Digitization of Photographs

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Abstract

Developing preservation strategies for photographic materials require specific expertise on storage, environment, package materials and conservation treatments. Many digitization projects for photographs grew out of project primarily dealing with text. Digitization of photographs:- Obviously digitization is considered to be very attractive by institutions that hold photographic collections. When digital copies are available, users can browse through a collection without handling fragile materials. Creating an adequate digital representation of a (historical) photograph requires expert knowledge of imaging techniques as well as photographic processes. The present paper describes in detail the methods and procedures adopted by The 'Collage'-project, The Public Record Office Library, Victoria and Albert Museum (UK), The British Library (UK) and Stadt- und Universitätsbibliothek Frankfurt for conservation of their photographic collection. It also highlights the unique properties of photographs and narrates the care to be taken before digitizing this material.

Keywords : Digitisation, Digital Preservation, Photographic materials

0. Introduction

In the last few decades preservation has become an 'essential part of the growing art of collection management'. Within a spider's web of various restraints – limited budgets, growing use, new technological developments – archives, libraries, museums and other memory institutions have to find ways to deal with ever increasing collections. Apart from the quantity it is also the variety of materials in their care that forces institutions to look for creative solutions. The preservation of paper collections for future use is a daunting task, but the situation has become infinitely more complex with the introduction of modern carriers like tape, film, videos and disks into the collections. Memory institutions are faced with the difficult task of serving the users of today as well as those of tomorrow. Although there are many differences between the nature of the collections and the way the information is presented to the public, archives, libraries and museums as guardians of cultural heritage share some of the same problems. All have to find a balance between making materials available now and feguarding information carriers for future use. Management decisions have to be made to achieve these two – at first sight – conflicting tasks: access and preservation.

1. Photographic Materials

Measures to preserve photographic materials cannot be avoided or postponed, since their life span is relatively short. Some types of photographs may start losing quality after only a few years' time due to intrinsic processes. This occurs also with very common and recent types, like color photographs and polaroids, of which institutions hold large quantities. The visual content of a photographic item is in addition easily affected by external factors like fading or mould. Managing photographic collections demands an active and decisive approach, for what one has today might be lost tomorrow. Developing preservation strategies for photographic materials require specific expertise on storage, environment, package materials and conservation treatments. Many digitization projects for photographs grew out of project primarily dealing with text. This created to problems because images have to be treated quite

differently when digitized. The main goal of text digitization in its legibility. However, many different aspects of quality have to be considered while digitizing images and photographs.

2. Digitization of Photographs

Obviously digitization is considered to be very attractive by institutions that hold photographic collections. The majority of institutions indicate that protection of vulnerable originals is a major argument for digitization. When digital copies are available, users can browse through a collection without handling fragile materials. However, when they request a copy for their own use, institutions still often have to return to the original to make a photographic print. The growing appreciation of photography puts pressure on institutions in various ways. Photographs have been discovered as 'content' ideally suited for digitization, and institutions are urged to make them accessible in digital format. The recognition of the importance of photographs has at the same time increased use of originals and the awareness of the need to preserve them. If one takes into account the enormous numbers of prints and negatives kept in institutions and the typical problems inherent in their preservation, it will be obvious that institutions cannot meet new demands without policies to guide their activities. The development of preservation policies is not only important to be able to priorities, to divide the work and to share tasks, but also to position photographic collections as part of the cultural heritage. Knowledge of historical techniques is required, not only for specialized conservation work, but also for identification of materials and for taking preventive preservation measures.

Digitization of photographs has several preservation aspects, which are not always fully recognized. The state of materials can be one of the criteria in selecting materials for digitization. Damage to photographs can be avoided by proper handling in the scanning process and the choice of suitable equipment. Digitization of originals can often be combined with basic conservation measures and re-packaging. Creating an adequate digital representation of a (historical) photograph requires expert knowledge of imaging techniques as well as photographic processes. In addition, ethical judgement has to be exercised to come to the best decisions. Is the aim to represent the intent of the photographer, or rather the picture as it looks now? How can the intrinsic characteristics of the photograph be distinguished from the effects of ageing, and to what extent should image enhancement techniques be used? In view of responsibilities for quality control and authenticity, it is necessary to explicitly document the capturing process and indicate the precise relationship between the digital image and its source.

Photographs can be classified into two groups according to whether the image is viewed by reflected or transmitted light. The most important difference between the two is in dynamic range. Reflection prints of any type usually have a smaller dynamic range than negative. Color transparences have the largest dynamic range. Negatives are not used directly by users because their image content is not readily available. A printing process is needed to get a positive image. It has been proved that as soon as negatives are scanned and a positive image can be viewed, almost instantaneously their use has grown enormously.

Images can be classified by color type. Depending on the color type, images should be scanned i.e. black and white or color. Most of today's photographs are taken in full color. However older photographs are black and white. Many 19th century photographs have monochromatic colors i. e. purple-brown color. As the digitization of large collection is not likely to be attempted more than once due to high cost, many decisions about scanning and archiving processes are imperative. The term archival implies that all digitized images are not only optimized for current work flows and imaging devices but will continue to be usable on future. One of the big issues should be considered is that the anticipated use of their digital image collections. There is a consensus within the preservation community that a number of image files must be created from every photograph to meet a range of uses first, an archive or master image should be created. The archival master file should represent the highest quality. It should not be treated for any specific output and should be left uncompressed or compressed in a loss less manner. It also requires

an intensive quality review. From this archival file, various derivatives should be calculated. These derivative files are meant to be used. Speed of access and transmission and suitability for certain purposes are the main issues to consider in the creation of these derivative files.

A decision has to be made whether to scan from the original or a duplicate. There are advantages and disadvantages to each approach. Because every generation of photographic copying involves some quality loss, using intermediates immediately implies some decrease in quality. Intermediates may also serve some other purposes. This leads to the question of whether the negative or the print should be used for digitization. Quality will always be best if the first generation of an image (i.e. the negative) is used. But one should take into account the difference between the print and the negative. The print copy is prepared by spending a lot of time in the darkroom. The efforts of the artists and the finest results are lost if the negatives are selected for digitization.

The best approach to digital image quality control includes the subjective visual inspection and objective measurements performed in software and on the digital file themselves.[8] In the most cases the first evaluation of scanned image is done by viewing it on a monitor. Looking at images and judging their quality has always been a complex task. The viewer will decide whether the image on the monitor fulfills the goals that have been sated at the beginning of the scanning project. This is important because human judgment decides the final acceptability of an image As the image is viewed on the monitor, defects such as dirt, half images, skew, laterally reversed images and visual sharpness can be detected.

On the other hand, objective image quality parameters must be employed. One can accomplish this by scanning special targets and evaluating them in specialized software.

The targets and software to evaluate them are not just for vendor checking. They are to serve the guarantee for long-term usefulness of the digital files and to prefers the investment of the institution. Image quality is affected by the sequence of applying different image processing steps including compression. Image processing done before storing the images can affect the quality of future processing. It is recommended that the archival master file should not be sharpened before storing.

Tone reproduction is the single most important parameter for determining the quality of an image. Three dependent attributes effect tone reproduction i. e. the Opto Electronic Conversion Function (OECF), dynamic range, and flare. The OECF shows the relationship between the optical densities of an original and the corresponding digital value of the file. Dynamic range refers to the capacity of the scanner to capture extreme density variations

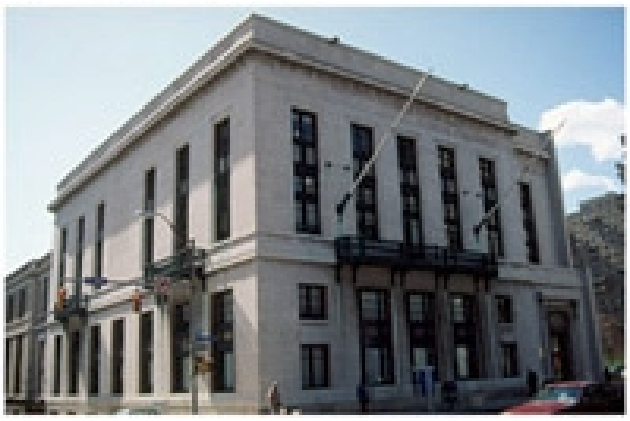

Figure 1 Dynamic range

The effect of dynamic range is shown in the above figure . The below picture is clear than the above. After taking into account all the factors mentioned above, one can achieve the best quality photographs for access and archival purpose. . Flare is generated by stray eight in an optical system. Flare reduces the dynamic range of a scanner. Several color reproduction intents can apply to a digital image. Perceptual intent, relative colorimetric intent and absolute colorimetric intent are the terms often associated with international color consortium (ICC) Perceptual color intent is used to create a pleasing image on a given medium under given viewing condition. Relative colorimetric intent is to match, as closely as possible, the colors of the reproduction to the colors of the original, taking into account output media and viewing condition. Absolute cdorimetric intent is to reproduce colors as exactly as possible, independent of output media and viewing conditions, format of the original, film grain, film resolution, exposure, and processing techniques have to be taken into consideration to accurately determine the actual information content of the specific photographs. The best measure of detail and resolution is the Modulation Transfer Function (MTF). The MTF is a graphical representation of image quality that eliminates the need for decision-making by the observer. Many institutions have undertaken the digitization photographs. Their projects experiences would be useful to others who are planning a digitization of photographs. A brief account of such projects has been described as below.

3. Digitization of photographs projects

3.1 The ‘Collage’-project

The ‘Collage’-project (Corporation of London Library & Art Gallery Electronic) was carried out in about 18 months by a project staff consisting of 8 persons, including a project manager, a senior curatorial assistant, three curatorial assistants, a photographer, a photographic assistant and an imaging assistant. The aim of the project was ‘to resolve the central problem of increasing access to collections whilst continuing to preserve them for posterity’, First of all the print collections were given a unique identifier in the shape of a barcode on the mount. These barcodes were linked to a database in which the object was described according to in-house guidelines. Each object was catalogued by the curators, with the help of existing catalogue records. Before the actual copying began, the copyright status of every item was established. Next step in the process was the photographing of the collections on 35mm color transparency

film for the majority of the collections, with larger format cameras used for the very detailed originals. These films were sent to an outside firm that digitized the film and put the images on Kodak Photo-cds, which has five different standard resolution scales. After the cds had returned, the images were attached to their descriptions in the database. The images were cropped and fine-tuned in terms of colors and contrast only if absolutely necessary. The in-house image base and the Internet version of it were made in cooperation with a commercial firm. The main difference between the two versions of the image base is that the in house application is faster and has fewer copyright restrictions, since it can only be used within the reading room. The in-house application combines a wide variety of search possibilities with a user-friendly interface and many possibilities to zoom in or out and to cross-link.

3.2 The Public Record Office (UK)

The Public Record Office in Richmond holds the national archives for England, Wales and the United Kingdom, about 90 miles of shelving. Its huge collection consists of records dating back to 1086 (Domesday Book) to the present, with many highlights such as Shakespeare's will, Guy Fakes' confession and Napoleon's post mortem. The PRO has approximately one million photographic items. The collection contains a wide range of types such as glass plate negatives, nitrate, polyester and acetate negatives, daguerreotype, albumen prints, carbon prints, ferric processes, colloid on prints, silver gelatin prints and color prints.

The most important criterion for selecting photographic items for conservation is public demand. Photographs that are requested frequently are given priority over the ones that are not. When visitors ask for a specific photo they are allowed to handle the original. On special request the PRO supplies digital or photographic copies. In order to find out more about the possibilities of digitization the PRO conservation department started a pilot project in 1997.

The aim of this project was to digitize and describe 10,000 glass plates that had not yet been catalogued and stored properly. The main objective was to find out what was depicted on them and if any prints of them were available. A digital camera was bought to scan the glass plates. The images were scanned as gif images at a resolution of 300 dpi, 256 grayscale, which was considered sufficient for retrieval purposes and delivery of user copies. The gif format was chosen because it provided better quality than jpeg and the files were far smaller than tiff files.

First the glass plates were re-housed in special sleeves and given new reference numbers. Archival and reference information about the original were recorded into a condition report, which was added to the image base. Then the glass plate negative was scanned and saved in different versions; as a negative, as a positive and in some cases as a detail of the original. Since the main purpose of this project was to provide the public with printouts of the highest possible quality and not to imitate the original as closely as possible, editing the digital image (adjusting contrast and brightness) was not considered to interfere with the authenticity of the original. After the images were scanned and saved they were put into the Images database. A content description of the image was made, and certain keywords were added to facilitate future searches. The images were stored on the network and on CD-ROMS. The project has been running for about two and a half years and so far about 4,000 glass plate negatives have been done. Conversion of the scanned negatives into positives makes it much easier to describe the images.

3.3 Victoria and Albert Museum (UK)

Ever since 1852, the year it was founded, the Victoria and Albert museum has been collecting objects of the decorative arts. Today it holds about four million objects including the national collections of sculpture, furniture, fashion, paintings, books, prints and, photographs. Within the V&A the Picture Library is

responsible for the approximately 300,000 photographic items that are mainly stored in a depot in London Olympia, not far from the museum. The Picture Library staff, consisting of 25 employees, deals with about 16,000 requests for duplicates a year, from all over the world. Customers, usually publishers, request either a photographic or a digital copy of an original item. Most photographic materials are supplied as color transparencies. It is also possible to have certain V&A items especially photographed by the photographic bureau.

The V&A started collecting photographic materials as early as the 1850s and has done so ever since, so part of the photographic collections consists of invaluable historical photographic items. The other part is formed by photographic prints of V&A objects that are displayed in the museum or kept in the repositories. Many different photographic types are represented in the V&A collection, including glass plate negatives, daguerreotypes, polaroids, color prints, even inkjet prints. The Picture Library is not responsible for the preservation of the photographic items, only for their commercial exploitation.

While a master copy of every image is saved in the depot at Olympia, prints are held at the Picture Library reading room for visitors. These prints have been made quite some time ago so that some, especially the older ones, have become quite rare themselves. Since a few years the standard procedure when receiving or making new photographic prints consists of making a transparency for the reading room, having it scanned by an outside firm, and cataloguing it in an Index + database. The digital images are stored on a Kodak cd at different standard dpi resolutions, with a maximum file size of 18 mb. So far about 20,000 images have been digitized and described. When there is time left, older photographic items are digitized, but this has not yet been done on a large scale. The photographic items have always been described, the oldest ones in a card box system, the more recent ones in a database. This database does not only provide information about the object, but is also linked to an administrative system in order to be able to deal with requests efficiently and fast. As for offering their services on the Internet, the V&A is exploring the possibilities. On the one hand it may be an attractive option, since quite a large part of the Image Library customers are from outside the UK. It would perhaps be a suitable way to expand their commercial reach. Yet, copyright issues might be a problem, and at the moment it is hard to get staff to build such an application. The V&A is considering having this application built by an outside firm, but no decisions have been made yet.

3.4 The British Library (UK)

The subject of the preservation of photographs is very pertinent and timely for the British Library in two particular ways. Firstly current curatorial surveys of all the Library's collections are revealing that the Library contains one of the largest collections of 19th and early 20th century photographically produced books in the world and one of the most important collections of photographs relating to India. These surveys are also highlighting the need to further address the conservation of these whole collections and formulate a preservation strategy. Secondly, the BL is very active in the development of a Digital Library Programme and all the issues relevant to the preservation of digitized photographic collections are being raised in this broad, library-wide context.

It is estimated that the British Library photographic collection consists of approximately 400,000 photographic items. Only five years ago the BL started to assemble photographic items from different departments in the library. A wide variety of different materials, including glass plates, silver gelatins and albumen prints, were collected, predominantly from the 1890s to the 1920s. Many unique photographs have been 'discovered', for instance an invaluable collection on the First World War, a large archaeology collection and many other 'hidden treasures'. Even today occasional rarities are brought into the conservation department.

The photographic collection mainly consists of photographic items that were donated to the BL. Furthermore the BL has quite a large number of photographically illustrated books, which contain most genres of individual photographic processes by early innovators and practitioners, such as William Henry Fox Talbot. The BL photographic collection has not been widely used so far, since the public is not aware of the existence of this collection. Most visitors come to see the BL photographic collection out of their interest for the scientific development of the photographic items. On request they are given access to the original photographic items.

Since their involvement with photographic materials is quite recent, the BL Conservation Department has quite a large backlog. Many photographic

materials are only now being catalogued and described and have not been stored in appropriate package materials.

As far as the conservation of the photographic items is concerned there are also a few problems. Mould and poor storage are the hardest issues to deal with when conserving photographic materials. The move to the new building at St Pancras has resulted in improved storage conditions for much of the collection. At the moment the BL is looking at the storage of negatives, whether under cold conditions or in anoxic (oxygen free) storage.

3.5 Stadt- und Universitätsbibliothek Frankfurt

The ‘Deutsche Kolonialgesellschaft’ (German Colonial Society) was the largest society of the German colonial movement. From 1882 up until 1943 the dkg organized lectures, in which guest speakers illustrated their stories by using photographic materials like glass plate negatives, coloured positive slides, etc. These materials contained photographic impressions of many German colonies including Togo, Cameroon, Namibia, Tanzania, Burundi, Rwanda, and many other countries in Africa, Asia, Australia and Oceania. Together these now constitute the Society’s collection, which consists of approximately 55,000 items with invaluable information about the country’s agriculture, geology, vegetation, settlement activities, traditional commerce, transport, economic development, political history etc.

At present this collection is stored in cardboard boxes and is liable to all kinds of damage. There are quite a few broken glass negatives, some of the negatives are stuck together, many negatives have been scratched or moulded and almost all the pictures are dusty. The bad condition of the collection was the main reason for Prof. Uwe U. Jäschke from the ‘Hochschule für Technik und Wirtschaft Dresden’ to start thinking about a way to safeguard the collection for future use. Together with the Stadt- und Universitätsbibliothek Frankfurt am Main, where the collection is housed, and the Hochschulrechenzentrum of the Johann Wolfgang Goethe Universität, a plan was drafted in 1994/95 and funding was sought for the project. This funding was eventually provided by the Deutsche Forschungsgemeinschaft, the Margaund Kurt-Möllgaard Stiftung and the August Messer Stiftung.

The collection was in such a poor condition that access to the originals could no longer be permitted. Therefore the plan aimed to duplicate the collection for access purposes. Investing in a (lower-quality) backup system was preferred to investing in conservation measures to preserve the originals. First the collection was to be put on halftone and colour microfilm. After microfilming the film was to be transferred on microfiches for internal use. Finally, access copies had to made, either photographic prints or digital copies. Since digital copies were far less expensive, it was decided in the end to digitize the microfilm. The digital copies were to be stored on Kodak Photocd. By building up a database and making it accessible through the Internet, which was the final aim of the project.

The microfilming and scanning, which were outsourced to a specialized firm, started in 1997 and were finished in 1999. The digital images were now available, but had to be put into an ImageFinder Archive database. Since approximately a third of the items in the collection had no description whatsoever, this turned out to be a very time-consuming part of the project, and in fact impossible to complete. Currently students are working part time on the cataloguing. However it was also decided to put images on the Internet without proper descriptions, and users are invited to comment and add information. In this way the project is a continuing one that may go on forever.

The collection has been available on the Internet for two years now. The audience mainly consists of students, researchers and amateur scientists from all over the world. About once a week the library receives a request for a copy of a photograph. A photographic print of an item

4. Conclusion

In order to fulfill the wide range of demands placed upon libraries, libraries have to accommodate a variety of new media both to satisfy users needs and to automate their housekeeping procedures. With respect to photographs, one can find that the most important criterion for selecting photographic items for preservation is public demand. Digitization of photographs have several preservation aspects, which are not always fully recognized. Digitization can be combined with basic conservation measures and re-packaging. At the same time knowledge of historical techniques is also required.

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