<div align="center">

UIS Informatics Commission

Publications Exchange Working Group

Chairman: Trevor FAULKNER, United Kingdom

Appendix 2:   Paper Publications and Digital Warnings

Issue 2: 9 November 2016

</div>

Observations and recommendations

2.1   Publishing on paper is probably still the most reliable method of achieving a long-term (perhaps >100 year) archive, especially for text in black and white. It avoids most of the complications of electronic storage. Please refer to comments by the VP of Google and by British Library archivists, as reported in the next two pages.

2.2   For some organisations, exchanging journals electronically could impact their sales of paper journals, which they might use, quite legitimately, to cross-subsidise other speleological activities.

2.3   In some countries, making cave information widely available electronically could result in more cave vandalism and raise safety issues for the public, who do not commonly read paper caving journals. However, in other countries, it has not been the practice to give cave location information, even in paper journals. Thus, each country needs to agree its own site information standards. These might vary from putting most cave grid references in all paper and electronic journals and on websites (if there is little risk, as in the UK), to limiting this to paper journals only, or to completely refusing to publish any site location information (as in Australia).

2.4   For organisations that choose to publish only electronically, it is recommended that, in order to create a permanent archive, some copies (perhaps at least 10) should be printed to paper. Two of these should be stored in the organisation's own library, with the others possibly distributed more widely as exchange copies.

2.5   Despite using digital electronic production methods, it is expected that many high-quality journals will continue to be published on paper for those who request it, although many will also be published electronically. Receiving speleological journals on paper remains popular with many club members and organisations. It is clearly more efficient for the publisher to do the printing of covers and contents and the binding, rather than for each individual reader to try to do that for himself, to the same quality standard. Thus, some members may be prepared to pay a premium for this 'service', whilst others may prefer electronic distribution, to avoid paper altogether. Some people will also welcome both delivery methods, to take advantage of digital searching.

2.6   Each journal should be specified in Appendix 7 to show which issues were published on paper, which of those have been scanned, and which were produced digitally. Note that some digital journals might contain material that is not suitable for printing.

2.7   Commercial publishers increasingly charge authors for publication, especially for colour pages, as a way to help cover their costs. Additionally, commercial charges to authors or their institutions for making papers 'open access' are several thousand per article. These practices provide niche opportunities for speleological journals that are published locally and not via an international publishing house. Such journals could make similar but much more modest charges or simply request some small financial support from each author's academic institution, if applicable. However, any such charges or requests need to ensure that they do not limit the volume of submissions.

2.8   For articles that are not written in English, consider having an English summary or abstract. The contents of PEWG Appendices are biased towards Europe and English language journals at present. It might be beneficial if versions could be provided for Latin American use, written in Spanish and Portuguese.

2.9   It is recognised that to attract good academic papers, some publications need to be peer-reviewed. They also may need to obtain an ISI number and a high citation index, so that authors who submit to them continue to receive research funding.

2.10   It is recognised that not all published speleological literature has been listed in the UIS *Speleological Abstracts*.

Digital is decaying. The future may have to be print

Ian Sample
Science editor
San Jose

Piles of digitised material - from blogs, tweets, pictures and videos to official documents such as court rulings and emails - may be lost for ever because the programs needed to view them will become defunct, Google's vice-president has warned.

Humanity's first steps into the digital world could be lost to future historians, Vint Cerf told the American Association for the Advancement of Science's annual meeting in San Jose, California, warning that we faced a "forgotten generation, or even a forgotten century" through what he called "bit rot".

Cerf called for the development of "digital vellum" to preserve old software and hardware so that out-of-date files could be recovered no matter how old they are.

"When you think about the quantity of documentation from our daily lives that is captured in digital form, like our interactions by email, people's tweets, and all of the world wide web, it's clear we stand to lose an awful lot of our history," he said.

"We don't want our digital lives to fade away. If we want to preserve them, we need to make sure that the digital objects we create today can still be rendered far into the future."

The warning highlights an irony at the heart of modern technology, where music,

Google boss warns about digital files

photos, letters and other documents are digitised in the hope of ensuring their long-term survival. But while researchers are making progress in storing digital files for centuries, the programs and hardware needed to make sense of the files are continually falling out of use.

"We are nonchalantly throwing all of our data into what could become an information black hole without realising it. We digitise things because we think we will preserve them, but what we don't understand is that, unless we take other steps, those digital versions may not be any better, and may even be worse, than the artefacts that we digitised," Cerf told the Guardian. "If there are photos you really care about, print them out."

Ancient civilisations suffered no such problems, because histories written in cuneiform on baked clay tablets, or rolled papyrus scrolls, needed only eyes to read them. To study today's culture, future scholars would be faced with pdfs, Word documents and many other file types that can be interpreted only with dedicated software, and sometimes hardware too.

The problem is already here. In the 1980s, it was routine to save documents on floppy disks, upload Jet Set Willy from cassette to the ZX Spectrum, slaughter aliens with a Quickfire II joystick and have Atari games cartridges in the attic. Even if the disks and cassettes are in good condition, the equipment needed to run them

is mostly found only in museums. The rise of gaming has its own place in the story of digital culture, but Cerf warns that important political and historical documents will also be lost to bit rot.

Cerf concedes that historians will take steps to preserve material considered important by today's standards, but argues that the significance of documents and correspondence is often not fully appreciated until hundreds of years later.

Researchers at Carnegie Mellon University in Pittsburgh have made headway towards a solution to bit rot, or at least a partial one. They take digital snapshots of computer hard drives while they run different software programs.

These can then be uploaded to a computer that mimics the one the software ran on. The result is a computer that can read

Google vice-president Vint Cerf says we are nonchalantly throwing all of our data into what could become a black hole without realising it

otherwise defunct files.

Inventing new technology is only half the battle, though. More difficult still could be navigating the legal permissions to copy and store software before it dies. When IT companies go out of business, or stop supporting their products, they may sell on the rights, making it a nightmarish task to get approval.

"To do this properly, the rights of preservation might need to be incorporated into our thinking about things like copyright, patents and licensing," said Cerf. "We're talking about preserving them for hundreds to thousands of years."

"Going, going, gone ", Lewis Dartnell

A huge amount of the information we consume and transmit in our everyday lives is perilously ephemeral. Every second, thousands of new photographs are uploaded to social media. Most of the images we take today are uploaded straight from a digital camera or a phone, with the picture never actually existing as a physical artefact.

So how will future historians and biographers piece together our lives and times without bundles of diaries, paper letters and professional correspondence? Family photos and emails are important to us personally, but what about more significant losses of our collective heritage? How do we preserve our interaction on Facebook, Twitter, comment threads and citizen journalism across the web? And does the "grey literature" of official reports, briefings and policy statements that are only published online also risk being lost to the future? In a speech last week, Google's vice-president Vint Cerf warned that a whole century of digital material could be lost.

There are some attempts to preserve this digital data. In 2010, the US Library of Congress signed an agreement with Twitter to archive public tweets sent since the platform's birth in 2006, and to continue preserving tweets to make this data available for analysis and research. In the UK, the British Library is taking bold steps to rectify what it refers to as the "digital black hole", where information is lost once it is taken down from a webpage or an entire site shuts down. Since 2004, it has been working to archive websites for future generations, just like paper-based literature. This effort received a huge boost in 2013 when the non-print legal deposit regulations came into force and allowed the British Library, as well as the five other UK deposit libraries, including those at Oxford and Cambridge universities and Trinity College Dublin, to archive all digitally published material. Nearly 5m UK-based websites will be preserved for the historical record, with regular snapshots taken so future historians can track how webpages evolve over time. Online retailers are also getting in on the act - services such as

Blurb.co.uk or MySocialBook.com will print a physical photo album from Facebook posts.

But it is not just words and images that we risk losing for ever. Huddie William Ledbetter was an influential American folk and blues musician at the turn of the 20th century, admired as the king of the 12-string guitar. As Lead Belly he is included in the Rock and Roll Hall of Fame in Cleveland, and is considered the godfather of modern music; Elvis Presley, Johnny Cash, Led Zeppelin, the White Stripes, Red Hot Chili Peppers and Nirvana have all covered his tracks. Yet, sadly, many of his original recordings have already been lost to time. Tapes of his sessions have degraded beyond salvaging - the recording on a tape is stored as a magnetic imprint in a thin film of metal oxide, and if this delicate coating flakes off, the music is irretrievably lost.

The sound archive at the British Library is one of the largest such repositories in the world, and the archivists here estimate that around two million of their recordings are fragile and at risk of being lost for ever. These historical recordings exist on large reel-to-reel tapes, cassettes, lacquer discs and even wax cylinders, and are vulnerable not just to physical degradation, but obsolescence and the disappearance of the technology needed to play them. If archivists don't get to the deteriorating media soon, the very act of trying to copy a recording could destroy it in the process.

Similarly, deciding on the best format to preserve them for the next hundred years »

British Library archivists estimate about two million of their recordings are at risk of being lost for ever