2.1 Strategic Overview

- **Why** is it necessary to take action?
- **How** are digital materials different?
- **What** digital materials are being produced?
- **Who** needs to be involved?
- **How** much does it cost?

Why is it necessary to take action?

More and more information is being created in digital form, either through converting existing materials to digital form or, increasingly,"born digital", where there is no other format but the digital original.There are increasing expectations in all spheres of life that the information we all need will be available on the Internet or at least in an offline digital format, such as CD-ROM. Digital access has many advantages over paper-based or microform access in terms of convenience and functionality.The increasing proliferation of digital information, combined with the considerable challenges, detailed elsewhere in this handbook, associated with ensuring continued access to digital information, means that it is imperative that there be concerted action to overcome these challenges.While there is as yet only largely anecdotal evidence, it is certain that many potentially valuable digital materials have already been lost. Some of these may have disappeared without ever having reached a wider audience than the original creators (see note). At the very least, this constitutes failure fully to maximise the potential benefits of the investment expended in creating these digital materials.

In 1996, a specially commissioned US Taskforce on Digital Archiving published the final report of its work (Waters and Garrett 1996).The impact of the work of the Taskforce has been felt world-wide. In the UK, it was a key influence in a workshop sponsored by the Joint Information Systems Committee (JISC) and the British Library (Fresk o 1995).

The implications for preserving continued access to important digital materials is already being felt by libraries and archives, many of which have begun to consider and take initial steps to meet their responsibility effectively. As business records are increasingly being created digitally records managers in the commercial sector and government also need to consider how they will

implement records management practices which will ensure continued access to important digital records. In addition, the museums and cultural heritage sectors are increasingly utilising digital technology to create digital surrogates of rare, unique and valuable collections.The primary objective of these projects is invariably access. Preservation considerations, if they are stated at all, tend to be primarily related to the preservation of the object being digitised, not to the digital surrogate. However, a logical consequence which very quickly becomes apparent, is the question of how long access to the digital surrogate can be maintained. If access cannot be maintained beyond the short-term, then how can the initial (and often substantial) investment in creating the digital resources be justified?

back to top

How are digital materials different?

As a recent Research Libraries Group (RLG) Survey noted:

"Digital materials, regardless of whether they are created initially in digital form or converted to digital form, are threatened by technology obsolescence and physical deterioration." (Hedstrom and Montgomery 1998
)

The challenges in maintaining access to digital resources over time are related to notable differences between digital and paper-based material:

- Machine Dependency. Digital materials all require specific hardware and software in order to access them.
- The speed of changes in technology means that the timeframe during which action must be taken is very much shorter than for paper.Timeframes during which action needs to be taken is measured in a few years, perhaps only 2-5, as opposed to decades or even centuries we associate with the preservation of traditional materials.Technology obsolescence is generally regarded as the greatest technical threat to ensuring continued access to digital material.
- Fragility of the media.The media digital materials are stored on is inherently unstable and without suitable storage conditions and management can deteriorate very quickly even though it may not appear to be damaged externally.
- The ease with which changes can be made and the need to make some changes in order

to manage the material means that there are challenges associated with ensuring the continued integrity, authenticity, and history of digital materials.

- The implications of allocating priorities are much more severe than for paper. A digital resource which is not selected for active preservation treatment at an early stage will very likely be lost or unusable in the near future.
- The nature of the technology requires a life-cycle management approach to be taken to its maintenance. A continual programme of active management is needed from the design and creation stage if preservation is to be successful.This in turn leads to much more involvement both within and between institutions and changing roles.

The above issues are all interconnected and mean that a radically different approach is required in managing digital materials than for paper-based materials, one in which action needs to be taken, and planned for, at regular intervals. Retrospective preservation of digital materials is at best costly, possibly prohibitively so for any but the most highly valued, and at worst impossible.While concrete cost examples are few, it is widely acknowledged that the most cost-effective means of ensuring continued access to important digital materials is to consider the preservation implications as early as possible, preferably at creation, and actively to plan for their management throughout their lifecycle.

back to top

What digital materials are being produced?

Digital materials range from relatively simple, text-based files (e.g. word processing files), to highly sophisticated web-based resources which fully exploit the benefits of the technology (e.g. combining sound with images, the ability to link to other resources, the ability to interrogate the data).There have been numerous projects to digitise collections of texts and images, primarily to utilise digital technology to improve access to these materials, which would otherwise require a visit to the holding institution.

Increasingly, resources are being created for which there is no analogue equivalent.These "born digital" materials utilise the technology to provide a level of convenience and functionality which is not possible in the analogue environment. For example, dynamic databases which are constantly updated, to produce large scale mapping or on demand publications, are continuing to proliferate.These utilise the technology very effectively for current access but pose considerable challenges in terms of the ability to maintain access to them over time and also the

ability to compare data at different points in time.

Both digital surrogates of analogue originals and "born digital" resources will ultimately pose similar challenges in terms of ensuring their continued survival, though the latter may be considered the most vulnerable as there is no analogue original if they are lost (PRO 1999). In general, the more complex the materials, the more challenging it will be to ensure that they remain accessible and retain the same functionality over time.

back to top

Who needs to be involved?

Because of the nature of digital materials, as outlined above, the ability to preserve access to them well into the future depends upon the involvement of a wide range of stakeholders. Principal among these are the creators of digital content, whose involvement in their preservation might involve, for example, consideration of standards in terms of format and media, and ensuring enough documentation is available to enable their management by others. Another key stakeholder will be institutions which act as long-term repositories for digital materials.They must establish an ongoing dialogue with creators and a pro-active approach to potential future accessions.

The nature of digital technology dictates that it is not feasible simply to hand over stewardship of the resource at some point in the future, without having managed it sufficiently to facilitate management by whatever repository has accepted long-term preservation responsibility. Large institutions involved in creating digital materials may most sensibly be the ones which retain them over time, thus ensuring maximum return on the initial investment of

creation. Co-operative models for long-term preservation might include a number of organisations, some of which may have experience in ensuring the preservation of paper-based materials and seek logically to extend this remit to their digital counterparts, while others may specialise in particular subject areas and/or particular types of digital materials.

All public institutions such as archives, libraries, and museums need to be involved in applying their professional skills and expertise to the long-term preservation of digital materials, just as they have taken a role in the preservation of traditional materials.Throughout the world, some of these institutions have taken a strong leadership role in addressing the practical implications of digital preservation.

For some organisations, it may prove more cost-effective to contract all or part of their digital preservation responsibilities to a third party.

Nevertheless, staff will need to be sufficiently aware of digital preservation issues, particularly as they relate to legal, organisational and contractual problems, to manage these third party contracts effectively.

Whatever model is adopted for the long term, it will need to involve the cooperation and participation of all who have an interest in creating, acquiring and making accessible, digital materials.

back to top

How much does it cost?

Digital preservation is essentially about preserving access over time. This makes it virtually impossible neatly to segregate costs which are only for digital preservation from costs which are only about access. Access costs are significant because both the technology and user expectations advance at a very rapid rate. The initial technical infrastructure costs required for creating and/or acquiring digital materials and providing access to them are substantial. It makes sense to consider means of protecting this investment from the outset.

Preservation costs are expected to be greater in the digital environment than for traditional paper collections based on four interrelated factors:

- The need actively to manage inevitable changes in technology at regular intervals and over a (potentially) infinite timeframe.
- The lack of standardisation in both the resources themselves and the licensing agreements with publishers and other data producers, making economies of scale difficult to achieve.
- The as yet unresolved means of reliably and accurately rendering certain digital objects so that they do not lose essential information after technology changes.
- That for some time to come digital preservation may be an additional cost on top of the costs for traditional collections unless cost savings can be realised. Institutions with responsibility for both digital and traditional collections, such as deposit libraries, face the most difficult challenge, as they need to balance resources equitably between two quite different requirements. These institutions are also more likely to have a higher priority on long-term preservation as opposed to short-term access. There is scope for shared cost models and these may prove to be the most cost-effective in the long term.

While there is understandable concern that the costs of preserving digital materials will be high, it is equally important to consider the costs and implications of not preserving them. The costs of recreating a digital resource may be much higher than that for preserving it; further, the opportunity to do so may no longer exist (see note). An increasing dependence on both digitally produced and accessed information means that there is a rapidly growing body of digital material for which there are legal, ethical, economic and/or cultural imperatives to retain, at least for a defined period of time and, in some cases, forever. If active steps are not taken to protect these digital materials, they will inevitably become inaccessible within a relatively brief timeframe.

Further information for various categories and calculation of costs, can be found in the **Costs and Business Modelling Section** . References on specific cost subjects from digitisation to calculating the costs of preserving digital objects over time can be explored in the **Exemplars and Further Reading for Costs and Business Modelling** and **Creating Digital Materials** .

The issue of cost is also discussed in **Organisational Issues** , where it is intended to be used as a basis for awareness raising and improved understanding of cost elements as they relate to organisations.