Digitizing Historic Panamanian Parish Records

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Date:

May 14th, 2020

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1 Introduction

The recorded history of Panama stretches back for hundreds of years, documenting the daily lives and interactions of its people after the Spanish conquest in 1501. The Catholic Church, and more specifically St. Mary's Parish, located in Panama City (see Figure 3), have served in a supporting role as unofficial record keepers for members of the parish. These records reside in the parish's library in a number of ledgers. Although another organization had previously completed a capture of the parish's records, this group took all the information with them and did not allow the parish to have access to the records after their capture. The parish would like to digitally capture these records in order to safeguard them from being lost forever. If the church staff catalogs and electronically captures these documents, the parish staff can properly appreciate and more easily retrieve the records.

St. Mary's Parish has reached out to Footprint Possibilities in the hopes that they will help them develop a digital system to preserve the parish history within their documents for many years into the future. These records document the history of the members of the parish and its members from 1810 to the present (V. Guerrero, personal communications, May 6, 2020). St. Mary's Parish contains historic documents that are important to the history of Panama, and to the people affiliated with the parish. Footprint Possibilities, a 501(c)3 private charity, has worked to support local community centers like St. Mary's Parish by providing support, funding, and coordination in order to create more opportunities for educational and cultural platforms (Footprint Possibilities FAQ, 2020). These two organizations plan to work together to make these records live on as a part of Panama and its history.

St. Mary’s Parish wishes to capture these records electronically and enter them into a database to provide efficient access to the digitized records and a catalog that contains the physical location of each document in their library archives. The team's goal is to develop a process for digitally capturing and organizing historic documents stored in the St. Mary’s Parish archives. To accomplish this, the team must establish a method to capture these records and input them into the database. Once the team establishes a method, the team must also train staff at the parish to complete the capture process and how to use the database. Footprint Possibilities will serve to facilitate the transition from this team to the staff at the parish and the fulfillment of this overarching goal. In order to achieve these goals, the team will learn about past archival projects, understand the goals of the project from the perspective of the church staff, and deliver product recommendations that take into account the limitations imposed by the church’s documents and the church’s budget. The team expects that the completion of these objectives will result in a working database system that suits the needs of the church.

2 Background

2.1 Footprint Possibilities

Footprint Possibilities is a 501(c)3 private charity with headquarters in St. Petersburg, FL in the United States (Footprints FAQ, 2020). Currently, they are focusing their efforts entirely within the nation of Panama. However, their website indicates that this scope may change with longer range assistance, more access to resources, and greater expertise (Footprints FAQ, 2020). Within Panama, the charity's mission is largely centered around organizing local community efforts. According to their website, their efforts can range from healthcare, to education, to construction projects, or to the environment (Footprints FAQ, 2020). Communities in Panama come to Footprints and lobby them for assistance. If Footprints determines that it can assist these communities, they find resources and other expertise that are specific to the problems of the communities (Footprints FAQ, 2020). In essence, Footprint Possibilities provides a pathway for communities in Panama to reach out into the broader world for aid which might not be normally available to them.

Footprint Possibilities has helped many different communities in Panama with their service efforts, and they document several of these initiatives on their Facebook page. Between January and April of 2020, they began work on a water distribution system in conjunction with Michigan Technological University at La Penita in eastern Panama (Footprint Possibilities Facebook Page, 2020). They also began work on another water distribution system in conjunction with Columbia University in San Lorenzo del Chagres along the Atlantic coast of Panama (Footprints Facebook, 2020). Furthermore, they are actively working to continue previously existing projects related to clean drinking water in Kuna and San Francisco in Panama

(Footprints Facebook, 2020). However, while this might suggest that Footprints only works to create water distribution systems, in October 2019 they completed two projects with groups of WPI students. One student team focused on creating a guided tour of the museum at the El Cano archeological site, and the other team focused on identifying dried plants buried alongside the chieftains at the El Cano site (Footprints Facebook, 2020). Footprint Possibilities is committed to helping communities in Panama by working closely with them, and by providing resources and expertise to accomplish the goals of those communities.

2.2 The Catholic Church and Its Influence over the People of Panama

The Catholic Church has been present in Panama since the early 1500s when Spanish explorers began converting the native population to Christianity. For the next three hundred years the Spanish brought Christianity to all of Panama, building cities with churches and parish communities. In 1821 the Spanish rule ended with the liberalization of the people of Panama who immediately joined the Union of Gran Colombia. By this time, churches were the epicenters of towns and cities where people would regularly congregate and practice Catholicism. When a church performed a baptism, it would create a baptismal certificate to record the event. The certificate information includes the baptized individual's date of birth and the names of the parents with the mother's maiden name (see Figure 1). This information is also in a ledger, proving that the church baptized that baby. If someone were to question a parishioner's background or religious affiliation, that parishioner could request their file for proof. The church would then let the requesting individual see the appropriate record as proof of that person's past, which was important when getting married. The Catholic churches of Panama kept records of baptisms, confirmations, marriages, and deaths. Many of these records still exist, however many documents are at risk of succumbing to fire and water damage. Churches gave its members a

sense of safety and it was important for the church to work effectively for the community by maintaining these records (Museum, 2018).

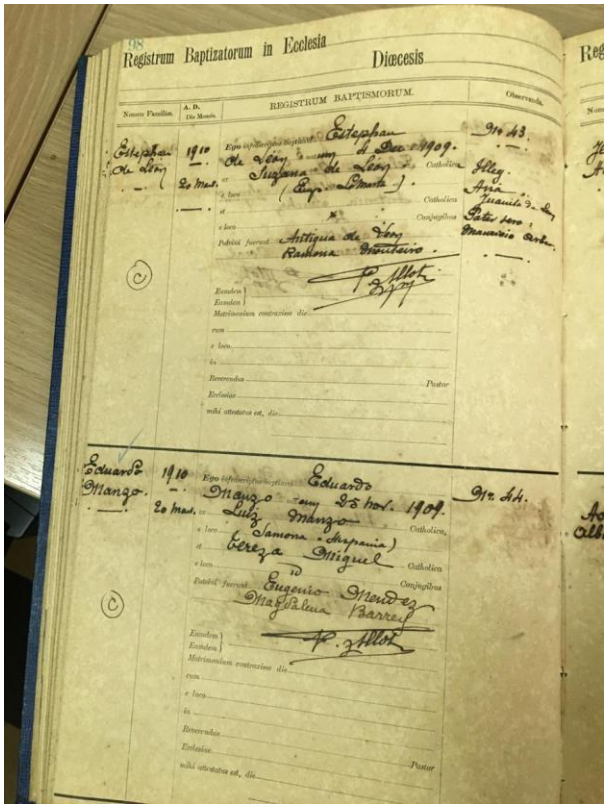

Figure 1. Pio, P. (2020). Image 1. St. Mary's Cathedral, Panama City, Panama.

2.3 St. Mary's Parish

Footprint Possibilities has placed the team into contact with St. Mary's Parish. St. Mary's Parish is the headquarters of the Catholic Archdiocese of Panama, with their house of worship being the iconic Cathedral Basilica of St. Mary, shown in Figure 2. It is located in the Old Quarter of Panama City, Panama. According to their website, Bishop Remigio de la Santa Maria la Antigua consecrated the Cathedral in 1796 after over one hundred years of construction

(Arquidiócesis de Panamá, 2020). The parish itself, however, predates the completion of the Cathedral by nearly three hundred years. In 1513, King Ferdinand of Aragon asked Pope Leo X to appoint a bishop for the purpose of converting and evangelizing the native population of mainland America (Arquidiócesis de Panamá, 2020). The Pope granted this request and created the Diocese of Santa Maria la Antigua located at a town called Santa Maria la Antigua on the Atlantic coast (Arquidiócesis de Panamá, 2020). In 1520, Governor Pedrarias of the Panama colony transferred the bishopric across the isthmus to the site of present-day Panama City, shown in Figure 3 (Chow, 2020). In 1925, the church elevated the See to the status of Archdiocese, and today its head is Archbishop Jose Domingo Ulloa Mendieta, O.S.A. (Chow, 2020). The borders of the Republic of Panama and the Archdiocese are not one and the same, rather the Archdiocese composes only a small part of Panama (Chow, 2020).

St. Mary's Parish maintains archives that chronicle the lives of the people that have lived and died within its boundaries. According to Father Pio, the custodian of the documents at St. Mary's, their archives stretch back as far as the year 1810, meaning that they document over two hundred years of the parish's history . Currently when a member of the parish requests to see any record in their possession, a staff member has to look through a filing cabinet of names on index cards, and match the requested name to a name in the index card system. Then, the information on the card indicates a book where the actual record is kept (V. Guerrero, personal communications, May 6, 2020). It is clear that the parish cares very much about using their records and archives as intended. However, the current process for accessing records is slow and many of the books are very fragile. The index card system is also incomplete, as the staff has sporadically updated it over the years. The parish must continue to provide information requested by parishioners because these archives document the histories of the parishioners. If fire, or

water, or an earthquake, or human error were to damage or destroy these archives in any way, part of the spirit of the parish would be lost forever.

Figure 2. St. Mary's Cathedral. From "Places of Worship in Panama City", by J. Dooley, 2005, https://www.gpsmycity.com/img/gd_cover/4081.jpg. Released under Creative Commons License.

Figure 3. Google (n.d.). [Google Maps Location of St. Mary's Cathedral in Panama]. Retrieved May 8th, 2020, from www.google.com/maps/place/Saint+Mary%E2%80%99s+Parish/@9.171749,-82.1464867,7z/data=!4m5!3m4!1s0x8facaf5528206f41:0x65298d13ff4e5c11!8m2!3d8.952482!4d-79.557538.

2.4 The Cultural Significance of Archives

An organization preserves itself and potentially its culture through the use of archives. Organizations maintain archives hoping that they might be useful to them at some point in the near or far future for any number of reasons (King's College, 2020). In addition to the organization housing the archives, there are a wide variety of groups outside the organization that might find the archives useful. For example, a local historian might be interested in a certain archive if they are trying to paint a picture of what past life was like in a specific locality, or academics might be interested in a certain archive if they are trying to place themselves in the past (King's College, 2020). Government officials might seek archives if they are looking to

validate or dispute the past actions of people, or artists might seek them if they are looking for inspiration from the past to guide their work (King's College, 2020). Archives, then, propagate cultures due to their contents which many groups and organizations might find informative, and it is important for the organization which houses their archives to do well in maintaining them.

Custodians of archives have a responsibility to identify, appraise, preserve, and make available any and all documents in their possession if someone who has the correct privilege seeks them (Council on Library and Information Resources, 2020). They have to be familiar with the history of their organization, and they have to be sensitive to any of the associated connotations that documents in their collections might have, whether they are good or bad. In the case of St. Mary's Parish, the custodian of their archives is Padre Pio. The organization which hosts the archive, then, has it in their best interests to support the custodians of archives and the processes that preserve them. The institution might have a legal obligation, for if a government organization were to inquire about some piece of information, that organization might require that the institution which houses the archives comply with their request (CLIR, 2020). In the case of the Catholic Church in Panama, marriages within the church require a civil marriage, and so the government of Panama would not be relying on St. Mary's for this information (Angloinfo, 2020). The institution might also have an obligation to the relatives of the people who are named in the archives; the institution would give those people the freedom and the ability to access information related to their families. For an organization like St. Mary's Parish, this takes on an even greater meaning because these records describe the lives of numerous individuals who have families and contribute to the culture of the parish. Archives are significant to organizations like St. Mary's because they house information that cannot be reproduced by anyone today.

2.5 The Size, Shape, and Form of Their Documents

Most of the documents stored at St. Mary's Parish are in the form of log books (see Appendix A). According to email communications with Padre Pio, the log books are similar in size, with the pages of the largest book being 60 cm tall by 50 cm wide. On the pages are tables which record sacramental events including baptisms, confirmations, marriages. Included in these records are the dates of the events and names of participants. There are also other recorded details about the events which vary across the different log books. Figure 4 shows a photograph of a log book that is in the parish archives. There are a few other documents that exist in the parish records such as blank certificates. The parish does not wish to digitize these other documents because they are not part of the main record keeping system. There is a system of sheets and cards that the parish staff use to search through the records manually. Included on the cards are the names of the person receiving a sacrament as well as which log book and on the page where the record resides. The parish staff retrieves documents using the card system and going through the records manually. The writing on the documents is hand-written in ink. Almost all of the writing is in Spanish cursive. Some of the older documents have faded writing that is difficult to read. The parish is concerned that humidity and age may damage the documents further. They are also worried about the documents being destroyed by some disaster such as flooding.

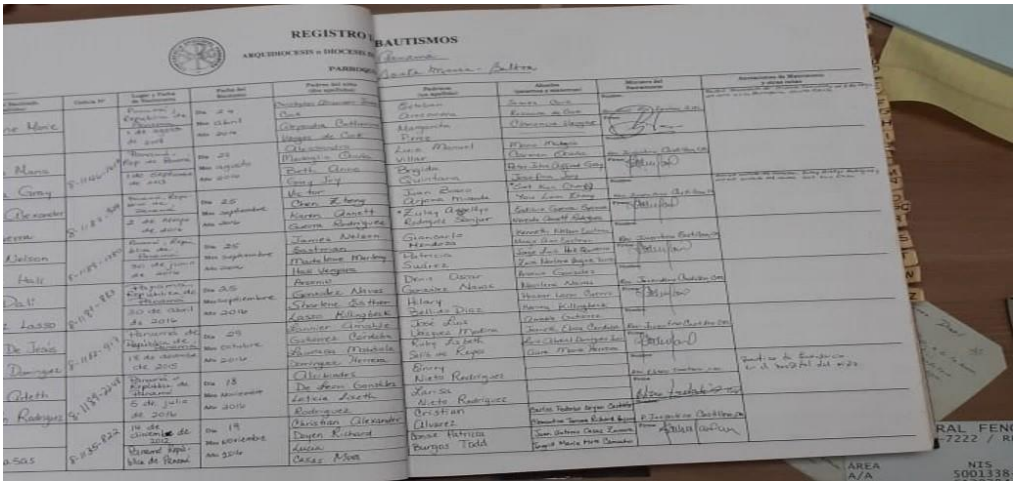

Figure 4. Pio, P. (2020). Image 8. St. Mary's Cathedral, Panama City, Panama.

2.6 The Issues Related to Digitization of Church Records

There are many different factors to consider for the protection and preservation of historic documents in the digitization process. The church staff must preserve the historic documents when handling and capturing them, by limiting sources of potential harm, the original copies will endure after the church staff completes the capture. First, the church staff must inform the team on the condition of the documents, in order for the team to incorporate proper preservation techniques into the procedure. The methods and equipment used for safely capturing images of the documents depend on the condition of the historic records. Additionally, the team must develop criteria for a safe workspace for capturing the documents which the church staff will create. This workspace must eliminate potential hazards such as, humidity, ink, and sharp objects. The team must train the church staff working on the digitization of documents on safe handling and capture techniques for historic documents. The church staff will need to ensure safe transport and storage of these documents during the handling and digitization

process. Some documents involved may already be in very poor condition, in this case the church may need to repair them prior to capture. Finally, different types of documents require distinct capture methods. Certain documents may be too delicate or may have dimensions that are incompatible with certain types of capture equipment (Library of Congress, 2020).

For a project of this nature there are three options for digitization. These options are to use a flatbed scanner, an overhead scanner, or a digital camera. Typically a flatbed scanner is used for simple flat pieces of paper which can be safely pressed between the scanner faces. An overhead scanner is usually used for books which cannot be pressed into a flatbed scanner. A digital camera is used if there are irregular documents or artifacts which cannot be captured by either type of scanner. Each option for capture has its own pros and cons and within each type there are many individual products that cover a wide range of prices and specifications (Theil, 2008). The equipment the church staff uses to capture documents will influence the requirements for their database. Different equipment will produce different image quality meaning storing the images will require smaller or larger storage requirements in digital memory space.

2.7 Database Technologies

Designers of databases organize the storage of digital records by selecting a database management scheme which enables a computer to rapidly query a database and retrieve the information stored in the database. A database exists on a computer which is generally responsible for managing queries and returning the requested information. Sometimes the user requirements for databases are very complicated due to the need to handle multiple users that have different read and write privileges, records of modifications, and even being distributed across multiple computers. Databases with simpler functional user requirements store and assist

a single user with rapid retrieval of information. They are relatively easy to construct and have been commonly used since the 1980s. Many databases store a specific record along with several details about the artifact. Frequently in modern database infrastructures, a database consists of several “tables” that are constructed and accessed using the language SQL, a language which has many free implementations (W3Schools, 2017).

Some databases exist as a file on a local computer that a single user accesses directly. Powerful servers host other databases that the user accesses online the Internet. The requirements and use of a database dictate the hardware requirements of the hosting computer as well as of any other devices which may be needed. A single-user database may only require a simple processor and will not be very resource-intensive - unlike a widely-used online database which may require a multi-threaded processor, a reliable Internet connection, and possibly even other computers to assist it (Encyclopedia Britannica, 2018).

The information stored on the database is in a digital form, however, this digital information still exists physically as markers. Computers store most of these physical markers on components known as hard drives. Depending on the required speed of the database or other database usage requirements, the hard drive storing the information of a modern database could be a disk-drive, solid-state drive, or even a large plate of random access memory in some industrial databases. Disk-drives contain physical disks which spin at very high speeds. Because of their physical, high-precision components, disk-drives are somewhat fragile and should not be left running for long periods of time. Sudden changes in the temperature, humidity or even orientation of a disk-drive can cause the drive to damage itself. Solid-state drives store data in logic-gate circuit components which act as switches. Solid state drives are faster than disk-drives and can be left running for much longer, however, they are significantly more expensive and can

only be re-written a few times (PCMag, 2019). The different internals of disk drives (HDDs) compared to solid state drives (SSDs) can be seen in Figure 5.

Any database operates under the assumption that something may damage or destroy its information storage devices eventually. To mitigate this, architects of a database design it with a backup solution in mind. Copying database records via a backup operation to external storage devices is a necessary step that an entity must perform. The entity then will be able to recover the information even if the master database itself is somehow damaged. It is best practice to store the backups in a separate location from the database itself, and to have multiple backups in case one fails. Simple computer programs known as scripts can be written to automatically restore a database from a backup (SANS, 2015).

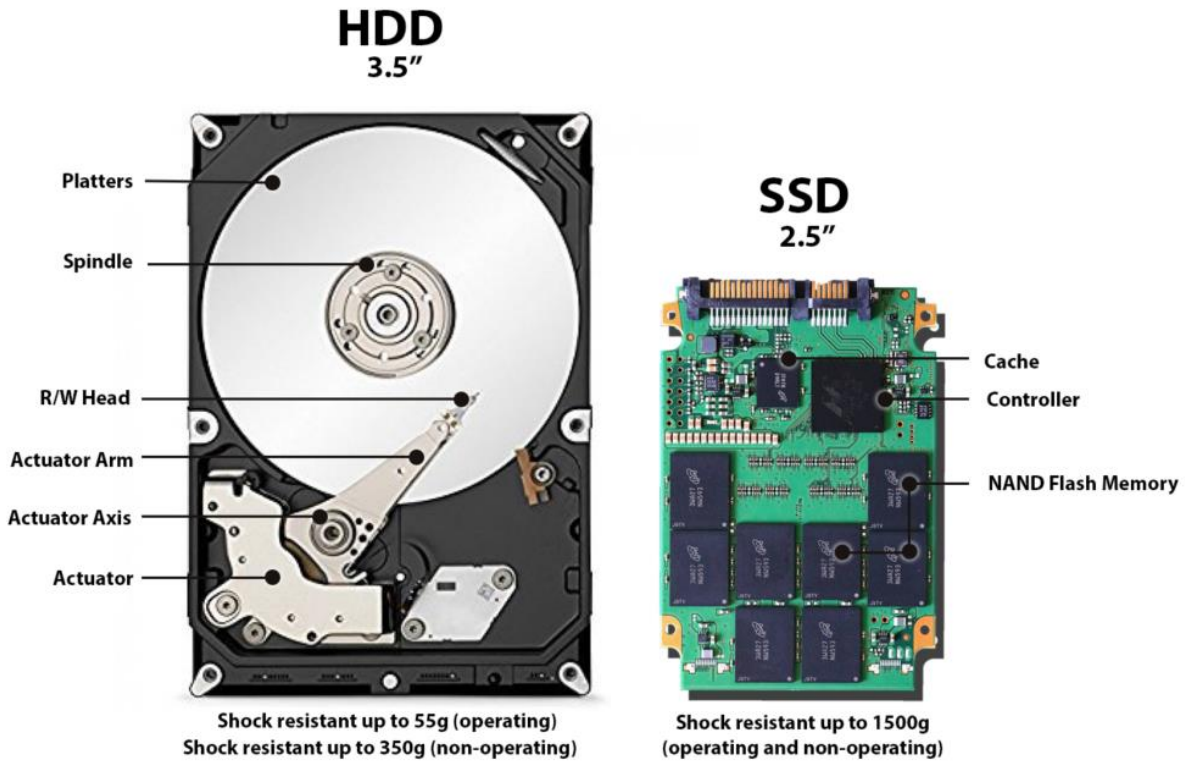

Figure 5. Internals of hard drives. From "How To Move Programs From HDD to SSD", by P. Chakraborty, 2019, https://silicophilic.com/wp-content/uploads/2019/11/hdd_vs_ssd.png. Released under Creative Commons License.

2.8 Perceived Stakeholders

This project has two stakeholders who have a vested interest in its successful completion including the church staff who will be interacting with our project and people interested in the documents now made accessible. The first stakeholder is the staff of St. Mary's Parish. The team's primary contact at St. Mary's Parish, Tito Mouynes, has indicated that the parish would like to have a digital copy of their records. This will permit them to quickly retrieve records upon request by individuals seeking information from the parish. The parish is a key player in this project because they are the organization which houses the archives, and without their assistance, this investigation will not be able to proceed. The second stakeholder are the individuals who are named or whose relatives are named in the archives at St. Mary's Parish. These individuals should be able to access the information housed in the archives of St. Mary's Parish, and therefore they have a stake in the safekeeping of the information contained in the documents. Additionally, one of our sponsors, Footprint Possibilities, is the charitable organization which put the project team into contact with St. Mary's Parish. Footprint Possibilities works with organizations in Panama by providing resources and expertise for local projects, seeking to aid the organization undertaking the project until its completion.

2.9 Summary

The stakeholders for this project would like a database for the rapid retrieval of records and to protect the database information from becoming lost or damaged. St. Mary's Parish has been a religious center for Catholics in the Panama City area since the early 1500s. The parishioners of St. Mary's have their sacramental records as well as the records of their earlier community stored in the archives of St. Mary's. Footprint Possibilities wants to support this endeavor of St. Mary's Parish, and is working with the project team to digitize the documents and build the database. Digitizing the documents will enable the parish workers to quickly retrieve the information contained in the records. Developing the database in such a way that the information can be easily recovered can protect the availability of the information. Backing-up the digitized records and holding copies of them off-site can also protect the integrity of the information for long periods of time. The team has decided to research database solutions, find the required hardware to run the database, create the database to the specifications of St. Mary's Parish and Footprint Possibilities, and then thoroughly train others on how to use the database and electronically capture the documents.

3 Methodology

The team's goal is to develop a process for digitally capturing and organizing historic documents stored in the St. Mary's Parish archives. The database will catalogue and digitize these documents to preserve and make accessible the information in them by the church staff. Currently, when someone requests to see a record, the parish staff must go through an poorly kept system of index cards to find the document's location. As this current process is slow and tedious, a database would provide efficient location and retrieval of the documents' information.

There are three primary objectives for this project which served as a guide when conducting research for the project. The first objective is for the team to learn how other groups and organizations have completed similar projects in the past. The second objective is for the team to understand the goals and limitations of the project in greater detail from the perspective of the church staff. The last objective is for the team to deliver the sponsor a set of product recommendations, in regards to the hardware and software options for the project, which takes into account limitations imposed by the documents inside of the church's archives and the church's budget. This chapter discusses the proposed methods for accomplishing these three objectives with justification for the teams methods choices.

3.1 Researching Other Archival Projects

To better inform this study's choices, it is important to investigate other successful archival projects. Reviewing previous efforts of a similar nature will provide insight into key design decisions for this project that might not be obvious at first glance. These decisions can range anywhere from selecting the imaging techniques best-suited for this project to choosing the most efficient database organization schema for St. Mary's identified needs. The team has established two methods to investigate this objective. First, the team will search the Internet for

similar projects to get a sense of the scope and the work required to successfully complete this investigation. Second, the team will interview experts in the digitization and archival fields to refine the team's knowledge of this process. Both of these methods will work together to create a backdrop that will inform other objectives for this project.

3.1.1 Research Similar Projects on the Internet

Investigating other archival projects calls for accessing similar research in conferences, journals, or other papers on the Internet. The purpose of this method specifically is to gain information about the amount of work that creating a database retrieval system for St. Mary's Parish requires. These projects will guide the team's fundamental organizational and technical decisions, working in tandem with interviews of experts in this field, knowledge of the documents, and the limitations of commercially available hardware and software.

Using Internet search engines, the project team has free access due to WPI licensing agreements to academic journals and conference proceedings. Quality projects that the team will find useful should relate to the use of a database as a retrieval system for documents and not a wholesale replacement of the documents. They should also consider the use of more portable imaging techniques in order to keep costs down for the parish. Even projects which fall outside this scope may be useful for determining good workflows, correct document handling techniques, or recommended database structures and tools. This information will guide the investigation through the remainder of the project's development.

3.1.2 Interview Archival and Database Experts

The second method which will investigate other archival projects calls for interviewing experts in the fields of historic archives and archival databases. Information gained from this method will be specific to the project. The team seeks these experts in order to fill gaps regarding

best practices for digitizing archives which St. Mary's may not be acquainted with, and to fill in gaps regarding research on the Internet of other successful projects. Information gathered through interview questions will inform stylistic decisions later in the project, and may be more pertinent to the team's needs.

The team will be conducting interviews over video conferencing platforms or over the phone. These interviews will involve the team asking the interviewee questions from a script. The preliminary set of questions which the team plans to ask experts can be found in Appendix C. Topics that the questions cover include: personal experience and accomplishments, document handling techniques, imaging methods, database structuring ideas, and long-term maintenance strategies. The project team has already been in contact with an archival expert from the U.S. Army Corps of Engineers who has provided the team the name of another expert on databases that the former expert knows. Other expert opinions will augment this research, possibly coming from faculty in the WPI Data Science Department, and from a historic archive expert at a museum in regards to specific considerations for archives. These interviews will provide supporting details for the team's completion of the project.

3.2 Understanding St. Mary's Situation

The next objective is to gain an understanding of the limitations imposed upon the team by the church. The product that the team will produce will mainly serve the church. The documents within the St. Mary's library and St. Mary's budget for this project will impose limitations on the project design and implementation. The team collected information in this area directly from the church staff. The detailed information the team collects in this phase of the project are important considerations with respect to the team's decisions when recommending

hardware and software options.Additionally, the information will guide the development of the methods used for digitizing the records at the church.

Learning about the church staff's goals is critical to the team's decisions about the processes, hardware, and software that the team will use for this project. Initially, Footprint Possibilities gave us some general information about the project. This information included a general outline of the church's requirements, which served as a base to begin research for the project. Unfortunately, this initial information did not sufficiently describe their situation.

The team decided that it would be useful to conduct an interview with Tito Mouynes, a member of St. Mary's financial committee, and the team's contact at the church. This interview clarified many of the undetermined aspects of the project. This allowed the team to focus the research on the hardware, software, and imaging and handling techniques involved with the project. The team asked a number of questions which covered a range of topics regarding the church and their opinions on the project (see Appendix D).

One line of questioning for this interview was about the documents the church has stored in their library. The questions focused on the types of documents stored, the number of documents stored, and the condition of the documents. Learning about the types of documents stored in the church's library allowed the team to narrow down their search for options for capturing the documents. Getting a rough estimate of the number of documents stored in the church's library provided insight into the amount of digital storage needed to hold the images in the database. Understanding the condition of the documents stored in the library informed the team of certain precautions that the church staff will need to take to protect the documents.

Another line of questioning during the interview was about the church's goal for the project. The team asked questions about the functionality of the database, the parties or

individuals with access to the database, and the primary use for the database. Understanding the functional specifications for the database was a key step to enable the team to design a low-cost computer that will meet the necessary hardware requirements for the desired function. Knowing who will have access to the operational digital archival system and its primary function will enable the team to understand the required user-interface, noting necessary hardware or software needs.

Finally, the project team asked about the church's budget for the project. The budget is one of the primary limiting factors to the project. The budget affects all of the hardware and software that the church can afford for the project. The options for the hardware that the project could use for capturing and storing images of the documents cover a wide range of prices. The team can find a solution with almost any budget, but the budget will affect the overall quality and reliability of the system.

During the interview Tito was able to answer most of the questions posed by the team, however he was not able to answer every question that the team had. In cases where Tito was unable to answer the team's questions, he made plans to email the team with the answers after consulting with other church staff. In addition to email communication, the team will continue to meet with Tito as the project continues to develop. In addition to meeting with Tito, the team is in the process of making plans to meet with higher level members of the church such as Father Pio, the Priest at St. Mary's Parish. This will provide a continuous stream of information as the project develops.

3.3 Recommending Scanner and Computer Options for the Parish

Completing the project requires us to outline constraints and limitations, especially related to the hardware and software recommended for the project. The sponsor's budget is a

limiting factor to take into account, as they could not afford expensive and complex solutions. The parish is funded by donations from their parishioners and can only afford to spend a few hundred dollars on the project - though expenses should be limited as much as possible (Tito Mouynes, interview, May 1st, 2020). Establishing contact with the parish to discuss their specific requirements and their budget was initially difficult because of the confusion caused by the lockdown in Panama. After discussing the Parish's needs with Tito Mouynes, the team and Tito made the decision to limit expenses on scanning equipment as much as possible and use a phone camera for data capture.

3.3.1 Research of Scanner Options

In order to recommend options for capture hardware that is relevant to this project, the team needs to continue to conduct research on the different types of capturing hardware. Each type comes with its own pros and cons. Once the team chooses a type of capture hardware for the project, the team must conduct more research into options for that type of hardware. The information gathered on this topic comes from various sources on the Internet. The differences between different types of scanners predominantly comes from BCR's CDP Digital Imaging Best Practices (Theil, 2008). This document explains how to capture documents and what tools to use for the process. The team used this information to narrow down the search of imaging hardware. The rest of the information that the team gathered was about specific products from various distributors. By predominantly focusing on prices and specifications, the team can make recommendations of specific products for the church to acquire.

3.3.2 Research of Database Hardware and Software Options

The team conducts research on the database hardware by establishing requirements for the potential computational load, the database storage, and the basic computer components. This

investigation estimates via communications with St. Mary's that the expected computational load for the system will be very minimal. According to St. Mary's, only one user will be using the database at a time and users will only access the database in person (Tito Mouynes, personal communication, May 1st, 2020). By learning the approximate number of physical records to digitize, the project team was able to calculate the necessary storage space requirements. Using the online computer hardware compatibility tool PC Part Picker, the project team designed a basic computer that can support one local user, safely store the required amount of data, and minimize costs. For software research, the project team needed to find a database tool-set and user interface that would be both effective and cost efficient. Such file-management solutions which allowed for the searching of tagged files have been around since the 1980s and thus the code for them is widely available (W3Schools, 2017). Because the code is freely available and designed to be modified, the project team intends to modify the code to fit the specific needs of the St. Mary's archival database.

3.4 Summary

St. Mary's Parish asked Footprint Possibilities and the project team to help them with digitizing and providing access to their archives. The team's solution is to create a database to manage and provide access to the information and to capture an image of the record in the database for future reference. The database will be accessible from a computer at the parish which will allow for keyword searches and more advanced retrieval methods to locate relevant documents. This project will help St. Mary's to catalogue and preserve their archives for future use.

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Appendix A: List of Documents the Team Captured at St. Mary's Parish

- There are 38 books of baptismal records
    - Each book is estimated to have 250 pages
    - Each book is estimated to have around 800 entries
    - Some books are in good condition, generally these are the newer ones
    - Some books are in poor condition, generally these are the older ones
    - The largest of these books is 60cm wide and 50cm tall

This appendix includes what the team currently knows about the documents at St. Mary's Parish. The team gathered this information from the interview of Tito Mouynes, a member of the St. Mary's Parish financial committee, and the preceding email communications. The team hopes to get more information on this topic as the project develops.

Appendix B: Interview Informed Consent Template Script

Considerations:

- Remain neutral on the subject. Ask open ended questions that are not leading in any way.
- Make sure the interviewee is aware they can remain anonymous if they choose. This will hopefully ensure their answers are honest.
- If the interviewee appears to be uncomfortable with a question, do not pry, just move to the next question.

Introduction:

Hello _____. We are American students from Worcester Polytechnic Institute doing a research project on digitizing a historic archive at a church in Panama City, Panama. We are working with St. Mary's Parish and Footprint Possibilities, the custodian organization of the archive and a group brought in to assist the project. We would like to interview you on _____. If it's okay with you, could we get your permission to record this interview on our phones to make sure we capture your responses? If you would rather not, it's perfectly fine, we can just take notes instead. Any information you share with us is completely confidential and will only be used for research purposes with your permission. Do we have your permission to quote you in our report? You have the option to remain anonymous. We will not identify you by name in any of our writing to make sure the information you share with us is confidential, unless you would like to be quoted. Our report will summarize methods for creating a digital database for the retrieval of documents in their possession. Our recommendations will at minimum provide a pathway to creating what we have outlined, and will at optimum implement

our solution. It will be available online after we finish writing it, and we can also email it to you if you wish. If we ask a question that you do not want to answer, just let us know and we will move to the next one. If you don't understand our question, let us know and we can try to rephrase. Do you have any questions for us before we begin?

Date/Time: _____

Location: _____

Interviewers: _____

Interviewee(s): _____

Interviewee(s) Role: _____

Question	Yes	No
Do we have permission to record this interview?		
Would you like to be confidential, or can we use your name and quote you in our report?		
Would you like us to share our paper with you when it is complete?		

Interview Questions:	Notes on Response:
Q(N)	
Q(N+1)	

Conclusion:

Thank you for talking with us today and for participating in our research! Was there anything in the interview that you think we missed or wish we would have talked about more? Do you want

to review our notes and transcript of the interview? Is there anything else you would like to add? You can always reach us at _____ and you can also contact Footprint Possibilities at _____ to ask for us. Thank you for your time.

Appendix C: Interview Questions for Experts

Introductions:

- What past projects have you worked on regarding archival work?
- What is your past work experience and education in general?

State of the documents:

- Is there any special care that needs to be taken with regards to the physical age and condition of the documents?
    - Is there a concern that handling the documents like this will cause them damage?
- Is there any specific way that you have scanned documents?
    - What quality of capture should the parish be looking for image-wise?
    - How important should image quality be to the parish?
    - Should a scanner built for the task be used, or is it acceptable to use a camera or a smartphone to do this job (cost is a big thing here)?
    - Is a smartphone camera too low of quality (depends on the smartphone)?
- Our level of involvement is going to be somewhat minimal with regards to scanning the documents, what is your experience with instructing others to do the actual work of archiving documents?
- Are there any privacy concerns?
    - Our sponsor contact has told us in our initial meeting that we would only have to put a statement saying that we are not responsible for this, however the records stretch into the late part of the 20th century, meaning that we could safely assume there are people still living that are named in these documents.

Database questions:

- What is the current organizational scheme of the parish archives?
    - Can we somehow adapt this structure so that we are creating a “virtual archives”, almost a one-to-one mirror of the physical archives?
- In your opinion, is one record equal to one page of a book, or is one record equal to one entry in a book?
    - Could this be taken care of with tagging and transcription of the picture?
    - If each record is going to be its own file do you want to include the whole image multiple times, crop each section, or map multiple records to one image?
- How much storage space is needed?
    - This is dependent on how we capture the data and how many documents there are.
- Where do you recommend the master copy of the data be hosted?
    - We have concerns about cloud storage, mainly that if the parish were to stop paying for the service all of the data would be erased.
- Are the images expected to be “high quality, lossless” pictures to be held onto for all eternity (this affects the amount of storage required)?
- In the long term, how have you dealt with the creation of a digital archive and then it is maintained once the original architects of the database are no longer involved?
- St. Mary’s has said the database will not be open to the Internet, therefore who should our end user be?
- Should volunteers be entering the data by hand, or should some type of software (OCR) be employed to do the heavy lifting of transcription?

    - The documents were not created with a computer in mind, it would be more tedious for the volunteers to do it by hand but it might be more accurate, especially since we don't know how mature OCR is in working with spanish script.
        - Maybe run the two methods in parallel to ensure accuracy, and then if OCR is good enough stick with that to reduce hand work.
- User Interface: "a link to the image of the certificate, book, page, or original document"
    - For example, if one document were searched for, should the final interface contain just the document in question, or should the interface contain more details like what each field reads in some organized way?
    - What types of information should be searchable, for example: title of document, date of creation, names present in the document, location of creation, etc. (complex or simple searches)?
    - Does the interface need to look "pretty" or just get the job done?
    - What language should the final user interface be?
        - The documents were originally written in latin, spanish, and a little english, so this would depend on who was using the interface (parish staff we'd assume)?
    - Would it be more helpful when organizing the files on the interface to have them pre-sorted in some default way (by type then date, for example), as if they were in a filing cabinet (imagine how files are stored on your personal computer)?
- Is there any software that you have used that you might be able to recommend to us?

- Backups
    - In your opinion, what is a bare minimum for a number of backups and what is a sufficient amount of backups?
        - Remote backups that are stored at other parish locations?
        - This goes back to the point asking if the parish is the only group that will have access to this data, or are there other groups in Panama that would benefit from this data?
    - Should there be full backups of the database implementation as well?
    - Should these backups include all documents or only certain ones? (For privacy concerns)

Closing Remarks:

- Ask any other questions that might have been put off here

Appendix D: Interview Questions for Tito Mouynes at St. Mary's Parish

Introductions:

- What role do you fill at the parish?

State of the documents:

- What is the physical condition of the documents, generally?
    - How large are the documents inside the church's library?
    - Are those books the largest things that we will encounter?
    - Is there a concern that handling the documents like this will cause them damage?
- Is there any specific way the parish would like the documents scanned?
    - How important is image quality to the parish?
    - Should a scanner built for the task be used, or is it acceptable to use a camera or a smartphone to do this job, this will greatly affect the cost?
    - Would a smartphone camera be sufficient, or is the quality too low?
- How many documents will be scanned into the system?
    - Will the database include all of the parish's historic records, or only a subset of them?
    - How many documents are there total?
- What is our level of involvement in scanning the documents?
    - Will the team handle the documents at all or will only the parish staff be handling them?
- Information contained on the documents:

    - Will we be having to handle marriage and death certificates, property transactions, and other types of records in this project?
    - Are there any privacy concerns?

Database Information:

- What is the current organizational scheme of the parish archives?
    - Can this somehow be adapted into a “virtual archive”, almost a one-to-one mirror of the physical archives?
- In your opinion, is one record equal to one page of a book, or is one record equal to one entry in a book?
- How much storage space is needed?
    - This is dependent on how we capture the data and how many documents there are.
- Since we are not from Panama, how easily can hardware be acquired for computing and scanning in general?
- Where would you like the master copy of data to be hosted: locally on a computer, somewhere in a “cloud”, or somewhere else?
    - A concern with cloud storage is if the parish were to stop paying for the service all of the data would be erased.
- Are the images expected to be “high quality, lossless” pictures to be held onto for all eternity?
- Who will be curating the database once we are no longer involved?
- Who is our “customer,” that is, who is the end user in all of this?

- Should volunteers be entering the data by hand, or should some type of software be employed to do the heavy lifting of transcription?
- User Interface: “a link to the image of the certificate, book, page, or original document”
    - For example, if one document were searched for, should the final interface contain just the document in question, or should the interface contain more details like what each field reads in some organized way?
    - What types of information should be searchable, for example: title of document, date of creation, names present in the document, location of creation, etc. ?
    - Does the interface need to look “pretty” or just get the job done?
    - What language should the final user interface be?
        - The documents were originally written in latin, spanish, and a little english, so this would depend on who was using the interface?
    - Would it be more helpful when organizing the files on the interface to have them pre-sorted in some default way, as if they were in a filing cabinet?

Digital Backup Information:

- Where does the parish want their backups stored and how many of them should there be?
    - Should remote backups be stored at other parish locations?
- Do you want full backups of the database implementation as well?
- Should these backups include all documents or only certain ones?

Budgetary Questions:

- What kind of investment is the parish willing to put into this?

- Even a rough ceiling for the amount that the parish is willing to pay would be helpful so that we can focus our product research more.