LOSS OF INTELLECTUAL CAPITAL IN THE FEDERAL GOVERNMENT: DESIGNING A KNOWLEDGE RETENTION STRATEGY FOR THE FEDERAL GRAIN INSPECTION SERVICE (FGIS)

A Thesis
submitted to the Faculty of the Graduate School of Arts and Sciences of Georgetown University in partial fulfillment of the requirements for the degree of Master of Arts in Communication, Culture and Technology

By

Idelisse Rodriguez Martínez

Washington, D.C. December 17, 2007
Those pragmatic and well-educated baby-boomers who have worked more than 25 years in the U.S. workforce soon will retire. They’ll take with them the vital skills attained on their jobs through training and experience. These factors make up an organization’s intellectual capital. The U.S. Federal Government is following this pattern of dramatic knowledge loss. Thus, the manner in which governmental organizations capture, share and retain the knowledge possessed by their employees directly impacts the organization’s overall performance.

This thesis project will discuss tools and processes from the Knowledge Management (KM) field utilized by best practices organizations to encounter knowledge gaps caused by worker attrition. It primarily focuses on knowledge retention, addressing acquisition, storage and retrieval. This thesis project discusses types of knowledge, possible costs of knowledge lost and barriers that organizations in the U.S. Federal Government may encounter when trying to implement knowledge-retention initiatives. Also described in this thesis project are effective and frequently used approaches to retain critical knowledge through human resources practices, knowledge-sharing techniques and information-technology applications. Ultimately, this thesis project employs this
theoretical framework to design a knowledge retention strategy for a U.S. Federal Government agency.
ACKNOWLEDGEMENTS

First and foremost I would like to thank my thesis advisor, Prof. Denise Bedford, for introducing me to the world of Knowledge Management. Her insightful advice and support during this project have been remarkable. Special thanks to my thesis reader, Prof. Jeanine Turner, for cheering me on and for her helpful tips. I also would like to thank all the professors and staff of the Communication, Culture and Technology Program at Georgetown University for giving me the opportunity to pursue my graduate degree in such a fascinating field. Thank you to my friends and coworkers at the Federal Grain Inspection Service (USDA GIPSA FGIS) for your support and confidence in my work. It is a distinct honor to work in such a great agency.

I especially thank Javier and my patient friends for you support through my highs and lows. I dedicate this thesis to my loving parents, Haydee and Luis, and sisters, Deyra and Mileidy. Thanks for your unconditional love and encouragement across the distance.
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CHAPTER 1. INTRODUCTION

1.1 Knowledge in the past, present and future

In upcoming years, U.S. workforce attrition will make vast quantities of knowledge permanently inaccessible. As eligible employees choose to retire, injurious knowledge gaps will be created in organizations that have not captured and shared critical knowledge systematically. Organizations that undertake knowledge management initiatives will handle the inevitable challenges that result from lost knowledge better.

Entities dedicated to public service, such as the U.S. Federal Government, are following the steps of private companies. They have become interested in preventing future dramatic knowledge losses that could affect generations to come.

Possibly the most famous example of lost knowledge in history is the destruction of the Library of Alexandria in Egypt during 300 A.D. The library contained more than 400,000 papyrus scrolls, including original manuscripts of the Greek tragedians Sophocles, Aeschylus and Euripides (Delong, 2004). Knowledge of technology and craftsmanship also has been lost. These losses include the art of making high-quality violins once made by Italian families during the 17th and 18th centuries known as “the Stradivarius secret” (Delong, 2004). Additionally, the knowledge behind the construction of the astonishing Mayans pyramids probably has been lost forever. While it is unlikely that we will ever decipher how Archimedes developed the principles of physics, we can avoid these type of historical shortfalls by taking preemptive actions.

Today, the greatest threat of losing critical knowledge is found in the U.S. workforce. The U.S. will experience a labor shortage of 4.8 million workers during the
next 10 years and 19.7 million during the next 20 (Leavitt, 2002). Retirement of seasoned employees accounts for this shortage, specifically soon-to-be retired baby boomers. This demographic represents 76 million people born between 1946 and 1964. If present trends continue, by 2013 the number of workers in this country between the ages of 35 to 44 will shrink almost 10 percent, while the number of workers age 55 to 64 will grow by almost 40 percent (Leavitt, 2002).

1.2 Intellectual capital in the U.S. Federal Government

The U.S. Federal Government is following this pattern of dramatic knowledge loss. The pragmatic and well-educated baby boomers have worked more than 25 years and soon will retire. By 2009, almost 53 percent of the Federal civil servants will be eligible to retire. Additionally, 71 percent of these employees will be senior executives in the U.S. Federal Government (Liebowitz, 2004). The attrition described above will take away vital skills attained on the job through training and experience. These skills make up an organization’s intellectual capital.

Professor Daniel Andriessen (2005) explains that intellectual capital is the combination of human, structural and relation capital (See Appendix A.). These three spheres are interrelated and cover major components of an organization’s functions. Relational capital comprises perceptions and interactions with players outside the organization. Structural capital relates to tangible and explicable assets. Human capital refers to skills embedded in the organizational context that are not communicated easily.
Structural capital includes explicit knowledge, processes and organizational culture. Two components make up relational capital: networks and reputation. For Andriessen, human capital encompasses implicit knowledge, skills and worker attitude (Andriessen, 2005). Dr. Jay Liebowitz, the first Knowledge Management Officer at NASA Goddard Space Flight Center, adds that human capital is the “brainpower” or the “collective experience, knowledge and expertise” of workers in an organization (Liebowitz, 2004). These skills are essential economic and performance assets for any private or public entity. In an organizational context, structural, relational and human capital resides on its employees’ knowledge. Thus, the manner in which organizations are able to capture, share and retain knowledge possessed by their employees will directly affect the availability of the organization’s intellectual capital.

Knowledge Management (KM) is a developing field that runs across many functions in an organization. This field deals with how to identify, capture, share, apply and create the knowledge that resides in an organization’s intellectual capital (Liebowitz, 2004). It mainly involves the creation, retention and sharing of knowledge (Dembla & Mao, 2002). Best Buy and World Bank are two companies that have become known for making knowledge management a critical resource. They have taken remarkable measures to store, share and retrieve knowledge within their organizations. In these and other best-practice companies, knowledge is defined during the creation process and better shared and reused after it has been retained effectively (Delong, 2004). During its creation process, knowledge generally fits in two types. These types, tacit and explicit, each require different methods for communication and sharing (Hawryszkiewycz, 2002).
Chapter 2 of this thesis project will focus on these knowledge types and expand on knowledge retention. Chapter 3 covers identifying critical knowledge. It also describes possible costs of lost knowledge and barriers that Federal Government organizations may encounter when trying to implement knowledge management initiatives. Chapter 4 describes approaches to retain knowledge through human resources practices, knowledge-sharing techniques and information-technology applications. Chapter 5 explains methods to support and measure the effectiveness of knowledge-retention initiatives. Chapter 6 identifies the strategic goals, critical knowledge, costs and barriers of knowledge retention in a government agency. This chapter, which focuses on the Federal Grain Inspection Service (FGIS), one of two organizations within the Grain Inspection, Packers and Stockyards Administration (GIPSA) of the U.S Department of Agriculture (USDA), also describes processes and recommendations to preserve this agency’s knowledge. The last chapter concludes this thesis with closing remarks on the relevance of knowledge retention initiatives.
CHAPTER 2. KNOWLEDGE RETENTION OVERVIEW

2.1 Knowledge in an Organization

In organizations, the terms data, information and knowledge are related but not equal. According to Thomas H. Davenport, American academic and author specialized on KM, data are “structured records of transactions without any inherited meaning (Davenport, 1998, p. 3).” Data are transformed into information by adding value to it. Thus, information is data with content (Davenport, 1998). Consequently, knowledge derives from the collection of data and the processing of information. David Delong, renowned professor and researcher on the topics of workforce demographics and knowledge loss, adds that for organizations, “Knowledge is the capacity for effective action or decision making (Delong, 2004, p. 27).” Therefore, whereas information is data subject to the user’s ability to process interpret and integrate it, knowledge is the combination of information with the user’s experience utilized to take action (Delong, 2004).

Knowledge can be tacit or explicit. Explicit knowledge is concrete and can be transferred and explained easily. Tacit knowledge, a term originally introduced by famous polymath Michael Polanyi, is more abstract, complex and context dependant (Delong, 2004). According to Polanyi’s definition, tacit knowledge is in people’s minds and difficult to express (Firestone & McElroy, 2003). Since it is socially rooted, tacit knowledge needs to be extracted, codified and transformed into explicit knowledge for it to be captured (Dembla & Mao, 2002).
Noble Price winner economist, Prof. Douglass C. North (1999), further explains the differences between communicable or explicit knowledge and tacit knowledge. He argues that, while both communicable/explicit and tacit knowledge involve learning skills, explicit knowledge is transmitted from person to person and can be codified. For example, it can be captured or written down in manuals and catalogs. Tacit knowledge, in contrast, only can be gained through training and personal experience. It is not entirely communicated since individuals acquire it through their innate abilities. North calls it “learning by doing,” which implies that employees learn organizational skills and working routines from the repeated interaction among themselves and the tasks they share (North, 1999, p. 74).

Professor Donald A. Norman (2002) also describes these two types of knowledge as, *knowledge of the head* and *knowledge of the world*. “Knowledge of (in) the world” (explicit knowledge) is retrievable whenever possible and is always accessible and waiting to be used. “Knowledge of the head or how to” (tacit knowledge) is transmitted better via training or gained through personal experience (Norman, 2002). According to Norman, not all knowledge that triggers behavior needs to be mental. He adds that “people can deliberately organize the environment to support their behavior (Norman, 2002, p. 79).” Hence, if knowledge at the workplace is meant to be shared, it should be accessible and retrieved easily. Additionally, knowledge that resides in people’s head needs to be captured and converted into worldly knowledge so that people can retrieve and use it.
Experts in the topic agree that categorizing knowledge either as tacit or explicit is not always straightforward particularly when attempting to capture knowledge with different approaches and methods. Knowledge usually begins as explicit and becomes implicit with practice and experience. To address this knowledge continuum from tacit to explicit and vice versa, leading Japanese scholar, Prof. Ikujiro Nonaka, developed the Socialization Externalization-Combination Internalization (SECI) model (See Figure 1.). This model theorizes that knowledge continually evolves by a “knowledge conversion.” In this conversion, knowledge expands in quantity and quality through four modes - socialization, externalization, combination and internalization- following a clockwise direction (Leavitt, 2002). The Knowledge Management field assumes that in the SECI model, different levels of the organizations, individuals and groups create and improve knowledge among each other (Rice & Rice, 2007). Most KM programs focus on the “Externalization” quadrant which is the hardest to address because it is where knowledge changes from tacit to explicit structures. SECI also provides a framework to evaluate and select approaches to better capture knowledge such as interviews and web-based repositories. This paper will address how different knowledge-sharing approaches fit this model in Chapter 4.
North argues that managing knowledge, specifically tacit knowledge, is a way to capitalize on the performance of organizations (North, 1999). Investing in tacit knowledge eventually will pay off because:

Organizations will also encourage the society to invest in the kinds of skills and knowledge that indirectly contribute to their profitability. Such investment will shape the long-run growth of skills and knowledge, which are the underlying determinants of economic growth (North, 1999, p. 79).

Therefore, economic efficiency is also dependent on how an organization manages its existing knowledge. Skilled and knowledgeable employees work better and faster. The outcome of their work is reflected on the economic performance of the
organization. Tacit knowledge is also particularly beneficial for the innovation process. The advantage lies on the fact that employees knowledgeable on certain functions can innovate faster than those who have to start without previous experience.

2.2 Knowledge Retention

Not all organizations can manage knowledge in the same manner. Each has different standards, operation procedures and organizational structures. KM initiatives could be incorporated in an organization’s business functions in the same manner they incorporate such common functions as profit measurement and service delivery. Strategies in KM should be tailored to each organization’s culture, strategic goals and available technology.

One solution to address knowledge needs in an organization is to design a knowledge-retention strategy. KM includes “the development of tools, processes, systems, structures and cultures explicitly applied to improve the creation, sharing, retention and use of knowledge critical for efficient decision making and action (North, 1999, p. 46).” Accordingly, knowledge retention is an essential part of KM since it addresses knowledge acquisition, storage and retrieval. A knowledge retention strategy is used to improve market share, productivity, employee turnover, time to competency and employee satisfaction in an organization (Leavitt, 2002). This type of initiative would be effective if it is all-inclusive, long-lasting, and customized to the organization’s needs (Delong, 2004). Thus, knowledge retention processes target critical skills that
The purpose and business direction of an organization. The next chapter explains how to customize a knowledge retention strategy for a government agency.
CHAPTER 3. DESIGNING A KNOWLEDGE RETENTION STRATEGY

A knowledge retention strategy should be planned and launched carefully. Evidently, many factors need to be taken into consideration before implementing such a strategy. First, the organization must create awareness about the issue and earn management’s support (Leavitt, 2002). Before designing the strategy, organizations need to set strategic goals for knowledge retention. Then, they need to identify what knowledge should be captured and determine what knowledge is at risk. Subsequently, organizations should assess costs and any possible barriers that may surface. The next step is to describe the strategy and decide what approach should be used first (Delong, 2004).

While it seems like a straightforward process, a knowledge retention strategy will face many obstacles. In the federal government, specifically, culture seems to be one of the greatest barriers because of its bureaucratic structure, regulations and overall working environment. In a study conducted by the American Productivity & Quality Center (APQC), many of the sponsors which included seven federal agencies - U.S. Department of Commerce, Bureau of Census; U.S. Department of the Navy, Acquisition Reform Office; U.S. Department of Veterans Affairs; U.S. General Services Administration; U.S. National Security Agency; U.S. Naval Sea Systems Command; and U.S. Social Security Administration – testified that they battle against knowledge retention barriers. Still, federal organizations like NASA and the U.S. Navy have demonstrated that knowledge management initiatives can be implemented successfully. Moreover, current trends
indicate that this field keeps evolving in part because so many corporations have already become interested and invested on knowledge retention solutions.

### 3.1 Set strategic objectives

A knowledge retention strategy must have strategic objectives that support the agency’s goals or objectives. In the APQC a study, 24 sponsors and 9 best-practice partners identified how KM’s principles, tools and practices can be applied to retain valuable knowledge before it leaves the organization through exiting employees. It also focused on transferring that knowledge to the organization’s new members (Leavitt, 2002). The study’s partners were asked to rank the top objectives for a knowledge retention strategy. Their number-one objective was to build a knowledge-sharing culture in their respective organizations (75%). They also indicated that they wanted to prevent the loss of technical knowledge (58%), retain valuable knowledge as employees transfer jobs inside their organization (58%), bring new hires up to speed more quickly (50%), capture lessons learned (45%) and prevent the loss of business knowledge (42%) (Leavitt, 2002). Aligning these or similar objectives with the company’s strategic goals and taking them into account during the developing stage of the knowledge retention strategy are key elements for its implementation.

### 3.2 Identify Critical Knowledge

The first step in designing a knowledge retention strategy is to identify what critical knowledge needs to be captured. Several KM methodologies have documented
that the initial step is a knowledge audit or some variation of a cultural assessment to identify strong and weak assets in an organization (Buchwalter, 2002). It would be almost impossible to capture all knowledge in an organization. Thus, organizations need to assess what knowledge is worth capturing, storing and sharing (Leavitt, 2002). According to the Knowledge Life Cycle, a KM reference model developed by members of the Knowledge Management Consortium International (KMCI), part of the assessment should include knowledge from both its integration and production stages. During its production, knowledge usually begins as information and becomes explicit or tacit knowledge at the individual or group level. Subsequently, knowledge is given organizational content, communicated and made accessible to all employees during its integration (Firestone & McElroy, 2003).

The costs incurred from losing knowledge could be mitigated by anticipating the costs of losing certain individuals. Creating ways to do this will avoid disruptions in an organization’s essential operations (Delong, 2004). Best-practice organizations in the APQC study have used different approaches and methods to identify critical knowledge. The following are some frequently used and effective approaches:

**Senior Management Discussions** - According to the APQC study, this was the most frequently used method to identify critical knowledge and identify who has that knowledge. NASA’s Jet Propulsion Laboratory (JPL) used this approach when they talked to 1,000 NASA project managers, engineers and scientists to identify knowledge gaps (Delong, 2004).
Interviews with Employees Changing Roles, Subject Matter Experts, etc. - This method is also frequently used to identify critical knowledge and those who have it. Siemens AG Incorporated, an electronics and industrial firm, used interviews with the management team and other key personnel as one of its stages in the knowledge management process the company has developed (Leavitt, 2002).

Communities of Practices – These are informal networks where people share similar interests and skills. They have become increasingly popular and effective in knowledge retention strategies. Best Buy, for example, started a pilot program with three different communities of practice: the Microsoft Networks (MSN) sales associates, Mobile Installation Associates, and Personal Computer (PC) technicians. The three pilots had impressive results and proved to be valuable tools in knowledge retention and sharing (Leavitt, 2002). Since this method is more recognized as a knowledge sharing approach, it will be described further in the next chapter.

Social Network Analysis (SNA) – This type of analysis develops graphic displays of how employees rely on each other regardless of their positions. Some popular software available to conduct SNA are InFlow, UCI NET, Capital Works Learning Effectiveness Index and Verna Allees Value Network Analysis (Delong, 2004). Mapping the flow of knowledge in an organization reveals what its type, who creates it and who needs it.
Data on Employee Tenure/ Staffing Models and Projections - This data include attrition profiles that monitor when will employees become eligible for retirement. They are useful to indicate what talents and skills will be lost in the long and short term (Leavitt, 2002; Delong, 2004). Corning Incorporated, the top world’s producer for fiber optics, had been losing valuable knowledge since the 1990s because of attrition. Corning calculated that, cumulatively, 2,000 years of experience will leave the organization’s Research and Development division alone. Additionally, 50 percent of the organization’s population had less than four years of experience with Corning. Given this scenario, Corning recognized the need to identify and share critical knowledge (Leavitt, 2002).

Other methods and approaches used less frequently by best-practice organizations include - focus groups, end-user/front line interviews, surveys, knowledge inventory assessment, exit interviews, HR-identified upcoming retirement dates, industry analysis/demographics and external consultant evaluation.

3.3 Identify Costs of Lost Knowledge

Not surprisingly, squandering skills and knowledge of seasoned workers will have negative repercussions on the organization’s economic and performance outcomes. Consequently, identifying possible costs brought about by the loss of valuable knowledge is crucial to a knowledge-retention strategy. Knowledge can be lost in a particular function, team, individual role or organization level (Delong, 2004). For this reason, when assessing the cost of lost knowledge, organizations should consider all current and future scenarios in which performance and productivity could be harmed by losing
knowledge. Costs could affect all levels, including individuals, groups and the organization as a whole. Some costs are also intangible, like the loss of key personal and business relationships. Thus, organizations should focus on both tangible and intangible costs and encourage preventive action. Organizations need to consider whether the impacts of lost knowledge might be delayed over years or if the threat is such that they need to address it immediately (Delong, 2004). When dealing with lost knowledge, executives might face different scenarios. For instance, in the case of Delta Airlines and Northrop Grumman, both faced the immediate threat of lost knowledge, which already was affecting their overall performance. While the Tennessee Valley Authority (TVA) and NASA’s Jet Propulsion Laboratories also confronted imminent loss of human capital due to age demographics, they were still on time to address this loss before it affected the organizations’ performance (Leavitt, 2002).

Knowledge can be very costly for the organization because, if lost, it could weaken its strategic goals and economic performance. As previously mentioned, lost knowledge can reduce an organization’s ability to innovate since senior expertise is essential to develop new products and services. Retirements and turnover mean fewer employees available to support an organization’s expanding operations. Increasing retirement also translates into less potential mentors for new employees. Additionally, losing essential know-how triggers more frequent and costly errors. Losing knowledge can benefit competitors because some knowledge is strategic in nature. Competitors also might be able to retain the knowledge that the agency has lost (Delong, 2004).
According to David W. Delong (2004), two key segments in the human resources area of an organization deeply affected by lost knowledge are employee retention and recruitment. Thus, organizations need an integrated approach to address retirement, retention of mid-career employees and recruiting (Delong, 2004). Organizations may opt to retain older workers to assure that they transfer specific knowledge before they leave and not jeopardize high performance levels. Older workers could be willing to stay if they are given opportunities to develop new skills, use their time productively and make useful contributions. They also might wish to take advantage of additional training and engage in new challenges or any other meaningful activities that allow them to maintain social interactions (Hedge, Borman, & Lammlein, 2006).

In terms of recruitment, many organizations, such as the U.S. Federal Government, tend to do little hiring because of downsizing and cost-cutting. Thus, their recruiting networks and processes usually are outdated (Delong, 2004). Competition is also a factor since many influential companies, such as investment banks, consulting firms and high-tech companies attract more graduates in the field of engineering and science. Lacking an effective recruitment system is risky because organizations need new employees so that older, experienced workers can transfer their knowledge to them (Delong, 2004).

While there are various ways to share knowledge, not all them may be productive. For example, according to North, increasing human capital is not always the best option. While hiring more people increases the talent pool, they also make coordination difficult as demonstrated by the law of diminishing returns. That is, additional inputs reduce
productivity after they reach a certain point (where marginal costs meet average costs) (North, 1999). Additionally, physical structures or physical capital may not be sufficient to accommodate an increased amount of human capital (North, 1999). On the one hand, when trying to retain seasoned employees, the promises posed by workless life after retirement are hard to ignore. Retaining younger workers is also challenging since their working experience differs from their predecessors.

3.4 Identify Barriers to Knowledge Retention

Implementing knowledge-retention processes is not easy. Since lost knowledge is not own by anybody in particular, no one feels compelled to take prompt action. Employees might feel that only a particular group, such as management, is in charge and not see a need to act (Davenport, 1998). Most employees would argue that they are not given opportunities to invest and engage in knowledge-sharing-activities (Delong, 2004). Others may even argue that they do not have an adequate place to meet. Additionally, lacking a reward system for people who invest in knowledge-sharing could become an obstacle (Davenport, 1998). In general, people are reluctant to change by nature and may not embrace new practices willingly. The costs of lost knowledge are not always obvious. Leaders are not always aware or informed where they have become most vulnerable. Most senior executives should recognize the problem intuitively and be willing to invest resources in addressing it (Delong, 2004).

Knowledge retention strategies also might be absent from the organizational culture. Kimiz Dalkir, Knowledge Management consultant, defines organizational
culture “as the manner in which an organization solves problems to achieve its specific goals and to maintain itself over time (Dalkir, 2005, p. 181).” If knowledge-sharing is not part of the daily activities of employees, they may consider knowledge-retention activities unimportant. In many cases, employees do not trust each other entirely and have not built personal relationships. Trust is an important feature of knowledge-sharing cultures because, without it, people will not share knowledge and not act on what they do share with each other (Ellis, 2005). Best-practice organizations like HSBC Bank have identified that, along with trust, to share knowledge, employees need to have the willingness to admit failure and ask for help whenever needed (Ellis, 2005).

Organizations that use face-to-face communication have a different culture than those which mostly communicate via phone or email. In some cultures, employees need to follow strict rules and procedures. Others give employees more flexibility. Sure enough, stringent cultures require finely tuned KM strategies (Buchwalter, 2002).

Building an organizational culture suitable for KM is one of the greatest challenges faced by U.S. Federal Government agencies. J. Judah Buchwalter, specialized KM programmer at the Social Security Administration (SSA), explains that “changing a culture in a government organization where people are permanent employees, there is a strict organizational structure and directives come from numerous sources is a formidable obstacle (Buchwalter, 2002, p. 93).” Building a culture appropriate to share and capture knowledge is difficult to achieve when employees are used to following specific rules that do not allow time neither to build relationships nor engage in knowledge-sharing activities. NASA, for example, recognized it needed more than technology and a change
of culture to implement KM. Thus, the agency developed an “Intelligent Synthesis Environment” (ISE), or a fusion of scientists and engineers. Through ISE, NASA has transformed its organizational culture through training, education and new management practices. New management practices particularly are difficult to implement because, unlike private agencies, government agencies have many “bosses,” starting at the highest level within the executive and the legislative branch down to immediate supervisors (Buchwalter, 2002).

Buchwalter proposes three steps that government agencies can follow to successfully implement KM. The first step he proposes is to develop a business assessment to describe the requirements, priorities and goals for KM activities. The second is to conduct a knowledge audit that will provide the sources, destinations and flow of knowledge in an organization. For the government, this type of audit will unveil the agency’s initiatives and plans.

The third step is to furnish a list of executive and legislative government initiatives that apply to the specific agency and are tailored to improve government performance. Some past examples of these initiatives include the National Performance Review (1993), the Government Performance and Results Act of 1993, the Federal Information Technology Executive Order, the Government Management Reform Act of 1994, the Paperwork Reduction Act of 1995 and the Computer Matching and Privacy Protection Act of 1998 (Buchwalter, 2002). Additionally, agencies must target knowledge leaders because if “they can be influenced to promote the culture that is required for the KM initiative, then the rest of the organization will follow them (Buchwalter, 2002, p. 94).”
The influence that knowledge leaders can exercise on other workers is crucial to encourage them to participate in activities designed to share and capture knowledge.

The historical background or institutional knowledge of an organization is also crucial to design KM initiatives for government agencies. Notorious, published author and professor, James R. Beniger (1986) believes that history is an analytical method for understanding change and innovation, particularly for technology and economy. He explains that “if we recognize that understanding ourselves in our own particular moment in history will enable us to shape and guide that history (Beniger, 1986, p. 6),” consequently, learning about past occurrences will help foreshadow future outcomes and costs that will assist organizations in making better policy decisions (Beniger, 1986). This concept is relevant for government agencies created to meet regulation needs. Understanding why regulations were needed and how they were addressed are fundamental pieces in comprehending how a government agency presently functions.

North further emphasizes the importance of having an institutional framework, or the context in which procedures are developed to meet and maximize organizational objectives. Pirates, for example, need extensive knowledge of naval warfare and trade routes to survive in their own institutional framework: piracy in the high seas. This experience-based knowledge determines technological needs and possible economic opportunities for pirates and their victims (North, 1999). Therefore, institutional context dictates how different knowledge and skills are acquired to address organizational needs and economic opportunities. The manner in which these knowledge and skills are acquired in an organization ultimately dictates how an organization performs.
CHAPTER 4. METHODS FOR CAPTURING AND SHARING KNOWLEDGE

After identifying critical knowledge and assessing any costs and barriers for knowledge-retention strategies, organizations must test different approaches and methods for capturing and sharing knowledge. David Delong (2004) has developed a comprehensive framework for organizational knowledge retention that covers four key areas of knowledge management. This framework offers viable solutions to overcome barriers in knowledge retention. This thesis synthesizes this framework into the following three areas: Human Resources (HR) Processes, Knowledge Sharing Practices and Information Technology Applications.

4.1 Human Resources Processes

Human resources processes and practices that directly address knowledge retention improve the organization’s knowledge culture, recruitment and employee retention. Some examples of successful HR practices include systems for evaluating skill/knowledge base, recruitment, career development/succession planning, working with the aging workforce and contracting/consulting after retirement.

Systems for Evaluating Skill/Knowledge Base - This type of system tracks current skill inventories and future needs. It helps management identify future knowledge gaps that could materialize due to retirement. The tool also facilitates professional and managerial succession planning (Delong, 2004).
Recruitment - Organizations also should focus on reinventing their present recruiting processes. If agencies maintain outdated systems, they will find themselves competing in a competitive labor market to attract employees who will become crucial resources in knowledge-transfer activities (Delong, 2004).

Career Development/Succession Planning - Employees can take advantage of potential future opportunities within the organization through succession planning and career paths. This tool complements the skills-inventory system. Succession planning is an effective way to retain employees, slow turnover and build the capabilities of an agency’s workforce for the future (Delong, 2004).

Working with The Aging Workforce - Older employees need to be motivated and exposed to different scenarios. Thus, “by exposing employees to a variety of situations and responsibilities, continual learning of critical knowledge and skills help ensure continued motivation to learn, positive work attitudes and effective job performance” (Hedge, Borman, & Lammlein, 2006, p. 112). With the rapid approach of baby-boomer retirements, HR management needs to create innovative and appealing opportunities by which older employees can contribute significantly to organizations (Hedge, Borman, & Lammlein, 2006). According to the APQC study, the most effective methods to retain employees were professional development, challenging projects, skill certification, new technical skills and professional development (Leavitt, 2002).
One formal method to work with the aging workforce is Phased Retirement Program, or “flexible phased retirement.” It allows older employees to create more varied and shorter work schedules (Delong, 2004). This program is designed as a transition from full-time employment to full-time retirement. Under this program, (1) retirees can become consultants or temporary seasonal or part-time workers; (2) they can gradually reduce their working hours to get a taste of retirement; and (3) they can participate in job-sharing activities (Hedge, Borman, & Lammlein, 2006). Job rotation also is an option to encourage employees who want to explore different segments of the organization.

Job redesign is another popular approach. Some areas that should be considered for redesign include diverse work location, job content, work pacing, autonomy for completing assigned tasks, the physical environment, and tools and work aids (Hedge, Borman, & Lammlein, 2006). If such a formal program cannot be implemented, similar flexible work alternatives and work scheduling also could benefit older workers.

**Contracting/Consulting after Retirement** – This extended retention strategy usually covers such functional areas as industrial trades, engineering, executive level and technical experts. Companies such as Siemens, Northman Grumman and Monsanto have used retirees as contractors or consultants. Siemens, for example, gives cell phones to retiring employees to keep in contact with them. Northman Grumman operates a system called X-Ref that has a database of departed employees who are contacted when their expertise is needed (Leavitt, 2002). Monsanto has created formal programs to encourage
reemployment. This method has proven to be cost efficient because it keeps the company from having to invest in training, health benefits or bonuses. Other methods that concentrate on learning as a career path, provide economic benefits, flexibility and status include: organizational retraining, extended health benefits, alternative career paths, managerial training and bridge jobs (Delong, 2004).

4.2 Knowledge-Sharing Practices

There are several knowledge approaches used by best-practice organizations to share and capture both tacit and explicit knowledge. These practices have been prioritized in companies like Siemens, Corning and the World Bank. They also have included knowledge sharing into their formal rewards and recognition systems, such as performance appraisals (Delong, 2004).

The APQC study showed that the knowledge-sharing approaches more frequently used were not necessarily the most effective. In this study, the most effective approaches had a personal or face-to-face element. Generally, study findings also explained that all effective ways to capture, transfer and retain knowledge are embedded in the organization’s work flow (Leavitt, 2002).

The most frequently used approaches to share and capture tacit knowledge in the APQC study were milestone reviews, training, After-Action Reviews, internal networks and documentation of work/flow process. However, the most effective approaches as indicated by sponsors and partners in this study were Communities of Practice/interest, internal networks and After-Action Reviews (Leavitt, 2002). Below are the most
frequently used and most effective approaches to share and capture different types of knowledge:

A Community of Practice/Interest (CoP) – This approach originally started informally and has evolved into formal groups with specific goals for which they are held accountable. Unlike teams, these communities are brought together because of a genuine interest in a certain topic. These communities are used to build connections among practitioners not located in the same area. They also help build a sense of trust, mutual obligation, reciprocity and a common language shared by all participants. CoP develops its own processes and is responsible to its members. These communities decrease the learning curve of new employees because it: 1) helps newcomers identify subject matter experts who could answer questions and guide them to resources within the organization; 2) helps new employees understand institutional context; 3) helps foster relationships between mentors and mentees; and 4) creates shared narratives to transfer tacit knowledge (E.L. & Storck, 2001).

Participants of these groups can meet face to face or virtually. In CoP, members can reuse their existing knowledge assets more easily. This is especially true in virtual repositories where members can store, organize and download presentations and other related materials. These communities also might be sources of new ideas and products (Lesser & Stork, 2001).

CoP generally shares crucial tacit knowledge. For this reason, best-practice organizations have allowed employees some time to engage in CoP-related activities.
CoP is now regarded as a key asset of knowledge-management initiatives. A great example of successful CoP is the “Thematic Groups” of the World Bank. These groups work under 20 sector boards (rural development, health, education, etc). Each sector has between 3 and 12 thematic groups (Leavitt, 2002). Currently, there are 79 Thematic Groups at the World Bank. Participation in theses groups is voluntary and open to all staff. They also have external partners, and knowledge sharing mainly takes place across the group through E-mail distribution lists and websites (World Bank, 2007). Another example is Buckman Laboratories’ K’Netix open forums. The forums allow employees to participate in question-and-answer sessions. These forums work under the company’s Code of Ethics which provides the basis for the respect and trust of a knowledge-sharing environment. Any employee that violates the code is ejected from the forums (Fulmer, 2003).

**After Action Reviews** – The U.S. Army created this technique “to improve team performance by reflecting on action” (Leavitt, 2002). The reviews are designed usually to capture explicit knowledge. Still, the teams’ discussions create content and tacit knowledge for the captured explicit knowledge. In the U.S. Army, these reviews are conducted only after critical projects in which they have spent resources. During these discussions, participants gather to discuss what was supposed to happen, what actually happened, any discrepancies from the initial goals and what they learned. In some cases, like After-Action Reviews conducted by Xerox Connect, the reviews will include what information will be captured and apply and what will be measured (Leavitt, 2002).
Interviews/Videotaping – Interviews typically are conducted during a project review or when employees are about to leave. The APQC study found that, while videotaping could be effective in capturing tacit knowledge, it was not used frequently because of its high cost (Leavitt, 2002). Conducting interviews can be problematic because the content is hard to convert into accessible knowledge. The World Bank has targeted this problem by strategically choosing individuals and teams, and making short video clips that capture the interview’s highlights. Corning Incorporated’s interview program, “The Legacy Package,” is composed of two historians, one technical interviewer and a videographer who serves as the interviewer. Each interview can be stored on VHS, DVD or online. It then is made accessible via index or transcripts and finally interpreted (Delong, 2004).

Storytelling – Embedded in organizations’ day-to-day activities, storytelling “is the way people make meaning out of their experiences (Delong, 2004, p. 101).” The World Bank, for example, has an “Oral History Program” used for tacit knowledge debriefings. While these interviews are not videotaped, they are available to the public online. Mostly, they are used to convert tacit knowledge into explicit knowledge. NASA has incorporated storytelling in two different divisions:

- The Jet Propulsion Laboratory (JPL) sponsors storytelling sessions conducted by veteran JPL scientists, engineers, administrators and project managers. During these sessions, veterans and new employees share the history of space exploration.
- The Academy of Program and Project Leadership (APPL) uses storytelling primarily to transfer project management expertise. Project managers participate in story-based, knowledge-sharing meetings supplemented by their online magazine (Delong, 2004).

**Mentoring** – Mentoring or coaching is an effective way to transfer technical, operational or managerial skills from older to new employees (Delong, 2004). In the APQC study, organizations used mentoring programs to focus on leadership, behavioral and skill development for high-potential employees (Leavitt, 2002). In practice, many organizations today find this method difficult to sustain because experts find it hard to take time to train new hires satisfactorily (Delong, 2004). Xerox Connect and Siemens both have implemented successful mentoring programs. Siemens has a 4X6 integration process where new employees face four integration points “in the first six hours, in the first six days, in the first six weeks and in the first six months (Leavitt, 2002, p. 52).” Employees are integrated progressively throughout this program.

**Documentation of Work/Flow Process** – Documenting knowledge for future use should be a continuing process. Organizations need to make documentations more accessible and widely distributed, and create documentation practices from scratch if present practices are ineffective. Employees should be able to pass the “bus test.” That is, if they were hit by a bus, would their surviving co-workers be able to find and use their files. This practice is particularly important because exiting employees are not motivated to
organize their files and “some savvy professionals and managers will recognize that, by leaving their files in disarray, or even nonexistent, they can assure themselves lucrative consulting contracts for a few years (Delong, 2004, p. 90).” Corning’s Developed Technology Archives, for example, is a Web-based, searchable index that stores information on project participants and documentation.

Training – Training is used mostly to transfer explicit knowledge. It can be useful in certain jobs and for specific types of knowledge. It is effective when transferring leadership or managerial skills to new employees and to develop specific technical or professional skills (Delong, 2004). A limitation of training is that it does not support the transfer of tacit knowledge, which may be the most costly resource to lose. The Federal Highway Administration (FHWA) has an appealing, customized training program taught by an experienced administrator who was hired after he retired (Delong, 2004). Other frequently used and effective approaches include internal networks, project milestone reviews, face-to-face teams or department meetings, e-mail, one-on-one consultation with an expert and an apprenticeship program (Leavitt, 2002). APQC integrated all approaches with the SECI model previously mentioned. Figure 2 shows how different methods transform tacit and explicit knowledge according to the SECI model.
4.3 Information Technology Applications

Information technology applications should be used in knowledge retention only as facilitators because practical knowledge cannot be captured by a computer. These applications are inefficient when used in a culture without knowledge sharing practices (Delong, 2004). Additionally, “technology applications do not in themselves, create a need or demand to change behavior or share knowledge (Leavitt, 2002, p. 7).” Many organizations already have experienced how many of their IT knowledge solutions have become abandoned applications (Leavitt, 2002). In order to avoid this type of scenario, IT systems should be combined with knowledge retention initiatives as supporting tools.
If used appropriately, IT solutions can speed up and facilitate knowledge retention and sharing. IT systems specifically should be used to connect people, accelerate learning, capture knowledge and map human knowledge (Delong, 2004). Best practices organizations have also successfully utilized technology to support knowledge retention strategies. They have testified that there is no unquestionably superior application or technology for knowledge retention. Most organizations use basic tools, such as collaborative applications, data repositories, e-mail, and videoconferencing (Dembla & Mao, 2002).

Technology is necessary to build knowledge-management strategies accordingly. It should be integrated as part of the knowledge retention strategy. Some frequently used IT systems include expert locator systems, Web-based repositories, content Management Systems (CMS), E-learning applications and knowledge maps.

**Expert Locator Systems** – These systems are like corporate yellow pages or directories that point to individuals both inside and outside the organization. They usually are used to exchange tacit knowledge. Northrop Grumman has implemented such a system successfully. In Grumman’s expert locator system called X-Ref, employees complete their own profiles. X-Ref is mandatory for all employees and is used frequently by managers to staff new projects, manage talent, and identify career paths for employees (Leavitt, 2002). Still, companies have discovered that the biggest problem with these systems is that people do not always update their profiles (Delong, 2004).
**Web-Based Repositories** – These repositories usually are used to capture explicit knowledge. They contain databases with structured content that can hold such information as presentations, reports and competitor analysis. Xerox Corporation has developed Xerox Connect (XConnect) Inc., a national information technology enabled knowledge management integration system. This consulting and outsourcing system provides a tool called iConnect to Xerox clients. iConnect provides centralized storage, flowchart processes and sources of data among other types of information (Leavitt, 2002). Some similar repositories include lessons-learned databases and electronic notebooks (Delong, 2004).

**Content Management Systems (CMS)** – These systems create processes that identify, collect, categorize and refresh content. They include people, processes and technology, and are used mostly to capture explicit knowledge. CMS is comprised of content creation, management and delivery (Leavitt, 2002). Corning Incorporated has a system called “SOLAR” or “secure online lab reports.” It is a delivery mechanism that creates document and user profiles. Old lab reports are scanned and categorized in this program. For security purposes, the system’s content is restricted to those working on a given project (Leavitt, 2002).

**E-Learning Applications** – This application is used for self-assessment and customized educational programs. The U.S. Navy developed a program called the Flag University.
This Web-based system gives every Navy senior officer his or her own secure Web page with his or her own learning plan (Delong, 2004).

**Knowledge Maps** – Discussed previously was the relevance of knowledge mapping to capture critical knowledge. Technology can contribute greatly to make this method faster and more efficient. The partners in the APQC study noted that this was one the most effective ways to capture knowledge.

Other applications include shared folder or drives, personal Web pages, E-mail and other collaboration tools. NASA’s technical questions database and the U.S. Navy online community of practice called Tomoye Simplify are two of the most remarkable online tools. NASA’s technical questions database houses questions asked by technical experts during project development or formal review meetings. Thanks to this database, teams without enough experience are better able to anticipate concerns and issues that may come up during a specific project. With the Navy’s Tomoye Simplify, employees can find experts, share knowledge using fill-in forms, and have conversations on different topics using a Web-browser (Delong, 2004).
CHAPTER 5. SUPPORTING STRUCTURES AND MEASURES

5.1 Supporting Structures

The success of knowledge-retention strategies depends on their design and supporting structures. An effective communication system is a crucial supporting structure. To ensure that employees are aware of knowledge-retention strategies, they need to be told about it. E-mail or other Web-based applications provide this type of support and ultimately will encourage employee participation.

Training and recognition can also encourage employees to participate in knowledge-sharing activities. In addition to aligning knowledge retention initiatives with strategic goals, another imperative element of knowledge-retention support structures is a rewards system. Somehow, employees need to be rewarded for participating in knowledge retention because “cultures that don’t reward behaviors to prevent critical knowledge loss are much less likely to see the value of investing in programs that encourage such activities (Delong, 2004, p. 191).” Since knowledge retention is not owned by anyone in the organization, rewarding those who do invest time and effort in knowledge-sharing activities will encourage them and others. Incentives and rewards programs can trigger behavioral changes in favor of knowledge retention as demonstrated by Quaker Chemical. This company successfully awarded bonuses to those employees who participated in its electronic knowledge-sharing program (Delong, 2004).

The APQC study and supporting literature also demonstrated that senior management support was essential. Government agencies are no exception. Senior management executives are the leaders that provide the funding, minimize barriers and
help promote knowledge sharing. Best-practice organizations have had a central knowledge management group. Usually, this group is composed of a leader, knowledge-management team members, HR/training personnel, IT personnel, product groups and content managers. Other members include subject matter experts, CoP gatekeepers and interviewers/videographers. Collectively, this group minimizes barriers, promotes and advocates knowledge sharing, approves and develops initiatives, and supports implemented methods (Leavitt, 2002).

In terms of financial support, available funding for knowledge-retention initiatives varies across organizations. Since KM covers many areas of an organization, funding could come from different sources, starting with Human Resources. Partners of the APQC study reported that, on average, they spent from $100,000 to $249,000 (Hasanali, Haytmanek, Leavitt, Lemons, & Newhouse, 2003).

5.2 Measures

Having a metric system is beneficial to better assess the effectiveness of knowledge-retention strategies. Metrics are used to measure the value implementation and lessons learned, and to develop benchmarks. Rather than having one “right” set of metrics, they should be a combination of measurement types and classes. Knowledge-retention metrics should help achieve consistency across an organization and prevent the duplication of efforts (Bedford, 2005).

Some measurements used by best-practice organizations include surveys of users of knowledge retention systems and internal balance scorecards. Tracking the number of
knowledge capture activities and that of knowledge “objects” also are methods used to measure the success of knowledge retention (Hasanali, Haytmanek, Leavitt, Lemons, & Newhouse, 2003). Some organizations like Xerox Connect link knowledge retention participation with both the organizational and individual performance. The World Bank tracks the number of employees who view online videos and transcripts. It also tracks the number of hits on each project debriefing (Leavitt, 2002). With similar measurements, such as workshops and focus groups, organizations can determine trends in organizational behaviors, what parts of the strategy need improvements and where to concentrate future efforts.
CHAPTER 6. USDA/GIPSA FEDERAL GRAIN INSPECTION SERVICE (FGIS)

6.1 The Organization

The Federal Grain Inspection Service (FGIS) is one of two organizations within the Grain Inspection, Packers and Stockyards Administration (GIPSA) of the U.S. Department of Agriculture (USDA). FGIS offers sampling, inspection, process verification, weighing, and stowage examination services. These services accurately and consistently describe the quality and quantity of the commodities being bought and sold. FGIS’ main customers are farmers, handlers, processors, exporters and international buyers. The agency also establishes standards for quality assessments, regulates handling practices and manages a network of Federal, State, and private laboratories across the U.S. This network of certified laboratories provides impartial, user-fee funded official inspection and weighing services. Overall, FGIS’ standards, oversight and regulatory programs facilitate the marketing of U.S. grain and related agricultural products. In FY 2007 alone, the official system provided more than 3 million inspections on more than 294.2 million metric tons of America’s grain (GIPSA, 2007).

Like many other federal-government agencies, FGIS will experience a drastic outflow of seasoned employees due to attrition. By 2009, 64 percent of its workforce will be eligible to retire. By the same year, 73 percent of Agricultural Commodity Graders (ACG) and 63 percent of Agricultural Marketing Specialist (AMS) will be eligible to retire. These two functions are mission-critical within FGIS (GIPSA, 2005).

FGIS is also changing its organizational structure. The operations of five domestic field offices will be merged into one central lab called the National Grain
Center. This center will provide centralized oversight of FGIS programs. It will house
the entire Technical Service Division (TSD) and two new branches of the Field
Management Division: the Quality Assurance and Control Staff (QUAC) and Field
Operations and Support Staff (FOSS). While the organizational changes will result in a
more focused oversight system, it also will cause a further decrease of experienced staff
when the centralization of monitoring functions finalizes (See Appendix B- FGIS
Organizational Chart).

6.2 History of the Organization

As previously discussed, James R. Beniger’s (1986) believes that history is an
analytical method for understanding change and innovation. Douglas C. North (1999)
adds that an institutional context reveals how different knowledge and skills are acquired
to address organizational needs and economic opportunities. The rich institutional
context provided by FGIS history substantiates Beniger’s and North’s assertions. The
creation and development of FGIS delineate its mission and forecast possible challenges
it could encounter when dealing with retirement and changes in its organizational
structure.

During the 1850s, the large quantities of grain stored in warehouses and elevators
became difficult to separate. The introduction of preprocesses such as standardized
methods of sorting, grading, weighing and inspecting resolved this problem. Inspectors
and samplers hired to preprocess the grain became part of the new wave of workers
created by the Control Revolution (Beniger, 1986).
At the end of the 19th century, the grain business still experienced a lack of uniformity in grain quality standards and terminology among American grain markets leaders. The need for national standards and a national grading system became evident with the prevailing confusion about grading procedures in different markets. While national grade standards were introduced in 1909, these did not involve strict grain standards procedures. Grain merchandisers and producers were concerned about this situation since several states and trade organizations had established inspection points that used different terminology for grain standards and regulations. After several hearings and deliberations on this crisis, Congress enacted The United States Grain Standards Act (Act) in 1916. The act authorized the Secretary of Agriculture to:

- Establish official U.S standards for grain;
- Perform appeal and dispute inspections and collect fees for appeal inspections; and
- License competent persons to inspect and grade grain and to suspend and revoke such licenses.

The Act also helped the grain industry expand to a multibillion dollar, domestic and export operation (FGIS, History of the United States Grain Standards Act, 1978).

In 1968, the president revised and updated the legislation. Its most significant amendment required all export grain sold by grade to be inspected in accordance with the official standards. This applied to all official samples obtained after the final elevation of the grain as it is loaded aboard or while it is in the final transportation carrier. The amendment also required the shipper to issue a valid official certificate with the bill of
landing and other shipping documents. While all private inspectors were licensed by the USDA’s Agricultural Marketing Service (AMS) and supposed to receive over-the-shoulder supervision from the AMS grain division (FGIS, History of the United States Grain Standards Act, 1978), events that took place from 1973 to 1976 ran counter to the amendment.

In 1973 and 1974, the grain industry experienced major irregularities in the weighing and inspection of grain. Elevator employees were not receiving proper supervision from AMS federal graders. Thus, federal control over inspections was minimal. Additionally, weighing services were provided by non-federal (private) inspections agencies without any control from the government over the grain that was weighted. Not surprisingly, many individuals, grain elevators and companies took advantage of the situation (FGIS, The New Orleans Grain Inspection Scandal, 1977). Licensed inspection personnel in Houston, Texas, were accepting bribes and gratuities before or after they performed stowage examinations in exchange for certifying that ships were clean and acceptable for loading grain. In Baton Rouge, Louisiana, private inspection companies allegedly were accepting briberies to misrepresent the weigh and quality of commodities used for exports and “upgrading” soybean shipments (FGIS, 1977). The Federal Bureau of Investigation (FBI) first identified these irregularities through a series of investigations triggered by reports of grain thefts and bribery in the lower Mississippi River. The Federal Maritime Commission and grain-shipping industry employees provided the reports (FGIS, History of the United States Grain Standards Act, 1978). The wrongdoings were committed by both inspectors and members of the export
grain industry, from the barge dispatcher to the executive vice president of exporting companies. The investigations resulted in 124 Federal grand jury indictments against 94 individuals and 14 firms (FGIS, 1977). These events severely impacted American farmers and the credibility of the entire U.S. grain marketing system. These series of repeated and calculated abuses, which disrupted grain trade relationships overseas, became known as the Grain Inspection Scandal of 1976.

Because of the scandal, on November 20, 1976, Congress created FGIS as part of the amendments to the United States Grain Standards Act. Congress charged FGIS with managing the national grain inspection system and instituting a national grain weighing program. This separate federal grain inspection entity was designed to ensure the development and maintenance of uniform U.S. standards. It also developed inspection and weighing procedures for grain in domestic and export trade, and facilitated grain marketing. FGIS oversees a network of Federal, State and private entities that provide inspection and weighing services to customers nationwide. Currently, the organization has headquarters units in Washington, D.C., and Kansas City, Missouri, and field offices located in export and domestic markets in the United States and eastern Canada.

FGIS consists of 425 employees: 53 in the headquarters, 61 in the Technical Service Division and 311 in field offices. According to FGIS’ future projections, this number will be reduced even more when it consolidates the field offices in the National Grain Center. The organization will also lose a significant amount of its workers to retirement. By 2010, 79 percent of FGIS supervisors will be eligible for retirement. By the same year, 75 percent of all Agricultural Commodity Graders (ACGs) and 90 percent
of field supervisors will also be eligible for retirement (GIPSA, 2005). These numbers are particularly distressing because most retirees leave with a significant amount of years of service that translates into many years of acquiring knowledge and skills not easily taught or learned.
CHAPTER 7. FGIS KNOWLEDGE RETENTION STRATEGY

The first portion of a knowledge-retention strategy for FGIS is the alignment of that strategy’s goals with those the agency has established to describe its cores business functions. FGIS has one overarching strategic goal and three objectives. The main goal is to facilitate the marketing of U.S. grain and related agricultural products. Three strategic objectives branch out from this goal:

Objective 2.1: Provide the market with terms and methods for quality assessments;
Objective 2.2: Protect the integrity of U.S. grain and related markets; and
Objective 2.3: Provide official grain inspection and weighing services (GIPSA, 2005).

Accordingly, the knowledge retention strategy proposed in this thesis project has three main goals intended to fulfill FGIS objectives:

1) Capture FGIS best practices so they can be retrieved when fulfilling future service requests from domestic and international customers;
2) Shape the FGIS workforce to ensure that critical workforce skills and capabilities are in place to preserve the agency’s trustworthy standing; and
3) Promote the retention and sharing of knowledge among employees to prevent knowledge loss of grain inspection and weighing services.

The methodology used to understand better the application of the theoretical framework previously discussed in this project was the interview. I conducted 12 interviews with FGIS Executive Management Team (EMT) members (Deputy Administrator and Division Directors) and “Knowledge Leaders.” EMT considered these “Knowledge Leaders” key players in the organization with a wealth of knowledge that
have been working in FGIS for more than 15 years. One of the original knowledge leaders mentioned by the EMT was not interviewed because of scheduling conflicts. I did not add more interviews to the original list of knowledge leaders because after 12 interviews, there were evident trends among the participants’ answers. Participants brought to the interviews between 19 to 37 years of work experience within the grain industry and FGIS. The interviews contained a total of six questions and were conducted in a three-week span (See Appendix C). On average, interviews lasted from 30 minutes to 1 hour and 15 minutes. One interview was conducted via email, five interviews were conducted face-to-face, and the remaining six took place over the phone. I took detailed notes during the conversational interviews and later transcribed them.

To understanding FGIS’ goal and objectives better, participants were asked to explain the agency’s core capabilities; or what the organization does that is not imitated easily. Most participants agreed that the agency’s goal is to provide impartial grading services. A private entity cannot provide these services as well as FGIS does. In spite of pressure from the grain industry, FGIS still maintains impartiality and independence by providing uniform standards and services. Customers are always going to look back at its standards, definitions and factors. Overall, FGIS provides central, impartial standards for all services, definitions and grading.

One interviewee explained that FGIS primarily “standardizes the human brain.” For example, FGIS performs 2,000 inspections and makes them all the same by utilizing equal standards. Inspectors are able to inspect color, texture and shape with the same standards across the country. They determine adequate grade sample populations and
FGIS also develops the uniformity and continuity of the official inspection system. This well-recognized, independent system is not driven by a profit motive. In many parts of the world, such a system is not as independent. One interviewee explained that the agency enjoys “doing the job right,” not because someone is paying “underneath the table.” For instance, most non-federal employees do not have enough support to prevent them from getting fired since they work in an environment that is more permissive than mandatory. In contrast, FGIS employees are not influenced by profit. Only the appropriate standardized processes really matter to them. The key element is that FGIS has the resources to be independent from the industry. The agency does not have to be concerned about the results. It focuses on completing the work. Inspectors are interested in the accuracy instead of the potential costs for the customers.

While FGIS works with a grain industry that is profit driven, it does not exist to make a profit. Congress mandated FGIS to provide inspection services independently. Its greatest strength is that it offers quality without being profitable. FGIS has what one interviewer called “umpire arrogance.” The agency can remain accurate without compromising its integrity. Unlike private agencies, FGIS is a true, unbiased “umpire.” The official inspection system established by FGIS is impartial. Therefore, employees “don’t have any reason to go one way or the other.” This impartiality has strengthened
the agency’s positive reputation during its existence. It also has given customers confidence in the agency’s services.

People tend to trust the agency and its employees because FGIS is the “government”. The agency represents the grain industry to buyers and governments around the world. FGIS speaks government to government on behalf of the grain trade. This is true for governments such as the Japanese and Canadian, with whom FGIS has developed reciprocal, professional relationships. This characteristic is very unique to governments because they do not represent specific companies or the industry over others the way other private organizations do. FGIS has statue and notoriety in the U.S. and overseas as a result of the impartiality of the services it provides.

This agency delivers services by bringing different market players together and eventually performing rulemaking. Employees are recognized for providing standardization and quality control throughout the country. Before FGIS, a lot of companies were grading grain independently. Thus, customers received different grades and consequently lost money. FGIS pulled these companies together and instituted a national program. Thanks to FGIS standards, customers buy and sell grains with much more confidence. FGIS basically harmonizes grain trade since its employees can work together to build consensus and reach a reasonable solution to solve issues that impact the entire grain system. The agency can understand the costs and benefits from all angles without advocating for a particular cause.

In addition to facilitating grain trading, FGIS also identifies technologies that meet quality grain needs. Employees at the Technical Service Division (TSD) develop
new technologies and processes to standardize methods so FGIS can deliver reliable measures on a national scale at a tolerable cost. As one interviewee explained it, FGIS can say “this is how it should be done.”

Being able to oversee a national grain inspection system is one of FGIS’ strengths. While most private agencies can operate efficiently at a local level, they would have difficulty delivering the same quality of service at the export level. To oversee and manage a national–level, grain inspection system, FGIS has developed a well-defined and well-maintained Quality Assurance and Quality Control (QAQC) process and system. Most participants argued that the private sector does not have such a QAQC system in place because their in-house people may not remain objective.

7.1 Critical Knowledge in FGIS

According to the APQC study of best practice organizations, senior management discussions and interviews with employees changing roles are the most effective techniques to identify what types of knowledge need to be captured. At FGIS, senior management already has discussed the need to retain critical knowledge. It has included Knowledge Management as a future activity in the agency’s business plan. The interviews conducted for this project were used primarily to identify what knowledge can be used to devise and recommend appropriate retention processes.
7.1.1 General Skills

Interviewees were asked to identify the skills and talents they considered key for the organization. They identified five general skills as critical for employees working for FGIS: communication and interpersonal, flexibility and adaptability, analytical skills, political savvy and IT. Participants agreed that while all employees should have these skills, they become more indispensable and relevant as workers rise within the agency and take managerial positions. While these skills are not specific to any particular group, they must be conveyed and exhibited by upper management to establish the culture of an agency or business.

Communication and Interpersonal Skills

Most interviewees stressed the importance of communication skills. They called these skills essential for any employee. Being able to communicate and handle different people constantly is almost a requirement in the workplace. These skills are required even when communicating electronically. Writing skills are the basis for creating the agency’s policies and procedures. They reside with people writing directives (Filed Management Division’s Policies and Procedures Branch) and Compliance Division investigators, TSD scientists and upper management. Ultimately, all employees should be able to write and communicate what they have accomplished at their jobs.

Interpersonal, or “people,” skills involve having contacts within and outside the organization. People with good interpersonal skills can function successfully within a multi-cultural and multi-level organization. These skills also allow employees to work
effectively, individually and with a team. Employees should be able to prioritize and work independently, and work with others in a team setting.

**Flexibility and Adaptability**

Being flexible and having the willingness to adapt are important skills for FGIS employees to possess because the market the agency serves is changing constantly. Workplace scenarios change constantly. Employees need to adapt throughout the organization, particularly as they climb the career ladder. They need to be able to resolve other people’s issues when they cannot resolve those issues themselves. As employees rise in their careers, they will interact more with individuals from different cultural and educational backgrounds, and work experiences.

For upper management, having the ability to look in the future, that is, being a visionary is also part of being flexible and adaptable. Some participants emphatically said that managers should have vision and strategically think about the agency’s current and future challenges and should be able to convey both. Since the vision of the agency’s future is not a daily conversation topic, management must insure that it communicates that vision to its employees.

**Analytical Skills**

The interviewees noted that the ability to analyze information is also crucial. Employees need to be able to see and gather data, assimilate and translate them into what it means to the agency, and take any actions to implement that information. These skills
are implicit or tacit in nature. Problem-solving is one of these analytical skills. Employees must capitalize and help the market place solve any problems. For example, when new, unregulated Biotech products appear, different divisions inside the agency must work together to analyze current data to reopen markets, conduct tests, build statistical expertise and facilitate the marketing of the product with international markets. The real challenge is to gather all the information and determine how the organization can handle pending issues. Another example is the Quality Control Management Staff. In FGIS, these specialized individuals study all data that are being collected. In contrast to other managerial skills, these are inherited skills. One participant explained that, “You can easily hire managers, but is hard to find individuals with this type of specialized knowledge.” This is true for employees who can use their technical expertise and apply it to particular projects.

**Political Savvy**

A core group of people must understand the organization’s internal and external policy. Upper management, specifically, has to really know the workings between USDA and Congress. This knowledge includes contacts and key players who know how to operate within the system diplomatically. This political savvy is based mostly on experience; therefore, it is tacit knowledge. Members of the Executive Management Team mainly are involved in functions that require this knowledge. Collectively, this group can recognize opportunities and turn them into reality and deliverables.
Basic Skills of Information Technology (IT)

Because IT changes quicker than other areas, employees must understand how to use basic information technology effectively. IT can help organizations meet strategic goals faster and more accurately. While the lack of computer skills seemed to be a problem in the past, today most employees know how to work with computers adequately. Still, FGIS currently is launching a fully integrated Web site called FGIS Online. The site will enable FGIS employees and their customers to conduct business in an organized manner, mirroring many of the steps they follow already in their jobs today. FGIS will train its employees on the system. Specifically, headquarters employees will need to understand how all the applications fit together and how to use those applications properly.

7.1.2 Specific Knowledge in FGIS

Interviewees also talked about the knowledge needed to achieve strategic goals. Participants revealed critical knowledge unique to FGIS. Management and knowledge leaders must have the technical expertise for inspection services. They also must understand industry marketing and delivery structure to meet current demands and anticipate the services that may be needed in the future. I have categorized participant’s responses in seven knowledge realms necessary to meet strategic goals. They are:

- Grain grading and weighing;
- Technical expertise;
- Regulations and standards;
Grain Grading, Sampling and Weighing

The ability to accurately grade, sample and weigh grain is critical for FGIS. These are cognitive talents that support the agency. These talents ensure the validity and accuracy of official certificates. This validity resides exclusively in FGIS and cannot be found outside the organization. FGIS basically has to be the best at inspecting and weighing because accurate grades are essential and critical in determining grain crop value. Grain grading and weighing are continuing skills that FGIS will need over the years.

Grading cannot be taught easily in universities. These skills are learned mostly in the field offices of the Agricultural Commodity Graders and Grain Marketing Specialists, two of the agency’s mission-critical positions or the backbones of the organization. Licensed inspectors and samplers in the private official agencies that FGIS oversees also have these skills. Most of these trained workers boast between 20 and 30 years of experience each. Learning this grading process takes a long time, beginning with the very basic protection and collection of grain. Field folks have the potential to grade faster to improve actual delivery, which would improve overall performance.
These skills are timeless because the grain industry will request them even if existing and new objective methods are developed. While these skills are not considered the more prestigious ones, coming from such an entry-level position (dirty, sweaty types of jobs) in the field gives employees an advantage over potential competition. Grading and weighing entails technical aspects that take time to develop. Thus, employees must participate in an apprenticeship program to learn these skills. Grain-grading skills are considered implicit knowledge because these skills can be learned only by working with a trained professional. For example, when grading any type of grain, FGIS inspectors must smell it and identify any odor. There are three types of odors: sour, musty and commercially objectionable foreign odors. An inspector with little experience will need repeated attempts to differentiate odors adequately because odors cannot be described with just words.

For weighing, scale specialists must know how to operate and understand scales, and how to troubleshoot these machines and detect any type of cheating. Their educational background obtained from working at grain elevators and within the grain-processing industry allows the specialists to accomplish their tasks. Many employees do not have these skills because they are very specific and there is no easy way to transfer them. Even though employees have reference prints with calibrated, colored images of grain damages, determining grain grades is highly subjective. Certainly, as one participant explained, “you just can’t pick up a grain inspector” because it takes years to train them properly.
Technical Expertise of Scientists

The technical expertise of scientists is essential to improving current methods and developing new, undiscovered ones for objective testing. FGIS’ technical credibility includes knowledge of the equipment, calibration development and maintenance. This expertise remains supported by the knowledge gained by visual inspections. Scientists have worked for many years at the FGIS Technical Service Division. Their expertise is a combination of formal education and work experience (tacit and explicit knowledge). Formal education involves such subjects as mathematics, chemistry, physics, engineering and biology. FGIS needs the technical expertise to investigate what services the industry needs and study any potentially new ones for the future.

The other element of this scientific expertise is the application of technical skills within FGIS. The research done at the Technical Service Division is called “applied research.” This part is important because the application commands the analytical, specialized skills required in a number of projects. Having these skills allow employees to reconcile field knowledge and technology. These skills are less accessible through a standard education process because they cover detailed knowledge about grain quality. Taking scientific principles to grain quality measures is crucial in meeting strategic goal 2.1. While the Agricultural Research Service (ARS) uses basic research, FGIS knows what the grain markets need. Since there is not a lot of funding dedicated to grain-testing research, if FGIS does not conduct it, the research may not take place.

Methods, research and testing developments found in the Technical Service Division have the best capability to develop and test technology that meets the grain
industry’s needs. The grain industry seems to be lagging on the automation of processes. Thus, FGIS could explore this area further.

Regulations and Standards

FGIS must ensure that inspections are aligned to its standards and the Act. Additionally, having a keen understanding of the federal regulatory rulemaking process of all grain standards and regulations is critical since the authority to implement these comes from the Act. Having individuals who know the law and how to propose regulation changes is critical. The Market and Program Analysis Staff, the Management Support Staff (MSS) and the Compliance Division are the agency’s main carriers of this knowledge.

Employees frequently refer to the standards and directives contained in the agency’s policies and procedures to ensure specific tasks are done properly. As one participant explained, there’s usually more content behind the written word. Regulations are brief and open to interpretations. Moreover, the true intent behind the words is implicit.

Policies and Procedures

Grain standards are written with the intent to follow regulations and the Act (Intent of Congress). With those standards in mind, FGIS develops policies and procedures concerning grain marketing and handling. These procedures are created by people with knowledge of such issues as grain transportation, testing, economic
ratifications and estimations. The people with this knowledge originally started as inspectors and graders. They have risen through the system and worked with the industry to create the actual standards. These skills, developed by working with industry people, finally transform into written procedures. Employees from the Field Management Division, Compliance Division and the Market and Program Staff possess this knowledge.

FGIS relies on a core group of employees with field experience to decipher what the written word should mean and represent. Most of the implicit knowledge has been delivered over a long period of time. Employees have determined what works and what does not. If an employee fails to follow the directives, results will be erroneous. The Policies and Procedures Branch, for instance, can increase performance by initiating policies that promote official inspections. These new policies include, for example, official agencies being allowed to perform phytosanitary inspection services under the Agricultural Marketing Act.

One interviewee explained that while the temptation to cheat does exist, a little bit of cheating can grow into something bigger. For example, to keep dust suppressed inside inspection labs, one agency started using water. Soon, more agencies also started using this technique. When the extra water added weight to the sample, competitors complained which created controversy. Because of this and other similar scenarios, it is critical to enforce the policies and procedures already in place. FGIS auditors and investigators in the Compliance Division are charged with enforcing these rules to protect the integrity of the inspection services provided by the agency.
Another group involved with implementing and controlling policies and procedures is the newly formed Quality Assurance and Control Staff. This group could improve overall performance of the official system by providing GIPSA, as well as the service providers, timely and accurate performance evaluations. The staff also will provide content designed to help workers improve. This information will allow service providers to see where they rate compared to their peers.

Historical Perspective

Interviewees also said that it was important workers knew about the Grain Inspection Scandal of 1976. Congress created FGIS because of the Scandal. According to one participant, “The Scandal is how we came to be as an organization.” It created the need to have a third-party inspection system. The Scandal also presented government in the light of providing services through a regulatory agency. Soon, grain inspection evolved into a service organization not driven by profits.

Some participants believe history may repeat itself. Thus, the potential for some wrongdoing exists. Understanding how the agency began will help future generations understand the importance of having a system with integrity. The agency might have such an objective if it starts contracting. One interviewee added that the official inspection system should be “above reproach.” Having a mere perception of the type of work the agency performs is not enough to understand the consequences of corruption and fraud.
There is a big difference between those who worked during the Scandal and new employees unaware of its magnitude. One interviewee actually worked during the Scandal and had to testify in front of a grand jury. He argued that those who lived the Scandal have a greater sense of pride and purpose because they witnessed other employees bypassing the sampling system by cheating and taking bribes from ships not cleaned properly. He even declared that new employees don’t understand why FGIS was created.

As mentioned earlier, participants noted the importance of learning from the past to anticipate the future. They said history dictated the decision-making on what services FGIS should provide. For example, the survey program for pesticide residues on wheat exports originally started after Japan and Korea addressed the issue. FGIS developed these tests because it considered those markets crucial. Today, while this program is formal and common, employees need to understand all the research and context with which it was first developed.

**Institutional Context**

FGIS also must be able to work in a “holistic” fashion. Many workers tend to get isolated. Instead, they also need to find opportunities to work outside their duties. In the field, for example, employees tend to get too focused on what they do and ignore the big picture. Employees need to know what the agency is doing and how it relates to the broader world. Therefore, people need to understand the processes that go into a specific project and learn from past mistakes. One interviewee said employees must focus on
both “what you know and what you don’t know.” Experience also goes with technical knowledge. Without it, employees are bound to reinvent the wheel. While certain fumigation procedures have very specific notices and instructions, only experience determines if those procedures will work or not. Knowing who has the fumigation expertise will help clarify these procedures and prevent future missteps.

Institutional knowledge also looks at how different divisions and work units merge together. One of the interviewees commented that having these skills also means staying informed of “what’s going on.” Employees should know what responsibilities belong to what division. To one participant, this meant comprehending who has the “finger in the pie.” Thus, employees need to have “organizational savvy.” The Management Support Staff (MSS), Budget and IT are the support groups needed to help people understand the program and give it context. Institutional knowledge helps determine who to contact inside and outside the agency. For example, certain contacts and specific places exist that are very helpful for employees who perform collateral duties overseas. Yet, this type of knowledge really is not documented. As one interviewer declared, this “knowledge is in my head.”

Since FGIS works with many private and government organizations, knowing the links between them and FGIS is valuable. It is essential to know how FGIS fits into other parts of USDA and the government. As employees move up, it is critical to learn about the agency’s roles and responsibilities, and its relationship with other government agencies. Additionally, FGIS needs people who understand the reauthorization process thoroughly. Congress reauthorizes FGIS every few years. Without this reauthorization,
FGIS would lose its budget, be barred from using appropriated money and prevented collect fees. Thus, it is essential to understand the issues and history of previous reauthorizations, including any arguments for and against.

Understanding customers and the industry

All employees need to have a high regard for customer service. They need to know that they serve taxpayers and have an obligation to the general public and industry, including international customers. These employees also have an obligation to protect their interests and maintain the system’s integrity through progressive yet prudent management. For an agency dedicated to public service like FGIS, learning about customers and their expectations is vital.

For the agency to meet its strategic goals, it must know its customers and the industry it serves. Accomplishing this means understanding grain markets, their needs and how grain sales transactions work. Knowing what company has the expertise to produce a given test and what partnerships are beneficial for the agency is part of this industry awareness. FGIS benefits from having this market awareness and key understanding of market needs, and any potential impacts of the markets. It is vital to know what the market needs to predict its future.

The ultimate output of the agency is an official certificate with a particular value. The certificate’s value is possible because FGIS has developed standards to provide buyers and sellers the information needed to make sales transactions plausible: grade, test weight, moisture content, official factors and other related factor information.
certificate is the product of all of FGIS’ processes. Certificates are used as basis for trade and common in international trade. One participant compared the agency’s certificates to the stickers on gas stations pumps which ensure proper calibration and inspections for fuel pumps. In the same manner that customers at gas stations are assured that the money they spend on gas concurs with its quality, all FGIS customers are guaranteed that the price paid or received from selling/buying grain matches the product’s true (quality) value.

Employees need to understand how the industry works and how business relationships were formed originally. Being able to work with the grain industry is important because it keeps the agency relevant. It also stabilizes its relationship with Congress. This responsibility starts with upper management, the Office of International Affairs, Market and Program Analysis Staff, and filters down all the way to the field offices. The Market & Program Analysis Staff can impact revenues by producing new services and testing for products not already performed by the official system. An example of this would be the current process of exploring the demand for the standardization of dried distiller’s grain. The Office of International Affairs also works with international visitors who contact FGIS for current grading practices and new services and methods.

One interviewee explained the relationship between FGIS and the grain industry. He mentioned that Federal employees do not compromise the integrity of the grain system because “their checks are guaranteed to come every two weeks.” The industry could exercise control over the private sector but not over FGIS. During a grain
transaction, federal employees guarantee quality, accuracy and credibility. While the business is not profitable for employees, it is for the industry. Since the industry is revenue driven, private entities without government oversight could compromise integrity. A participant further recommended that the agency look at private work with great caution to protect the grade’s integrity. Private agencies are more compelled to do what the industry “wants them to do” because it benefits them. Thus, FGIS must also ensure that its services are market driven instead of regulation driven except to protect the integrity of the official system.

Meanwhile, FGIS employees must respect the work private, agencies and their employees perform on the agency’s behalf. Often, the field work is performed under adverse conditions and for minimal compensation. Employees must know how official agencies work and how they work with them. While agencies are profit driven, FGIS focuses on helping the American grain market. FGIS does not have the same underlying goals of private agencies but employees of both sectors need to learn how to alienate them and work together. The Compliance Division and the field offices to some degree have this knowledge.

7.2 Costs of Lost Knowledge

Most interviewees agreed that FGIS will become inefficient if all critical knowledge is lost. They argued that lost knowledge could reduce its reliability and quality significantly. Inevitably, employees most likely will repeat costly errors made previously. One interviewee categorically argued that the agency will become a
“bureaucratic dinosaur” without the trust and respect of the public and international customers.

FGIS employees will find themselves duplicating previous work. If they do not understand why they have to follow certain processes, employees will fail to recreate the same knowledge. In other words, employees will need to “learn from the beginning.” For example, once during a stowage examination, despite the paint on a barge carrying wheat not being dry, the chief inspector made a judgment call and called it acceptable. When the wheat was unloaded in Japan, significant amount of grains were found glued on the barge’s walls. Japan claimed damages on the wheat. After further investigation, the agency faulted the inspector and reimbursed the receiver. While the error seemed insignificant, the Field Management Division (FMD) ruled on the issue. If employees are unaware of these type of issues, the agency will find itself repeating the same mistakes constantly. Thus, employees must convey all critical knowledge to reduce the time it takes for tasks to be completed.

If critical knowledge vanishes, the inefficiency soon will follow. At the same time knowledge loss decreases efficiency, it also increases the responsibilities of others. One employee, for instance, explained that if he did not show up for work, the responsibility of his immediate co-workers would increase because they would have to cover for him. In most cases, it could take years to gain back the experience of a seasoned co-worker. Lost knowledge will just “make the job harder” and waste the agency’s resources.
Without tacit knowledge in grain grading the agency will not be able to provide the same level of service. It will be difficult to transfer this knowledge because the experience will be missing. Moreover, without the scientific expertise, the agency will not be able to develop new methods and practices adequately. Thus, if the agency does not keep hiring and training scientists, FGIS will not be proficient at developing future services that will be increase in demand later. Competitors like Australia and Canada, who understand what the agency does, will continue conducting tests and move ahead of FGIS.

Additionally, employees new to the grain business do not know “why” they are there. As one participant explained, the agency will have a real young, “green” workforce that will be thrown into the “snake pit” without enough experience to face the industry pressure. For instance, supervisors find themselves in a “babysitting” role, overseeing contractors from the grain industry. The main drawback is that all experienced workers are leaving. Consequently, the agency will have “green” people watching other “green” people. If the agency does not take preventive actions, some interviewees argued, the industry could end up owning the grain inspection agencies.

Inevitably, institutional knowledge will be lost with attrition. Since it is difficult to trace back history, it is critical to learn whether someone has studied the same problem previously or not. At the same time, there is also potential for embarrassment and a decrease in the customers’ non-retrievable trust on the agency’s services. If FGIS does not know what the customers and market want, the agency can become irrelevant and
tarnish its good reputation. The industry expects FGIS to be the “silver bullet” of new methods. Lost knowledge could potentially shatter these expectations.

Experienced employees can guide new ones through many of the new issues that develop. This experience can help many of these “new” issues become old ones. For example, a recent issue concerning soybean standards was found to be the same one that occurred in the 1990s. The main consequence of lacking historical knowledge is that a new employee will neither be respected nor trusted by the grain industry. Industry pressure can also trigger more congressional scrutiny for the agency. If employees do not understand why the agency exists, the grain industry will continue to pressure Congress and others to limit FGIS’ authority and possibly have it eliminated.

The agency also will become less relevant if critical knowledge is lost. FGIS must be accurate and trustworthy to ensure that its certificates will “stand up.” Customers trust certificates to be accurate and a reflection of what they are buying. Certificates lose value if this accuracy is lost through retirement.

7.3 Barriers to Knowledge Retention in FGIS

Like in many other government agencies, FGIS’ structure is designed to increase predictability and resist changes. It has standardized roles, measurable rules and long-term employment based on seniority. These factors add difficulty to the learning process. FGIS specifically lacks formal processes for documentation and a learning organizational culture.
Overall, the agency does not have the adequate means to capture best practices. While FGIS has many of its procedures in writing, the agency does not cover why they exist. If a new employee does not know where to find the required information for a project performed previously, that employee might overlook, for example, simple changes that made significant improvements in the past. Many employees would claim that there is no time to document processes and might even doubt its worth. FGIS does not have a formal process or mechanism to collect or capture critical knowledge. In some cases, a lot of knowledge is not documented because it is considered “unwritten truth.”

FGIS does not have an organizational culture and environment embedded in knowledge-sharing practices. Employees are not held accountable for sharing knowledge. Thus, they do not feel compelled to engage in activities designed to communicate vital information related to their jobs. Without the appropriate learning culture, employees will not be motivated to participate in knowledge-sharing activities.

During the interviews, one participant also described a very common situation that takes place at FGIS. He differentiated between “good” and “bad” knowledge. Bad knowledge takes employees backwards. Some employees only remember one way to do their jobs because they always were performed in the same way. In many cases, employees just know the “old” ways and remain “stuck” in the past. They are not able to “think outside the box” and, consequently, inhibit their own creativity and that of others.

In the area of communication technologies, telephone and e-mail are the preferred modes of communication among FGIS employees. Many seasoned employees feel more comfortable talking on the phone or face-to-face. While most employees are not familiar
with advanced online communication programs, they are comfortable working with their computers. E-mail is also used widely and accessible both through an e-mail application, Outlook, and via a browser. Most divisions have shared network drives accessible to their respective employees. These shared drives are used to save public documents, as a network drive, but searches are limited similarly to those abilities built into users’ desktops. Since the system merely is a shared hard drive on the network, it lacks useful features present in most document/file management applications. For example, there is no way to track file changes to see who changed what and when. This presents challenges for users looking for a document’s most recent version. Although users likely know where needed files are located within their own project folder, they may have problems finding projects they are not directly involved with due to varying organizational schemas.

Online communication programs might also face challenges with Departmental security and accessibility to specific systems. Employees also would be concerned with the accuracy of the information shared in online forums, for example, and the possibility of using posted statements against other employees. In both face-to-face and online discussions, the relevancy and applicability of the topics to their specific jobs could also be an issue. For online programs specifically, some employees might have difficulties explaining issues. These difficulties could generate possible misinterpretations of the posted comments and the agency’s position as a whole. All the more, employees could fear potential repercussions and reprisal from management in reaction to shared information.
7.4 Legislative and Departmental References

The following list covers executive and legislative initiatives that support KM strategies in federal government agencies. The plans below cover initiatives dated from 2001 to present (for legislative actions dated before 2000 provided by the USDA Forest Service, please refer to Appendix D). This list starts with the overarching President’s Management Agenda (PMA) and ends with strategic initiatives tailored for the agency in the FGIS Business Plan.

President’s Management Agenda (PMA) is an initiative introduced by President Bush in 2001 to make the Federal government more results oriented, efficient and citizen centered. PMA focuses on strengthening human capital management and expanding electronic government (E-government). It emphasizes regular performance reviews for departments, increased managerial flexibility and greater accountability for employees. PMA addresses five areas: human capital, financial accountability, competitive sourcing, e-government, and budget and performance integration. The Office of Management and Budget, and the Office of Personnel Management for Human Capital scores agencies and departments quarterly (PMA, 2007).

Federal Enterprise Architecture Program (FEA) is part of PMAs E-government initiatives. It consists of a set of interrelated “reference models” designed to facilitate cross-agency analysis and identify duplicative investments, gaps and opportunities for collaboration within and across agencies. FEA’s Mode of Delivery Business Area
includes a knowledge creation and management section that involves the programs and activities in which the federal government creates or develops a body or set of knowledge to serve the public better (FEA, 2006).

USDA Strategic Human Capital Plan 2003-2007 was designed to institute policies and practices to ensure USDA has a workforce executing carrying out the Department’s Strategic Plan. This plan incorporates a section for Knowledge Management and Employee Development. This section’s first priority is to capture retiree and departing employee knowledge by implementing USDA e-Government content and knowledge-management efforts. It also focuses on:

- Utilizing incentives for employee/alumni participation in knowledge capture;
- Addressing department-wide competency gaps; and
- Promoting communities of practice and networking.

The Department also has a cross-agency content management team that explores projects related to information management and using of corporate taxonomy. These moves will lead to improvements in organizing, accessing and using information, documents and corporate knowledge (USDA Human Capital Plan).

GIPSA Human Capital Plan 2005-2007 integrates strategic alignment and planning with workforce development, accountability, talent management and leadership development tied to succession planning. The plan guides continued agency efforts to improve its overall operations and maintain a high-performing workforce. The Human Capital Plan
focuses on strategic workforce planning and maximizing employee performance. It seeks to ensure the workforce remains current with technology, customer service and business skills. This plan also branches out to the GIPSA Workforce Plan FY 2005-2009 and GIPSA Succession Plan.

FGIS Business Plan 2008-2010 is a living document still under development that supports the GIPSA Strategic and Human Capital Plans. The business plan includes the establishment of an institutional knowledge-management program.

7.5 Recommendations

Demographical data demonstrate that FGIS faces imminent knowledge lost resulting from attrition. This critical knowledge makes up the agency’s intellectual capital. This capital includes implicit and explicit knowledge, skills, attitude, culture, processes, networks, and reputation. The costs of losing critical knowledge are sufficient to raise concern and awareness about knowledge retention. The interviews conducted for this research project further corroborated this problem. Management already has recognized the need for a KM program in its FGIS Business Plan. Additionally, the National Grain Center will have fewer employees doing the same tasks that a larger number of employees in the field offices currently perform. This centralization can create knowledge gaps if the agency does not take action before its completion.

The knowledge retention strategy typically begins with the design and launching of one or more initiatives. To ensure the success of these pilot projects, they should
demonstrate that knowledge management will work and impact organizational performance positively (Hasanali, Haymanek, Leavitt, Lemons, & Newhouse, 2003). In addition, FGIS, like many other federal government agencies, is not a profit-driven organization. Therefore, the outcomes of knowledge retention should be defined in terms of such results as an upsurge of service requests, improved accuracy and the development of new standards that satisfy the grain industry.

Figure 3 shows FGIS critical knowledge inside the SECI model. It considers that knowledge changes throughout the four modes while it is shared and captured. This figure also specifies methods to capture critical knowledge depending on which conversion mode contains that knowledge. Tacit knowledge is located in the upper half of the model and explicit knowledge is in the lower half. Yet, as this knowledge is shared and captured through such methods as Communities of Practice or After Action Reviews, it transfers to the next mode and from one half to the other following a clockwise direction. FGIS already has identified some of the general skills that interviewees mentioned as being critical for the agency. It also has developed initiatives to address those. These initiatives, which belong to human resources, specifically in the recruitment and training domains, are explained in the following section.
### 7.5.1 Existing KM Practices in Human Resources Processes

In the area of Human Capital Succession Planning, FGIS has already taken measures to counter retirement. The agency has created initiatives concerning recruitment and training. In 2005, FGIS formed a human capital planning team that identified steps to be taken to cope with retirement and the future reduction of personnel. The team stressed the importance of training and communication necessities within the agency and with private official agencies regulated by FGIS. While this thesis project
will not elaborate in this area since they pertain more to the human resources field. It will cover how they target the critical general skills mentioned interviewees.

FGIS already has a variety of work-life programs available to retain employees that are about to leave. Similar to the phased retirement program described in Chapter Four these activities are designed to create desirable work environments. They include telework, alternative worksite, retention bonuses and maxi-flex tours of duty among others. The agency also provides its employees with the opportunity to develop new and mission-critical skills via details and cross-utilization of personnel. The skills acquired through these programs are indispensable for higher and more demanding positions (GIPSA, 2005).

Management and staff continually evaluate skills to identify areas that need additional development. Training and recruitment are targeted to improve the skills necessary to meet strategic goals. Whenever budget permits, FGIS will offer formal training programs and such development opportunities as rotational assignments, details and special programs, technology-based training, on-the-job-training, mentoring, coaching, attendance at professional events, special projects, informal methods and travel. In-house or outside training is also provided to enhance leadership, communication and data analysis skills (GIPSA, 2005).

Currently, FGIS has various specific training and development programs. The Leadership Development Program (LDP) offers courses in leadership competencies and other learning activities. The Agricultural Commodity Grader Program for technicians working in export field offices includes regulatory, technical and administrative
components. The Specialized Enhancement Program acts as a refresher course for basic technical skills. For supervisors, managers and executives, FGIS offers 360-degree assessment tool. FGIS also offers more than 4,000 free courses in USDA’s Web-based training program, AgLearn (Minute, 2007).

7.5.2 New Recommended Practices for Knowledge Retention

The six KM recommendations developed in this project are designed to compliment the agency’s existing efforts. They consist of knowledge sharing and retention practices tailored for FGIS. These practices mostly emphasize the importance of documenting workflow. These recommendations include IT solutions to be used as aids to support KM initiatives. Nowadays, online knowledge-sharing programs are valuable because information can be diffused quickly through IT and other computer-integrated, data-management systems. While employees should consult each other to obtain the information they need to do their jobs, there is no reason why many of these queries could not be handled by a better technological search engine. Having information categorized and saved in a place accessible to everyone could accelerate knowledge sharing and improve communication among various levels of the organization. Many of the IT systems recommended should be considered in the long run whenever budget permits.
Recommendation #1 - Knowledge Retention Culture

Knowledge-retention initiatives for FGIS must be embedded in employee workflow processes. To accomplish this task, knowledge management should exist in the organizational culture. Like many other government agencies, FGIS’ structure and organizational practices are not receptive to knowledge sharing. Because culture is rooted deeply in an organization, change could be difficult to achieve. Supervisors and employees who create the culture – an organization’s values, norms and practices - deeply influence knowledge-sharing strategies (Delong, 2004). Participation from experienced workers is imperative because personal advice from seasoned employees has been proven to improve work quality (Knowledge@Wharton, 2007). Therefore, FGIS needs to address the cultural and change management enablers who will guarantee wider participation in knowledge-sharing activities. The new, young employees to be hired to replace retirees already are submerged in a high-tech society and accustomed to working in projects instead of jobs.

Any group in the organization has the potential to increase overall performance through knowledge retention and practices. Anyone within an organization can make suggestions to increase overall performance. While a field-office employee may have an innovative idea to perform his or her job more efficiently, some ideas may not be communicated beyond the supervisor level. For instance, one interviewee commented that, in the agency, there is a difference between “us,” the employees working in the field, and “them,” the employees working at the D.C. headquarters. To avoid this type of
division, each supervisor must welcome ideas and encourage employees to share suggestions so that management is aware of potential opportunities.

All employees should engage in knowledge exchange, particularly managers and supervisors who lead and set examples for the rest of the organization. Increased overall performance through KM technically starts at the top with leadership that can provide direction to get the organization to rally behind the agency’s core objectives. FGIS management already is aware of this issue and supports it. To support knowledge sharing further, managers can establish specific times and places to share knowledge. FGIS can also provide incentives and reward systems (i.e. Spot Awards, Time-Off Awards, etc) based specifically on knowledge sharing. Including an element of knowledge sharing as part of the specific goals of each employee could also serve as a motivation.

In addition to management, each individual employee needs to be wary about opportunities to increase overall performance through KM. A dual responsibility exists between management and individual employees because, to a large degree, employees have to take the initiative. All levels of the organization have different perspectives and directions; therefore each supervisor must look into ways to increase performance. Employees also must be alert for potential opportunities. For example, participants of the Organizational Assessment Survey Team agreed to work with other co-workers to increase overall performance. Participants of the Leadership Development Program stepped out of their normal day-to-day jobs to work on projects that could increase overall performance. This type of program involves much work and forces participants to leave their comfort zones.
All employees should participate in knowledge-retention strategies. Best-practice organizations have noticed that having a core group of employees working on these strategies is essential. This group would implement KM initiatives, report to management, collect information and measure the initiative’s performance. Initially, the group could be composed of volunteers truly interested in the idea. To be successful, it and other similar groups should be:

- Staffed with experienced workers;
- Allowed sufficient “slack time” to work on knowledge-sharing activities; and
- Given enough authority to make their own decisions (Knowledge@Wharton, 2007).

This group should first discuss the critical bodies of knowledge identified in this thesis project and tests the knowledge management tools recommended. Taking into consideration available funds, it should then explore innovative IT tools that the agency may incorporate to support knowledge management. Finally, this group must develop performance measures and redefined knowledge retention tools if needed.

Recommendation #2 - Retirees’ Legacy Program

As previously mentioned, by 2009, more than half of the entire FGIS workforce will be eligible to retire. Before it is too late, the agency can start working with the aging workforce by implementing a formal retention program six months or one year before they become eligible. This formal program could include documentation, interviews/videotaping and storytelling. Such a program could be designed just for employees who have held a critical FGIS position for many years.
First, employees eligible to retire will need to document the workflow processes of their jobs. This first piece will be called the “Hit by a Bus Test.” This test captures procedures that co-workers should follow in case the employee is, hypothetically, “hit by a bus.” This plan will include key contacts, applications, timeframes and tasks. This piece should include just enough information so that when an employee decides to retire, someone else can complete the tasks.

Conducting interviews is the second element in the Retirees’ Legacy Program. Best-practice organizations note that videotaping these interviews is an efficient, but costly tool. An alternative is to use “storytelling.” This approach includes non-videotaped interviews that are tape recorded and transcribed. Interviewers should have the proper documentation to ignite discussion about specific issues. The transcripts also can be available online from the agency’s internal Web site.

Recommendation #3 - FGIS Archives Online

An effective and cost-expensive approach to learn about the history of the organization is to create an FGIS Archives Online. These archives would act as repositories of all historical documents, pictures and videos that describe the organization’s history. They would be available online and organized by subject, taking into consideration the critical knowledge categories provided in this project based on interviews. The information obtained from the “Retirees’ Legacy Program” can also become part of these archives. A picture gallery also would document historic evidence and memories from the past.
The most time-consuming part of the creation of these archives would be obtaining and cataloguing the information to make it readily retrievable. Employees would have to participate actively by providing their own documents and stories. After collecting the information from group and personal libraries, it would be categorized and uploaded to the Web site in the appropriate format. Summer interns could assist with this project. The Defense Intelligence Agency’s (DIA) Web site (http://www.dia.mil/), for example, has a very informative “History” division with a picture gallery, “short stories” and “references” sections (DIA, 2007).

Recommendation #4 - After Action Reviews

Interviewees familiar with TSD’s scientific projects expressed the need to capture best practices from these projects. While the agency has written procedures on its operations, the lessons learned are missing. One way to fill the void is by creating after-action reviews. These reviews are designed to capture key research elements for future reference.

Similar to the U.S Army, these reviews only will be conducted after critical projects on which TSD have spent resources. During these documented discussions, participants determine:

- What was supposed to happen;
- What actually happened;
- Any discrepancies from the initial goals;
- What they learned;
• What information will be captured and applied; and

• What will be measured.

After-Action Reviews do not have to be limited to scientific projects. They can be implemented across the agency in different ways. For example, they can be composed after Market and Program Analysis Staff’s grain surveys or Compliance Division’s investigations. Like with other knowledge-retention initiatives, accountability is important. Thus, someone in the project group must be delegated to form these reviews. Although this type of approach is time consuming, they have to be done to summarize lessons learned. With time, after-action reviews will become customary assessments and an important part of the agency’s projects.

FGIS can post these reviews online in a content-management system or a Web repository in the near future. As previously mentioned, Corning Incorporated has a system called SOLAR which houses lab reports online. SOLAR gives scientists and other authorized employees the ability to access these reviews from their own computers. Lessons learned from previous projects could be disseminated more effectively electronically. Another example is the Defense Nuclear Security Lessons Learned Center. This online tool summarizes lessons-learned data on physical security-related issues (DNSLLC, 2007).

Recommendation #5 - Communities of Practice

Communities of Practice (CoP) are mentioned under the Knowledge Management and Employee Development action strategy of the USDA Human Capital Plan. CoP is
one of the most effective approaches to share tacit knowledge. These formal groups of people are formed because of a genuine interest in a certain topic. Participants usually meet in person or virtually. In FGIS, CoP can hold discussions on such topics as grading and weighing, policies and procedures, FGIS history, official agencies, or customer satisfaction. These groups can initially meet quarterly or biannually depending on the time and resources available. Employee participation in these groups should be voluntary and with supervisor permission. Each community should develop its own processes with the help of a facilitator and should always welcome new members. Before each meeting, participants can suggest topics for discussions. A designated member should collect them to furnish a final list. To build the trust inside these communities, they should develop rules and protocols. Like other CoP in best-practice organizations, these groups can:

- Hold informal lunchtime or breakfast seminars;
- Conduct training sessions;
- Produce materials covering relevant topics;
- Capture experiences of retiring practitioners in multimedia;
- Sponsor conferences with outside speakers;
- Develop Web links to relevant outside sources;
- Develop Web sites with relevant training material and advice;
- Hold face-to-face discussions and meetings to share insights;
- Use video-conferencing to connect research labs;
- Maintain internal listservs for individuals to post comments about modifications;
• Maintain extensive discussion database where individuals can post and seek answers; and

• Develop e-mail-based expert access/question-and-answer system to post and distribute inquiries (E.L. & Storck, 2001).

FGIS should consider utilizing online resources to hold CoP meetings in the future. Its IT Department first would need to look for systems suited for government-owned computers. Employees then would have to familiarize themselves with online discussions systems before these CoP meetings can be held virtually. “Wikis” have become an increasingly popular method of online communication in the KM field. A “wiki” is computer software used to create collaborative Web sites. These sites allow users to create, edit and link to these Web sites easily. The best well-known example is “Wikipedia.org.” Instead of focusing on layout like content-management systems, “Wikis” focus primarily on content. Many businesses have installed this type of software to build inexpensive Intranets or for use in Knowledge Management (Wikipedia, 2007).

Recommendation #6 - Web-based repositories

FGIS explicit knowledge can be captured in a common place accessible to all employees, such as a Web-based repository. This type of repository contains databases with structured content that can hold presentations, reports, competitor analysis, lessons-learned information and electronic notebooks.

Currently, the agency uses FGIS Online. While this Web-based repository program accommodates most of FGIS’ application, it also consumes a substantial portion
of its budget. Therefore, building a Web-based repository may not be a feasible option presently. Nonetheless, such a system will benefit the agency since employees potentially could control their own email, oversee the number of versions of a certain document and share group projects. This type of system can house After-Action Reviews, documents and interviews from the Retirees’ Legacy Program.
CHAPTER 8. CONCLUSION

On September 2005, Congress reauthorized the Grain Standards Act for 10 more years. During upcoming years, FGIS will relocate an essential part of its operations in the National Grain Center. Most of the agency’s experienced employees will be eligible to retire. The National Grain Center will redistribute control from field offices to current official private and state inspection agencies, giving them more autonomy. This autonomy calls for stronger federal enforcement and strategic planning to prevent scandals like the one in 1976. Even more, contracting out inspection services could become an obstacle for knowledge sharing within FGIS because most contracts do not offer incentives to share knowledge own by the private company. At the same time, the grain industry will demand more services including the development of automated inspection procedures. Given this scenario, FGIS needs to ensure that critical knowledge does not leave the agency. Only with FGIS’ general skills and specific knowledge can it meet strategic goals and remain a current, reliable player in the grain inspection business.

Capturing critical knowledge in FGIS is necessary because “the collective wisdom of an organization’s employees can be transformed into organizational intelligence whereby the organization can become an agile, adaptive learning organization (Liebowitz, 2004, p. 1).” Initiating a knowledge retention pilot program is FGIS’ first step in becoming a learning organization. Initiatives in knowledge retention should be a balance between formal and informal learning. A learning organization begins with the injection of an organizational culture and environment in which employees are motivated and allowed to share knowledge. For that reason, the support of
upper management is essential since they are the leaders who can provide motivation and dedicate time to knowledge retention. Strong, active support from management executives and a consistent knowledge management group are essential for the success of a knowledge retention program.

Additionally, best-practice organizations have utilized technology to support knowledge-retention strategies successfully. They agree there is no superior application or technology for knowledge retention. Most organizations use basic tools, such as collaborative applications, data repositories, e-mail and videoconferencing (Dembla & Mao, 2002). To further explore the use of IT applications for knowledge retention, I attempted to create a knowledge map of FGIS using the INFlow software. Unfortunately, this tool was not informative for this project’s purposes. This drawback proves that not all technologies are appropriate to capture critical knowledge in FGIS. Further research on the proper use of this IT tool and social networking analysis, specifically, might provide better results.

FGIS also has to be very specific because it has specific regulations that need to be followed. Not surprisingly, employees sometimes inhibit their creativity because they become very methodical. Without tacit knowledge, it will be even harder to encourage creativity since the applicability of many of the agency’s procedures will be missing. In addition, because FGIS is a government organization, its bureaucratic structure may resist change. Nevertheless, the agency, like other U.S. federal government ones, gradually can embrace knowledge retention with the recommendations described in this thesis project.
The recommendations are a continuing set of processes that must be measured, revised and changed if necessary.

While such knowledge-retention initiatives as After-Action Reviews and Communities of Practice surely will encounter many obstacles, the costs of knowledge loss are sufficient to justify these efforts. The benefits of knowledge retention ultimately offset the effects of attrition. They also improve the costs of knowledge loss and foster trust and cooperation among employees. Additionally, knowledge retention preserves the processes, knowledge, culture and networks embedded in conceivably the most important asset for an organization: its intellectual capital. Most importantly, the theoretical frameworks, examples and initiatives described in this thesis project create awareness and further stress the importance of FGIS having a knowledge-retention program.
BIBLIOGRAPHY


APPENDIX A. TYPES OF CAPITAL

Types of Capital

Companies

- Tangible capital
  - Explicit knowledge
  - Processes
  - Culture
  - Reputation
- Intellectual capital
  - Implicit knowledge
  - Skills
  - Attitude
  - Explicit knowledge
  - Processes
  - Culture
  - Networks
  - Reputation
- Financial capital
  - Human Capital
  - Structural capital
  - Relational capital

APPENDIX C. INTERVIEW QUESTIONS

1. What are the skills and/or talents that you consider are key for the organization?
   In what individual does it resides? In other words, who has them?
   In what group does it resides?

2. What knowledge (both explicit and implicit) is needed to meet strategic goals and in which domain does it reside?

3. What do you think would happen if this knowledge is lost?

4. What are the organization’s core capabilities (not competencies); that is, what does the organization do that is not easily imitated?

5. What are the key groups that have the potential to increase revenue or overall performance?

6. With what individuals or division outside your division do you interact/work?
APPENDIX D. LEGISLATIVE REFERENCES

KM Reference Federal laws and documents provided by the USDA Forest Service

Acquisition Results Act of 1998
The purpose of this Act is to improve the performance of the Federal procurement system by managing for results and by improving the capability of the federal acquisition workforce to achieve the desired results.

Chief Financial Officers (CFO) Act of 1990 (Public Law 101-576)
The CFO Act provides a framework for improving federal government financial systems. It centralizes within OMS, through the Deputy Director for Management and the Office of Federal Financial Management, the establishment and oversight of federal financial management policies and practices and requires OMS to prepare and submit to Congress a government-wide, 5-year financial management plan. The act also requires the 24 major agencies to have CFOs and deputy CFOs and lays out their authorities and functions. Further, the act sets up a series of pilot audits under which certain agencies are required to prepare service wide financial statements and subject them to audit by the agencies' inspectors general.

Clinger-Cohen Act of 1996 (Public Law 104-106)
This law is intended to improve the productivity, efficiency, and effectiveness of federal programs through the improved acquisition, use, and disposal of IT resources. Among other provisions, it (1) encourages federal agencies to evaluate and adopt best management and acquisition practices used by both private and public sector organizations, (2) requires agencies to base decisions about IT investments on quantitative and qualitative factors associated with the costs, benefits, and risks of those investments using performance data (such as reduced costs, improved employee productivity, and higher customer satisfaction) to demonstrate how well the IT expenditures support improvements to service programs, and (3) requires executive agencies to appoint CIOs to carry out the IT management provisions of the act and the broader information resources management requirements of the Paperwork Reduction Act. The Clinger-Cohen Act also streamlines the IT acquisition process by eliminating the General Service Administration's central acquisition authority, placing procurement responsibility directly with federal agencies, and encouraging the adoption of smaller, modular IT acquisition projects.

Computer Security Act of 1987 (Public Law 100-235, as amended by Public Law 104-106)
This law addresses the importance of ensuring and improving the security and privacy of sensitive information in federal computer systems. The act requires that the National Institute of Standards and Technology develop standards and guidelines for computer systems to control loss and unauthorized modification or disclosure of sensitive
information and to prevent computer-related fraud and misuse. The act also requires that all operators of federal computer systems, including both federal agencies and their contractors, establish security plans.

**Copyright Act**
It protects the intellectual property of authors and creators as contained in works (print and non-print) and includes the provisions of Fair Use.

**Executive Order Facilitation of Cooperative Conservation, August 26, 2004**
This order ensures that the Departments of the Interior, Agriculture, Commerce, and Defense and the Environmental Protection Agency implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation, with an emphasis on appropriate inclusion of local participation in Federal decision making, in accordance with their respective agency missions, policies and regulations.

**Federal Acquisition Streamlining Act (FASA) of 1994**
Law designed to overhaul the cumbersome and complex federal procurement system. Among the many aspects of this law, it eliminates most paperwork and record keeping requirements for acquisitions below $100,000 and allows direct micro-purchases of items below $2,500 without competitive quotations or compliance with Buy American Act and certain small business requirements.

**Federal Financial Management Improvement Act of 1996 (Public Law 104208).**
This Act requires that service financial management systems comply with federal financial management system requirements, applicable federal accounting standards and the U.S. Government Standard General Ledger (SGL) in order to provide uniform, reliable, and more useful financial information. The act requires that auditors for each of the 24 departments and agencies named in the CFO Act report, as part of their annual audits of the agencies financial statements, whether the agencies financial management systems comply substantially with federal financial management systems requirements, applicable federal accounting standards, and SGL at the transaction level. The act also requires that GAO report on its implementation annually.

**Freedom of Information Act of 1966**
This federal law establishes the public’s right to request existing records from federal government agencies. Anyone can file a FOIA request, including US citizens, foreign nationals, organizations, universities, businesses and state and local governments. Organizations required to submit to FOIA requests include the executive branch departments, federal agencies, including federal regulatory agencies, and federal offices.

**Federal Managers Financial Integrity Act (FMFIA) of 1982 (Public law 97255)**
FMFIA requires agencies to establish internal accounting and administrative controls in compliance with standards established by the Comptroller General. The act also requires that OMB establish, in consultation with the Comptroller General, guidelines that the
agencies shall follow in evaluating their systems of internal accounting and administrative controls.


This legislation amends 44 U.S.C. Chapter 35 by enacting a new subchapter on "Information Security". The Security Act requires the establishment of service wide information security programs, annual service program reviews, annual independent evaluations of service programs and practices, service reporting to OMB, and OMB reporting to Congress. The Act covers programs for both unclassified and national security systems, but exempts agencies operating national security systems from OMB oversight. The Security Act is to be implemented consistent with the Computer Security Act.

**Government Management Reform Act of 1994 (Public Law 103-356)**

This legislation expands the requirement for a fully audited financial statement under the CFO Act to 24 agencies and components of federal entities designated by the Office of Management and Budget. The act requires the Department of the Treasury to produce a consolidated financial statement for the federal government, which GAO is to audit annually.


GPEA requires that by 2003 federal agencies provide, where practicable, for the option of submitting, maintaining, or disclosing information in electronic form as substitute for paper, and for the use and acceptance of electronic signatures.

**Government Performance and Results Act of 1993 (5 USC 306).**

The law holds federal agencies accountable for achieving program results by measuring program performance against program goals and requires agencies to publicly report their progress. The law improves Federal program effectiveness and public accountability by focusing upon results, service quality, and customer satisfaction. It also requires Federal managers to plan for meeting program objectives and provide annual performance plans covering each program activity set forth in the service budget to the Director of the Office of Management and Budget.

**Information Technology Management Reform Act of 1996**


**Paperwork Reduction Act (PRA) of 1995 (Public Law 104-13)**

PRA applies life cycle management principles to information management and focuses on reducing the government's information-collection burden. To this end, PRA designated senior information resources manager positions in the major departments and agencies with responsibility for a wide range of functions. PRA also created the
Office of Information and Regulatory Affairs within the OMB to provide central oversight of information management activities across the federal government.

**Privacy Act of 1974 (Public Law 93-579)**
The Privacy Act protects the privacy of individuals identified in information systems maintained by federal agencies by regulating the collection, maintenance, use, and dissemination of information by such agencies.

**Rehabilitation Act of 1973. Sec. 408(b)**
This newly revised Section 508 imposes strict requirements for any electronic and information technology developed, maintained, procured, or used by federal agencies.