knowledge and intellectual capital. The environment of e-commerce and knowledge management will change the business-consumers relationship paradigm. In the electronic world of the knowledgebased economy, competitive advantage will be with those organizations who would have strong social cohesion with their customers to understand their expectations and who would have capacity to deliver fast. While most new management techniques fade quickly, knowledge management provides a level of intelligence not found in most supply chain information systems. Knowledge management is an intelligent process by which raw data is gathered and transformed into information elements. These elements are assembled and organized into context-relevant structures that represent knowledge. The nascent form of e-business has shown much promise yet still has many unresolved issues, most importantly in the handling of interactions with customers. The question that remains to be answered is how can e-business be best used to secure the patronage of a customer and how can this 'virtual' relationship be sustained.

Most valued customers', customer-knowledge management initiatives take time and effort, so a firm has to know which customers are worth such investment. FedEx, US WEST' and



several banks categorize customers according to profitability [10]. IE is an important part of any knowledge management system. Working in conjunction with information retrieval and organization tools, machine-driven extraction is a powerful means of finding content on the Web. Information extraction software pulls information from texts in heterogeneous formats—such as PDF files, emails, and Web pages—and converts it to a single homogeneous form. In functional terms, this converts the Web into a database that end-users can search or organize into taxonomies. The precision and efficiency of information access improves when digital content is organized into tables within a relational database. The two main methods of information extraction technology—natural language processing and wrapper induction—offer a number of important benefits.

## 15. Ontologies for enterprise portal

Traditionally, HTML is the main technology used to create the content of web sites. It is a good document standard for presentation and web navigation. It, however, suffers greatly from being difficult to access and maintain the content (<http://www.w3.org/TR/RECxml>). XML separates structure and presentation in document and it improves to some extent the problems of HTML. However, the XML structure, either in DTD or Schema can only represent the compositional relationship between the higher and lower level elements, which are not sufficient as a representation of semantic content in document (<http://www.w3.org/TR/xmlschema-0/>). RDF (Resource Description Framework), a data model in directed label graph, enhances the shortcomings of XML by allowing user expressing the property values of subjects (<http://www.w3.org/RDF/>). RDF is a W3C recommendation. An RDF document thus can be viewed as collection of subject predicate-object statements. An RDF schema is a class of RDF having a specific vocabulary for nodes and edge labels. RDF Schema (RDFS) (<http://www.w3.org/TR/rdf-schema/>), a special schema, provides facilities for user to define class, subclasses, property, etc., which is used as the basis for ontology development. DAML, adding practical considerations, is an extension of RDFS and becomes the most important ontology language. Based on the common knowledge of ontology, the semantic content of RDF files created by different parties can then be shared, processed, integrated, and reused by machines (<http://www.daml.org/ontologies/>). The Semantic Web is a vision towards this (<http://www.w3.org/2001/sw/>). In this section, we describe the details of ontology technology that can be used for developing enterprise portal.

E-commerce requires rich data: Retailers require data to flow from wholesalers and wholesalers require data to flow from producers. Data-exchange of this kind is currently very limited, consisting of tab-delimited dumps or product-specific tables. Specific XML formats for each exchange task improves the situation, but ones misses the network effect of being able to share 90% of the processing software, because the XML data model is too low-level. Approaches like ebXML or the Meta-Data Coalition try to tackle this problem by “aiming at the development of an open XML-based infrastructure enabling the global use of electronic business information in an interoperable, secure and consistent manner by all parties. However, all these approaches have to represent different terminologies used in different types of businesses. This leads directly to the use of ontologies. For sharing information and knowledge (that means for interoperability) between different applications a shared set of terms describing the application domain with a common understanding is needed. More flexibility is gained; if not just a flat set of terms is defined, but also relationships between these terms. This helps an application to at least partially understand the domain and adds to its flexibility. Such a set of terms is called Ontology [6].

There are variety of ontologies that can be used to develop enterprise portal. Ontologies are like classification schemes. They are ways of defining the relationships between objects in the world. Metadata is just data about data. RDF (Resource Description Framework) can be used to describe metadata. Within RDF there is a mechanism for including different ways of classifying things in the same documents, using XML namespaces. This means that several different ways of classifying the world can be combined. Ontologies establish a joint terminology between members of a community of interest. These members can be human or automated agents. To represent a conceptualization a representation language is needed. Several representation languages and systems are defined.. KIF-based Ontolingua, Loom, Frame-Logic are examples of representation languages based on First Order Logic, but with different expressiveness and computational properties. However, for applications on the web it is important to have a language with a standardized syntax. Because XML emerges to be the standard language for data interchange on the web, it is desirable to also exchange ontologies using an XML syntax, thus simplifying the task of writing parsers [14, 31, 32, 48]. This requirement leads again to XML-based languages, defining a language on top of XML. Examples include SHOE, Ontology Exchange Language (XOL), Ontology Markup Language (OML and CKML), Resource Description Framework Schema Language (RDFS), and Riboweb. All of them use XML syntax, but with slightly different tag names. A new proposal extending RDF and RDF Schema is OIL (Ontology Interchange Language). RDF and RDFS are already in use in the library community and has good chances of becoming an accepted standard. A successor of OIL is DAML+OIL, jointly developed by a group of European and US-American scientists. The DARPA Agent Markup Language (DAML) is being developed as an extension to XML and the RDF. The latest release of the language (DAML+OIL) provides a rich set of constructs with which to create ontologies and to markup information so that it is machine readable and understandable.” The reference description document characterizes DAML+OIL as “a semantic markup language for Web resources. It builds on earlier W3C standards such as RDF and RDF Schema, and extends these languages with richer modelling primitives. DAML+OIL provide modeling primitives commonly found in frame-based languages. Another ontology technology that is evolving is OWL. The OWL Web Ontology Language is designed for use by applications that need to process the content of information instead of just presenting information to humans. OWL facilitates greater machine interpretability of Web content than that supported by XML, RDF, and RDF Schema (RDF-S) by providing additional vocabulary along with a formal semantics. OWL has three increasingly-expressive sublanguages: OWL Lite, OWL DL, and OWL Full [6, 14, 31, 32, 43, 44, 48].

## 16. Instant messaging (IM) and online world of blackberries and other e-mail devices

In the Internet world, instant messaging has been the fastest growing communication channel during the past few years. Instant messaging services allow users to see the presence status of their friends and send instantly delivered messages or initiate chat sessions. Major IM providers are negotiating with wireless carriers to add SMS functionality to their systems, and a number of system suppliers are offering wireless carriers the technology needed to build their own instant messaging services. Business use for instant messaging is also on the rise. According to IDC, the number of worldwide instant messaging corporate users will increase at a compound annual growth rate of 140%, from 5.5 million in 2000 to more than 180 million in 2004, the main market area for professional IM usage being the United States [21, 22]. Many employees in organizations have set up informal IM groups to supplement corporate e-mail

system. Gartner, Inc., a consulting and research firm based in Stamford, CT, predicts that 70 percent of enterprises will be using IM by 2004. IM—which lies somewhere between e-mail and the telephone—is catching on as an effective new mode of business communication. Among other things, IM is used for inter-office communication; it can be used like e-mail within a wide network of users, such as America Online; or it can be used as a customer service function on an e-commerce site, allowing visitors to get instant personal assistance without ever picking up the phone. One of the draws of IM, is the ability to carry on many conversations simultaneously. IM is attractive for targeted customer communication because it allows users to have more control over who contacts them. That way, the people being targeted are more likely to take notice of the messages that reach them. IM replaces some of those e-mails that would go unnoticed. Instant messaging looks poised to become an increasingly effective way for businesses to communicate with customers [23, 36]. Blackberries and many small pager sized devices which enable people to send and receive email wirelessly from just about any location in the world (where subscriber service exists) are another mechanism for business communication. Email is of course the killer app of the Internet, and given the opportunity to send and receive email from anywhere, at any time, users are quick to embrace it. The ability to import address books, message folders and the like into the BlackBerry and other such devices means that users can effectively take their email programs with them. Such explosive growth of IM indicates that enterprise portals should have IM embedded into their architecture. However, IM usage may bring some security concerns. The concern is that IM and P2P applications provide users—and viruses—ways of circumventing traditional security measures. For instance, most public instant messaging clients attempt to connect to their networks' central servers or other users through a variety of ports, some of which may not be blocked by corporate firewalls. As a result, file-sharing can be taking place without IT's safeguards—potentially opening the door for hacker or worm attacks. IM software also can open the door to remote-control by hackers, in connection with chat rooms [21–23, 36].

## 17. Conclusion

The 21st Century brings with it a new economy that requires us to become more productive without increasing the inflation rate. Potentially there are two key contributors to success in such an environment: people and technology. It is the combination of these two factors with new business processes and business models that will underpin success in the next decade. The importance of KM technology and the role it will play in organizational success cannot help but increase. E-commerce and knowledge management both will need a secure access conduit, through which information can traverse more efficiently between seller and buyer. Without such a conduit; however, we predict that many e-businesses will be left to flounder. We believe the solution lies in the development of an enterprise-wide e-commerce portal. In this paper, we proposed a framework for an enterprise-wide e-commerce portal. Our framework provides useful and important guidelines to build an enterprise-wide e-commerce portal.

## References

- [1] Adams, K. C. (2001). "The Web as a Database: New Extraction Technologies & Content Management." *Online; Wilton*, 25(Issue 2), 27–32.
- [2] Anonymous. (2001). "Knowledge Management Is No Bag Of Wind." *Internetweek*; Manhasset, Issue 849, pp. 36.

- [3] Back, W. E., & Moreau, K. A. (2001). "Information Management Strategies for Project Management." *Project Management Journal*, 32(Issue 1), 10–19.
- [4] Beckman, T. (1999). "The Current State of Knowledge Management." In J.Liebowitz (ed.) *Knowledge*.
- [4a] Breidenbach, S. (2000). "Security Tools: Keeping Ahead of the Cybercrooks," *Informationweek* (Issue 800), 136–138.
- [5] Ceri, S. P. F., & Bongio, A. (2000). "Web Modeling Language (WebML): A Modeling Language for Designing Web Sites," *Computer Networks*, 33 (Issue 1–6), pp. 137–157.
- [6] Chandrasekaran, B., Josephson, J. R., & Benjamins, V.R. (1999). What Are Ontologies and Why Do We Need Them? *IEEE Intelligent Systems*, 14(1), 20–26.
- [7] Chiu, C. M., & Bieber, M. (2001). "A Dynamically Mapped Open Hypermedia System Framework for Integrating Information Systems," *Information and Software Technology*, 43 (Issue 2), 75–86.
- [8] Cox, J., (2000). "E-Commerce Changing the Face of Databases." *Network World*, 17(Issue 31), 38.
- [9] DAML Ontology Library, Available at <http://www.daml.org/ontologies/>
- [10] Davenport, T. H., Harris, G.J., & Kohli, A.K. (2001). "How Do They Know Their Customers So Well?" *Mit Sloan Management Review*, 42( Issue 2), 63–73.
- [11] Davenport, T., & Prusak, L. (1998). *Working Knowledge*. Boston: Harvard Business Press.
- [12] Duffy, J., (2001). "The Tools and Technologies Needed for Knowledge Management." *Information Management Journal*, 35(Issue 1), 64–67.
- [13] Edelman, R., & Jussila, T. (2000). "Portals Help Integrate Interdependent, Applications," *Informationweek* Dec 11.
- [14] Guarino, N. (1998). "Formal Ontology and Information Systems." In N. Guarino (ed.), *Formal Ontology in Information Systems. Proc. of the 1st International Conference*, Trento, Italy, 6–8 June 1998. IOS Press (amended version) <http://www.ladseb.pd.cnr.it/infor/Ontology/Papers/FOIS98.pdf>
- [15] Hammond, C. (2001). "The Intelligent Enterprise." *InfoWorld*, 23(Issue 6), pp. 45–46.
- [16] Haecckel, S. H., & Nolan, R.L. (1993). Managing by Wire, *Harvard Business Review*, Sept–Oct 1993, pp. 122–132.
- [17] Hansen, M. T., & Oetinger, B.V. (2001). "Introducing T-Shaped Managers: Knowledge Management's Next Generation." *Harvard Business Review*, 79(Issue 3), 106–116.
- [18] Hille, E. (2001). "The 10 Rules for Evaluating an e-mail Management Solution" *Customer Inter@Ction Solutions*, 19(Issue 8), 50–54.
- [19] Hoven, J. V. D. (2001). "Information Resource Management: Foundation for Knowledge Management." *Information Systems Management*, 18(Issue 2), 80–87.
- [20] Huff, C. W., & Finholt, T. (Eds.). (1994). "Social Issues in Computing." *Putting Computing in Its Place*. New York: McGraw-Hill.
- [21] IDC (2000). "Finding a Place: Corporate Instant Messaging Market Forecast and Analysis, 2000–2004." *IDC*.
- [22] IDC (2002). "Instant Messaging: Wireless IM Market Forecast and Analysis, 2000–2004." *IDC*.
- [23] Instant Messaging Tutorial (2000). "The International Engineering Consortium." Available as HTML in [http://www.iec.org/tutorials/instant\\_msg/](http://www.iec.org/tutorials/instant_msg/).
- [24] Jones, G. (2001). "E-mail Management Technologies: A Purchaser's Primer." *Customer Inter@Ction Solutions*, 19(Issue 8), 56–59.
- [25] Kanter, J. (1999). "Knowledge Management, Practically Speaking, Information Systems Management." *16*(Issue 4), 7–9.
- [26] Keen, P. G. W. (1991). "Relevance and Rigor in Information Systems Research: Improving Quality, Confidence, Cohesion and Impact in Information Systems Research." *Contemporary Approaches and Emergent Traditions*, pp. 27–49, Elsevier Science Publishers.
- [27] Kouloupoulos, T. M. (1997). Smart Companies, Smart Tools, John Wiley & Sons, Inc.
- [28] Linderholm, O. (2001). "Different Routes to Content Management." *InfoWorld*, 23(Issue 8), 44.
- [29] MacLeod, M. (2000). "Language Barriers." *Supply Management*, 5(Issue 14), 37–38.
- [30] McDonough, Brian. (2000). "The Intellectual Capital Management Software Market." *IDC Bulletin* #22637.
- [31] McGuinness, D. L. (2001). "Description Logics Emerge from Ivory Towers, Stanford Knowledge Systems Laboratory Technical Report KSL-01-08 2001." In *the Proceedings of the International Workshop on Description Logics*. Stanford, CA.
- [32] McGuinness, D. L. (2002). "Ontologies Come of Age." In Dieter Fensel, Jim Hendler, Henry Lieberman, and Wolfgang Wahlster (eds.). *Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential*. MIT Press.
- [33] Meister, F., Patel, J., & Fenner, J. (2000). "E-commerce Platforms Mature." *Informationweek* (Issue 809), 99–108.

- [34] Perkowski, M., & Etzioni, O. (2000). "Adaptive Web sites." *Association for Computing Machinery. Communications of the ACM*, 43(Issue 8), 152–158.
- [35] Pickering, C. (2001). "A Look Through the Portal." *Software Magazine*, 21(Issue 1), 18–23.
- [36] Presence and Instant Messaging Report. (2000). Technical Marketing Inc. and pulver.com, Inc.
- [37] Rosen, M. (2000). "Enterprise Portals: A Single Point of Access to Corporate Data." *Software Magazine*, 20(Issue 5), 22–24.
- [38] Ruppel, C. P., & Harrington, S. J. (2001). "Sharing Knowledge Through Intranets: A Study of Organizational Culture and Intranet Implementation *IEEE Transactions on Professional Communication*, 44(Issue 1), 37–52.
- [39] Schoonmaker, M. (2001). "Opinion—Rosettanet Standards Provide Full E-Biz Process Architecture." *Ebn* (Issue 1253), pp. 43.
- [40] Schumacher, E. (2001). "Collaborative Logistics." *Traffic World*, 265(Issue 8), 29.
- [41] Seely, J. B., & Duguid, P. (2000). "KM's Future in the Eworld." *Information World Review* (Issue 158), 18.
- [42] Sementic Web <http://www.w3.org/2001/sw/>
- [43] Staab, S., Studer, R., Schnurr, H., & Sure, Y. (2001). "Knowledge Processes and Ontologies." *IEEE Intelligent Systems*, 16(1), 26–34.
- [44] Staab, S., Erdmann, M., & Maedche, A. (2001). "Ontology in RDF(S), Electronic Articles in Computer and Information Science ISSN 1401–9841" 6(9), 2001 Available at URL: <http://www.ep.liu.se/ea/cis/2001/009/>
- [45] Stehle, D. (2001). "System Performance Depends on Middleware *Material Handling Management*, 56(Issue 2), ADF4-ADF6.
- [46] Stratigos, A. (2001). "Knowledge Management Meets Future Information Users. *Online*, 25(Issue 1), 65–67.
- [47] Talley, B., & Mitchell, L. (2000). "Which Product Should You Choose to Quickly Develop a Database-Driven Commerce Site?" *InfoWorld*, 22(Issue 38), 82.
- [48] Uschold, M., & Gruninger, M. (1996). "Ontologies: Principles, Methods and Applications." *Knowledge Engineering Review*, 11(2), 1996. Also available as AIAI-TR-191 from AIAI, The University of Edinburgh.
- [49] W3C, Extensible Markup Language (XML), Available at <http://www.w3.org/TR/RECxml>
- [50] W3C, XML Schema Part 0: Primer, W3C Recommendation, 2 May 2001, Available at <http://www.w3.org/TR/xmlschema-0/>
- [51] W3C, Resource Description Framework (RDF). Available at <http://www.w3.org/RDF/>
- [52] W3C, RDF Schema (RDFS). Available at <http://www.w3.org/TR/rdf-schema/>
- [53] Wickramasinghe, N., & Mills, G. (2001). "Integrating E-commerce and Knowledge Management—What Does the Kaiser Experience Really Tell us," in *International Journal of Accounting Information Systems*, 3(Issue 2), 83–98.
- [54] Wigg, K. (1993) *Knowledge Management Foundations*. Arlington: Schema Press.
- [55] Wingenroth, B. (1999). "The Evolving Organization." *Quality Congress. ASQC... Annual Quality Congress Proceedings*, p. 58.
- [56] Zack, M. (1999). *Knowledge and Strategy*. Boston: Butterworth Heinemann.

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