The role of science in the management of the UK's heritage: A response from the Digital Preservation Coalition

Introduction

1. The **Digital Preservation Coalition (DPC)** is a not-for profit membership organisation whose primary objective is to raise awareness of the importance of the preservation of digital material and the attendant strategic, cultural and technological issues. Its vision is to make **our digital memory accessible tomorrow.**

2. The Digital Preservation Coalition welcomes the opportunity to comment on the National Heritage Science Strategy (NHSS). It is our hope to provide an appropriate response to each of the reports within the series commissioned by the NHSS. This contribution pertains specifically to Report 1: The Role of Science in the Management of the UK's Heritage, published in April 2009.

3. In summary, we share the view of UNESCO (2003) that digital resources can have 'lasting value and significance, and therefore **constitute a heritage that should be protected and preserved** for current and future generations.'

4. Our experience is that the threats to the digital estate are distinctive. Conventional conservation and preservation actions will not be sufficient to the challenge of digital preservation, nor will benign neglect provide a serendipitous digital heritage.

5. We believe that the National Heritage Science Strategy should take account of digital resources not simply as a by-product that supports the management of heritage, but as a component of the heritage in question. We call on the steering committee to assess more fully the mechanisms that put this heritage at risk and to identify means through which these threats can be reduced mitigated and managed. By understanding these risks and by assessing current gaps in knowledge and provision it will be possible to make significant improvements in practice.

6. It is also our experience that the challenges are common across the diverse agencies operating within the heritage sector. Co-ordinated action which accesses a wider skills base and achieves greater efficiency is both desirable and possible.

7. The Digital Preservation Coalition is a cross-sectoral organisation with a distinctive capacity to explore, develop and deliver co-ordinated approaches to the management of the UK's digital legacy. **We offer our support** in delivering this element of your strategy.

The threats to digital data

8. We note and wish to underline the risks which accrue when digital resources are not properly managed. These are most often expressed as legal, financial, regulatory and

reputational risks such as the 15 million dollar damages suffered by Morgan Stanley in 2006 for failing to preserve and manage email (Taub 2006).

9. We note the opportunity cost associated with the loss of digital data: such as loss of data associated with the 1975 NASA Viking Lander projects. Tapes containing primary data from these missions was found to be cracked and unusable in the late 1990's and researchers were forced to re-assemble and re-code the data from print outs (Cosgrove-Mather 2003)

10. Less immediate but more sustained are the risks to cultural heritage triggered by poor management of digital resources. The capacity of heritage to provide witness, inspiration and meaning-making are not in question. But, without access to suitable digital collections, future generations will be constrained in their capacity to understand, be inspired and create meaning from the digital outputs and interactions of this generation.

11. The heritage sector has long recognised that significance cannot be reduced to scientific, legal or commercial value. Consequently, whereas regulatory, scientific and commercial justifications underpin many digital preservation strategies, these may not be sufficient drivers for the curation and management of a digital cultural heritage.

The distinctive threats to digital heritage and mechanisms to offset them

12. We note the description of the factors that contribute to material decay of heritage (pp14-24). In this section we provide an insight into the factors that contribute to the decay of digital resources and methods used to offset them.

13. At a general level, the threats to digital heritage are well known. Digital information has little inherent meaning: it can only be rendered comprehensible through a particular combination of technologies. The necessity to co-ordinate technologies and skills is at the core of the digital preservation challenge.
    - Access depends on the configuration of hardware and software and the capacity of the operator. If any of these elements is not available or configured poorly then access is impossible or constrained.
    - Technology continues to change. This renders earlier technologies, such as file formats and computing platforms, obsolete.
    - Digital storage media have a comparatively short life span and the devices through which media are accessed are subject to obsolescence.
    - Digital preservation systems are subject to the same threats of obsolescence and mis-configuration as the contents they are designed to safeguard.
    - Digital resources can be altered without obvious detection, can be corrupted without notice, and can be deleted without hope of restoration.
    - Digital resources are intolerant of gaps in preservation: they require ongoing management.

14. Although daunting, experience shows that each of these problems can be resolved. It is also clear that digital preservation is a continuing process requiring constant modest intervention from active management.
    - Documentation can be used to capture configurations, while emulation and migration can be used to create conditions where access is possible.
    - Technology watch services can give advanced notice of obsolescence while migration and emulation can reduce the impact of changes in technology.
    - Storage media can be refreshed periodically and in some cases can 'self-check'. Moreover storage densities continue to increase, providing ever greater storage at reducing cost.
    - Preservation systems can be built using open standards and can be modular. This reduces the impact of obsolescence and allows for new components to be plugged in where old components fail.
    - Digital signatures and wrappers can be created to safeguard the authenticity of digital files, while passwords and security measures can prevent illicit access.
    - Because digital copies are perfect replicas of the original and because they can be distributed with relative ease, data loss can normally be prevented.
    - The ongoing services required for digital preservation need not be substantial and often times bring economies in scale. Some core functions like media checking and replication can be automated.

15. This discussion of threats and their resolution is generic. Contextual factors and the nature of the content can hinder or enhance the likelihood of long-term access to data. However, experience of DPC members shows that early recognition of the value of resources and early action to secure them are critical success factors.

Gaps in knowledge and practice

16. We note the description of gaps in knowledge and practice and how these pertain to the practice of heritage conservation (25-35). We wish to respond by noting some of the gaps in knowledge and practice pertaining to the digital estate. In particular we would draw attention to our own study 'Mind the Gap: assessing digital preservation needs in the UK' which articulates the needs and responsibilities for digital preservation in the UK (Waller and Sharpe 2006). A copy of this report accompanies this response.

17. Digital preservation is a new problem: we are the first generation to create digital objects in abundance and we are the first generation whose legacy will be digital. This means there are gaps in our knowledge and practice. Because digital resources are intolerant of interruption to their maintenance, these gaps need to be filled without delay.

18. Although daunting, the digital preservation challenge is one that the UK is well placed to meet. A decade or more of research and development has created an environment where a

small network of experts now understands many of the mechanisms through which our digital legacy can be secured. Capacity is our recurring challenge.

19. For example a survey of local government archivists in 2008 revealed that almost 50 percent of local archives in England now have a policy in place to deal with the acquisition of digital data. This indicates that progress has been made in recent years and it points to a degree of fundamental work that is still required. Respondents to the same survey ranked 'skills and training' as second only to 'finance' in what they needed to make further progress (Boyle et al 2008).

20. Research shows that metadata creation and ingest are significant cost drivers to digital preservation (Beagrie et al 2008 72). Therefore continuing research into tools for metadata extraction, validation and ingest are likely to pay dividends.

21. The concept of 'significant properties' has been core to much digital preservation activity and requires further investigation through a closer understanding of the user requirements. By identifying or quantifying the significant properties of a digital object it becomes possible to assess the interference that may result from any preservation action. Significance has typically been characterised by the creator of an object or by reference to a 'designated community' of users, or both. As the gap between creator and audience grows, or in contexts where there are likely to multiple or contradictory understandings of significance, so the need to develop a more sophisticated understanding of significant properties emerges.

22. We note the particular concern expressed about the conservation of contemporary art (p 28). Aware that contemporary art practice blends digital and material outputs, and aware that many of the tools of digital preservation are configured around very different types of use, it is clear that further research will be needed around this topic. It is reasonable to deduce that a more holistic conservation practice which blends digital and physical preservation will be needed to sustain this generation's artistic outputs.

23. We note the particular concerns expressed about the energy performance of heritage assets (p 31). This is also a concern for digital preservation. There is not necessarily a correlation between the volumes of data stored and the volumes of energy consumed. However de-duplication and co-ordination of functions are likely to reduce the energy requirements of digital preservation.

24. We note the call for increased access to tools and knowledge (p 35). We believe there is a need for greater access to knowledge and tools for digital preservation, as well as the training to use these tools.

25. It is reasonable to suppose that increased capacity in the sector will help digital preservation practices to mature. Wider deployment will refine the tools and services currently available and create a virtuous cycle of development, deployment and research.

References

Beagrie, N Chruszcz, J and Lavoie, B 2008 Keeping Research Data Safe: A Cost Model and Guidance for UK Universities, JISC, London online at: http://www.jisc.ac.uk/media/documents/publications/keepingresearchdatasafe0408.pdf last access 28/08/09

Boyle, F, Eveleigh, A and Needham, H 2008 Report on the Survey Regarding Digital Preservation in Local Authority Archive Services, Digital Preservation Coalition, York, online at http://www.dpconline.org/docs/reports/digpressurvey08.pdf last access 28/08/09

Cosgrove-Mather, B 2003, Coming Soon: a Digital Dark Age? In CBSNews Tech., online at: http://www.cbsnews.com/stories/2003/01/21/tech/main537308.shtml last access 04/08/09

Taub, S 2006, Morgan Stanley Email Penalty: $15million, CFO, online at http://www.cfo.com/article.cfm/6934609 last access 04/08/09

UNESCO 2003, Charter on the Preservation of the Digital Heritage, UNESCO, Paris, online at http://portal.unesco.org/en/ev.php-URL_ID=17721&URL_DO=DO_PRINTPAGE&URL_SECTION=201.html last access 04/08/09

Waller, M and Sharpe, R 2006 Mind the Gap: assessing digital preservation needs in the UK, Digital Preservation Coalition, York, online at: http://www.dpconline.org/graphics/reports/mindthegap.html last access 28/08/09

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