

# Creating a Collections Management System


An Interactive Qualifying Project Report

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by

  
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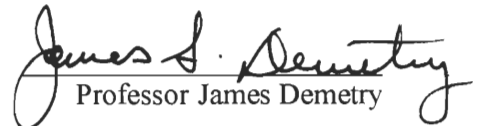
  
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1. digitisation
2. cataloguing
3. database

## **Abstract**

The importance of digitally cataloguing collections of historical significance motivated the sponsorship of this project by the Charles Dickens Museum. The immense number of objects in its collections required a system which would provide organisation and rapid access. After conducting interviews, surveys and case studies, we determined that a comprehensive collections management system would benefit the museum greatly. Thus, we created a collections management system that encompasses all of the museum's collections. The data from two existing electronic catalogues were migrated into the new system and over six hundred book illustrations were digitised and entered. User and administrative manuals describing the use of the system were also created.

## Executive Summary

With tens of thousands of objects in its possession, the Charles Dickens Museum (CDM) was experiencing difficulties managing its collection. No definitive list of the objects the CDM held existed and, in many cases, there was no record of an object at all. This especially led to problems when dealing with customers who wished to purchase portraits of Dickens or illustrations of his novels. Combined, these two collections contained over five thousand objects, yet the sole method for locating a specific object was to sift through the large metal filing cabinets in which they are stored.

Initially, the goal of this project was to digitise the CDM's illustrations and enter them into a database of portraits created by a previous WPI project team [Burkart, Campbell, & Lambert, 2002]. From our discussions with the staff of the CDM, though, we came to the conclusion that it would be more helpful to develop a complete collections management system (CMS) for the museum. The new system would give the CDM a central location for storing information about all of the objects in their various collections. Thus, our expanded goal had three parts: to create the CMS, to transfer the records from the portrait database into the new CMS, and to digitise and enter as many illustrations as we could into the CMS.

The CMS we produced was the result of thorough research of past digitisation projects, case studies collections management systems used at large institutions, and the specific needs and desires of the CDM. Research was conducted on digitisation projects that were similar to ours in order to determine standards that should be followed when creating digital images from original works of art. Using this data, we decided to create two images for each illustration: a small image with little detail called a thumbnail, and a larger image with more detail that could more easily be used

to study the specific details of the object. Examining other collections management systems helped us to create database fields that would be able to describe any object contained in the CDM's collections. These fields were based on standards for electronic cataloguing to ensure that our CMS could be migrated to another software package without losing any data. We also conducted interviews with both the staff of the CDM and the past patrons of the museum. The information we gathered from these interviews allowed us to create a user interface that was custom tailored to the needs of the staff and other potential users.

The interviews with the CDM staff indicated the need to bridge all the digitised and catalogued collections. This shifted the goal from an electronic illustrations catalogue to a complete collections management system. Moreover the research we conducted on collections management systems greatly influenced the design of our own CMS. We discovered that it is common to have two formats in which to display the results of a query. One format, called the thumbnail view, allows the user to view many images at once. Thus, if a query results in many matches, the user can quickly locate the ones they are interested in. The second format, known as the detailed view, only allows one image to be displayed at a time. This image is much larger than the thumbnail view, however, and all of the information for the particular object is displayed as well. This was important information that we used when we were creating the interface of the catalogue portion of the CMS.

The interviews with the staff of the CDM as well as the information that we gathered from the museum's patrons allowed us to custom tailor the catalogue and the overall collections management system to their specific needs. Since the CDM staff would be the primary users of the catalogue, we asked them what features would be most useful to them. It was determined that being able to create very specific

searches, as well as being able to search all of the collections at the same time would be very useful to the CDM. Also, we discovered that updating their invoicing system to a digital format could benefit the museum by allowing them to determine their largest customers as well as which objects are requested most frequently and creating the initial step to a customer profiling system. The information provided by the past patrons of the CDM also indicated to us that if the catalogue were available via the Internet, they would be more likely to purchase images from the CDM. Making their collections available via the Internet has been a long-term goal of the CDM for some time and this data shows that it would likely be a profitable venture.

The existing catalogued collections migrated into our CMS were the portraits catalogue, the objects catalogue, and the topography catalogue. The illustrations collection was digitised and catalogued by our team and inputted into the system. Outsourcing the digitisation work was considered briefly, but it was decided that the museum could not afford the additional expense. Our project liaison had previously told us that the digital images would not be used for reproduction, so the additional quality attained by professional equipment would not be needed. After conducting tests on the CDM's digital camera and scanner, we decided that the digital camera was the best option for digitising the illustrations as it was capable of capturing the images more quickly. We chose to store these images in the JPEG file format. While this format lowers the image quality, we found that the JPEG images still exceeded the requirements if the sponsor and provided the benefit of a reduced file size.

After deciding upon the equipment that we would use, we created the process by which we would digitise the illustrations. We designed a step-by-step process to speed up the digitisation process, and created a guideline for the CDM to follow when completing the catalogue. It included the methods that we used to capture, edit, and

enter the information about the image. This was an important step because, though we managed to digitise more than 600 illustrations, there were still over 600 illustrations and many more objects to be added to the CMS.

Following the creation of the collections management system and its population with over 600 illustrations, there are a few recommendations that we would encourage the CDM to consider. The process of cataloguing all of the museum's collections should be continued. If the CDM staff does not have the time to do this themselves, a potential solution could be the hiring of an intern. Good starts have been made on both the portraits collection and the illustrations collection by the WPI teams; by using the manuals we created, an intern could easily complete our work. A complete population of the CMS will provide the CDM with its full benefit. This is also true for the invoice system. As the CDM uses the system, the record of past purchases will increase, and the population of customer profiles will subsequently increase. We also recommend the museum creates backups of the database frequently to prevent any information loss if anything were to happen to the computer on which the collections management system was installed.

Finally, keeping in mind the data we gathered from the CDM's patrons, we strongly urge the CDM to proceed with their long-term goal of making the catalogue accessible via the Internet. Achieving this goal would help the museum disseminate knowledge about Charles Dickens and increase its revenue stream. This would require research that would explore the advantages of in house or external hosting of the database for the museum. Further, in order to make the catalogue available online, changes may have to be made to the underlying database. In the spirit of continuing WPI's relationship with the CDM, we would like to suggest that such a project could be completed by a WPI IQP or MQP team

## **Acknowledgements**

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# 1. Introduction

With most of the world being pulled into the information age, many museums and libraries have begun digitising and electronically cataloguing their collections of rare and precious works. There are numerous benefits associated with these undertakings. A properly constructed collections management system (CMS) allows entire collections to be searched for a single object in seconds. Further, though original works of art are transitory and subject to decay, digital images can be preserved indefinitely. Finally, digitised collections can be made accessible via the Internet, exposing the works to people who ordinarily might not even know they exist.

The Charles Dickens Museum (CDM), having seen the benefits of collections management systems at work in other museums and libraries, realised that constructing a CMS for their own collections would alleviate many of the problems they were facing. Each year, the CDM receives about six hundred inquiries for reproductions of the images they possess. The sale of these images is an important source of revenue for the museum so it would be beneficial if the staff could process the inquiries quickly. This was difficult prior to our project because no definitive list of the objects the CDM held existed and, in many cases, there was no record of an object at all. The sole method for locating a specific object was to sift through the large metal filing cabinets in which they are stored, a task that was both tedious and time consuming.

The CDM had already taken steps towards creating a fully functional collections management system before we arrived. A portrait database was created and populated with approximately six hundred images by a WPI IQP team in 2002 [Burkart, Campbell, & Lambert, 2002]. While this was a good start, the catalogue focused only on the portrait collection and was not flexible enough to store the other

types of objects in the CDM's collections. To add this functionality to the catalogue, numerous changes would have to be made.

In order to build a collections management system that would encompass all of the CDM's collections, our team had to increase the flexibility of the database fields and further develop the user interface of the portrait catalogue. Case studies of similar projects provided us with the information we needed to decide how to best go about doing this. We conducted interviews with the CDM staff to determine which features to include in the CMS. Also, because it is a long-term goal of the CDM to make their collections available on the Internet, we sent surveys out via e-mail to determine which features the patrons of the CDM would require. By including the patron's desires in the CMS, we insured that few changes would have to be made before putting it online.

Upon the completion of this project, we presented the CDM staff with a collections management system that is capable of storing all of their collections. A new method of searching was created to allow the staff to create customised queries that are as general or as specific as the situation requires. In addition to the objects in the portrait catalogue, the CMS was populated with a list of objects the CDM already possessed and approximately six hundred illustrations that our project team digitised and entered. Although we were not able to complete the digitisation of all collections, the creation of the CMS was the most important step.

Included in the CMS is an invoice generator, which contains a database of the patrons of the CDM. The CDM will be able to use this to create a customer profile to determine how to best market their collections. We also created two guides – user and administrative – describing the use of the catalogue. Using these guides, the

CDM staff will be able to digitise the remainder of their collections and add them to the CMS.

Though the CMS will not be accessible via the Internet, it was designed with the CDM's future plans in mind. Relatively little effort will be required to migrate our database to a software package that is more suited for use over the Internet. In doing so, the CDM will achieve their goal of making the images in their collections available to a broader range of people.

## **2. Background**

The purpose of this chapter is to present the reader with the background information needed to fully understand our project. The information contained within was a major contributing part to the creation of the methods that we used to complete this project. This information is focused in three primary areas: the work of Charles Dickens, digitisation, and electronic cataloguing. The preservation of the original illustrations, while important, is not central to our project. Preservation is discussed in detail in Appendix A.

### **2.1. Charles Dickens**

Since the project team would be dealing with works exclusively from Charles Dickens, it was important that we had an understanding of the man himself, his work, the illustrators that created the illustrations we would be working with, and the place where much of his work rests, the Charles Dickens Museum. This information was essential in determining the priority of digitising the CDM's illustrations, as well as making the process of identification of the illustrations go much smoother.

#### **2.1.1. Charles Dickens Biography**

The stories and characters of Charles Dickens are among the most recognizable in the world. Considered by many to be the best novelist of the Victorian period, Dickens success came in spite of his humble upbringing. Dickens was forced to leave school at the age of 12 due to his father's debt problems. The young man took a job at a blacking warehouse to help his family make ends meet. Though the work was not overly hard and Dickens did not stay long, this experience deeply troubled the boy. Dickens was able to return to school when his grandmother died, because she left the family enough money to pay off their debts [Priestly, 1961].

Soon after graduating from school, Dickens began working for his uncle's newspaper, *The Mirror of Parliament*. Dickens quickly distinguished himself with the accuracy and speed of his reporting. By 1834 he had moved to the *Morning Chronicle*, a larger, more popular newspaper. Dickens was not content to simply be a reporter, however. In 1836, a collection of stories penned by Dickens was published under the pseudonym Boz. This collection was called *Sketches by Boz*. Dickens' first real novel, *The Pickwick Papers*, was published in serial form shortly afterwards and met with great success [Priestly, 1961].

In the wake of his writing successes, Dickens quit his job as a reporter and married Catherine Hogarth. Dickens' relationship with his wife was frequently strained by his dedication to his work. Nonetheless, the couple had ten children over the course of their marriage, which ended in 1858. Between 1838 and 1844 Dickens published no less than six books, including *Oliver Twist*, *Nicholas Nickleby*, and *A Christmas Carol*, founded his own weekly magazine called *Master Humphrey's Clock*, and toured through the United States and Italy [Priestly, 1961].

Dickens kept up his dizzying pace through the end of his marriage with Catherine Hogarth and the beginning of his relationship with Ellen Ternan. In this period, he published some of his most famous novels: *A Tale of Two Cities* in 1859 and *Great Expectations* in 1860. Dickens kept busy until his death, publishing stories and touring both the United States and England. On June 8, 1870, Dickens suffered a stroke. He died the following day and was buried at Westminster Abbey [Priestly, 1961].

Charles Dickens is undoubtedly one of the most acclaimed authors the English language has ever known. Much of his early success, however, was due not to his skill with a pen, but rather to his collaborators' skills with the pencil.

## 2.1.2. Dickens' Illustrators

Though Dickens had published stories before *Sketches by Boz*, it was his collaboration with George Cruikshank on that book that made him a well-known author. By 1838 Dickens' popularity had eclipsed that of his illustrators, but before that time his success was as much due to his words as it was his collaborators' images [Cohen, 1980].

At the time Dickens began publishing, illustrated publications were still relatively new. Due to the lack of inexpensive visual entertainment such as television and photographs, illustrated stories quickly became a popular amusement. They were so popular that oftentimes the text was merely an accompaniment to the illustrations and not the other way around. Dickens' work played a large role in reversing this trend [Cohen, 1980].

### 2.1.2.1. George Cruikshank

Dickens' relationship with his first illustrator would set the tone for many of his future partnerships. At the time of their meeting, Cruikshank was already an established illustrator. A book published with his name on the cover was almost certain to sell well. Dickens was initially very excited to be working with Cruikshank but the relationship quickly soured as both author and illustrator vied for control of the project. Despite this competition, the two managed to finish the book, entitled *Sketches by Boz*, in 1836 [Cohen, 1980].

This struggle for creative control would play itself out again in the future but it is interesting to note that though Cruikshank and Dickens disagreed frequently, they went on to work together on later projects. Cruikshank would illustrate *Oliver Twist* and appear in several plays with Dickens between 1835 and 1850. Their friendship



finally came to a bitter end as Cruikshank accused Dickens of stealing ideas from him [Cohen, 1980].

#### **2.1.2.2. Robert Seymour**

Like Cruikshank, Robert Seymour was a well-known illustrator prior to working with Dickens. Also like Cruikshank, Seymour believed that Dickens should write prose based on his illustrations and not the other way around. Seymour would catapult Dickens to popularity but, sadly, not because of the quality of his work. While illustrating the second instalment of *The Pickwick Papers*, Seymour suffered a nervous breakdown and committed suicide. This garnered the novel a certain level of notoriety and served as a morbid sort of advertisement [Perdue, 2003].

#### **2.1.2.3. Hablot Knight Browne**

After the death of Robert Seymour, several artists were considered to finish *The Pickwick Papers*. Robert Buss, an admirer of Dickens, was hired to replace Seymour, but he was fired for unsatisfactory work after submitting only two illustrations. Famous names like John Leech and William Thackeray were considered to replace Buss, but in the end a man by the name of Hablot Browne was given the job. For the first time, Dickens was more famous than his illustrator, a fact reflected in Browne's choice to adopt the pen name, Phiz, to complement Dickens' Boz. Dickens and Browne developed a working friendship that would last for 23 years and ten novels [Perdue, 2003].

#### **2.1.2.4. The Later Illustrators**

As Dickens' popularity grew he no longer had to worry about whether he would have creative control over his stories or if the illustrator would. He also had the ability to choose his own collaborators. Thus, many of Dickens' illustrators after *Pickwick* was published were his friends as well as artists. Of these, John Leech, the

illustrator of *A Christmas Carol*, was perhaps the best known at the time. Other members of this group include Frank Stone, who illustrated *Nicholas Nickleby*, and his son Marcus who worked on *Great Expectations* before becoming an independent artist. Numerous other artists were also involved in the illustration of Dickens' novels including Luke Fildes, George Cattermole, and Clarkson Stanfield [Cohen, 1980].

With all of these illustrators, Charles Dickens created the large body of work that he now leaves behind. Because of the popularity of Charles Dickens there have been many editions printed of his novels, and also his popularity has created a Dickens Fellowship to form. The Dickens Fellowship played a major role in creating the Charles Dickens Museum, which has now become a focal point for anyone who is seriously studying Charles Dickens.

### **2.1.3. The Charles Dickens Museum**

The Charles Dickens Museum was Charles Dickens' residence from April 1837 to December 1839. During his short stay at this residence Dickens wrote a number of works, including *The Pickwick Papers*, *Oliver Twist*, *Nicholas Nickleby* and *The Lamplighter* [Charles Dickens Museum, London]. Despite its historical significance, the house was almost demolished in 1927, but through the efforts of the Dickens Fellowship, it was saved. The CDM now holds one of the largest collections of Charles Dickens' work in the world. It should be noted that the Charles Dickens Museum had recently changed their name from the Dickens House Museum. This change occurred during March 2003. The two institutions are one and the same.

Currently the CDM is governed by a board of trustees that overlook the museum and have a vote in every action of the museum itself. This leads to a very democratic approach to the governing of the CDM. The CDM is a registered charity and a registered museum, this helps the CDM to be recognized for its services. The

staff includes a curator, and assistant curator, a receptionist, a museum technician, and volunteers who would look after the shop. Revenue generated through the shop, the daily visitors, the sale of prints of illustrations and portraits, and the letting of part of the building itself all lead to the financial stability of the CDM.

The collections of the CDM contain artefacts from every aspect of Charles Dickens' life. There are chairs and desks as well as other furniture that Dickens had used throughout his lifetime. Also, many other objects adorn the museum, such as writing utensils that Charles Dickens used and many other personal items of the man. The library contained at the museum contains many editions of Charles Dickens' work, it is the premier source for anything Dickens. The CDM's holdings also include photographs, illustrations, and originals of many items such as playbills from Dickens' plays and manuscripts.

At the time of our project, the CDM had in their possession between 3,000 and 4,000 illustrations. These were indexed in a Microsoft Word document, which made it very difficult and time consuming to search for a specific illustration. The illustrations themselves are in protective sleeves and stored in filing cabinets. Approximately 1,200 of the illustrations existed as photographic reproductions of the originals. When the CDM receives an order for a specific illustration, the staff finds the general location using the Word document, retrieves the illustration, and then finds the illustration's photographic negative. It is from this negative that the illustration is reproduced. In order to expedite this process, our team digitised the CDM's collection of illustrations and entered them into a comprehensive collections management system.

## 2.2. Digitisation

As discussed in section 1, we created an electronic catalogue for the CDM. We focused on the digitisation of the *illustrations* collection held by the CDM, since a previous IQP team had already digitised the *portrait* collection. This process of digitisation is important because of the visual nature of the illustrations. This section also provides information directly related to the decisions that we made concerning the choice of methods we used in digitising the illustrations.

Digitisation is the process in which an image is converted, or captured, from its original form to its digital equivalent. There are many factors to consider when embarking on a digitisation project. Different hardware types, file formats, and image resolutions must be investigated and decided upon before the first image can be digitised. In our project we also investigated the special circumstances created by digitising illustrations, such as handling and light exposure. There are many similarities between capturing images of illustrations and other works of art, such as photographs.

Organizations such as the National Archives and Record Administrations (NARA) have conducted a great deal of research with the aim of developing best practices for their digitisation projects. Though some of these methods are specific to a single project, many of them can be easily adapted to similar undertakings. The methods suggested by NARA and other organizations will be combined with the results of our research methods to help us decide on a final digitisation procedure. This process will answer one of our research questions, the purpose of which is to determine the best methods for digitising the CDM's illustrations collection.

### 2.2.1. Hardware

The two primary pieces of equipment used to digitise images are scanners and digital cameras. The advantages and disadvantages of both options must be weighed against the requirements and constraints of any digitisation project before a decision can be made.

Scanners are characterized by resolution, bit depth, scan area, and colour accuracy. Digital cameras are judged by a very similar set of criteria. The resolution of a scanner is measured in dots, or pixels, per inch (DPI). The greater the number of DPI, the larger and more detailed the resulting image will be. A distinction must be made between optical resolution and interpolated resolution, the latter of which is the ability of a scanner to guess, with the use of an algorithm, which colour pixel should be inserted into the area where the optical sensor could not detect. Digital cameras measure resolution in millions of pixels captured, or mega-pixels. Nonetheless, the same rules apply. As the number of mega-pixels increases, so does the images quality and size. Bit depth refers to the amount of colour information that can store in each pixel. High bit depths allow for more colours to appear in the image but also increase the file size. Scan area is only a concern for scanners and is usually given in the dimensions of the largest surface that can be captured at once. Finally, colour accuracy is a measure of how closely the colours captured by the hardware resemble the colours on the original image [Grout et al]. It should also be mentioned that hardware that has the capability to capture at high resolutions, quickly, and with great colour accuracy is more expensive for these better qualities. Professional hardware is required to produce images of high enough quality to be used for reproduction purposes. This type of hardware can be fifty times more expensive than consumer

grade hardware. A major contributor to our decision making will be the cost associated with the hardware, since our funds will be limited.

One advantage digital cameras have over scanners is the lack of a maximum scan area. Because of this, digital cameras can be useful for digitising particularly large items. Further, the time required to capture an image is usually far less with a digital camera than with a scanner. Scanners, on the other hand, are able to provide a constant light source, thus insuring a consistent brightness level across all images in a collection. Also, while digital cameras usually store the captured image on compact memory cards in a compressed format, scanners send the image directly to the computer for storage in any format [Western States Digital Standards Group, 2003].

With our two options for digitisation being either using a scanner or a digital camera, all of the tradeoffs between these two options were weighed and deliberated upon. A major contributor into the final decision process was the amount of money that each of these processes required. The CDM would already have hardware that was able to create images suitable for the internet, but not for reproduction. Other aspects of the digitisation process also affected our final decision, one of these being storage space, which would rely mainly on file format and file size.

### **2.2.2. File Formats**

The amount of memory required to store the images is also dependent on the file format used. There are several types of file formats for images, but the two formats that we will concentrate on are the Tagged Image File Format (TIFF) and the Joint Photographer Expert Group (JPEG) format. These are both common formats and can be viewed by just about any type of computer platform. The TIFF format can be used to store high-resolution images without compressing the data. The JPEG format is used to store the images at a lower resolution. JPEG images use “lossy”

compression, which means that some image data is discarded in order to decrease the size of the file.

### **2.2.3. Processes**

Bishoff (1999) and Puglia et al. (1998), and the respective institutions they represent, The California State Library and The National Archive and Records Administration, have created a list of guidelines to be followed when digitising a collection of images. These guidelines are discussed in the following paragraphs.

The National Archive and Records Administration recommends that three versions of each image should be created [Puglia et al., 1998]. The first version, called the master archive, should be captured at the highest level of quality possible and stored using the TIFF file format. This image is manipulated to create the two remaining versions. The second version of the image is called the access image. This image should fit on a typical computer monitor and be small enough to transfer over the Internet quickly. Further, because it will be used on the Internet, it should contain a large amount of detail, but not so much that it could be used to reproduction. Bishoff suggests using the JPEG format to store this image, as the compression will remove detail from the image and decrease the file size. The third and final version of the image is the thumbnail. The thumbnail image should only be large enough to identify the original image. Puglia suggests a limitation of 200 pixels along the largest dimension. This image is also stored in JPEG format and requires very little memory [Puglia et al., 1998].

The University of Bristol Visual Arts Data Service also provides a set of guidelines for handling fragile works of art. These guidelines were created by British and American organizations after extensive research on the subject. The digitisation of fragile material, such as 19<sup>th</sup> century illustrations, requires delicate handling. If

possible, the images should be placed in protective sleeves. Operators should be careful with the original images and wear gloves when touching them. Also, a record should be kept listing when each image began the digitisation, who handled it, and when the digitisation was completed [Grout et al.].

#### **2.2.4. Advantages and Disadvantages of Digitisation**

Digitisation carries with it a large number of advantages. Catalogues of digitised images can be browsed without the fear of damaging an important work of art. In addition, they can be made available online, thus increasing the public's awareness of their existence. Perhaps the most important advantage is that the content of the image will be preserved indefinitely, even if the object itself is not. The disadvantages of digitisation have proven to be less persuasive than the advantages, but it is still important to consider them. The most threatening of these is that, by increasing the public's ability to access the images, their ability to violate the owner's intellectual property rights is also increased.

It is this threat upon their intellectual property that the CDM has to protect itself against since the museum generates revenue through the reproduction of these images. All of the works that are contained in the CDM are protected under copyright law in the United Kingdom, so reproduction without permission is illegal [UK Patent Office, 2003]. If the database is available online, however, it would be very difficult to track down users that have violated the CDM's intellectual property rights. To combat this, the images available over the Internet should never be of the highest quality possible. Also, the previous IQP team had mentioned in their recommendations that a watermark could be included on top of the image to make illegal reproduction of the image even less desirable [Burkart, Campbell, & Lambert, 2002]. A second disadvantage of digitisation is the cost associated with it. Though



the price of image capturing hardware and storage space has decreased drastically in recent times, the price of maintaining an electronic catalogue will always be greater than the price of not doing so.

### **2.3. Cataloguing and Databases**

Cataloguing refers to the classification and categorization of objects based on their key characteristics, which may include location, size, title, and any other relevant information. This data is recorded, sorted, and then stored in an easily accessible location to facilitate searching through the archive [Grout, Purdy, & Rymer, 1998]. The research we have done in this field assisted us in deciding on the best method for the CDM to index the digital images of the illustrations, which is one of our research questions.

Users who wish to locate a specific item can refer to the catalogue to get information about the target of their search. If the catalogue is designed well, this information will lead the user to the exact location of the object in the collection, preventing needless handling of the potentially fragile items. Improperly designed catalogues, on the other hand, may be as harmful as having no catalogue at all. A catalogue with incomplete records or poor searching capabilities can lead the user in the wrong direction and possibly force them to search through the collection manually. It is important, then, to ensure the catalogue is easy to use and contains the information necessary to identify and locate the objects it describes [Grout et al., 1998].

In modern computer databases, the cataloguing information is referred to as metadata. Metadata is so named because it is data that describes other data. The metadata for an illustration may define its title, artist, or publication date.

### **2.3.1. Catalogue Design**

To aid in the proper design of catalogues, numerous cataloguing standards have been developed. A selection of the most pertinent of these cataloguing standards is discussed in section 2.3.1.1, which include MARC and CDWA. Some of these standards mandate which data should be recorded and what format that data should be in while others define a common vocabulary of words to use in the description of the items. The purpose of these standards is to enable different institutions to share information about their collections without having to create customized software.

#### **2.3.1.1. Categorization Standards**

One of the oldest cataloguing standards is known as MARC, or Machine-Readable Cataloguing Record. MARC was created by the Library of Congress in order to allow libraries to share bibliographic information more easily. After more than 30 years of revisions, MARC is now flexible enough to be used for books, music, and works of art. Its greatest strength is that it has become the international standard in libraries for bibliographic information [Furrie, 2000].

There are other cataloguing standards that are more specific to works of art. Of these, the Categories for the Description of Works of Art (CDWA) stands out. Created by the Art Information Task Force (AITF), this standard provides “a single, encompassing, framework for descriptive information about works of art” [Grout et al., 19998]. The CDWA defines an extensive list of categories to be used when describing works of art. A far smaller number are defined as core categories that must be present to comply with the standard; however the CDWA allows its users to redefine which categories belong in this group. Though it is not yet as widespread as MARC, the CDWA has been mapped to MARC so that the two can be used interchangeably [Baca & Harpring, 2000].

### **2.3.1.2. Controlled Vocabularies**

When people speak to one another they use what computer scientists call “natural language”. That is, they tend to use different words that mean nearly the same thing and leave the listener to interpret exactly what is meant. This scheme works very well in normal social interaction but is less effective for use with computers. A controlled vocabulary attempts to rectify the situation [Fast, Leise, & Steckel, 2002].

A controlled vocabulary is a subset of natural language. Employing such a structure in a catalogue limits the terms that can be used to describe an item. This, in turn, makes the process of searching easier [Fast et al., 2002]. As an example, consider a user searching through an image database for a picture of an old man. Without a controlled vocabulary this user may have to try many different synonyms for “old”, such as “elderly” or “wizened” before they stumble upon one that yields results. With a controlled vocabulary, only the word “old” would be allowed to appear in the description of an item. Thus, the user will see all results containing elderly men in only one search.

### **2.3.2. Using Databases to Catalogue**

Prior to the advent of computers, catalogue systems were unwieldy and complex. Frequently the records were sorted alphabetically, a system which restricts the users to searching only by the alphabetized term. This limitation was circumvented by the creation of additional catalogues sorted by different search terms. An art museum, for example, might have three catalogues: one sorted by artist, another by title, and a third by style. Each item in this museum’s collection would need an entry in each catalogue and, should any information about an item change, each entry would need to be revised [Chenhall, 1975].

In the past two decades, major advances have been made in computer indexing. Database software has grown both in complexity and usability, making the decision to switch to computer catalogues a relatively easy one. Databases have evolved from the original flat-file model, which stores all of the data in one large table and requires certain information to be duplicated, to today's standards: the relational and object-oriented models.

Though many consider object-oriented databases (OODBs) to be the future of databases, their use has only become widespread in computer aided design circles. This is primarily because most organizations do not need the flexibility that OODBs provide. In many cases, relational database (RDB) software performs as well as or better than comparable OODB software [Leavit, 2000]

#### **2.3.2.1. Relational Databases**

Relational databases (RDBs) are the most common type in use today. Like flat-file databases, RDBs use tables to store data, but unlike their more primitive cousins, RDBs allow several tables to be used. For each type of record in the database there is a separate table. In the case of the CDM, for example, there would be different tables for the illustrators and the illustrations. Each record in a table is given a unique value known as the primary key that can be used to reference it in another table. Thus, the illustrator information would only have to be entered once and whenever information about that illustrator would be requested, by a query about a specific illustration of his perhaps, the information would be provided by that single entry [Grout et al., 1998].

#### **2.3.2.2. Comparison of Popular Database Software**

Most commercial database software is based on the relational model. Microsoft Access, Microsoft SQL Server, MySQL, and Oracle are all relational

database software. Due to the prohibitive cost of Oracle and Microsoft SQL Server, neither will be considered for use in this project.

Microsoft Access has only a few advantages over MySQL. Access is a graphical Windows program. As such, its interface will be familiar to anyone who has used Microsoft Windows. This drastically reduces the learning curve for both administration and general use. Further, it has already been used to develop a portrait database for the CDM in a previous IQP. Access is also more reliable than MySQL though its uses are rather limited [DonCarlos & Learned, 2003].

MySQL is an open-source database program available for commercial use for a fee of \$395. MySQL is usually run on a computer dedicated to it, though this does not have to be the case. It complies with the Structured Query Language (SQL) standard, which allows the database software to be changed without significant changes to the programs that access it. Though it is harder to administer, the commercial license for MySQL includes technical support and there are large communities on the Internet dedicated to supporting the program. Unlike Access, MySQL is easily accessed via the World Wide Web. This is especially important as one of the CDM's future goals is to make their databases available online [DonCarlos & Learned, 2003].

## **2.4. Related Projects**

There have been numerous studies and research projects in the field of digitisation. Though it only recently became economically feasible for small museums like the CDM to digitise their collections, larger museums and libraries were able to complete this task much earlier. In the 1990s digital imaging devices like scanners and digital cameras became inexpensive enough for even amateur home use and thus significantly reduced the costs of digitisation. Since then, many of the

smaller galleries that previously could not afford to digitise their collections have begun to do so. As such, there is a wealth of studies and project reports on the process of digitisation available on the Internet.

#### **2.4.1. Charles Dickens Museum Photography Collection**

In 2002 another WPI project team completed a project that was very similar to this one. Like this project, the 2002 IQP team had to determine the best methods for digitising fragile images and create an easily searchable database to access them. The primary difference is that the 2002 project focused on digitising the CDM's collection of *photographs* while this project's goal is to digitise their collection of *illustrations* [Burkart, Campbell, & Lambert, 2002].

Many of the decisions made by the 2002 IQP team will affect the decisions that we make. They too investigated the feasibility of migrating to a mySQL database instead of a Microsoft Access one. Their decision to continue using Access will heavily influence our choice of database software. Further, this project would to well to emulate some of the design decisions of the previous IQP group in order to present the user with a common interface. This will reduce the amount of time needed to learn to use the illustrations database and thus increase productivity.

#### **2.4.2. iBase Case Studies**

iBase is a company in the United Kingdom that specializes in digitisation. Their website contains a series of brief case studies detailing iBase's efforts with various organizations. Of these, their project with the Museum of Science and Industry in Manchester is the most applicable to this project [iBase.com, 2001].

In 2001, the Manchester Museum of Science and Industry hired iBase to digitise its collection of 19<sup>th</sup> century engineering plans and drawings. Many of these irreplaceable items were in poor condition and had to be handled very carefully. In

addition, many of them were oversized and required specialized equipment to digitise them. iBase used a professional quality digital camera to capture images of these drawings. The images were stored on CD-ROM in TIFF format and required as much as 100 megabytes per file [iBase.com, 2001].

Though this project utilized equipment that is far more advanced than the CDM possesses, many of their other decisions can still be used in our project. For example, iBase photographed the drawings in a room near where they were stored to minimize the amount of time the drawings spent being handled. Their choice of file format and storage media was taken to account in our project [iBase.com, 2001].

### **2.4.3. California Heritage Collection**

The California Heritage Collection was created by the Bancroft Library at the University of California at Berkeley. This archive contains over 28,000 photographs and pictures. The images were captured using Kodak Photo CDs and a 35mm camera. From the files on the CDs, three images were made. The smallest of these is used as a thumbnail preview while the other two are higher resolution images for use over the Internet [Bancroft Library, 1997].

The Bancroft Library chose to track their collection with a Microsoft Access database. They used Access to generate a barcode label, which enabled them to track each photograph as it progressed through the digitisation process. The Berkeley group noted that with such a large database, searches over a network could take a long time. To remedy this, they suggested switching to an Oracle or Sybase database. Neither of these are options for the CDM, however the suggestion to switch database packages was considered [Bancroft Library, 1997].

This project used MARC as a guideline for the creation of metadata. They used customized PERL scripts to create HTML documents, which can be displayed in web browsers, from the database [Bancroft Library, 1997].

#### **2.4.4. Display of Search Results Case Studies**

The Visual Arts Data Service (VADS) has defined guidelines to follow when deciding on how to display the results of a search. VADS suggests that two versions of the results should be designed in the database and displayed after a search. The first version consists of a thumbnail gallery with short descriptive text accompanying each thumbnail. The other version of display of the results is a detailed view of each picture. This results page consists of one larger image, usually a JPEG, large enough to see details of the image, and then on the side of the picture, all the descriptive information about the particular image is displayed [Phil Purdy, 2001].

These guidelines are followed by most electronic catalogues in Britain. The digitisation company iBase, which we have previously mentioned, follows this guideline for portraying the results of an image search as well. They use a thumbnail gallery, with short text for each image and then a detailed view with extensive information on one page for each image [iBase.com, 2003].

An important British online gallery of images, which also follows this norm, is the British Library online image catalogue. Results from a search can be viewed in two versions, thumbnail with a title or larger image with detailed information [The British Library, 2003].



## **3. Methodology**

The primary goal of our project was to create an electronic catalogue of the illustrations in the CDM's collection. To achieve this, we had to determine which features and information the CDM required in the catalogue, how to organize this data in an efficient manner, and what methods to use to digitise the illustrations collection. This section describes both the research methods that were used to address these issues and the applied methods that we employed to create the electronic catalogue.

### **3.1. Interviews**

The first research method that we used for this project was interviews. The reasoning behind this is because the techniques and technology of digitisation are still being developed and improved upon. For this reason, we chose to gather much of our research information by interviewing experts in fields related to digitisation, rather than from the frequently out-dated books on the subject. Appendix B contains a list of the questions that each respective group was asked and the reasoning behind the choice of questions.

Prior to leaving the United States, we interviewed digital imaging experts, a database expert, and some experts in the field of the life of Charles Dickens and his work. After we arrived in London, we interviewed the CDM staff and then a sampling of their past patrons. These interviews were extremely important because the information that we received from these interviews guided every decision that went into creating the electronic catalogue.

#### **3.1.1. Digital Imaging Experts**

The digital imaging experts that we interviewed were very helpful in a number of ways. One of these experts was Lee Fontanella, a professor of the Humanities and

Arts and a specialist in the history of photography and printmaking. Professor Fontanella has worked with the CDM in the past to investigate the possibility of linking its collections to those belonging to other institutions. He answered many questions related to what should be identified when an image is going to be digitised. Also, Professor Fontanella described the handling procedures and some storage procedures that should be followed when handling these types of illustrations.

Rodney Obien is another specialist in this field. Mr. Obien was working on a project similar to ours involving company letterheads from the late 19<sup>th</sup> century. In addition, as the head archivist at WPI's Gordon Library, Mr. Obien was also in charge of the library's extensive collection of first-edition Dickens serials and novels. The information he provided was an iteration of the information about handling these types of work that Professor Fontanella had already informed us of. Mr. Obien also showed us some examples of what exactly we would be working with and offered a few ideas on best practices that we should keep in mind when digitising.

### **3.1.2. Database Expert**

In order for us to better understand the issues that we would be confronted with, such as the organisation of the database along with the fields that should be included in the database itself, we decided to interview Deborah Diemente, the Collections Manager of the Worcester Art Museum. She is also a digitisation and electronic cataloguing specialist. The project that she was working on at the time was to link many different collections to one main database. This interview gave insight into the scope of what it means to combine several collections into one database. When designing our database, we will have to take into account that we will be including several collections. This means that we will have to create a database that is

flexible enough to encompass all of these collections as well as providing a rigid organisational structure for the catalogue.

### **3.1.3. Charles Dickens Experts**

To help us identify the audience of the catalogue, we decided to interview Joel Brattin and Laura Menides. Both are professors of Humanities and Arts at WPI and both have a strong working knowledge of Dickens' work. Professor Brattin edited and co-wrote a collection of essays regarding the illustration of Dickens' novels entitled *Illustrating Dickens*. He was able to advise us on the handling of the illustrations and the identification of the techniques used in their creation. Professor Menides is a member of the worldwide Dickens Fellowship, an organization of scholars interested in the life and work of Charles Dickens. Professor Menides also served as an advisor for the 2002 IQP team, which created a portrait database for the CDM. The information we gained from these two experts helped in creating a background in Dickens life and his work, but also it gave us an insight into what the potential users of the database would find useful.

### **3.1.4. End Users of the Electronic Catalogue**

Once in London, we began the second phase of our interviewing process, which comprised of two days performing the interviews and another week compiling data. In this phase, we spoke with the potential users of the illustrations catalogue. These users can be divided into two groups: the CDM staff and their patrons. We interviewed every member of the CDM staff that will have access to the database. This included Andrew Xavier, the curator of the CDM, and Florian Schweizer, the assistant curator and our project liaison. In addition, the past patrons of the CDM were useful in determining how the database would be used.

The interviewing of past patrons of the CDM included interviews with organizations that frequently requested illustration reproductions from the CDM. These included BBC, Oxford University Press, AMS Press, Bridgeman Art Library, The British Library and also a number of independent researchers, mainly university professors, Prof. Newey from Leicester University and Prof. Philip Allingham from Lakehead University and a number of publishing houses. These interviews were conducted via email, using a questionnaire with open-ended questions about the use of the database. A guideline for these interviews can be found in B.5. We sent the emails to the patrons on March 19<sup>th</sup>, and received all of the responses within two weeks.

The value of this data was of great importance to our database design. Ultimately, we weighed the responses of the CDM staff heavier than those of the patrons. This is because the catalogue would be used mainly by the CDM staff, as so their needs should be considered more urgently. Though we conducted our interviews with the CDM staff in person and those with their patrons via email, our procedures for both were rather similar. These interviews consisted of open-ended questions designed to allow the respondent to elaborate on their answers, thus maximizing the amount of information we gathered.

### **3.2. Content Analysis of Similar Projects**

Our next research method was to perform a content analysis of projects similar to ours. Many of the decisions that we made during the design and creation of the database had already been made by researchers working on similar projects. For this reason we decided to perform a content analysis on these projects to analyze and compare their procedures. The results of this method enabled us to make more informed decisions about our own project.

There are a large number of digitisation projects to be found on the Internet and though all of them share certain goals with our project, we could not analyze them all. Purposeful sampling was used to narrow the field to just those projects that had major similarities to our own. Included in this group were the CDM Portrait Catalogue project, Gordon Library's letterhead digitisation project at WPI, and the Worcester Art Museum's image database project. Other projects were also investigated so that the project team could learn more about displaying the results of a query.

### **3.2.1. CDM Portrait Catalogue**

The CDM Portrait Catalogue project was an IQP that was completed in 2002 for the same sponsor. Many of the requirements for this catalogue were the same as those for the catalogue that we created. Further, the 2002 IQP team had the same hardware available to them that we were able to use. Because of these similarities, the 2002 IQP report provided us with insight into the procedures we used in the design of our database and helped us to resolve any problems before they arose. This project was less useful in helping us to decide how to handle the items as there are significant differences between photographic images and paper illustrations. Fortunately, there were other projects that involved the digitisation of works of art on paper.

### **3.2.2. WPI Gordon Library Letterhead Digitisation Project**

WPI's Gordon Library was involved in a project to digitise and archive company letterheads from the 19<sup>th</sup> century when our project was just beginning. As in our project, the Library's archivists had to decide how to best digitise images printed on paper without damaging the original copy. We analyzed the methods they chose to ensure the preservation of these items to determine how they could be applied to our

project. The fields they chose to catalogue and describe each object were also taken into consideration for application in our project. Finally, their decision to digitise the letterheads in-house using a scanner and digital camera helped us to rule out outsourcing and determine what type of hardware we should use.

### **3.2.3. WAM Collections Digitisation**

Both the 2002 IQP project and the Gordon Library's project required the digitisation of one set of objects. Our project is similar to these in that we were to only digitise the illustrations, but we also had to integrate the 2002 IQP team's database into the database we created. The Worcester Art Museum (WAM) faced the same problem when digitising their collections. Although the WAM has far more resources available to them than we ever had, the general design of their database was still very useful to us. We had studied the layout of their database system, paying special attention to how they linked dissimilar collections together, so that they could be accessed and searched using one interface. This key aspect of integrating the databases together was a very important focus of our work with the CDM's collections.

Each of the projects we studied in our content analysis was chosen because it had at least one major similarity to our project. Much of the information we gathered was about the specific topics that these projects addressed, but more general information was gathered from these undertakings as well. Special attention was paid to whether or not the digitisation effort was out-sourced to a company that specializes in digital imaging, what hardware was used, and which file formats were chosen.

### **3.3. Applied Methods**

In order to meet the goals of this project, we designed a database and began to digitise the CDM's collection of illustrations. Several options were available for both

of these processes. To choose between the many different approaches for each task, we decided to combine the analysis of the data collected from the previously discussed methods in Sections 3.1 and 3.2, with the research context we gathered for this project. Each of our three main applied methods will be discussed in this section and our decisions on which process we used will be presented.

The applied methods consist of creating the database schema, coding the backend of the database, designing a user interface for the electronic catalogue, the digitisation of the illustrations, the editing of the digitised images, and inputting all of the information of each illustration into the database.

### **3.3.1. Database Design**

The factors that influenced our choice of database software were ease of use, flexibility, and maintainability. There were three major database software packages that we considered for this project. These three software packages were Microsoft Access, PastPerfect, and MySQL. While we were researching the attributes of each of these database software packages, we looked for the factors that were of most importance to the CDM.

#### **3.3.1.1. Microsoft Access**

For several reasons, Microsoft Access was the most plausible choice of software for our project was Microsoft Access. Of the three database packages we examined, Access was the least expensive and easiest to maintain. In addition, the CDM already possessed two databases in Microsoft Access format. Because we were expected to link the CDM's older databases to the one we created, it was best to keep the formats consistent. If we had chosen to use a software package other than Microsoft Access, we would have to convert the previous databases to that package as well, which would have taken additional time.

### **3.3.1.2. Past Perfect**

PastPerfect is a piece of collections management software that the CDM would eventually like to move to so we considered it for use in our CMS. There were several drawbacks associated with choosing PastPerfect for our project, however. The price of PastPerfect at the beginning of our project was approximately \$500. For the CDM to spend this amount of money they would first have to obtain authorisation from the museum's board of trustees. This process could have taken up to two weeks of our seven-week term and there was no guarantee that the money would be granted. Also, because the users were not familiar with PastPerfect, more time would have to be devoted to training them in its use. Further, the other two databases that the CDM held were created in Microsoft Access and the amount of time it would require to convert them was unknown.

### **3.3.1.3. MySQL**

MySQL was another choice of database software. Because MySQL has no graphical front-end, it requires relatively few computer resources. That also means that we would have to develop a graphical front-end for the CMS from the ground up. MySQL was designed primarily for use on the Internet, which fits well with the CDM's long-term goal of making their collections available online. As it is not one of our project's goals to make the CMS available on the Internet, the benefits associated with MySQL were lessened. Finally, all of the same issues of converting and integrating past databases from Microsoft Access to MySQL applied.

### **3.3.1.4. Required Fields**

The fields that we used in the database can be found in Appendix C. This list was compiled from the interviews with experts in the field performed in the United States. In addition, because the CDM obtained a trial copy of PastPerfect, we were



able to incorporate many fields that program uses in our own CMS. This ensures that the eventual transition to PastPerfect will go smoothly.

The CDM requested a collections management system that would allow a search across all the collections they have digitised. This system would include the portraits catalogue and the topography catalogue. Therefore we decided to begin with the portraits database and make significant changes to the schema and the design to accommodate the requests of the CDM staff. While populating the database, the information for the illustrations was placed in the same table as the portrait collection, which allows the common search. Our database also allows the users to search a single collection should they choose to.

#### **3.3.1.5. Displaying Results**

An important aspect of the database design was display modes of the results. A number of guidelines are set for this and these are described in the respective section of the research context. Furthermore our sponsor requested a certain way to display the search results. Taking into consideration the requests of our sponsor and the guidelines set by the Visual Arts Data Service of the University of Bristol and the British Library image galleries on their website, we decided to use the following two modes of displaying the results of a search. The first is a thumbnail gallery with a short descriptive information on the side of it, title of image and artist. The second view option for the results is a detailed view of the image with a large photo and all the information surrounding that specific image stated around it.

The second full week in London was devoted to designing the database. This included creating the metadata fields, creating the layout of the database, and creating the user interface as well. Once the initial schema of the database was formulated the population of the database with entries commenced. Working on multiple computers

allowed us to simultaneously begin the population of the database as well as working on the database schema and design of the forms.

#### **3.3.1.6. An Automated Invoice Generator**

After discussing with our liaison we determined the need of the CDM for an automated invoice generator that would consist of a database with its clientele incorporated in it. This would allow the CDM to easily keep track of its orders and browse the patrons' orders. The invoice generator was included into the larger database of the illustrations and the portraits however allowing only administrative users to access it.

The type of information that would be stored in the invoice database would be all of the information that is recorded on an invoice. This is the customer's name and other information, along with the order that was made. A search form was then created so that administrative users could search through the invoices using any field they wish to search by. It could be just searching a specific customer to review the business that they have conducted before, to review all of the customers who had purchased a specific image, or many other search possibilities.

#### **3.3.1.7. Testing the Database Design**

In order for us to determine if the database we designed was exactly what the CDM needed to move forward towards their goal of an online catalogue, we had to test the database design itself. There were two major parts of the database that we tested the interface and the metadata of the database. These were the two most important parts of the database.

Throughout the process of creating the interface we would receive feedback from our liaison about the features of the searching capabilities of the database as well as the overall look and feel of the forms. After the completion of the creation of these

forms, we conducted a small test of the interface with the primary users of the database to determine if it was what the CDM needed. The test was to allow these primary users to search the database as they normally would and then report back to us on what they liked or disliked about the experience. We created feedback forms with questions on the usability of the database, which can be found in Appendix D. This feedback would then be the next tool we used in finalizing the interface of the electronic catalogue for the CDM.

We tested the fields of the database as well. The process that we used to test the fields was, at first, brainstorming and gathering all the types of objects that the CDM held. Then we created all the fields that were required to record all of the information about that object. When this was completed for each object we then compiled the fields into one main database that could be used for all the objects that the CDM held. This was the method we used to test the robustness or flexibility of our database, but by minimizing the amount of tables used we could still manage the organization of the database as well.

### **3.3.2. Digitisation Options**

Three options were available for the digitisation process. These options included, scanning, digital photography, and professional outsourcing. Also, a combination of any of these could have been considered. Another aspect of digitisation was the file format in which these images were stored. We will also explore four key elements that assisted us in determining which digitisation process would be most useful. These four key elements are: size of the illustration, the medium the illustration is on, the available technology, and the CDM's previous experience with each option. These facets of the digitisation process will be discussed below.

The advantages and disadvantages of scanning and digital photography have been discussed in Section 2.2; a brief discussion of how these processes could be used is discussed here. A combination of both digital photography and scanning could be useful if we were presented with a variety of sizes or mediums of illustrations. For instance if an illustration from a book with a fragile binding was to be digitised, we would use digital photography to avoid any damage that a scanner could inflict on the book. We determined through interaction with the CDM, that the museum was not intending to reproduce from these digital images, so it was not necessary to capture images at the highest possible resolution. However, we still had to determine the specifications of the hardware available and the quality of their hardware, so outsourcing the digitisation process still may have been considered.

Outsourcing the digitisation process has potential advantages as well as disadvantages when compared to in-house digitisation. The concerns over the size of the illustrations, the mediums that the illustrations are on, and the available technology are dismissed when outsourcing is contemplated. Outsourcing vendors are able to handle all of these aspects with the professional equipment that is available to them. Another element that we considered was the past experience that the CDM has had with outsourcing. We had found, through our liaison, that the CDM had not been satisfied with the digitisation work that outsourcing had produced in the past, but outsourcing still has other advantages. Among these are high production levels, more advanced technology, and the ability to commit more workers to the task, thus finishing earlier. The last of these would interest the CDM the most, since the task of digitising nearly four thousand illustrations presents itself as a daunting task for the small CDM staff. The cost of outsourcing, loss of control over the digitisation processes, and potential damage to the illustrations, are all disadvantages of

outsourcing that had been taken into consideration throughout our decision making process [Bishoff, 1999].

Based on our research in section 2.2.2 and taking into consideration that the CDM had limited computer storage space and did not intend to reproduce from the images, we determined that using the JPEG file format would satisfy the requirements of our project. Specifically, we decided to use two JPEG images for each illustration. One lower resolution image was used as a thumbnail to identify the illustration, and a second, higher resolution image was made available to the user so that he could view the details of the illustration.

### **3.3.3. Image Quality and Hardware Testing**

Before deciding on whether to use a scanner or digital camera to capture the images, we evaluated both options. The criteria used in this evaluation included speed, image quality, and ease of use. We then created a controlled experiment to help us test these criteria. First, we positioned an image for capturing and begin timing. The timing will stop when the image has been successfully transferred to the computer for editing. We then inspected each image for the quality of colour reproduction and overall image clarity. Finally, we reflected on the relative ease of use of these two devices and rate each digitisation process accordingly. When we completed the test for all of the hardware that was available to us, we then compared the times and the ratings for each piece of hardware and through this process determine the digitisation process we would use.

This image quality and hardware testing allowed us to determine that using the digital camera of the CDM was the best way to digitise the illustrations, but there are some limitations to this choice. Firstly, the images that are captured are not at the quality to be reproduced from. This was not a major concern of the CDM, but it is

still a limitation to the digitisation process we used. Also, the photographs required some editing, which did consume more time of the project team. It was determined though that the time that was required to do that digital photography and the photo editing was still less time than using the scanner of the CDM.

#### **3.3.4. Gathering and Inputting Information**

We had found that inputting the illustrations' data would be the process that consumed most of our time. Also, it was the time spent researching the data to input for each illustration that would slow down this process even further. The situation that we were presented with was one where only limited information was listed on the back of each illustration. This meant that we had to find all of the information that was not present, which could be the illustrator, the characters depicted, or any other vital information to the illustration. In order to speed up the collection and input of this data we decided to arrange the input of data for each illustration into two main phases. The first phase included inputting the data that was present on the illustration, be it the place depicted, the character, the title, the illustrator, or any other data easily available. This then led us into our second phase which was to list the illustrations by illustrator, find the corresponding work of that illustrator, and then input the rest of the remaining data that we did not have. This was the easiest way to determine the more obscure information about the illustrations that was not readily available on the illustration itself.

#### **3.3.5. Digital Image Editing**

After digitally photographing the illustrations it was required to perform some editing on the images to make the suitable for the database. The white space around the image had to be cropped out, and we found that if the brightness level of the image was increased, then the details of the illustration were much more visible.

After these functions were performed on the image, the image had to be made into a size that is suitable for viewing the details of the illustration, but with a small file size so that the database does not grow to an unmanageable size. Now, two different variations of the image were to be saved. One would be of the detailed size that was just created, but with a watermark imposed over the image. This watermark and its function are discussed in Section 2.2.4. The image would also be saved at a much smaller size to be used as a thumbnail image in the database. All of these procedures were carried out in Adobe Photoshop. The project team then created automated actions for these processes to speed up this image editing process. These actions in Adobe Photoshop required little input from the user so that a non-expert could still perform these procedures.

### **3.3.6. Resulting Methods**

After conducting our image quality testing, we decided it was best to create a step by step method to follow in order to streamline our inputting of the illustrations and their information into the catalogue. This procedure was important to create, because with a three man team we were able to divide the work and accomplish our goals much faster this way. With a formal step by step process we were then able to divide the whole process into small processes of which each member would be in charge. Then when a member of the team had finished his smaller process he would then pass the product he possessed to the next team member. This formed an assembly line that improved the speed of the data inputting process.

Figure 1 shows the step by step process that we followed while inputting the illustrations into the database. Most of these processes were also done in large batches to speed up the process. This step by step process was usually split into three main sections, these sections being capture, editing, and data entry. Figure 2 shows

the setup for the image capture. No flash was used during the image capture as it would produce distorting effects on the image. The sunlight through a window was satisfactory and the pictures were also brightened during editing with Adobe Photoshop.

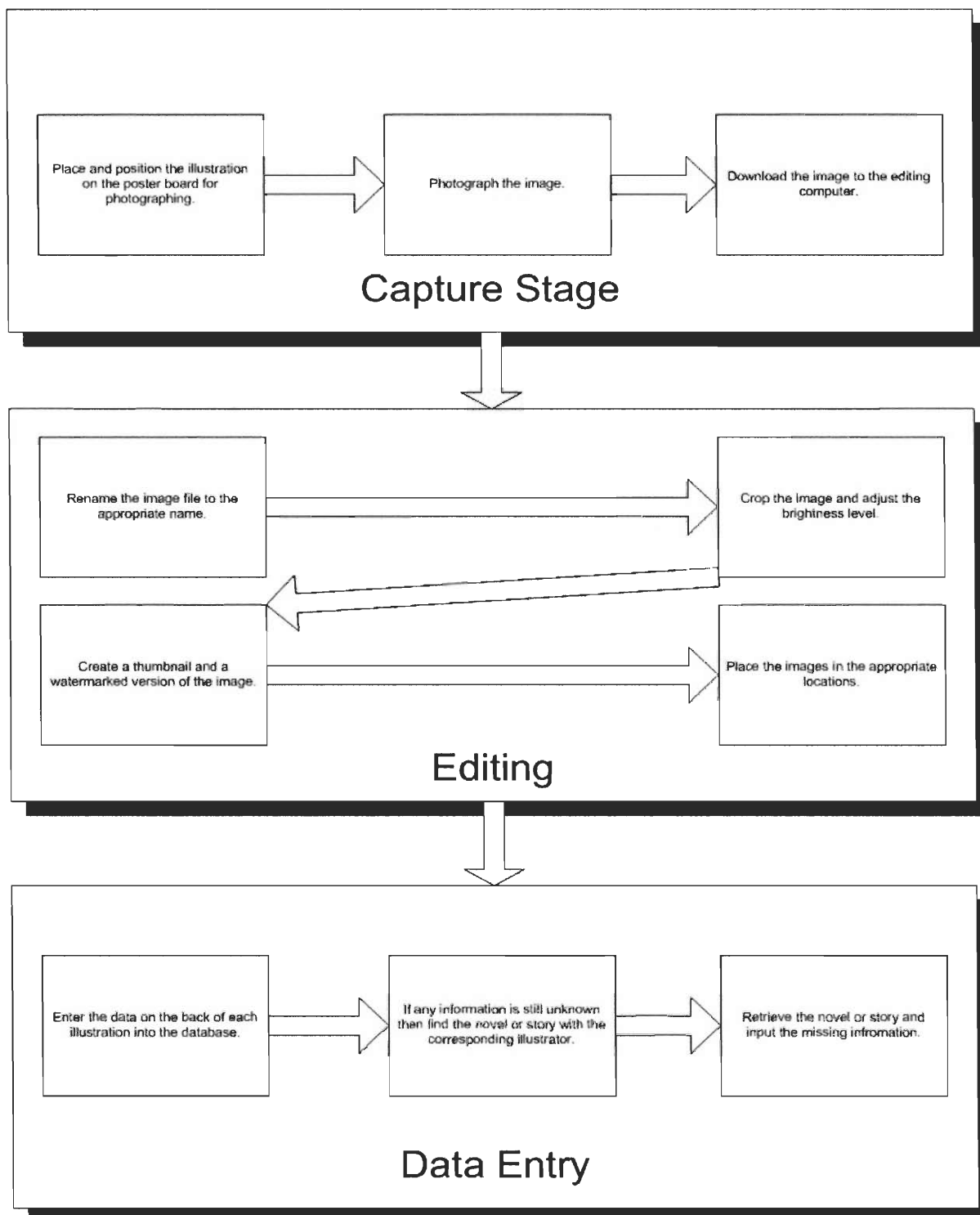


Figure 1 - Resulting Image Entry Process





Figure 2 - Setup used to capture images

### 3.4. Schedule

Our schedule for this project consisted of three main milestones to achieve. These milestones were the interviews, both in Worcester and in London, the design of the database, and the digitisation of the illustrations themselves. Our schedule can be viewed in its entirety in Appendix E.

The schedule for the interviews was divided into two phases. One phase consisted of the interviews done in the United States, while the second phase consisted of the interviews done in London during our time there. We made an effort to conduct the interviews as early as possible in both phases, which worked to our advantage so that we could analyze our data during the beginning and therefore start the other parts of our project sooner. The interviews in Worcester had been completed by February 6th, and the interviews in London were completed by March 21<sup>st</sup>.

Our next milestone was the design of the database itself. This process included designing the database, which entailed creating metadata, creating the required tables, producing a controlled vocabulary where needed, and then designing

the user interface of the database. This stage of our project also included coding all of the backbone of our electronic catalogue. After all of these aspects were designed, agreed upon, coded, and tested, we then began to input data into the database. This initial step of creating the tables and then creating an interface that was both easy to use and a powerful search engine relied on much of the information we gained from performing our interviews and the feedback we received from the CDM's past patrons.

When viewing our schedule located in Appendix E, it is apparent that our next milestone, the digitisation of the illustrations, occurred concurrently with our database design process. We had decided to do this because it required only one member of our team to input all of the agreed upon fields into the database itself, while the others put their energy into starting on the next step of our project. After the fields were entered into the database tables, then the input of the data would be started. But before the digitisation of the illustrations occurred we performed out image quality testing. This testing was performed over two days, and the results from the testing are included in the next chapter. At first we populated the database with a fair amount of information so that we could test our design and make minor improvements to it. This process also allowed us to create a process that the CDM could follow when they are inputting the rest of their illustrations collection that we were unable to finish. We decided upon which process is quickest and easiest for the CDM to input data by April 9<sup>th</sup>.

Since by April 9<sup>th</sup> our team had established a process of inputting the images and their information, we began testing our electronic catalogue with the members of the CDM staff who would use it. With the results from the testing we then

troubleshoot any problems that arose. All of this feedback was included in the administrative and user manuals that we created.

Finally, during the last week of our project we gave our presentation to the staff of the CDM and wrapped up any loose ends with our electronic catalogue that we had created.

## **4. Results and Analysis**

This chapter will present the reader with an analysis of the information that was gathered while performing the research and applied methods described in Section 3. It begins with an analysis of the results of our research methods and explains how they influenced various design decisions and helped us to develop our applied methods. It then discusses how we went about performing our applied methods and describes the CMS that resulted from them.

### **4.1. Results of Research Methods**

Before we began creating the CMS, we performed the research methods described in Sections 3.1 and 3.2. These included interviews with experts, the CDM staff, and past patrons of the CDM, as well as case studies of projects similar to ours. The results of our research methods provided us with the information we needed to develop our applied methods. This section will list these results and also explain how we interpreted them.

#### **4.1.1. Expert Interview Results**

In order to gather information about the key issues related to this project, our team interviewed experts in several fields related to digitisation and Charles Dickens. The fields that we focused on were Charles Dickens's life and work, the design of collections management systems, and the processes of digitisation. The insight given to us by the experts in these fields was discussed briefly in Sections 3.1.1, 3.1.2 and 3.1.3, but will be further developed here.

##### **4.1.1.1. Digitisation Experts**

We interviewed two subjects in the United States to gather knowledge about the digitisation of works of art on paper. The project team interviewed Professor Lee

Fontanella and Mr. Rodney Obien because both had knowledge and experience with handling 19<sup>th</sup> century paper products.

Professor Lee Fontanella provided us with an explanation of the equipment that is usually used when displaying old books or any other bound work. He also explained to us that the protocol for dealing with bent pages or other signs of wear in these books differs between institutions, and that this work should only be done by the professionals themselves. This information, while helpful when dealing with original works, was not entirely applicable to our project as we spent most of our time handling photographic reproductions of the originals. Professor Lee Fontanella also informed us that the light from a camera flash or scanner is not as harmful as some had thought in the past. Nonetheless, a piece of artwork should not be subjected to many flashes from a camera or any intense light source, because over time this will cause the piece to age more quickly.

Mr. Rodney Obien was in the process of digitising and cataloguing a set of 19<sup>th</sup> century letterheads when we conducted our interview with him. He told us that paper from the 19<sup>th</sup> century had good rag content and was therefore a durable type of paper. This also means that 19<sup>th</sup> century paper would not discolour as quickly as paper made in other time periods. Mr. Obien also allowed us to browse through some of the Charles Dickens collection that the WPI Gordon Library possesses. This was helpful because it allowed us to see exactly what the original illustrations looked like.

#### **4.1.1.2. Database Experts**

Deborah Diemente allowed us to examine the WAM's collections management system. This provided us with information regarding the organisation of a large database. She also explained to us the many ways in which the database can be useful for museums. For instance, they are able to track the location of their

objects by using the database. That type of detail is not needed by the CDM, but the interview with Deborah Diemente was also useful in determining what a database could do, so that we were able to identify the scope of what we could accomplish with our project.

#### **4.1.1.3. Charles Dickens**

Professors Joel Brattin and Laura Menides provided us with background information regarding the CDM and helped us determine what the future users of the catalogue would be looking for. Professor Brattin, being a member of the Dickens Fellowship and a researcher of the works of Charles Dickens, was able to inform about what someone researching the works of Charles Dickens would be searching for and what they would find most helpful. Professor Laura Menides answered questions pertaining to how the CDM currently organized their collections.

The information we obtained from these experts informed us how the CDM currently operated, what our processes should consist of, what our database could do. With all of this background information we were easily able to develop focused questions to ask the CDM staff that would allow us to create a customized electronic catalogue for their specific needs.

#### **4.1.2. CDM Staff Interview Results**

It was the interviews performed with the CDM staff that allowed the project team to formulate a solid understanding of how the catalogue would be used at the museum and a larger outlook for the future of the database and the museum. The interviews consisted of speaking with our liaison and the assistant curator of the CDM, Florian Schweizer, and the curator of the CDM, Andrew Xavier.

Florian Schweizer explained to us that the long-term goal of the museum was to make the catalogue of their collections available over the Internet. He also

identified the key information that should be recorded for each illustration and the quality of the images that they would require. Also, Mr. Schweizer was very helpful in designing the interface of the catalogue. With his suggestions, we redesigned the appearance of the catalogue and created the ways in which the results are displayed.

During the preparation stage for this project, our team explored the possibility of creating a stratified payment scale so that organisations seeking to use the CDM's images for profit would pay more than smaller researchers. Such a system has the potential to simultaneously increase the dissemination of Dickens illustrations among the scholarly community and increase the CDM's revenues from the sales of these images. Mr. Schweizer expressed an interest in this idea and it was decided that we would develop an electronic invoicing system that would be linked with the electronic catalogue. Using this system, the CDM will be able to determine which images are the most popular and which customers make the most purchases. From this data they can create the stepped payment scale that we discussed. An additional benefit of this invoice system is that the CDM will have a list of their customers and their addresses. The CDM could use this list to send out newsletters to inform their customers of any additions to their collections, changes to their catalogue, or new exhibitions they may have.

Our interview with Andrew Xavier confirmed most of what Mr. Schweizer had told us about the design of the database itself. Since he was the liaison for the past IQP project with the CDM, he was able to show us what that team accomplished and identify any improvements we could make in the catalogue itself.

After completing the interviews with the staff of the CDM who would be using the catalogue, we were able to refine the scope of our project. The key goals we set for ourselves were (a) to create an electronic collections management system that

	<b>Publishing Companies</b> Sample Size 8	<b>Researchers, Universities, Dickens Scholars</b> Sample Size 6
<i>Why have you inquired the CDM about illustrations in the past?</i>	For new editions of Dickens's works or related works.	Publishing and article publishing purposes.
<i>How frequently do you inquire the CDM about their illustrations?</i>	Once or twice a year.	Once or twice a year.
<i>When making an inquiry, did you have a certain illustration in mind?</i>	Yes.	Yes.
<i>Would you use the illustrations catalogue if it were available on the Internet?</i>	Yes.	Yes, if the catalogue included a powerful searching mechanism.
<i>If such a catalogue were available to you, which categories do you think you would search by?</i>	Novel	Novel, Character, Subject, Edition Date, Country of Edition
<i>Would you be more likely, less likely, or just as likely to purchase illustrations from the CDM the catalogue were available via the Internet?</i>	Answers ranged from "just as likely" to "more likely".	More likely, although quality is not recommended for research and careful observation.

**Table 1 – Patrons' responses to the e-mail survey**

was able to contain all of the collections that the CDM held, (b) to migrate the existing electronic catalogues of the portraits and the objects into the new CMS, and (c) to digitise and catalogue as many book illustrations as time would allow. Though it was not a goal of ours to make the CMS available online, it is a long-term goal of the CDM. For this reason, we asked the patrons what features they would like to see in the CMS. By incorporating their desires into the CMS, we helped to insure that few changes would need to be made before putting it on the Internet.

#### **4.1.3. Patrons Survey Results**

The feedback that was acquired from the past patrons of the CDM served to reinforce the information we gathered from our interviews with digitisation and



database experts and the CDM staff. The patrons also indicated that that CDM's long-term goal of making the electronic catalogue available over the Internet would be beneficial to the institution.

The questions that were asked of the past patrons can be found in Appendix B.5. After receiving the responses from these e-mails, we compiled the results into a table divided into two different categories of patrons. The first of these contained publishers or any type of large media corporation that would use the images mainly for profit. The other category contained libraries, universities, or researchers who would use the material mainly for research purposes. Table 1 shows these compiled results. From these responses we were able to conclude that:

- The patrons of the CDM would use the catalogue if it were available on the Internet.
- The patrons of the CDM would purchase more reproductions if the catalogue were available online.
- The search capabilities that we developed were sufficient.

#### **4.1.4. Case Studies of Existing Electronic Catalogues**

Before designing the interface to our electronic catalogue, we first examined similar systems in place at other institutions. We did this because we wanted to create an interface that would be similar to the ones our users had seen in the past. Our study of existing electronic catalogues focused mainly on large institutions, as those are the ones that the users are most likely to have seen. We drew much of our inspiration from the British Museum and the British Library, but WPI's own Gordon C. Library helped us to make our decisions as well.

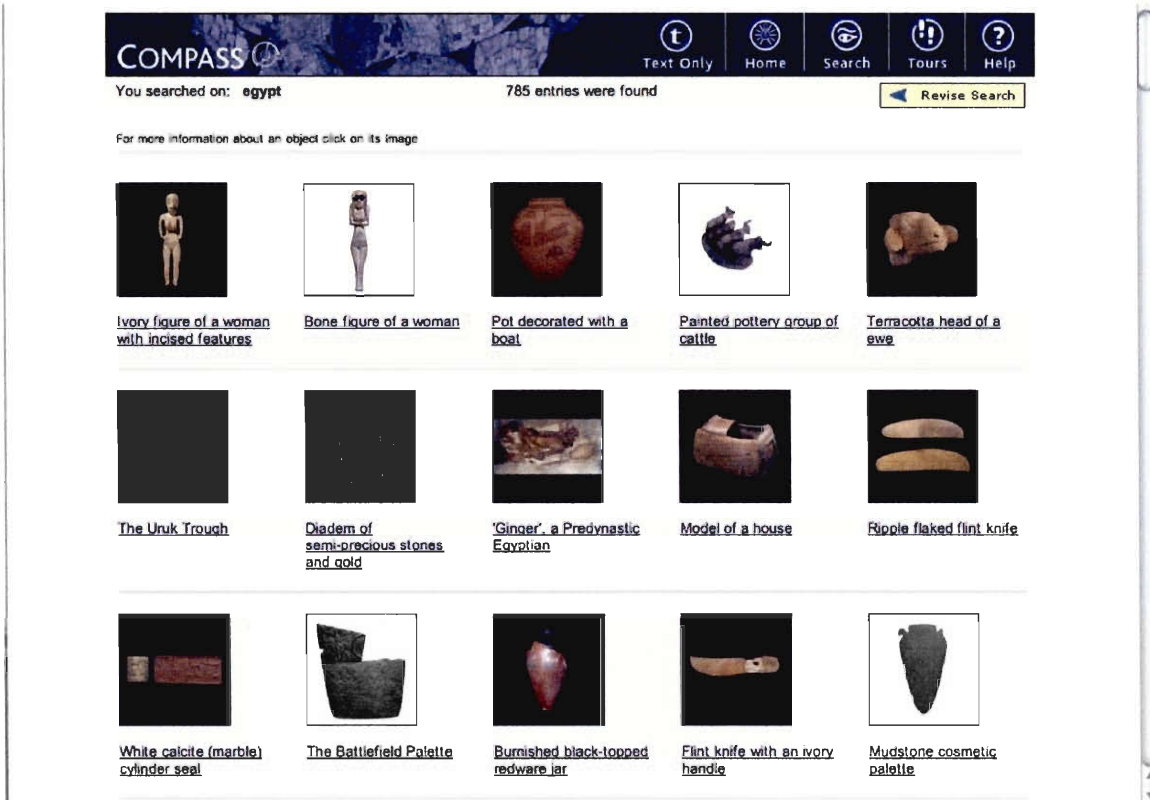


Figure 3 – The British Museum’s thumbnail view

#### 4.1.4.1. The British Museum

We chose to study the British Museum’s electronic catalogue for several reasons. As previously mentioned, we sought out larger institutions to conduct our case studies. As the largest museum in London, the British Museum surpassed this criterion. Further, the British Museum has an excellent online catalogue that would serve as a good example for the CDM of what could be done on the Internet.

Unfortunately, the British Museum’s catalogue’s searching capabilities only allowed the user to query one field at a time, making complex search strings impossible. Much more was learned from the methods it used to display results. The British Museum follows the VADS guidelines mentioned in Section 2.3.3.4. That is, a large number of the results were displayed at once in a thumbnail gallery, which is shown in Figure 3. When the user selected one of these results, a more detailed form was displayed containing a larger image and information about the object, as seen in Figure 4.

COMPASS

Text Only Home Search Tours Help

Search Results 3 of 785

**Pot decorated with a boat**

From Hu, Egypt  
Late Predynastic period, Naqada II, 3600-3250 BC

**A pink pot with red decoration**

The pink colour of the fabric of this vessel is typical of the marl clay obtained from the desert areas of Egypt. Vessels with rounded or tapered bases were common in the Predynastic period, and occurred throughout Egyptian history. These pots were supported on a stand or were placed in a depression made in the sand.

The exterior is decorated with stylized representations in **red ochre** paint. The simple abstract patterns and spirals of the earliest examples were probably imitating vessels made of a hard stone such as breccia. The multiple wavy lines around the neck of this example, may represent water.

The motifs used in later scenes include birds, animals, people and boats. The stylized boat on this vessel is typical of this period. It has a basic long curved shape, with strokes coming off it to represent oars. The two structures in the centre are probably cabins or shrines, one with an emblem like the later standards that represented different districts. Human figures are sometimes depicted near the cabins. These are often women, who are interpreted as dancers because they have their arms raised above their heads.

Height: 22.9 cm  
Width: 20.2 cm (max.)

Gift of the [Egypt Exploration Fund](#)

picture request  
larger image

**Related Objects and Information**

- Pottery ware jar with a mocc seat
- Blue-painted pot
- Burnished black-topped redware jar
- Stone vessel in the shape of a frog
- Bone figure of a woman
- Black polished incised ware cup

Figure 4 – The British Museum’s detailed view

#### 4.1.4.2. The British Library and the Gordon C. Library

Though we left the British Museum with a better understanding of how query results should be displayed, we were less impressed by the searching capabilities of their catalogue. Our quest for a better search form led us to the British Library’s website. That institution’s search form is shown in Figure 5. It allows the user to select which fields they wish to search by and join up to six queries using common Boolean terms such as “AND” and “OR”. Further, the user is able to select which categories of documents to search, for example “All Catalogues” or “All Reference Catalogues”.

After seeing both the British Library’s and the British Museum’s search forms, we sought out a third example. The purpose of this was to determine which method of searching was more prevalent: the museum’s simple search form or the library’s

Figure 5 – The British Library’s search form

more complex one. The subject we chose to study for this was WPI’s Gordon C. Library.

The Gordon C. Library’s advanced search form is shown in Figure 6. Like the British Museum’s form, it allows the user to choose which fields will be searched and to join several search terms using Boolean logic. It confirmed to us that the CDM should offer a more complex form.

#### 4.1.5. Image Quality and Hardware Testing

Prior to commencing the digitisation of the illustrations, we first had to decide what hardware we would use. To do this, we conducted a test using the CDM’s two pieces of digital imaging hardware: their digital camera and their scanner. This test was performed as detailed in Section 3.3. We quickly found that after the editing process described in Section 3.4.5 had been completed, the images from each piece of hardware contained the same amount of detail. Further, the quality of the resulting

# George C. Gordon Library

[Databases](#) [Search](#) [Patron](#) [Login](#) [Request](#) [Remote](#) [Help](#) [Exit](#)

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Database Name: WPI George C. Gordon Library

Basic Searches Advanced Search Course Reserves New Acquisitions

Search for:  all of these (more specific) ▾ Search In:

AND    OR    NOT

Search for:  all of these (more specific) ▾ Search In:

AND    OR    NOT

Search for:  all of these (more specific) ▾ Search In:

25 records per page ▾   Search   Reset   Limits

[Help With Advanced Search.](#)

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[Databases](#) [Search](#) [Headings](#) [Titles](#) [Patron](#) [Login](#) [Requests](#) [History](#) [Remote](#) [Help](#) [Exit](#)

**Figure 6 – George C. Gordon Library’s search form**

images exceeded that of the images created by the previous project team and were considered more than satisfactory by the CDM staff. This indicated to us that the digitisation process could be completed in-house, thus avoiding the added expense of out-sourcing.

Since the quality of the images produced by the scanner and digital camera was no longer a factor in the decision making process, the only thing left to consider was the amount of time needed to acquire an image. The amount of time required to digitise one image by each piece of hardware is listed in Table 2. Our data clearly showed that the digital camera was faster than the scanner for capturing images. With this information in mind, we made our decision to use the digital camera to digitise the illustrations.

	Digital Camera	Scanner
Set Up	10sec	2sec
Capturing Image	3sec	120sec
Download	8sec	0sec
Total	21sec	122sec

Table 2 - Times required to digitise an image

## 4.2. Development of the CMS

Developing the CMS was a three-part process. We first finalised our choice of database software. For the reasons listed in Section 3.3.1, Microsoft Access was the most logical choice. With that decision made, we next had to determine which tables would need to be present in the database. Each type of object stored in the CMS needed a separate table and each table needed several fields to describe the object the table represents. In the final part of the design process, we created the forms that would be used to interact with the CMS.

### 4.2.1. Designing the Tables

The CDM divides their collections into five major categories: illustrations, portraits, topographies, objects, and miscellaneous. The CMS had to be able to store each of these categories. Rather than make a separate table for each category, we decided to store them all in a single table. This made the CMS less complex, however certain fields that did not apply to all of the collections would nonetheless be present in those records. To avoid confusion, we disabled these fields on the forms when appropriate.

We designed the fields in the object table based on the categories the CDM's staff and its patrons indicated they usually search by. Additional fields were chosen so that the catalogue would conform to PastPerfect, the collections management software that the CDM would like to use in the future. The fields we decided on can

be found in Appendix C.1. Further, one table each was used to store information about customers (Appendix C.2) and invoices (Appendix C.2).

There are several other tables that store administrative data about the CMS as well. One of these tables is used to store settings that determine where the images are found on the computer's hard disk. Another table stores controlled vocabularies, which are described in Section 2.3.1.2. A third table stores information about the users of the database. This allows the CMS to automatically fill in certain fields on the object and invoice forms. Finally, we used a table to store menu options for the switchboard form. The fields for these tables can be found in Appendices C.4, C.5, C.6, and C.7, respectively.

#### **4.2.2. Creating the Forms**

We used three basic types of forms in the CMS: switchboard forms, display forms, and search forms. The information that was gathered from the existing electronic catalogues possessed by institutions such as the British Library, the British Museum, and the Worcester Art Museum, assisted us in designing forms that were consistent with those used by larger institutions. This would both take advantage of the research that went into these interfaces and create a comfortable environment for the users of the catalogue.

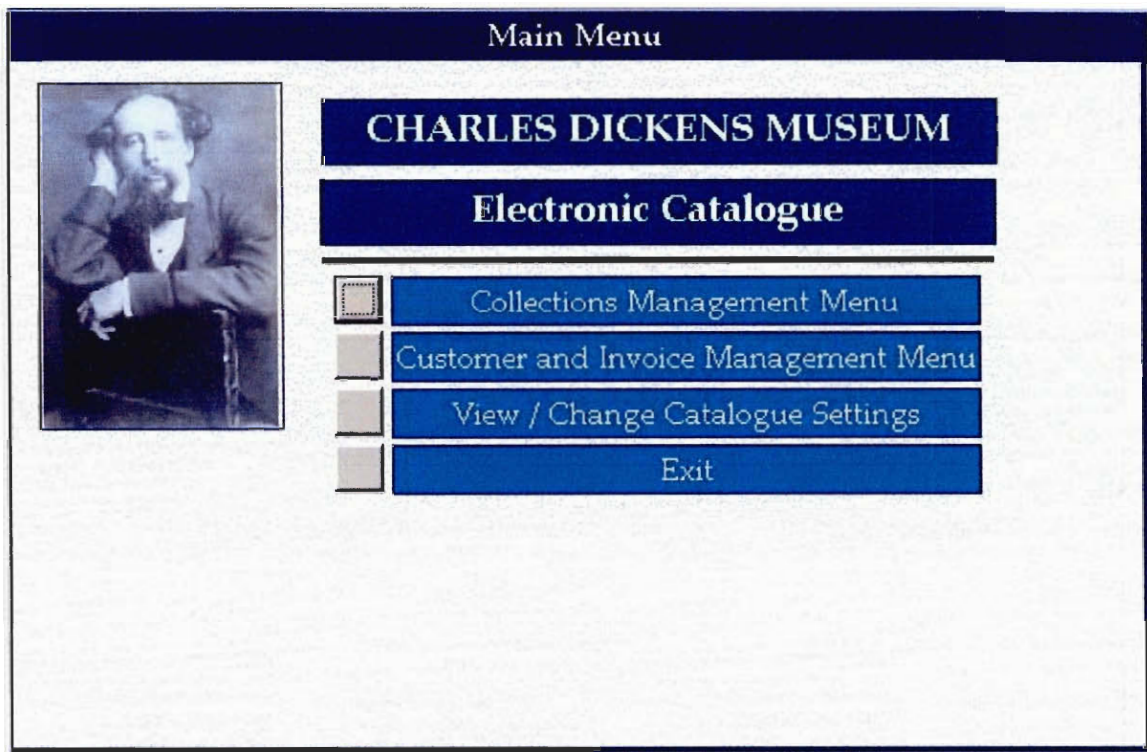


Figure 7 - The switchboard form

#### 4.2.2.1. Switchboard Form

The switchboard form, pictured in Figure 7, is the only remaining part of the previous IQP group's electronic catalogue. The appearance of the form has been altered so that it resembles the rest of the forms that we designed, but the underlying code is the same. This will help bridge the gap between the CMS that we created and the electronic catalogue the CDM has been using for the past year.

#### 4.2.2.2. Search Forms

From the interviews with the staff of the CDM, we already knew that the previous catalogue's search capabilities were adequate, but that they could be improved upon. We looked into making a search form that could be used to create very precise queries, but would still be self-explanatory and user-friendly. The two institutions that influenced our search form the most were the British Library and WPI's George C. Gordon Library. The search forms from these two institutions can be seen in Figure 5 and Figure 6.



The search interface that we designed for the objects catalogue was based on these two forms, because they could be used to conduct simple searches as well as

Search Term	Conjunction	Search Field	Comparison Type	Search For
Search Term 1:		Any Field	CONTAINS	
Search Term 2:		Any Field	CONTAINS	
Search Term 3:		Any Field	CONTAINS	
Search Term 4:		Any Field	CONTAINS	
Search Term 5:		Any Field	CONTAINS	

Figure 8 – Object search form

Search Term	Conjunction	Search Field	Comparison Type	Search For
Search Term 1:		Any Field	CONTAINS	
Search Term 2:		Any Field	CONTAINS	
Search Term 3:		Any Field	CONTAINS	
Search Term 4:		Any Field	CONTAINS	
Search Term 5:		Any Field	CONTAINS	

Figure 9 - Invoice search form

complex and specific searches. The design that our project team eventually decided on is the one seen in Figure 8. Later, when designing a search form for the invoice generator, we copied the appearance of this form. The invoice search form can be seen in Figure 9. We also found, through testing, that others found these search forms easy to use, and after a few uses they were able to create very specific searches of their own.



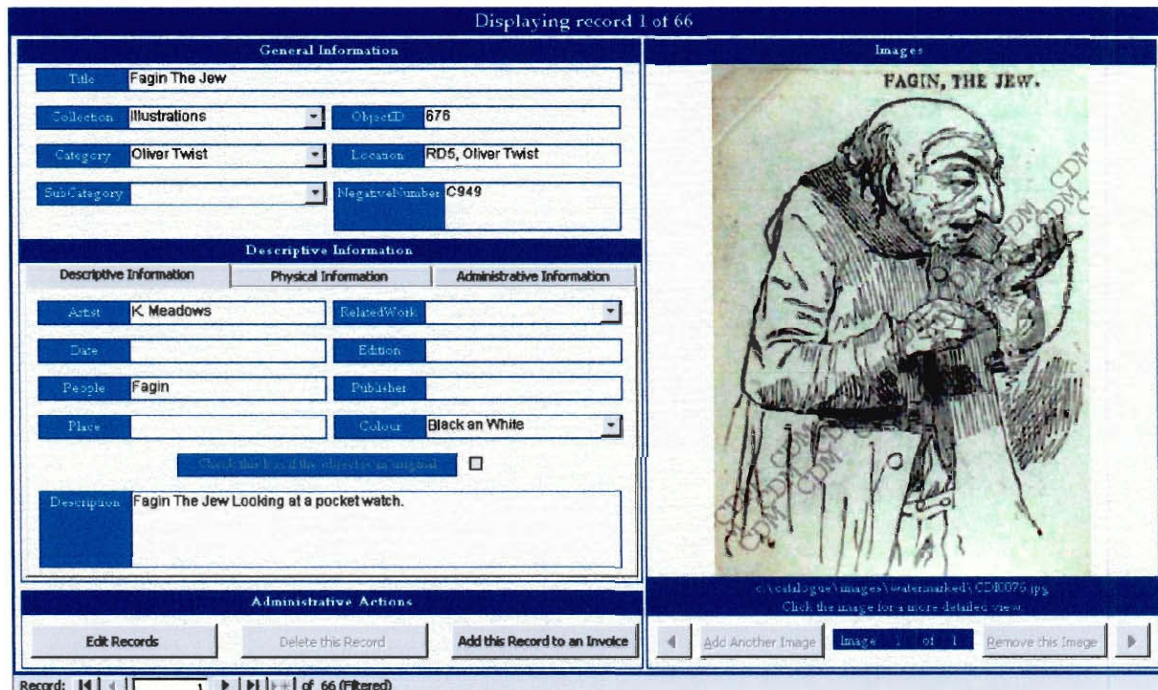
Figure 10 – Object thumbnail view

#### 4.2.2.3. Display Forms

The forms used to display search results were also influenced by already existing catalogues. The use of two views was seen in many of the catalogues we researched. We decided that using one view to display a thumbnail of the image with its title (Figure 10) and another to display a larger image with all of the details related to it would be sufficient for anyone using the catalogue.

When designing the detailed form, we found that the information recorded for each image would not fit on one screen. Displaying the information for one result on multiple pages would not be very user-friendly, so we divided the details for each image into categories and displayed these categories using tabs. PastPerfect, a CMS that the CDM would like to use in the future, uses a similar approach and it was decided that imitating its interface in our CMS could only help the CDM in the long run. The detailed view form we designed can be seen in Figure 11.

The layout of the invoice display form, which is shown in Figure 12, was made to resemble the layout of the paper invoice the CDM used. The price of each



**Figure 11 – Detailed object view**

item is calculated by the form automatically, as is the total price of all the items together. When the invoice is complete, the data it contains can be exported to a Microsoft Word file and printed out. The resulting document is shown in Figure 13. Each invoice is capable of storing eight items at a time. Though this is a limitation of the system, we did not find any invoices in the CDM’s records that had more than eight items. Further, if a customer were to purchase more than eight items at once, the CDM could create two separate invoices for the order.

Only customers that are already in the CMS can be used in an invoice. This forces the CDM to enter more customers into the database and ensures that it will be populated with as many customers as possible. The form used to add or modify a customer can be seen in Figure 14.



Add or Modify Patrons	
<b>Patron Information</b>	
Name	Philip V. Allingham, Ph.D.
Organisation	Lakehead University
Billing Address	Philip V. Allingham, Ph.D., 1/5 English Curriculum & Instruction, Faculty of Education, Lakehead University, THUNDER BAY
Shipping Address	
Customer Type	University Researcher
	<input checked="" type="checkbox"/> If ticked, this customer is a not for profit organisation
<b>Actions</b>	
<input type="button" value="Add a New Record"/> <input type="button" value="Remove this Patron"/>	

Figure 14 - Add / Modify customer form

### 4.2.3. Testing the CMS

Like all software, one of the most important processes is the testing and then troubleshooting of the programme. Throughout our seven weeks on-site at the CDM, several researchers tested our catalogue. This was found to be quite helpful since these people had no prior experience with the programme and pushed our catalogue to the limits. Several instances occurred when bugs did arise, but they were quickly solved.

One of the first bugs that we found in the catalogue dealt with the speed at which Microsoft Access loaded the pictures. We discovered that if the user attempted to advance to the next page of the thumbnail gallery before the images on the current page were loaded, Microsoft Access would crash and the programme would close. Further research indicated that the previous IQP team experienced the same problem when developing their catalogue. Their solution was to store the images in the database, however this introduced limitations that our team was not willing to accept [Burkart, Campbell, & Lambert, 2002]. Our solution was to disable the buttons that allow the user to switch pages until all of the images had finished loading.

Throughout the stages of development of the CMS's interface we gathered feedback from our advisors, Professor Brown and Professor Demetry, as well as our

liaison, Florian Schweizer. It was through this continuous feedback that we were able to refine the smaller details of the interface. Some of the suggestions we received dealt with details such as having inactive text boxes appear darker than active ones and changing the colour scheme so that the catalogue would have a more modern look. Overall, every suggestion that we received about the catalogue was taken into account and the CMS was modified accordingly.

The testing of the database was completed by providing our liaison with the form shown in Appendix D. The purpose of this was to gain feedback on the level of satisfaction of our sponsor with the CMS.

### **4.3. Migration of Existing Digitised Collections**

To provide the CDM with a fully functional CMS we decided to migrate all the existing digitised collections in its possession to the CMS we created. The collections that were digitised and inputted into the CMS were the portrait catalogue the previous WPI IQP team had digitised [Burkart, Campbell, & Lambert, 2002], and the object catalogue, which did not contain any images.

The overall process of the migration went smoothly and no major problems surfaced. The main concern was modifying the field names and sizes to accommodate the differences between each table.

### **4.4. Digitisation of Book Illustrations**

One of the major undertakings of this project was to digitise as many as book illustrations as possible and input them into the database. During the seven weeks of our project, our team managed to digitise over six hundred book illustrations. This constitutes roughly fifty percent of the CDM's illustrations that have photographic negatives and represents some of Dickens most popular novels including *A Christmas Carol*, *Oliver Twist*, *Great Expectations*, *David Copperfield*, *The Pickwick Papers*,

*Nicholas Nickleby* and *Dombey and Son*. The order in which these illustrations were digitised was chosen by our liaison, Mr. Schwiezer.

The procedure we used for digitising and inputting the illustrations into the CMS was fairly fast paced. However, the most time consuming step of the procedure is the retrieval of information about the illustration, which includes the edition, publisher, and other details. This information is scattered throughout several different books and sometimes cannot be found at all. This makes it difficult to estimate the time needed for an intern to catalogue the remainder of the illustrations. Nonetheless, if we assume the intern experiences the same amount of difficulty as our project team, a seven to eight week term should be sufficient.

## 5. Conclusions and Recommendations

This chapter will discuss the progress that the team made in completing the goals of our project, as well as what was learned during the project. Also, recommendations will be made that will increase the effectiveness of the project as well as bring the CDM closer to their long term goals.

### 5.1. Conclusions

Our project was comprised by three basic goals. These were to create a collections management system, to then transfer all of the data contained in the portrait catalogue into the new collections management system, and then to digitise and add the illustrations from the requested novels and works. At the end of our seven week period at the CDM our project team was able to successfully meet and, in some areas, exceed these goals.

Our team started with the five literary works of Charles Dickens that were most popular and inquired about most often for their illustrations. These works were *A Christmas Carol*, *Oliver Twist*, *Great Expectations*, *David Copperfield*, and *The Pickwick Papers*, *Nicholas Nickleby*, and *Dombey and Son*. This entailed us digitising over 600 illustrations, editing the images so they were suitable for the catalogue, and finally researching and then inputting all of the available information about each image. This was a very time consuming process, even with the process being separated into smaller steps that several team mates could work on. For the CDM to finish this task they will need a staff member dedicated to digitising and inputting their collections into the catalogue.

The WPI IQP team from 2002 created a catalogue for the portraits of Charles Dickens and his family [Burkart, Campbell, and Lambert, 2002]. They were able to



digitise over 600 portraits during their seven week period at the CDM. There are still many more portraits to be digitised, like the illustrations, and a member of the CDM staff will have to continue this process. We completed our first goal of creating a collections management system by creating a database that could be used to describe any of the objects that the museum held. The reasoning behind creating a collections management system was that the CDM needed a central point where all of their collections could be accessed and easily searched. After the organisation of the collections management system was in place, the operation of merging the exiting portrait catalogue into the collections management system was easy.

Our second goal, being transferring the data from the portrait catalogue, was quickly completed after we had created the collections management system. We then looked to integrate any other databases that the museum may have. An objects database with over 700 records of the objects contained in the museum was found. This database was then merged into our collections management system as well. With these two databases merged into our collections management system, the next goal to complete was digitising and inputting the illustrations into the collections management system.

In order to digitise and input as many of the illustrations that we could in our seven week period, we decided that it would be best to create a step-by-step procedure that could be broken down into smaller processes. The procedure that we created consisted of ten steps and three major processes. This enabled our team to work in an assembly line, where one member could work on one of the three major processes. Creating this process and following it allowed our team to digitise and input over 600 illustrations. Seeing that we had completed all of our goals, we also discovered another area that we could improve upon, the invoicing system of the museum.

After we conducted the interviews with the CDM staff we decided that if their invoice system was incorporated within the collections management system, creating the invoices for customers could be made much simpler. This invoicing system will now keep records of the invoices created, which makes searching through the invoices much faster. The CDM will also be able to use the invoicing system to track their sales to find their largest customers or to determine their most popular objects. This automated invoice system generator is an initial step for a customer profiling system for the CDM, which may be able to be used to increase their income.

## **5.2. Recommendations**

While we were completing our goals, we discovered a few opportunities for improvement. Although we started the population of the illustrations portion of the collections management system, and created an invoicing system, there is still more ways to improve the overall collections management system. Also, the long term goal, of the CDM, to have the catalogue be available via the Internet could have many advantages, which we will discuss further.

### **5.2.1. Using and Populating the Catalogue**

Our project team was able to digitise and input over six hundred illustrations in a seven week period, but there are still approximately six hundred illustrations to be digitised and inputted into the collections management system. The collections management system will become much more effective with the complete collections inputted into the system. In order to facilitate the process of inputting the rest of the illustrations, portraits, and any other holdings of the CDM, we have created a user manual, an administrative manual, and a procedure for digitising and inputting objects.

Although we created the user interface of the entire collections management system to be as user-friendly as possible, we have created and included a User Manual in Appendix F and an Administrator Manual in Appendix G. We would recommend any user not familiar with search forms to quickly read through the User Manual. Whenever an administrator would like to modify the collections management system, he should refer to the Administrator Manual for any needed assistance.

The User Manual is a short and concise manual that uses images taken from the catalogue itself to guide a user through the entire process of using the catalogue. This manual was designed for a user with minimal computer background. The manual guides the user through the steps of starting of Microsoft Access, logging into the system, creating their search, and then finally displaying and navigating through the results.

The Administrator Manual contains information about how to perform all of the administrative actions such as adding records, editing records, deleting records, and working with the invoices. This manual uses images directly from the collections management system and explains in full how to use all of these features. The main objective of the Administrative Manual is to enable the CDM to populate the collections management system with all of their collections.

The catalogue will become even more useful when the cataloguing of the CDM's collections is complete. This will then allow the CDM staff and any others who would like to search through the holdings of the CDM to explicitly use the catalogue and not interact with the objects themselves. This will help with the preservation of the objects, and the process of searching through the catalogue will be much faster than conducting the search by hand through a filing cabinet. But only once the cataloguing is complete will the full usefulness of the collections

management system be realised. For these reasons we suggest that an intern is hired by the CDM and populate the database with the collections that the CDM holds.

The automated invoicing system, which has been integrated with the collections management system, requires the staff of the CDM to use it exclusively when creating invoices. Populating the invoicing system in this manner will allow the CDM to eventually move to a paperless invoicing system, which will be much more organised than the invoicing system that is currently in use. Also, if the invoicing system is used by the CDM staff, searching for information from past invoices or determining their larger customers will be made easier with this system.

### **5.2.2. CDM Catalogue via the Internet**

There are great benefits to be gained from having the catalogue portion of the collections management system able to be accessed via the Internet. There would be a larger amount of people able to access the collections of the CDM, more knowledge about Charles Dickens could be more easily available, the museum could be able to increase their income from possible increased business, and the researchers would be able to find the objects they were looking for on their own, which would decrease the workload on the CDM staff.

One of the long term goals of the CDM was to have a catalogue of their collections available via the Internet. We recommend this to be the next step to be taken after the collections management system is populated with more or most of the CDM's objects. This process of getting the collections management system ready for the internet could even be done as a project with WPI. The first steps that would need to be taken in order to get the catalogue portion of the collections management system would be to determine the logistics of hosting a website. There are several options that the CDM had to consider. The CDM could host the website itself on a computer

dedicated to serving the website, or they could hire an outside company to host the website for them. This decision could then impact some of the other decisions that have to be made on this subject. For instance, if the CDM decides to use a hosting company to host their website, they may also opt to have the same company create the interface for the catalogue. Once these decisions have been made, about hosting solutions, then whatever processes that still need to be completed could be handled by a WPI project team. This could include a number of things, such as creating the interface that the users would use to search the catalogue, if needed, or transferring the data into whatever format is required for the program that they are using. Since making the catalogue portion of the collections management system available via the internet was not within the scope of our project, we have not done extensive research into what is required for this process.

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## **Appendix A. Preservation**

One of the main goals of creating the database of the CDM's illustrations is to help preserve them for generations to come and be able to admire and learn from his work. Since most of these illustrations were created on paper, we will be focusing on how to preserve works of art on paper. Although we do assume that the Dickens House Museum already has a firm grasp on how to properly preserve the illustrations, we want to make ourselves aware of the appropriate steps one must go through to preserve the illustrations. The following will be a discussion on a few particulars regarding the preservation of works of art on paper.

### **A.1. Art on Paper**

The destruction of works of art on paper can be classified into two categories, internal or external. Firstly, internal factors which cause the breakdown of paper are inherent to how the paper was created and even how the work of art was made. For example, the materials that have been used to create paper for the last century or two have included unrefined wood pulp, chlorine bleaches, and unstable sizing agents (Whelchel, 1992). These types of materials cause the visible yellowing of paper as well as the tendency of paper to become brittle. It is usually recommended that if any pieces of artwork are rapidly deteriorating because of internal factors to put them through a process known as deacidification. Although this type of process may change the look of the piece, so it is a decision the curator or keeper of the collection must seriously weigh.

Internal factors do not solely rely on how the paper itself was made though, it can also be the materials the artist used when created the work of art. Some paints are unable to adhere to certain types of paper for long periods of time, and may flake off.

Also, some pastels are very light and powdery, which may cause them to fade more easily than some other colors or mediums (Whelchel, 1992). Even though the internal factors cause damage to the works of art, it is more often the work of external factors which destroy the pieces. The external factors include the way in which the piece of art is displayed as well as the environment in which it is stored.

## **A.2. Displaying Paper**

Of all of the many things that can be done to a work of art on paper, one of the most common, framing and matting, can be the most harmful. It is the adhesives that are used during the framing of the illustration which can later break down and destroy the paper itself. Everyone has seen examples of when adhesives such as old tape breaks down, it no longer has the ability to perform its function and will also leave a telltale mark on the paper where it once was (Clapp, 1974). This chemical breakdown is not limited to the types of adhesives that are used though; the matting that may be used for protection or display purposes may also over time have a chemical breakdown.

Most matting is made of some form of paper, and like the works of art on paper that we are trying to preserve, these paper composites can become acidic and start to internally destroy themselves. Then this now acidic matting can start to attack the illustration it is in contact with. Measures can be taken in order to prevent this from happening, such as using matting that is acid-free, or that has been chemically purified and buffered. The matting should be carefully researched, because even if the matting when manufactured had a pH of 7, the process of aging can bring that pH down to dangerously acidic levels (Whelchel, 1992).

Once again, we will have to observe how the Charles Dickens Museum currently displays the illustrations and find if there are any suggestions we can make to how they can improve on their current care.

### **A.3. Storage Environment**

Some of the largest external factors that lead to damage of works of art on paper are the many different aspects of the environment where the paper is stored or displayed. These factors include the relative humidity of the museum and the amount of light that the paper is exposed to.

#### **A.3.1. Relative Humidity (RH)**

When the RH of a room changes frequently, this causes the paper inside the room to shrink and swell. This shrinking and swelling causes much damage to the paper and will eventually destroy the piece of art. The relative humidity inside of buildings that do not have a system to regulate it can vary from seventy percent during the summer to ten or fifteen percent during the winter (Clapp, 1974). The optimum RH for the preservation of paper is between the range of forty to sixty percent. This range of RH reflects many factors that can harm paper, such as molds will thrive with high humidity, and if the humidity is too low, then other materials such as wood may be damaged by excessive dryness (Clapp, 1974).

#### **A.3.2. Light Exposure**

It is the ultraviolet (UV) rays from sources of light like sunlight and fluorescent lighting that destroy paper the quickest. Although the higher energy wavelengths of light, like UV rays, do the most amount of damage to the paper, any form of light will still over time fade and eventually destroy the paper and the artwork. It should be noted that it is not only the paper that is adversely affected by

exposure to light, but it is also the drawing ink that is used in the illustrations that can become faded with exposure to light (AIC, 2003). Preventative measures such as UV shielding on the lights themselves, or on the illustrations can be used to minimize the damage, but overall it is recommended to illuminate art on paper with a range of brightness between five and ten foot-candles, for preservation reasons (Clapp, 1974).

## **Appendix B. Interview Questions**

### **B.1. Guideline for Digital Imaging Experts**

1. What is your professional title?
2. Have you ever worked on a project similar to this one?
3. What are the pros and cons of capturing images with a scanner?
4. What are the pros and cons of capturing images with a digital camera?
5. To what extent will the light from the hardware damage the original illustrations?
6. What file format would you recommend for a digital imaging project?
7. Do you have any other suggestions for us?

The first question is an opening question to get to know the interviewee. The second question will introduce the interviewee to our project. Questions three through six will provide us with specific information on the hardware and file formats that should be used according to the demands of our project. Finally, question seven will allow the interviewee to give us advice on topics we did not address in our questions.

### **B.2. Guideline for Electronic Cataloguing Experts**

1. What is your professional title?
2. Have you ever worked on a project similar to this one?
3. What database software would you recommend for a small museum's collections management system?
4. Would you suggest using any particular metadata standards?
5. Do you have any other suggestions on database design specific to our project?

The first question, as before, is an opening question and establishes the relationship of the interviewee with us. The second question will introduce the

interviewee to our project and allow him to relate specific past and present experience of his similar project to ours. The fourth and fifth questions will provide us with specific information on software and the basic elements of a database design. The final topic will guide the interviewee to give us some suggestions on the choices we should make according to his or her opinion and experiences and related to our project's demands.

### **B.3. Guideline for Dickens Scholars**

1. What is your professional title?
2. What is your affiliation with Dickensian work?
3. Do you have any knowledge about the illustrations, usage, production, artists, interesting facts and details?
4. What potential users would our project result attract when made accessible through the web?

The first question is an introductory question. The second and third questions will provide us with background information on Dickens, his illustrators and the drawings themselves. The last question in this section is a very important question as it will be useful for identifying the future target users of our database.

### **B.4. Guideline for CDM Staff**

1. What is your position within the Dickens House Museum?
2. Who from the remaining staff will be a potential use of the database?
3. What categories would you like to search by in an illustration database?
4. What are your dislikes and likes from the current portrait database?
5. How would you use the illustration database, for what reasons?
6. How do you search for an illustration currently?

The first question is an introductory question. The second question will determine who from the rest of the CDM staff we should interview. The third question will provide us with the wishes of the CDM staff for their database search process. The fourth question will give useful information on what to avoid or include that the previous WPI team did not include in their portrait database. Finally the last two questions will give valuable information on the design of the database.

## **B.5. Patron E-mail Survey**

Dear Sir or Madam:

We are a group of students working on a project with the Charles Dickens Museum. The goal of this project is to digitise and catalogue the Museum's collection of illustrations and photographs. To ensure that the result of this project suits the needs and desires of the Museum's patrons, we request that you briefly answer the questions that follow.

Thank you,

Stavros Kakouros, Christopher Lacasse, David Loose

1. Why have you previously inquired the Charles Dickens Museum about their illustrations?
2. How frequently do you inquire the Charles Dickens Museum about their illustrations?
3. When making your inquiry did you have a certain illustration in mind? If not, what were you looking for (novel, character, location, etc.)?
4. Would you use the illustrations catalogue if it were available on the Internet?
5. If such a catalogue were available, which categories would you find most helpful to search by?
6. Would you be more likely, less likely, or just as likely to purchase illustrations from the Charles Dickens Museum if their catalogue was available online?



## Appendix C. Database Fields

### C.1. Item Table

Field Name	Data Type
Collection	Text
Category	Text
SubCategory	Text
ObjectID	AutoNumber
Description	Memo
Title	Text
People	Text
Place	Text
Artist	Text
CreatedDate	Text
Height (mm)	Number
Width (mm)	Number
Location	Text
NegativeNumber	Text
RelatedWork	Text
Edition	Text
Publisher	Text
PrintType	Text
Material	Text
Original	Yes/No
Condition	Text
ConditionRemarks	Memo
Notes	Memo
Owner	Text
Colour	Text
NumberOfImages	Number
ImageFileName	Memo
CataloguedBy	Text
CataloguedDate	Date/Time
UpdatedBy	Text
UpdatedDate	Date/Time
AcquiredFrom	Text
AcquisitionDate	Date/Time
AcquisitionType	Text

## C.2. Invoice Table

Field Name	Data Type
InvoiceNumber	AutoNumber
CustomerID	Number
InvoiceDate	Date/Time
ShippedDate	Date/Time
PaidDate	Date/Time
Contact	Text
ReferenceNumber	Text
ShippedVia	Text
Terms	Text
Notes	Memo
Quantity1-8	Number
Description1-8	Text
UnitPrice1-8	Number
Object1-8	Number
Amount1-8	Number
PostageAndPacking	Number
SubTotal	Number
Total	Number
VAT	Number

## C.3. Customer Table

Field Name	Data Type
ID	AutoNumber
Name	Text
Organisation	Text
BillingAddress	Memo
ShippingAddress	Memo
Type	Text
NonProfit	Yes/No

## C.4. Settings Table

Field Name	Data Type
ID	AutoNumber
InvoicePath	Text
ThumbnailPath	Text
WatermarkedPath	Text

### C.5. Controlled Vocabulary Table

Field Name	Data Type
Vocabulary	Text
Value	Text
ID	AutoNumber

### C.6. User Table

Field Name	Data Type
UserName	Text
FullName	Text
Initials	Text

### C.7. Switchboard Table

Field Name	Data Type
SwitchboardID	Number
ItemNumber	Number
ItemText	Text
Command	Number
Argument	Text

## Appendix D. Database Testing Guide

The testing of the Database will involve these questions, which will be answered using a graduated scale from one to five. One will represent that the subject strongly disagrees with the statement and five will represent that the subject strongly agrees with the statement.

The questions are as follows:

I was able to easily conduct my search.

1      2      3      4      5

I could easily navigate the catalogue.

1      2      3      4      5

The detailed view displays the information that I needed.

1      2      3      4      5

The thumbnail view was helpful.

1      2      3      4      5

I enjoyed the appearance of the catalogue.

1      2      3      4      5

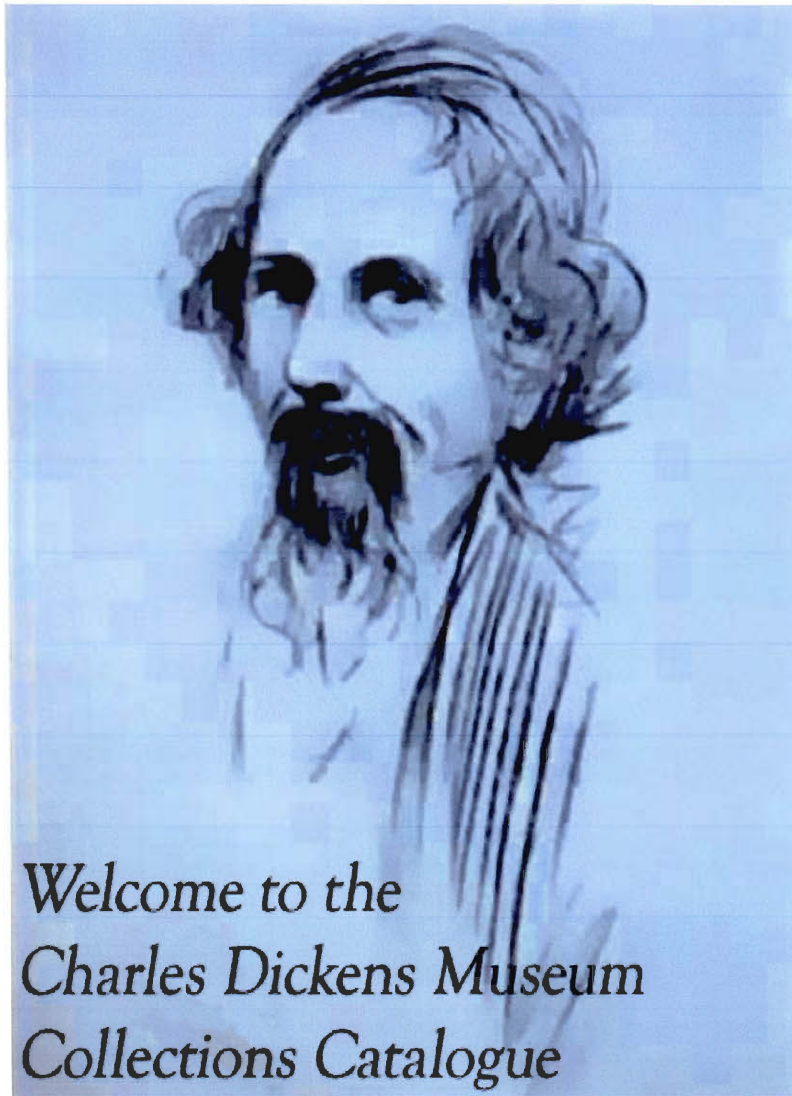
What can you suggest as improvements at this point?

# Appendix E. Schedule

	26-Jan-03	2-Feb-03	9-Feb-03	16-Feb-03	23-Feb-03	2-Mar-03	9-Mar-03	16-Mar-03	23-Mar-03	30-Mar-03	6-Apr-03	13-Apr-03	20-Apr-03	27-Apr-03
	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF	SMTWTF
Interviews (Worcester)		█	█	█										
Proposal Writing			█	█	█									
Presentation of Proposal					█									
Break						█	█	█						
Arrival									█					
Orientation									█					
Interviews (London)									█					
<b>Database Design</b>										█	█	█	█	
<i>Metadata Creation</i>										█	█	█	█	
<i>Backend Coding</i>										█	█	█	█	
<b>Digitization</b>											█	█	█	█
<i>Image Quality Testing</i>											█	█	█	█
<i>Creating Images</i>											█	█	█	█
<i>Input Data</i>											█	█	█	█
Creation of Manuals												█	█	█
Testing												█	█	█
Troubleshooting												█	█	█
Presentation														█
Writeup														█
Departure														█

## **Appendix F. User Manual**

The user manual that we created for the collections management system can be found on the pages that follow. The manual assumes little to no prior experience with computers to ensure that a broad range of people will be able to understand and use the CMS. It focuses primarily on searching because that is the only operation non-administrative users are allowed to do. The administrative manual found in Appendix G covers the remaining operations.



*Welcome to the  
Charles Dickens Museum  
Collections Catalogue*

User Manual

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# 1. Getting Started

To start the electronic catalogue, first double left-click on catalogue icon.



Figure 1 - Catalogue Icon

The image shows a standard Windows-style dialog box titled "Logon". It features a blue title bar with a question mark icon and a red close button. The main area contains two text input fields: "Name:" and "Password:". The "Name:" field is filled with the text "Researcher". The "Password:" field is empty. To the right of the "Name:" field is an "OK" button, and below it is a "Cancel" button.

Figure 2 - Logon Form

Then, enter “Researcher” into the username textbox. There is no password required for this account, so you may leave that textbox blank.

Then click the “OK” button, or press the enter key. This will log you into the catalogue as a read only user. This means that you are unable to modify any entries, or create any new ones. Now, you will be presented with the search form for the Charles Dickens Museum Collections Catalogue.

## 2. Search Form

The search form is as shown below in Figure 3.

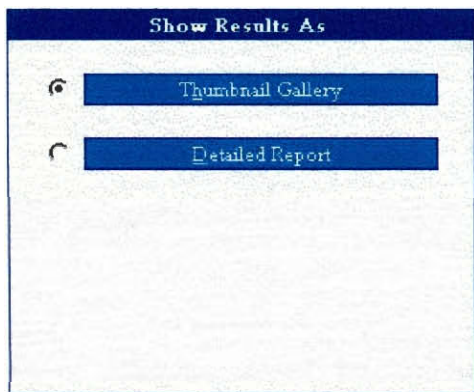
**Figure 3 - Electronic Catalogue Search Form**

As one can see in Figure 3 there are three main tables, Collections to Search, Show Results As, and the Main Search Table. There are also two buttons the Search and the Clear Form buttons. All of these features will be explained in detail in this section.

Firstly, the Collections to Search table, as seen in Figure 4, consists of five check boxes, each representing one of the collections. By clicking on either the checkbox itself or the blue textbox you can include or exclude these collections.

When the search form is first opened, all five of the collections will be included in the search.

**Figure 4 - Collections to Search Table**



**Figure 5 - Show Results As Table**

Next, the Show Results As table, as seen in Figure 5, contains only two options. These options are Thumbnail Gallery or Detailed Report. Both of these options will be explained further in section 3 Displayed Results. When first opened the Thumbnail Gallery option will be selected.

Finally, the Main Search Table, as seen in Figure 6, is where you enter the terms you will search by, and make your selections for the fields that will be searched. All of the fields

	Conjunction	Search Field	Comparison Type	Search For
Search Term 1:		Any Field	CONTAINS	
Search Term 2:		Any Field	CONTAINS	
Search Term 3:		Any Field	CONTAINS	
Search Term 4:		Any Field	CONTAINS	
Search Term 5:		Any Field	CONTAINS	

**Figure 6 - Main Search Table**

that you are able to search by are contained in the drop down box under search field.

Next, you may choose the comparison type that you will use within that search field. For instance if you would like to find any mention of the word Oliver, you would type in Oliver in the Search For field and leave the Search Field to "Any Field" and the Comparison Type to "CONTAINS". This search can be seen in Figure 7.

	Conjunction	Search Field	Comparison Type	Search For
Search Term 1:		Any Field	CONTAINS	Oliver
Search Term 2:		Any Field	CONTAINS	
Search Term 3:		Any Field	CONTAINS	
Search Term 4:		Any Field	CONTAINS	
Search Term 5:		Any Field	CONTAINS	

**Figure 7 - Search for Oliver**

After you have entered all of the terms you would like to search by, you initiate the search by left clicking the Search button. If at any time you would like to clear the entire search form and start new, simply left click the Clear Form button. Section 3 Displayed Results will show you how the information is displayed from the search conducted in Figure 7.

### 3. Displayed Results

The selection for Show Results As is defaulted to the Thumbnail Gallery, this means that when the search form is first opened, Thumbnail Gallery will be selected. The search shown in Figure 7 when viewed in the Thumbnail Gallery format will appear as shown in Figure 8.



Figure 8 - Thumbnail Results

The number of results and the selection of the results that you are currently viewing can be found at the top of the image, near area 1. Area 2 displays the smaller, thumbnail image of the object. This area can be left-clicked on and the detailed report for that image will appear. The detailed report will be discussed later in this manual. Area 3 shows the title and the artist of the particular image being displayed, that is if this information is available. Area 4 and area 5 depict the navigation buttons that allow you to advance to the next fifteen results or to the previous fifteen results.

If Show Results As was selected to be Detailed Report, then the results for the same search conducted before would return results shown in Figure 9, below.

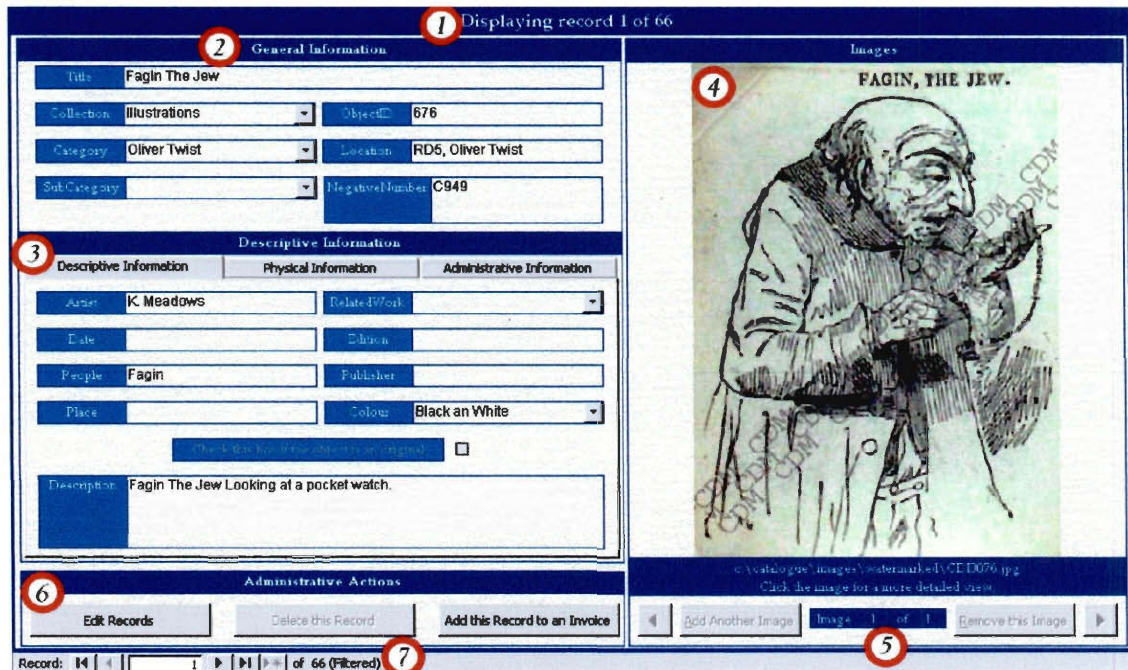
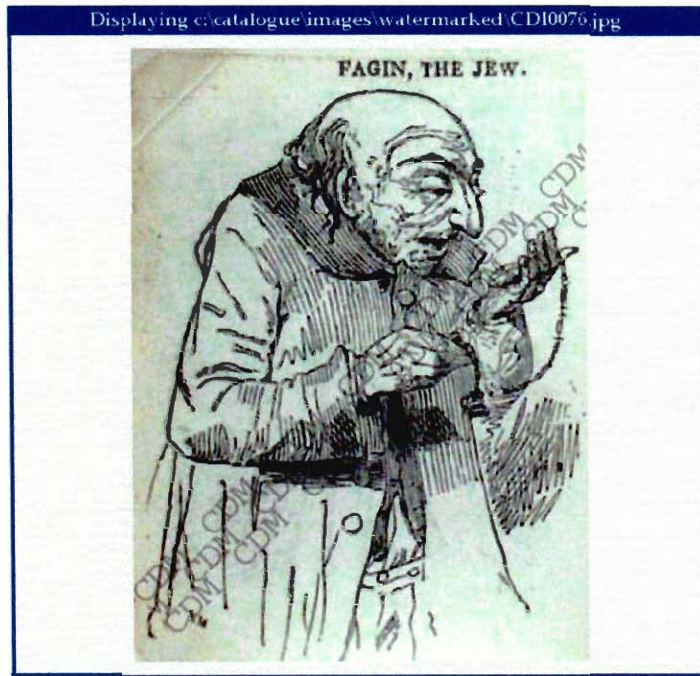


Figure 9 - Detailed Search Results

Once again, the number of results and the current record being viewed can be found in area 1. Area 2 contains the general information about the current object, this is information that can help locate the object. Area 3 is a multipurpose section. There are three tabs that can be left-clicked, and each tab will allow for new information to be displayed. The three categories of information are descriptive, physical, and administrative. Area 4 is the area where the image of the object is displayed. You are able to left-click on the image to view the image at its full size. This is shown in Figure 10. Area 5 shows how many images are associated with the current record. If there is more than one image associated with a record the left and right buttons will be enabled and you will be able to switch between the images. Also, directly below the image the full path to the image file itself is displayed. Area 6 displays the administrative actions

available in the detailed view form. These actions include editing the current record, deleting the current record, and adding the record to an invoice. These functions are discussed further in the administrative manual. Area 7 contains the navigation buttons that you can use to search through the records one by one.

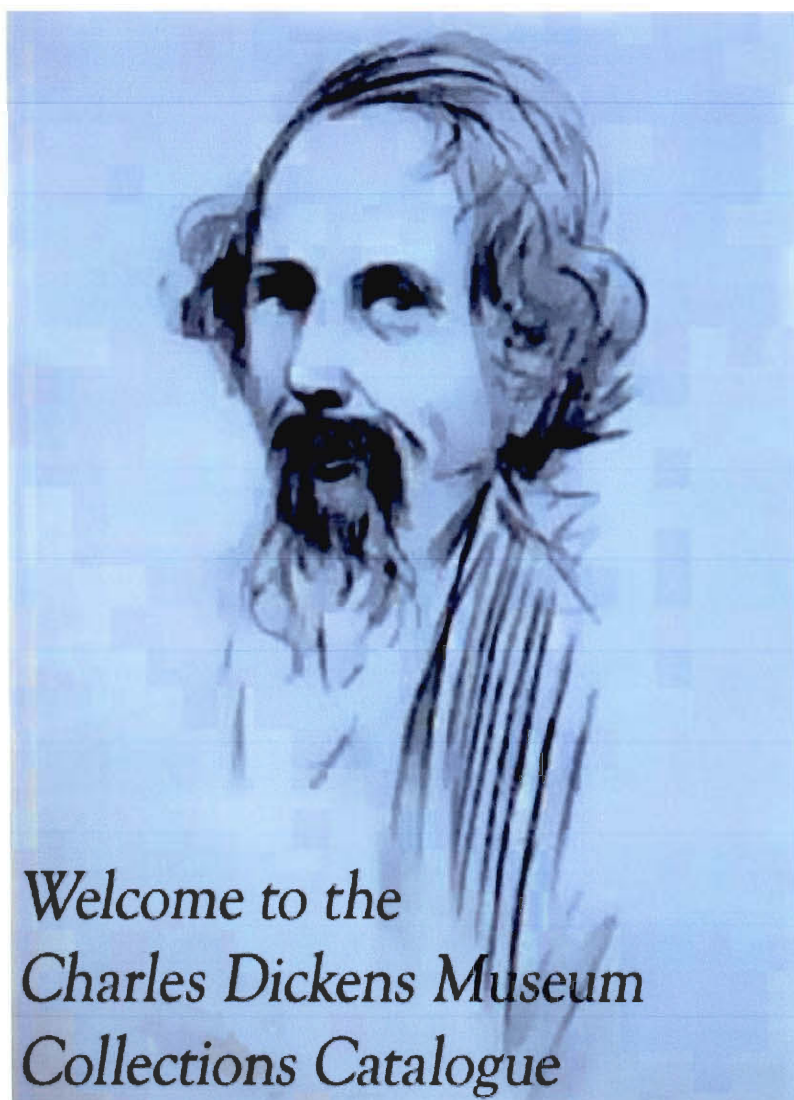


**Figure 10 - Detailed Image View**

## **Appendix G. Administrative Manual**

The administrative manual that we created for the collections management system can be found in the pages that follow. Its purpose is to aid the staff of the CDM in completing the digitisation of their collections. It describes the methods we used to capture the illustrations and enter them into the catalogue. The manual also explains how to create invoices, change database settings, and modify security information.





*Welcome to the  
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Administrative Manual

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Next, is the process of creating thumbnails and watermarked copies of the images.

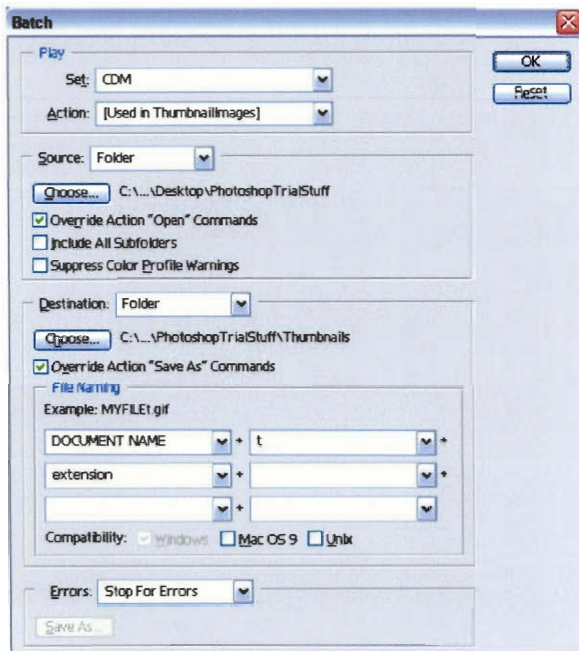


Figure 17-Batch Dialogue Box

To create the thumbnail copies of the images, use the

“Thumbnailimages” action. A dialogue box will then appear like

the one in Figure 17. Pay close attention to the two “Choose...”

buttons. Left-click on the first

“Choose...” button and select the folder in which your images are

stored. Now, left-click on the

second “Choose...” and select the

folder in which you would like to store the thumbnail images. You may choose to have

the destination folder be the same as the source folder for easy tracking of the images. To

create the watermarked copies of the images you must use the “Watermarkimages”

action. Use the same procedure for entering information into the dialogue box as you did

with the “Thumbnailimages” action. When both of these actions are complete, you will

have a complete set of thumbnailed, watermarked, and original images. To enter these

images into the database refer to Section 2.1.

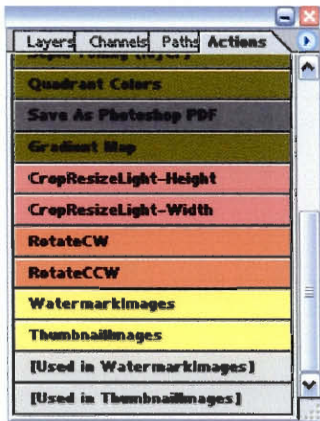


Figure 15-Actions Toolbar In Adobe Photoshop

The two actions entitled “Rotate CW” and “Rotate CCW” will rotate your image clockwise and counter-clockwise respectively. These actions were included to make straightening your images easier. Once your image is straightened, select the Rectangular Marquee Tool. The button to select this tool is highlighted in **Error! Reference source not found.**



Figure 16-Rectangular Marquee Tool

With the rectangular marquee tool, select the portion of the image that you would like to keep and enter into the catalogue. Now, use the “CropResizeLight-Height” or the “CropResizeLight-Width” action. In

order to determine which action to use, if the height of your image is the largest dimension then use the “CropResizeLight-Height” action, or if the width of your image is the largest dimensions then use the “CropResizeLight-Width” action. This action will discard any portion of the image that you did not select, resize the image so it will be easily displayed in the catalogue, and adjust the brightness of the image. You must now do this for each image you wish to enter into the catalogue.



**Figure 14-Image Capture Setup**

Use a flat white surface, like the poster-board on the floor in Figure 13 as your background. Remember to remove the object from its plastic sleeve to reduce the amount of glare. Then, position the camera on the tripod so that you are able to photograph the entire object. After photographing the object, replace the object into its protective sleeve, and continue with the same process above for all of the objects you wish to digitise.

## ***5.2. Editing***

The images are not yet suitable for the catalogue, so they must first be edited.

Open Adobe Photoshop 7.0. Now, you will want to open all of the images that you wish to enter into the catalogue. Left-click on Window, then left-click on Actions. This will present you with the Actions toolbar as seen in Figure 15.

click on the “Add a New Record” button. This will then allow you to enter all of the information for that customer to the database.

## **5. Digitisation Process**

The process of digitising and then inputting the data for each illustration can be found here. This chapter will guide you through each of the two main steps in this process, capture and editing.

### ***5.1. Capture***

Although the images contained in the catalogue itself will not be used for reproduction purposes, it is best to photograph the images at the highest possible quality. Using the Olympus C-2500L camera that the CDM owns, set the camera to super high quality mode (SHQ). Next, set the file format to be JPEG and not TIFF. If you are using the 128MB compact flash card, the compact flash card should be able to store approximately 65 images with these settings. This is with an empty memory card. If the camera is reporting a much higher or much lower number, then check your settings again.

click on the “Add to Invoice” button on the detailed view of the search report. This will automatically update the invoice with the selection you have made. Then you must fill in the information related to the quantity ordered and the unit price. The invoice will calculate all of the totals for you. When you are finished creating the invoice you must now left-click the “Done Editing” button. This will save all of the information that you input for that invoice. You may also want to print the invoice. To do this left click on the “Print this Invoice” button.

### 4.3. Add or Modify a Customer

This option will allow you to add or modify a customer that is already contained in the customer database. When this option is chosen, the form shown in Figure 13 will appear.

Patron Information	
Name	Philip V. Allingham, Ph.D.
Organisation	Lakehead University
Billing Address	Philip V. Allingham, Ph.D., 1/5 English Curriculum & Instruction, Faculty of Education, Lakehead University, THUNDER BAY
Shipping Address	
Customer Type	University Researcher
<input checked="" type="checkbox"/> Included, this customer is a not for profit organisation	

Actions

Add a New Record      Remove this Patron

Figure 13-Add or Modify Customers Form

To modify a customer who already exists in the database, simply find their name in the drop down menu, and then edit their information. To add a new customer, left

able to print normally from Microsoft Word. If at any time during this process Microsoft Word asks you to save, select “No”!! This is so that you do not save over the template created for the invoice.

## 4.2. Create

You are also given the option to create a new invoice. After left-clicking on the “Create a New Invoice” button, you will be presented with the form shown in Figure 12.

The screenshot shows a web-based invoice form titled "The Charles Dickens Museum - [Adding Records]". The form is titled "Adding invoices to the database" and is divided into several sections:

- Customer Information:** Includes fields for Name, Organisation, Billing Address, and Shipping Address.
- Invoice Information:** Includes fields for Invoice Number (781), Date Ordered (4/29/2003), CDM Contact (Andrew Xavier), Customer Ref Number, Date Shipped, Shipped Via, Date Paid, and Payment Terms (30 days).
- Items Purchased:** A table with columns for Quantity, Select, Description, Unit Price, and Amount. The table contains 8 rows of data, each with a quantity of 0 and a unit price of £0.00.
- Additional Notes:** A text area for additional notes.
- Summary:** A table with columns for Category and Amount. It includes Subtotal (£0.00), VAT (£1.00), Postage and Packing (£0.00), and Total (£0.00).
- Actions:** Includes buttons for "Done Editing", "Delete this Record", and "Print this Invoice".

Figure 12-Create an Invoice Form

Then you may fill the invoice with the information that you have about the customer. If you are adding an object that is related to anything in the catalogue, then you could use the search feature to add it to the invoice. To do this, left click on the magnifying glass on the line you are currently filling in. This will then bring up the search form, so that you may find the object you are looking for. After you have found the object, you can



You are able to use up to five search terms to create your search. The search operates in a very similar manner to the catalogue search. After you have entered in all of your search terms, left click on the “Search” button. Your results will then appear in a form like the one in Figure 11.

The screenshot shows a web application window titled "The Charles Dickens Museum - [Renewing Invoices]". The main content area is titled "Displaying invoice 1 of 3".

**Customer Information:**

Name: Philip V. Allingham, Ph.D.	Organisation: Lakehead University
Billing address: Philip V. Allingham, Ph.D., 1/5 English Curriculum & Instruction, Faculty of Education, Lakehead University, THUNDER BAY	Shipping address:

**Invoice Information:**

Invoice Number	Date Ordered	CD/DL Contact	Customer Ref Number	Date Shipped	Shipped Via	Date Paid	Payment Terms
778	1/15/2003	Worcester Polytechnic Institute	ABC 123	1/22/2003	Post	1/25/2003	30 days

**Items Purchased:**

Quantity	Object ID	Description	List Price	Amount
200	342	Portraits: 'Woodcut of CD Writing'	£84.50	£16,900.00
1	1	Topography: 'Photograph of woodcut'	£1.00	£1.00
2	22	Portraits: 'CD April after 1837'	£2.00	£4.00
3	333	Portraits: 'Profile of CD sitting in a chair'	£3.00	£9.00
4	4	Portraits: 'Woodcut for "Little Folks" No. 63'	£4.00	£16.00
5	470	Portraits: 'CD cover of "The Paried"'	£5.00	£25.00
6	666	Illustrations: 'Marley's Ghost' by John Leach	£6.00	£36.00
7	7	Portraits: 'Bifurcable of Young CD'	£7.00	£49.00

**Additional Notes:**

	Sub total	£17,016.00
	VAT	£2,982.00
	Portage and Packing	£0.00
	<b>Total</b>	<b>£20,022.00</b>

**Actions:**

Edit Invoice    Delete this Record    Print this Invoice

Figure 11- Invoice Search Results Form

As you can see, all of the information is listed in the invoice search result view. This view contains all of the customer’s information along with the specifics of the order. There are also three actions that you may use: edit invoice, delete this record, and print this invoice. Simply left click on the corresponding button to perform that action. In order to delete the record you must first left-click on “Edit Invoice” and then you will be able to left-click on “Delete this Record”. If you choose to print the invoice, then Microsoft Word will open with all of the information loaded. From there you will be

## 4. Invoice Management

The invoice management system allows for two basic functions searching invoices

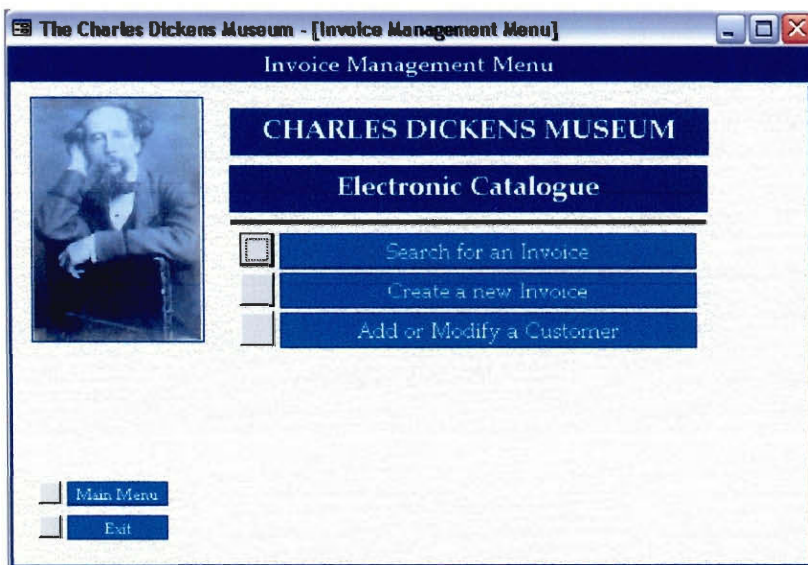


Figure 9 – Invoice Management Switchboard

and creating invoices. Figure 9 shows the switchboard that you are presented with when you choose the invoice management option. From here you can choose either

option, search, create, or add or modify a customer entry.

### 4.1. Search

The invoice search form is similar to the search form used to search the catalogue.

Figure 10 shows the invoice search form.

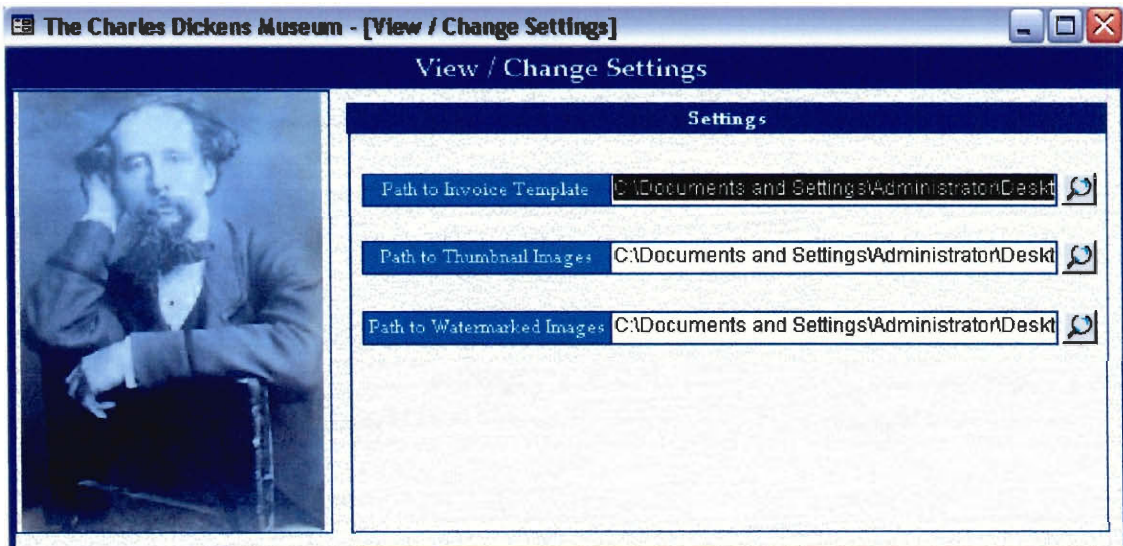
The screenshot shows a web browser window titled "The Charles Dickens Museum - [Searching for Invoices]". The page has a dark blue header with the text "Invoice Search". Below the header is a portrait of Charles Dickens on the left. To the right of the portrait is a table with five rows and four columns: "Conjunction", "Search Field", "Comparison Type", and "Search For". The first row is pre-filled with "AND", "Any Field", and "CONTAINS". Below the table are two buttons: "Clear Form" and "Search".

	Conjunction	Search Field	Comparison Type	Search For
Search Term 1	AND	Any Field	CONTAINS	
Search Term 2		Any Field	CONTAINS	
Search Term 3		Any Field	CONTAINS	
Search Term 4		Any Field	CONTAINS	
Search Term 5		Any Field	CONTAINS	

Figure 10-Invoice Search Form

### 3. View or Change CMS Settings

To view or change the settings of the CMS you will need to click on the similarly named button on the switchboard which is shown in Figure 3. When this option is chosen you will be presented with a form like the one displayed in Figure 8.



**Figure 8- View / Change Settings**

As you can see, if the location of where the images or the invoice document was stored was to change, you can update the catalogue using this form. Simply left click on the magnifying glass to the right of the option you wish to change and then using the dialogue box that appears, choose the new location.

general information area where important information such as the Title and the Collection that the object belongs to should be entered. Area two contains three tabs that allow you to switch between descriptive, physical, and administrative information for the object. Area three is the image area of the entry. To add an image left click on the “add another image” button. First, a message will appear providing you with instructions to choose the location of the watermarked image.

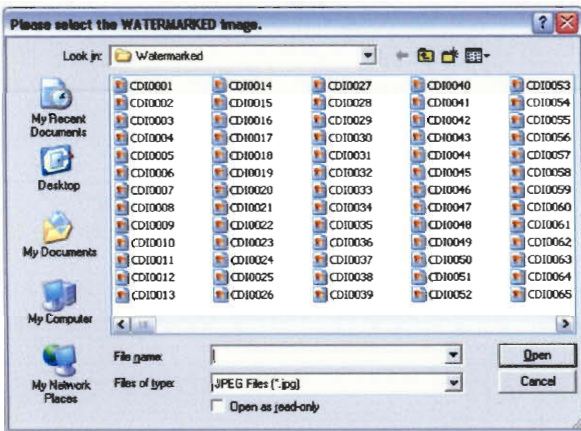


Figure 5 - Watermarked Image Dialogue Box

The dialogue box that will then appear is shown in Figure 5. After choosing the watermarked image that you want to add to the entry, left click on the Open button. Another message will then be displayed asking you to choose the location of the thumbnail image for the entry. The dialogue box

in Figure 6 will then be displayed. After you locate the thumbnail image for the entry,

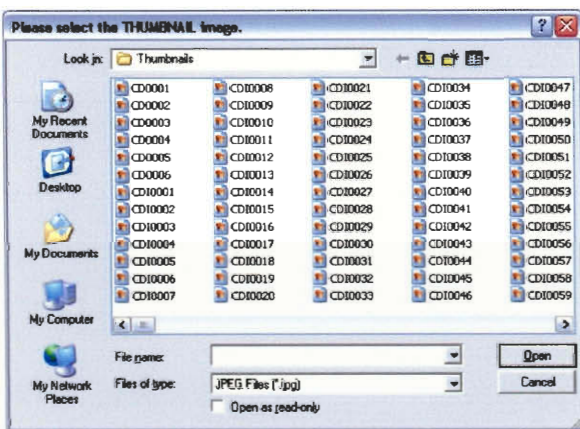


Figure 6 - Thumbnail Image Dialogue Box

left click on the Open button. You will now have completed adding the images to your entry. If you have multiple images for one entry, then left click the “Add Another Image” button. You will then proceed through the same process as you did for adding the first image.

Once you have entered all of the images

## 2. Manipulating Records

There are three main functions that one can perform on a record. These functions are adding a record, editing a record, and deleting a record. The following sections will provide you with information regarding how to perform these actions.

### 2.1. Add a Record

To add a record to the database you must click on the respective button on the switch board that you are presented with when you log on to the CMS. Then you must left-click on the second button, the one entitled Add an entry to the Electronic Catalogue. This will then bring you to the next screen which can be seen in Figure 4.

The screenshot shows a web-based form titled "Adding records to the database". The form is split into two main columns. The left column contains three sections: "General Information" with fields for Title, Collection, Category, SubCategory, ObjectID (AutoNumber), Location, and Registered number; "Descriptive Information" with tabs for Descriptive Information, Physical Information, and Administrative Information, and various input fields for Artist, Date Created, People, Place, Related work, Edition, Features, and Colour; and "Administrative Actions" with buttons for "Done Editing", "Delete this Record", and "Add this Record to an Invoice". The right column is titled "Images" and contains the text "There are no images available for this object." Below this is a status bar showing "Image: 0 of 3" and buttons for "Add Another Image" and "Remove this Image". A footer bar at the bottom shows "Record: 14 of 841".

Figure 4 - Add an Entry Form

The “add an entry” form has the same look as the detailed result view. This will also be the same view that is used when editing an entry. Area one in Figure 4 is the

# 1. Getting Started



Figure 1 - Catalogue Icon

the database. You will then be prompted with a

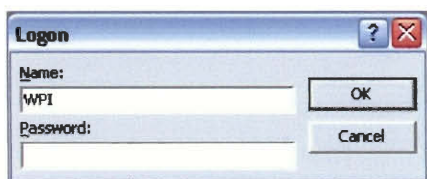


Figure 2 - Logon Form

After you have entered your password, you can either left-click the “OK” button, or you can press the enter key. If you have forgotten your user name or password, contact another administrator and they will be able to retrieve and then change your name and password for you.

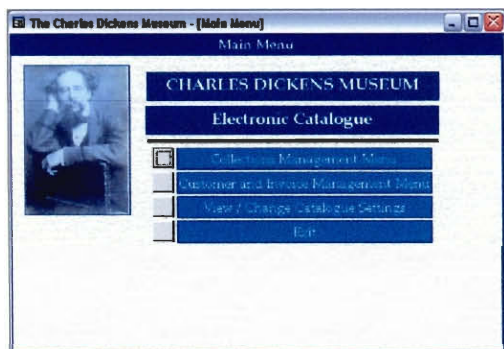


Figure 3 - Switchboard

If you would like to search the catalogue, then left-click the first option and you will be presented with the search form. A full explanation of the search form is given in the User Manual.

To enter the electronic catalogue, first double left-click on the catalogue icon shown in Figure 1.

This will start Microsoft Access and will open

the logon screen shown in Figure 2. Depending on the user you will have a different name and password.

The example shown in Figure 2 is that of a

member of the WPI team logging in. After logging into the catalogue, you will be presented with the switchboard seen in Figure 3. From this point there are five options. You can search the database, add an entry to the catalogue, manage the invoices, perform other administrative actions, or exit the catalogue.

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