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IMPROVING EFFICIENCY OF PROCESSING PATENT APPLICATIONS

An Interactive Qualifying Project Report
submitted to the Faculty of
Worcester Polytechnic Institute
in partial fulfillment of the requirements for the
Degree of Bachelor of Science

Washington, District of Columbia Project Center

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17 December 2001

Mr. Robert Nappi
Technology Center 2800
Groups 2830/40
Crystal Plaza Four
U.S. Department of Commerce
Patent and Trademark Office
Washington, DC 20231

Dear Mr. Nappi,

Enclosed is our report entitled Improving Efficiency of Processing Patent Applications. It was written at the Technology Center 2800, a part of the United States Patent and Trademark Office, during the period of October 29 through December 17, 2001. Preliminary work was completed in Worcester, Massachusetts, prior to our arrival in Washington, D.C. Copies of this report are simultaneously being submitted to Professor Brigitte Servatius and Professor Richard Sisson for evaluation. Upon faculty review, the original copy of this report will be catalogued in the Gordon Library at Worcester Polytechnic Institute in Worcester, Massachusetts. We appreciate the time that you and the other members of the TC2800 have devoted to us towards the completion of this project.

Sincerely,

Jay Guise

Benjamin Parks

Ian Rice

Douglas Tilkin

Abstract

This report, prepared for Technology Center 2800 (TC2800), a part of the United States Patent and Trademark Office, provides analysis and recommendations to help TC2800 improve the procedural processing of patent applications. Interviews conducted with the staff of TC2800 provided insight into the application process currently in place. Analysis of these interviews and other collected data led to recommendations of procedural improvements that streamline the process and reduce the number of recurring errors.

Authorship

The authorship of all sections of this report was divided equally among the project team members: Jay Guise, Benjamin Parks, Ian Rice, and Douglas Tilkin.

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The team would also like to thank its advisors:

Professor Brigitte Servatius
Professor Richard Sisson
Professor David DiBiasio

Thank you!

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Chapter I - Executive Summary

When restructuring due to recent legislation, Technology Center 2800 (TC2800) accumulated a large backlog of paper applications. There are currently plans to move to paperless applications, but TC2800 must first eliminate this backlog.

1.1 Project Objectives

It was the goal of the Worcester Polytechnic Institute (WPI) project team to provide suggestions to streamline the procedural processing of patent applications and reduce the number of recurring errors in TC2800. After deciphering the application processing steps currently employed, the project team developed a list of the inefficiencies and recurring errors found in the process. The project team then developed a series of recommendations to resolve these found inefficiencies and determined which of these resolutions would have the greatest impact on reaching the goals of TC2800.

1.2 Methodology

To investigate into the current patent application process, the project team primarily used interviews with the employees of TC2800. From initial interviews with the directors, the project team was able to narrow down the scope of the project to the work done by the clerical support. The project team worked closely with a Team Leader, several Supervisory Patent Examiners (SPE's), and the Directors to determine the application process and the goals of TC2800. Using all the data collected from interviews, the project team determined which steps in the process were inefficient or error prone.

1.3 Results

After piecing together the application process from interviews with TC2800 employees, the project team identified inefficiencies and recurring errors in the patent procedural process. Application files are too large and complex for any employee of TC2800 to become entirely familiar with and mistakes are going to happen. Applicants can also cause delays by transposing numbers within the serial number when sending communications to TC2800, causing communications to be associated with the wrong application file. Application files are also frequently lost because employees do not always update the Patent Application Location and Monitoring (PALM) system, the tracking software used by TC2800, as to the current location of the file. These recurring errors, along with the inefficiencies caused by an application being handled by too many people and moving great distances within the office building, do not allow TC2800 to attain its goals.

1.4 Recommendations

Through analysis of the data collected and suggestions from employees of TC2800, the project team developed a series of recommendations to resolve the inefficiencies and reduce the recurring errors in the patent procedural process. The project team recommended increasing the availability of PALM terminals to the employees, and even suggested moving to portable PALM terminals for the contractors, much like the shipping companies use to track packages. The project team also recommended changes to the procedure of associating communications with application files so that there is no movement of the file, as is the current practice. Another recommendation included implementing accountability for the contractors and the work they do. Finally, in order to

resolve the flow of files between hands and floors, the project team recommended a color-coding system that involves keeping files on the same floor at all times.

Using the data collected from observing employees, the project team is confident that by implementing these recommendations, TC2800 will be able to reduce its backlog of paper applications and move forward with its transition to a paperless application system.

Chapter II - Introduction

In a perpetual crunch to save time and maximize resources, many organizations seek efficiency, and providing members with the means to accomplish a task as quickly as possible ensures two benefits: members can move on to other tasks and a greater number of tasks can be completed. In a production-based organization, however, each task must be accomplished with a certain standard of quality.

The United States Patent and Trademark Office (USPTO) grants patents in a production-based system. In an effort to make the USPTO more efficient, a complex classification system has been designed to help channel applications to patent researchers who are familiar with the specific arts involved in the application (Jones, 1973, p. 43). This classification divides the office into several divisions, one of which is Technology Center 2800 (TC2800).

While a patent application needs to be processed in a timely manner, much effort must be invested in order to most fairly guarantee patent protection to an inventor. A thorough search for identical, prior arts must be conducted to ensure the validity of a patent (Bennet, 1972, p. 67). Patent examiners, however, are under many time restrictions, and the procedural process used prior to the search can cause long delays on the application reaching the examiner, further tightening these time restrictions.

2.1 Problem Statement

The General Agreement on Tariffs and Trade, a part of the North American Free Trade Agreement (GATT-NAFTA), changed the way the USPTO determines the length of an inventor's patent protection rights. Prior to the GATT-NAFTA, an inventor's patent rights began on the patent grant date and lasted seventeen years; as a result of the GATT-NAFTA, an inventor's patent rights still begin on the patent grant date, but last until twenty years

after the initial filing date - regardless of how long the application process lasted. This new law caused a concern for inventors; the duration of the examination period infringed upon the length of the inventor's patent protection. In response, the American Inventors Protection Act (AIPA) was implemented in the name of efficiency - it applies deadlines for the USPTO within the patent application process. This act ensures timely application handling and penalizes untimely handling, guaranteeing an inventor a proper length of patent protection.

As a result of the AIPA, TC2800 has been restructured. More examiners have been added to the TC2800 staff and the USPTO has hired contractors to handle staffing the mailroom and moving cases from place to place. Dealing with this change has been somewhat difficult, and further restructuring has been halted in anticipation of a change to paperless applications. TC2800 is having little difficulty meeting the standards set by the AIPA, but in the meantime, the office is collecting a backlog of paper applications. Even if the office were to move to paperless application immediately, there would still be hundreds of thousands of paper applications to be dealt with in TC2800 alone. The TC2800 directors wish for this backlog to be reduced, and the current procedural processing of patent applications is not efficient enough to eliminate the problem.

2.2 Project Goals and Objectives

It was the goal of the Worcester Polytechnic Institute (WPI) project team to provide suggestions to streamline the procedural processing of patent applications and reduce the number of recurring errors at TC2800. The project team developed the following:

a) A concise overview of the steps currently employed in the procedural processing of applications in Technology Center 2800.
b) A listing of the inefficiencies and recurring errors found in the procedural processing of applications in Technology Center 2800.
c) A statement of how these inefficiencies and errors are affecting Technology Center 2800's ability to meet or exceed its goals.

d) A series of recommendations to resolve the inefficiencies and reduce the number of recurring errors.

e) A ranking of these resolutions, showing which will have the greatest impact on improving the Technology Center 2800 goals.

2.3 The Interactive Qualifying Project

The Worcester Polytechnic Institute Undergraduate Catalog (2000, p. 37) describes the Interactive Qualifying Project as follows:

> The Interactive Qualifying Project (IQP) challenges students to identify, investigate, and report on a self-selected topic examining how science or technology interacts with social structures and values. The objective of the IQP is to enable WPI graduates to understand, as citizens and as professionals, how their careers will affect the larger society of which they are a part.

Societal-technological interaction in the USPTO occurs on several levels. The USPTO provides a clear interface between technology and society on a global level since it regulates societal impacts on new technology in the form of patent protection rights. On a more localized level, TC2800 is about to undergo a technological change that will have a sizeable impact on the people working within the center. Accordingly, the problem identified by the USPTO lends itself to a solution in the form of a WPI Interactive Qualifying Project.

Chapter III - Literature Review

The information contained in this section was intended to provide a background that supplies rationale for proceeding with the project. This background information provided the necessary knowledge to fully understand the goal of the project and the methods to go about completing the project.

3.1 Patents and the United States Patent and Trademark Office

A patent is, in the most general sense, a contract between some governing body, usually a federal government, and an inventor (Foster & Shook, 1989, p. 29). The governing body provides exclusive rights for the inventor to market his or her invention in exchange for a complete description of the invention, usually in the form of written explanations and diagrams. Not only does a patent reward an inventor with protection over his or her invention for a set number of years, it also gives society the knowledge of the new technology, meaning that the invention can be improved upon or can lead to new inventions.

The first recorded issuance of a patent dates back to 1443 when the Republic of Venice granted one to Antonius Marini (Foster & Shook, 1989, p. 4). He offered to build twenty-four waterless flour mills - all other flour mills at the time required running water - for each of Venice's boroughs, but before he began, he requested that the Senate not permit anyone else to construct a waterless flour mill for a period of twenty years. After proving his invention worked, the Senate granted protection to Marini, and thus, the first patent was issued.

3.1.1 History of the USPTO

Although the patent has deep-seeded European roots, it is in the United States that the concept of the patent was first formalized and given its own administration (Bennet, 1972, p. 65). The United States patenting system started with special acts of local government, and with much refinement and reorganization has become what it is today.

A few patents were granted by "special acts of legislature" in the colonial United States (Bennet, 1972, p. 65); the issuance of these patents was based somewhat on the English patent system. Samuel Winslow obtained the first colonial patent for a salt manufacturing process from the Massachusetts General Court in 1641. This early consideration for patents on Colonial soil led to the implementation of a patent system at the very formulation of the United States.

Government provisions for a patent system had been in place since the meetings of the Continental Congress, as both the Virginia Plan and the New York Plan allowed for patent-based protections (Bennet, 1972, pp. 65-67). Both Charles Pinckney and James Madison also advocated that the new federal government should have the ability to grant patents (Foster & Shook, 1989, p. 9). Their proposals resulted in Article I, Section 8, Clause 8 of the United States Constitution :

> The Congress shall have Power.... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.

This was the first time in history that a constitutional instrument granted property rights to an individual for his invention and realized it was in the best interest of the public and progress of technology to protect those rights for some period of time (Foster & Shook, 1989, p. 9).

The first Patent Act, passed in 1790, called for a patent committee to be composed of the Secretary of State, the Secretary of War, and the Attorney General. As Secretary of

State, Thomas Jefferson was the first administrator of the American patent system. The Patent Act of 1793 allowed patents to be granted through no examination process; this action brought into question the validity of any patent granted. Reform to this process came about in 1836.

The Patent Act of 1836 brought back into play the examination process and called for the appointment of a Commissioner of Patents; this statute also marked the beginning of the United States Patent and Trademark Office (USPTO) (Bennet, 1972, p. 67). The examination process was unique because it called for a classification system that enabled searches for prior arts to be conducted more efficiently. Although the basics of this classification system remain in place today, it is constantly changing (Jones, 1971, p. 45).

Since 1836, the USPTO has been subject to several reorganization studies and government acts, which have offered a plethora of results (Jones, 1971, pp. 33-36). These studies have resulted in suggestions for streamlining the office process, changing the management structure, and updating the classification system. Some studies resulted in the relocation of the USPTO from Richmond, Virginia, to its current location in Arlington, Virginia. Three major acts of legislature - The Patent Act of 1952, the General Agreement on Tariffs and Trade (a part of the North American Free Trade Agreement), and the American Inventors Protection Act - have also had major impacts on the laws governing the USPTO.

3.1.2 Purpose of the USPTO

Throughout all of these reorganizations, the main purpose of the USPTO has remained constant. The USPTO's main purpose is to grant patents for the protection of inventions and to register trademarks (USPTO website, 2001). As part of the Department of Commerce, the office assists other agencies of the United States government on matters of intellectual property with regards to patent and trademarks. The office examines

applications and grants patents to the people who are entitled to them. The office then records and publishes this patent information, which is available to the public. By letting the public know of recent inventions through these publications, the USPTO encourages the scientific and technological advancement of the nation.

3.2 Patent Application Processing

The efficiency of moving patent applications through the USPTO has always been a major concern of the office. The staff of TC2800, along with the USPTO and the other six Technology Centers, realizes that the patent application process currently in place is inefficient and needs improvement (S. Levy, personal communication, September 19, 2001). Plans are currently in place for the USPTO to go to paperless applications in a few years, but an interim solution is needed to handle the already large backlog of applications. There are two sides to submitting an application for a patent - one the inventor's, the other the USPTO's - and both parties have very different perspectives when it comes to the patent application process.

3.2.1 The Inventor's Perspective

Before an inventor submits a patent application, there are recommended procedures through which he or she should go (Barnes, 2000, pp. 106-107). First, the USPTO recommends getting legal assistance from a patent attorney. The inventor should keep careful records of the invention and record every step of the process that he or she took to create it. The inventor needs to diagram every part and modification, and a test model may be necessary. All of these files must be documented, dated, and signed with two witnesses - all of which can be done with the help of the patent attorney. Next, the potential of the creation as a product should be considered. The inventor must know why the invention is unique and can be distinguished from similar creations. The invention cannot have been

for sale or known about for more than a year before applying for the patent. Finally, the inventor or the lawyer must do a complete patent search, or novelty search, to ensure that the product has not already been patented or submitted for a patent.

As set by Title 35 of the United States Code, the USPTO has a set of requirements for a patentable invention, which must be known by the inventor before submitting an application. The invention must be new (35 USC 102), useful (35 USC 112), and non-obvious (35 USC 103). New simply means it must not be identical to any other invention; an invention that is useful is one that has a function; and non-obviousness is anything that is outside the ability of one having ordinary skill. In the actual patent application, the inventor or his or her patent attorney describes the invention and identifies all prior related arts or methods known at the time. If the application is considered allowable, the inventor receives a Notice of Allowance, and shortly thereafter is granted a patent. Should the application not be considered allowable on the initial attempt, the result is an office action. In the office action, a patent examiner lists and explains the reasons why the application has not been allowed. In an Amendment or a Response, the applicant can either revise the patent application to make it more specific and unique or explain why he or she believes the examiner's reasons for the rejection were incorrect. Sometimes several office actions are given for the same application.

3.2.2 The USPTO's Perspective

When the inventor submits his or her application, a thorough examination process ensues in the USPTO. The patent is first classified based on a complex and constantly changing classification system (Tuska, 1964, pp. 94-95); the system classifies new arts based on functionality. New categories are frequently required due to changing technology, and old categories are constantly outdated. The USPTO maintains a handbook that explains the classification system.

Based on its classification, the patent application is then assigned to an examiner (Tuska, 1964, pp. 94-95). The examiner's task is four-fold - the examiner must consider compliance with regards to both the law and the Rules of Practice, the level of disclosure of the application, the validity and accuracy of the drawings, and the novelty of the creation. Since the applications are assigned examiners based on the classification system, each examiner develops proficiency in examining a certain class. He or she becomes very familiar with the prior arts, which aids his or her search.

The examiner's search results in an office action (J. DiTullio, personal communication, September 26, 2001). The office action is a response to claims made on the application by the inventor, and it may allow all claims, reject some claims, or reject all claims. Claims may be rejected for several reasons. If the inventor disclosed details about his invention in a publication more than a year prior to filing a patent application, the examiner may reject a claim (35 USC 102(b)). Claims may also be rejected if the drawings for the invention are insufficient (35 USC 112), or if the examiner determines that the work is an obvious extension from a previous discovery or invention (35 USC 103).

A patent application can be delayed for a number of reasons. First, the office action set forth by the examiner may be disputed, or the applicant may choose to clarify the claims that are disallowed. Second, the examiner may declare interference, which occurs when two applications for the same art co-pend in the USPTO (Tuska, 1964, pp. 115-116). Interference proceedings require separate examinations. Also, the patent application may be appealed in a court before it is granted (Jones, 1971, p. 42).

3.2.3 The European Patent Office

The USPTO is often compared to other patent offices around the world, especially when it comes to patent application processing. The application process at the European Patent Office (EPO) is different from that found at the USPTO because of the differences in

organizational structure (EPO Website, 2001). The EPO has designed a three-phase process in which a patent application is filed, reviewed, and examined. The EPO is comprised of three main branch offices located in Munich, The Hague, and Berlin, but is not limited to these three; in the scope of the EPO, there are offices in a total of nineteen countries. An application can be sent to any one of the three main offices or an office in any one of the contracting states. The application review process is divided into three phases. The first phase of the European patent application process is filing the application where then an examination and publication of the application is reported. The second phase is a thorough examination of the application where either it will be approved or denied. The third phase of the process involves the Munich office only, whereas in the other two phases can be handled at any of the three main offices. This third phase allows any third party to file an appeal or opposition to the granted patent.

3.3 Legislation

Article I, Section 8, Clause 8 of The United States Constitution provided for the creation of the patent system. Since then, many acts of legislation have reformed the laws pertaining to the examination of patent applications. The first Patent Act, passed in 1790, established an examination system and was administered under the Attorney General's Office. The Patent Act of 1793 changed the examination system to registration without examination and stated that all patent related manners were to be handled by the Federal Courts. The Patent Act of 1836 later reinstated the examination system and codified the concept of novelty as a basis for patentability. This act was amended several times to keep pace with changes in legal concepts in the courts and was kept as law until 1952.

3.3.1 The Patent Act of 1952

The Patent Act of 1952, which codified and enacted into law Title 35 of the United States Code, reformed the patent application process (Franklin Pierce Law Center Intellectual Property Mall Website, 2001). The legislation "simplified and clarified language and arrangement, and eliminated obsolete and redundant provisions." For many years, the laws governing the Patent Office originated from court rulings, which oftentimes conflicted with each other, and were never written down in any true order or form; the Patent Act of 1952 changed this. The code divided patent law into three parts. *Part I – Patent and Trademark Office* contained provisions for governing the office concerning its powers and duties; *Part II – Patentability of Invention and Grant of Patents* set out the conditions under which patents may be obtained and the procedure for doing so; and *Part III – Patents and Protection Patents* explained the rights related to patents themselves and the protection of rights under patents.

In 1975 a new part, *Part IV – Patent Cooperation Treaty*, was amended to Title 35 (Franklin Pierce Law Center Intellectual Property Mall Website, 2001). The treaty simplified the filing of patent applications on the same invention in different countries by providing centralized filing procedures and a standardized application format. Other smaller amendments to Title 35 concerned revisions in fees, schedules for application and issuance of patents, and modifications in procedures related to the protection of patents.

3.3.2 The GATT-NAFTA

The General Agreement on Tariffs and Trade (GATT), a part of the North American Free Trade Agreement (NAFTA), made several changes to Title 35 of the United States Code to make domestic patent procedure similar to that of other countries (Franklin Pierce Law Center Intellectual Property Mall Website, 2001). Signed on December 8, 1994, the largest reform brought about by the GATT-NAFTA was the change it imposed on the term of patent

rights. Prior to the implementation of the GATT-NAFTA, patent rights granted to an inventor extended from the patent grant date to seventeen years after grant date. The agreement changed the term of patent rights so that they extended from the grant date to twenty years from filing date. This change meant that the examination period would count against the inventor - the longer the USPTO took to examine the application, the shorter the term for the granted patent rights.

3.3.3 The American Inventors Protection Act

The American Inventors Protection Act (AIPA) greatly affected the way the USPTO handles patent applications (USPTO, 2000, p. 23). Taken into effect on November 29, 1999, the AIPA established more rights for the inventor and set ground rules in which the USPTO would use to increase efficiency in the patent application filing process.

In order to decrease processing delays and provide an inventor a guarantee that he or she will be compensated for such delays as set forth by the AIPA, the USPTO developed what is called the "14-4-4-4-36" timeliness standard (USPTO, 2000, p. 24). This standard sets constraints that the USPTO must meet or the inventor's patent term will be adjusted to account for delays. The following guidelines must be followed and are outlined as the definition of the timeliness standard:

- A first office action on the merits of the claimed invention must be issued within fourteen months from the filing date.
- An application's reply to a rejection or appeal must be responded to within four months of receipt by the office.
- The office must act on an application within four months by a decision of the Board of Patent Appeals and Interferences or the federal courts.
- A patent must be issued within four months from the payment of the issue fee.
- A patent must be issued within thirty-six months from the original filing date.

Along with these conditions, the AIPA "provided for the publication of patent applications 18 months after filing unless the applicant requests otherwise upon filing and

certifies that the invention has not and will not be the subject of an application filed in a foreign country" (USPTO, 2000, p. 24). This is perhaps the biggest change made by the AIPA. It states that patents must be filed within eighteen months unless specified by the applicant at that time they will be published, as is required in most foreign countries.

3.4 Five Goals of the USPTO

In 1997 the USPTO outlined five goals that would be the head of the office's strategic plan for the following years to come (USPTO, 2000, pp. 24-29). The AIPA changed these goals and forced the USPTO to rethink and develop a new framework for their original goals. In 2000, the office reevaluated its strategy in order to incorporate the standards set by the AIPA. The Performance and Accountability Report examined each goal and described how the USPTO is taking strides to reach these goals.

3.4.1 Enhancing the Quality of Products

Programs such as focus sessions with customers, written communications of the examiners positions, and an "in process review program" for the technology centers were instituted (USPTO, 2000, pp. 24-25). Since the AIPA provided new guidelines for the USPTO, the office trained and provided guidance for the current employees of the new re-examination process by publishing new written guidelines. Other training was implemented for examiners in technical areas, and customer specific partnerships were formed to help provide expertise in technical areas. Technology fairs were held by each technology center to provide examiners with technical training programs specific to their areas of expertise. Several rules packages were developed to implement the AIPA; training programs were established to educate both employees and customers in new practices before the AIPA's implementation. USPTO employees traveled to many cities to educate customers on these rule packages.

3.4.2 Improving Quality of Services

The USPTO wishes to strive for customer satisfaction in the following areas : resolving problems; returning telephone calls within one business day; directing customers to the correct point of contact; timely mailing of correct filing receipts; and promptly delivering faxes to examiners (USPTO, 2000, pp. 25-26). Customer satisfaction was up in the year 2000 based on surveys given by the USPTO. An important area of improvement was in the customer service areas of the Technology Centers in order to improve response to any customer questions or concerns as quickly as possible. To aid in this process, direct access was given to customers through the Patent Application Location and Monitoring system, which is directed through the Patent Application Information Retrieval system. An inventor can now check where his or her patent application is at anytime. For the year 2001, the USPTO is hoping that its electronic filing system will be fully deployed and will greatly increase overall timeliness and quality. These new developments will also help in achieving the next goal of optimizing processing time.

3.4.3 Optimizing Processing Time

Optimizing process time is an important goal to attain for the USPTO since the AIPA set a new framework for timeliness in the processing of patent applications (USPTO, 2000, pp. 26-27). It is essential for the USPTO to meet these guidelines in order to insure that each new invention is protected quickly and to promote technological advancements in the country. Overall, the speed of the application process has been increasing in the past few years, but there is still plenty of room for improvement. The office has begun a review and reorganization of its business practices based on the standards set by the AIPA. One large problem faced by the USPTO is the loss of examiners, and to deal with this loss, the workload of the employed examiners is greatly increasing. Handling these losses of examiners is the main priority of the office's next goal.

3.4.4 Enhancing Employee Satisfaction

Employee satisfaction is very important in that it directly affects the customer as well as the patent application processing (USPTO, 2000, pp. 27-28). To ensure the AIPA standards are met, the USPTO staff feels its employee well being is a big concern; while overall employee satisfaction has recently been on the rise, the office continues to enhance the working atmosphere for employees. A Patent Auxiliary Council (PAC) was established by the USPTO to represent examiners in order to extend relations between patent unions and management. The PAC set certain partnership agreements with the Patent Examiners Union and the Patent Office Professional Association (POPA). Another important undertaking was the training of employees in connection with the POPA and other local unions to design a workflow training process.

3.4.5 Integrating Business into Electronic Government

Finally, the last goal outlined by the USPTO is integrating their business into an electronic form of government (USPTO, 2000, pp. 28-29). A big task faced by the USPTO is developing and updating its electronic-business in an increasing electronic age, becoming less paper dependent offers the office its best hope in improving the timeliness within which an application can be completed. A very important part of this is developing a web based application process. Customers can now apply for a patent online as well as calculate fees and track their application status. Another major enhancement is with the Examiner's Automated Search Tool, which helps to ease transitions from paper-based materials, and the Web-based Examiner Search Tool.

In the years to come, through such developments in e-business, the agency hopes to continue to improve and streamline the patent application process. Currently, however, the USPTO must continue to use traditional paper applications and is continuing to struggle

to meet the standards set by the AIPA. An interim solution is necessary for the office to meet these standards before going paperless.

3.5 Streamlining Office Operations

The underlying problem behind the project is timeliness with office procedures. There are techniques available to people to help the office become more efficient. In many instances, the people in the office may not be aware that the office is inefficient – they just go about their daily routines and do the same thing day in and day out simply because it's the way things have always been done. This is a common problem for many offices, and this problem can be resolved not only by the office as a whole, but also at the individual level.

3.5.1 The Individual

The backbone of any office is the individual employees, and before an entire office can become more efficient, the employees must work on their own personal time management skills. The key to effective time management at the individual level lies in concentrating on long-term goals as opposed to short-term goals like many people believe (Yager, 2001). The basic concepts behind time management are easy to understand, but actually implementing these concepts is the challenging part.

One of the most important concepts in improving individual time management is to set priorities (Yager, 2001). The most common method of prioritizing involves setting clear long- and short-term goals as well as defining the tasks it will take to achieve those goals. The individual should then prioritize this list of goals and narrow the list down to a few tasks that must absolutely be completed in the near future. By doing this on a daily basis and actually following through with this action, an individual's time management skills will improve.

Merely setting priorities, however, will not entirely solve an individual's time management problems. Another important concept involves doing tasks early (McDargh & Sweeney, 2001, p. 6). The basic idea behind this concept is to not procrastinate, as many employees will admit can be quite a problem. An employee should create artificial deadlines for oneself that are in advance of the true deadline. Using this method, the work will be completed by its true deadline and the employee will not fall behind in other tasks that need to be completed.

One final concept important to improving individual time management is staying organized (McDargh & Sweeney, 2001, p. 6). When most employees walk into their office, they see an overwhelming pile of papers on their desk and sometimes even on the floor. Employees should can the clutter - scan through the various piles and only keep the items that are absolutely necessary to complete some task, otherwise, recycle it. If recycling papers is not an option, another suggestion is keeping the papers in order in a file cabinet or at least the same pile (Yager, 2001). With papers organized, employees will be able to find documents and papers quickly and will not have to spend countless hours searching through piles.

There are numerous other concepts useful in improving individual time management. Setting priorities, doing tasks early, and staying organized are some of the most important concepts and will only lead to better time management skills and more efficiency at the individual level.

3.5.2 The Office

Being efficient at the individual level, however, does not guarantee efficiency by the office as a whole (Parsley, 2001, p. 36). A poorly designed procedural processing system can make an entire office inefficient, even if the employees are individually efficient.

While there are many techniques in actually changing the procedural processing system of an office, there are certain steps one should take when analyzing the office's efficiency.

The first step one should take when analyzing any office is a walkthrough (Parsley, 2001, p. 36). This should not be just a tour to get a general idea of the office - the walkthrough should be very thorough and should follow the flow of material, in the USPTO's case the application, from start to finish. Things that should be noted include distance the material travels as well as the number of people who actually handle the material throughout the process. Immediately following the walkthrough, the individual or team analyzing the office should brainstorm ideas about how to improve the efficiency of the office (Parsley, 2001, p. 36). While these ideas might not be the most well thought out or the most effective, this process often spawns more ideas about improving the efficiency of the office.

The next step taken when analyzing an office is probably the most important. Key processes, which are required to conduct business within the office smoothly and responsively, must be identified (Parsley, 2001, p. 36). Since these key processes must remain in place regardless of the overall changes made, determining improvements to the efficiency of the office is narrowed down greatly. This does not mean, however, that these key processes should be ignored because there might perhaps be ways of improving these processes individually.

When analyzing an individual process, there are two things one should look for - time drivers and activity drivers (Stout, 2001, pp. 29-30). Time drivers measure the time devoted to an activity. The idea of a time driver is to specify some measurable event that explains the relationship between an activity and the amount of time devoted to it. This can aid in improving the efficiency of an office, especially when compared with the total number of resource hours an office has available to it. Similar to time drivers, activity drivers relate activities to outcomes. The goal of identifying activity drivers is to relate time

spent on an activity with the outcomes created by the activity. Activity drivers aid in determining exactly how many activities are required to achieve any outcome and are especially helpful when it is determined that the activity no longer has relevance to achieving the overall goals of the office and can possibly be eliminated.

The final step when attempting to improve the efficiency of an office short of actually implementing a change is to prepare a preliminary design of possible changes to be made to the overall process of the office (Parsley, 2001, p. 37). The design should not only include what hopes to be the final stages of change within the office, but also information about implementing the changes and possible disruptions that could occur. The design should be studied and discussed with all levels of employees in the organization, not just with top officials, and modified and revised as needed.

3.6 Recapitulation

The information contained within this Literature Review was essential to fully understand the problem facing Technology Center 2800. General knowledge of the USPTO as well as TC2800 was necessary in order to understand the environment in which the problem is taking place. Understanding the patent application process and how acts of legislation has affected that process within the office was one of the most important background elements for the problem at hand. And in order to provide suggestions for a more efficient procedural processing of patent applications within the office, the project team also had to understand methods of analyzing an office at both the individual level as well as for the office as a whole.

Chapter IV - Methodology

The goal of this project was to provide suggestions to help Technology Center 2800 (TC2800) resolve inefficiencies and reduce the number of recurring errors in the procedural processing of patent applications in order to eliminate a large backlog of applications. These suggestions will improve the efficiency of the patent application process before the entire process goes paperless in a few years.

The methodology for completing this task consisted of an investigation into the current patent application process as well as the processing goals of TC2800. The employees of TC2800 were the main sources of this information, and the information was obtained both through interviews and a technique known as participant observation (Bernard, 2002, pp. 323-324). Participant observation puts one where the action is and lets one collect data - in this instance, the project team followed contractors on their rounds and shadowed Legal Instruments Examiners (LIE's) as they processed cases. Since the project group members were not actual employees of the United States Patent and Trademark Office (USPTO), they were considered to be participant observers to the office (Bernard, 2002, p. 327).

4.1 Interviews

The majority of the interactions between the employees of TC2800 and the project team came in the form of interviews. The interviews conducted by the project team focused on the various aspects of the patent application process and the goals of TC2800. The project team used two types of interviewing techniques to gather all the information required - structured and unstructured interviews (Bernard, 2002, pp. 204-205). Since the project team was not entirely certain as to what type of data (either qualitative or quantitative), the employees of TC2800 would provide in the beginning, an unstructured

interviewing technique was preferred. The project team had a clear plan as to what it hoped to learn from each interview, but based on what types of data were provided, the actual questions had to change accordingly. Later in the development of the project, when the project team realized the type of data the employees were providing, the structured interviewing technique was used. The project team went into the interviews with a set of questions and those questions were the ones asked.

The project team could not interview every single employee in TC2800. As mentioned earlier, TC2800 is the largest technology center in the USPTO and employs approximately nine hundred people, of which about seven hundred are patent examiners. This was too many for the project team to interview considering the time constraints on the team. Therefore, a sample of people to be interviewed had to be selected. The sample selection process used by the project team is called snowball sampling (Bernard, 2002, p. 185). This is a method by which the next person or persons to be interviewed on a certain topic is suggested by the previous. This method was chosen so that TC2800 employees could direct the project team to others who might have been able to supply useful information regarding the project.

From initial interviews with the directors of TC2800, the project team was able to narrow down the scope of the project to the work done by the clerical support within TC2800. With the many time constraints on the USPTO to accomplish its tasks, it is important that clerical support be efficient and commits as few errors in their work as possible. Clerical support within TC2800 is divided up into eight different teams, each with a Team Leader. The functions of the Team Leaders and the clerical support teams are the same for all, so the project team interviewed only one Team Leader and her staff. This allowed the project team to become well acquainted with the members of the team and understand the procedural processing of patents within TC2800. The project team

interviewed the Team Leader multiple times as well as the Team's LIE's, who handle each application many times throughout the process.

4.2 Analysis

After completing any of the interviews, the team analyzed the collected data. The majority of the collected data was qualitative in nature; data analysis was therefore also qualitative. The various bits of information collected from the employees of TC2800 helped the project team to piece together the actual process of a patent application. The project team had previously researched the patent application process, but interviews revealed that the actual process within the office was slightly different. The project team also used the interviews to determine which steps in the procedural process were inefficient or error prone.

Some of the data collected by the project team was quantitative in nature. The quantitative data collected consisted of the indicators used by the management staff of TC2800 to determine if goals are met. These numbers helped the team determine the inefficiencies and errors of the patent application process and the location of these problems within the process. These quantitative measures will potentially help the project team determine how well suggested improvements are working should TC2800 decide to implement these suggestions.

4.3 Outcomes Development

After determining inefficiencies in the patent application process through both qualitative and quantitative analysis, the project team began the final stage of the methodology, outcomes development. As requested by TC2800 in its project description delivered to the project team prior to the start of the project, there were five outcomes the project team developed.

The first two outcomes consisted of a concise overview of the currently employed patent application process in TC2800 and a listing of the inefficiencies found in this process. The third outcome was a statement of how these inefficiencies and errors are affecting the office's ability to meet or exceed its goals. The goal of most interviews conducted by the project team was to determine the patent application process employed in TC2800, and after analysis of the data collected, inefficiencies of the process and their effects were determined.

The development of the final two outcomes was what interested the employees of TC2800. The fourth outcome of the project consisted of a series of recommendations to resolve the inefficiencies in the process, and the fifth outcome was a ranking of these recommendations, showing which would have the greatest impact on improving the efficiency of the patent application process. Using the knowledge gained through interviews about the current process and prior research on how to streamline an office, the project team began by brainstorming ideas on how to resolve the inefficiencies in the process. This produced an extensive list of recommendations, not all of which were feasible or likely candidates that TC2800 would adopt. The list of recommendations was narrowed down, which the project team then developed more thoroughly. To determine which recommendations would have the greatest impact on improving the efficiency of the patent application process, the project team analyzed the data already provided, knowledge from the project team's observational experiences, and a comparison to practices used in other document tracking organizations, such as Federal Express.

After developing these five outcomes and preparing them for the final written report, these recommendations were offered in the final presentation to the employees of TC2800. The implementation of these recommendations, should TC2800 decide to do so, is expected to serve as a solution for the office to increase the efficiency of the procedural processing of patent applications.

Chapter V - Results and Discussion

The information contained in this chapter serves as a summary of the data collected by the project team. Quantification in this chapter is largely comparative. The project team collected data from interviews with employees of Technology Center 2800 (TC2800) and the quantification provided is a direct reflection of the quantifications provided by the interviewees.

5.1 Procedural Processes

The following information contains a brief overview of the entire procedural processing of patent applications within TC2800. A part of the overall process, the procedure for associating incoming communications with application case files has also been included in more detail because of its importance and effect on every application that moves through the office. These procedures are also presented in flowchart form in Figures C-1 and C-2, located in Appendix C.

5.1.1 Overview

Once arriving in the United States Patent and Trademark Office (USPTO) mailroom, applications are directed to the Office of Initial Patent Examination (OIPE). This processing includes the assignment of a serial number and a check for completeness. This check for completeness includes making sure all proper forms have been completed and signed by the applicant. OPIE also makes an initial entry of the application file into the Patent Application Location and Monitoring (PALM) system. The USPTO uses the PALM system to track the location of files and communications throughout its offices. The application then goes under an initial classification. From the initial classification, the OIPE determines

which Technology Center the application belongs to as well as assigns the application to a Group Art Unit (GAU).

After the application is received by the mailroom in the Technology Center, the application is forwarded to the appropriate Clerical Support Team that corresponds to the GAU as classified by the OIPE. One of the Team's Legal Instrument Examiners (LIE) then checks the application again for completeness. The LIE's check for the Specifications and proper drawings, count the number of Claims, check for the proper signatures on the Oath and Declaration, and make sure the proper claims fees have been paid by the applicant. Should any of these items be missing from the application or the claims fees improperly paid for, a letter is sent to the applicant informing him/her of the problem. The Clerical Support Team must then wait for the problem to be resolved before being able to move along with the process.

Once the application is correct in its entirety, the application is sent via a contractor to the Supervisory Patent Examiner (SPE) of the GAU. The SPE decides which examiner within the GAU is to examine the application and dockets the application to the examiner. The application file is then picked up by a contractor and sent to Central Files, where it is stored until examination.

An examination can result in either an Office Action or a Rejection. After delivering the application file and Office Action or Rejection to the proper Clerical Support Team, an LIE processes the document by making sure it is complete with all references and proper signatures. A copy of the Office Action or Rejection is then sent to the applicant and a contractor returns the application file to Central Files.

The applicant then has four months to reply to the Office Action or Rejection in the form of an Amendment, and the procedure to associate this communication with the application file is located in the next section. Once the Amendment is matched with the appropriate application file, the Amendment is sent to the Clerical Support Team. An LIE

then checks to make sure the Amendment is permitted, complete, and contains the proper signatures. If all checks out, the LIE makes the appropriate changes to the application file as directed by the Amendment. The application file is then picked up by a contractor and sent back to the examiner so that another examination of the updated application can take place.

The examination can result in another Office Action or Rejection, wherein the previous process is repeated, or the examination can result in a Notice of Allowance. A Notice of Allowance occurs when the examiner determines that the application is valid and worthy of becoming a patent. Should the examiner grant a Notice of Allowance, the application is sent to the Clerical Support Team, which checks the application for accuracies and the proper signatures. The application file is then sent to the Publications Department (PUBS) where the final fees are collected and the patent is sent off for printing. Should a problem be noticed or any type of paper associated with the application received while the application file is in PUBS, printing is stopped and the application file is returned the proper Clerical Support Team. Once the printing is complete, the patent is granted.

It should be noted, however, that at anytime during this process, the application could go abandoned. The most common reasons why a case would go abandoned include a problem with the collection of fees from the applicant or the applicant's time to respond to Office Actions or Rejections expires.

5.1.2 Associating Communications with Files

At any time during the procedural processing of applications, incoming communications may need to be associated with the corresponding application file. Incoming communications include Amendments, Responses, Petitions, Power of Attorney Transmittals, Priority Documents, requests for a filing receipt, requests for a change of address, translations, and a letter to the examiner.

These communications are first channeled to the appropriate Technology Center by matching the serial number on the communication to the application. A contractor in the Technology Center mailroom then sorts the communication according to its type. A cover sheet is attached to the communication with the appropriate Clerical Support Team number and the GAU number for the associated application. Contractors then use the PALM system to determine the location of the application file within the office and physically find the file. The application is pulled from its location, the communication put into the file, and the contractor takes the file to the appropriate Clerical Support Team office. The Team then sorts the incoming case file according to its type - amendments, responses, and miscellaneous communications - and puts the application file onto the appropriate shelf. The LIE then carries out the action requested by the communication and enters the information into the PALM system. A contractor then takes the application file back to its original location, which is usually either Central Files or an examiner's office.

5.2 Procedural Problems

Once the procedural processing of patent applications within TC2800 was pieced together, the project team began analyzing the procedure for recurring errors and inefficiencies. These problems were identified by the project team through analysis and learned from the employees of TC2800 through interviews.

5.2.1 Handling of Applications

During the procedural processing of applications, papers and files change hands many times. The same employees within TC2800 do not always handle the same applications throughout its processing - while one examiner and one SPE are associated with each application, LIEs and contractors are not. Each LIE is assigned to a GAU, but only for the processing of Office Actions.

When any communication comes into the office, any contractor can go pull the application file from its location. The file is then brought back to the contractors' main office where another contractor handles the file in order to look up which Clerical Support Team the application belongs to. The application is then handed off to another contractor who brings the files to the appropriate Clerical Support Team office. Before being put on the shelves, another employee must sort the applications by the GAU number. Then any LIE in the office handles the application while putting the corresponding information into the PALM system. Another contractor then takes the application file from the Clerical Support Team office and delivers the file back to its original location. In this one small portion of the process, at least five different people handled the application, and those same five people might not handle that application when another communication arrives.

5.2.2 Recurring Errors

For every individual that handles an application, the possibilities of human error increase. Application files in the USPTO are large and require meticulous work by the applicant, the examiner, and the members of the Clerical Support Team.

Each application requires signature from every inventor as well as all the necessary documents and drawings to describe the invention. Examiners must also include proper paperwork for any of the possible responses to an examination including Office Actions, Responses, Rejections, or Notices of Allowance. It is the responsibility of LIEs to make sure that everything is present and where it is supposed to be, but they sometimes make mistakes and miss documents or signatures. These mistakes are caused by the complexity of the system in which the USPTO has organized itself. Examiners and LIEs are people, not machines, who are required to posses a vast knowledge of the numerous laws governing the USPTO, and mistakes are going to happen.

Applicants can also make errors that delay the procedural processing of applications within TC2800. All communications that come into the Technology Center must be labeled in some way so that it is associated with the appropriate file. This is usually accomplished by labeling the communication with the application serial number, but sometimes the applicant will thoughtlessly transpose some numbers. If the error goes undetected by the mailroom or the contractors delivering the communication, it will be associated with the wrong application file. At that point, the file has been removed from its proper location for processing intended for another file. The examination procedure for two applications has then been disrupted - the application the communication was intended for and the application mistakenly removed from its proper location.

5.2.3 Lost Cases

When an application file cannot be found for any reason, TC2800 considers the case lost. A listing of these lost cases goes to a member of the Customer Service staff, and it is her job to locate the application files. A lost file stops the processing of that application and delays the processing on other applications within TC2800 while the lost file is searched for. The most common reason a case is lost as described by members of the Customer Service staff is discrepant PALM system entries caused by files being removed from examiner's offices. Every time an application is moved, regardless of the reason, whoever is handling the file is supposed to enter into the PALM system the new location. This, however, does not always happen.

Anyone working in TC2800 can be the source of this problem, but of no fault of their own, contractors are oftentimes the source. With a recent software update in the PALM system, computers are required to enter location information as opposed to small terminals used before the update. The Team Leaders' offices are not currently equipped with computers for the contractors to update the PALM system. All other employees in

TC2800 have the capability enter new location information into the PALM system, but for reasons unknown, this does not always occur.

For example, if an examiner pulls an application file is from Central Files, the PALM system is supposed to be updated to reflect the location change. If another employee looks up the location of the application file in the PALM system and the location was not updated, he or she will be directed to Central Files. The employee will not be successful in finding the application file because the file is actually in the examiner's office. The case will be declared lost until the examiner either returns the file to Central Files or updates the PALM system from his or her office.

5.3 Attaining Goals

The project team interviewed the directors of TC2800 to determine the center's goals and to examine the center's shortcomings related to the goals. The directors of TC2800 are responsible for ensuring that the Technology Center's goals are met. To report these goals, the USPTO uses the Balanced Scorecard method and distributes one each quarter year. The goals are reported and each Technology Center is rated on how well it does in comparison to the goals set for it by the USPTO. The number of applications that fall short of each goal is also reported.

The two goals identified as relevant to the project team by the directors were the timeliness standards and the quality standards. It is important to note that the Technology Center falls short of none of these goals. The office does, however, have a backlog of hundreds of thousands of paper applications, and more efficiency is required to work through this backlog. The project team identified recurring errors as a problem relating to application quality. The other two, handling of applications and lost cases, affect the timeliness standards; improving the application timeliness would save TC2800 money.

Chapter VI - Recommendations

The main objective of the project team was to develop a series of recommendations to resolve the inefficiencies and reduce the number of recurring errors in Technology Center 2800 (TC2800), and these recommendations are contained in this chapter.

6.1 Increase PALM Availability

One of the biggest problems facing TC2800 is lost cases because employees do not update the Patent Application Location and Monitoring (PALM) system when an application changes location. Examiners and members of Clerical Support Teams currently have the capability to update the PALM system using a computer in their office; contractors cannot, however. The project team recommends that there be computers available to the contractors in at least all of the Clerical Support Team offices and Central Files. With computers in all of these places, contractors will have the ability to update the PALM system every time an application changes location.

A better, more ideal recommendation to TC2800 to increase PALM availability is to provide portable PALM terminals to the contractors. Much like the way Teamsters working for the United Parcel Service scan packages every time that package changes locations, contractors working in TC2800 would be able to scan an application file every time it changes location, as soon as it begins to move.

Increasing the contractors' ability to update the PALM system of changes of location of application files would reduce the number of lost files within TC2800. No longer would the PALM system direct someone looking for a file to an incorrect location.

6.2 Communications Association Process

Currently, when a communication is associated with an application file, the file is removed from its current location. This sometimes leads to lost files because the application never makes it back to the original location. Other times, the communication could be associated with the wrong case file, delaying the procedural processing of the application.

6.2.1 New Process

The project team recommends a new process for associating communications with its respective application file, a process that affects every application passing through TC2800. The project team's recommended process eliminates the movement of the application file completely, meaning only the communication moves throughout the office. This procedure is also presented in flowchart form in Figure C-3, located in Appendix C.

The first few steps of the currently used process would remain the same - contractors in the mailroom would sort the communication according to its type and attach a cover sheet with the appropriate Clerical Support Team number and Group Art Unit (GAU) number to the communication. The contractor would then deliver the communication to the Clerical Support Team office without the application file. After entering the information into the PALM system, the location of the application file would be determined and a routing slip attached to the communication. Contractors would then physically find the application file and associate the communication with the file. There would be no need for the file to be removed from its current location because the new information has already been entered into the PALM system.

6.2.2 Serial Number Improvements

In order to implement this new procedure, however, a few more changes would need to be put in place. A recurring problem in TC2800 is an applicant's mistake of transposing digits in a serial number when sending in a communication. Unless detected, this causes the communication to be associated with the wrong application file. To resolve this problem, the project team looked to the Trademark Office for ideas. The project team recommends that TC2800 send out stickers with the serial number and a barcode to the applicant and require all incoming communications have this sticker attached to it.

Going one step further, the project team recommends that there be an identifier in the barcode on these stickers. Currently, the barcodes attached to the actual case files contain identifiers that allow PALM to know of the present location of the file. The identifier located on these communication stickers would indicate to the PALM system that a communication has been entered into the system but not matched with the file. When the contractor then brings the communication to the application file, he or she would scan, using a portable PALM terminal, the barcode from both the communication and the case file. This would indicate to the PALM system that the communication has been matched with the application file.

6.3 Implement Accountability

In line with increased file tracking capabilities allowed by an increased number of available PALM terminals, the project team suggests the implementation of an accountability measure. The project team recommends assigning each contractor a unique identification number. In this manner, when a contractor enters a file into the PALM system, he or she has been associated with the file as having touched it. Contractors will therefore comprise a link in the chain of accountability for when problems occur in a file.

In the case that TC2800 should not increase the number of available terminals, the project team recommends that contractors sign the file to signify that they have had it in their possession. Quality related incentives should then be provided for contractors to help ensure better workflow.

6.4 File Flow Resolutions

Many of the employees of TC2800 had qualms with the number of hands handling an application file as it is processed and the vertical distances a file travels. TC2800 is also expanding in the near future to two more floors in a different building, so an application file could soon be traveling not just between floors, but also between buildings.

6.4.1 Decentralize Option

In order to eliminate the need for application files to move from floor to floor, the project team recommends always keeping application files on the same floor as the examiner in charge of the file. The only reason a file would need to leave its floor would be if the application needed to be handled by a Special Programs Examiner (SPRE Shop).

In order to guarantee that an application file belongs to and is on the correct floor, the project team recommends implementing a color coding scheme to the file jackets in which each floor is represented by a different color. Because of the way most files are stored in Central Files and examiner's offices, a sticker or a piece of tape wrapped around one of the top edges of the file jacket would be the most ideal way to color code.

A change would also need to be brought about in how the Clerical Support Teams are divided amongst the examiners of TC2800. Under the current process, Clerical Support Teams are in charge of approximately eight Group Art Units (GAU's), and each GAU consists of anywhere between ten and twenty-five examiners. Not all of the examiners in each GAU, however, are located on the same floor - every attempt is made to

have them all on the same floor, but this is not always possible. For this reason, the project team recommends that the Clerical Support Teams be in charge of all examiners on the floor in which the Clerical Support Team office is located. With this resolution, application files would never need to change floors in order to be processed.

This brings up an interesting scenario for the floor on which the SPRE Shop is located. Because the SPRE Shop is all located on the same floor and takes away office space from examiners, the Clerical Support Team located on that floor would handle all applications that process through the SPRE Shop. Files that pass through the SPRE Shop are special cases that usually require special processing by the Clerical Support Team. The members of the clerical support team would become proficient in these special processing procedures because they would be the only ones carrying out these procedures. There would be fewer regular files to be processed because of fewer examiners, but processing the special case files from the SPRE Shop would make up for the difference in the amount of work done in comparison to the other Clerical Support Teams.

The location of Central Files and the contractors' office is another change that would need to be implemented in order to keep application files on the same floor. Central Files is currently located on the fourth floor and the contractors' office is located on the tenth floor of the eleven-story building which TC2800 is located. When being moved, all files pass through the contractors' office and all files are stored in Central Files when waiting to be examined. This leads to unnecessary vertical movement of a file and the contractor, especially when a communication comes into the office that needs to be processed. The project team recommends having a file room on each floor with a contractor desk in that room. With the color coding scheme and the Clerical Support Team divided by floor resolution implemented, application files would always remain on the same floor for examination and any processing that may need to take place. Files pulled

from the "Floor Filing Room" would stay in the same room as contractors sorted the files, and then the files would stay on the same floor as they were delivered.

6.4.2 Centralize Option

The project team realizes, however, that office space is limited in TC2800, and having a file room per floor might not be feasible. Should the previous resolutions not be possible, the project team recommends having Central Files, the TC2800 mailroom, and the contractors' office all on the same floor - nicknamed "The Hub Floor" by the project team. It is still recommended, however, that TC2800 color code its application files by floor and divide Clerical Support Teams by floor rather than GAU.

Central Files would be arranged according to floor as opposed to by serial number, which is the current arrangement. Most doctors' offices use a color coding method along with the first few letters of the patient's last name to sort medical charts. Color-coding Central Files would narrow down the search for an application to only a few racks of the same color as opposed to the entire room of forty thousand applications.

Putting the mailroom and the contractors' office on the same floor as Central Files would eliminate the need for files or communications to travel through the building multiple times before reaching its destination. If a communication comes into TC2800 that needs to be associated with an application located in Central Files, the communication would come into the mailroom and would stay on the same floor. The search in Central Files would be shorter because there are fewer files to look through with the color coding scheme in place, and the Clerical Support Team office the file is destined for would already be known. The communication, already associated with the file, would then make its way to the floor of the Clerical Support Team office where it would be processed, and then move for the second and final time back to Central Files. This resolution cuts down on the number of trips a communication and the application file must make within the building.

Chapter VII - Conclusions

The project team was asked to rank its recommendations based on which would have the greatest impact on attaining the goals of Technology Center 2800 (TC2800).

7.1 Recommendations Impact

The project team has divided its ranking into two lists - one ranks recommendations to improve application quality, the other to improve application efficiency. The application efficiency list is ranked in terms of hours each suggestion would save TC2800. The quality list is ranked in terms of the impact the project team has found that each suggestion would have on overall application quality.

7.1.1 Application Efficiency

The project team most strongly recommends moving to its decentralized option as a file flow resolution in which there would be a central filing and paper matching area per floor. This recommendation results from the team's calculation that decentralizing the filing and paper-matching area will save TC2800 twenty-five hours per bi-week in elevator transit time. Implementing this recommendation would require files be color coded to help identify files and that Clerical Support Teams would be assigned by floor instead of Group Art Unit (GAU); these recommendations go hand in hand and are just as strongly recommended by the project team.

The project team's second ranked recommendation is to implement the centralized option as a file flow resolution, which involves "The Hub Floor." Using this centralized method, the team calculated a savings of a little over six hours per bi-week in elevator transit time. The project team still strongly recommends implement a color-coding scheme for the application files and assigning the Clerical Support Teams by floor as opposed to

GAU. These resolutions would shorten the search time within Central Files and eliminate confusion as to the final destination of an application file.

The project team has two further recommendations. Although the project team was unable to calculate tangible timesavings in the implementation of a portable Patent Application Location and Monitoring (PALM) system, the team estimates that using this method of file control would significantly reduce the number of lost files, which would result in a savings in hours spent searching for lost files. The project team also recommends sending serial number stickers to each applicant. This would mitigate an approximately two minute search for the correct serial number every time an application is sent in with a transposed serial number.

7.1.2 Application Quality

The project team also responded to consistent complaints that contractors are unaccountable for file errors with its recommendation to assign each contractor an identification number for use when scanning file jackets and matching communications to application files. Implementing this resolution would require either a portable PALM system or an increased availability of PALM terminals. Without a capable PALM system, a signature sheet should be attached to the file wrapper for contractors to sign when they touch a case file.

The project team also highly recommends implementing its new communications channeling process. By reducing actual application file flow, the project team believes that the number of lost files and papers missing from files or communications associated with the wrong application file would be reduced. Additionally, the chain of accountability related to a case file will be shorter.

Further recommendations from the project team also include accountability to increase quality. Assigning clerical support by floor should increase application quality by

narrowing the chain of accountability. The project team restates its recommendation for serial number stickers, since the chance for a communication to be associated with the wrong case file would be reduced. The project team also restates its recommendation for the implementation of a portable PALM system, since knowing where a case file is should reduce the number of case file losses.

7.2 Final Conclusions

The recommendations presented in this report are suggestions to help TC2800 resolve its problems with procedural errors and inefficiencies. The project team developed them from interviews, research, and empirical information gathering. The solutions are intended to help the staff of TC2800 handle its paper flow until paperless applications can be used. In the culture of TC2800, the project team's solutions should help the Technology Center progress toward a large advance in its technology use. Therein lies a clear societal-technological interaction, which captures the essence of the Worcester Polytechnic Institute Interactive Qualifying Project.

Appendix A - About the USPTO

A.1 Mission Statements

A.1.1 Department of Commerce

The Department of Commerce promotes job creation, economic growth, sustainable development and improved living standards for all Americans by working in partnership with business, universities, communities, and workers to:

1. Build for the future and promote U.S. competitiveness in the global marketplace by strengthening and safeguarding the nation's economic infrastructure.
2. Keep America competitive with cutting-edge science and technology and an unrivaled information base.
3. Provide effective management and stewardship of the nation's resources and assets to ensure sustainable economic opportunities.

The Commerce Department touches the daily lives of Americans in many ways - it makes possible the weather reports heard every morning; it facilitates technology that Americans use in the workplace and home every day; it supports the development, gathering and transmitting of information essential to competitive business; it makes possible the diversity of companies and goods found in America's (and the world's) marketplaces; it supports environmental and economic health for the communities in which Americans live and it conducts the constitutionally mandated decennial census which is the basis of representative democracy.

A.1.2 United States Patent and Trademark Office

The PTO promotes industrial and technological progress in the United States and strengthens the national economy by:

- Administering the laws relating to patents and trademarks.
- Advising the Secretary of Commerce, the President of the United States, and the Administration on patent, trademark, and copyright protection.
- Advising the Secretary of Commerce, the President of the United States, and the Administration on the trade-related aspects of intellectual property.

A.2 Size and Budget Information

The United States Patent and Trademark Office (USPTO) occupies a combined total of over 1.4 million square feet in numerous buildings in Arlington, Virginia. The office employs over five thousand full time equivalent staff to support its major functions.

The budget for the USPTO in the 2001 fiscal year was $1.039 billion, and the planned budget for the 2002 fiscal year is even large, at $1.139 billion.

A.3 Organizational Structure

The United States Patent and Trademark Office is one of ten bureaus in the Department of Commerce, as shown in Figure A-1.

Figure A-1: Organization of the Department of Commerce

Office of the Secretary of Commerce
- Bureau of Export Administration
- Economics & Statistics Administration
- Economics Development Administration
- International Trade Administration
- Minority Business Development Agency
- National Oceanic & Atmospheric Administration
- National Telecommunication & Information Administration
- Office of the Inspector General
- **Patent and Trademark Office**
- Technology Administration

Figure A-2 shows the seven sub-organizations within the USPTO. The project team's work was concentrated in the Patent Office, which is headed by the Commissioner of Patents. Under the Commissioner of Patents are three more sub-groups, one of which is in charge of the Patent Examining Groups, as shown in Figure A-3.

Figure A-2: Organization of the USPTO

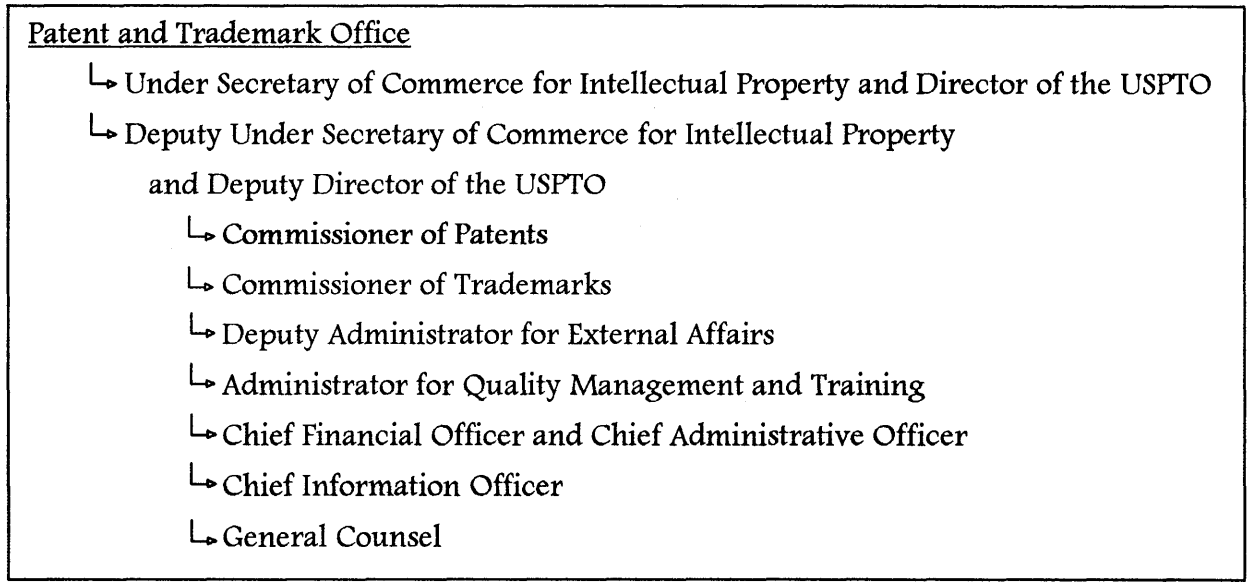
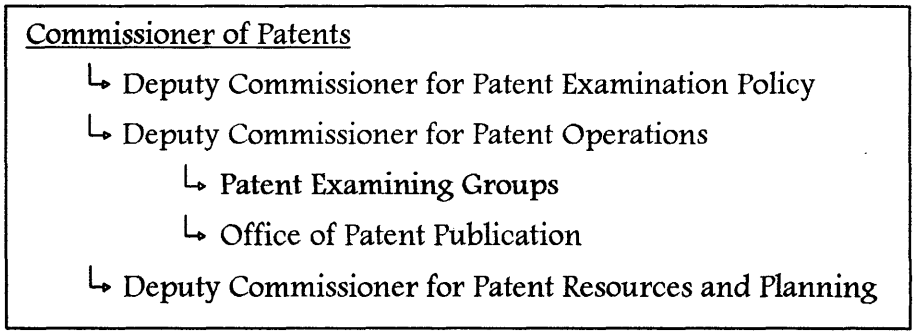


Figure A-3: Organization of the Patent Office



Patent Examining Groups are divided into seven Technology Centers, as shown in Figure A-4. The project was sponsored by the Technology Center 2800 (TC2800), which handles applications for semiconductors, optical and electrical systems and components. Of the seven Technology Centers, TC2800 is the largest with approximately nine hundred employees and it handles approximately twenty-five thousand applications per year.

Figure A-4: The Technology Centers

Patent Examining Groups (Technology Centers)
- 1600 Biotechnology, Organic Chemistry
- 1700 Chemical and Materials Engineering
- 2100 Computer Architecture, Software, & Electronic Commerce
- 2600 Communications
- 2800 Semiconductors, Electrical and Optical Systems and Components
- 3600 Transportation, Construction, Agriculture, National Security, License and Review
- 3700/2900 Mechanical Engineering, Manufacturing, and Products and Design

Since the goals of this project were concerned with improving the procedural processing of applications, the project team worked most with the Clerical Support Team, more specifically, Clerical Support Team 7. In order to more fully understand the process, the project team also interviewed Directors, Supervisory Patent Examiners, Special Programs Examiners, Customer Service Specialists, and Quality Assurance Specialists.

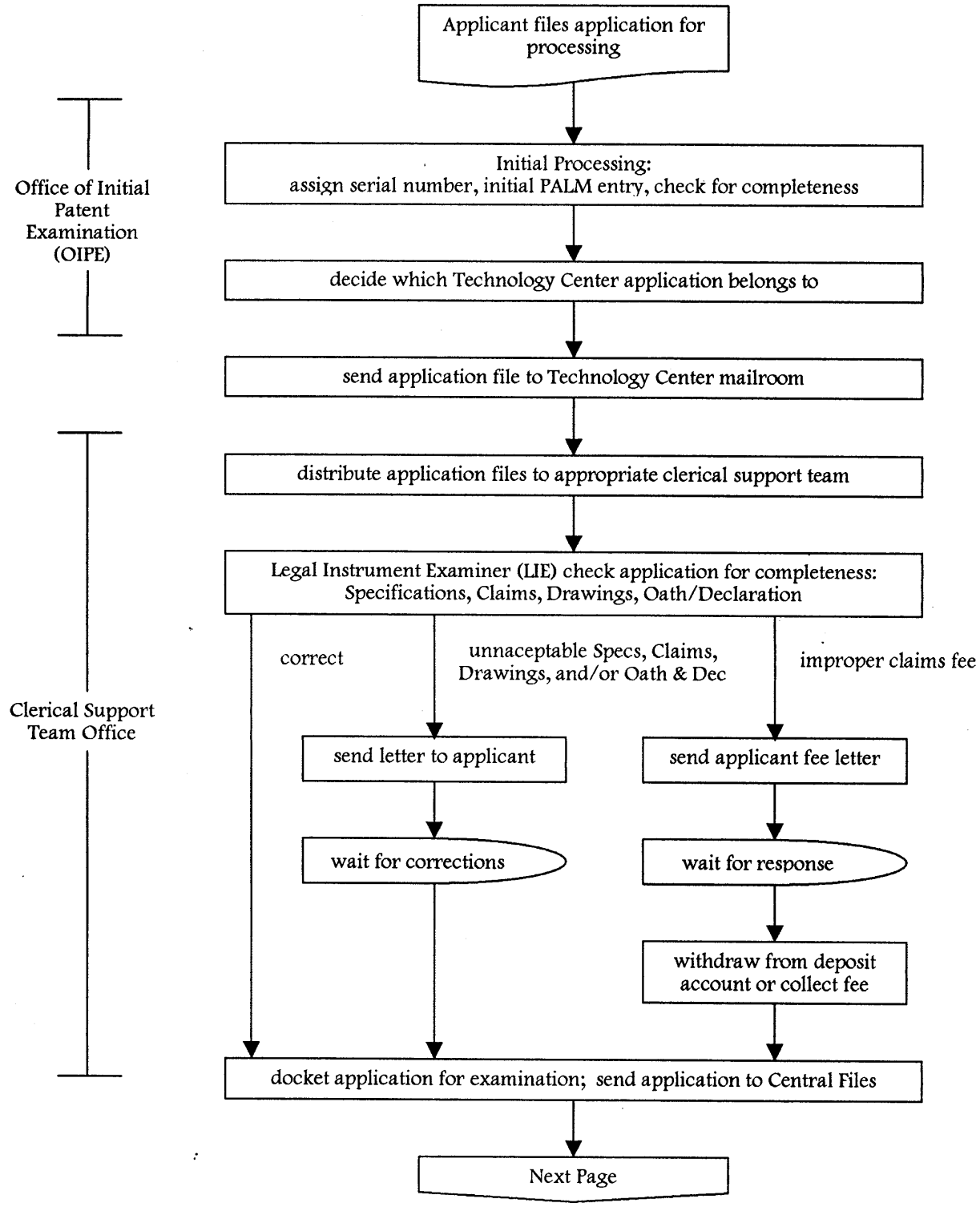
A.4 Comparison to Other Patent Offices

Table A-1: Applications Processed by Various Patent Offices in 2000

USPTO	270,187
European Patent Office	142,941
Japanese Patent Office	436,865

Appendix B - Flowcharts

Figure B-1: Application Procedure



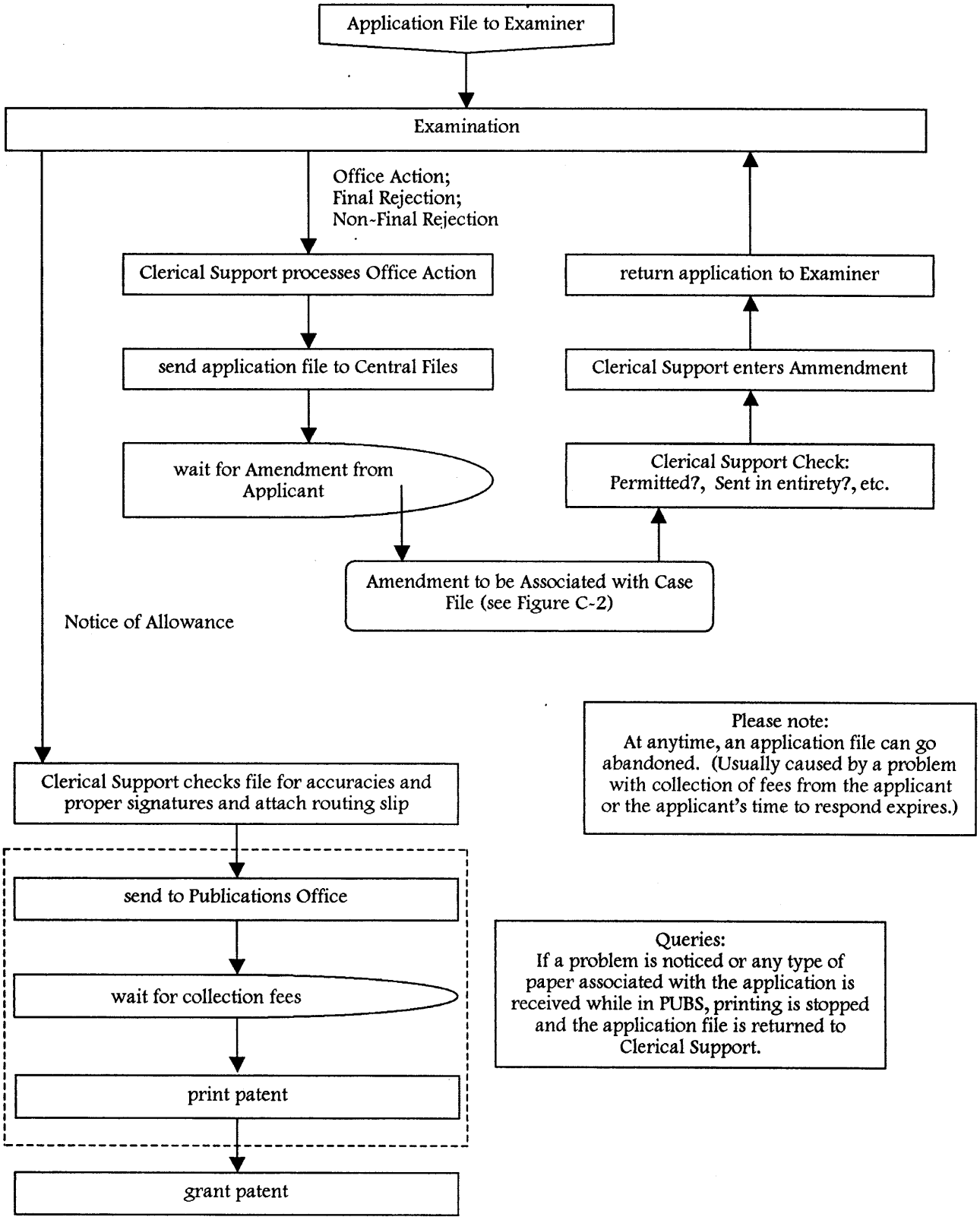

Application File to Examiner
Examination
Office Action;
Final Rejection;
Non-Final Rejection
Clerical Support processes Office Action
send application file to Central Files
wait for Amendment from Applicant
Amendment to be Associated with Case File (see Figure C-2)
Clerical Support Check: Permitted?, Sent in entirety?, etc.
Clerical Support enters Ammendment
return application to Examiner
Notice of Allowance
Clerical Support checks file for accuracies and proper signatures and attach routing slip
send to Publications Office
wait for collection fees
print patent
grant patent
Please note:
At anytime, an application file can go abandoned. (Usually caused by a problem with collection of fees from the applicant or the applicant's time to respond expires.)
Queries:
If a problem is noticed or any type of paper associated with the application is received while in PUBS, printing is stopped and the application file is returned to Clerical Support.

Figure B-2: Associating Communications with Application Files

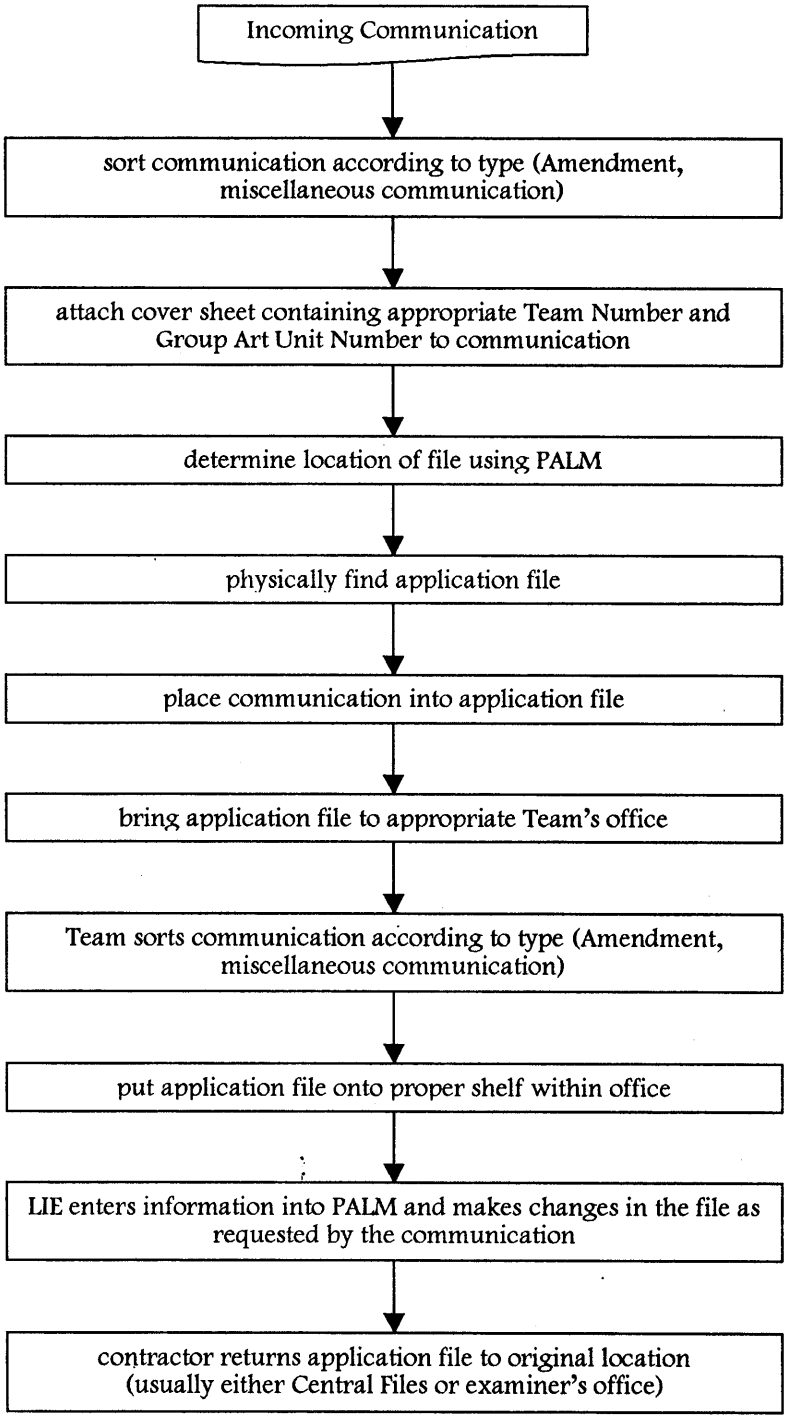
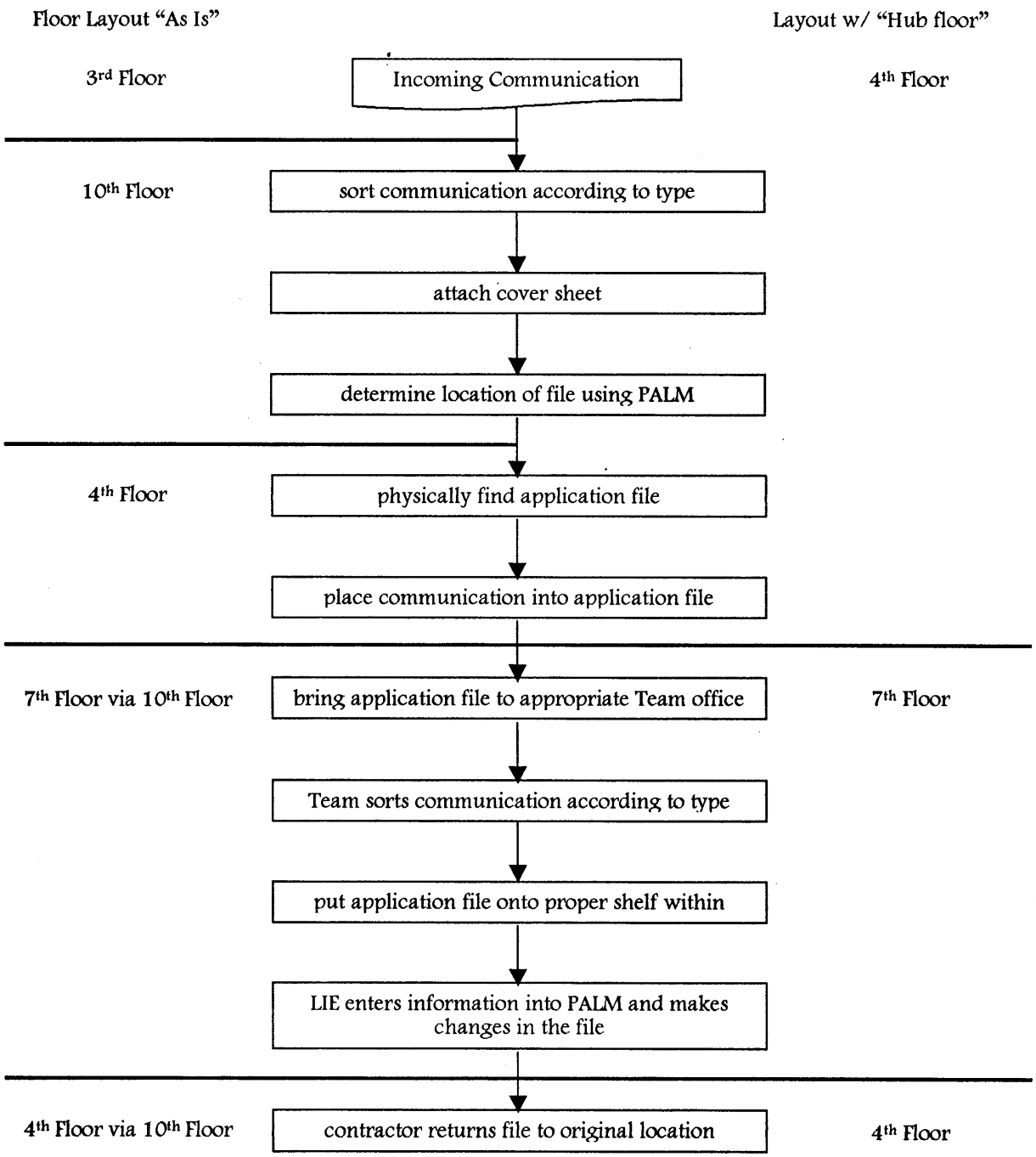


Figure B-3: Associating Communications with Application Files - Floor Information



** Please note **: This flowchart assumes the following : 1) the file is located in Central Files, and 2) the Clerical Support Team office is located on the 7th floor, the middle floor of the Team offices

Figure B-4: Recommended Process for Associating Communications

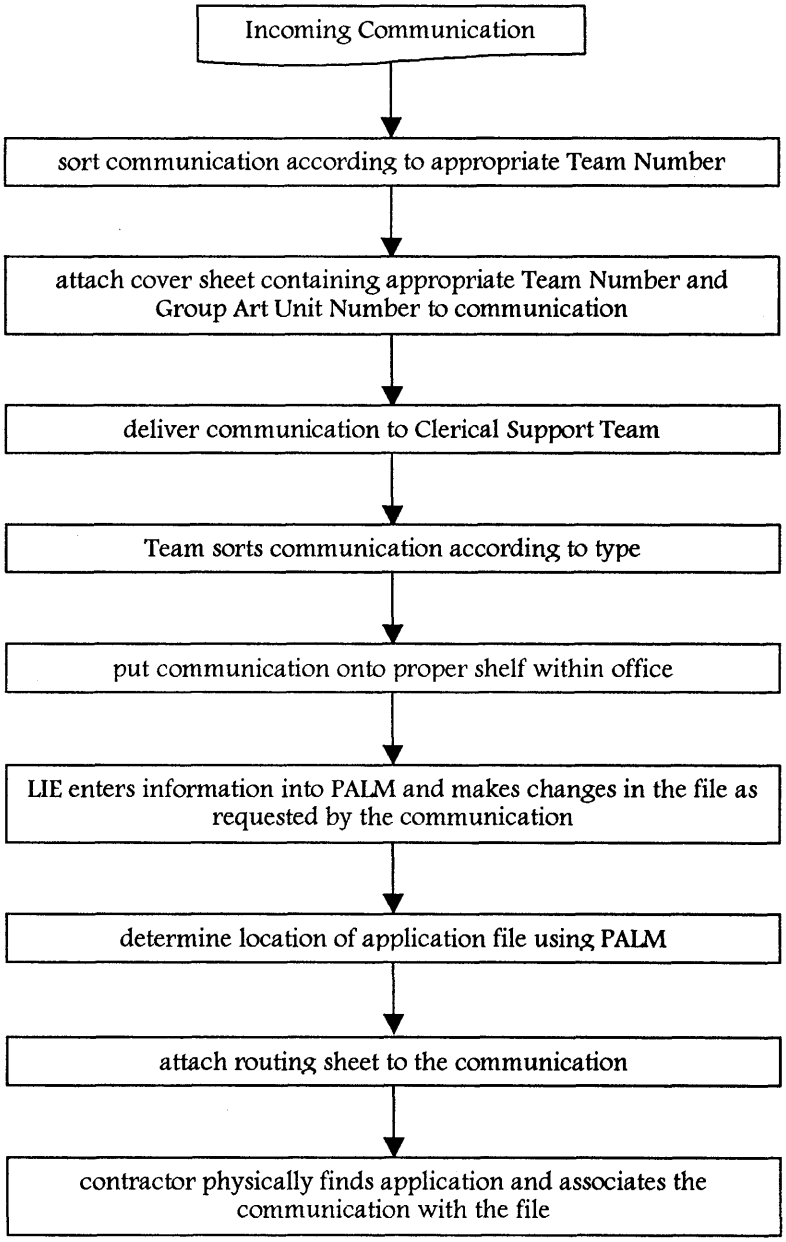
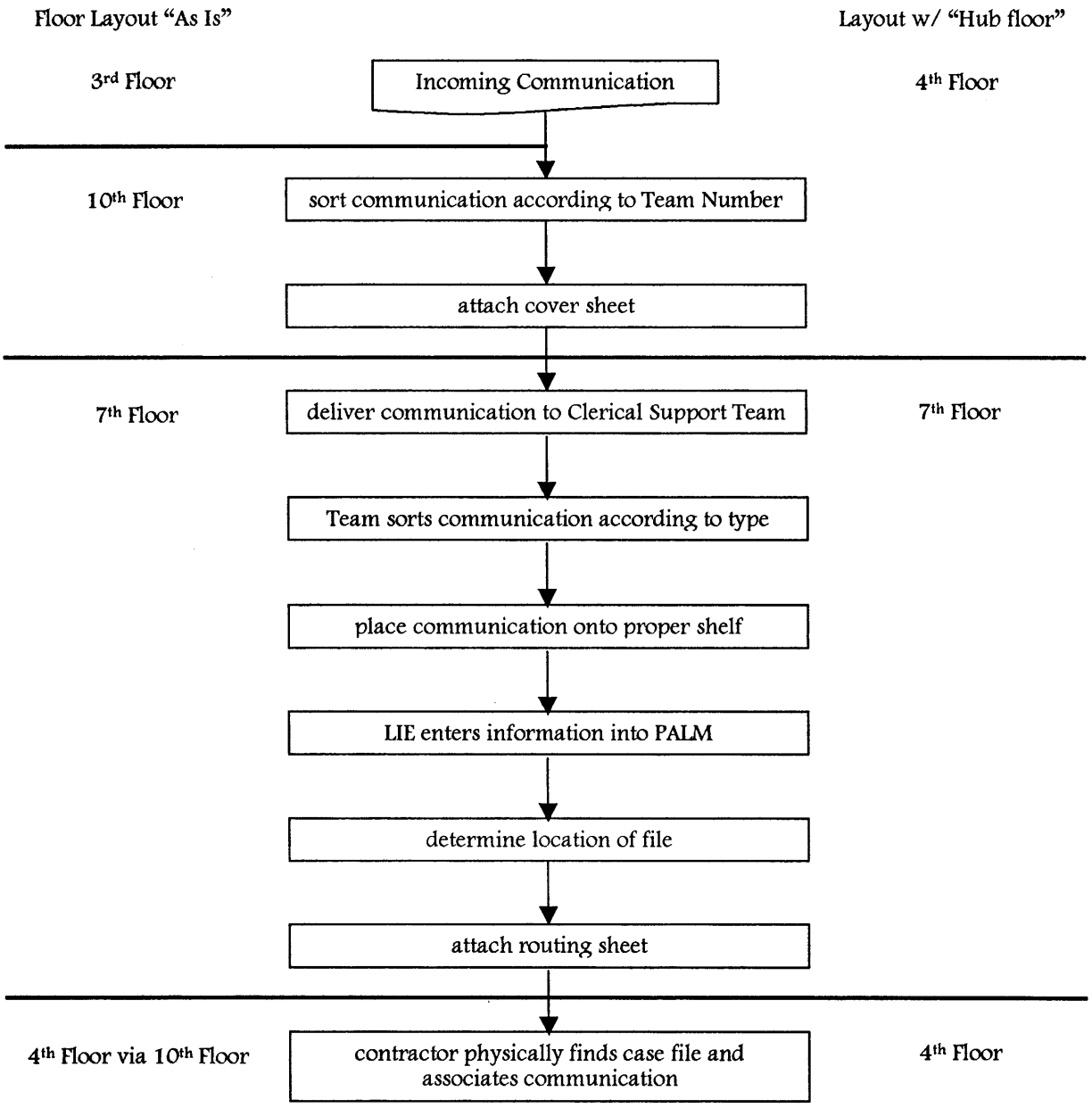


Figure B-5: Recommended Procedure for Associating Communications - Floor Information



** Please note **: This flowchart assumes the following : 1) the file is located in Central Files, and 2) the Clerical Support Team office is located on the 7th floor, the middle floor of the Team offices

Appendix C - Interviews

The project team collected most of its data through interviews and below is a log of all interviews conducted. Most of these interviews were unstructured; those conducted in a semi-structured nature are found in *italics*. A protocol for the interviews with the directors (Janice Falcone, Howard Goldberg, Rolf Hille, and Stewart Levy) is included, as well as the protocols and results for two Supervisory Patent Examiners (Nestor Ramirez and Josie Ballato) and a Customer Service Specialist (Wynette Stapor).

Table C-1: Log of Interviews

Date	Interview	Title	Interviewer
29-Oct	Rob Nappi	Supervisory Patent Examiner	everyone
29-Oct	TC2800 Overview		
30-Oct	PUBS Overview		
30-Oct	Tiffany Vines	Team Leader	everyone
31-Oct	Brian Sircus	Supervisory Patent Examiner	everyone
1-Nov	Rob Nappi	Supervisory Patent Examiner	everyone
1-Nov	Hien Phan	Special Programs Examiner	everyone
5-Nov	Tiffany Vines	Team Leader	everyone
6-Nov	Linda Hodge-Taylor	Customer Service Specialist	Ben
6-Nov	Hien Phan	Special Programs Examiner	Ben
8-Nov	Weekly Meeting w/ Nappi, Vines, Ballato, Ramirez, Goldberg		
9-Nov	Joy Dozier	Legal Instruments Examiner	Ian, Jay
9-Nov	*Howie Goldberg*	*Director*	*Ben, Doug*
13-Nov	*Rolf Hille*	*Director*	*Ben, Doug*
13-Nov	Linda Hodge-Taylor	Customer Service Specialist	Ben, Jay
13-Nov	Tiffany Vines	Team Leader	Ian, Jay
15-Nov	Weekly Meeting w/ Nappi, Vines, Ballato, Ramirez		
15-Nov	*Nestor Ramirez*	*Supervisory Patent Examiner*	*Ben, Doug*
19-Nov	Tiffany Vines	Team Leader	everyone
19-Nov	Rob Nappi	Supervisory Patent Examiner	everyone
19-Nov	*Josie Ballato*	*Supervisory Patent Examiner*	*everyone*
26-Nov	Tiffany Vines	Team Leader	Ian, Jay
26-Nov	*Janice Falcone*	*Director*	*Ben, Doug*
27-Nov	Kristine Kincaid	Quality Assurance Specialist	Ben
27-Nov	Tiffany Vines	Team Leader	Ben, Ian, Jay
29-Nov	Weekly Meeting w/ Nappi, Ramirez		
30-Nov	*Wynette Stapor*	*Customer Service Specialist*	*Ben, Jay*
30-Nov	*Stew Levy*	*Director*	*everyone*
1-Dec	Rolf Hille	Director	Ian, Jay
10-Dec	Weekly Meeting w/ Nappi, Vines, Ballato, Ramirez, Goldberg		

C.1 Directors

C.1.1 Interview Protocol

- What is the relationship between your job and the goals on the scorecard?
- Which of these goals stand out as the most important to you?
- Where would you like to see the most improvement?
- Some of the comparisons made on this scorecard are in terms of a number of applications that did not make the goal specified. How do you track these applications?
- Are there any particular problems that you can attribute to causing large numbers of these "problem applications"? How would you suggest resolving these problems?

C.1.2 Interviews Summary

From the interviews with the directors, the project team began to grasp the scope of its project. Whereas the original goal had been to reduce the number of recurring errors in the procedural patent process as, the team shifted its focus to specific parts of the process that seemed to be error prone and affecting nearly every application. With this change, the outcome of the project would be better average patent application processing times as opposed to reduced number of applications running over time standards.

Mr. Goldberg identified the number of applications awaiting action after amendment over four months as particularly important. In the average twelve days taken for an amendment to filter through mail and reach the examiner, an application may frequently be lost. He explained that there is no good tracking mechanism for the applications that run over their respective deadlines. In other words, it is difficult to find raw data explaining why applications fall short of the "14-4-4-4-36" standard.

Rolf Hille and Janice Falcone identified quality concerns as those of most importance to them. Processing quality is out of the scope of this project; however, Mrs. Falcone correlated quality concerns to the timeliness standards by explaining that errors affecting

quality can also affect timeliness. The most prevalent errors she mentioned were those with the PALM interface- lost files and improper status entries.

C.2 Others

C.2.1 Ramirez Interview Results

- How do you deal with a count sheet?
  A count sheet is basically a method by which the examiner gets credit for his or her work. It is a piece of paper that is printed as a report from OACS. It gets put in the file; it has the examiner's name on it.

- How do contractors pull cases from your office?
  They basically look for it and then remove it. The communication that needs to be associated with the file is usually not brought together. This causes problems when the examiner wants to look at a file and it is missing from his or her office.

- What happens if you look for a case and a contractor has removed it?
  Usually, the contractor leaves a notice saying that the file has been removed. Not always the case.

- In the SPE Presentation to Esther Kepplinger, she and the SPEs went back and forth about evaluations. The impression that I got was that the evaluations aren't always an accurate assessment of performance. Is this a TC wide occurrence? Is it something you can elaborate on?
  It's not that performance appraisals are inaccurate, but that they don't match. A SPE's appraisal focuses on quality, whereas an examiner's appraisal focuses on production. It causes a mismatch of priorities. Examiner appraisals are favorable toward examiners- that is, 95% achievement is acceptable, which Nestor considers "barely getting by"

- How do you design your current filing system?
  Nestor's filing system is organized. His office seems very neat. He explains that incoming files wind up on a table in his office. Sorted case files going to the examiners sit on a shelf at his door. Sig. Reviews are stacked beside his desk, and work in progress is open on his desk.

- What can you tell about the SPREs, your interactions with the SPRE Shop, and what the SPREs do?
  SPREs are support personnel. They are basically an extra set of eyes for high scrutiny cases to make sure errors are not made.

- Problems identified by Mr. Ramirez:
  - Use of delivery sheets- who prints them out? What purpose do they serve? GAU is indicated on the file wrapper. It should be enough.
  - Contractor drops cases off in pile- why not sort them?

- Tech support case tracking- TSS writes down case #'s for counting purposes. Examiners do this also. Suspected that PALM entries don't occur as often as they should.
- Track a file wrapper in clerical support by tagging it.
- Mechanical arrangements of furniture should be looked into. Also- how many times does a case file change floors?

C.2.2 Ballato Interview Results

- How do you deal with a count sheet?
  The examiners primarily deal with count sheets. Problems are encountered when computer tracking systems go down immediately before the deadline and examiners aren't credited for their work until the next biweek. It makes for inaccuracies in the examiner's evaluations.

- How do contractors pull cases from your office?
  They come in and remove them. There is typically a piece of paper left behind saying that the case has been removed, but not always. Communications can be informal. Sometimes a contractor will remove a case and leave a handwritten note with just the case serial number on it. This is a problem because the SPE has no clue what the case was in the office for.

- What happens if you look for a case and a contractor has removed it?
  Supposedly, the contractor has left a note. Not always the case. Notes don't always clearly identify which stack the case file was removed from.

- In the SPE Presentation to Esther Kepplinger, she and the SPEs went back and forth about evaluations. The impression that I got was that the evaluations aren't always an accurate assessment of performance. Is this a TC wide occurrence? Is it something you can elaborate on?
  The priorities of the clerical support staff and the examiner do not match.

- How do you design your current filing system?
  Small office= few cases. Only sig reviews and problem cases stay in the office. The office is set up to maximize turn around times for case files so that they do not pile up. Cases are classified next door.

- What can you tell about the SPRE's, your interactions with the SPRE Shop, and what the SPRE's do?
  Josie does not typically interact with the SPRE's.

- Problems/Suggestions cited by Josie:
  Cases arrive to the office of Petitions without being properly charged.
  Faxes in Josie's mailbox that have to be sorted through.

C.2.3 Stapor Interview Results

- How do requests for lost files get channeled to you?
  Lost files request arrive by telephone, by fax, or by email. Mostly by telephone and email.

- How is a file determined to be lost?
  If the file has never been docketed, you can't be certain which tech center it's in, because the case may have been transferred from group to group. If no one can find it, it's lost.

- Is the reason a file has been lost ever determinable?
  "All the time." A lot of times, a case file have been removed from Central Files without being charged to a location. 95% of the time the lost file is not where PALM says it should be.

- How do you find lost files?
  Get a PALM report, check central files, go to examiner, check team, check location file was lost from.

- Are PALM Reports of any assistance to you?
  Yes. See above.

- Do you ever find files that have been lost as a part of the clerical support process? Why do you think these files get lost?
  Files lost in clerical support may happen because of contractor lag time, or because cases arrive in clerical support and are not charged in.

Appendix D - Elevator Data

Table D-1: Elevator Wait Time (in seconds)

Down

20	55	30	95	115
40	100	60	115	20
90	40	35	80	15
15	15	135	10	10
5	15	65	145	40

Average	54.6
Min	5
Max	145

Up

40	55	25	30	10
15	35	10	25	10
10	10	5	10	15
5	60	0	60	10
15	25	80	20	5

Average	23.4
Min	0
Max	80

Overall Average 39

Table D-2: Elevator Transit Time (in seconds)

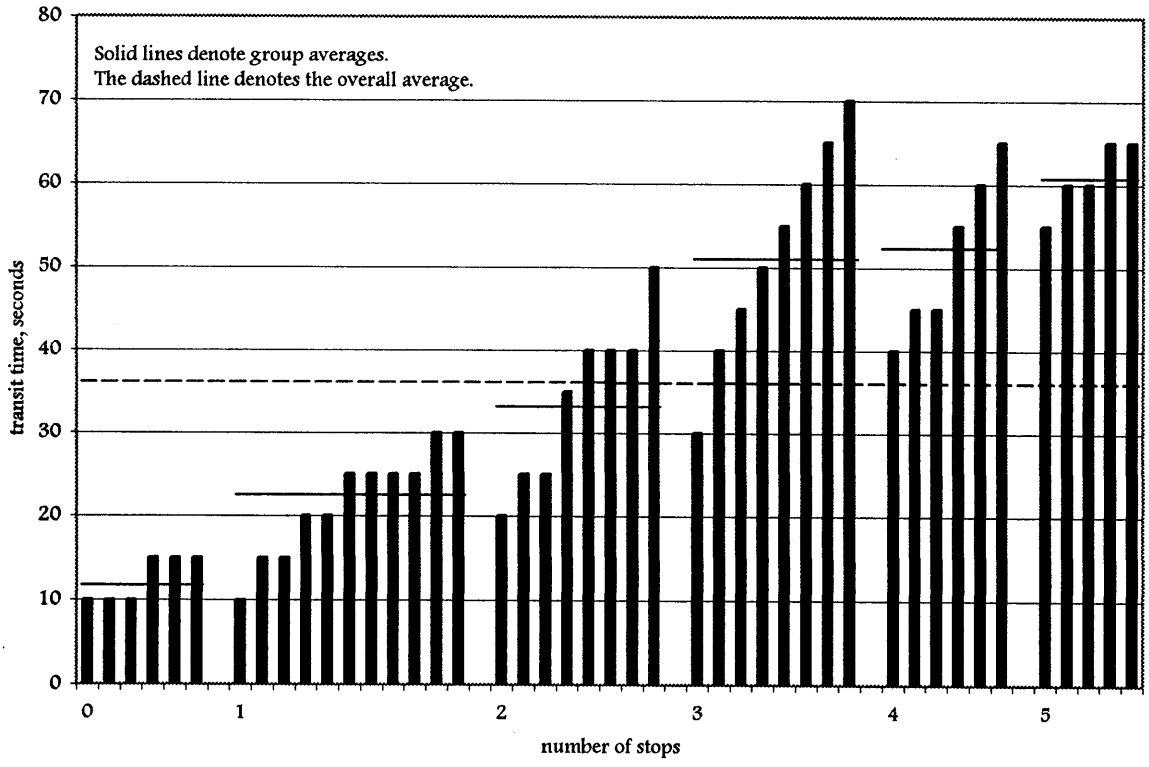
# of Stops	0	1	2	3	4	5
Travel Time, 6 Floors	10	10	20	30	40	55
(seconds)	10	15	20	40	45	60
	10	15	25	45	45	60
	15	20	35	50	60	65
	15	25	40	55	65	
	15	25	40	60		
		25	40	65		
		25	50	70		
		25				
		30				
		30				
Average	12	22	33	51	52	61
Overall Average	36					
Average Time Per Floor	6					

Table D-3: Cart Traffic

Number of Floors Traveled, Each Cart		
	6	6
	3	4
	1	1
	1	1
	6	1
	3	5
	1	6
	1	7
	6	1
	6	1
Average Cart Travel		3

Cart Case Load,	16
Carts Entering Elevator	20
	6
	0
	0
	40
	6
Average Case Load per Cart	12.25

Figure D-1: Transit Time in Elevator, 6 Floors



Appendix E - Time Statistics

Table E-1: Time Statistics

Papers Per Cart	50	
Papers Matched	1000	(daily)
Case Flow	500	From Central Files

Per Person a Day

	# Trips	Trip Time (min)	Total Trip Time (min)
Current	8	1	8
Hub	4	1	4
Decentralized	0	1	0

Wanding (per person/day)

Cases per floor	Cases Per Person	Wanding Time (sec)	Total Time (mins:sec)
100	50	10	8:20

Accountability

Time per Person Daily (min)	Weekly (hr)
8	1.2

Contractors as a whole (20)

	# Trips	Time per Trip (mins)	Total Time (hrs)
Current	8	1	2.4
Hub	6	1	1.8
Decentralized	0	1	0

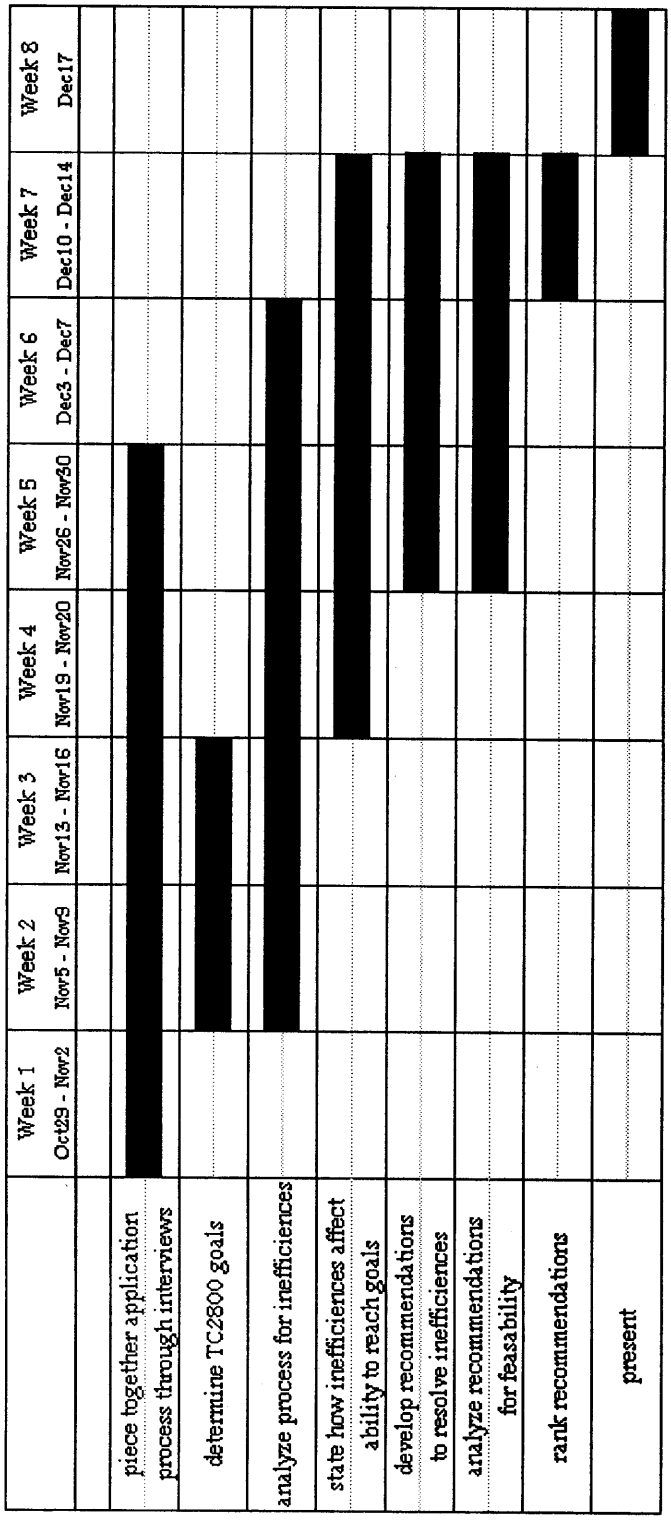
Wanding (contractors as a whole)

# of Cases	Wanding Time (sec)	Total Time (hrs)
1000	10	2.8

Papers per cart, papers matched daily, and case flow from central files were obtained from an interview with a paper matching contractor.

Appendix F - Project Work Plan

Figure F-1: Project Team Work Plan



Appendix G - Original Project Proposal

US Patent and Trademark Office
Technology Center 2800

Improve Efficiency of Processing Patent Applications

Objective: To provide suggestions for the more efficient procedural processing of patent applications within Technology Center 2800.

Significance: The recently enacted American Inventors Protection Act (AIPA) transformed the Patent and Trademark Office (PTO) into a Performance Based Organization. As such, the success of the PTO and the different organizations within the PTO is based upon meeting several performance goals. Many of these goals are based upon the amount of time the application is being worked on, and other goals are based upon the quality of the work performed. In order for Technology Center 2800 to meet its portion of these goals, we need to re-evaluate the time an application spends in the Technology Center and determine if there are processes that can be optimized to save time. One process which needs to be further optimized is the procedural processing of patent applications.

Background: Over the past several years the PTO has reorganized, which has resulted in a reduction in the number of federal employees performing the procedural processing of patent applications. To cope with the reduced number of federal employees, contractors were hired to do the routine functions, while the complex and critical functions were reserved for PTO employees. In the process of this reorganization some inefficiencies may have been created. Subsequent to the reorganization, the AIPA was implemented that placed goals for the different stages of the patent examination and issue process. To meet our new goals under the AIPA, we are going to need to discover the inefficiencies in the procedural processing patent applications in the technology center, and to propose methods which will allow Technology Center 2800 to meet or exceed our goals.

Project Description: This project is to evaluate the process of how the clerical support staff of Technology Center 2800 performs the procedural processing of applications. It is anticipated that the students will learn the procedural steps which are required, and to observe how these steps are performed in the Technology Center 2800. From this knowledge and their observations it is hoped that the students will be bale to identify practices which consume time and create errors. Further it is hoped that the students will provide recommendations to rectify the identified problems. It is anticipated that the recommendations may include changes in the duties assigned to federal employees and contractors, and changes to the methods of processing and tracking work.

Key Tasks: Meet with members of the Technology Center 2800 staff to get an overview of the group; meet with members of the PTO automation, SIRA, to get an overview of the electronic record keeping of patent applications; meet with the Technology Center 2800 Quality Assurance Specialists, Customer Service Specialists, and Special Programs Examiners to obtain data concerning quality from internal review and customer feedback; meet with clerical Team Leaders to get an understanding of the procedural requirements and the process currently employed; meet with Technology Center 2800 management to

gather data about the indicators used to determine if the goals are met; make suggestions to improve the process.

Skills Desired: Ability to communicate well with others (both in writing and orally); an understanding of how time management can be applied to processes to maximize efficiency; ability to correlate systematic errors and inefficiencies to specific process steps; understanding of the priorities of the USPTO and the process by which an inventor applies for a patent; ability to determine the fundamental elements of work process steps and recommend improved steps; ability to perform statistical analysis; ability to develop creative solutions.

Recommended Outcomes:
A report that includes:

a) A concise overview of the steps which are currently employed in the procedural processing of patent applications in Technology Center 2800.
b) A listing of inefficiencies and re-occurring errors found in the procedural processing of patent applications in Technology Center 2800.
c) A statement of how these inefficiencies and errors are affecting the Technology Center's ability to meet or exceed its goals. (This statement should identify how the inefficiencies and errors were identified, e.g., data from interviews, customer service feedback, etc.)
d) A series of recommendations to resolve the inefficiencies and reduce the re-occurring errors.
e) A ranking of these resolutions, showing which will have the greatest impact on improving Technology Center 2800 goals.

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