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The ecpa Secretariat is located at the Royal Netherlands Academy of Arts and Sciences in Amsterdam, and it has as its first chairman Professor Pieter J.D. Drenth. Professor Klaus-Dieter Lehmann, President of the Prussian Heritage Foundation, serves as vice-chairman.

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In the picture

Preservation and digitisation of European photographic collections

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Research and data collection was done as part of the European Visual Archive (eva) project, in the framework of the info 2000 programme. Further research and writing was done as part of the project Safeguarding European Photographic Images for Access (sepia). sepia is a one-year project funded by the European Union under the Framework Programme in Support of Culture.
Executive summary

This report describes the ways in which European institutions manage their photographic collections in terms of preservation and digitisation. The material for the report was collected over a period of 14 months, from December 1998 till February 2000. Data were collected by a questionnaire distributed to well over 300 institutions that hold photographs. About 140 responses were received and they form the basis of this report. In addition, working visits were paid to a number of institutions with significant photographic collections and desk research was carried out to provide a context for the results from the survey.

Photographic collections are an essential part of the European cultural heritage both for their artistic and documentary value and as a record of the history of photography, as a technique as well as a form of artistic expression. Interest for photography has recently grown, not least by the new possibilities offered by digitisation and the internet. Institutions make great efforts to increase access to photographic collections, and at the same time the preservation of valuable and fragile originals is an urgent problem that requires substantial investments in time as well as money.

The institutions in the survey together hold about 120 million photographs, half of them over 50 years old, and representing a wide variety of different photographic processes. The life-span of photographs can be measured in decades rather than centuries, and many of them have now reached such an age that their preservation has become a matter of great urgency. In fact, some types of photographs, even recent ones like colour prints, are so unstable that they may start deteriorating after only a few years.

The threats to photographs are many. They are very sensitive to high or fluctuating temperatures and relative humidity, frequent handling, air pollution, and light. On the whole institutions are familiar with these risks and many have taken preventive measures to protect their collections, though they often indicate that they lack the possibilities to do all they would like to do. It is for instance still not uncommon to keep nitrate-based negatives together with other materials even though it is well known that nitrate is highly flammable and should be stored separately under safe conditions.

Many institutions do not have staff specifically trained in photographic conservation, and expertise in this area seems to be concentrated in relatively few places. Although the need for preservation policies is stressed in the literature, as an instrument to
coordinate activities and set priorities, a substantial number of institutions do not have such a policy for their photographic collections. Effective national plans or policies that could direct and support initiatives by individual institutions often do not exist either.

The survey showed that a wide variety of descriptive methods is used for photographic materials. Many institutions use the same descriptive standard (whether for libraries, archives or museums) for photographs as they use for their other materials. Specific description models for photographic materials are seldom used.

The majority of institutions are either engaged on projects for digitising photographs or planning them. The main reason they mentioned for digitisation was protection of vulnerable originals from frequent use. Digital images thus have a role to play in preservation management in relieving strain on the originals. They are, however, not usually regarded as a substitution of the originals, which will therefore have to be preserved all the same. Many institutions do not create high quality master copies from which derivatives can be made to meet a range of (future) uses. This means one may have to go back to the originals to make user copies, and possibly to re-capture certain photographs in the future for some as yet unforeseen use. There will usually be other, more important arguments, relating to the task of the institution and the nature of the collection, for preserving the original prints or negatives. The sum total is in most cases that continued access needs to be guaranteed to the digital images as well as the original collection, and preservation consequently becomes more rather than less complex.

The most time-consuming and costly aspect of digitisation projects is the description required to facilitate searching. The level of description of the originals is often found to be insufficient for effective searches, and many institutions are facing serious backlogs in the description of their photographic collections which have to be dealt with when digitisation is undertaken. The variety of descriptive methods used poses problems when cross-collection searching is aimed for as well, and only a minority of institutions at the moment apply metadata that would make such searches easier.

Adding metadata for management and preservation is not common practice either, and hardly any institutions document the digitisation process. This raises concern for the long-term management of digital files: even if they are only used for search-and-retrieval purposes and the original photographs are kept safe,
it does not seem cost effective to create digital images that may only with considerable difficulty be migrated to the next generation of computer systems. Costs for long-term maintenance of digital collections are according to recent estimates in any case substantial, and this may become a serious problem as most digitisation initiatives are now funded as projects and lack provisions for future migration.

The results of the survey point to several areas for future work:

1. National and institutional policies for preservation of photographic collections: The growing appreciation of photography puts pressure on institutions in various ways. Photographs have been discovered as ‘content’ ideally suited for digitisation, 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 prioritise, to divide the work and to share tasks, but also to position photographic collections as part of the cultural heritage.

2. Expertise on photographic processes and preservation of historical photographs: Knowledge of historical techniques is required, not only for specialised conservation work, but also for identification of materials and for taking preventive preservation measures. At the moment there are only very few specialists in this field. Opportunities should be created for exchange of expertise, and available knowledge should be more widely disseminated through continued training and workshops.

3. Preservation aspects of digitisation: Digitisation of photographs has several preservation aspects which are not always fully recognised. The state of materials can be one of the criteria in selecting materials for digitisation. Damage to photographs can be avoided by proper handling in the scanning process and the choice of suitable equipment. Digitisation of originals can often be combined with basic conservation measures and re-packaging. To involve staff with a preservation background in a digitisation project will contribute to its success in terms of management of photographic collections.
4. The relationship between original photographs and digital images: 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. Discussions on these issues, which should involve experts on imaging and photography, could also benefit from the input of the conservation field where similar problems exist.

5. Descriptive standards and metadata to facilitate searching: The variety of models used to describe photographs will prove to be by far the greatest obstacle in creating joint digital collections, accessible through one shared user interface, which is at present high on the political agenda. The development of descriptive standards for photographs and the use of controlled vocabularies and thesauri is part of the solution. A complementary approach is the promotion of the use of metadata for searching, which can be generated from different existing description models. Given the Herculean task that institutions are facing in this area, the development of user-friendly and sophisticated tools for description and searching is of the utmost importance.

6. Long-term access to digital images: In spite of the widespread concern about long-term access to digital files, many digitisation projects do not appear to take account of management over time. The use of lossy compression formats, of proprietary software, the low level of documentation, and the limited use of preservation metadata are all indications that a short-term view prevails. At least in part this must be ascribed to a lack of awareness of the urgency of such measures. As yet, the problem still seems to lie in the future, and there are not many examples of proven solutions that can easily be followed. As enormous investments are now made in the creation of digital collections, however, it remains essential to keep hammering on the need to make provisions for maintaining them in the future.
Contents

Introduction 1

Survey population 7

Preservation of photographic materials 11

Digitisation of photographic materials 25

Conclusions 53

Suggestions for further reading 57

Appendix A 65
How charming it would be if it were possible to cause these natural images to imprint themselves durably and remain fixed on the paper!

William Henry Fox Talbot
Introduction

General overview

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 safeguarding information carriers for future use. Management decisions have to be made to achieve these two – at first sight – conflicting tasks: access and preservation.

For photographic collections this is especially acute. 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 colour photographs and polaroids, of which institutions hold large quantities. The visual content of a photographic item is in addition easily affected by external factors causing, for instance, 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 requires specific expertise on storage, environment, package materials and conservation treatments. As photography is a chemi-

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2 The expression 'photographic materials' is used to indicate negative as well as positive photographic materials.
eral process, all photographic materials, even the more stable ones, are subject to internal degradation. Many collections have now reached an age at which conservation has become a matter of urgency. Proper storage, which is an important preventive measure to slow down degradation processes, is an issue that many institutions are only starting to address. Active conservation to stabilise deteriorating items is time consuming and costly, and requires expert knowledge that is only available in a minority of institutions. The situation is complicated further by the variety of photographic processes used over the past 150 years, which all require different preservation measures.

At the moment there are only a few specialised photographic conservators in Europe. Those responsible for conservation have often originally not been trained to do this work. Especially in local institutions, with a few exceptions, there appears to be a lack of knowledge about how to deal with photographic materials. Institutions are catching up on this training backlog, but still a lot of work has to be done.

The vulnerability of photographic materials forces institutions to make management decisions before it is too late. At the same time photography, as a form of artistic expression as well as visual documentation, has attracted growing interest over the last few decades. By depicting a past world, photographs can provide invaluable information about events, people and daily life. The growing popularity of local and personal history, as well as the surging interest of photography as an art form has stimulated use of photographic cultural heritage. The balance between making photographic collections available to the public and at the same time protecting the collection for future use has become a more challenging task than ever before.

The advent of the new media has created a new situation for the management of photographic collections. Digitisation of photographs makes it possible to offer users access to digital copies instead of originals. From a preservation perspective, this has the important advantage that damage to materials by frequent handling can be prevented. For many institutions it is an attractive option to make digital copies available as searching, even at a distance over the Internet, can be greatly facilitated and access to collections is significantly increased. Creating sustainable digital collections, however, involves much more than scanning. Tech-

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technical requirements and selection of materials depend on the goals set in a digitisation project, and for integration of collections and long-term maintenance it is important to follow standards for file formats and descriptions. Information on the direction in which digitisation efforts are moving is essential for institutions wishing to undertake new projects.

In order to find out more about the situation in European institutions that hold photographic collections, the European Commission on Preservation and Access (ecpa) sent out a questionnaire at the end of 1998 to well over 300 archives, museums, libraries and other similar organisations all over Europe. The survey contained questions about the size of the collection, the different types of photographs held, and the content of the collection, together with questions about conservation and preservation policies. The role of digitisation within preservation policies was another focal point. On the Internet there is a substantial amount of documentation on American digitisation projects, but relatively little is known about the European practice.

By March 1999 about 140 questionnaires had been sent back. The results of the survey provided the ecpa with a lot of information about preservation and digitisation of photographic materials. Some working visits were made to the United Kingdom, Germany, France, Denmark and the Netherlands to learn about the daily practice in institutions that hold photographic collections.

The results of this research were used for two purposes. First of all the conclusions served to inform the partners of the European Visual Archives (eva)-project. This project, funded by the Info 2000 Programme of the European Union, started in December 1998 and is due to be concluded in 2001. It involves digitisation of 20,000 photographic items from the City Archives of Antwerp (saa) and the London Metropolitan Archives (lma). The aim is to develop an open-structure working model which allows users to access collections through the Internet and will enable other institutions to join later. The information of the survey was used

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4 See appendix A.

5 The eva partners are: Antwerp City Archives (Belgium), Telepolis (Belgium), London Metropolitan Archives (uk), Netherlands Institute for Scientific Information Services (the Netherlands), SailLabs GmbH (Germany) and the European Commission on Preservation and Access (the Netherlands). See url: <http://www.eva-eu.org>
as a starting point for eva-partners to find out what was being done in European institutions. Since the eva-partners were mainly interested in digitisation projects, the working draft report that was published in March 1999 focused on this specific part of the survey.

After the eva report it was decided to publish a more extensive report on European photographic collections, also highlighting issues concerning the preservation of photographic materials, within the framework of the project sepia (Safeguarding European Photographic Images for Access). This European project started in the fall of 1999. sepia aims to promote awareness of the need to preserve photographic collections, to provide training, and to develop an overall framework under which future projects in the area of preservation and access of photographic materials can be brought together. By combining the results of the survey, the information from the working visits and desk research, a general impression could be derived on how European institutions that hold photographic collections cope with preservation issues. The aim of the present report is to give some insight into general practices in the field of photographic preservation. It is not meant to provide ‘solutions’ for specific problems, but to give an overview of the current situation and identify the problems and questions.

Like almost any survey the European Photographic Collections Survey also suffered from inconsistent and incomplete replies. The questionnaire was kept as brief as possible on purpose, to encourage responses, but as a consequence some questions proved to have been too general to yield sufficient information. The structure of a questionnaire sometimes forces respondents to give short answers about complex issues, which may result in an-

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6 The sepia partners are: the British Library (uk), the Public Record Office (uk), the Centre de Recherches sur la Conservation des Documents Graphiques (France), the Stockholm City Museum (Sweden), the Royal Library of Denmark, the National Photorestoration Studios (the Netherlands), the Finnish Museum of Photography (Finland) and the European Commission on Preservation and Access (the Netherlands). See url: <http://www.knaw.nl/ecpa/sepia/>.

7 About inconsistency within survey on Digital Preservation Guidelines, Marc Fresko and Kenneth Tombs, Digital Preservation Guidelines: The state of art in libraries, museums and archives (European Commission 1998), p.58-60. The authors of this report conclude that one of the main reasons for the inconsistency in this survey is the supposition that a large part of the cultural community ‘is still forming its perspectives on digital preservation’.
answers that seem to be conflicting or are hard to interpret. Questions were not always correctly interpreted, perhaps partly due to the fact that not all respondents were equally familiar with the widely different aspects covered, ranging from historical photographic processes to metadata. Furthermore, although the response rate could be considered quite high, it is still only a sample survey. Definitive or far-reaching conclusions about all European institutions cannot be drawn from the answers received. The results of the survey indicate certain tendencies and are illustrative of the situation in European institutions that hold photographic collections. The original questionnaire has been included as an appendix. An extensive bibliography on photographic preservation and digitisation can be found at the end of the report. It contains some useful references to Internet-sites and literature.

Sources

The main source for this report is the survey, which 141 respondents from 29 different European countries returned, 31 of them by e-mail, since the survey had been put online on the European Preservation and Information Center (epic)-website. Most respondents came from the United Kingdom, which is probably due to the fact that the online survey was forwarded to very active uk mailing groups. Among the respondents were local, national as well as international institutions. About two-fifths were archives, a third were libraries, and one-fifth museums; the remainder consists of combinations of the types mentioned, commercial firms and photographic societies.

Besides the results of the survey an in-depth research was done on the practical experiences of institutions that preserve photographic materials. The following institutions were visited:

- The British Library, conservation department, London, United Kingdom
- Centre de Recherches sur la Conservation des Documents Graphiques, Paris, France
- Danmarks Natur- og Lægevidenskabelige Bibliothek, university library, Copenhagen, Denmark
- Deutsches Filminstitut, Frankfurt a.Main, Germany
- Dutch Photo Archives, Rotterdam, the Netherlands
- The Guildhall Library, printroom and library, London, United Kingdom

8 url:<http://www.knaw.nl/ecpa/>
Without the cooperation of these specific institutions as well as all the institutions that have responded to the survey this report would not have been possible. Therefore the ecpa would like to thank all participants and in particular the following persons: Mark Browne, Mette Bruun Beyer, Claudia Dillmann, Eline Doelman, Franziska Frey, Stephen Harwood, Birgit Henriksen, Hans de Herder, Kim van ’t Holt, René van Horik, Louis Husballe, Torsten Johansson, Ingrid Fischer Jonge, Ursula von Keitz, Seamus McKenna, Koos Kroon, Bertrand Lavédrine, Maria Leonardi, Lynne MacNab, Henning Nielsen, Jonas Palm, Jean-Daniel Pariset, Torsten Schlichtkrull, Wilhelm Schmidt, James Stevenson, Els Wagenaar and Irmtraud D. Wolcke-Renk. We would also like to thank our colleagues Paula Witkamp and Anne Muller for their support, critical comments and useful ideas, and Nicoletta Bromberg of State Historical Society of Wisconsin for the photographs.
Survey population

As a background for the results presented in this report, it is important to bear in mind the characteristics of the group of respondents. The institutions that responded vary greatly in size and fulfill very different roles. A museum of photography that holds only photographs may have a medium-sized collection, whereas national institutions for which photographs constitute only a small part of their total collections may hold a huge number. However, as the results were to be presented so that institutions could not be identified, the different characteristics have not been related to each other in the summary below.

Size

The average size of the photographic collections was about 838,000 items, ranging from 700 to 12,034,313 items, together 118,276,223 photographic items. The average size of the archives that contributed to our survey is about 1,350,000, libraries had an average size of about 536,000 photographic items and museums had an average collection size of about 400,000.

Nationality

The 141 respondents represented 29 different European countries (figure 1). About a fourth are from the UK, which is probably due

Figure 1: Number of respondents per country
to the fact that the web version of the survey was picked up by a few British mailgroups.

**Type of institution**

About two fifths were archives, a third were libraries, a fifth museums (figure 2). The remainder consisted of combinations of the types mentioned, commercial firms and photographic societies.

![Figure 2: Type of institution](image)

**Photographic processes**

About 40 different types of photographic types were mentioned (figure 3), of which glass plate negatives and silver gelatin processes were most frequently present within the collections of the respondents.

![Figure 3: Types of photographic material](image)
**User groups**

Most institutions that participated in the survey attracted an audience that visited the institutions for research purposes (figure 4). Only a relatively small part offered their services predominantly to a commercial user group.

![User groups chart](image)

**Age of photographs**

Over half of all the photographic items the survey institutions held was fifty years or older (figure 5). About a third dated back to the period 1910-1950. 4% of all photographic materials were from the first 30 years after the ‘invention’ of photography (1839), still about 5 million items.

![Age of photographs pie chart](image)
Preservation of photographic materials

Introduction

Preserving photographic materials requires knowledge and understanding of the physical complexity of a photographic item. Ever since the introduction of photography in 1839 numerous photographic processes have been invented and applied, sometimes on a large scale, sometimes only within the inventor’s studio. Daguerreotypes, salted paper prints, wet collodion plates, albumen prints, cellulose nitrate film, acetate and polyester film – these are just a few of the many types that have been developed over the past one hundred and sixty years. The identification of the different types of photographs can be difficult, even for the expert. Yet it is of essential importance, as the different processes often have different preservation requirements.

Basically a photographic item consists of a base and an image layer. In the case of a print the base is usually made of paper. The base of a negative is usually composed of glass or plastic film. The image layer of a photographic item consists of chemicals which are highly sensitive to external influences like high or fluctuating temperatures and relative humidity. If specific measures to protect the photograph are not taken, it can deteriorate very rapidly, even up to a level that it can no longer be used for access.

Specific knowledge of photographic materials is needed to treat photographic items that are damaged or threatened by decay. Since there are only very few specialized photographic conservators in Europe this task often falls to paper conservators or other non-specialists who have not originally been trained as photographic conservators. Although recently there has been an increasing amount of information exchange by means of conferences, societies, workshops, etc., professional knowledge still seems to be lacking in many institutions. Photographic preservation is quite a new discipline and it is still in a phase of experiment and development.

Photographic preservation

Preservation measures should preferably be based on a policy that sets out aims and tasks in general terms. As far as national preservation policies for photographic materials are concerned, if they exist, not many institutions in our survey were familiar with them (figure 6). In Sweden for instance one institution mentioned a national plan for photographic materials, whereas the
other three respondents were unaware of this. On an institutional level preservation policies for photographic materials are more common: about 60% of all respondents claimed to have such a policy.

A word of caution is in order here. It appears from the literature that respondents may interpret the phrase ‘preservation policy’ very differently. Some regard the mere legal obligation to preserve materials as a ‘policy’, whereas the term may also be understood as referring to a written document formulated specifically for the institution. In addition, there is often some confusion in that a plan to carry out specific measures may be viewed as a policy. On the other hand, if no policy has been explicitly formulated in writing, there may still be a silently shared set of assumptions that in practice works like a policy.

More than a third of respondents employ a trained conservator for photographic materials. This could either be someone who has received further training in photographic conservation or someone who has been trained specifically as a photographic conservator. Since there are only a few European institutions that offer such an education, the latter will probably occur less frequently.

The 50 institutions that employ a trained conservator for photographic materials have an average collection size of 1,568,934,
which is about 800,000 above the overall average (838,000). This indicates that photographic conservators are generally employed by institutions with large photographic collections.

About 40% of respondents do not have their own conservation department. Their average collection size is 576,248 which is about 300,000 below the overall average. This indicates that especially institutions with relatively small collections often do not have a conservation department. They apparently outsource conservation work to commercial companies or rely on more specialized institutions for assistance. It is interesting to note, however, that of those that do have their own conservation department and therefore are not likely to outsource all conservation work, there is still a substantial group (39/83) not employing anyone trained in photographic conservation.

However one interprets the replies to these questions, the fact remains that 40% of respondents state they do not have a preservation policy for their photographic collections and two-thirds that they do not employ anyone who is specifically trained to deal with photographic materials. Preserving the many different types of photographic items is a very complex task. One could argue therefore that even if most of the conservation work is outsourced, it would still seem advisable to have some staff trained in photographic preservation, at least up to a certain level, so that at least the basic issues are known. The answers to the survey indicate that further training would be necessary in order to achieve this.

Storage and environmental measures

One of the credos of a responsible preservation management policy is that prevention is better than cure. To prevent damage, certain recommendations for optimal storage and environmental control should be followed where possible. A basic recommendation is to keep photographic materials separate from other materials. One reason for this is that recommendations for temperature and relative humidity for photographs differ from those for other materials. Measures to check and control conditions to an optimal level are easier to take if materials are not mixed. Keeping the photographs separate also limits the risk of damage.

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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 Fawkes’ 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, daguerreotypes, albumen prints, carbon prints, ferric processes, collodion prints, silver gelatin prints and colour prints. The PRO is one of the few UK institutions that employs a trained conservator for photographic materials within the conservation department. Most of the PRO photographic materials are in a special photographic storage room, where the temperature and relative humidity are monitored and controlled, airfilters are used and the objects are protected against excessive exposure to light. Some of the items, especially some brittle ones, are packed in polyester sleeves and, if necessary, supported by silversafe paper. The nitrate-based negatives are stored separately.

Since there is still quite a large backlog in cataloguing and storing the photographic materials some priority decisions cannot be avoided. The most important criterium 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. This is not considered to be an ideal situation, but the financial means to make working copies of the objects are insufficient. And even if there are working copies, the law requires that access to the originals should always be possible. On special request the PRO supplies digital or photographic copies.

In order to find out more about the possibilities of digitisation the PRO conservation department started a pilot project in 1997. The aim of this project was to digitise 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 greyscale, 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 rehoused 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 imagebase. 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 ImageAXS 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. As far as the description is concerned no existing set of guidelines was used.
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. In this way, scanning is a good means to facilitate cataloguing negatives. Yet, since a lot of the glass plates had not been catalogued before, finding out who and what was on them was a very hard and time consuming job, that sometimes even proved impossible. This has been one of the major obstacles in the project so far. For the future the PRO, in the framework of the AD(Access Direct)2001 Programme is working towards providing electronic access to their services and records. For the photographic collection this means new opportunities and consequently new problems to solve.

Sources:

- PRO website: <http://www.pro.gov.uk/>
- Card, Melvin and Anna Rotondaro, ‘Digital Image Handbook’ (version 1, unpublished, interim report)
- Meeting with Stephen Harwood, photographic conservator at the PRO on 12 April 1999.
to other materials: the continuing chemical process that is characteristic of photographic materials may produce harmful chemical substances which should be kept away from other materials.

There are only a small number of institutions that do not keep their photographic items apart from the other materials. Most institutions protect their photographic items against exposure to excessive light (figure 7). Since this is mainly a question of storing one’s collection in a room where there is not too much light, this might be a relatively cheap and therefore feasible measure. More than half of all institutions use equipment to monitor and control temperature and relative humidity. Depending on the local climate the urgency to control temperature and relative humidity may differ. Since storage at lower temperatures together with a low relative humidity level are considered to be the best circumstances for preserving photographic materials, the climate of the Nordic countries is more favourable than for instance the Mediterranean climate. In the survey institutions from southern Europe frequently mention temperature and relative humidity as threats to their photographic collections.

Pollutants stimulate chemical reactions in photographs. As a result photographs can become stained or faded. Pollutants can
be eliminated by using air filters. About a third of all survey respondents used these filters. One should bear in mind, though, that the necessity of air filters depends on specific local circumstances, so that installing them may not have been required in all cases.

Because of their vulnerability photographic materials require special storage measures to protect them from any outside dangers. Almost every respondent had arranged their photographic materials by size and stored them in special, acid-free boxes. Many institutions packed their photos in polyester, polypropylene or polyethylene sleeves to protect them from dust, frequent handling, etc.

In the survey about two-thirds of all respondents indicated that they held cellulose acetate or cellulose nitrate negatives. Cellulose nitrate film was manufactured from 1888 to 1951. It has proved to be chemically unstable and highly flammable, which makes it very dangerous. Experts therefore advise institutions migration of nitrate negatives to higher quality film. The successor of cellulose nitrate film, acetate film, which was introduced in the 1920s,

![Figure 8. Storage measures](image_url)

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is also quite unstable and can deteriorate very rapidly. The deteriorating process of both nitrate and acetate can be slowed down by storing them under low temperatures. To prevent them from harming other materials it is recommended to store acetate and nitrate negatives separately from other photographic materials.

In practice however 38 of the 65 respondents that hold nitrate-based negatives do not keep them apart from the rest of their collections. Some mention lack of space as a reason, others lack of money, but in general one could say that nitrate-based negatives are still a huge problem that will become even harder to solve as time progresses.

Apart from general preservation issues like the 'vinegar syndrome' some institutions also brought up specific problems encountered in preserving their photographic collections. Although more than half of all respondents control and monitor temperature and humidity in the storage rooms, there are still quite a few that have difficulties in protecting the collection against unstable environmental influences. Lack of storage room is also considered to be a serious problem. In a few cases there were difficulties with storing specific photographic materials like for instance stereographs that are housed in a wooden viewer or very large glass plates. One institution had to deal with emulsion rolling off the glass negatives, leaving a opaque white glass surface underneath. Further problems that were mentioned: lack of trained staff, broken glass negatives, curling albumen prints, unfixed materials, photographs stored in harmful, acidic sleeves.

Albums

Another specific problem which occurs within institutions that hold photographic materials is the fact that some photographs are included in albums that are not acid free or contain harmful sleeves. Especially in the 19th century there were quite a few photographers who printed out their photographs and included them in limited edition albums. In the 1860s, together with the growing popularity of the carte-de-visite portraits, family albums became popular, which by now have become valuable historical

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13 The deterioration process of acetate based negatives is sometimes called the 'vinegar syndrome', referring to the penetrating smell of the deteriorating acetate-based negatives. The vinegar syndrome is not only a problem within the field of photography but also in the cinematic field.

14 This is sometimes called the 'glass disease'.
The Royal Library of Denmark

The Royal Library has the largest photographic collection of Denmark, comprising approximately 8 million photographic items. It contains portraits, aerial photographs, historical or photo-historical items and special collections like the German press photograph collection. Within the collection there are many different photographic processes such as daguerreotypes, albumen prints, carbon prints and collodion prints. About 75 percent of the overall collection is fifty years or older. The collection is predominantly black-and-white. The items are often described on the level of subcollection.

The Library has a conservation department, employs a trained conservator for photographic materials and a preservation policy for photographic materials is under development, to be finished in 2000. The negatives are stored in a room with monitored temperature and humidity and the nitrate negatives are stored separately. The photographs are packed in special materials. They are arranged by size and stored in boxes to suit the size of the object.

The Print and Photographs collection of the Library contains pictorial materials which are fragile, labour-intensive to handle and largely inaccessible to the public. In order to improve this situation the Library set up a digitisation project which has been running ever since 1993. The primary goals of the project were:

– to improve access to the pictures by establishing an image base
– to improve searching for particular information in pictures by making the images searchable via text/catalogue information linked to the images in the database and thus ease the reference work of the department
– to reduce the handling of the originals

It was estimated that in order to find 3-5 pictures a user may handle as many as 300 originals. This generates a lot of work for the staff and also causes damage to the originals. Digitising of frequently used materials was considered to be a good way to deal with this problem.

As per December 1998 40,000 images were digitised of which 30,000 have been properly described. Each picture is scanned only once, at a high resolution, at 2208 x 1728 pixels in 16,7 million colours, which produces images of 11,4 MB uncompressed and between 200kB and 700kB compressed. A unique id-number is attached to every single picture. They are stored both at high resolution quality and presentation quality. The Library’s online catalogue REX contains a special image catalogue database in which the images are described. Each item that is being digitized is described in a very basic way. A real classification system, with a thesaurus, is still under development.

So far the availability of part of the image collection on the Internet has not caused an increase in requests for the originals. Yet the collection has attracted the attention of a new type of customer; people from the commercial field. However, further commercial exploitation of the collections is not considered a priority within the policy of the Library.

Sources

– Leaflets about the Royal Library of Denmark and the Image Database Project
– Meeting on 21 December 1998 with Ingrid Fischer Jonge (Head of Photo and Prints Collection) and Birgit Henriksen (Head of the Department of Digitization)
– Website: <http://www.kb.dk/formidl/index-en.htm>
documents. Then there are also quite a number of books with photographic prints as illustrations.

Besides photographs these albums sometimes contain additional notes or have a special value in themselves because of their special binding or ornamental parts. In some cases institutions are forced to make a choice between preserving the album as a whole or, in order to save the photographs, taking out the pictures and keeping them separately.

Because of the complex nature of albums, experts recommend that treatment should be determined on an individual basis. For proper treatment of photographic albums the expertise should come from three main sources: curator, photographic conservator and conservation bookbinder. This makes conserving photographic albums a complicated and time-consuming matter.15

Cataloguing and describing photographic items

Of all the 141 respondents to the survey 70 institutions said they followed a standard description model (figure 9). The responses to the question show a wide variety of ‘standards’. The expression ‘standard’ was meant to indicate an officially recognized standard (like e.g. iso or ansi-standards, or sets of recommendations developed by organisations like ica, ifla or icom) but many respondents mentioned unofficial standards, which therefore actually are guidelines rather than standards. This observation should be taken into consideration when trying to evaluate the results.

Archives, libraries and museums do not share such a thing as one generally accepted standard description model to be used for every photographic collection. There is a wide range of guidelines, from specific photography guidelines like fotios16 to general library standards like aacr217 and isbd18 and an archival standard like isad(g).19 In the survey there were also a number of

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16 A Dutch database system designed to manage and facilitate access to collections of photographic materials. See: <http://www.au.adlibsoft.com/prodinf/noframes.html>.
17 aacr 2 is: Anglo-American Cataloguing Rules, second edition.
18 isbd is: International Standard Bibliographic Description.
19 isad(g) is: General International Standard Archival Description.
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, last but not least, 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, deal 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 colour 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, colour 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 digitised and described. When there is time left, older photographic items are digitised, but this has not yet been done on a large scale. The photographic items have always been described, the oldest ones in a cardbox 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.

Sources

– V&A website: <http://www.vam.ac.uk/>
– Meeting with James Stevenson, photographic manager, at the Victoria and Albert Museum on Monday 12 April 1999.
Preservation and digitisation of European photographic collections

Institutions that had developed their own set of guidelines (see figure 10).

In Europe on a national level there have been some attempts to introduce a description model for photographic materials. In Italy, for instance, the Italian Ministry of cultural heritage (Ministero per i Beni e le attivita' culturali, Istituto Centrale per il Catalogo e la Documentazione) developed a set of guidelines for photographic materials.\(^{20}\) In the Netherlands the Dutch Photographic Society in collaboration with ad lib Information Systems bv created a photographic description model called fotios. Yet, so far all these different guidelines have not resulted into the acceptance of one specific standard for photographic materials on a national, let alone European level.

One of the reasons sometimes put forward to explain this patchwork of different guidelines is the fact that institutions aim to include their photographic materials into their general description and cataloguing system. In this case the same search facility is used for all materials. An exclusive standard for photographic materials might conflict with specific institutional guidelines.

Cataloguing and describing photographic items can either be done on the level of individual items, subcollection or a combination between the two (see figure 11). The level of description is determined by the size of the collection, but also by the financial

\(^{20}\) See url: <http://www.iccd.beniculturali.it/>.
resources available. Of all survey institutions that had described and catalogued their collection about 85 per cent had done this on an individual level. The remaining part, mainly consisting of institutions with large collections, had only done this on the level of subcollection.

The level on which a photographic collection is described does not necessarily say anything about the quality of description. On item level as well as subcollection level materials can be described in varying degrees of detail. Different description levels and different degrees of detail have created a wide landscape of description models. The survey results do not say anything about the quality of description or about the number of items described so far.

Software

Photographic items are usually described by using an automated system (see figure 12). In general the software respondents used to catalogue and describe the photographic item could be divided into database software, document information systems (dis) and programming software.

Currently, European institutions mainly use database software like Microsoft Access, Filemaker Pro and Microsoft Fox Pro (see figure 13 and 14). What cannot be derived from the results of the survey is whether digital images are included in the database or whether it includes only descriptions and reference numbers. Software like Microsoft Access and Filemaker Pro provides some facilities to connect images to the database. They have, however, certain limitations as to the number of images that can be included. Programming software like Delphi and Oracle is more suited for large databases, but requires expert knowledge about the programming language.

About a third of the respondents integrate these descriptions into a computerised dis-systems like for instance aleph or geac-Advance (see figure 13). One of the main objectives to do so is the fact that the photographic materials are not separated from other materials in the collection, like documents, books and serials.
There are only relatively few institutions that use specialised imagebase software such as ImageFinder or Atlant. Since this software more or less forces one to separate the photographic collection from the rest the use of these programs is often only considered useful by institutions that primarily hold photographic materials.

Figure 14. General database software
Digitisation of photographic materials

Why?

Almost four fifths of all the respondents had already digitised part of their collection or were planning to digitise in the future. Obviously digitisation is considered to be very attractive by institutions that hold photographic collections.\textsuperscript{21} But why do they actually digitise?

The majority of institutions indicate that protection of vulnerable originals is a major argument for digitisation (figure 15). 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. Duplicates to be used as masters for user copies are not routinely made. Almost a third of all respondents did not have duplicates of the original photographs. At the moment most digital images are not yet of sufficient quality to function as surrogates for the originals. As

![Figure 15. Reasons to digitize](image)

\textsuperscript{21} This conclusion corresponds with certain previous studies like for instance David Parry, Virtually New. Creating the Digital Collection. A Review of Digitisation Projects in Local Authority Libraries and Archives (London 1998). Parry reports on a survey among 146 uk institutions that photographs are "by far the most popular material for digitisation" (p. 7).
One of the most exciting and fascinating examples of how to improve access to a collection can be found in the heart of London, at the Printroom of the Guildhall Library. At the initiative of the Libraries and Art Galleries an image database has been developed and funded by the Corporation of London, the local authority for the City of London. So far approximately 30,000 images have been made accessible, 20,000 of which are on the Internet. The digital collection currently contains some 20,000 prints and drawings, over 1,000 maps and about the same number of caricatures, all from the Print Room of Guildhall Library and virtually the entire Guild Hall Art Gallery collection, including works from 17th-century Dutch and Flemish masters and important Victorian painters such as Millais and Rossetti.

The ‘Collage’-project stage (Collage stands for: 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’, as project manager Oliver Vicars-Harris put it.²²

Before Collage the Guildhall Library collection was stored away on closed access, so that people who wanted to see an object could only directly consult the original with the help of the small and busy Guildhall Library staff. Thus the collection has remained underexposed, not only because of the fact that it cannot be easily explored but also due to the fact that improving accessibility and simultaneously encouraging further use would mean more pressure on the Library staff. How was the project carried out? 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 colour 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 digitised 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 colours and contrast only if absolutely necessary. The in-house imagebase and the Internet version of it were made in cooperation with a commercial firm. The main difference between the two versions of the imagebase 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 crosslink. The Internet-version is equipped with an order form, which people

can use to order photographic copies of the prints. Downloading high-resolution digital copies from the Internet is not yet possible, but with careful planning, it might be possible in the near future.

The Guildhall Library Printroom receives about 250 requests for photographic copies a year, resulting in around 1000 photos in total, mainly from students and researchers. Within the library a specific area with six terminals was designated to users of COLLAGE. This area is located centrally and near the information desk.

COLLAGE has hugely improved access to the collections and prevents much damage to the originals, but still a lot of work has to be done. Only a small part of the about 25,000 photographic items has been included in the COLLAGE system. The remainder is stored in boxes in the reading room or in the depot, and has partly not been catalogued. The glass plate negatives are currently being put in silversafe envelopes and stored in a purpose-built cabinet. One of the big problems is that the photographic materials in the reading room are subject to a highly varying temperature and humidity. The future of COLLAGE is yet uncertain. Now that the actual project has been completed, there is a lack of funding for the further development and maintenance. COLLAGE has been viewed as a great success by both staff and public. If funding can be found, there is still a wealth of interesting material that could be added. Recently, COLLAGE touchscreens have been installed in the newly opened Guildhall Art Gallery, as well as at other libraries within the City of London.

**Sources**

- Website: <http://www.cityoflondon.gov.uk/organisation/index_collage.htm>
- Grout, Catherine, COLDIP: The Corporation of London Data Imaging Project. One of a New Age of Imaging Projects to be found on the Visual Arts Data Service-website: <http://vads.ahds.ac.uk/training_advice/case_studies/Coldip.html>
- Meeting with Seamus McKenna, reprographics officer and Lynne MacNab, librarian on 13 April 1999.
Another important reason for European institutions to digitise is to facilitate access. By digitising a collection and including the digital images in an imagebase that can be searched by the public, institutions try to make their collections more accessible, in-house or through the Internet. Sometimes yet unattended parts of the collection are digitised, in other cases institutions digitise parts of the collections that were already accessible through card index boxes or other cataloguing systems. The (part of a) photographic collection that is digitised is usually the part that is considered to be most attractive for the public. In pilot projects for instance institutions frequently choose to digitise the most popular parts of their collection.

The content and quality of digitisation is often determined by the demands of the user group an institution aims to serve. There may be a large difference between the demands of a common user, a researcher, and a commercial user, which has implications for what and how an institution digitises.

However, public memory institutions do not only have a responsibility to make their collections accessible for the public, they also have to safeguard them for future use. In the case of photographic materials, which are usually very vulnerable, this can be a very complex and costly matter. Many institutions consider digitisation an attractive method to make their collections accessible and at the same time reduce handling of the originals.

Because automated systems generally offer more search options and it is easier to scan results quickly than with card indexes, users can do their own searches and then pre-select from the screen. An imagebase can also be used by the staff to answer queries from users. Valuable staff time is saved if no longer envelopes and folders with several or dozens of photographs have to be retrieved to make a selection – which happens when they are not described individually – but only specific items found in the imagebase. In this way, digitisation indeed leads to reduced handling of originals.

Yet, it has also been observed that increased accessibility may stimulate users to request prints of originals, if only because they were previously not aware of their existence. Consequently, the rate of physical handling may go up again if prints then have to be made from originals. Generally speaking, the effect of digitising a photographic collection differs from institution to institution, but it is important to consider how increased access may affect
use of originals, or one may find the outcome is the opposite of the initial purpose of the digitisation project.

**How?**

The way an institution digitises is usually related to the content of the collection. The image quality is often determined by the aim of digitisation. Reilly and Frey quote G.A. Gerscheider, who separates image quality into two classes:

1. **'objective image quality'.** The quality is evaluated through physical measurements of image properties. By means of targets it is possible to make objective measurements of the tone reproduction, detail and edge reproduction, noise and colour reproduction. Targets are used to evaluate the scanning system and not the collections. They do not judge the quality of a photograph but the characteristics of the scanning system that is used to digitise the item faithfully.

2. **'subjective image quality'.** The quality is evaluated through judgements by human observers.

Image quality can be approached in different ways. When trying to capture the intent of a photographer ('rendering intent') the highest digital quality is determined by the judgement of an expert's eye. When the highest digital quality is required to enable users to get a close view of an image, it is determined by certain technological requirements, which are more objective. These two approaches do not necessarily lead to the same definition of high digital quality. For instance, enabling users to zoom in might require colour adjustments which were originally not intended by the photographer. Defining high quality remains a complex task. As Anne Kenney puts it: 'It is often difficult to state requirements in terms of precise objective characteristics'.

If photographs are scanned that are primarily important for the information there will often be less focus on high quality than with fine art collections. For instance aerial photographs, used for drawing maps, when converted into a digital format, have to

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be accurate enough to recognize roads, rivers and houses but do not have to be so accurate that you can recognize every garden shed.

There are many other elements that could also influence the way an institution digitises. The budget, the staff available, logistics, these are only a few of many elements which affect a digitisation process considerably. Some elements will be discussed here in more detail.

**Budget**

For most institutions digitisation is quite new and not yet fully integrated in the organisational structure; a lot of digitisation work is done in pilot projects. Only within some larger institutions does digitisation have a more permanent character. From a management angle a project has the advantage that it is usually easier to get funding for something that has a definite end. Problems arise when the project is finished and no funding is left to maintain the final application. It happens that large investments are made to finance high-quality applications, while there may be no certain funding for maintenance of the application. This non-structural way of budgeting partly results from the fact that digitisation is relatively new in the heritage field and a lot of the funding comes from special grants to stimulate wide-spread application of new technology. There is a growing consensus among experts that digitisation should move from the project to program, providing it with a more structural organisational base.25

Steven Puglia, researcher at the National Archives and Records Administration (nara), divides costs of a digital imaging project into three parts: the actual digitising, the creation of metadata, and ‘other’, which includes identifying and preparing materials, monitoring, quality control and project management. On the basis of information derived from digital imaging projects at nara and the Library of Congress he concludes that only a third of the total costs is spent on digital conversion.26 The costs of producing a digital image of one photograph is estimated at $19.30 of which almost half is spent in the category ‘other’.

Once the digital image has been created it must remain accessible, no matter what changes in hard- and software will take place in the future. The methods to preserve digital data for future use are only beginning to be developed and there is not a lot of information available on the costs. Most institutions have no experience with maintenance over the medium and long term, and though there are serious concerns about the complexities of keeping digital information accessible over time, there are very few hard facts to go by. Puglia mentions a figure of about 50 to 100 per cent of the initial cost per image for maintenance for the first ten years. This wide margin illustrates the fact that at the moment little is known about the costs of long-term preservation of digital files.

The costs of a digital image is only partly dependent on the actual scanning of the photograph. Identifying and preparing the materials, monitoring, quality control, the creation of metadata and project management together take up a much bigger part of the budget. In the survey, cataloguing and description of photographs were mentioned most often as factors that had been underestimated. During the working visits the unexpected difficulties and the laborious efforts of describing images were also stressed. The costs of long-term maintenance and preservation of the digital collection are often not taken into consideration either. Since almost all survey respondents digitised on a project basis, budget estimates usually focus on the phase of creation and implementation of the application. Once the application has been developed, the project ends and the financial sources run dry. However, as Puglia emphasizes, a digitisation project is never finished and requires a structural way of financing in order to avoid future financial surprises.

Digitising in-house or externally?

Of all the respondents to the survey about a fifth outsourced their digitisation activities to an outside firm (see figure 16). The larger part of the respondents digitised themselves or combined inhouse digitisation with outsourcing. One of the main advantages of doing digitisation projects inhouse is that the staff develops a knowledge base, which can be utilised for maintenance of applications and other projects in the future. Furthermore inhouse experience with digitisation could make future communication

Figure 16. Digitisation inhouse or externally

27 Puglia, RLG Diginews p.5.
with outside digital imaging firms easier, as one has learned more about requirements to be specified.

By outsourcing a digitisation project an institution can profit from external expertise, which might not be present in-house, as is often the case with small institutions. Yet relatively few survey respondents have outsourced the whole process of digitisation. This might have to do with the fact that institutions fear to lose control over the project when they outsource the whole, or there are objections to having materials leave the premises.

A number of respondents choose to combine outsourcing with in-house digitisation. In most cases describing and cataloguing is done in-house, while the actual digitisation of the photographic items is contracted out. Not surprisingly, these institutions choose to use their own experience with describing and cataloguing objects and combine it with external expertise on digital conversion of materials. Digital conversion in these cases usually concerns large quantities of a similar format, which can be batch-processed.

The results of the survey do not provide extensive information about the general approach of an institution towards digitisation. Depending on the nature of a digitisation project a choice can be made to do the work in-house, outsource or to combine the two. This choice will differ from project to project.

Technical requirements

There is not much point in talking about technical requirements in isolation: technical requirements can only be defined in relation to the demands of the user group and the goal of the digitisation project. Digitising just for retrieval purposes is different from digitising for reproduction purposes. Discussions about resolution, format, colour depth and other technical requirements are closely connected with the requirements of the user group. Then there is also the question of the way an institution wants to present its photographs. Should one aim at rendering the original as much as possible (within the limitations of the computer screen)? Does that imply editing the digital image to give it more of the look and feel of the original as it is now? Should an unrecognizable, stained and faded original be transformed into a perfect, spotless digital image to allow users to see the image as it may have been intended at some point in time? What if one has a flawless negative and a damaged print of the same picture? Opinions are divided on this matter, which has actually more to do with ethics than technique.
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 digitised 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. Problems such as acid paper or vulnerable emulsion layers are a lower priority as they occur less frequently. For the future the Conservation Department has an enormous amount of work to do in order to preserve all the photographic collections to the highest standards.

Sources

– Meeting with Mark Browne, photographic conservator, on the 13th of April 1999
– The British Library website: <http://www.bl.uk/>
One of the most complicating factors in the digitisation chain is that every single technical decision could have serious implications for the broader aim of the project. For instance, choosing a dpi-(Dots-Per-Inch) resolution for scanning is largely a matter of deciding on the right resolution for a specific purpose. If the digital images are only used as visual references in an electronic database, it can be an advantage to make low-resolution images so that less storage space is required. If one digitises to use the images for reproduction, the resolution should be higher than for reference purposes. If one wants to take into account any possible not yet foreseen use, the recommendation is to digitise at the highest quality one can afford (in terms of time, storage space and money) and make working copies from these so-called ‘master’ or ‘archive’ images (‘create one scan to serve multiple uses’).

When aiming at the highest quality possible it is of essential importance to choose the adequate colour depth, imaging equipment, digital format and calibration software. Usually institutions have to operate under certain financial and logistic restraints, which may influence the level up to which the ideal technical requirements can be met. Creating high-resolution images automatically involves the creation of large files, which have to be stored and maintained on the local network. The local hardware might not be able to cope with a large number of multiple mb images. For instance, the master files of the nara Electronic Access project have an average size of 10 mb. A standard pc with a 4 gigabyte harddisk can only store about 400 digital master images. The creation of a digital master file for the nara-eap is estimated at $7,60. Creating 400 master images and maintaining them for the next ten years will involve an investment of at least $4,560. This could exceed the budget of an institution considerably and be a reason to choose a lower resolution.

In some cases limitations can be set by the photographic materials to be digitised. The physical condition of some objects may not allow transportation. Furthermore there is the issue of the long-term effects of light exposure of scanners and cameras.

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29 Puglia, RLG Diginews
30 Based on data provided by Puglia. He estimates the costs of maintenance for the next ten years at 50% to 100% of the initial digitizing costs. In this example the maintenance costs are 50% of the initial costs of creation.
about which there is a lot of disagreement.⁶¹ Some say the density and brightness levels of uv lights which all scanners emit are extremely high while others claim that in terms of light exposure a scanner provides exposure equivalent of less than 10 minutes on a museum wall. Library of Congress research has shown that ‘the heat generated by the equipment and light’ can cause greater damage than light exposure levels during scanning projects.⁶²

Direct scanning of old photographic processes remains an uncertain and risky undertaking. Not only because of the wide range of different processes or the possible damaging effect of the ccd (Charged Couple Device, the scanner’s sensing array), but perhaps even more important – because of ‘issues associated with a document’s physical protection during scanning, such as damage to spine or friable paper’.⁶³ The choice between a flatbed scanner or a digital camera largely depends on the physical characteristics of the photographic objects to be digitised.

Of those who had digitised or were planning to digitise (part of) their collection (80% of the total number of responses) about two-thirds were able to specify the technical characteristics of the digital imaging. These specifications were usually in terms of resolution level (varying from 72 dpi to 2000 dpi), image size and image dimensions. Information about issues such as colour depth and targets was generally not included. A survey like this usually forces people to give short and basic answers and many respondents may only have mentioned the first thing that came to mind. In addition many respondents worked in the conservation department and are probably not involved in the technical realisation of digitisation projects. It is however evident that resolution is the most familiar technical issue of a digitisation project and that other technical aspects are not foremost in people’s thoughts.

Digital formats

In choosing the right format for digital images one has to decide whether to use an uncompressed format, a lossless compression format, lossy compression format or a combination of these for-

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Uncompressed images are recommended for archival purposes, but not primarily for viewing. Lossless compression formats can exactly reproduce the original image file from a compressed file. An example of such a format is tiff. A lossy compression format compresses a digital image in a way that there is loss of information, resulting in some loss in quality but also a substantial reduction of file size. Well-known lossy compression formats are jpeg and gif.

Storing an image in an uncompressed form means that every single dot is represented in the file. The size of such a file can be quite large. A compressed format makes use of certain formulas to store data in an efficient way and limit the file size. To be able to view a compressed image you need to use certain software which can transform the formulas to dot level. This means that using a compressed format makes one dependent on viewers that might become outdated. This is one of the reasons why it is recommended to make an uncompressed master image first and then derivatives for specific purposes.

Another reason to do so has to do with the so-called ‘digital cliff’. When one byte is damaged in an uncompressed file the image can still be viewed. This is often not the case with compressed images, which then become unsuitable for any further use. Uncompressed formats are therefore considered more robust for archival purposes.

Choosing the right format is mainly a question of what one wants to do with the digital images. If the images are only used in a search and retrieval database, the file size has to be limited in order to keep the database accessible at a reasonable speed. If reproduction quality is required it is better to use a higher-quality, lossless compression format like tiff to get the best results. Purpose, file size and format are closely connected.

The most popular digital format used by the respondents of the survey was jpeg (see figure 17). Almost half of the respondents used jpeg in combination with a lossless compression format, in most cases tiff. This means that the other half only used a lossy compression format to digitise their photographic items. As ex-

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35 tiff is: Tag Image File Format.
36 jpeg is: Joint Photographic Experts Group.
37 gif is: Graphics Interchange Format.
In the picture 37

explained before they are susceptible to the risk of the ‘digital cliff’. Furthermore they are dependent on viewing software that is able to ‘unfold’ their compressed image. In the near future, when their format might become obsolete, they will be forced to reformat and, in a worst-case scenario, redigitize their images.

‘There is a growing consensus within the preservation community that a number of image files must be created for every photograph to meet a range of uses. First an “archive” or master image should be created... it should be uncompressed or compressed in a lossless manner’.38

This practice, advised by Franziska Frey and James Reilly, has however not yet been generally accepted within European institutions that digitised or are planning to digitise photographic items.

This may be because in some projects, where it concerns search systems or Internet applications, speed and manageable file sizes are considered more important than high quality scans, for instance because the images will primarily be viewed on screen. The creation of high quality master images takes more time and consequently increases the costs of digitisation. The extra storage space, whether on harddisk or on external storage mediums like cd-roms, and the extra time it takes to create master images involve extra investments, which may not always be considered to be necessary or feasible for the project.

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 Margarete und 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 be 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 for ever.

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
from microfilm can be supplied, as well as a digitized copy. For a photographic copy from the original item 500 Mark (about 250 Euro) is charged. This high fee is used to discourage use of originals as much as possible. So far, no one has made such a request.

Currently the library is planning to buy a colour laser printer, to be able to provide high-quality prints of the photographs. Any e-commerce possibilities are yet to be investigated, but this was never the main purpose of the project. Visitors are no longer allowed to handle the originals, which are still stored under the same conditions as before. By making the collection accessible through the Internet, it has attracted a larger audience than ever before.

Sources
– Meeting with Dr Wilhelm Schmidt, deputy director, and Dr Irmtraud Wolcke-Renk, head of the department Africa-Asia, of the Stadt- und Universitätsbibliothek Frankfurt a.Main on the 28th of April 1999
– Website: <http://www.stub.uni-frankfurt.de/colonial/rgbinfo.htm>
Image enhancement

In the survey just over half of all the respondents (are planning to) enhance their digital images (figure 18). The practice of editing a digital image seems to be quite common within European institutions. The reasons to do so differ from institution to institution but some general remarks can be made.

Software like Adobe Photoshop offers extensive possibilities to adjust digital images. By performing a few simple actions one can adjust contrast, brightness and colours, remove stains or cracks, turn negatives into positives, etc. Today image enhancement is no longer done only by specialists. Depending on the difficulty of enhancement (ranging from a simple conversion from negative to positive to removing small stains) this can be either done successfully or end up in a failure. Any which way the originals will not be harmed, the only thing that can be damaged is the institution's credibility, at least when the digital images are supposed to be true representations of the originals.

As has been discussed many institutions digitise to facilitate access. They consider a digital image to be an autonomous object only used to extend search and retrieval facilities.

Whether or not digital images are enhanced depends predominantly on the policy of an institution towards the status of the digital images. Should the digital images be true representations of the original or should they offer the user a spotless, enhanced digital image? As they are in any case physically different from the original (unless the originals are digital as well) and serve different purposes, it may be more legitimate to enhance them.

Metadata

Metadata have become increasingly important as the Internet developed into a World Wide Web. In very broad terms metadata can be described as ‘structured data about data’. This structured data could refer to handwritten as well as machine-generated data about a resource. In relation to digital files information is added to the code of the image.

There are many different metadata formats such as soif (Summary Object Interchange Format), gils (Government Information Locator Service) or pics (Platform for Internet Content Selection). Within heritage institutions the most frequently used metadata format is Dublin Core39. The Dublin Core Metadata

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39 Dublin Core refers to Dublin, Ohio where the DC directorate is located at the Online Computer Library Center.
intiative began in 1995 and aimed to develop conventions for resource discovery on the Internet. Since then experts have met regularly to discuss these conventions and adapt d c. The latest version of the d c format consists of 15 elements: title, creator, subject, description, publisher, contributor, date, type, format, identifier, source, language, relation, coverage and rights.\textsuperscript{40}

Applying metadata can serve multiple purposes. For instance the Making of America\textsuperscript{ii} testbed program\textsuperscript{41} distinguishes three different kinds of metadata:

1. Descriptive metadata; metadata used for resource discovery. For example: many websites contain so-called metatags with a certain description and specific keywords, which enable search engines to find them. In case of digital metadata they are used for the identification, description and location of networked electronic resources.

2. Structural metadata; metadata that a system can use to help present a particular digital object to a user.\textsuperscript{42}

3. Administrative metadata; metadata that allows the management of a digital collection.\textsuperscript{43} Preservation metadata are considered to be a subdivision of this category. By adding metadata to an image, one provides information to it which might be of essential importance for future conversion.

As far as imaging projects are concerned, metadata are often used as a kind of layer to facilitate one search facility to be applied to different databases. For instance the Digital Library Production Service (dlps) at the University of Michigan use metadata for this purpose. When one institution has a database with a field called ‘artist’ which holds artist names and another has a database with a field called ‘architect’ which holds architect names, the more general term, ‘creator’ maps all ‘artist’ and ‘architect’ field data to a ‘creator’ field.\textsuperscript{44} Metadata can provide high level access to different description standard models. Since the respondents to our survey did not use one widely accepted photographic description standard, metadata could play an important role in facilitating cross-collection searching.

\textsuperscript{40} Situation on the first of November 1999.
\textsuperscript{41} See url: \textless http://sunsite.berkeley.edu/moa2/\textgreater
\textsuperscript{43} See url: \textless http://sunsite.berkeley.edu/moa2/wp-v2.html\textgreater.
\textsuperscript{44} Weise, John, Image Database Access Architecture (version 1.1, draft 1, 1997), url: \textless http://images.umd.umich.edu/info/arch/Image_Tech_Dev_Plan.html\textgreater.
Based on the information provided by the DC homepage European DC metadata projects are generally carried out in libraries. DC is used as an overall set of conventions to describe (digital) documents. Only in a few cases, such as the elise (Electronic Library Image Service for Europe) project, DC is specifically applied to photographic collections. This is in accordance with the survey results (figure 19). Of all 109 institutions that were working on digitisation only 16 included metadata in their digital images. A few respondents indicated explicitly that they were not familiar with the expression ‘metadata’. Unfamiliarity with the concept of metadata may explain the relatively low frequency of use. But given the emphasis in the literature on the importance of metadata for optimal searching, exchange of information, and long-term maintenance, this would be somewhat worrying.

**Documentation**

Experts generally agree on the fact that documentation of a digitisation project is a very important feature. Not only for evaluation purposes or for communication but also for future maintenance and conversion of the digital images it is essential to know how the images have been created. As Howard Besser and Jennifer Trant of the Getty Information Institute put it: ‘Accurate technical documentation will improve the long-term usability of an image database’.

Despite the emphasis by experts on the importance of documentation, in practice in European institutions seem to underestimate the necessity of documenting a digitisation process. 38 out of 68 respondents that digitised or were planning to said they were not documenting their activities (figure 20).

Presumably documentation is not often considered to be an integral part of the project, but more a kind of extra activity that needs to be done when the project is finished. Then, at the end of a project, there may not be enough time left and documentation is easily neglected. Another problem is that there are no general

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45 [url]: [http://purl.org/dc].

46 elise is a EU-funded project aimed to producing a working prototype system for providing image access from remote sites. DC was used here to synchronise different photographic description databases. [url]: [http://severn.dmu.ac.uk/elise/].

accepted rules according to which a digitisation project should be documented. So even when it has been documented there can be great differences in the level and (consequently the quality) of documentation.

Storage media

Once the digitising has been done the digital images have to be stored. Within European institutions this is usually done on cd-rom, network or a combination of the two (see figure 21). Whether institutions used these storage mediums for daily use or archival purposes cannot be derived from the survey results.

One of the advantages of cd-rom is that it can contain about 650 mb of data, enough to store about 32,000 retrieval quality jpeg files (average size 20k). Since the use of jpeg is quite widespread amongst the respondents, it is not surprising that cd-rom is the most popular storage medium.

Especially when managing a large digital collection using a network disk may be easier than using cd-roms which are more limited in storage space. Institutions that have large archival images usually store them on a network disk. In 19 out of 34 cases this is done in combination with zip-disks, cd-roms or an offline storage medium.

Storage media are liable to become outdated in rapidly changing developments. Magnetic tapes, floppy disks, punchcards, just like cd-rom they were once considered to be generally accepted storage media. In the near future the Digital Versatile Disk (dvd) might take over the current role of the cd-rom. Within these fast changing circumstances institutions have to watch out not to end up with an out-of-date collection that in the worse case cannot be viewed anymore. This requires an active archiving policy.

Another concern for the future is the longevity of the cd media themselves. Depending on the quality of the cd media and the storage environment some of them are expected to last for for only a decade or so. Delamination, yellowing, plastic flow, physical distortion, cracking, pinholes, reflection changes, these are all threats to the cd media. A lot of research has yet to be done on

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The Médiathèque is in charge of collections of architectural maps and photographs (prints and negatives). The negatives are preserved by the Archives photographiques (fort de Saint-Cyr, Saint-Quentin-en-Yvelines) and prints by the bibliothèque du Patrimoine (hôtel de Croisilles, Paris). The basis for the collection were the photographs made for the Commission des monuments historiques, among them the collection of the Mission héliographique, the first state commission to photographers in 1851, which documented many buildings and structures all over France. Until the 1880s, the Commission continued to acquire photographs, mostly prints. In the following period the Commission acquired more and more negatives of which prints were frequently made by government services. Today the collection of negatives consists of 5 million original negatives. On the whole the negatives are in good shape, kept in aluminium boxes. Few are still in their original wooden boxes. The negatives have first been described and digitised, in order to make a link between the original negatives and the original prints. User copies are made available by the Caisse Nationale des Monuments Historiques et des Sites (cnmhs). The Médiathèque itself provides services for staff of government agencies responsible for buildings and monuments.

The project most relevant for this survey is the digitisation of photographs of monuments, French landscapes and historic events (World War I, world exhibitions, the flooding of Paris etc.). The project is in the framework of the programme of the Ministry of Culture to make different types of material available on the internet (http://www.culture.fr). The Ministry of Culture provides technical support through its information service, dosi. Apart from the Mémoire database, which is the one used for this project, several other databases can be accessed through the server of the Ministry. The approach is a centralized one, with different institutions supplying digital copies and accompanying descriptions in a certain format and the Ministry providing the technical infrastructure to make access over the net (intranet or internet) possible. The central services of the Ministry are responsible for keeping the digital files accessible over time through migration and conversion. Participation in the programme requires that digitisation and description meet a number of criteria, which are listed in very detailed documents (see: <http://www.culture.gouv.fr/culture/mrt/numerisation/>).

In Saint-Cyr glass negatives are digitized using a flatbed scanner. A scanner was chosen rather than a digital camera to limit damaging effects to the negatives: because the time of exposure of every part of the negative is shorter (the light of the scanner moves over the image) and a scanner (cathode) does not generate heat. The processing of the images includes cleaning and repackaging where necessary, which takes up far more time than the scanning itself.

The negative scans are reversed to positives using programmes like Photoshop. Staff with training in photography are involved in the scanning, and they use software to produce images of the best possible quality, as they would do when making a conventional photographic print from a negative. This implies that some image enhancement may be applied when this improves the final print.
colour or 256 levels of gray, is made on the basis of the original technique used. Only for autochromes and in cases when coloured prints exist, scanning is done in colour. For each photograph, the zoom factor depends on the visibility of the details, e.g. when a streetscene is depicted, it must be possible to read the signs. Most negatives are digitised with a good-quality print in mind. This means most of the times a scan of 2000 x 1500 pixels. Only large 30 x 40 negatives are scanned with 3000 x 2000 pixels to preserve the details. The resolution of the scans depends on the size of the original and may vary between 125-418 dpi. The scans are stored on CD-ROM and copies are sent to the Ministry of Culture.

Digitisation has been motivated by the desire to reduce handling of the glass negatives and to reduce the costs of producing copies: a photographic print of an autochrome for instance is about 30 times as expensive to produce as a digital print. User copies – primarily for government agencies, architects and researchers – are now in most cases provided on the basis of the digital files. Speed, reduction of costs and possibilities to bring out details in the best possible manner are criteria guiding the process. The artistic and historical value resides in the original glass negatives, and measures are taken to ensure their conservation. It was decided not to select photographs for digitisation but instead digitise complete collections. One reason is that the collections constitute the core of French photographic heritage and are extremely important in many ways. Selection would be difficult and time consuming, and it would be almost impossible to establish criteria to exclude certain photographs. It was considered therefore it would be more efficient to systematically digitise everything.

Sources

Meeting with Jean-Daniel Pariset on Thursday 8 April 1999
longevity of CD media, but experts already warn against too high expectations concerning the life-span of CD media. It is however very likely that they exceed the life of the technology that supports it. Yet, in some cases, when the CD-ROM is the original source of information, preservation of CD media will still remain an issue to be coped with.

User copies

The rationale for optimising access to collections is to facilitate use. In the case of photographic collections, use consists in consulting (digital) copies, studying originals, or obtaining copies for personal use, research or to include them as illustrations in all kinds of publications. It is logical to assume that the increased search facilities provided by digitisation will encourage use of photographic collections, and the aim of many digitisation projects is at the same time to relieve strain on collections by making it possible to browse through digital copies and to view the images over the Internet. Will easier access also result in a greater demand for user copies, and will these copies then be supplied in digital format?

At the moment, most institutions in Europe fulfill users' requests for copies with photographic prints, and only a minority make copies available to users in digital format. Some institutions provide both services, depending on the customer's wishes. Whether it is feasible to provide digital copies depends of course first of all on the amount and quality of digital images available. If only a small part of the collection is digitised, or the images were not digitised at a high quality but primarily for use in search systems or Internet presentations, few user requests can be met in this way. It will then be more efficient for the organization to supply photographic prints. Moreover, the quality of an analogue photographic print is at the moment still much higher than of any digital copy, which may make this a less satisfactory option for some users and for some materials. Individuals will in many cases be happy to use copies they can find on the Internet, for instance students writing papers. If individuals specifically request


copies for private use, they may find a photographic print more attractive than a digital file because it is more tangible and direct.

Digital delivery of copies has obvious advantages in being cheaper and quicker than producing photographic prints, and it does not involve handling of originals. The latter is an important consideration: about half of the respondents do not make duplicates to serve as masters for producing further prints, and user copies are therefore often taken from the originals. However, whether an institution will move towards digital delivery depends very much on present demand and expectations for future use.

A driving force behind national and European digitisation programmes for cultural heritage has been the belief that the collections in heritage institutions constitute attractive content for the multimedia industry and that demand from that sector will increase considerably when access is improved. Yet nearly half of respondents indicate requests for materials from publishers, multimedia industry and news agencies are no more frequent than once a month. It remains to be seen whether frequency of use will indeed increase with improved access: 16 institutions report demand has gone up since the collection has been accessible over the Internet, but 11 report they have seen no such increase (yet).

The differences in frequency of commercial use between institutions should probably first of all be explained by differences in the size of the collections and the nature of the collections held. The institutions that reported an increased demand because of the accessibility through the Internet hold much smaller photographic collections than the ones that did not get more requests (1/2!). Perhaps the fact that their collections are often limited to a specific subject can explain for their ‘success’. One should however bear in mind that the information provided by the survey on this is limited to only a few institutions.

More than half of the respondents receive requests for copies from commercial companies at least once a week. These are institutions with large collections (about 600,000 above the overall average), both local as national institutions. They usually charge higher fees for commercial use than for private use or research purposes, and may well be able to generate significant income this way. For these institutions it may indeed be attractive to create an infrastructure for digital delivery of copies, to be able to process requests quickly and cheaply and to meet the expectations of multimedia companies and publishers that all work in a
digital environment. A prerequisite is that digital master images have been created of the highest quality, in order to be able to fulfill specific requirements of printers and publishers when supplying copies. The requirements for resolution, for instance, will depend on the quality and size of the image as they wish to present it in print. Only if such output requirements have been taken into account when the image was scanned in the first place can a digital file be supplied that is of sufficient quality.\textsuperscript{52}

In some cases institutions provide inkjet prints of digital copies. About the permanence of inkjet prints there is a lot of uncertainty and it is still a relatively new field of research. Some inkjet prints deteriorate rapidly, and institutions should be aware of this, or they may inadvertently provide users with copies that will fade in a few months’ time.

When institutions supply copies to users or even when copying for internal use the copyrights of the photographs should be taken into consideration. Who owns the copyrights is not always easy to solve. Legislation in the European Union stipulates that copyrighted materials fall into the public domain only 70 years after the death of the maker.\textsuperscript{54} Theoretically this means that even use of 19th-century photographs may still be restricted, if the photographer is known and did not die before 1930. One may run into additional complications with photographs depicting living persons. Therefore many institutions choose a pragmatic approach and limit digitisation efforts to materials in the public domain. However, they will still have to familiarize themselves with legal implications in order to decide on a well-founded policy for digitisation and copying.

**Digitisation, cataloguing and describing**

As research has shown (e.g. Steven Puglia, Simon Tanner and Joanne Lomax Smith)\textsuperscript{55} digitising a photographic collection is

\textsuperscript{52} By way of illustration: a small colour portrait (5 by 5 cms) captured at a resolution of 150 dpi resulting in a file of 295 x 295 pixels can be used to print an illustration in a book or magazine of 3 x 3 cms maximum. If the illustration is meant to be larger, an acceptable quality of the printed illustration cannot be achieved.

\textsuperscript{53} Jürgens, Martin C., Preservation of Ink Jet Hardcopies, url: <http://www.knaw.nl/ecpa/publ/jurgens.html>.

\textsuperscript{54} See <http://www.eblida.org/ecup> for extensive information on European copyright regulations.

much more than converting analogue photographic items to arithmetic combinations of 0s and 1s. Selecting materials, preparing them for digitisation, creating an efficient workflow, description, checking and correcting, and documentation together take up much more time than the actual digitisation.

It is especially the work involved in description of the images that is often underestimated and proves to be a stumbling block in the digitisation project. More than half of the respondents indicated that (part of) their collection is not described at item level. A description at (sub-)collection level may cover a few images, but also a few hundred. About 25% of respondents still (also) use a card index system to search photographs. As was mentioned repeatedly during the working visits to institutions, existing descriptions regularly turn out to be unsatisfactory. In a digitisation project, combining images and descriptions in an automated system, the weaknesses and lacunae of the old situation stand out and the new system offers the opportunity to put everything right, to exploit the full potential for searching inherent in digitised collections. This explains why, in the experience of many institutions, description turns out to be more time-consuming than originally envisaged and is often the most costly part of the digitisation process.

Long-term preservation of a digital collection

A digitisation project is actually never finished, it needs regular maintenance and attention. At the moment there is ‘no viable long-term strategy to ensure that digital information will be readable in the future’.

Currently a lot of research is done within the field of long-term preservation of digital data, and several strategies have been proposed to ensure future accessibility to the original data.

One of the strategies consists in regularly ‘updating’ a digital collection by migrating the data to new digital formats. Critics claim that migrating does not reckon with the look and the feel of the original digital file. Another disadvantage of migration is that ‘the difficulty in predicting the timing, nature and costs of this

For more than 50 years the Deutsches Filminstitut, formerly known as the Deutsches Institut für Filmkunde (DIF), has been collecting films and film-related documentation. Since 1984 the institute has been located in the building of the German Filmmuseum in Frankfurt a.Main. It holds a large collection of books, newspaper clippings, national and international film magazines, film programmes, posters, censorship cards and about 1.5 million photo stills. The photo still collection, originally used for promotion purposes, contains wonderful photographic material from the beginning of this century up to present-day, ranging from the very first German and other European silent films up to current Hollywood releases, from Fritz Lang to Quentin Tarantino.

Within this collection are glass plate negatives, acetate and polyester negatives, transparent positives, albumen prints, ferric processes, silver gelatin prints, PE/RC paper prints and colour prints.

The Filminstitut does not have a conservation department, nor a photographic conservator. The Department of Documentation and Information, responsible for the still collection, is run by a 12-member staff, who have to cover a wide range of responsibilities. Preserving the photographs is only part of their responsibility. The DIF has to find solutions within the restrictions of a rather tight budget, yet recognizes the need for more training and cooperation within the field of photographic conservation.

Since the stills were originally used to pin on promotion boards outside cinemas, they have a strong backing, which makes them less vulnerable to handling. The main conservation problem the Filminstitut has to deal with is the temperature under which the photographic stills are stored. Negatives as well as positives are stored under room temperature, which can get very high, especially in summer time. Another problem is the lack of suitable package materials. The positives and negatives are packed in envelopes that are not acid-free and could eventually damage the photograph. Finally, although a large part of the collection has remained in good condition, there are quite a few items that have been damaged by mould or silvering. Treatment is needed but money is lacking. Currently improvements on storage conditions are under review.

A problem for the future might be the fact that quite a lot of photographs have not been described. There is too little time to do this thoroughly, so in some cases customers have to rely on the specific knowledge of the staff. The chief curator has developed a project for data-based cataloguing and describing of the most valuable part of the collection (stills from 1907 to 1930), but a partner will have to be found to finance this project.

The digitisation of photographic items is closely connected with customers’ requests and certain filmhistorical projects. Whenever a customer asks for a copy of a photograph by phone, fax or e-mail, he or she can choose between a digital user copy (tiff, gif, jpeg or other required format) or a photographic print. Whenever a digital user copy is made, a tiff-version of the same image is saved for internal use. Eventually these copies are put on CD-ROM. Usually, unless a customer has specific wishes, the photos are scanned at 300 dpi with a Heidelberg flatbed scanner. So far about 500 digital copies have been made. Future
projects to digitise part of the collection have been planned but not yet carried out. As for the future the Filminstitut is working hard to get funding to improve the conservation of their photographic collection.

Sources

– Meeting with Ursula von Keitz, deputy director and chief curator, Claudia Dillmann, director, and staff on the 29th of April 1999
– Website: http://www.filminstitut.de/
approach match the unpredictable nature of technological obsolescence itself.\textsuperscript{58,59}

An alternative strategy for long-term preservation of digital data is emulation of obsolete systems and the preservation of obsolete technologies. By applying specific software on new systems it is possible to access the data in its original state. This approach implies that these emulators are technically feasible. If not, one is forced to enter the field of ‘digital archaeology’ in order to recover the digital collection, which can be a costly matter. Emulation is still largely untested in the context of digital preservation.\textsuperscript{60}

As far as preservation of digital collections is concerned, most institutions try to minimize the risks by choosing standard formats and storage mediums. Forced by the unpredictable future a long-term policy can often not be formulated. For institutions like archives, libraries and museums, used to long-term planning, it is usually hard to cope with the uncertainty involved in long-term management of digital collections. Some have outsourced maintenance of digital data to specialized organisations.


\textsuperscript{59} One of the advocates of migration is David Bearman (Archives & Museum Informatics). See article ‘Reality and Chimeras in the Preservation of Electronic Records’ in D-Lib Magazine (vol.5, no.4, April 1999), url: <http://www.dlib.org/dlib/april99/bearman/04bearman.html>.

\textsuperscript{60} Research in the field of emulation is done by Jeff Rothenberg, senior research scientist of the RAND Corporation. See for publication Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation (Washington/Amsterdam 1999), url: <http://www.clir.org/pubs/reports/rothenberg/contents.html>. 
Conclusions

Photographic collections form an essential part of the European cultural heritage. They are held by many different institutions, varying from museums with the specific task of collecting and preserving photographs, to archives and libraries for which photographs are just one of the many types of materials held. Most of the institutions in the survey served primarily general users and researchers; for only a small minority commercial exploitation of their photographic collections is an important activity.

The total number of photographs held in heritage institutions is huge and displays a wide variety of materials. Preservation of the original materials is problematic. Only a minority of institutions have staff with specific expertise on photographic preservation. The size of collections and the many different processes encountered – some of which are not easy to identify for the non-expert – make preservation a complicated task. Given the fact that more than half of the photographs in collections are over 50 years old, and some of the recent materials, such as colour prints, are notoriously unstable, it is moreover extremely urgent that preservation measures are taken. Many institutions, however, do not have a preservation policy for photographs that would help to set priorities and develop strategies for the longer term. Nor do there seem to be effective national policies that could position photographic collections as part of the national heritage and could provide a framework for national initiatives.

At most institutions efforts are made to package materials in special folders and boxes and to create good storage conditions. Awareness of the need for such measures seems reasonably widespread, although there are restrictions that make it difficult to achieve all that could be done. It is striking, for instance, that only a minority of the institutions that hold nitrate-based negatives have found ways of storing them separately, in spite of the well-known risks involved.

The increasing interest in photography as a form of artistic expression and the value of photographs for documenting the past have led to many initiatives to increase access. Almost all institutions in the survey have started digitisation projects or are considering them in order to improve access. Preservation is for most institutions a prime motive in these projects as the fragility of photographs makes frequent handling of originals a serious threat to their survival. Digitisation of photographic collections therefore is not only an answer to the current emphasis on mak-
ing heritage collections more accessible to users, it can also be a rational management choice from a preservation perspective.

The way many institutions digitise their photographs indicates digital images are thought of primarily as copies to be used for purposes of searching, internet presentations or common-or-garden applications by a general public. High-quality, archival digital images are not standardly produced, and lossy compression formats are regularly employed even if no archival scans have been made. This may be a conscious choice, either to simplify the scanning process and thereby reduce costs, or because some loss of quality is not considered detrimental as long as the information content of the photographs is adequately conveyed on the screen. For the future this may cause problems when screen resolutions become higher and users of digital materials more demanding.

The survey provides some indication that in digitisation projects a short-term view sometimes prevails over a long-term vision. The fact that many institutions do not add metadata for preservation to digital files points to a lack of awareness of the importance of metadata for the management of digital assets over time. In this respect it is also worrying that imaging projects are very often not documented, complicating future migration and conversion, which are considered essential for long-term access. If digital images are regarded as copies for access and use, it may seem logical to focus preservation efforts on the originals. Another explanation may be that as preservation strategies for digital materials are only beginning to be developed, there is lack of experience and/or uncertainty as to how to deal with these issues. All the same the result is that many image collections are created now whose continued access over the next decades is insecure. Even if these images do not replace the originals and re-scanning at a later stage would theoretically be possible, this may cause serious problems in terms of organisation and funding in the future.

For imaging, a relatively limited number of formats are used which can be considered as de facto standards. For descriptions the situation is more complicated. Some institutions, but not all, use descriptive standards current in their sector – libraries, museums, archives – also for photographic collections. These standards have not been specifically developed for photographs, but the advantage is that all materials in an institution can then be accessed through the same system. A considerable number of institutions use non-standard description methods, sometimes with applications developed especially for image collections, some-
times with custom-built applications using well-known database programmes.

The variety of descriptive methods results from the different requirements of the institutions and is in itself not problematical as long as collections are only consulted on site. However, the move to internet and especially to a system of distributed digital collections accessible through central gateways promises to become a long and difficult one: if one aims for user-friendly, reliable and sophisticated search systems across collections, the lack of descriptive standards will seriously hamper progress in this area. Metadata like Dublin Core may prove to be a solution, but as these are as yet infrequently applied, the solution is in practice not yet in sight.

The transition may be speeded up with growing commercial interest in heritage collections. As yet, commercial use of photographs accounts for only a very small percentage of the total, with only a few large institutions with vast collections frequently supplying photographs to publishers and the multimedia industry. For those institutions it is both feasible and necessary to invest heavily in creating digital collections that facilitate commercial exploitation. Many other institutions will have special collections that may attract commercial users if they are easy to access. However, it should be recognised that most heritage institutions, whether in traditional or digital format, primarily serve educational, scholarly or cultural needs. In the end it therefore depends on the level of public funding whether increased access to these collections, which will directly benefit students, scholars and general users, can indeed be realised and maintained over time.
Appendix A

Original survey with results
Survey European Photographic Collections

1. About your Institution
Name of the institution: 141 respondents
Address: ____________________________________________________________________
Country: 29 different countries
Telephone: __________________________________________________________________
Fax: _______________________________________________________________________
Email: _____________________________________________________________________
Contactname: _______________________________________________________________
Function: __________________________________________________________________
Please give us a brief characterization of your institution: (collections, aims)
Please add a brochure.

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

For what purposes do people visit your institution? Please indicate the importance of the following groups using the numbers 1 to 3.
‘1’ = 92, ‘2’ = 22, ‘3’ = 18 Research purposes (e.g. students, scholars)
‘1’ = 24, ‘2’ = 34, ‘3’ = 68 Commercial purposes
‘1’ = 29, ‘2’ = 57, ‘3’ = 38 Personal purposes

2. About the collections
Does your institution have (a) separate photographic collection(s) or are photographic materials included in the general collection together with other materials?
Separate = 65, Included = 22, Both = 42
Please give an estimate of the number of photographic materials in your collection:
Total 118,276,223
What special photographic collections does your institution have?

__________________________________________________________________________

From which period do most of the photographs date? Please add an estimated percentage.
Before 1870 4% 1870 - 1910 13% 1910 - 1950 35% After 1950 48% (overall averages)
Please indicate of any of the following types of photographic materials are represented in your collection?

**Negatives**
- Glass-plate: 113
- Nitrate: 65
- Acetate: 95
- Polyester: 91

**Positives**
- Transparent positive (e.g. slides): 104
- Daguerreotype: 52

**Prints**
- Albumen prints (ca. 1850-1900): 79
- Carbon prints (ca. 1860-1940): 44
- Ferric processes (e.g. Cyanotype): 37
- Collodion prints (1885-1920): 66
- Silver gelatin prints (ca. 1880 - present): 106
- Polaroids: 45
- PE/RC paper (Polyethelene): 75
- Colour prints: 104
- Others, *autochromes, ambrotypes, tintypes, etc*

**Conservation and Storage**

Does your institute have a conservation department?
- Yes: 83
- No: 53

Does your institute employ a trained conservator for photographic materials?
- Yes: 50
- No: 86

Is there a national preservation plan for photographic materials in your country?
- Yes: 29
- No: 94

Does your organisation have a preservation policy for the photographic collections?
- Yes: 86
- No: 47

Does your organisation have a budget for preservation?
- Yes, please indicate the percentage of the total budget available for preservation: 80, 21%
- No: 47

Does your institution make duplicates of original photographs? (to protect original materials)
- Yes, digital duplicates: 12
- Yes, duplicates on film: 45
- Yes, both: 44
- No: 31

Are there any specific conservation problems?

See analysis: _______________________________________________________

____________________________________________________________________
____________________________________________________________________

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Which of the following storage and environmental measures have been taken at your institution?

**Environment:**
- Temperature is monitored 80
- Relative humidity is monitored 82
- Temperature is controlled 78
- Relative humidity is controlled 71
- Air filters are used 42
- Objects are protected against excessive exposure to light 107
- Other measures, dehumidifiers to reduce humidity, portable humidifier in an attempt to boost humidity levels, etc

**Storage:**
- Photographs are packed in special materials, such as acid free envelopes, polyester sleeves, etc. 98
- Materials are arranged by size and stored in boxes to suit the size of the object 94
- Nitrate based negatives are stored separately 38
- Other measures, glass plate negs have been sleeved in silver-salt envelopes and stored in a purpose-built restore cabinet, restricted access, etc

### 3. Digitization

What collections have been (or will be) digitized? Please give the approximate size of the collection.

See analysis, 109 digitized or were planning to, 32 hadn't or weren't

What was the reason to digitize the(s) collection(s)?
- To protect vulnerable originals from use 73
- The collection(s) were in high demand 42
- To make the collection accessible through the internet 56
- To include the digitized images in retrieval software (e.g. an image base) 60
- Other reasons, for exhibitions, saving of labour, promotion via cd-rom, etc

Did you do the digitisation work in-house or was it commissioned to an outside firm?
- In-house 53
- Outside firm 18
- Both 10

What digital format(s) have you used? (e.g. tiff, jpeg, etc.)
- Jpeg = 52, tiff = 34, bmp = 4, gif = 4, pcd = 4

What image quality did you use? (resolution and image size) and why did you choose this image quality?

See analysis

___________________________________________________________________________

___________________________________________________________________________
Have you applied image enhancement techniques? (e.g. adjusting contrast, brightening colours, removing scratches, etc.)
- Yes 44
- No 34

Have you documented these activities?
- Yes 30
- No 38

Did you include any metadata in your digital images?
- Yes 16
- No 53

On what storage medium do you keep the digital files? (e.g. network or CD-ROM's)
cd-rom = 44, network = 34, zip = 4, pcd = 2

Is your collection accessible through the internet?
- Yes, (please add your internet address) 33
- No 78

If not, do you plan to make your collection accessible through the internet in the near future?
- Yes 63
- No 22

4. Search tools and access
What kind of search and retrieval facilities do you use?
- Card index box 42
- Automated system (please add the name of the software) 83
- Other 19

Is your collection described on the level of sub-collections or on the level of individual items?
- Sub-collections 16
- Individual items 47
- Both 49

Do you follow a standard description model?
- Yes 70
- No 50

5. Image delivery
Please estimate how many copies of images for external use are made on a yearly basis. See analysis
Does your organisation charge reproduction costs for these copies?

☐ Yes 107
☐ No 11

Do you usually meet these requests with photographic or digital copies?

☐ photographic prints 87
☐ digital copies 5
☐ both 24

Do you often get requests for copies of items in your collections from publishers, multimedia firms and news agencies? (Please circle the right answer)

Once a week or more 65
Once a month 29
Once every six months 6
Hardly ever 16

Please only answer the following questions if your collection is accessible through the internet:

Did you get more requests for copies since the collection is accessible through the internet?

☐ Yes 16
☐ No 11

Does your website include an order form for copies?

☐ Yes 11
☐ No 16

Additional Comments:

See analysis ___________________________