

# Current Practice in Digital Imaging in UK Archaeology

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## Abstract

*The field of archaeology relies heavily on photography as a way of recording information about sites and artefacts. It is therefore essential that we can have confidence in the photographic record, as any changes over time can result in information being lost forever. In the past five years digital imaging has become a potential alternative to traditional film photography. However, this has great implications, as both methods have very different advantages and disadvantages. Most notably, if the rise in digital photography in the heritage sector mirrors that of current public trends, there is a danger that digital preservation issues could be neglected. We undertook a survey of photographic practice among archaeologists in the UK in order to gain an insight into the prominence of digital photography for recording our past. This paper presents and analyses our results.*

Categories and Subject Descriptors (according to ACM CCS): J. Computer Applications [J.2 Physical Sciences and Engineering]: Archaeology

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## 1. Introduction

Photography is an essential part of recording information about archaeological sites and artefacts. For around 150 years this has been in the form of chemical (silver halide) film photography, but in the last five years digital imaging has become an alternative to traditional film-based methods. However, differences in these media have great implications. There is uncertainty as to whether those working in cultural heritage are using digital technology only after careful considerations of its advantages and disadvantages, or if they are simply following current public trends.

Photographs used in the recording of excavations and artefacts are by necessity of a high quality, both in the prints themselves and in the skills of the photographer. If a change in technique was to influence this adversely this would be a huge loss to the discipline. Digital photography offers advances such as convenience, immediacy, ease of dissemination, and long-term savings in equipment costs. However, the use of film photography still generally offers better quality and longer lasting images. Current debate in the field of digital archiving shows that often people are unaware of issues surrounding digital preservation, or are unable or unwilling to address the changes that digital imaging brings about.

We undertook a study of photographic practices in UK ar-

chaeology. The results gave an insight into current practices and views on the rise of digital imaging in the cultural heritage sector, specifically in archaeology. This paper presents the findings and analyses the current attitudes towards recording the archaeological record heritage in a digital format.

## 2. Background

Although digital imaging – the capturing of images via an electronic rather than chemical means – has been around since 1981, it is only relatively recently that there has been a rise in the mainstream use of this technology [Gre05]. Compared to the 150 year old history of traditional film photography, the digital technology involved is new and the full implications have not yet been fully assessed. In UK archaeology the changes have begun – the decision making process is no longer ‘large format or 35mm?’ but ‘digital or film?’ [Hou06].

The photograph is ultimately a descriptive medium, one which is said to speak a thousand words. It can relay the complex detail of its subject, show the relation with other things present and depict a precise location. One of the key roles of photography in archaeology is to capture a moment of time: a series of photographs are taken over the duration

of an excavation, for example, and thus capture each stage, producing a kind of timeline. Photographs portray specific factual information, and this is important in archaeological recording where an attempt is usually made to strip images and plans of as much subjectivity as possible. This is not to say that photographs are completely objective. The photograph itself is the product of the photographer and there are always some choices to be made that will affect the picture, such as where the photographer stands or how high or low they hold the camera [Cla97]. With the rise of digital photography, altering photographs is becoming much easier, it is possible that the relative objectivity of archaeological photography could be seen to decline.

Photography was invented in the mid 1800s, beginning as the basic concept of capturing a negative image on silver chloride-impregnated paper which was then contact printed to give a positive image. The English patent-holder of this process, W.H. Fox Talbot, was also one of the first antiquarians to record archaeological finds with photography [Dor94]. Photography was an important contributor to the shaping of archaeology as a more scientific-based discipline with an increased analytical approach. From the end of the nineteenth century photography became a standard technique for recording excavations as an accompaniment to illustration, and some of the early photographs are still in a good state of preservation some 100 years later [Dor94]. Today, the use of photography in archaeology ranges from aerial photography, infra-red photography for environmental analysis, photogrammetry, data recording and public relations, to name a few. Our investigation concentrates on photographic practice by UK archaeologists engaged in fieldwork.

### 3. Method

We sought to investigate opinions in UK archaeology regarding digital imaging. We wanted to gain an insight into the uptake of digital photography in archaeology, the attitudes towards it, whether the type of photography was influenced by purpose, and whether people were aware of digital preservation issues. We designed a questionnaire with an easy-to-read mixture of multiple choice and open-end questions. It consisted of twenty questions split into four sections: General, Personal Opinions, Film and Digital. The questionnaire is shown in Table 1. An email survey was deemed most appropriate, with the questionnaire placed in the body of the email. Ninety-two questionnaires were sent out to addresses in the Council for British Archaeology's (CBA) email directory – twenty-six to UK universities and sixty-six to archaeological contractors and units. Eighty-four of these were successfully delivered.

## 4. Questionnaire Results

Of the eighty-four email questionnaires sent out, there were forty detailed replies, representing a 49% response rate. The results that follow are broken down by questionnaire section.

### 4.1. Section 1: General

The survey showed that 95% (37/39) of archaeologists use both film and digital in their work despite current consumer trends where the majority of cameras sold to the public today are digital, illustrated in the way that corporations such as Kodak, Nikon and Konica Minolta are switching entirely from film to digital imaging. The main reasons given for using film were archive stability, quality of results, and tradition, whilst the main reason for using digital was ease (for example manipulation, quick emailing capabilities, and ease in inserting photographs into lectures and reports). Other reasons for using digital photography included the ability to verify the image immediately on site, flexibility and versatility, and low cost. However, 32.5% (13/40) of respondents stated that the reason they used a particular system of photography was due to rules imposed by curators, museums and county archaeologists. Only one respondent stated that they used digital photography exclusively, stating 'digital suits the requirements of the work best and I see no need at all to do film photography any longer'.

The responses showed that 60% (24/40) of respondents use different systems of photography for different projects, whereas 22.5% (9/40) do not, 10% (4/40) stated it would depend on circumstances (such as how quickly the image was needed, the resolutions required, and the purpose of the picture), and 7.5% (3/40) answered that it was the decision of the curator. As illustrated in Figure 1, the general consensus was that if a photograph can be taken again (for example artefact recording or surveying), digital is often favoured, whereas if the image cannot be taken again (for example, during excavations), film, or a combination of both film and digital, is preferred. This appears to reflect the opinion that digital photography is less reliable.

With respect to purpose, the answers to the questionnaire showed that the majority of photographs are used for publication (27%) and teaching (20%), with archives (17%) and site records (14%) following (Figure 2). Publication work and archives often use traditional photography, whereas teaching and site record photographs tend to favour digital, showing that digital and traditional photography seem to have an average split.

Regarding the preservation of photographs, the results show that 85% (33/39) of respondents store their photographs in both an analogue and digital fashion. Analogue storage includes prints, slides and negatives, whereas digital storage includes hard drives, servers and CDs. The remaining 6/39 respondents were divided equally between analogue and digital storage.

Archaeological Photographic Survey

General:

- 1) What system of photography do you use in archaeological projects?  
Digital / Film / Both
- 2) Why do you use that system (for example cost issues, easier use of equipment and processing, etc)?
- 3) Why do you NOT use an alternate system?
- 4) Do you have a different system for different projects? For example, sites/artefacts photography?
- 5) What are your photographs used for (for example, publication, records, slides, etc)?
- 6) How do you store your photographs?  
Prints / Digital / Both
- 7) Do you have a professional photographer on site/ taking artefact photos?

Personal Opinions:

- 1) Which system do you think prints better photographs?  
Film / Digital / Equal
- 2) Do you think digital manipulation is an advantage or disadvantage?  
Advantage / Disadvantage / Not really thought about it
- 3) What is the main reason for the above answer?

Film:

What type of film do you use?  
Colour / Black and White / Slide / A combination (please specify)

- 2) What equipment is necessary apart from the camera itself?
- 3) How easy is it to look after the camera and equipment on site (for example, carrying it around, preventing it getting dirty)?
- 4) How easy is it to adjust the settings on your camera?  
Easy / Can be difficult occasionally / Difficult / Other (please specify)

Digital:

- 1) Are batteries running out a problem on site?  
Yes / No
- 2) What equipment is necessary apart from the camera itself?
- 3) How easy is it to look after the camera and equipment on site (for example, carrying it around, preventing it getting dirty)?  
Easy / Can be difficult occasionally / Difficult / Other (please specify)
- 4) How easy is it to adjust the settings on your camera?  
Easy / Can be difficult occasionally / Difficult / Other (please specify)
- 5) Do you transmit photos online straight from a site?  
Yes / No
- 6) Do you find the resolution of digital prints a problem?  
Yes / No

END

Thank you for taking the time to fill out the questionnaire.

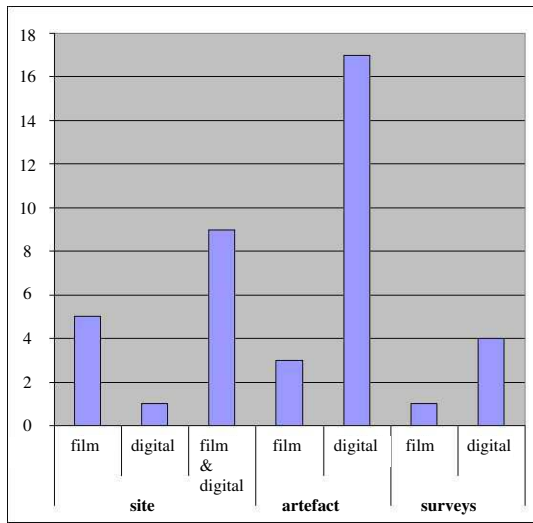
**Table 1:** *Questionnaire used in this study.*

The last question of the 'General' section revealed that 75% (30/40) of archaeological excavators do not have a professional photographer on site, 15% (6/40) sometimes do, and 10% (4/40) do so permanently.

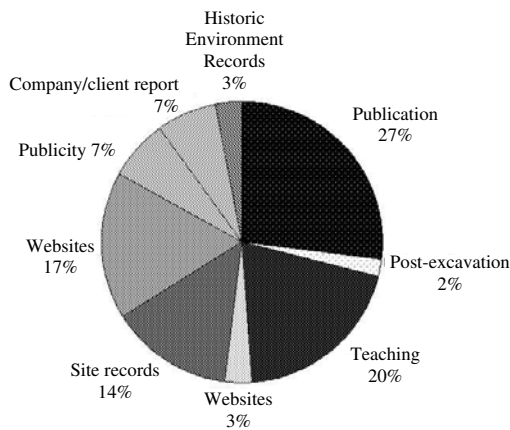
#### 4.2. Section 2: Personal Opinions

When asked which system prints better photographs: film, digital or equal, 40% (16/40) of recipients answered 'film', 10% (4/40) answered 'digital', 30% (12/40) thought they

were equal and 20% (6/40) said that that the quality depends on a certain factor. The factors they suggested included the quality of the digital camera (the higher the pixel value the better), quality of the printer, paper and ink for digital printing, the skill and experience of the photographer, the type and quality of film used in traditional cameras, and the processing lab used. However, although the quality of digital prints is approaching the quality of film prints, the latter currently still has the edge.



**Figure 1:** Breakdown of positive responses to the question 'Do you use a different photographic system for different projects?'



**Figure 2:** Pie chart showing uses of photographs.

A large proportion of respondents, 87.5% (35/40) stated that they thought digital manipulation of photographs was an advantage, 7.5% (3/40) thought it was both an advantage and a disadvantage, and one stated that it was a disadvantage, with one other not having considered this as an issue. However, comments such as 'not always appropriate', 'open to abuse' and 'a code of practice may be eventually required' were stated on many replies, showing that many archaeologists are still wary and possibly dubious about the use of digital manipulation of archaeological photographs. The main reasons for digital manipulation being an advantage were:

the ability to 'tidy up' images (for example cropping or zooming to define specific features), the ability to adjust the light levels and colour balance of the photograph, the ability to easily add text, arrows and annotations, and the ability to improve the quality or enhance poor quality photographs. The main reason for digital manipulation being a disadvantage was that it could be misleading. Although only 1/40 recipients stated digital manipulation as a disadvantage, the concern about misrepresentation was in fact mentioned 5/40 times. 7.5% (3/40) of recipients also stated that manipulation of film is also possible.

**4.3. Section 3: Film**

The first question of the 'Film' section asked about the type of film used. Most recipients used a combination of films, the most popular being slide (42%), then black and white print (36%), and lastly colour print (22%).

Question 2 was the first of the three questions repeated in the 'Digital' section (see 4.4) asking about necessary photographic equipment (excluding the camera itself) used on site. The items were, in order of popularity: tripod, flash, lenses, filters, films, light meter, light box, cleaning equipment/wipes, and batteries.

When polling the respondents on the care of a film camera and related equipment on site, 16/37 found it difficult, 15/37 found it difficult occasionally, and 6/37 found care to be easy. The reasons suggested for difficulties in looking after the cameras included dropping them, cameras accidentally becoming buried or crushed (including under heavy machinery), and getting them covered in rain and mud. However, one respondent stated that older cameras can take more punishment, and 4 out of the 6 of the respondents who gave the answer 'easy' stated that this was only when a camera case and common sense were employed. As one respondent stated, it is technically not difficult to look after a camera on site, but in reality people often neglect to clean them or look after them properly.

Regarding the use of the cameras, 84% (32/38) respondents stated that the settings were easy to adjust on their film cameras, and only 8% (3/38) stated that it was difficult occasionally. No one chose the 'difficult' response to this question, however 8% (3/38) did state that it has more to do with experience, suggesting that it was 'easy if you know how, hard if you don't'.

**4.4. Section 4: Digital**

One major difference between film and digital cameras is the requirement of digital cameras to run on batteries. Therefore the questionnaire asked whether batteries running out on site was a problem. 67% (26/39) stated that this was not a problem, 31% (12/39) stated that it was a problem, whereas 2% (1/39) stated that it was a problem occasionally. Various solutions to this problem were using re-chargeable batteries,

carrying spares, and using in-car chargers. One respondent stated that people were often better at remembering batteries when using digital cameras as opposed to film.

The necessary equipment required for digital cameras on site were in order of popularity: tripod, batteries, laptop, charger, flash, software, memory cards, lenses, cleaning equipment, and a downloading cable. 20.5% (8/39) of respondents stated that the same items were required for digital as for film, and 10% (4/39) stated that no extra equipment was required for digital photography. The list illustrates that the extra equipment necessary for digital photography mainly centres around downloading images, rather than items directly to aid taking photographs.

When asked about camera and equipment care, comments made in response to this question included the need for extra care when looking after digital cameras as they are more expensive to replace. There were suggestions that digital cameras are easier to look after as the body does not need to be opened to access film, but conversely that digital cameras are more difficult to look after as they are less robust than film cameras.

76% (26/34) of respondents stated that the settings were easy to adjust on their digital cameras, 18% (6/34) stated that it was difficult occasionally, and 6% (2/34) stated that it was difficult. Reasons for it being difficult were stated as being due to the newer technology, being difficult to see the LCD screen in bright light, and complex menus on the cameras. One respondent also stated that digital cameras are more likely to have 'fiddly' controls than film cameras.

82% (32/39) respondents stated that they do not transmit digitally downloaded photographs straight from the site, 8% (3/39) stated that they do, and 10% (4/39) stated that they occasionally transmit photographs straight from the site. 5% (2/39) stated that they would consider transmitting photos from the site, but the main reason for not doing so was the lack of suitable facilities on site (such as internet capabilities). One respondent, however, stated that they have sent photographs via camera-enabled mobile phones if unexpected elements have arisen on site.

Regarding the resolution of digital images, 53% (20/38) of respondents stated that they do not find the resolution of digital prints a problem, whereas only half this amount, 26% (10/38) stated that they do. 21% (8/38) of respondents stated that the resolution of digital prints can sometimes be a problem, and that often digital prints are not quite good enough for some publications.

## 5. Discussion

Four main issues arose from our findings: first, convenience; second, image manipulation; third, skill; and fourth, preservation.

### 5.1. Main issues

Digital photography in archaeology seems to be mainly used for two reasons; speed and ease. The immediate digital format of the photographs means there is no waiting time for photographs to be developed, therefore making it fast and simple to insert pictures into reports, on to websites, and into presentations – a major advantage for desk based assessments and evaluations, where quick reports are often needed. Alongside this is the ease of digital pictures over film when distributing multiple copies to clients. One respondent gave the example of being able to tie the digital photographs of a specific site immediately into an object database, making the task of recording several thousand objects in an area much easier, faster, and more comprehensively than if film photographs had been used. However, it is also apparent from the results that digital photographs appear to be used for less academic purposes than film photographs. The digital images taken were working shots, website shots, photographs for monitoring sites, for publicity and for general information. Although digital photographs are used in written reports, the general opinion seems to be that film photographs ensure quality, especially in printed publications, whereas digital photographs ensure ease and speed.

A second issue that was raised more than once was the manipulation of photographs. Although many respondents agreed that this was an advantage, there were definite concerns about the subject. Unlike some other areas of photography where artistic license is acceptable or desirable, archaeological photography aims to be an accurate representation and record of what is present at the time, and the integrity of the record is paramount. There are, of course, reasons unrelated to image manipulation as to why photographs can be more subjective than objective; camera angle, lighting and framing, which are all controlled by the photographer and can influence the way that the subject is seen [Sav97]. However, it is the manipulation of the image itself which can cause it to be false and unrealistic, something of great concern in archaeology. Although digital manipulation can be very advantageous when 'tidying up' images (for example cropping, zooming and adjusting colour balance and brightness to a certain degree), the potential to take it too far is evident. As one respondent stated, digital manipulation of images 'opens up a can of worms when considering that your image is supposed to be an accurate representation of the truth – airbrushing out a stray trowel is only the start of a slippery slope'.

One might argue that manipulation of photographs has always been possible, even for film photographs, and this is indeed true. However the difference, and concerns, with digital manipulation is that it can be done quickly and easily; most people can easily learn how to use software suitable for altering images. With electronic computer based methods of manipulation, processes such as combining and blending images from different sources, repositioning features and ob-



jects, or even removing them altogether, can be done easily and with such skill that, unlike film manipulation, it is very often impossible to detect. Methods suggested in the results of the survey to avoid this problem are simple yet effective: document altered images, keep the original file format where appropriate, be clear about why the image is being altered, and incorporate rules such as manipulation being acceptable for presentations, but unacceptable for archives. Codes of practice do exist and would be a great advantage if made prominent in this discipline.

The third main issue is that of photographic skills and quality. The ability to easily manipulate images can, unfortunately, compensate for bad photography, or as one respondent stated, 'get you out of jail, so to speak'. Many respondents mentioned that it can be difficult to rely on staff to take good photographs, and that they often have limited knowledge. Although this may not necessarily be true for all archaeological units, the results of the questionnaire showed that it is definitely a problem for a significant number of establishments, with replies such as 'training in photography is non-existent', 'increasingly staff have no knowledge of SLR cameras', 'insistence on using manual settings when they [staff] do not know the basics' and 'site photography when completed by site staff, rather than a professional photographer, can be of low quality' appeared frequently enough to make the problem apparent. The results of the questionnaire showed that only 10% (4/40) of archaeological units surveyed employ a full time professional photographer. The main reason for not doing so was cost. When the market today offers such easy access to photography through high-quality compact digital cameras it is possible that there is a reliance on the technology to automate the necessary photographic procedures, with less of a requirement to learn the appropriate manual skills. Simply taking into consideration aspects such as leading lines, balance, and centre of interest, can improve a photograph; making the subject easier to discern but without changing the image itself [Sim69]. Skills such as these can be, to a certain extent, disregarded with digital photography, as manipulation of the image at a later date could rectify them. As Parkhouse [Par05] states in a staff training manual, 'when you look through the viewfinder, look at the edges of the view as well as the subject of the photograph – you may be surprised how many extraneous bits of litter/piles of loose spoil/pieces of clothing/tools there are'. Simple skills like these which have always been taken into consideration in film photography may be considered less important in digital photography, with the photographer safe in the knowledge that they can erase any unsightly and irrelevant aspects of the picture later on. Some respondents even mentioned the reluctance of staff to use a simple but important piece of kit: the tripod.

The final issue is that of preservation. Not all respondents were aware of the need for digital preservation, and although one respondent stated that the 'problem of digital archiving will soon be resolved when the national archives start pro-

viding server storage and data migration for site archives', there are other issues involved. In UK archaeology digital storage in physical form generally means either on CD or DVD, internal hard drive or external hard drive. Small units and contractors frequently do not have the money, resources or expertise to regularly back up data onto magnetic tape. There are two main issues concerning digital preservation: media holding digital data being subject to physical decay, and the technology used to retrieve that data becoming obsolete, although the problem of obsolescence is a greater problem than that of media fragility [Tec02]. CD-R and DVD-R are the most common physical digital preservation method employed by those surveyed, although possibly the worst choice, as over the last few years there have been concerns with lost data and unreadable disks [APE\*06]. The loss of data stored on this type of media is most likely due to poor storage or writing (burning the data to the disc), and so in many ways does not differ from analogue storage in that it requires sufficient care and attention.

A survey by the Archaeology Data Service (ADS) in 1999 that most archaeological digital information was held on floppy disk, and little use was being made of CDs, as well as a sizable minority of organisations presuming that they would not have the capacity to work with the Internet [CRRW99]. Only six years on we take such things for granted, showing how quickly technology changes. There are of course methods which can be employed to avoid such situations, making digital preservation an active task: monitoring of data, as well as the software and hardware in which they are contained, for possible obsolescence and degradation and a procedure for the appropriate action to be carried out to overcome these problems. Alongside this a risk assessment of the image content is necessary, which means an understanding of the content, how it is held and the risks of obsolescence associated with the format and media [APE\*06, PV05]. However, the cost of such active intervention across the life-cycle of a digital archive is unclear, as any existing operational digital preservation systems are too recent to provide stable information. With many UK archaeological contractors operating as small businesses, it seems unlikely that they would be able to meet the potentially prohibitive costs. Fortunately, digital repositories are available through organisations such as the ADS, and our survey indicates that print archives are indeed in place, and continue to be recommended by professional bodies such as the Institute of Field Archaeologists.

## 5.2. Other issues

The cost of digital cameras ranges vastly, with many being cheaper than film cameras, but high resolution digital being much more expensive. Assuming that the resolution of 35mm film is approximately the same as a digital resolution of 12-20 megapixels [Woo04], when comparing the price of an SLR film camera to a comparable resolution dig-

ital camera, the digital camera is currently over double the price of the film camera. The results of the survey indicated that the most of the respondents were using digital cameras of around 6 megapixels resolution, and several respondents complained of the cost of digital imaging equipment. However, the results of the questionnaire showed that just over half of the respondents do not find the resolution of digital prints a problem.

Wooliscroft [Woo04] suggests that an advantage of using digital cameras on site is the ability to download photographs on site and subsequently transmit them to conservation specialists or heritage bodies. Although this sounds advantageous, the results of the questionnaire show that in reality few archaeology units do this, with only 18% of respondents transmitting or sometimes transmitting pictures from site. Not unexpectedly, the reason for not doing so is mainly due to lack of suitable resources on sites such as internet connections or even electricity.

In general, the results of the survey indicated that respondents found settings harder to adjust on digital cameras, with 24% of respondents choosing 'difficult' or 'sometimes difficult', as opposed to only 8% for film cameras. Comments from respondents suggests that this is due to complicated interfaces. Keeping a copy of the camera manual to hand was mentioned by various respondents only for digital cameras, not for film cameras, and one responded stated that 'the basics of camera operating are more easily demonstrated on traditional cameras'.

### 5.3. Conclusions

Overall, our survey suggests that although digital imaging has become the mainstay of the consumer market, UK archaeologists have approached it with consideration and are not just 'following fashion' as suggested by Wooliscroft [Woo04]. Film photography is still widely used and is for the most part regarded as more stable in terms of quality, reliability and longevity. However, digital imaging has found a niche amongst archaeologists with definite advantages such as convenience and ease of use.

Somewhat worrying, however, is that not all those questioned were aware of the need for digital preservation, and there was little to no sign of digital preservation policies actually being implemented. Establishing a secure digital preservation strategy is paramount if archaeological images are to be successfully accessed in the future. This is particularly important for excavation photographs where the archaeological process itself is destructive and the image is an essential record of the past.

Finally, the responses to our survey raise awareness to the fact that digital imaging may be accelerating the decline of photographic skills and knowledge, as poor photography can be rectified with digital manipulation a later stage. We

strongly advocate the training of staff and the use of existing standards and guides to good practice regarding digital photography in order to ensure that our cultural heritage can benefit from advances in technology.

### References

- [APE\*06] ANDERSON S., PRINGLE M., EADIE M., AUSTINE T., WILSON A., POLFREMAN M.: *Digital Images Archiving Study*. Joint Information Systems Committee, 2006. URL=<http://www.jisc.ac.uk/index.cfm?name=imagesarchiving>, accessed 20/04/06.
- [Cla97] CLARKE G.: *The Photograph*. Oxford University Press, 1997.
- [CRRW99] CONDRON F., RICHARDS J., ROBINSON D., WISE A.: *Strategies for Digital Data: findings and recommendations from digital data in archaeology: A survey of user needs*. Archaeological Data Service, 1999.
- [Dor94] DORRELL P.: *Photography in Archaeology and Conservation*. Cambridge University Press, 1994.
- [Gre05] GREGORY P.: Digital photography. *Optics and Laser Technology* 38 (2005), 306–314.
- [Hou06] HOULDER E.: Think before you click. *British Archaeology* 87 (2006), 30–33.
- [Par05] PARKHOUSE J.: Archaeological photography. Unpublished staff training handbook, 2005.
- [PV05] PAQUET E., VIKTOR H.: Long-term preservation of 3D cultural heritage data related to architectural sites. In *Proceedings of the ISPRS WG V/4 Workshop 3D-ARCH 2005* (2005).
- [Sav97] SAVEDOFF B.: Escaping reality: Digital imagery and the resources of photography. *The Journal of Aesthetics and Art Criticism* 55 (1997), 201–214.
- [Sim69] SIMMONDS H.: *Archaeological Photography*. University of London Press, 1969.
- [Tec02] TECHNICAL ADVISORY SERVICE FOR IMAGE: *An Introduction to Digital Preservation*, 2002. URL = <http://www.tasi.ac.uk/advice/delivering/digpres.html>, accessed 20/04/06.
- [Woo04] WOOLLISCROFT D.: *Thoughts on the suitability of digital photography for archaeological recording*. Institute of Field Archaeologists Opinion Page, 2004.