USDA Forest Service
USDI Bureau of Land Management

Discover

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Note: The author used the “Managing mission-critical Employee Knowledge” document as a launching pad for this effort. The USDA Forest Service (FS) and USDI Bureau of Land Management (BLM) greatly appreciate the willingness of Michael Furniss, Boundary Spanner, and Michael Rauscher, Research Forester, both of the FS, who coauthored the original document, for their willingness to share this material. Reflecting the true spirit of sharing and collaboration, this gesture enables the FS and BLM to learn from and build on their extensive research in this area.

Table of Contents

Figures

Tables

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1.0 Executive Summary

The Human Capital Initiative in the President's Management Agenda[1] calls for agencies to discover and capture the knowledge and skills of retiring employees. Over the next five to eight years, approximately 50 to 80 percent of the employees in the USDA Forest Service (FS) and USDI Bureau of Land Management (BLM) will be eligible to retire. Even though the scope and complexity of the workload increases steadily, there is institutional resistance to reducing the scope of the agencies' missions, and dwindling budgets make it difficult to replace departing employees.

No national strategy exists to replace or reconstitute the missing knowledge or skills. The FS and BLM clearly need an effective strategy to manage mission-critical knowledge, i.e., to discover, capture, and disseminate knowledge and skills over the entire span of an employee's working life. Research has shown that only about 20 percent of tacit knowledge can easily be converted into explicit knowledge. Tacit knowledge is informal, experiential, knowledge that exists within employees' heads or organizational memory.[2] Also, employees have no way to conduct a "knowledge dump." Rather, they respond to specific queries by offering "just-in-time" knowledge, even though they a knowledge dump might be more efficient. This document proposes creating a process and a system, which we call Discover, for capturing and conserving mission-critical knowledge in the growing population of managers and staff eligible for retirement, combined with the shrinking number of incoming new employees.

2.0 Background

Every agency has rules and regulations on how to perform one's job. These are rare in the FS – most handbooks and manuals were scotched in the late 1980s on the altar of paperwork reduction, and few position descriptions reflect the actual work or how it is done. Nevertheless, these rules comprise an organization's explicit knowledge. Old-time subject matter experts (SME) know how to interpret the rules based on the situation at hand, using their tacit knowledge.

2.1 Value Added If Effective Strategy Were Available

An effective knowledge management (KM) strategy would result in faster learning by employees, wider and faster dissemination of mission-critical knowledge throughout the FS and BLM, better problem solving, and cost savings in increased speed of operations and higher quality results. An effective KM strategy could create a large institutional repository of knowledge for managing explicit knowledge as well as vigorous communities of practice (COP) that could create connections to one's peers, allowing for learning and focusing on tacit knowledge.

2.2 Relationship to Other Issues

Effectively managing mission-critical employee knowledge relates to other issues by creating continuity, building on corporate knowledge, providing a support system for mentoring, and minimizing start-up time for new employees. It allows agencies to think on a more strategic level without having to spend energy on capturing knowledge.

3.0 Lessons Learned

So as not to start from scratch, managers and staff need to investigate what others have done to discover and capture critical knowledge within their organizations and build upon this experience.

We should also perhaps first look at what the FS has done, outside the realm of KM. While not a full solution by any stretch, it is not a void either. And existing applications have the advantage of being demonstrably implementable. For example, the following activities capture employee knowledge:

- Details with experienced units to supervisors.
- COP meetings, conferences, and symposia with proceedings and interactions between new and old employees.
- Mentoring, both formal and informal.
- Publications by scientific staff, which often preserves the most critical knowledge.
- Smithsonian video interviews (ad hoc).
- Certification programs, such as for silviculturalist, archaeological tech, or various civil engineering specialties.
- Various "new employee" orientations, many include roving around with experienced employees.

See Figure 3.1 for a way to conserve employee knowledge.

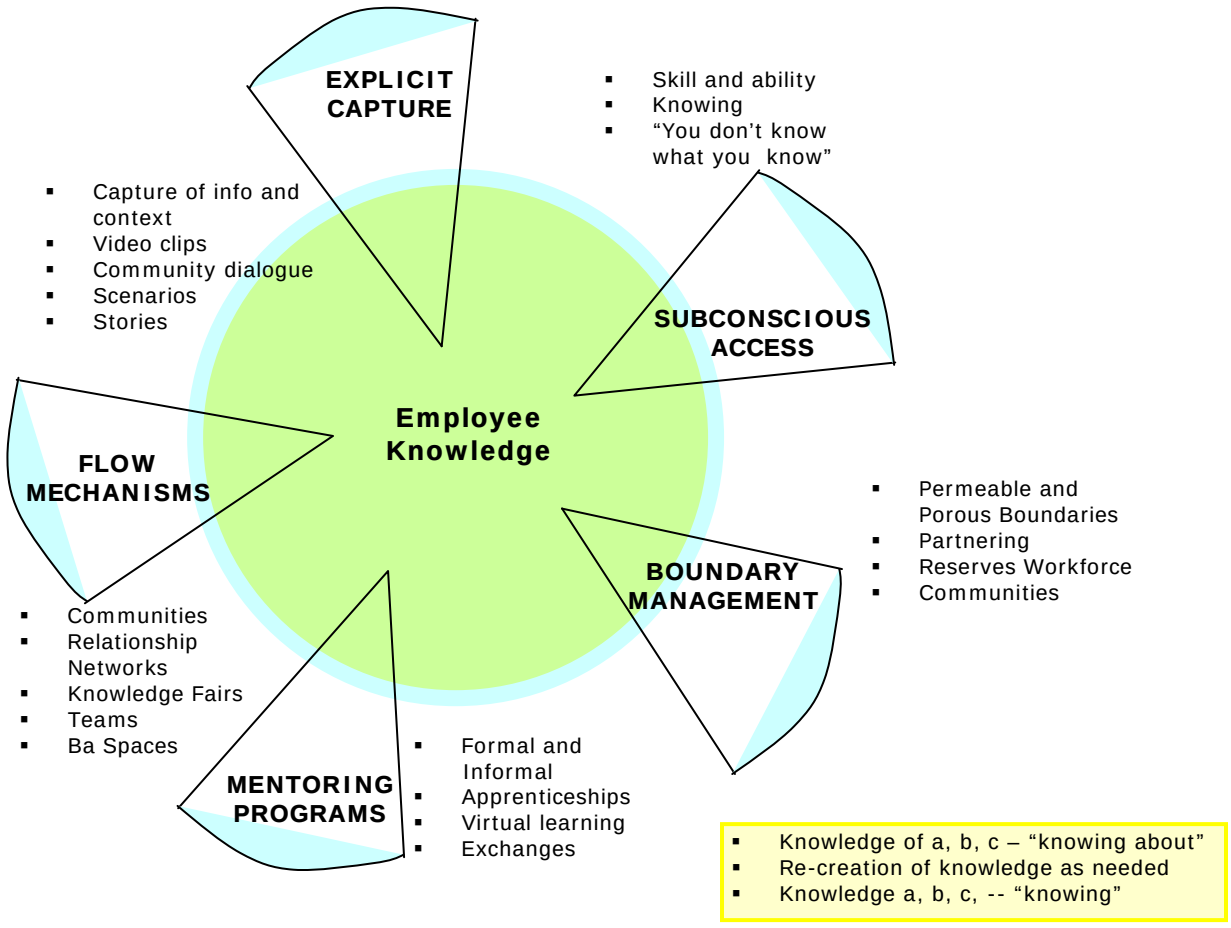

Figure 3.1 Conserving Employee Knowledge[3]

3.1 Find Answers[4]

The FAA has developed a continuously evolving database to reflect how SMEs respond to frequently asked questions. Internal and external users are first directed to this site to check if an answer to their query is already in the database before posting their question.

3.2 Extramural Standard Operating Procedures[5]

The National Institute of Allergy and Infectious Diseases posted its SOPs on a public Web site so its customers, its grantees, and contractors would be on the same page as its program and administrative staff. Based on SME input, SOPs provide step-by-step instruction by role for dozens of procedures. They also include contact information and links to more resources, including policy documents, required forms, and others.

3.3 Video Debriefings Program[6]

The World Bank Group uses debriefings to capture SME knowledge. These take place either at the end of a tour at one of the geographic regions or at the end of a person's mission to a country. After extensive video taping, the material is posted to the Web site using video, audio, and text. The videos can then be viewed in their entirety or in short segments through the use of searchable text.

3.4 Knowledge Asset Development System[7]

The United Nations Population Fund has implemented KADS as a living repository of collective know-how. It attempts to answer three basic questions:

- How do I…?
- Who can I ask for help with…?
- Where can I find an example of…?

KADS contains distilled experiential knowledge on any subject or issue. It is based on work processes and provides a structure or knowledge map to display knowledge. It presents information in a Q&A format and has links to examples and further readings. It also has links to SMEs who can provide additional information or offer guidance. KADS is developed, updated, and supported by a network of staff and outside resources when needed.

3.5 Mentoring

As the FS and BLM try to bring new employees to full performance level, the agencies need to figure out how to get the SMEs to transfer their tacit knowledge to less experienced employees. Mentoring can help by assigning new employees to experienced ones. For example, new employees will read the FS or BLM manuals and ask the SME questions about the deviations from the rule. Once this paradigm shift occurs, SMEs will start sharing their tacit knowledge, preserving it for future recruits.

We can take this process one step further by creating a business process by which new employees will record any deviation from the rules as part of their daily routine, converting tacit knowledge into explicit. Keeping in mind that current critical knowledge generally has a half-life of three years, organizations must continually maintain their tacit knowledge.

3.6 Succession Planning

The FS and BLM could institute a program under which every time a manager or executive is about to retire, a replacement is selected at least three months before that date. This will allow for a special kind of mentoring (see section 3.5 above) and the transfer of tacit knowledge associated with the retiree's job before her or his retirement.

3.7 Social Network Analysis

Numerous organizations use SNA to identify critical people within their network. Organization needs to identify the people who act like the "glue" within the network and are the key conduits of information. Once these people are identified, a formal training program can be put into place to educate replacements for these critical members of the network to ensure continuity after they depart. Figure 3.2 represents an example.

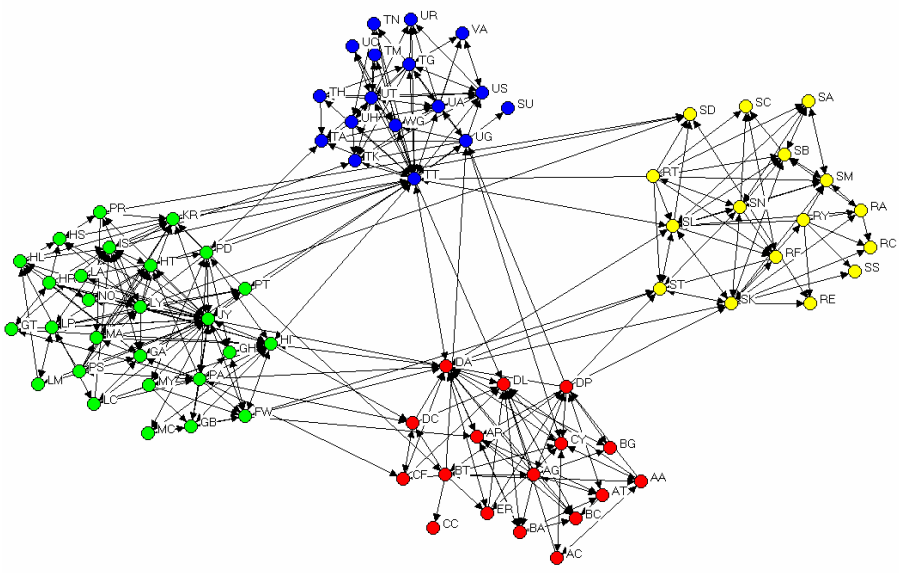

Figure 3.2 Sample Social Network[8]

4.0 Next Steps

4.1 Description of the Desired State

An accompanying document, KM Strategic Plan[9] discusses a plan of learning and KM for each employee from the time that they are hired until they retire. This strategy ensures that the learned knowledge and skills will be shared with others and be put to use.

5.0 Implementation

5.1 Implementation Actions Needed

An effective strategy to manage mission-critical knowledge is composed of many elements. Our most immediate focus is to identify the most significant losses the two agencies are likely to suffer over the short term (one to five years). In creating methods for minimizing the negative impact of these knowledge and skill losses, the

FS and BLM will engage all managers and staff as participants in the following KM strategy.

5.2 Activities[10]

- Conduct a knowledge loss risk assessment.
- Determine an approach to discover, capture, and share mission-critical knowledge.
- Monitor and evaluate the success of the strategy and look for continual improvement opportunities

5.3 Assess Loss[11]

- Identify positions and people where the potential knowledge loss is greatest and most imminent.
- Ratings are composed of:
  - Time until retirement.
  - Position criticality[12] – see tables 5-1 and 5-2.

Years away from projected retirement	Point value
Projected retirement date is within one year	5
Projected retirement date is between one and two years	4
Projected retirement date is between two and three years	3
Projected retirement date within three and five years	2
Projected retirement date over five years	1

Table 5-1 Retirement Factor

Years away from projected retirement	Point value
SME possesses critical and unique knowledge and skills with potential for significant reliability or safety impacts. Knowledge is undocumented. It will require three to five years to train a replacement. There are no ready replacements available.	5
SME possess critical knowledge and skills. Some limited duplication exists elsewhere within the agency and some documentation exists. It will require two to four years of focused training and experience to acquire the same level of skills.	4
SME possesses important knowledge and skills. Documentation exists and other on-site personnel possess the necessary knowledge and skills. New employees are generally available and can be trained in one to two years.	3
The individual possesses procedural or non- mission-critical knowledge and skills. Clear, up to date procedures exist. Training programs are current and effective and can be completed in less than one year.	2

The incumbent possesses common knowledge and skills. Newly hired employees from outside the FS and BLM possessing the knowledge and skills are readily available and require little additional training.	1

Table 5-1 Position Criticality

RF[13] x PRF[14] = MCAT[15]

- Score between 20 and 25 = Immediate action needed.
- Score between 16 and 19 = High priority but time for methodical plans exists.
- Score between 10 and 15 = Important but education and training or recruiting possible.
- Score between 1 and 9 = Work to discover and capture employee knowledge as an ongoing activity.

- Provides focus by identifying positions where steps to mitigate knowledge loss may be immediately needed.

5.4 Discover, Capture, and Share

5.4.1 Codification

- Documentation and written procedures, e.g., good practices and lessons learned.
- Checklists, inventories, how to instructions, and other formats.
- Development of a knowledge asset to display, store, and share acquired knowledge, e.g., the Forest Encyclopedia Network.[16]
- Formal (exit) and informal interviews with departing employees to capture information. These could be made more effective if structured with core questions and others tailored to the employee's specialty, captured on video, and produced in the persistent electronic format used by the PNW Station for scientific presentations, e.g., http://www.fsl.orst.edu/geowater/morphology/. This approach would provide for random access of information that successors need without tedious searching through videotapes or written material.
- Knowledge maps. Figure 5.1 represents an example.

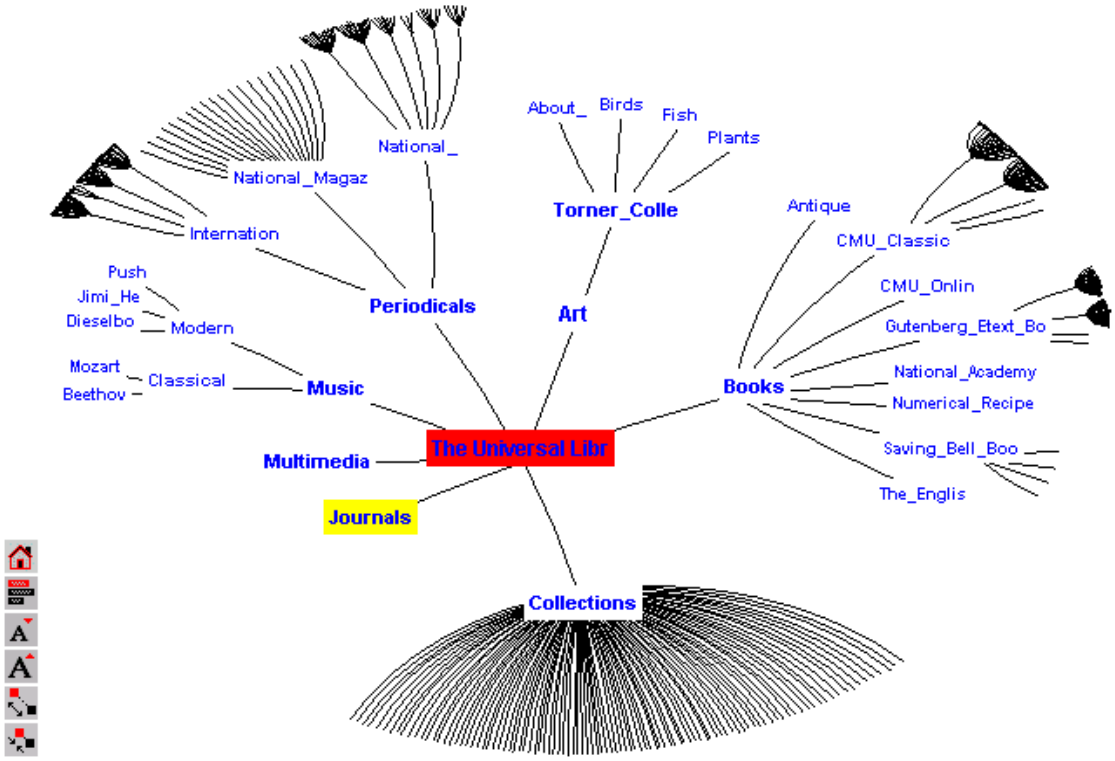

Figure 5.1 Sample Knowledge Map[17],[18]

5.4.2 Education and training

- Classroom and simulator training.
- Video-based or Internet-based coursework.
- Coaching, shadowing, and mentoring.
- On the job training and targeted work assignments – have junior-level employees sit in on important meetings.
- Apprenticeship programs.
- Action reviews and retrospectives to "pause" for knowledge acquisition; summarize, record, and share lessons learned.
- Storytelling (narrative) as a way to discover, capture, and share knowledge and skills.
- Time and place for employees to educate each other and learn from each other.
- Benchmarking across agencies to identify best practices and knowledge, record it and share it widely.
- Knowledge and skills improvement curriculum plan for critical disciplines to ensure continuous learning.

5.4.3 Development

- Improve the process to make it easier.

- Up-to-date equipment to make process easier.
- Elimination of a task, product, or service.

5.4.4 Alternative resources

- Contact in site, agency, or department experts.
- Use rotational or "visiting" staff.
- Cross-train existing staff.
- Use contractors, part-timers, and retirees.
- Establish communities of practice composed of job-related peers and develop peer assistance programs.

5.5 Monitor, Evaluate, and Improve

5.5.1 Design effective feedback loops everywhere

- Allow everyone the chance either by name or anonymously to provide feedback.
- Ensure action on feedback so people know it is worth doing and advertise this action widely.
- Reward and recognize feedback.

5.5.2 Milestones

- Garner formal FS- and BLM-wide, executive-level support and direction to all supervisors.
- Start a COP for this issue and make sure all supervisors are aware that this COP is there as a technical advisory and help system for developing their own plans of how to deal with this issue.
- Develop teams of experts within the COP that specialize in each of the action recommendations above so they can advise supervisors.
- Find or develop a user's guide for the COP and make sure each supervisor knows about this guide to help them take advantage of the COP.
- Beta test and critically evaluate the software knowledge assets offered up as part of the menu of actions.

5.5.2 Suggested team members

The FS

- Mike Furniss.
- Mike Rauscher.
- Susan Dreiband.
- Tina Welch.
- Jan Werren
- TBA team members with skills in the action items above

The BLM

- To be determined.

5.5.4 Resources Needed

To be determined.

5.5.5 Authority and funding

To be determined.

6.0 Barriers

- Unfamiliarity with instituting a new process across the two agencies.
- Time and attention for this project likely to be scarce among supervisors.
- Money, especially for travel support and for testing software systems in action list.
- Reluctance of the FS to push anything out from the national level. Voluntary tools are fine, but a mandate is very rare.
- The agencies continue a long-duration, steady contraction in numbers of employees, and budget, while the scope and complexity of the workload increase, mostly beyond agency control. Therefore, new work is a "zero-sum" proposition, and managers will ask what will not get done if this does. Unfunded nature of this mandate; i.e., this could be just another of a huge list of things supervisors have to do and the importance may not be perceived as high if they do not understand the benefits. . If we assume that it remains unfunded, it simply will not happen.

7.0 Kept in the Loop

The FS and BLM need to continually inform managers and staff about this program.

Appendix A – Acronyms

BLM	USDI Bureau of Land Management
COP	Community of practice
FS	USDA Forest Service
HC	Human capital
KADS	Knowledge Asset Development System
KM	Knowledge management
Q&A	Questions and answers
SME	Subject matter experts
SNA	Social network analysis
SOP	Standard operating procedures
USDA	US Department of Agriculture
USDI	US Department of Interior

[1] http://www.whitehouse.gov/omb/budget/fy2002/mgmt.pdf
[2] Giora Hadar, on load from the Federal Aviation Administration (FAA), *KM Strategic Plan*, January 2005
[3] Alex and David Bennet, Mountain Quest Institute
[4] http://faa.custhelp.com/cgi-bin/faa.cfg/php/enduser/entry.php
[5] http://www.niaid.nih.gov/ncn/sop/default.htm
[6] http://www.worldbank.org/ks/AFR.html
[7] http://www.unfpa.org/knowledgesharing/pkads.htm
[8] Robert Cross Darden School of Commerce, University of Virginia
[9] Giora Hadar, on load from the FAA, *KM Strategic Plan*, January 2005
[10] Amy Casher, *et al, Taking Action to Preserve Critical Knowledge* (Cambridge, MA, IBM Knowledge and Organizational Performance Forum, December 2003)
[11] Adapted from James E. Boyles, Tennessee Valley Authority
[12] Each supervisor or manager will rate her or his employees based on the two factors described in the tables below
[13] Retirement factor
[14] Position risk factor
[15] Mission critical attrition score
[16] http://www.forestencyclopedia.net
[17] The Rosenberg Group, LLC
[18] This kind of a knowledge map is represented in a hyperbolic browser. Examples can be seen at http://www.brain.com