

Chapter XLIV

Digital Preservation

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ABSTRACT

The rapid ongoing changes in software and hardware put digital information at risk. The challenge is to keep electronic data accessible, viewable, and usable for the future when the original software to interpret them has become unavailable. Digital preservation has thus turned into one of the most pressing challenges not only within the digital library community, but also in other areas such as archives and data centres. This chapter introduces the concepts and challenges in the field of digital preservation including the OAI reference model. We give an overview about the projects and initiatives worldwide dealing with this challenge. We furthermore present preservation planning as a key concept at the heart of preservation endeavours in detail.

INTRODUCTION

Digital objects have become the dominant way that we create, shape, and exchange information. They increasingly contain essential parts of our cultural, intellectual and scientific heritage; they form a central part of our economy, and increasingly shape our private lives. The ever-growing

heterogeneity and complexity of digital file formats together with rapid technological changes turn the preservation of digital information into a pressing challenge. The challenge is to keep electronic data accessible, viewable, and usable for the future, to ensure the survival of our digital artifacts when the original software or hardware to interpret them correctly becomes unavailable (UNESCO, 2003b).

Digital preservation deals with the long-term storage and access to digital objects. The Digital Preservation Coalition defines it as “the series of managed activities necessary to ensure continued access to digital materials” and adds that it “refers to all of the actions required to maintain access to digital materials beyond the limits of media failure or technological change” (Jones & Beagrie, 2002). The focus lies on “born digital” objects, not digitisation, which is a challenging field in itself (Digicult, 2004).

Rosenthal (Rosenthal, Robertson, Lipkis, Reich, & Morabito, 2005) describes requirements for digital preservation systems. A range of tools exists today to support the variety of preservation strategies such as migration or emulation. Yet, different preservation requirements across institutions and settings make the decision on which solution to implement very difficult.

In this chapter, we give an overview about the current state of the art, the major challenges as well as proposed solutions in digital preservation. We will further highlight current research activities in this field, with a specific focus on planning and evaluating preservation strategies.

THE CURRENT STATE OF RESEARCH

The companion document to the UNESCO charter for the preservation of the digital heritage (UNESCO, 2003a) provides a good overview of preservation strategies. Research on technical preservation issues is focused on two dominant strategies—migration and emulation. Migration requires the repeated copy or conversion of digital objects from one technology to a more stable or current, be it hardware or software. Each migration incurs certain risks and preserves only a certain fraction of the characteristics of a digital object. The Council of Library and Information Resources (CLIR) published different kinds of

risks for a migration project (Lawrence, Kehoe, Rieger, & Walters, 2000).

Emulation as the second important strategy is a means of overcoming technological obsolescence of hardware and software by developing techniques for imitating obsolete systems on future generations of computers (Jones & Beagrie, 2002). Jeff Rothenberg (Rothenberg, 1999) envisions a framework of an ideal preservation surrounding. The Universal Virtual Computer (UVC) concept (Van der Hoeven, Van der Diessen, & Van En Meer, 2005) uses elements of both migration and emulation, allowing digital objects to be reconstructed in their original appearance. The UVC is independent of any existing hardware or software, it simulates a basic architecture including memory, register and rules. An emerging approach of emulation is modular emulation. Jeffrey van der Hoeven presented the modular emulator called Dioscuri in (Van der Hoeven & Wijngaarden, 2005). It imitates the hardware environment by emulating the components of the hardware architecture. Each hardware components is run as individual emulators and the components are assembled in order to create a full emulation process.

Several other preservation strategies have been proposed. The Computer Museum is based on preserving the technical environment that runs the system, including the hardware, the operating system, original application software, media drives, etc. Another approach is Normalisation, a technique for the collection of different file formats, which are converted to a single chosen file format (CLIR & LoC, 2002).

Several common file formats are being adapted to achieve more stable long-term archiving. The most relevant is probably PDF/A, which defines a subset of PDF optimized for long-term preservation (ISO, 2004). Other examples are the Open Document Format for Office Applications (ISO, 2006) and MPEG-7 (ISO, 2002).

Metadata became a heavily debated issue in the field of digital preservation. Initiatives in the

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