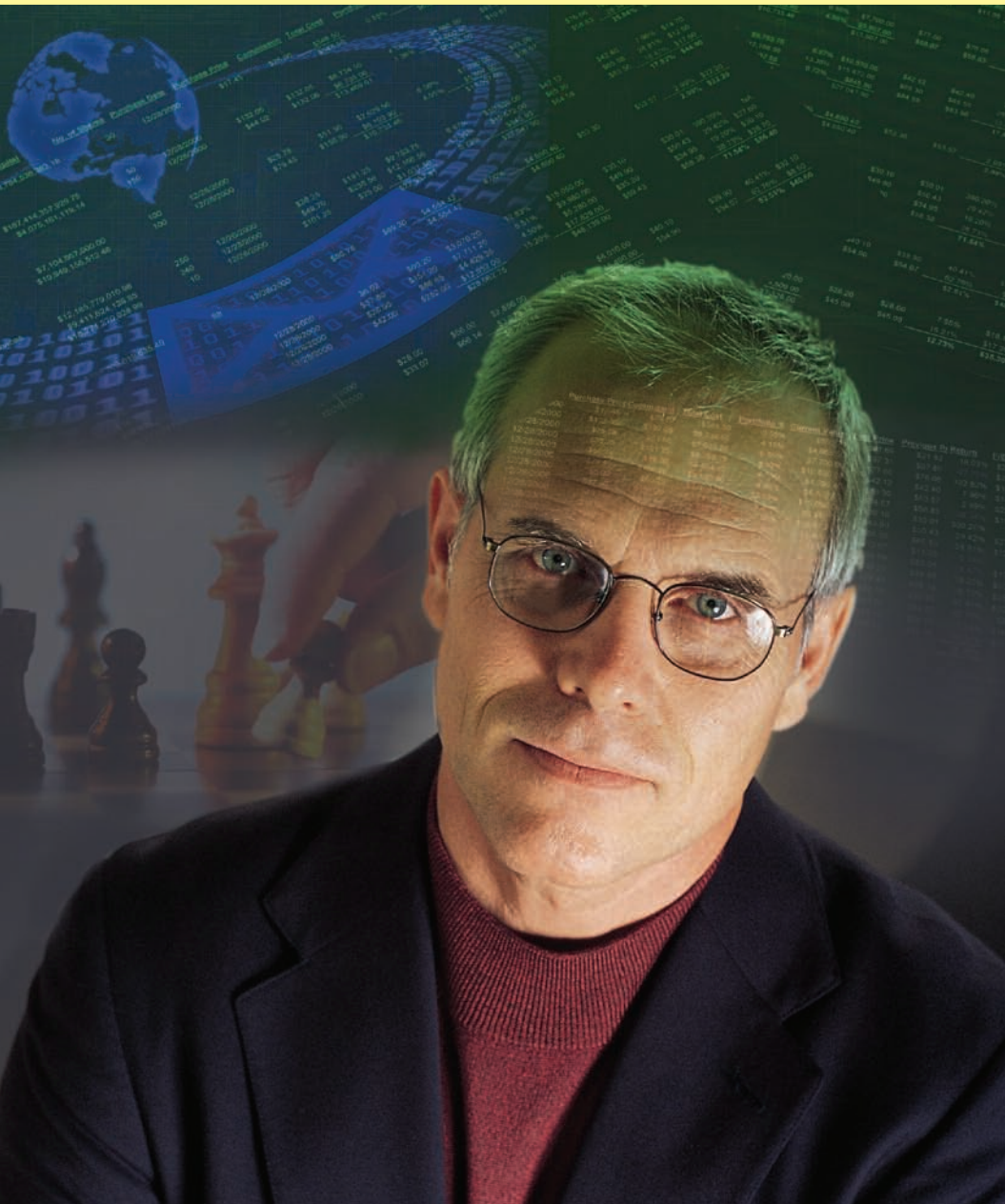


Knowledge management

Improved federal decision making and intellectual property protection

Executive brief



PLM Software

Answers for industry.

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Improving decision making across federal agencies while protecting the government's intellectual property

Executive summary

Knowledge management is a strategic initiative essential for any government agency's mission success. As a rising retirement rate diminishes the size of the federal workforce, the government's ability to protect – and effectively utilize – its intellectual capital is similarly diminished.

A lack of critical knowledge negatively impacts an agency's ability to make effective decisions in a timely manner. This limitation also inhibits agencies from being able to successfully execute their program on time, as well as being able to stay within the program's budgetary limits.

One assessment of this dilemma comes from the Aberdeen Group, who says, "Knowledge workers today are losing productivity in an endless search for information they know resides in the organization but is not easily accessible."¹

By implementing an enterprise knowledge management strategy coupled with an effective knowledge framework, agencies can distribute this critical program knowledge to widely dispersed stakeholders.

This flexibility enables program teams to continuously understand the interdependencies and consequences of changing requirements and changing environments across the life of the entire program/project. However, data by itself is only representative of a single point in time with no understanding of that data's relationships or how it can be used for decision making.

By being able to fully comprehend all aspects of agency knowledge (i.e., its lifecycle), knowledge workers can employ this information more effectively during the decision making process. This approach allows end users to understand agency knowledge as a whole so that they can ascertain its patterns and develop additional knowledge about how to use this information on a best practice basis.

In turn, these knowledge management techniques enable agencies to make informed decisions that improve the likelihood of program success.

Current challenges

Vanishing brainpower. Federal government agencies currently struggle with the challenge of capturing, disseminating, distributing and managing business-critical knowledge. This problem is exacerbated by the increasing number of government employees who retire from public service with each passing year – taking with them highly valuable intellectual property.

According to one well known study, "44 percent of all federal workers become eligible to retire over the next five years, with 61 percent reaching eligibility four years later."²

Ultimately, this trend results in ineffective decision making across an agency as knowledge workers find it more difficult to locate – and more importantly, to understand – the knowledge that is crucial for agency decision making.

As the business-critical nature of knowledge becomes apparent,

government agencies increasingly recognize knowledge as a strategic asset that deserves the investment of time, energy and resources.

Nature of agency knowledge. However, as agency knowledge gains credence for its mission-critical value, challenges arise from its inherent nature. Agency knowledge is highly dispersed, hard to identify and resistant to easy categorization.

Despite the advance of accepted IT and knowledge management solutions, agency-critical knowledge often resides only in the heads of experts – many of whom may be leaving their agencies relatively soon. To make matters worse, high-value knowledge workers seem to be the most likely candidates to depart. Some areas expect to lose 60 percent of their engineering staff within the next five years. In many cases, valuable knowledge will be lost forever when expert staff leaves.³



Government agencies also are challenged by the fact that not all information is of equal value. For many agencies, critical knowledge is invariably linked to the requirements definition for a particular program or project. This knowledge must be identified, stored and contextualized (i.e., linked to other relevant knowledge) to ensure its value.

For this reason, both government and business often employ product lifecycle management (PLM) solutions as an ideal backbone for implementing their knowledge management initiatives. PLM-based knowledge management is especially adept at facilitating better decision making by enabling users to understand the interdependencies that pertain to their information assets.

Managing policy knowledge. Another challenge arises because policies are often under-managed and under-utilized. Many sources throughout the government create or author policies. Some agencies are chartered with the responsibility for generating public policy, while other agencies create policy for governing agencies. In most cases, both approaches involve processes where the policy-generating agency combines with an internal organization that mandates policies for a particular agency.

Effectively managing this kind of knowledge requires the ability to understand how a policy got to where it is today. Agencies and other organizations can begin to understand and improve upon their policy making processes by managing policy definition, approval, rollout and obsolescence.

Just as importantly, by understanding the reciprocal relationships between policies and their dynamics, decision makers can eliminate confusion that arises when reviewing policy before task execution.

Key principles. Two kinds of knowledge are essential for government and business.

- *Tacit knowledge*, which includes human education, experience and expertise

- *Explicit knowledge*, which includes documents and data

Computer systems can automate activities associated with both tacit and explicit knowledge. If information is predictable and if it can be structured in standard and sharable ways, computer systems can manage it. However, if information is unstructured (e.g., buried in paper documents, spreadsheets and emails – or housed in the minds of knowledge workers), it can be very difficult to manage.

For these reasons, the effectiveness of knowledge management depends on both cultural and technical processes that facilitate knowledge creation, collection, sharing, recombination and re-use.

Agencies that want to implement a successful knowledge management initiative need to focus on three key issues:

- Developing an enterprise knowledge strategy
- Providing global knowledge access
- Implementing knowledge automation practices





Enterprise knowledge strategy

Strategy goals. According to Knowledge Management magazine, the goal of knowledge management is to:

Create new value by improving the efficiency and effectiveness of individual and collaborative knowledge work while increasing innovation and sharpening decision making.

At a fundamental level, knowledge management initiatives aim to eliminate non-value-added work. When tedious and manual tasks are automated, knowledge workers can focus their time on

activities they do best – such as creating, selecting and implementing policies and directives.

By making knowledge readily available at its point of need, agencies can improve the time to decision, as well as the quality of their decisions.

Initiative requirements. An effective knowledge management initiative requires implementers to:

- Set clear knowledge management goals
- Identify the processes and the agency-critical knowledge that is required to execute these processes
- Prioritize the most important and “doable” processes that should be implemented (to ensure a successful start and receive near-term payback)
- Identify potential bottlenecks/ failure points and the knowledge required to address them

Since knowledge management is virtually infinite in its scope and IT budgets are almost always limited, agencies must prioritize the information and data that constitute their truly critical knowledge. Agencies can start this prioritization by focusing on areas most likely to deliver immediate value. This focus needs to be maintained over time.

In addition, agencies should decide which implementation perspective is most important to them before diving into the initiative’s implementation. For example, the initiative’s requirements definition phase can be viewed from a systems engineering perspective by defining and capturing project requirements and mapping these requirements to appropriate system architectures.

Alternatively, this phase can be assessed from a downstream collaboration perspective that seeks to enable all knowledge workers to access those elements in the requirements definition phase that pertain to their project tasks.

Dealing with unstructured knowledge. Unfortunately, large amounts of valuable knowledge often elude agency computer systems because of their unstructured nature. Much of this knowledge resides in paper-based documents (notebooks, standards manuals and reference books) that are hard to update and distribute.

Valuable unstructured knowledge also can be found in spreadsheets, emails and blogs. Agencies must find ways to identify, categorize and retain their unstructured knowledge in secured repositories that can be accessed on an enterprise basis. This repository-based knowledge needs to be organized so that authorized people can quickly find documents and data required for their project tasks. PLM technology has proven to be the ideal infrastructure for managing enterprise knowledge and intellectual property.

Extracting value. It would be a mistake to assume that structured knowledge retained in enterprise systems is easy to access and use. In some instances, automation actually has created knowledge gaps and barriers that inhibit collaborative information sharing.

To generate value from the knowledge that they manage, agencies must be able to disseminate this information throughout an organization structure and across an extended knowledge-driven network.

Each added user brings new linkages and resources into the collaborative environment. This enriches the total value of the environment by enabling the whole to exceed the sum of its parts. In many ways, effective knowledge management becomes a process that has cultural, organizational and technological dimensions that must be cultivated to ensure success.

Best practice knowledge management initiatives leverage digital solutions to enable continuous knowledge capture, re-use, automation and management. Their aim is to generate real value from the collective intellectual assets of a global agency enterprise.

Role of the platform. According to AMR, a comprehensive knowledge management strategy must consider implementing a *platform*, which provides the set of focused applications and existing systems that the agency can leverage for knowledge management implementation. Enterprise infrastructures that are built on PLM provide the basic tools for effective knowledge management.

Agencies can capture and store their data and best practices in a PLM solution. The best of today's PLM tools enable agencies to

capture expertise at every stage of a program or project automatically. They also allow agencies to automatically apply this expertise to day-to-day work tasks. Equally important, PLM can be implemented or enhanced in cost effective stages.

Global knowledge access

Value of global access. Without an enterprise home to manage information, agencies have little opportunity for sharing and re-using their knowledge and intellectual property. Without a capability for global knowledge access, agency workers frequently waste time searching for the knowledge they need, performing unproductive and repetitive tasks that never add value to the agency or, even worse, reinventing knowledge totally from scratch.

These inefficiencies directly impact program schedules/cost and can significantly compromise program intent. To avoid these problems, agencies need to identify and manage all of their valuable information in an enterprise repository that provides universal access on a secured 24x7 basis.

This unified environment can enable agencies to identify, share and re-use collective knowledge, best practices, data and competencies across key agency

functions. To make certain that the right knowledge is captured and shared, users themselves should be able to identify and classify documents, spreadsheets, emails and other important kinds of unstructured information.

An enterprise knowledge repository ensures that the right knowledge is shared with the right people. New workers come up to speed much faster. Valuable knowledge stays with the agency when employees leave.

Knowledge workers can locate relevant information, proven methodologies and techniques in seconds regardless where this knowledge is created or stored. This functionality empowers knowledge workers to complete project tasks more quickly and effectively.



Digital knowledge capture. To effectively share and use information, agencies must first capture, store and manage it. Identifying all critical knowledge – whether it is in a spreadsheet, legacy system, scanned image or hardcopy – is an important first step in building an effective knowledge management system.

Agencies now realize that a great deal of knowledge is unstructured – that is to say, not easily captured by a computer system. According to Forrester Research, 80 percent of today's business knowledge falls into this category.⁴ Looking at this another way, today's decision makers could be making crucial decisions based on only 20 percent of what they really know.

To make matters worse, government agencies often have multiple versions of the same project information. If content is not intelligently standardized upfront, agency-critical data may not be searchable. What's more, rules for reporting and triggering agency-related actions may be difficult to implement effectively.

How can agencies effectively manage their knowledge gathering processes?

To begin, they can put tools in place to enable domain or discipline-specific experts (e.g., systems engineers) to easily capture cumulative knowledge. For example, agencies can create a systems-level template with governing rules to define how subsystems interact and then rapidly morph these processes through different variants and configurations.

Once these tools are in place, agencies need to continually improve and upgrade their knowledge assets. Innovation requires constant vigilance. Agencies need to drive toward the elimination of paper documents and paper notebooks. They should always ask "what are we missing?" They need to continuously invent better ways to digitally capture new kinds of knowledge.

Knowledge automation

Actionable information. Once crucial knowledge has been captured, agencies need to transform those assets into what Peter Drucker calls the essence of knowledge – "actionable information."⁵

This is the stage in the knowledge management initiative when information is linked to other relevant data or related information assets. Truly effective knowledge management systems must be sophisticated enough to match the right data elements together (for example, by matching requirements to the project tasks they drive).

Because knowledge management requires that information be shared across multiple groups and disciplines, investment in the knowledge management initiative can be wasted if agencies do not execute the initiative consistently as a single team. It is not enough simply to capture knowledge; knowledge must be put to work through better enterprise processes.

To achieve this level of productivity, agencies need to validate knowledge that is developed and captured offline before program executions. Then, they need to apply this validated knowledge during the actual program.

Multidisciplinary validation. Knowledge management initiatives necessarily span multiple disciplines (such as program management and analysis). As a result, they must support mutual validation.

If multidisciplinary validation is automated properly, it speeds process execution across the program lifecycle. In this case, validation ensures that all disciplines touched by a requirement or change are able to validate its impact by making certain that crucial needs are met from the beginning.

Validation enables agencies to incorporate key criteria – including check points for all



processes and for all disciplines – as an integral part of an automated workflow.

As agencies implement multidisciplinary validation capabilities into a knowledge management system, they extend the validation process across all relevant domains and disciplines – thereby allowing everyone to work from the same instance of the program/project definitions.

This best practice ensures accuracy and synchronicity. As more knowledge is pulled in, more players are brought into the process so they can actively contribute to its success. This practice also enables agencies to automatically perform the validation instead of separately performing the validation process after the fact. Automated validation moves checking to the forefront of knowledge management, instead of treating it as an afterthought.

Summarizing the role of PLM

Knowledge is now universally accepted as an important agency asset. As the Aberdeen Group indicates, “The ability of enterprises to manage the knowledge in their organizations is a prime determinant of overall financial and operating performance.”⁶

Today’s challenge is to find cost effective ways to capture the right knowledge and maximize its use throughout its lifecycle.

Despite the widespread use of computer systems, only a small fraction of business knowledge is effectively structured. This significantly limits its management by enterprise-class applications. Until recently, unstructured knowledge appearing in paper documents, spreadsheets and emails has proven difficult to automate.

What systems, then, are the most effective means of driving knowledge management?

Among the plethora of knowledge management systems available on the market today, PLM solutions provide government agencies with a standardized platform for implementing knowledge management on a best practice basis.

PLM solutions already have proven their value in managing highly valuable system design/

development knowledge on a mission-critical basis. PLM solutions often are configured with today’s best knowledge management tools.

Proven PLM solutions support highly collaborative environments that provide global users with a single source of program and process information that they can leverage across long lifecycles.

PLM solutions provide open access to authorized contributors. They excel at linking critical program elements, including tying requirements, systems architectures and testing to program budgets and schedules, which enables agencies to mitigate program risk.

In summary, PLM systems enable agencies to break down widely dispersed knowledge silos and pockets of expertise – fostering instead a comprehensive enterprise approach to knowledge management.

Footnotes

- 1 *Learning and Beyond: Leveraging Organizational Knowledge for Better Business Results*, Aberdeen Group, 2005.
- 2 *Federal Brain Drain*, Partnership for Public Service, PPS-05-08, November 21, 2005.
- 3 *Introducing the Active Knowledge Framework*, AMR, 2005
- 4 *Information Management 101*, Forrester Research, 2006.
- 5 *The Coming of the New Organization*, Peter Drucker, 1988.
- 6 Op. cit. *Learning and Beyond*, Aberdeen Group.



About Siemens PLM Software

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