

2002

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Recommended Citation

Liebowitz, Dr. Jay (2002) "Making Knowledge Management Part of Your Human Capital Strategy: A Look at a Large Government Technical Organization," *Journal of International Information Management*: Vol. 11: Iss. 2, Article 1.
Available at: <http://scholarworks.lib.csusb.edu/jiim/vol11/iss2/1>

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Making Knowledge Management Part of Your Human Capital Strategy: A Look at a Large Government Technical Organization

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ABSTRACT

The U.S. government is facing a human capital crisis in the next five years whereby around half of the federal civil servants will be eligible to retire. Because of this ensuing dilemma, each government agency is developing a human capital strategy. A key pillar underpinning this human capital strategy should be “knowledge management”. This paper discusses the knowledge management strategy for a large government technical organization, and explains how knowledge management, discovery informatics, and lessons learned systems can become a central component of a human capital strategy.

KNOWLEDGE MANAGEMENT: A KEY PILLAR OF A HUMAN CAPITAL STRATEGY

One of the five main government-wide initiatives as part of President Bush’s “President’s Management Agenda” is the Strategic Management of Human Capital. According to Knowledgeworkers.com, human capital is the accumulated value of an individual’s intellect, knowledge, and experience. In the U.S. federal government, a human capital crisis exists. The factors contributing to a human capital dilemma include a knowledge bleed due to retirement eligibility, changing perspectives on work, and escalating knowledge loss. According to a Joint Hearing on the Federal Human Capital, by 2005, more than half of the 1.8 million non-postal civilian employees will be eligible for early or regular retirement. An even greater percentage of the Senior Executive Service, the government’s core managers, will be eligible to leave.

With this impending human capital crisis in the federal civil servant population, how can knowledge management help resolve this critical situation? Knowledge management should be one of the four pillars of an organization’s human capital strategy. Competency management, performance management, knowledge management, and change management should comprise

a human capital strategy. Competency management refers to identifying and planning for the types of skills and proficiencies that the workforce of the future in an organization should comprise. Performance management is measuring the output derived from the individuals with the identified competencies in the organization. Knowledge management deals with how to capture, share, and apply the knowledge and experience gained from those individuals in the organization to best leverage the knowledge internally and externally. Change management refers to developing and nurturing the mechanisms in which the desired organizational culture of the future should possess.

As an example, at a large technical government organization, a human capital strategy working group has been formed to develop a human capital strategy and eventual implementation plan. About 60 percent of the organization's civil servants are scientists and engineers, with another 25% being professional and administrative. Within the next five years, about one-third of this organization's federal civil servants will be eligible to retire. This organization is taking a broader view of human capital to include the total capabilities of all the talented people who work on and contribute to the achievements of the organization—including its civil servants, colleagues at other locations, contractors and vendors, other federal agency partners, university partners, and international partners. In addition, the federal civil servants include full-time, part-time, and term appointments. The critical goals developed for the human capital strategy at this organization include: attract and maintain a vital and effective workforce; develop additional relationships with contractors, education institutions, and other partners; lay a new foundation for knowledge management.

With respect to the knowledge management (or the "learning") pillar, the hope is to promote a continuous learning culture for all of the contributors to this organization's mission, and develop systematic processes to leverage knowledge internally and externally. An investment in knowledge sharing and learning should be supported by technology, and should be valued, encouraged, and rewarded as part of the culture. In the past, there has been a lack of systematic knowledge capture processes and systems in place for knowledge management. This indicates the possibility of some serious "knowledge gaps" resulting at the organization in the coming years.

To compensate for these ensuing challenges and to better shape a knowledge management/human capital strategy, a Knowledge Management Officer was appointed to help build and nurture a knowledge sharing culture, create a unified knowledge network, and systematically capture and share critical knowledge. Various codification and personalization approaches to knowledge management are being applied. On the codification side, lessons learned are being entered into an enterprise-wide lessons learned information system, case studies are being written on successful and failed projects (these are also being interwoven within the project manager's education courses), knowledge capture sessions with leading experts in the organization are being videotaped for inclusion in the knowledge preservation project (a web-based, online searchable video repository), a new intranet is being developed which includes important sources of information and knowledge throughout the organization, colloquia are being webcasted and included within the knowledge preservation project, mini-courses in selected engineering areas are

being conducted and videotaped (and included within the knowledge preservation project), and other codification approaches are being applied. On the personalization side, knowledge sharing forums with up-and-coming and experienced project managers are being conducted (the use of storytelling is being applied here), mentoring programs are being used, online communities of practice have been started, a yellow pages of organizational expertise has been developed. Creative Learning Groups and special leadership programs that stress the holistic view of management are being utilized, the recognition and reward system is being analyzed to promote more significant learning and knowledge sharing behaviors, Knowledge Managers on key projects are being assigned, and tea & poster sessions, knowledge swaps, and brown bag lunches are being used as informal knowledge sharing approaches.

These knowledge management techniques are helping to shape and preserve the human capital in this organization and share knowledge within the organization, as well as for educational outreach activities. A variety of approaches are being considered that would be part of the organization's human capital strategy. For example, establishing more partnerships with universities and applying the use of term appointments in key areas are being pursued. Transforming the roles of civil servants and contractors in the future is also being considered whereby the civil servants will concentrate more on the analytical and "thinking" (along with universities) components of the organization's mission, and the contractors will focus more on operations and maintenance activities. Realigning the organization to have more of a knowledge management focus is also being considered whereby a redefinition of roles played by the Library, Public Affairs, Information Systems Center, Human Resources, and other relevant departments are being suggested, as well as having Knowledge Stewards in Directorates and Knowledge Retention Managers on projects.

Another creative way to share knowledge and develop the workforce of the future is to actively engage the retiree community associated with the organization. In the organization under study, the Retirees and Alumni Association has about 2500 members. Recent retirees are being paid (and volunteer) to help mentor others in the organization, write case studies of failed projects and lessons learned, and assist in knowledge retention activities. They can be brought on as consultants, subcontractors, or as part-time retired annuitants. An Emeritus program exists where recent retirees can still keep their office at the organization and come in periodically to work on projects. Tapping into the retiree community, a relatively "untapped" pool of expertise and experience, has been a win-win situation for everyone. The organization has benefited greatly, and the retirees are thrilled to contribute as part of the family.

PUSHING KNOWLEDGE TO THE WORKFORCE

According to Weber et al's (2001) research on intelligent lessons learned systems, 70 percent of the existing lessons learned systems are ineffective. One key reason for this is the reliance on "passive" analysis and dissemination versus "active" analysis and dissemination of the lessons learned. For example, most project team members don't have time to surf the web looking for lessons (passive approach) that may apply to their situations. They would prefer a

more pro-active approach to have lessons “pushed” to them that fit their areas of interest. The current Agency’s Lessons Learned Information System (LLIS) has a “push” feature, based on user profiling, to send appropriate lessons from the LLIS to those users whose interest areas match a new lesson entered in the LLIS repository. The main problem with the current approach, along with most lessons learned systems, is that the user may need a certain lesson that was pushed to him/her several months ago, and he/she may have forgotten about that particular lesson. Thus, the value-added benefit of this push feature is minimized. It would be better to synchronize the “pushed” lessons learned with the time the user needs those lessons most (i.e., when he/she is working in a particular area where appropriate lessons in that area would be pushed to the user).

The existing lessons learned systems (Department of Energy, Army, Navy, NASA, etc.) to date have not addressed this issue. Most are still relying on passive lesson analysis and dissemination techniques. In order to maximize the effectiveness of a lessons learned system, another approach needs to be incorporated into the system to push lessons to the right users *at the right time*. Thus, the key is to push appropriate lessons to users at the time they need them most.

An approach to accomplish this action involves developing an integrated approach using expert profiling, case-based reasoning, agent technology, and recommender systems. Expert profiling involves developing a user interest profile based upon emails and text documents. Case-based reasoning is a machine learning technique that applies analogical reasoning to retrieve similar (or relevant) past cases, using similarity measures like nearest neighbor, etc., in order to determine the closest matching solution to the user’s problem area. Agent technology, in this context, involves developing a software agent that will serve as a helper to assist the user in recommending, based upon recommender systems technology, appropriate lessons from the LLIS to aid the user in his/her work.

The following steps could be used to “push” lessons to the user community:

1. On a daily basis, the user sends email and creates text-based documents.
2. A tool, like Tacit’s KnowledgeMail could be used to generate a “(daily or weekly) dynamic user interest profile” by analyzing the user’s email and text-based documents (e.g., Word files, etc.) (there are also privacy provisions built into KnowledgeMail).
3. The user can refine the interest profile by directly making changes to the taxonomy of terms in the user interest profile, generated by KnowledgeMail.
4. A recommender agent then applies case-based reasoning to apply similarity measures based on matching the user interest profile with the text in LLIS lessons, to search for and recommend a list of pertinent lessons.
5. The pertinent lessons from the LLIS are then sent to the user on a daily basis in order to receive the lessons “just in time”.

This work would be unique in two major ways: (1) integrating methods from expert profiling, case-based reasoning, agent, and recommender systems and (2) applying this integrated technique in a lessons learned system, specifically the LLIS. The state-of-the-art in recommender

systems is moving from “how do we do it” to “how can we do it better” [Soboroff et al., 1999]. Much of the earlier work in this area evolved from Joseph Konstan’s research on GroupLens at the University of Minnesota and many of the underlying algorithmic approaches used throughout the field come from GroupLens [Ackerman et al., 2001]. With the knowledge management movement [Liebowitz, 2002], there has been a substantial interest in recommender systems for leveraging human expertise and knowledge. Recommender systems are real-time, on-line, model-free associations among people, and are easily explainable [Soboroff et al., 1999]. Many of the recommendation algorithms are based on improving the standard correlation-based prediction algorithms, and combining content and collaborative recommendation. Many recommender projects look at prediction error as a metric. Recommender systems are being used for expertise management [Ackerman et al., 2001] in order to find expertise in an organization. They are also being applied using case-based reasoning approaches [Aguzzoli et al., 2001]. Agents are also being used for expertise location, as in the work of the MIT Media Lab [Vivacqua, 1999] to build Expert Finders (in Java) to search for the right expertise who could help solve the problem. There are commercial vendors, like Orbital Software’s/Sopheon’s Organik [<http://www.orbitalsw.com>] product for developing user/expert profiles for locating, capturing, and sharing expertise. Tacit’s KnowledgeMail [<http://www.tacit.com>] product uses automated expertise profiling by continuously analyzing text-based content such as emails and documents to populate and maintain a detailed, expertise or interest profile for each user.

The new approach for “active analysis and dissemination of lessons” advances the current state-of-the-art in these areas above by integrating techniques from the expert profiling, recommender systems, agent, and case-based reasoning fields in developing a robust approach for capturing in real-time the ongoing interest areas of the user (based on an analysis of the user’s daily email and text-based documents), and then matching and sending appropriate lessons from the LLIS that fit this evolving profile.

THE EMERGING FIELD OF DISCOVERY INFORMATICS

The use of intelligent agents, as described in the LLIS example, is part of a growing field dealing with discovering knowledge in terms of new relationships and patterns in data, text, and multimedia. The “knowledge discovery in data (KDD)” community has existed over the recent years to apply techniques (such as semantic analysis, genetic algorithms, data/text mining, machine learning, etc.) for uncovering and better understanding relationships among structured or unstructured data (where data could be numbers, text, images, etc.). Coupling the KDD community with the “knowledge management” community creates a powerful, synergistic, emerging new field we are calling “discovery informatics”. Drug discovery (and innovation) informatics has been used in the pharmaceutical and biotechnology industries for trying to apply computer-related algorithms and techniques to accomplish such major tasks as decoding DNA or discovering new drugs. We, at the Center for Discovery Informatics at Johns Hopkins University, are applying “discovery informatics” in a wider context in terms of applying knowledge discovery techniques in various fields ranging from business, education, homeland security, biotechnology,

earth sciences, medicine, and others. For example, in the homeland security area, information fusion plays a major role whereby seemingly disparate pieces of information and knowledge may need to be organized in a manner which collectively provides useful information and knowledge. In business, determining customer buying patterns through discovery informatics techniques would affect where to group certain products in a given aisle. In education, the term "data-based decision making" is used to try to make sense out of data so that teachers and administrators can make informed decisions.

In terms of knowledge management and human capital, discovery informatics plays a key role. Discovery informatics can help in the creation, capture, and sharing of knowledge in order to build the institutional memory (organizational intelligence) of the firm. For example, through the use of data and text mining techniques, new relationships can be determined as in the case of a major oil company uncovering that it targeted its advertising funds to the wrong audience for promoting a new line of gasoline. Once this new knowledge is discovered, it can be captured, shared, and pushed to appropriate communities who could most benefit from this knowledge. Generating new knowledge from existing knowledge is an important direction for the discovery informatics field. Ultimately, the goal is to capture, create, and disseminate knowledge in order to lessen the effect of an organization's impending human capital crisis.

WHAT'S AHEAD FOR KNOWLEDGE MANAGEMENT?

In looking down the road beyond knowledge management, what will organizations be facing next? Some people talk about attention management [Davenport and Beck, 2001] in trying to develop better electronic ways of getting the attention of senior executives in prioritizing messages received via e-mail, voice mail, memos, documents, phone calls, regular mail, and the like. Others talk about information and knowledge ecology in finding improved ways of coping with information overload and producing a tranquil, harmonious environment in nurturing a knowledge sharing culture. Still others talk about the robots taking over, as hinted in the movie "AI".

Looking five to eight years ahead, what will be a key issue facing management and organizations? Hopefully, knowledge management will become woven within the fabric of organizations so that better techniques are used for capturing, sharing, and disseminating knowledge. Wireless computing will also become omnipresent and will continue to permeate corporate environments. Intelligent agent technology will certainly advance whereby learning will take place automatically in these software agents. But what are the main dilemmas that management will be facing which will drive the need for improved solutions? As the workforce is graying, the loss of key expertise in organizations will continue to be a major problem in the foreseeing future. The ability to have adaptive, agile organizations in coping with the Internet and e-business world and the rapidly diminishing half-life of information will increase the need for organizations to be innovative in faster, cheaper, and improved ways. International competition will certainly increase and will push organizations to either partner strategically, as being done today, or face the onslaught of competition from such growing, high brain-power economies as Brazil, India, China, and others.

In order to foster innovation and agility, organizations in the coming years will continue to strive to be “learning organizations”. Knowledge management will certainly contribute to this goal for knowledge creation and continuous learning. According to Reid Smith, Vice President of knowledge management at Schlumberger, the new challenge for knowledge management will be reinventing the organization as a provider of products and services that are only possible because it is able to leverage the collective knowledge of its people. To help in this regard, Hugh McKellar, the KM World executive editor, believes the next generation portal will plug the best enterprise knowledge from all diverse divisions into the corporate buss, apply abstract/contextual reasoning to it and automatically deliver it to the appropriate person or people. Artificial intelligence will play a major role in making these visions become reality.

A key element in creating learning organizations is transforming individualized learning into organizational learning. By building the collective intelligence of the organization, the organization should hopefully prosper through improved knowledge sharing mechanisms. Text mining and other knowledge discovery techniques will also be useful in creating knowledge for organizational intelligence. Embedding knowledge management processes within the business processes of the organization should help the organization in its “learning and unlearning” cycles.

In the years ahead, organizations will need to apply knowledge management in creative ways to foster their human capital. Establishing partnerships, strengthening mentoring programs, creating term appointments in key areas, developing systematic processes and systems for knowledge capture and sharing, and reassigning roles and responsibilities to lay a new foundation for knowledge management are techniques that more federal agencies will need to utilize as part of their human capital strategy. The next few years are tantamount for knowledge management playing a critical role in the strategic management of human capital. Those organizations that embrace these concepts now will be better prepared for the ensuing human capital challenges that they will face shortly. The years ahead look promising for organizations that put “learning” into their title. Knowledge management is putting us on the road to getting there, but it’s only a start. Hopefully, senior management will embrace these concepts as the intangibles become tangible!

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