

Knowledge Capture and Transition For State Agencies

“Do It As You Go, Not When You Go”



Team members:

Creig Grey, DNR Law Enforcement Division
Lisa Hainstock, MDA Food & Dairy Division
Jerrod Sanders, DEQ Water Bureau

Sponsor:

Gerald Harris, DNR Human Resources Chief

DEQ/MDA/DNR Leadership Academy

2006

Executive Summary

Knowledge Capture and Transition Action Learning Project

Knowledge management and retention is rapidly becoming more serious as time passes, since it is estimated that some 60% of state employees will be eligible for retirement within the next ten years (by the year 2015). These employees will take with them, literally centuries worth of earned service years, knowledge, and experience.

Although various State agencies have implemented a variety of individual practices to begin to address the issue, including job shadowing, mentoring orientation, new employee orientation, and an interdepartmental leadership academy, there does not appear to be any comprehensive strategies or plans to address this issue on a State-wide basis.

Project Scope

The Knowledge Capture and Transition Team project examined the issues surrounding critical program and administrative information, data, processes, and knowledge that must be retained as people depart from State government.

Tasks

The team performed a series of tasks to determine what methods were already being used at the State and Federal levels, then researched other available methodologies and protocols to see how improvements to the current system could be made. A pilot test of one of the methods provided the team with additional information to use in its recommendations to the agency administration to further address the knowledge loss issue.

Recommendations

While the team does not believe there is a “silver bullet” solution to knowledge management in state government, we believe the following recommendations address the core issues of critical knowledge retention in a realistic and adaptable way (listed in recommended chronological order):

1. Create Knowledge Retention Facilitator(s) within Each Department
2. Identify Critical Knowledge within Each Department
 - a. Supervisor scoring
 - b. Individual questionnaires and Interviews
3. Create Knowledge Retention Plans/Strategies. Develop and utilize the following tools to prevent critical knowledge loss, giving priority to direct person-to-person knowledge transfer:
 - a. Employee overlap
 - i. Hiring replacements before incumbents leave
 - ii. Hiring back incumbents as part/full time contractual replacement trainers
 - b. Mentoring
 - c. Cross-Training
 - d. Job Shadowing
 - e. Desk Manuals
 - f. Audio/Video Capture
4. Implement Knowledge Retention Plans/Strategies
5. Monitor and Modify. Adapt plans and strategies on an ongoing basis.
6. Be Proactive. In addition to retaining critical knowledge that already exists, utilize the tools and lessons learned to prevent isolated pockets of critical knowledge from forming.

Table of Contents

	<u>Page</u>
Executive Summary	1
Introduction	3
Methods	
Benchmarking of other agencies' knowledge capture and transition methodologies	6
Determination of which methodology to test	7
Identification of Critical Employees	7
Finding Willing Participants	9
Initial Assessment Questionnaires	10
Video Interviews	10
Creating Knowledge Retention Plan	11
Continuing Knowledge Management Program Needs	13
Items Noted During the Project	14
Selected Answers and Comments by Incumbents.....	14
Conclusions.....	16
Recommendations	17
Acknowledgements	18
Appendices	
Appendix 1: Questionnaire for Agency Human Resources or Organization Development Officers	
Appendix 2: Knowledge Loss Risk Assessment Spread Sheet	
Appendix 3: Analysis of Knowledge Loss Risk Factor for Lansing Employees	
Appendix 4: Initial Knowledge Assessment Questionnaire	
Appendix 5: Verbal Interview Questionnaire	
Appendix 6: Analysis Form for Assessing Knowledge/Skill Criticality	
Appendix 7: Knowledge Disposition Worksheet	
Appendix 8: Sample Knowledge Retention Plan	
Appendix 9: Agency Knowledge Retention Strategy	
Appendix 10: Knowledge Retention Tools Analysis	

Introduction

The Knowledge Capture and Transition Action Learning Project was made up of a three-agency interdepartmental team tasked with investigating knowledge capture and transition in state government and making recommendations to improve these processes within MDA, DEQ, and DNR. This was accomplished through:

- investigation of existing literature and methodologies from governmental and non-governmental organizations,
- testing an existing knowledge identification and capture method on employees from each department,
- developing a knowledge retention plan for at least one participating employee.
- using existing literature and field research in order to make a specific list of recommendations for senior management regarding the capture and transition of critical knowledge within the departments.

The purpose of this document is to report the findings of the investigation and make specific recommendations for improving these existing practices, implementing new practices, and providing specific objectives for this process moving forward.

What is Knowledge Capture and Transition?

Knowledge capture and transition, knowledge management, knowledge harvesting, and knowledge retention are all related terms for the processes by which organizations retain critical knowledge. In simple terms, **critical knowledge** is information that already exists within an organization, and meets both of the following criteria: (1) it is important to the organization, and (2) there is a high risk that the information will be lost to the organization with inaction. Below is a list of potential critical knowledge terms that will be discussed in this document.

Term Definitions

Organizational Knowledge. This is the compilation of all information available to an organization. It includes all hard copy and digital information, as well as information stored in the heads of its employees.

Explicit Knowledge. These are the documents, manuals, procedures, and references available within an organization. This type of information may be very important to an organization. It must be well documented, organized, and up-to-date if it is going to be available to employees in the future.

Implicit or Tacit Knowledge. This is the unspoken, unwritten, and unrecorded knowledge within an organization. This is the history of why decisions were made; the intricacies of dealing with individuals and organizations; or even the validity of explicit information on a particular topic. Most knowledge capture and transition programs are focused on retaining implicit knowledge, but it is important to understand that implicit knowledge within organizations is not always critical.

Much implicit knowledge is common among its employees, and/or unimportant to the mission of the organization. This information would still be implicit, but may not warrant the specific attention necessary to capture and transfer it as critical information.

Sole Subject Matter Experts. Whenever there is a question about any specific area of expertise, it is common for someone to say, “Ask Bob.” Bob may be a sole subject matter expert. In many cases, Bob, and those like him, have been the sole caretakers of specific programs for a long period of time. In some cases, they have managed them since their inception. They are often the only keepers of both implicit and explicit information about a particular topic.

Leadership. While leadership may not be traditionally referred to as knowledge, leadership skills are certainly critical to any organization. Much of this leadership knowledge is implicit. Adaptability, building trust, building partnerships, communication, decision making, facilitating change, strategic thinking, and team building are competencies which have already been identified as crucial to future leaders of MDA, DEQ, and DNR. Certainly, there is a significant amount of valuable explicit information available about these competencies, but the implementation of them within the context of how an organization functions is primarily implicit. In simpler terms, these traits are best learned by exposure to those that lead by example.

Incumbent. The person currently holding the critical position and/or critical knowledge and skills.

The Process of Knowledge Retention

In the general field of knowledge retention there are a multitude of terms, systems, techniques, and practitioners. However, in a more general sense, the process can be broken three components:

1. Identifying critical knowledge
2. Capturing critical knowledge
3. Transferring critical knowledge

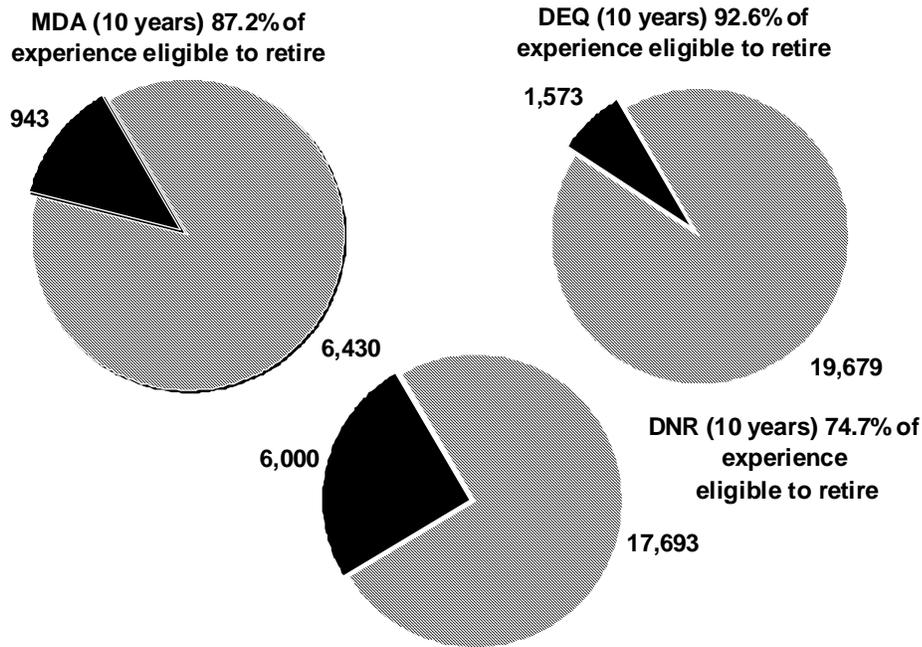
All methods and resources consulted during the course of this research project address each of these components. While they are identified individually here, these components should not be thought of in rigid terms. For example, in the case of a mentoring program, all three components are addressed when the mentee asks a question and the mentor answers it. The critical knowledge may be identified when the mentee expresses a lack of understanding about a topic that the mentor recognizes as critical. The capture and transfer occur simultaneously when the question is answered using the mentors implicit knowledge and experience. While the three components may not be distinguishable, they are all addressed during this process.

Why is Knowledge Capture and Transition Important?

Knowledge capture and transition has been recognized as an important topic across the spectrum of American organizations in recent years. The impending retirement of the “baby boomer” generation, and the increasing propensity for career changes in younger generations, have been the driving forces behind this trend. Michigan state government is not immune from these trends. With 26% of state workers eligible for retirement in the next 5 years and 60% in 10 years, there is an increasing risk that the critical knowledge the potential retirees possess (which may have taken many years to obtain) will walk out the door with them when they leave.

Specifically this report is being prepared for the Michigan Department of Agriculture (MDA); Michigan Department of Environmental Quality (DEQ); and Michigan Department of Natural Resources (DNR). The potential for knowledge loss in these three departments is staggering. There are an estimated total of 6,430; 19,679; and 17,693 years of earned service eligible to retire from MDA, DEQ, and DNR respectively in the next 10 years. This represents approximately 88% of the total years of experience in the three departments combined.

Figure 1: Estimated 10 year retirement eligibility based on total years of service of all employees in MDA, DEQ, and DNR as of September 24, 2005.



What is Being Done Currently?

Likely, partially due to the perception of increased cost, there are currently no State-wide efforts being implemented to address the impending knowledge drain. Current economic conditions complicate this issue, there are few additional resources available to identify, collect, and transfer critical knowledge, even from employees that will not be replaced. Alternatively, if they are replaced, the time lag resulting from typical hiring policies will not allow for interaction or effective knowledge transfer between the new employee and his or her predecessor.

The MDA, DEQ, and DNR have each implemented some individual practices to begin to address the issue, including career development courses, cross training, desk manuals, job shadowing, mentoring orientation, 1-2 day new employee orientation, rare departure/hiring overlaps, and an interdepartmental leadership academy. All of these programs can be effective methods of knowledge capture and transition.

Methods and Results

1. Benchmarking of other agencies' knowledge capture and transition methodologies

Each team member was tasked with contacting various sectors of industry and government to gather information regarding what existing knowledge capture/transition methodologies were currently in use. This also involved significant research on the Internet to determine what commercial or public use programs were available.

- **Federal agency results**

Representatives from several different federal agencies were contacted and asked about any knowledge capture or transfer methodologies currently in use.

In FY 2002, the President's Management Agenda identified as one of its initiatives the need to adopt information technology systems as a means of capturing some of the knowledge and skills of retiring employees. The following are a few examples of programs that seek to address this agenda item.

The U.S. Department of Agriculture's (USDA) Research, Education and Economics agencies have developed a series of programs designed to educate their staff and others through training and other educational programs. Many of these programs are web-based, others involve software programs, classroom training or are mentor-based.

Both the U.S. Department of Treasury's Federal Law Enforcement and the U.S. Federal Bureau of Investigation's training centers often use retirees as training staff.

The USDA's Administrative & Financial Management office has an on-line site called AgLearn, an employee education tracking system for recording the specifics of available courses and training that employees have received.

No Federal programs for identification of critical positions were readily identified in the research conducted by the Action Learning Program project team.

- **State agency results**

Team members interviewed the Human Resource division and other employees in their respective agency's using a questionnaire developed for this purpose (Appendix 1), to determine what, if any, existing capture/transition methodologies were currently being used.

While there does not appear to be any comprehensive state-wide or department-wide procedure for capture of critical knowledge, individual divisions have instituted various methods to capture/transition some information. Some of the methods used to capture or transfer knowledge included:

- Desk manuals for collecting individuals' standard protocols, contact lists, forms and other information is gaining support in various areas;
- Job shadowing of incumbent by replacement;
- Working out of class for some time period to assist while position is vacant;
- Mentoring
- 'Steer Your Career'-allowing employees to shadow other employees for a day to see what they do.

None of the State agencies contacted indicated that they had any protocols for identification of critical knowledge or skills currently held by their employees at high risk of retiring in the near future.

- **Non-government entity programs and resources examined for applicability**
Private industry has recognized the potential benefits of proactively managing knowledge loss. There are many consulting firms and websites throughout the world that specialize in knowledge capture and transition. Unfortunately, many of these services require resources that were not available for this project, and may not be available to state government on an on-going basis.

The following programs were chosen for evaluation after extensive Internet and literature research conducted by the team, but represent a fraction of the total available information on the subject.

- Knowledge Harvesting, Inc.™ program website
- Tennessee Valley Authority model
- Benchmark Technologies International Inc.- Prime Knowledge Capture™ program website
- Knowledge Research Institute website

2. Determination of which methodology to test

Criteria used for determination

- ⇒ Cost
- ⇒ Simplicity
- ⇒ Easily adaptable to project goals
- ⇒ Permission to use
- ⇒ Adaptable to government agency setting

Why the Tennessee Valley Authority (TVA) program was chosen

- TVA's program was for public use on the Internet
- No cost involved
- TVA gave its permission for us to use it
- TVA's only request was that any improvements made be shared with them.
- Easy to understand and adapt for use
- Large agency similar in size to MI state government

3. Identification of critical employees

The team looked within their respective agencies and identified sections/programs/units where it was believed critical knowledge existed. Once completed, the employees in those sections/units/programs were evaluated using the TVA Knowledge Risk Assessment model.

In the TVA model, as part of the attrition planning process, section managers perform a position risk assessment for each position in their organization. This assessment is based upon two factors, the *retirement factor* and the *position risk factor*.

Retirement Factor

In order to avoid any difficulties for managers or supervisors to share personnel retirement eligibility information, the team chose to access this information by referring to the September 2005 MI Department of Civil Service Retirement Eligibility report. Using this report, the retirement eligibility of the employees in the groups to be evaluated was estimated using earned years of service. The projected retirement eligibility dates for each employee in the workforce planning system were assigned a retirement factor (R_E) as follows:

- 5 - Projected retirement date within 1 year
- 4 - Projected retirement date within 1 to 2 years
- 3 - Projected retirement date within 2 to 3 years
- 2 - Projected retirement date within 3 to 5 years
- 1 - Projected retirement date is less than 5 years

Note: This factor may be based upon either employee estimates or calculated based on age and tenure data.

Position Risk Factor

In the TVA model, managers and supervisors are responsible for making these ratings based upon an estimation of the difficulty or level of effort required to replace the position incumbent. For this project, team members met with the manager or supervisor of the employee group(s) to request their assistance with the project. Once the nature of the project was explained to them and they gave their assent, the team member gave them the following criteria to use in their estimates of the Position Risk Factor (R_P):

- 5 - Critical and unique knowledge or skills. Mission-critical knowledge or skills with the potential for significant reliability or safety impacts. Has TVA or site-specific knowledge. Knowledge undocumented. Requires 3-5 years of training and experience. No ready replacements available.
- 4 - Critical knowledge and skills. Mission-critical knowledge/skills. Some limited duplication exists at other plants/sites and/or some documentation exists. Requires 2-4 years of focused training and experience.
- 3 - Important, systematized knowledge and skills. Documentation exists and/or other personnel onsite possess the knowledge/skills. Recruits generally available and can be trained in 1 to 2 years.
- 2 - Proceduralized 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.
- 1 - Common knowledge and skills. External hires possessing the knowledge/skills are readily available and require little additional training.

Total Attrition Risk Factor

The total attrition risk factor, (R_{TA}) was calculated using the following formula:

$$R_E \times R_P = R_{TA}$$

For example:

Projected retirement date of 07/04/07: Retirement date factor: **5**

Critical/Unique skills/Industry training: Risk assessment factor: **x 5**

Total attrition factor: **25**

The results for each group were then tabulated for comparison. Calculations and results were placed in a spreadsheet shown below for comparison across the division. (See Appendix 2 for example of completed table)

Dept. Name	DEPTID	Job Title	Incumbent	Civil Service Level	Retirement Eligibility in Years	Retirement Factor	Position Risk Factor	TOTAL ATTRITION FACTOR	Calculated Risk Priority	Supervisor

Employee knowledge loss risk was prioritized using the following criteria:

- **20-25: High Priority-** Immediate action needed. Specific replacement action plans with due dates will be developed to include: method of replacement, knowledge management assessment, specific training required, on-the-job training/shadowing with incumbent.
- **16-19 Priority rating-** Staffing plans should be established to address method and timing of replacement, recruitment efforts, training, shadowing with current incumbent.
- **10-15 High Importance-** Look ahead on how the position will be filled or the work will be accomplished. College recruiting, training programs, process improvements, reinvestment.
- **1-9 Important-** Recognize the functions of the position and determine the replacement need.

Appendix 3 shows the ranking of critical employees based on calculated knowledge loss risk.

4. Finding willing participants

Employees who were calculated to have a knowledge risk level in the High Priority or Priority categories were approached to determine whether they would be willing to participate in the project. This request included a brief explanation of the Leadership Academy program and the Action Learning Project segment, as well as the nature of the Knowledge Capture project goals. At this point, the employees who agreed to participate were identified as "incumbents". The TVA methodology was also explained briefly, and the incumbents were informed what would be expected of them if they participated.

5. Initial assessment questionnaires

The TVA knowledge cluster identification questionnaire was used as a template for completing an INITIAL KNOWLEDGE ASSESSMENT QUESTIONNAIRE. (Appendix 4) Since it was originally designed to elicit specialized information related to mechanized operations, and other information unique to power plants, it was necessary to make the questions more generalized so that they would be applicable to this project.

It was felt that the initial questionnaire should be relatively short, in order to allow team members to rapidly assess the incumbent's critical knowledge and be able to offer guidance to help elicit the kinds of information that may be captured and/or transferred to others.

The initial assessment questionnaires were distributed to willing incumbents identified in the knowledge loss risk calculations as being of High Priority or Priority categories. Chosen incumbents were given several weeks to complete the questionnaire, so that they would be able to review their records or other resources for historic information.

The team member would evaluate the completed questionnaire and determine whether the answers gave enough information to proceed. If it did not, the team member would discuss the questions with the incumbent and clarify what kind of information the project needed to proceed.

6. Video Interviews

Once the initial questionnaire was completed and submitted to the team member, it was reviewed to determine which salient knowledge items should be covered in greater detail. Once this was done, a total of two incumbents who completed the initial questionnaire were then asked to review the VERBAL INTERVIEW QUESTIONNAIRE (Appendix 5) designed to elicit more specific information about the critical skills and knowledge they had.

The questions also asked for information regarding historic and current issues that the incumbent had significant knowledge of that could still be used as a model for future policy or agency decisions.

These two incumbents were asked to take approximately one week to review these questions before meeting with the team member for a video interview. They were also asked to:

- be ready to discuss their responses to the detailed questions;
- provide a copy of their official position description, and;
- any other documents or resources that would facilitate identification and sharing of their critical knowledge with the interviewer.

The use of video as a recording method allows the evaluator to spend more time interacting with the person being interviewed rather than trying to write everything down. It also allowed the interaction to take on the form of Storytelling/Active Listening, providing the person the opportunity to discuss historic and current events in a more relaxed atmosphere to an interviewer who can ask the appropriate questions to elicit greater detail.

Video interviews also provide a means of recording information that must be demonstrated, such as the appropriate way to operate a piece of equipment as learned through use versus written instruction, or to diagnose unusual problem using sensory methods.

Each interview lasted approximately three hours, including breaks, if needed. The first half of the interview was comprised of two modules.

Part One - Critical Knowledge Identification - used questions to outline some of the job duties unique to the position.

Part Two - moved into specifics of certain program requirements discussed during the first module of the interview. This was designed to tease out information regarding the significance of the program knowledge and whether there exists any documentation or other means where the knowledge may have been or could be captured or transferred.

The second half of the interview was also comprised of two modules. This portion was an exercise in what kinds of information might be captured in an interview that would not likely reside in a document or training manual.

Part Three – Experience Module-the questions took the form of elicitation of general items experienced by the incumbent when they first began in their present job, as well as questions on historic information on specific important or controversial issues that they were involved in during their years of experience. These took the form of questions such as “What happened when....”

Part Four - Parting Messages-designed to allow the incumbent to describe any additional implicit information regarding people, advice, decisions, etc. that they believe an inexperienced employee should know.

Also, this section is used to capture particular knowledge they have about specific situations or problems, such as “I have found through experience that _____ situation may develop this kind of a problem if _____ happens.” The module concludes with lessons learned that might help a person or the agency avoid the repeat of a major error in the future.

The ultimate goal of the interview questions was more to identify the critical skills and how best to transfer them to others, rather than seeking to capture the actual knowledge itself. This process was followed because it was felt that in order to capture the knowledge effectively, a plan for how to do so was needed first.

7. Creating the KNOWLEDGE RETENTION PLAN

The following steps were undertaken to identify and record:

- what critical tasks or knowledge the incumbent has;
- what existing or suggested methods of capture and/or transition may be useful for these items, and;
- what may be some suggested time frames needed to prioritize when capture or transfer of this information should be completed.

After the interviews were completed each was reviewed in depth, along with the position descriptions and any other accompanying documentation provided by the incumbent. Those knowledge or skills that seemed to be the most critical based on the incumbent's answers, the agency's mission, and whether the knowledge was captured elsewhere were identified on the ANALYSIS FORM FOR ASSESSING CRITICALITY. (See appendix 6) This form recorded critical pieces of knowledge or skill and applied a calculation for criticality based upon the following factors and their considerations:

A. **Importance**

- How much its loss would have impact on safe, reliable and efficient operations,
- Would its loss have localized or system-wide impact,
- Do alternative methods exist?

B. **Rarity of knowledge**

- Redundancy of knowledge locally and department-wide,
- Agency-specific knowledge,
- The existence & cost of outside resources,
- The likelihood of new hires with this level of knowledge available,
- Loss might be gradual or abrupt (incumbent close to separation from State employment).

C. **Recovery difficulty**

- Documentation or records exist, or
- Lead time needed to document or transfer.

Each factor was given a numeric risk rating, from 1 (low) to 5 (high), based on input from the incumbent. The three numeric factors were multiplied to calculate the Criticality Score. **A score of 40 or above indicated a knowledge or skill that may be at-risk and could be considered actionable.**

The skills and knowledge identified on the Knowledge/Skill Criticality Analysis Form as having the highest criticality scores are transferred to individual KNOWLEDGE DISPOSITION SHEETS (Appendix 7) where all of the recommended methods for capture and transition of the information can be recorded, including identification and development of the replacement, on-the-job training, mentoring, elimination of the task, etc. These are used to develop the recommended actions that are transferred to the Knowledge Retention Plan for that incumbent.

The KNOWLEDGE RETENTION PLAN example (Appendix 8) identifies the incumbent name, position and their calculated Total Attrition Factor. (In order to maintain employee confidentiality agreed upon as part of the terms of this project, a sample plan is used for the example.) The plan also contains a summary of the incumbent's in-depth knowledge sets and what situations may exist to create the need for capturing it quickly and efficiently.

Each at-risk skill or knowledge item is numerically rated 1-5, with 5 being the most critical, and any identified as having a level of 4 or above are deemed actionable. The recommended methods for knowledge disposition are transferred from the disposition form as actions that have been or can be taken to retain the knowledge and minimize the impact of its loss.

Target dates for completion were developed, based on incumbent input and suggestions. A final step of the plan was to identify the status of the knowledge capture or transition and identification of any issues that affect how the process was proceeding.

The draft Knowledge Retention Plan was shared with the incumbent to determine whether the appropriate critical items and actions have been identified and recorded.

8. Continuing knowledge management program needs

Once the Knowledge Retention Plan has been developed for individual incumbents, it is important to ensure that the knowledge retention plan meets continuously changing business needs. This requires:

- Periodically reviewing updated work force data as part of the business planning process;
- Review of existing knowledge retention plans to determine how they are being followed;
- Identifying areas that need to be reassessed, and;
- Beginning reassessment process as appropriate.

NOTE: Appendix 9 is the AGENCY KNOWLEDGE RETENTION PLAN, for use by the agency to record and track all critical knowledge items and the milestones reached in the transfer of that knowledge.

Items Noted during the Project:

- All agencies agree that knowledge capture and transition is important, but research showed a lack of consistency in how the issue is addressed across State government.
- No State agencies appeared to have addressed the issues of identification of critical positions at high risk of attrition, or of what critical knowledge is currently held within their departments.
- Most advertised methodologies were difficult to assess from their websites or through available literature, since they are trying to sell a product.
- Employees asked to participate in the program varied in their comfort levels with the written questionnaire, video interview process, or with the knowledge capture concept, in general.
- Participants varied in the depth of the responses they gave to the written initial assessment questionnaire. In some cases, some of the questions seemed to be too vaguely worded and so failed to initially capture specific enough information to be useful. Further discussion was needed between the evaluator and incumbent to clarify what the questions were actually trying to ask.
- The criticality of the knowledge and skills used for analysis in this project were primarily identified by the incumbent, with some input from the team members after they reviewed the sum total of the information gathered.
- The agency administration may rate the knowledge loss risk differently; raising or lowering the criticality estimate based on a greater knowledge of the agency's overall mission, budget, and future needs.
- Therefore, it is highly recommended that the Knowledge Retention Plan be held in draft form until it has been reviewed by those qualified to determine the validity and relevancy of the identified knowledge and skills, in order to insure the accuracy of the plan.

Selected Answers and Comments by Incumbents

Q: How can agencies transfer knowledge and information from sole source experts to their replacements?

Answers:

“Knowledge is best transferred from a sole source expert to their replacement through hands-on experiences working with the expert. This takes time and involves continual instruction from the expert to the replacement person so that the knowledge is received.”

“Encourage/require the sole source expert to conduct cross-training of other agency/department staff.”

“For planned departures, (retirement, etc.) provide additional time in the last year of employment to train a replacement (HIRE for expected attrition and allow for mentoring).”

“Alter staffing levels (increase) to provide more time for experienced staff to document knowledge in reports, databases or presentations.”

“In the event of an unexpected vacancy, key positions should be required to maintain an operation manual on day to day procedure along with the electronic documents map.”

“Extremely hard to do in light of the way we are able to replace those leaving positions. Possibly bringing those experts back on contract to aid in the transition would be beneficial.”

Q: Looking back, what things to do you wish the department had taught you early in your job that you eventually learned the hard way?

Answers:

“They should have taught us more about oil/gas well blow-out prevention and well control. While I didn’t learn this the ‘hard way’ – the way I did learn it – has stuck.”

“Division fit and structure within the big Department picture. Recognize that internal stress comes most often from interaction with supervision and fellow employees, not from program operations.”

“How important negotiation skills and teamwork is.”

“Conflict resolution. This would have aided me much earlier in my career in dealing appropriately with issue dealing directly with the public related to officer complaints.”

“I think it is hard to improve on my “upbringing” in the department....I had three outstanding lieutenants and one of my two sergeants was similarly qualified. Those supervisors, during the first 9 years of my career, provided me with the motivation, responsibility and tools to try to achieve great things.”

Q: How important do you think knowledge capture and transition is, or will become?

Answers:

“I honestly don’t know what’s going to happen in the next few years, if the (agency) doesn’t start doing more about it than they are. We are going to be in a lot of trouble.”

“I already do a lot to record my knowledge in the form of documentation and training materials, but I know that there is a lot that will be lost because it cannot be written down. Mentoring or cross training is the only way to capture it.”

Conclusions

Knowledge retention is and will continue to be, a vital part of maintaining a highly qualified workforce to fully accomplish the mission of State government. Rapidly changing economic and political demands will require State employees to be capable of assessing their resources and making appropriate human resource decisions when faced with an aging workforce and decreasing pool of trained replacements.

The TVA methodology tested as part of this project appears to have some applicability to State government, as it is not patented or copy written, free of charge and easy to adapt as needed. However, other available programs may be easier to implement, because they provide training on how the program functions, as well as consultative services in its implementation.

The conclusion arrived at through this team project is that the State should immediately begin addressing the knowledge capture and transition issue in a more organized, proactive fashion using some of the recommendations at the end of this report (if not already doing so), not reactively as employees are departing.

Recommendations

After investigation, the Knowledge Capture and Transition Team does not believe that there is a single “silver bullet” in the knowledge retention field. Each of following recommendations reflects what the team believes are important components which would create an effective and adaptable knowledge retention process in MDA, DEQ, and DNR. These recommendations are presented here in a sequential approach, rather than by level of importance.

1) Create facilitator(s) in each agency

Each department should have a person, or group of people, trained in knowledge retention/management. These facilitator(s) will be responsible for oversight and advocacy of knowledge retention within the department. Facilitators may be departmental employees and/or consultants.

2) Identify critical knowledge/skills with the organization

The first and most important component of a successful knowledge retention program is an effective assessment of where critical knowledge exists within an organization. The TVA methodology tested during this project contains one method for doing so. If other materials are developed, they should analyze the criticality of knowledge using at least these two primary criteria:

1. Importance of the information to the organization. Critical knowledge is fundamental to the objectives and success of an organization. If it were to be lost, the organizational function would be harmed in some way.
2. Risk of loss. Critical knowledge is likely to be lost to the organization with inaction. This could be because the knowledge is rare, implicit, and/or difficult to capture and transition to other employees.

In addition, any program developed should contain at least the following three steps also found in the TVA methodology:

1. Identify critical individuals/positions within the organization (typically accomplished through supervisor evaluation)
2. Prioritize individuals/positions for knowledge capture and transition*
3. Identify critical knowledge held by the critical individuals identified in *Step 1* (typically accomplished through questionnaires, and more effectively, through personal interviews)

When determining priority, the TVA method gives equal weight to criticality of knowledge and proximity to retirement. We suggest that if this method is used, the formula should be adapted to give additional weight to the criticality of the knowledge over proximity to retirement to account for the trend of increasing transience in the work place.

3) Develop Knowledge Retention Plans and Strategies

A knowledge retention plan is written specifically for an individual or position within the organization. These specific plans are necessary for sole subject matter experts. A knowledge retention strategy is a less specific document, which may be developed for larger groups of individuals with broader methods and objectives. A knowledge retention strategy can be

developed for the entire organization, smaller subgroups, leadership positions, and/or specific disciplines within the organization.

Below is a list of recommended tools that may be included in both knowledge retention plans and strategies. These tools are further analyzed in Appendix 10. Priority should be given to tools that utilize person-to-person interaction for transfer of critical knowledge.

Recommended Knowledge Retention Tools (See Appendix 10 for tool details):

- 1. Employee overlap**
 - a. Hiring replacements before incumbents leave**
 - b. Use of retired personnel contracted to return to work part-time for limited period to implement training of replacement staff;**

Departments that replace retired employees or re-hire a retiree, thereby converting the retirement plan to a defined benefit plan, will see substantial savings as shown in Figure 2. This depicts three somewhat typical employees from each of our agencies, the hourly rate, and retirement cost associated with the “old” versus “new” retirement plans.

Figure 2 Estimated Retirement Cost Comparison

Job Class	Grade	Pay rate
Environmental Sanitarian Spec.	13	\$ 32.47
Environmental Quality Analyst	12	\$ 29.70
Fisheries Biologist	11	\$ 27.32

Retirement Plan	Retirement Code	Percent
Defined Benefit “old”	04	34.45%
Defined Contribution* “new”	40	27.15%
Defined Contribution* “ new”	40	24.15%
*DC retirement rate varies between 24.15% - 27.15%		
Retirement rates effective Jan. 1, 2006		

Replacing an employee with the defined benefit plan with a new employee under the defined contribution plan will result in saving from 7.3% up to 10.3%. This amount added to savings of an entry level employee could be used to hire or contract a retiree (subject matter expert) to work in a limited basis mentoring the new employee in their former position.

For example, the Fisheries Biologist 11 annual salary plus retirement costs under defined benefit would be \$27.32 x 2088 x 1.3445 equaling \$76,695.87. Under defined benefit this total would range from \$70,820 to \$72,532.

This results in savings from \$4,164.22 to \$5,875.55 annually. These figures do not include amount saved by a new employee starting at the lower step of the pay scale. In this scheme these savings could be used to fund bringing in the retiree for one or two days a pay period to pass along the experience, knowledge, and skills necessary to maintain an efficient and effective program.

2. **Mentoring**
3. **Cross-Training**
4. **Job Shadowing**
5. **Desk Manuals**
6. **Audio/Video Capture**
7. **Computer Software**

4) Implement Knowledge Retention Plans/Strategies

Once critical knowledge has been identified and the plans for capture and transition have been made, it is simply a matter of implementing those plans. If the planning process included an assessment of resources available, financial and time constraints should already have been accounted for.

5) Monitor and modify

The knowledge capture and transition process as a whole should be under constant evaluation and adaptation to meet the needs of the organization. This is a rapidly evolving field, and governmental agencies are likely to encounter new and difficult challenges during this process. Evaluation and adaptation by the facilitator and program participants should be engrained within the program.

6) Be proactive (Team Motto: “Do it as you go, Not when you go”)

The impending brain drain in the MDA, DEQ, and DNR is daunting. There may be a temptation to address only those employees who hold highly critical information, and are on the verge of retirement. Indeed capturing those employees' information should be a major priority. However, it is important to recognize that a proactive knowledge retention program can prevent knowledge management emergencies from occurring in the future. Tools such as mentoring, job sharing, job shadowing, and desk manuals should be made widely available as part of a state-wide/department wide knowledge retention strategy.

Acknowledgements

Our thanks to the following for their participation, information or insights into this project:

Gerald Harris, Human Resources Division Chief, DNR
Vickie Miles, Human Resources Division Director, DEQ
Robert Kaczorowski, Human Resources Division Director, MDA
Kathy Fedder, Food & Dairy Division Director, MDA
Ken Rauscher, Division Director, Pesticide & Plant Pest Management Division, MDA
Dr. Nancy Frank, Deputy Director, Animal Industry Division, MDA
Gina Davis, Pesticide & Plant Pest Management Division, MDA
Karen Anderson, Human Resources Division, MDA
Jerry Landon, TVA University, Tennessee Valley Authority
Douglas Daniels, Geologist, Office of Geologic Survey, DEQ
William Creal, Permits Section Chief, Water Bureau, DEQ
Mike Bryan, Nursery Program Manager, Pesticide & Plant Pest Management Division, MDA
Mel Poplar, Insect & Pest Control Specialist, Pesticide & Plant Pest Management Division, MDA

Appendix 1

Questionnaire for Agency Human Resources or Organization Development Officers

1. Has HR/ODO developed or knows of, any resources that have been developed to help the agency identify critical knowledge areas/jobs?

2. If so, what are those resources and who is in charge of implementing them? (try to obtain plans, tools or other resources used to gather such information, such as questionnaires, employee feedback surveys, etc.)

3. Does HR/ODO have, or know about, any listing of critical areas/jobs that have been identified for the agency? Is this list available? (e.g. typically where a single person or very few people have unique skill sets or experience not found in other employees or agencies – single subject matter experts)

4. What methods of implicit information capture do they have (the kind of information that only one person may have in their mind, not recorded elsewhere)

5. What methods of transition/knowledge transfer (training the new employee using the data gathered above) do they have/use?

6. Has the department developed any resources or plans or strategies to address this knowledge capture/transfer?

7. If so, how are they working? What are the measurements being used to determine success?

8. What gaps/overlaps have been identified in existing or proposed protocols? (example- have not been able to effectively capture data from people who leave prior to anyone being hired to fill the position, etc.)

Appendix 2 KNOWLEDGE LOSS RISK ASSESSMENT SPREADSHEET

Establish as a standard HR report. Managers/supervisors would complete the "Position Risk Factor" column and compute "Total Attrition Factor."

DEPT ID	Dept. Name	Job Title	Incumbent	Schedule FT/PT	Civil Service Level	Retirement info Source (Employee or Estimated Retirement Date)	Retirement Eligibility in Years	Retirement Factor	Position Risk Factor	TOTAL ATTRITION FACTOR	Priority	Supervisor
1st Section Dept **		Section Manager	Employee A	FT		Civil Service	NE	1	4	4	Important	
	Secretary	Section Secretary	Employee B	FT	9	Civil Service	0	5	3	15	High Importance	Employee A
		Enforcement Mgr	Employee C	FT		Civil Service	NE	1	3	3	Important	
		Certification Support	Employee D	FT		Civil Service	NE	2	3	6	Important	
		Program Mgr	Employee E	FT		Civil Service	NE	1	3	3	Important	
	Word Processing Assistant	Tech Support	Employee F	FT	E7	Civil Service	0	5	retiring 8/16/06			Employee I
		Sec'y	Employee G	FT		Civil Service	NE	1	3	3	Important	
	Specialist	Program Mgr	Employee H	FT	13	Civil Service	3 yrs	4	4	16	Priority	Employee A
	Industry Specialist	Program Mgr	Employee I	FT	13	Civil Service	< 1 yr	5	3	15	High Importance	Employee A
		Program Sec'y	Employee J	FT		Civil Service	NE	4	2	8	Important	
	Word Proc. Asst	Program Support	Employee K	FT	8	Civil Service	0	5				Employee H

DEPTID	Dept. Name	Job Title	Incumbent	Schedule FT/PT	Civil Service Level	Retirement info Source (Employee or Estimated Retirement Date)	Retirement Eligibility in Years	Retirement Factor	Position Risk Factor	TOTAL ATTRITION FACTOR	Priority	Supervisor
2nd Section Dept **		Section Manager	Employee L	FT	14	Civil Service	NE	1	4	4	Important	
		Section Sec'y	Employee M	FT		Civil Service	NE	1	3	3	Important	
		Program Support	Employee N	FT		Civil Service	NE	1	2	2	Important	
	Industry Specialist	Program Manager	Employee O	FT	13	Civil Service	4.5 yrs	4	4	16	Priority	Employee L
	Departmental Manager	Program Sup'vr	Employee P	FT	13	Civil Service	~5 yrs	3	4	12	High Importance	Employee L
		Program Coordinator	Employee Q	FT		Civil Service	NE	1	4	4	Important	
		Pathologist	Employee R	FT		Civil Service	NE	1	4	4	Important	
	Industry Specialist	Program Mgr	Employee S	FT	13	Civil Service	< 1 yr	5	3	15	High Importance	Employee L
		Program Licensing	Employee T	FT		Civil Service	NE	1	2	2	Important	
		Program Mgr	Employee U	FT		Civil Service	NE	1	4	4	Important	
	Word Processor Assistant	Program Support	Employee V	FT	8	Civil Service	~ 3 yrs	5	2	10	High Importance	Employee O
	Lab Technician	Lab Tech	Employee W	FT	12	Civil Service	< 1 yr	5	3	15	High Importance	Employee R

Appendix 3
Analysis of Knowledge Loss Risk Factor for Lansing employees of Sections 1 & 2
of the [REDACTED] Division, [REDACTED] Department

20-25 High Priority- Immediate action needed. Specific replacement action plans with due dates will be developed to include: method of replacement, knowledge management assessment, specific training required, on-the-job training/shadowing with incumbent.

***No employees currently meet this definition

16-19 Priority rating- Staffing plans should be established to address method and timing of replacement, recruitment efforts, training, shadowing with current incumbent.

<u>Employee</u>	<u>Position held</u>
Employee H	[REDACTED] Program Manager
Employee N	[REDACTED] Program Manager

10-15 High Importance- Look ahead on how the position will be filled or the work will be accomplished. College recruiting, training programs, process improvements, reinvestment.

<u>Employee</u>	<u>Position held</u>
Employee B	[REDACTED] Section Secretary
Employee I	[REDACTED] Program Manager
Employee O	[REDACTED] Supervisor
Employee R	[REDACTED] Program Manager
Employee U	[REDACTED] Licensing Support
Employee W	[REDACTED] Laboratory Technician

1-9 Important- Recognize the functions of the position and determine the replacement need.

<u>Employee</u>	<u>Position held</u>
Employee A	[REDACTED] Section Manager
Employee C	[REDACTED] Enforcement Manager
Employee D	[REDACTED] Certification Support
Employee E	[REDACTED] Program Manager
Employee G	[REDACTED] Program Secretary
Employee J	[REDACTED] Program Secretary
Employee L	[REDACTED] Section Manager
Employee M	[REDACTED] Section Secretary
Employee N	[REDACTED] Licensing Support
Employee Q	[REDACTED] Program Coordinator
Employee R	[REDACTED] Pathologist
Employee T	[REDACTED] Licensing Secretary
Employee U	[REDACTED] Program Manager

Appendix 4

Initial Knowledge Assessment Questionnaire

The purpose of this questionnaire is to help identify critical skills and knowledge in your agency, and that exclusive knowledge and skills that you possess in your current position.

1. What kinds of knowledge or skills do you now have that the department will miss most when you leave?
2. If you had to leave the department suddenly and only had one day left to brief your replacement, what would you put on your list of things to tell or give them?
3. Looking back, what things do you wish the department had taught you early in your job that you eventually learned the hard way?
4. What are currently the most important/controversial issues in your assigned programs? Why?
5. What are the major threats and opportunities to your department regarding these issues? Why?
6. What were historically the most important/controversial issues in your assigned programs? How and why has it changed over the years?
7. Describe any historical knowledge you have that might help avoid the repeat of a major error in the future.
 - a. Describe the type of failure and time frame.
 - b. Describe successes as well.
8. What positions within your agency would cause distress if the incumbent suddenly left the position and why?
9. How can agencies transfer knowledge and information from sole source experts to their replacements?
10. Do you know where documents of critical/ important/ controversial significance are kept?

Appendix 5 Verbal Interview Questionnaire

For each of the modules, these following screening questions should be considered to narrow down those items to the critical few that truly require further action to capture:

- ⇒ What is the relative importance of this knowledge to the agency?
 - ⇒ What is the relative immediacy of knowledge loss, i.e. how many people in the agency may also hold this knowledge?
 - ⇒ What is the cost and feasibility of recovering this knowledge, if lost?
 - ⇒ How difficult is it to transfer this knowledge?
 - Assigning a new employee to shadow the experienced person
 - Cross-training someone who's currently in a different job
 - Documentation of a procedure or process that's never been written down
 - Periodic meetings, e.g. 'brown-bag lunches' where employees can get together to discuss their work and problem-solve together
 - Elimination of the process by "engineering it out" of normal agency operations. (May be applicable in terms of programs no longer of priority or old programmatic protocols no longer relevant in current situations)
1. Using your knowledge of your current job duties, list each of the primary programs you work in or administer and give a list of the top four or five tasks you do in each of the programs.
 2. Of the programs/tasks you mentioned, which of these do you feel are the most critical to the operations of the agency and why? *(Try to prioritize these in terms of how much the agency will be affected should no one be able to do them)*
 3. Which of these programs/tasks are capable of being performed by other existing employees in the agency, and by whom?
 4. For which of these programs/tasks are you considered to be the agency's sole source expert?
 5. For which of these critical programs/tasks have there been any efforts at recording/capturing/transitioning the pertinent data? If any, what formats are used or are planned for use in the future?
 6. What resources, lists, manuals, procedures, etc., do you rely on to accomplish those critical, sole source expert-type tasks? What are they and are they in written or electronic form somewhere accessible to others, if necessary?

Part 2 - Knowledge Identification module

7. What are some of the more specific examples of knowledge or skills you have that no one else in the agency has and that they may miss the most when you leave? *(Please be as specific as possible, such as "I have a special skill in repairing the following equipment...". It is not necessary to tell the interviewer how to do it, only that you know how and can train someone else to do it or record it in some way for use in training other employees.)*
8. How did you learn this knowledge or skill?
9. Which of these skills or pieces of knowledge do you think may become more/less important in the future in the agency and why?
10. What do you think is/are the best way(s) to impart this information to someone else, if you had the chance to do so? Be specific as possible for each piece of knowledge or skill.
11. Describe or list any nonstandard (i.e. uncommon) knowledge that you possess or have developed about the diagnosis of complex problems. For example, "I have developed the methodology to detect <x> problem at a certain kind of facility"

Part 3 - Experience module

12. When you started in your present job, what were some of the important things that you didn't know that you had to learn in order to do your job effectively?
13. When you started in your present job, how did you learn what you needed to know that you didn't already know? How long did it take?
14. What suggestions would you have for relaying this information to a new employee or your replacement?
15. What were historically the most important/controversial issues in your assigned programs? How and why has it changed over the years?
16. Currently, what are some of the most important/controversial issues in your assigned programs? Who are the players? What happened and how has it developed? *(Be specific as possible)*

Part 4 - Parting messages

17. People facts-describe any special information or knowledge you may have about key contacts for expert advice, decisions, permission, getting something processed or expedited. Think of it in terms of critical information an inexperienced employee should know.
18. Failure patterns-Describe or list any special knowledge you may have about failure patterns for particular situations, protocols, etc. For example, "I have

found by experience that treating a pest problem with this type of method may fail if _____ happens (or doesn't happen), because.....”

19. Historic errors-describe any historical knowledge (lessons learned) you have that might help avoid the repeat of a major error in the future.

Appendix 6 Analysis Form for Assessing Knowledge/Skill Criticality

Position:

Incumbent:

General Position Description:

Factors to consider	Importance	Rarity of Knowledge	Recovery Difficulty		
	Impact on safe, reliable and efficient operations Localized vs. system-wide impact Existence of alternative methods	Redundancy of knowledge locally and agency-wide Agency-specific knowledge Existence & cost of outside resources New hires with this knowledge available Loss gradual or abrupt	Documentation or records exist Lead time needed to document or transfer		
Rating scale	1-Low	2	3-Moderate	4	5-High

At-Risk Skill or Knowledge	Importance	Rarity of Knowledge	Recovery Difficulty	CRITICALITY
	X	X	=	
	X	X	=	
	X	X	=	
	X	X	=	
	X	X	=	
	X	X	=	
	X	X	=	
	X	X	=	
	X	X	=	
	X	X	=	

Note: The higher the criticality score, the greater the need to address capture and transition of that knowledge or skill. A score of 40 or above indicates knowledge or skill that may be at-risk and could be considered actionable.

Prepared by: _____
Date : _____

Appendix 7

KNOWLEDGE DISPOSITION WORKSHEET Retention & Transfer of Critical At-Risk Knowledge

Critical Knowledge:

Description:

Recommended Disposition (Check all that apply)

Identify and Develop Replacement

- New Hire or transfer
- Current employee to assume responsibilities

Rely on alternative resources

- Establish a designated agency or site expert
- Collateral duty responsibilities
- Contractor/Personal Services

Formal Classroom Training

- Formal classroom instruction
- Classroom paper-and-pencil testing
- Demonstration of skill in lab setting
- On-the-job demonstration with supervisor/incumbent sign-off indicating mastery

Eliminate/Reduce the need for the know-how

- Replace equipment with devices that are easier to operate or maintain
- Replace rare or non-standard equipment with
- Eliminate task

On-the-job training

- Self-study
- Materials, resources, lesson plan, etc. provided
- Mentor/coach assigned
- Targeted work assignments
- On-the-job demonstration of skill with supervisor/incumbent's sign-off indicating mastery

Documentation & Codification

- Document knowledge for use by incumbent or or annotate current procedures
- Establish, or revise, formal procedures and processes
- Create a photographic, video, CD or DVD record
- Establish system(s) to store and share the information (e.g. documents, databases, on-line references, etc.)

Computer-based/video training

- Self-study using computer/based or video materials and lesson plans
- Testing and certification of mastery
- On-the-job demonstration of skill with supervisor/incumbent's sign-off indicating mastery

Other disposition

Additional Details or Recommendations:

Appendix 8 Sample Knowledge Retention Plan

KNOWLEDGE RETENTION PLAN				
Employee:	Position: Engr. Mech. General (NUC)	Position Risk Factor: 4 Retirement Factor: 5	Total Attrition Factor: 20	
<p>Summary and Situation Assessment:</p> <p>The incumbent has in depth knowledge of and expertise in piping analysis with emphasis on use of the T Pipe software. This software is unique to SQN and little duplication of knowledge exists. Though a replacement person with an engineering degree could become proficient in the use of this software in about six months, at least two years on-the-job training is needed to respond quickly to urgent questions related to piping analysis. In addition to the T Pipe system, there must be extensive knowledge of the Class II computer system, SDP – NEDP9, and SQN LDC 13.1 and 24.2. Though a person with a two year degree may be knowledgeable, it is preferable to have someone with a four year degree in either Civil or Mechanical Engineering.</p> <p>Currently <u>Employee A</u> is being cross-trained on the T Pipe system. <u>Employee B</u> also works with this system and has significant knowledge. <u>Employee C</u> and <u>Employee D</u> work in the Chattanooga TVAN Corporate office and also have knowledge of the system.</p> <p>Because the T Pipe system is unique to SQN there is no external training on its use. However ASME does provide training on piping analysis and code requirements.</p>				
Knowledge or Skill	Criticality (1-5)	Actions (Required of Criticality 4-5) List steps which can and will be taken to retain this critical knowledge/skill and/or minimize the impact of its loss)	Target Date(s) for Completion	Status and Issues
Rigorous and alternate piping analysis, component qualification of code components and pipe rupture analysis skills	5	<ul style="list-style-type: none"> Identify a replacement person for the critical skills Replacement person complete ASME courses in piping analysis and code requirements Replacement person develop a working knowledge of T-Pipe Code, ASME Code, procedures and criteria through reading and mentoring of _____ and _____. 	Dec 2004 Sept 2005 Sept 2005	<u>Employee A</u> and <u>Employee B</u> are being crossed trained in T-Pipe. Will send both to ASME Course when offered by TVA Training. Both being Mentored
Development Plans	5	<ul style="list-style-type: none"> Supervisor assign replacement person “trail tasks” under the direction of _____ and/or _____ Replacement complete qualification card under mentor sponsorship Include mentoring in _____ and ____ PR&D and developmental goals in replacement individual Recruit/hire person to replace replacement person 	March 2005 Dec 2005 Sept 2004 Oct 2005	On going replacements are
Documentation	5	Incumbent to develop a piping analysis, component qualification and pipe rupture reference library of handbooks, procedures, criteria and process in conjunction with replacement person.	Sept 2004	On going will be completed by Sept.
Knowledge Retention Plan Prepared by: <u>OE Consultant</u> Date: November 6, 2003 Last Update: <u>7/22/04; Manager</u>				

Appendix 9
AGENCY KNOWLEDGE RETENTION PLAN

Organization / Work group: _____

Prepared by: _____

Knowledge or Skill	Criticality	Actions (<i>Required of Criticality 4-5</i>) List steps which may be taken to retain this critical knowledge and/or minimize the impact of its loss	Target Date(s) for Completion	Status and Issues

Reviews:

	<hr/> Signature	<hr/> Date
	<hr/> Signature	<hr/> Date
	<hr/> Signature	<hr/> Date

Coordination Points:

Action	Concurrence	
	<hr/> Signature	<hr/> Date
	<hr/> Signature	<hr/> Date
	<hr/> Signature	<hr/> Date

Appendix 10: Knowledge Retention Tools Analysis

Knowledge capture and transfer methods to be incorporated into knowledge retention plans and strategies

Knowledge capture and transfer can be either person-to-person or through indirect (explicit knowledge storage) methods. Many of these methods are already utilized as part of employee career development by the MDA, DEQ, and/or DNR. However, currently most are not utilized for the specific purpose of transferring critical knowledge.

Person-to-person contact is the preferred of these two methods because it allows for interactive knowledge transfer experience. Specifically, questions can be asked and answered. Below is a list of several common methods of each type, and a brief discussion about each method.

Person-to-person capture and transfer methods:

Employee overlap is a method during which an incumbent and his/her replacement are given a period of time to interact during the normal course of business for that position. The specific objective of that interaction is the training of the replacement. The duration of employee overlap necessary to effectively transfer necessary knowledge will vary based on the position. Employee overlap can be accomplished by either hiring a replacement before the incumbent leaves, or hiring the incumbent back in a contractual relationship after leaving.

Strengths:

- Likely the most effective method of transfer for highly technical sole subject matter expertise
- Allows for observation and coaching during real work experiences
- Very effective at transferring implicit programmatic information
- Results in a replacement that is well prepared to take over programmatic responsibilities

Weaknesses:

- May be dependent on the incumbent being willing to indicate that he/she is leaving well in advance of actually doing so
- Success is somewhat dependent on the personalities of the incumbent and replacement.
- Does not address the lack of redundancy for the knowledge base in the organization
- There is the potential for additional financial burden associated with two employees filling only one position

In certain cases, the budgetary cost of the replacement and hiring the incumbent back on a part time contractual basis may be less than the original cost of having the incumbent as a full time employee.

Mentoring is a method of knowledge transfer where employees are assigned a more senior employee who has been identified as having critical knowledge. The mentor and mentee meet on a semi-regular basis in order to transfer critical knowledge, but the mentee has not typically been hired specifically as a replacement for the mentor, and in fact, may not even be of the same discipline as the mentee.

An effective mentoring program should have several important components:

- a) The mentors should be volunteers
- b) Training for both the mentors and mentees
- c) An agreement or contract between the mentor and mentee outlining their specific responsibilities to one another

d) A method of feedback to the program for improvement

Strengths:

- A very effective method of transferring many types of critical knowledge
- Proactively transfers critical knowledge before an employee leaves
- Relationships are typically long term
- Gives mentees advocacy within the organization
- An excellent method of transferring leadership knowledge

Weaknesses:

- May or may not provide specific implicit programmatic information
- Success is highly dependent on the personalities of the participants

References:

How to Develop an Operations Manual for your Mentoring Program. Sherk, J. EMT Group.

<http://www.emt.org/userfiles/Resources/MentoringProgOperationsManual.PDF>

Management Help.org - <http://www.managementhelp.org/>

Management Mentors - <http://www.management-mentors.com/>

MDA/DEQ/DNR Leadership Academy – Contact for mentoring training packets

Peer Resources - <http://www.peer.ca/mentor.html>

The Mentoring Group - <http://www.mentoringgroup.com/>

Cross Training is typically when an employee from a different section, division, or even department spends anywhere from one to several days with an employee from another section, division, or department during their day-to-day job duties. Typically the employees doing the cross training are of similar stature within the organization. This is an effective knowledge management method because it allows employees to better understand how different parts of the organization function, and the practice should continue. However, there may be some adaptations where the transfer of critical knowledge is the objective.

Employees from within a section or division cross training with a critical knowledge holder from the same part of the organization is an excellent method to provide redundancy for sole subject matter experts. While it would be impossible to transfer all implicit and critical information in a few days of cross training, this practice, especially when used in conjunction with a desk manual, can provide coworkers with a basic ability to complete core tasks if the sole subject matter expert were to leave the organization. Transfer and retention may be improved if the trainee performs the job duties of the incumbent during the cross training process.

Advantages:

- Provides redundancy within the organization
- Proactively transfers critical knowledge before an employee leaves
- Gives current employees a better understanding of how the organization functions
- Very effective if the incumbent may not be replaced, but the organization will continue to perform his/her responsibilities
- Success is less dependent on the personalities of the participants as other person-to-person transfer methods

Disadvantages:

- Typically very short term, so implicit details may not be transferred
- Not typically utilized at the supervisory and/or leadership level in an organization
- Takes existing employees away from their responsibilities
- This method may not transfer the ability to handle rare, but critical, job duties such as

emergencies

References:

Management Help.org - <http://www.managementhelp.org/>

Job Shadowing is very similar to cross training in that an employee spends time with the incumbent while the incumbent is performing day-to-day duties. However, job shadowing sometimes infers a longer term of interaction, and that the incumbent holds a higher level position than the trainee. This can be a very effective method of transferring critical leadership knowledge to future generations of leaders.

Advantages:

- Proactively transfers critical knowledge before employee leaves
- Gives current employees a better understanding of how the organization functions
- Can be effective for both sole subject matter experts and leaders in the organization

Disadvantages:

- Takes existing employees away from their responsibilities
- This method may not transfer the ability to handle rare, but critical, job duties such as emergencies

References:

Management Help.org - <http://www.managementhelp.org/>

Indirect methods of knowledge capture and transfer

Desk Manuals/Operating Procedures are essentially a detailed written description of how an incumbent performs job duties. The objective would be to organize them in such a way that someone unfamiliar with the program could complete the core duties of the position. These are particularly important for employees where person-to-person transfer is limited.

Advantages:

- Work very well for sole subject matter experts
- Make implicit information explicit for future replacements
- Once completed, much easier to update and maintain
- Also very helpful for times when the employee is on leave
- May be organized such that accessing procedures and information is very efficient

Disadvantages:

- Not effective for leadership positions where job duties are constantly in flux
- Do not allow for interactions and questions between the incumbent and replacement
- Time consuming to write initially
- Difficult for the trained facilitator to steer the entire development process

References:

University of Colorado, Boulder desk manual template:

http://abs.colorado.edu/ABS_WEB/non_htm_docs/MISC_WORD_DOCS/Desk_Manual_Template.doc

Making a Desk Manual Work for you:

<http://us.deskdemon.com/pages/us/training/deskmanual>

Audio/Video Capture involves a trained facilitator interviewing the incumbent while being recorded. The recording can then be stored digitally for reference in perpetuity.

Advantages:

- Make implicit information explicit for future replacements
- Can be effective for leadership positions where responsibilities are constantly in flux, but overarching themes and objectives are consistent
- Allows trained interviewer/facilitator to interact and steer the capture process to improve transfer

Disadvantages:

- Organizing the critical knowledge so that it can be efficiently accessed may be difficult
- Capture and transfer may be time consuming

References:

Digital Video for Knowledge Capture. Knowledge Management Mag. October 1998.

<http://kmmag.com/articles/default.asp?ArticleID=495>

IPOV.net - <http://www.ipov.net/>

Tennessee Valley Authority - <http://www.tva.com/knowledgeretention/>

Computer Software specializing in knowledge retention is available from several different sources. These programs have a wide range of functions and costs. Many are capable of storing and organizing both implicit and explicit knowledge. While knowledge capture software may provide excellent functionality to state government, we did not thoroughly investigate the different existing programs due to time and cost considerations. The facilitator should further investigate cost benefit of the varied software programs.

Advantages:

- Simplify and automate the storage and transfer of critical knowledge
- Other?

Disadvantages:

- Cost
- Other?

References:

Contextware - <http://www.contextware.com/>

Hyperwave - <http://www.hyperwave.com/>

Knowledge Harvesting, Inc. - <http://www.knowledgeharvesting.com/default.htm>

Mib Software - <http://www.mibsoftware.com/>

Power Know - <http://www.powerknow.com/>

TechRepublic - <http://techrepublic.com.com/>

The Works Software - <http://www.theworkssoftware.com/>