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Enterprise knowledge portals: two projects in the United States Department of the Navy

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Abstract

Two projects in the US Department of the Navy to develop enterprise portals for facilitating knowledge discovery and dissemination are discussed. The authors describe efforts within a global organization to capitalize on current knowledge management concepts and technologies for knowledge access and sharing in order to provide users with more personalized, responsive, and integrated information systems. The Next Generation Library supports knowledge management and networking objectives, as well as providing high-quality content access at the desktop. The Naval Postgraduate School Knowledge Portal, still under development, is designed to link internal administrative databases with current message traffic and external scholarly information resources.

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Introduction

Today, in most organizations, large and small, there is strong interest in identifying optimal strategies to leverage the intellectual capital of the organization's workforce. The Department of the Navy (DON) is no exception. Increasing the capability of knowledge workers for agile, effective decision making in fast-changing environments requires not only robust connectivity and infrastructure, but also organizational culture and processes that nurture and facilitate intensive levels of information sharing that in turn will lead to a larger common knowledge base and to evolution of new knowledge.

At the heart of two current projects in the US Department of the Navy are efforts to bring the librarian's professional knowledge and expertise to bear on integrating electronic library and information services with emerging knowledge management (KM) practices. More specifically, the objectives of these projects are focused on facilitating a progression from distributed information access in large organizations to a knowledge networking system – a system for seamless, shareable, interactive discovery, creation and use of disparate information resources – that enables transformation of information into accessible knowledge.

The Next Generation Library and the Naval Postgraduate School Knowledge Portal have been conceived as systems to support what is hoped will be an ever increasing level of willingness by knowledge workers to share their most valued information, insights, and discoveries as part of their "information and knowledge regimen." The Next Generation Library is being designed to provide a common research system for naval personnel, who, in their policy and decision-making roles, need information in the areas of business, management, information technology, and current naval and defense affairs. The Naval Postgraduate School Knowledge Portal is being designed to provide a single point of entry to key information and knowledge resources for students, faculty and staff.

Understanding knowledge management

Preliminary to linking virtual or electronic library services with the concept of knowledge networking, the first phase of these two projects entailed surveying the literature of

knowledge management, identifying experts and practitioners, and gaining an overview of strategies for knowledge management. (These two portal projects were initiated in the course of Dr Reneker's temporary assignment (summer 1999) with the Office of the Department of the Navy Chief Information Officer, and in collaboration with several staff members there, principally Ms Buntzen, Librarian of the Navy, and Dr Edward Schmitz, then team leader in knowledge management.) The focus was first on sorting through the many definitions of knowledge management. Brooking (1999) gives us one of the classic often-cited definitions: access to knowledge, information, and data that is available to the right person at the right time in the right place. In reality, however, for those trying to understand knowledge management concepts and possible applications, the truth about the current state of the subject is perhaps better expressed by Cortada and Woods (1999), "The subject today remains too broad, poorly defined, and does not fit neatly into pre-existing buckets of management practices. In short, it is a new sub-field under construction."

Davenport *et al.* (1998) define knowledge as "information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions. While knowledge and information may be difficult to distinguish at times, both are more valuable and involve more human participation than the raw data on which we have lavished computerization during the last 40 years. Given the importance of such an asset, it is not surprising that organizations everywhere are paying attention to knowledge – exploring what it is and how to create, transfer, and use it more effectively. Knowledge management, in particular, has recently blossomed."

Perhaps a good approach to understanding the promise and potential applications of knowledge management for electronic library and information services is to first parse the field into concepts that can be related to management practice, and then to attach information systems that could facilitate and align behaviors of employees to actualize the desired concepts and practices. Four such concepts are common cognitive ground, transformation of tacit into explicit knowledge, communities of practice, and facilitation of knowledge sharing within the organization.

Common cognitive ground

McElroy (1999), a member of the IBM Knowledge Management Consulting Group, postulates in *The Second Generation of KM*, "What second-generation KM has that first-generation schemes lack is a fundamental theory of knowledge and social cognition. According to second-generation theory, organizations not only hold collective knowledge, but they actually learn. The proper scope of KM, then, should be to enhance organizational learning... Feed the processes that spawn the production and integration of new knowledge in human affairs, and innovation and better organizational performance will follow." Nonaka (1991) describes the concept of redundancy in Japanese organizations and asserts that "Redundancy is important because it encourages frequent dialogue and communication. This helps create a 'common cognitive ground' among employees and thus facilitates the transfer of tacit knowledge."

Transformation of tacit into explicit knowledge

According to Manville (1999) much of an organization's knowledge is based in its people and cannot readily be collected or disseminated. In his view, judgement, experience, skills, and the previous learning of workers are tacit knowledge, which has "become the target of management approaches that sought techniques and processes to make the implicit explicit: to 'extract' knowledge from people and codify it for dissemination and use by others." Manville sees a third generation of knowledge management approaches that focuses on this task of extracting knowledge from people who do not realize they have it. Hansen *et al.* (1999) describe the differences in knowledge management application strategies between firms that emphasize knowledge reuse versus personalization strategies. Consulting firms using a personalization strategy, in contrast to firms emphasizing knowledge reuse or codification, offer clients advice that is rich in tacit or deep knowledge – the sharing of which is time-consuming, expensive and slow. Because it cannot be truly systematized, the application of this strategy requires personnel able to use person-to-person knowledge sharing effectively.

Communities of practice

People working together towards a common purpose and usually connected through a

common language and set of goals form the basis of communities of practice in an organization. Turner (1999) writes, "By definition, communities of practice are not defined. They have no names, no formal memberships, and no status. But they move information." They are characterized by intensive collaboration and sharing in their pursuit of greater understanding and knowledge. There can be many communities within an organization and knowledge workers will often be members of several.

Facilitation of knowledge sharing within the organization

Hansen *et al.* (1999) also emphasize that "people need incentives to participate in the knowledge sharing process. The two knowledge management strategies call for different incentive systems. In the codification model, managers need to develop a system that encourages people to write down what they know and to get those documents into the electronic repository. And real incentives – not small enticements – are required to get people to take those steps… Incentives to stimulate knowledge sharing should be very different in companies that are following the personalization approach. Managers need to reward people for sharing knowledge directly with other people."

Knowledge management in the Department of the Navy

Knowledge management is of keen interest across the Department of the Navy as new concepts and approaches are explored for dealing with post-Cold War trends and pressures to downsize, streamline, and respond to new missions and changing requirements. Virtually every naval organization is working to better understand the potential of knowledge management and to develop their strategies both for codification and for person-to-person knowledge sharing. Knowledge management is prominently addressed in the Department of the Navy's Information Management/ Information Technology Strategic Plan as Goal 4: "Implement management strategies that facilitate the creation and sharing of knowledge to enable effective and agile decision making"[1].

Just a few of the knowledge management initiatives and activities led by the Department of the Navy Chief Information Officer (CIO)

and the Deputy Chief Information Officer for Enterprise Integration include:

- Establishing a Knowledge Management Community of Practice (KMCoP) early in 1999 to provide a discussion forum, benchmark against best practices, and participate in developing enterprise-wide tools.
- Developing the Knowledge-Centric Organization Toolkit, a model with key steps needed to design, build, deploy, and sustain knowledge-centric organizations within the Department.
- Active membership in the IBM Institute and participating in its projects on Communities of Practice, Management of Expertise, and Strategic Planning.
- Leading working groups to investigate and plan for capabilities which the future Department-wide intranet will bring by identifying potential applications, e-business and commerce opportunities, and various leading edge developments including a strategy for portals to facilitate knowledge management.

Information environments in the Department of the Navy

The Department of the Navy is a complex, global organization made up of many diverse components. In addition to operational forces and their direct support infrastructure, components include medicine and health care with teaching hospitals, medical centers and clinics; pure and applied science and technology with R&D laboratories, engineering and testing centers; undergraduate and graduate education institutions; specialized training facilities in naval operations; and others. To meet the diverse information needs of naval personnel, there are over 500 libraries and information centers. Funding and resources are decentralized and provided by the local parent organization or command, resulting in a broad range of programs and operations from a very advanced digital library at the Naval Research Laboratory (Washington, DC), to many small, one- or two-person staffed operations offering very specialized services. The responsibility for library and information services policy is assigned to the Department of the Navy Chief Information Officer and functional duties are carried out by the Librarian of the Navy.

Naval libraries and information centers operate and serve their users in very network-centric organizations. There are several major Department-wide initiatives currently impacting network infrastructure and environments:

- Revolution in Business Affairs, an over-arching set of initiatives to more closely align naval business practices with the vast operational changes affecting naval affairs, such as incorporating commercial and electronic financial practices, and addressing quality of life issues for active duty personnel, such as housing reform, retention, and recruiting.
- Information-Technology-21, an effort to fundamentally transform the way the department plans and budgets for ship-based information technology (IT) and includes strategies to shift from acquiring IT as a centralized, large-scale system to considering IT as a disposable commodity, performing business case analyses within regional areas, and developing a global architecture to ensure interoperability.
- Navy Marine Corps intranet, a major project to develop a shore-based global intranet system (a network of networks) and replace a multitude of configurations with a system delivering standard solutions to about 350,000 desktops in the USA.

Portals for knowledge networking

A few portals have already been implemented in the Department of the Navy, including the Pacific Fleet's Knowledge HomePort to improve the ability of Fleet personnel to find and reuse information and knowledge, and LIFELines and MarineOnline designed to provide one-stop administrative support connectivity to sailors, marines and their families. These portals respond to the functional and service requirements of their respective user communities. In addition to portals, there are also many organization level intranets. At naval organizations with libraries, intranets are enriched by the library's collections and library-acquired electronic resources, as well as by involving librarians in their design. There are also many installations of online collaboration systems, such as LiveLink, throughout the Department, as well as many implementations of multi-functional applications and interfaces, including Lotus Notes and Microsoft Digital Dashboard to organize and customize internal and external information resources. All of these systems are part of the evolution from distributed information access to more and more advanced systems of knowledge networking or the interactive creation and use of knowledge.

Until inception, however, of the two portal projects discussed here, naval librarians had not yet had the opportunity to participate in design and implementation at the enterprise or inter-organization level of a knowledge networking system. These two projects are exciting opportunities to bring the principles of library and information science to the challenge of connecting people and information, certainly a key step in building knowledge sharing cultures.

Developing the next generation library concept

The next generation library (NGL) began as a proposal in summer 1999, to build a virtual library "node" for Department personnel in the Washington, DC headquarters network domain in order to provide content in support of business and executive level policy and decision making. Because naval libraries in the Washington area are focused on the physical and life sciences, headquarters personnel are not able to access fee or subscription based electronic content in the subject areas of business and management, information technology (IT), and naval, defense, and current affairs. Building on an earlier effort, the navy virtual library (NVL), the NGL is designed to meet this need. The NVL, developed in 1997-1998, was a prototype system that provided a single point of access via the Internet to fee-based science and engineering information resources. Dialog databases and ISI's *Current Contents* were some of the resources accessed through the NVL via user and organization profile management techniques, and it supported a geographically distributed community of 22,000 Navy scientists and engineers. The same techniques will be used in the NGL for providing a single point of access to highly relevant information resources in business, management, IT, and current affairs.

The CIO and the Deputy CIO for Enterprise Integration suggested pushing this virtual library concept to a higher level by integrating a virtual library with knowledge building and

sharing functionality. They recommended investigating adaptive searching, visualization, intelligent agents, and concept mapping, for example, and challenged us to develop a system that would provide services and support from "the best librarian you've ever known", or "the next generation library."

We broadened our focus to address objectives that would support knowledge management and networking, as well as provide high-quality content access at the desktop. Some of the knowledge management objectives central to our approach have been:

- Support distributed work groups to build relationships, foster communities of interest, and share information.
- Enhance ability to find expertise, peers.
- Provide tools to push information to interested individuals without requiring prior knowledge of who those individuals are.
- Provide capability for user defined (customizable) information work space.
- Improve search precision, enhance ability to "get smart fast", keep up to date, save time.
- Build and expand the common information and knowledge base.

Approach

To develop the NGL, a statement of work was prepared, proposals were solicited from systems integrators, and the Logistics Management Institute (LMI), McLean, Virginia, was selected in October 1999. In addition, funding was obtained to develop a similar portal at the Naval Postgraduate School (NPS); LMI was selected for that effort, as well. Tasks for both portals were clustered in five areas:

(1) Identify user requirements through focus groups and stakeholder interviews.
(2) Refine the concept of operations in response to user requirements.
(3) Evaluate and select portal software for purchase.
(4) Select content and method of external content integration in the portal.
(5) Configure and implement the portals.

Although the two portals will be serving distinctive user communities, it was anticipated that there would also be many areas for collaboration and opportunity to leverage common requirements and resources throughout not only development but also operation.

Portal software selection

Commercial-off-the-shelf (COTS) portal software in late 1999 already presented possibilities for our projects. New tools emerged to integrate capabilities for searching both structured and unstructured information with greater precision, personalize the search interface, visualize results, individualize intelligent search agents, and disseminate to colleagues the most highly relevant information discovered, as well as integrate other key functions in the process of discovering and sharing valuable knowledge. We developed a matrix of requirements using information gathered during stakeholder interviews. A key requirement of the searching component was pattern recognition for the capability to search across diverse resources and for the system to automatically suggest new information based on patterns of the users' use of the system.

The field of portal software was narrowed to three candidates, intensive demonstrations were provided by the software vendors and, in January 2000, the final evaluation and selection were performed by a multi-disciplinary panel, all of whose perspectives were important: librarians, those with knowledge management roles and expertise, and networking and software specialists. Autonomy's Portal-in-a-Box was selected, with the addition of the Autonomy Active Knowledge product to automatically suggest links to relevant information elsewhere, and Autonomy's Visualizer module to provide a unified view of disparate sources and show relationships and origin of information retrieved.

NGL concept of operations

The early implementation of the Next Generation Library was rolled out to a group of headquarters personnel in August 2000 and access was extended to additional offices beginning in September 2000. The NGL provides a single-search-input capability for simultaneous search and retrieval from across internal and external resources. This capability is key to acceptance by users since information literacy skills vary and most users are not supported by physical libraries and services; the portal must help them evaluate content from many sources. For those who have greater skills and, as new users gain

experience, there will be the option to turn on and off resources as they wish.

Information push and pull in the NGL will be based on users dynamically defining their areas of interest both explicitly and implicitly. As already mentioned, pattern recognition was a key requirement to provide more intelligent interaction with the user and for application in two ways: to identify and cluster content, and to observe user interests and the shifts in those interests over time. Access to a librarian for advice on selecting relevant resources and search strategy will be provided both online and by phone – in essence a research advisory desk. An electronic ordering system for publications is in the planning stage for integration in the near future.

NGL content and services

A librarian advisory panel was formed to assist with evaluation and selection of content for NGL. The primary selection criteria are:
- User requested or recommended.
- Relevance, comprehensiveness, and timeliness.
- Recognized and known sources.
- Cost and vendor pricing models.
- Full-image or full-text.
- Spiderable.

As many as possible of the user-requested resources will be included, as well as many that are recommended by the librarians as having name or brand recognition with users, that are current, and that are highly relevant to the NGL's subject scope. Full-text-image content is critical, since our headquarters personnel are not affiliated with physical libraries and interlibrary loan services. For fee-based resources, only those priced according to a simultaneous use versus a seat or potential user population model are being considered. With respect to spidering content, a key capability of the NGL is relevance ranking of search results retrieved across resources. For that to happen, the corpus (or publisher site, database, etc.) must be indexed by the NGL. Some information vendors, especially aggregators, may not be in a position to allow such spidering from either legal (copyright) or technical (database barriers) standpoints. This may change with time but, for these projects, we are negotiating

with each vendor or publisher individually for the optimum allowable and feasible technique.

Some of the internal (naval) resources scheduled for inclusion in the NGL are naval messages, policy and directives, and various naval and defense publications and databases. External resources include Jane's Magazine Library, several Bell & Howell Learning and Information fee-based resources (ABI/INFORM, five national newspapers, and ProQuest Computing and Military), as well as several general reference sources, news feeds, relevant Web sites and, eventually, commercial providers of trend analyses in information technology.

NGL configuration

This is a view from 38,000 feet of the NGL configuration using Autonomy knowledge portal software and is provided only to illustrate the process of searching and spidering remote resources, especially the fee-based type of resource, rather than a full description of NGL functionality and use (Figure 1). User authentication is by password and ID when users log on to the Navy Marine Corps intranet; this authentication information is then passed on to the NGL. In order to search across disparate and remote sources of information and for the NGL to provide relevance ranking of results, it is necessary to create an index of content of the sources. To do this, the Autonomy portal system includes index-creating software. The most common type of indexing is done by spidering Web sites.

Figure 1 Next generation library configuration
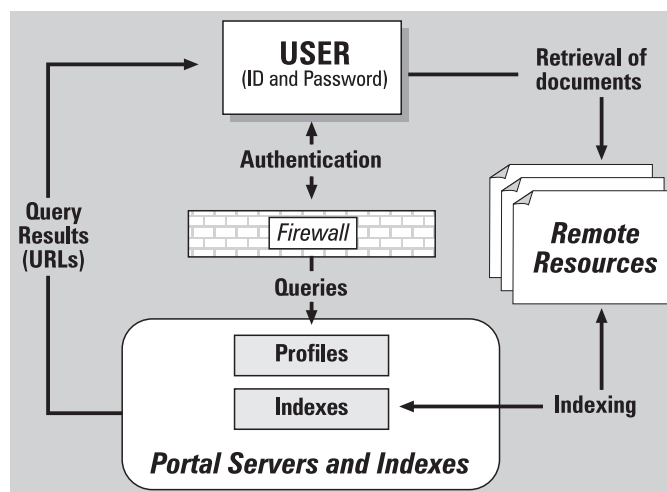
The spider is pointed at a spot in a tree of Web pages (not necessarily at the top, but at the top of the subtree that treats a topical area). The spider is then configured as to depth and breadth of retrieval desired, and then it goes about collecting the HTML pages found under the links it traverses. Thus, the query results, or URLs, come from the indexes.

In the case of licensed, fee-based resources, some content is spiderable, such as HTML-based information, but most content is not presented by hot-linked HTML. Rather, it is "hidden" behind queriable databases. This form of content cannot be spidered, and periodic access to the publisher's corpus (or a facsimile) must be negotiated. The corpus can be provided to the NGL via ftp or CD-ROM, but it is essential that the corpus contain the unique identifier (perhaps an accession number) used to retrieve documents from the online database. The NGL indexer is then run against the publisher's corpus. In summary, NGL users will actually query the index created by the portal software against the corpus and, when a document is retrieved, NGL will log on to the remote database and pass the HTML-based query string to that database to retrieve the document.

Development of the NGL has been an intensely collaborative effort among the authors, the LMI team, several naval librarians, and staff members of the DON CIO Office and the Naval Postgraduate School. This collaborative experience has enriched the discussion of implementation possibilities and strategies for both NGL and the NPS Knowledge Portal. Many areas remain to be addressed, but undoubtedly there will be opportunities to exploit as well as obstacles to overcome as we look at how the portals will interact with each other and the techniques of linking the two. While designed to serve differing user communities, there are also many common subject areas of interest.

The Naval Postgraduate School Knowledge Portal

The target audience for the Naval Postgraduate School Knowledge Portal is the students, faculty and staff, plus naval "sponsors" interested in using the capability of the School to produce research targeted to militarily-relevant needs of the fleet and other naval commands.

The Naval Postgraduate School is a graduate level research university whose mission is to enhance the combat effectiveness of the US and allied armed services and increase the security of the USA. Its student body is composed of officers and civilians from all five US uniformed services, and international students from 53 countries. It is unique as an academic institution in the composition of its student body, its primarily civilian faculty, and the breadth of its 46 militarily-relevant curricula that cover almost all academic disciplines, although the School's primary emphasis is on scientific, engineering, technical and behavioral science curricula.

NPS is also unique in working within an information environment, i.e. culture, that is a duality of civilian and academic. Communication issues and failure in knowledge searches result from the need of personnel to learn new vocabularies and understand different communication patterns. Military personnel assume that information will flow downward from the top, through the "chain of command". In the academic environment, communication, if it flows at all, is likely to flow laterally and upward.

Developing the NPS KP concept user requirements

The NPS KP requirements were initially informed by a previous study, conducted in 1998, which sought to identify the information needs experienced by NPS students, faculty and staff. Participants in 18 focus groups, conducted not by library staff, but by institutional support staff, were asked questions designed to elicit a general picture of the types of needs expressed by the three differing groups of campus personnel and, to the extent possible, not to bias the responses toward library resources. The intent was to take this wide range of information needs, and to interpret what place the Library would have in filling appropriate needs. Many of the needs expressed in the 1998 study related to quality of life issues. Use of Internet resources surfaced as a primary information source, and the Library was named as an information source in all 18 groups. Two significant findings of this study were the desire to locate information "in one place" and the frustration

of not having easy access to information about campus events, policies, and procedures.

Following the requirements of this study, developments in the knowledge management field, coupled with the development of new software applications developed to support enterprise resource planning (ERP) and the funding for the NGL project, presented personnel at NPS with the opportunity for a parallel project. The NPS project is conceptualized to use similar or identical software and is being undertaken by the same systems integration team, LMI. However, the information environment at NPS differs significantly from the target audience of the NGL, and the range of resources on campus is much broader, and selected to support scholarly teaching and research.

To prepare the concept of operations for the NPS KP, a second extensive user requirements study was conducted at NPS in February 2000. The questions were targeted at the development of the KP, including questions concerning incentives to utilize the portal and eliciting the participants' opinion on whether the cultural climate at NPS could be characterized as a knowledge sharing or knowledge hoarding climate. A total of 14 focus groups and 21 stakeholder interviews were conducted by NPS library staff and LMI personnel.

The need for a common understanding of the NPS information environment and of the various cultures of the members of the NPS community came through clearly in the focus group and stakeholder interviews. Easy access to information about what research is being conducted at NPS; quick access to the names and phone numbers of trusted human sources, or at least a place to start to get an answer; the ability to visualize information about, or messages written by, people working in similar areas, and the ability to establish searches that are updated regularly with information common to one's continuing information need can help create this common cognitive ground, so badly needed at NPS. Participants were cognizant of the need to facilitate contributions to the NPS KP by putting in place a reward system that would incentivize contributions.

In addition, surfacing in the user requirements study was the desire for NPS alumni to access the School's resources after their departure from Monterey, and to insert back into the School's research programs the specific operational problems they anticipate encountering in future tours of duty. In particular, the participants in the requirements study desired access to their professors via e-mail and the Internet, or through the NPS KP functionality.

The requirements study gathered information on issues such as user preferences for collaboration tools, information needs related to quality of life, thesis and research topic selection, the level of students' information-seeking skills, and user suggestions for incentivizing knowledge sharing at the Naval Postgraduate School. The NPS KP will support the academic and facilities management personnel of the School, as well as the teaching and research programs of the University. The School's curriculum is delivered through distributed learning programs to 12 sites throughout the USA and to ships at sea via videoteleconferencing and asynchronous learning courses. The KP will be designed to support these users as well as the on-campus community.

Participants offered a broad range with many differing views of how they would use the KP and what incentives could be used to encourage use. Opinions concerning the cultural climate were strong, but differed widely, with some participants stating clearly that the culture was a knowledge hoarding culture, and others believing that knowledge was widely shared, as is appropriate in a university environment. A point of consensus, however, among those who considered the climate a hoarding one, was that other groups, not their own, were involved in the hoarding or were responsible for deliberately not sharing information.

One clear message from the survey, however, is that participants want ease of access and use, for the KP to have a successful implementation, and some participants mentioned the importance of training in the use of the tool. With only a brief description of the capabilities of the types of software under consideration, participants were eager to conceptualize how it might be used in their work and how it might benefit them.

NPS portal software selection

The Autonomy Portal-in-a-Box software will also be used for the implementation of the NPS KP. Two modules of the software which

were enthusiastically received in the campus demonstrations to top level administrators were the capability to visualize the results of searches, using the Visualizer, and the ability to retrieve URLs in real time from external scholarly information sources, using the Active Knowledge module. The visualization tool, in particular, supports the collaboration and the building of communities of practice. This functionality will be important to all members of the NPS community, e.g. students, faculty and staff, assuming that policies will allow it to search public e-mail folders and message traffic on Microsoft Outlook, as well as databases such as the thesis database and the list of faculty résumés. NPS contains many academic groups and "centers of excellence" in various subjects which cross academic disciplines; therefore, the identification of personnel with interest and expertise which are currently unknown to the inquirer will be an important benefit of the project and the NPS KP.

NPS KP content selection

The results of the February 2000 requirements analysis yielded an 18-page spreadsheet of the sources named in the study, indicating whether the source was internal or external with brief attached comments from the participants. The selection of content for the portal will be driven not only by the expressed desire of the participants in the user requirements study, but by the feasibility of linking the databases to the KP. In many cases, the administrative, internal databases, such as those examples listed in Tables I-IV, are structured, and will require a data warehousing capability. The selection of external databases for the NPS KP, as for the NGL, will be driven by factors such as the technical feasibility of linkage to the NPS KP; the licensing requirements of the vendors/producers; and the importance of the database to the support of the research and instructional programs.

The analysis of the user requirements is still under way. The most frequently cited internal databases are being inventoried for their technical specifications. The external resources have not yet been selected but the prioritization of their selection will take into account the patterns of use under the present methods of access and the demand for their content in the user requirements study. The

Table I Student information database

Requirement	Focus – student database
Origin	Curricular office, assistant and associate provosts, deans, comptroller, other administrators, faculty
Needed by	Staff, deans, faculty
How satisfied	Student personal information, grades, classes, thesis *ad hoc* queries. (Also want schedules and demographics which FOCUS does not provide) Information is used by specific group on campus: security, police, curricular officers
Data owner	Registrar's office; information is input by different offices
Data administrator	Computer and information services personnel
Available to the portal?	Yes
Process to get access	Go through computer and information services personnel
Security controls	Restricted use because of social security numbers
Application software	A database – FOCUS is the commercial name – currently not Web-based, but future product being looked at that will be. Looking at FOCUS NT as well as software that will handle several resources such as faculty, student and financial info. Looking at COTS such as Oracle, People Soft, SQL Server – all have cost issues.
Size of the database	Unknown, only how many students it holds and number of fields
Location	On NPS mainframe due to security and reliability
Communication protocol	Hard to use, as not Web-based, person has to be knowledgeable about the database

concept of operations of the NPS KP was delivered in July 2000.

Caveats from the NPS KP analysis

According to Senge *et al.* (1999), much of the interest in "knowledge management" springs from concerns over enabling useful knowledge to travel between individual working groups, divisions, departments, and functions. In *The Dance of Change*, they write, many of the investments in knowledge management made in recent years – particularly investments in new information systems to capture and spread "knowledge" – have had disappointing returns. They include isolation, competitiveness, and distrust experienced by working groups toward one another as symptoms of the challenge of (knowledge) diffusion.

One such challenge is surely the deliberate withholding of knowledge and information. In the NPS requirements study, participants were

Table II Microsoft OUTLOOK – e-mail and message delivery

Requirement	OUTLOOK – personal e-mail posted to public folders and the scheduler, plus Navy Message Delivery
Origin	Academic staff, aviation safety, deans, comptroller, public works staff, provost, HRO, associate deans, faculty
Needed by	Staff, deans, faculty, deans
How satisfied	Current capabilities: personal e-mail posted in public or other designated folders and schedules, phonebook. Also want collaboration folders and bulletin boards
Data owner	Computer and information services exchange administrator
Data administrator	Same as data owner
Available to the portal?	Yes, public folders
Process to get access	Next version of Exchange should allow for direct link to public folders via the Web
Security controls	Currently access to public folders is determined by department or group
Application software	Microsoft Exchange
Size of the database	To be determined
Location	On various servers throughout campus and departments

Table III Facilities management database

Requirement	MAXIMO
Origin	Faculty, base support, public works
Needed by	Staff, faculty
How satisfied	Automated building master plan and will answer repair and facility questions
Data owner	Program manager: public works department
Data administrator	To be identified
Available to the portal?	Currently only being used by public works, but can be placed on portal
Process to get access	To be determined
Security controls	Set by public works
Application software	Oracle database
Size of the database	284M excluding application
Location	Public works purchase MAXIMO server with the software; resides in Ingersoll Hall. Dedicated server

asked to characterize the NPS environment between the extremes of information sharing versus information hoarding. From one respondent, we heard that information hoarding (to the extent that it exists) is partially due to the difficulty of sharing: "I think we are a pretty open knowledge sharing culture. Does knowledge get shared? Not necessarily, because it is hard. The time to input and locate or determine whom to share it with is the key. The portal notion is 'just put it there and others will find it.' Then it becomes the cost of the search. The question is how to offer up the tacit knowledge."

Another respondent "hits home" on the goals on KM: improving organizational performance: "I am not sure that we are

Table IV Thesis information database

Requirement	Thesis abstracts and electronic thesis
Origin	2nd quarter students, academic staff, associate provost, dean
Needed by	Students, faculty, deans
How satisfied	Abstracts are available now, some whole theses available after June
Data owner	Student owns thesis, NPS publishes it. Once thesis text is converted to PDF and research office "processes" it, the thesis will reside on NPS server accessible by the intranet and at some point the Internet
Data administrator	Research office processes the thesis after the student converts it to PDF and uploads it to the NPS server
Available to the portal?	Yes, as the PDF files reside on the NPS server. Should be available via a URL soon
Process to get access	Initially may require access to NPS intranet but, after classification concerns are taken care of, any unclassified thesis will be posted for access via the Web
Security controls	Only those mentioned above with sensitive or classified information in the thesis itself
Application software	Web browser and Adobe Acrobat

hoarding as much as not knowing who else needs the information and how to get it to them... We need to focus on the KM goal: increase the richness of the information environment at NPS and reward information searching through striving to have the users of the portal have a successful experience of that use. In addition, incentivize such use through giving contributors tangible rewards for sharing information by contributions to the database. If knowledge management principles hold, we should see improvement in the organization's achievement of its goals through the successes in finding and sharing information through the Knowledge Portals."

Conclusion

In the practice of applying information technology to human tasks, it seems that a type of role reversal occurs. To paraphrase a comment by Brown and Duguid (1999) on bots (autonomous software that operates as an agent for a user (FOLDOC, 1993)), "some accounts don't make bots sound like humans so much as make humans sound like bots." Many discussions of knowledge management seem to view humans primarily as knowledge managers, rather than to conceptualize knowledge management as an approach or set of processes and practices to improve human seeking and utilization of knowledge. Keeping this caution in mind, we need to look carefully at knowledge management tools, to see exactly what benefits (and costs) can be anticipated in implementing knowledge management and networking projects; how the benefits and costs will be measured; how organizational performance can be improved; and how the knowledge gained will be incorporated into the design of the knowledge portals of the future.

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