

Beyond the digital age

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INTRODUCTION

We tend to view history and societal change retrospectively in technological epochs, like the stone age or the bronze age, or closer to the present, the industrial revolution, the atomic age and the space age. We drop such terminology once the new reality becomes commonplace. Sound films were called “talkies” when they first appeared in the late 1920s, but the term was dropped within a few years when all films had become “talkies.”

The changes these “ages” usher in are permanent. Society reshapes itself around the new reality.

It surprises me, though, that people still say we are in the “digital age”, as if it is a novelty. It’s hardly that: it began before any of us were born. Surely, by now, the term is redundant.

There’s a long road of digital evolution which includes Charles Babbage’s “analytical engine” of 1837 – the direct ancestor of today’s computers – and the Jacquard loom of 1801, which used a punched card system to cause weaving

looms to reproduce pre-designed patterns in the cloth. IBM's punched card tabulators of the 1940s were an adaptation of the same idea.

By the late 19th century, Jacquard's concept had led to the paper music roll or cardboard music book, which actuated mechanical musical instruments such as orchestrions and the once widespread player piano. Piano rolls were produced for a mass market, especially in Europe and North America – and perhaps surprisingly, in my own country, Australia, where production only ceased as late as 2005.

In the instrument's most sophisticated form, the reproducing piano, as it was known, converted the decidedly analog performance of a pianist, with all its nuances, into binary code via punched holes on the paper roll. The roll could be played back to exactly reproduce the performance. Furthermore, the roll could be replicated and the copies would be clones of the original. There was no loss of information.

The history of sound recording demonstrates how analog technology overshadowed the digital variety for decades. But more recently it has been the turn of the digits to fight back.

THE DIGITAL REVOLUTION IN RETROSPECT

Is there any area of life which the digital revolution has not touched?

The word processor has replaced the typewriter. Telephones have become unwired and mobile. Emails and texting have replaced letter writing. Consequently, traditional postal services are declining and the ubiquitous public telephone box an increasingly feature of the urban landscape.

Social media has opened up new means of personal connectivity. Everyone has to have a facebook page. Public fig-

ures have twitter accounts with uncountable thousands of followers. We go shopping by internet instead of going to a bricks-and-mortar store.

The book encyclopaedia, the fount of knowledge once updated every few years, is now dead. The daily printed newspaper is slowly following as the e-version takes over. Wikipedia and its fellows are instantly accessible and updated by the minute, just like e-news. We can google for an instant answer on anything.

We pay our bills by phone, internet or swiping a credit card and check our bank balances on line. The net is converting money from a tangible to an abstract concept.

Cinemas now project digital images, not film. Our personal cameras are our iphones and our photo albums are our laptops. CDs replaced vinyl and DVDs replaced VHS. In turn they are giving way to download and streaming sites and services.

Computer chips are everywhere – in our cars, our household appliances, hearing aids – and now they are being surgically embedded in people. They can be read and programmed externally.

This is indeed a brave new connected world. Companies like Google, Apple and Microsoft have made vast fortunes. And for our iphones, ipads and laptops to work properly they must be connected to the web, where some of the software resides and where we back up our data into the cloud from whence, hopefully, it can be retrieved.

Is there a downside to all this?

Without realising it, we have become beholden and vulnerable to huge commercial enterprises and government bureaucracies which are accumulating vast amounts of data about our identities, our credit worthiness, our shopping preferences, our social contacts and our daily activi-

ties. When you install some new software do you read the fine print of the on-line contract – or do you just tick the box? How much of yourself do you reveal on your facebook page? Have you thought about the risks?

The initial promises of this brave new world, like the paperless office and teleworking, never really arrived. And the technology has evolved so fast that the world is awash in e-waste: redundant mobile phones, desktop computers, screens and other paraphernalia. They are now an environmental problem.

Every day on our email accounts we fight our way through the deluge of spam – which accounts for 70% of all traffic – and the entrapment of bogus bank messages and offers from strange sources of great financial riches. It has opened a whole new landscape of trickery – from identity theft to fraud and deception, as the recent scandal about toxic emissions from Volkswagen cars have made plain.

We have to replace our devices constantly because they date so quickly, and while we have them we also must constantly update their operating systems. It's very time consuming, and if that isn't enough, we have to keep track of a vast tree of log-ins and passwords which also have to be maintained to prevent our personal records being hijacked. How often has your credit card or email account been hacked – and how much time did you have to spend on the consequences?

The digital age has even brought a new kind of guerrilla war. It began with viruses, but it's evolved into a vast, global chess game, played in deadly earnest, as governments and corporations engage in cyber warfare: eavesdropping, bugging, infecting and mining each others' data bases and networks.

If you need guidance with your computer problems, your first port of call is your children. They have grown up in the digital environment and it envelops them. Now there are even detox courses for young people who have become so addicted to living in the on-line world that they have literally lost touch with reality.

DIGITAL MYTHOLOGY AND THE EFFECTS ON AV ARCHIVING

Although we in the archiving field know otherwise, there is still a wide public and political perception that “digital” equates with “cheap”, “modern” and “permanent”, which suggests preservation has become much simpler. For example, there are service providers who offer to transfer your old 8mm home movies to DVD, promising your DVD will last for hundreds of years, while your film will fade away. They don’t ask whether you will still be able to buy DVD players a couple of decades from now.

At its most extreme, this mythology has led to the assertion that we won’t even need archival institutions in the future: they’ll be replaced by a big data base. I have heard this seriously argued at professional conferences. Demonstrating our *raison d’être* – something, of course, we have always had to do – will become no less a requirement for archives in the future.

As we know there are a number of factors that can cause data to degrade, including leakage in solid state devices, gradual loss of magnetic orientation in magnetic carriers, and breakdown or “disc rot” in optical media. Software also degrades: changes in the hardware environment, bugs, evolution and software entropy. If we are to maintain the integrity of data and its permanent accessibility, the management

of data and software becomes a constant and growing financial obligation for audiovisual archives.

It has been argued that digitisation is a great democratiser, and in one sense this is true. If a document of any kind – be it text, image or audio – has been digitised and made accessible through the internet, it's available to anyone. You don't have to journey to the office of the archive to hear or see it. This has dramatically reduced geographic barriers to access and research, and with YouTube, Facebook and their siblings the internet has become a wonderland of images and sounds to be trawled for new discoveries. Wise archives, and entities like the World Digital Library, are using the net to open up their collections to vast new audiences.

But where there is action, there is reaction. This accessibility has been accompanied by an extension of intellectual property laws, as copyright owners have realised the commercial potential of their backlogs and libraries and increasingly control access for their own benefit – ironically, while the recordings are being preserved at public expense in archives, it is the copyright holders who reap the commercial benefit.

And curiously, this wonderland of choice on the net been taking the researcher into shallow rather than deeper waters. I call it the “net effect”: we now have a generation who have become so used to instant internet gratification that they assume that whatever isn't on the net doesn't exist. Archives can only combat this trend by digitising their collections and developing and promoting on-line catalogues on their own user-friendly websites.

Yet this “democratisation” has not worked for everyone. In reality the move to the diverse digital environment has only further segmented the world into haves and have-nots. It's called the “digital divide”. Put bluntly, it deepens the existing

gap between developed and developing countries. At one end of the spectrum, in rich countries like Denmark, Sweden and Norway, over 94% of the population use the internet. At the other end, in poor countries like Myanmar and Timor-Leste, it's just over 1%.¹ I've recently visited both countries, and seen first-hand the obstacles they face: in terms of infrastructure, education, information literacy and economics, they are formidable. It's hard to imagine how they can ever catch up as the rest of the world races onwards.

Overlaying this divide are the political and commercial considerations. For their own reasons, governments decide what parts of the net are "off limits". In China, you cannot access Google, and along with some other countries, including Iran and Syria, Facebook is also banned. In North Korea, internet access is limited to a tiny, government-approved elite. And anywhere in the world, digital content and software providers – Netflix, Amazon, iTunes, Microsoft and so on – determine how much of their proprietary material you can access, how long you can keep it, and what you will pay for it.

Finally, let's consider the "inertia" effect. At the personal level, while our devices and our software constantly change, the data we have accumulated easily gets left behind. We may never get around to transferring it; or it may become irretrievable; or it can be lost in a device failure like a hard disc crash. But even if none of these things occur, the sheer quantity of emails, photos, text documents and the rest becomes self defeating. Maintaining an organised personal data base takes time and discipline. How many of us manage it? In the days of film cameras, the number of photos you took of – say – a family outing was limited by cost and the 36-picture capacity of the roll of film. Today the same

¹ Source: Wikipedia, accessed 29 September 2015.

event can result in scores – maybe hundreds – of shots on your iPhone. Do you review them and select a few to keep? Or do you just put off the task for another day? And how many of the photos will survive for as long as the old family album your grandparents bequeathed you?

At the institutional level, the “inertia” effect is far larger. While the rate varies from archive to archive, we are not digitising threatened analog material in our collections fast enough to keep up with the loss of skills and transfer technology. We are set to lose a significant percentage of what we already hold. And the dilemmas of choice are only increasing as standards and formats constantly change, demands on storage capacity relentlessly increase, and we also have to spend time to select from the deluge of new content.

THE ANALOG/DIGITAL DICHOTOMY

We have become accustomed to thinking of “digital” and “analog” as mutually exclusive domains. I think the reality is more complex.

The world around us is best described as analog. Time is analog – it proceeds continuously. We can express time digitally by breaking it arbitrarily into discrete, numerical values; yet that does not change its nature. Digital information might be described as an idealised abstraction of physical reality.

Hence, the Roman alphabet could be described as a digital system. So could moveable type. The keys of a piano are a digital system: so is Western musical notation, at least mostly – non-discrete instructions such as *adagio*, *forte* and *legato* are analog! While the fingerboard of a violin, being fretless and continuous, is analog, the fingerboard of a guitar

is digital, divided by frets into discrete notes. Western music itself is built around deliberately selected wavelengths. Is it thereby digital, or partly so?

When it comes to motion pictures, what we would normally describe as analog film is actually a hybrid. The film emulsion is analog, since its particles are distributed organically and randomly. Unlike digital pixels, they cannot be numerically counted. But the individual frames are countable and digital in concept: they are a sampling of a photographic objective at the rate of 24 per second. The impression of movement relies on the phenomenon of persistence of vision.

Digital information itself, of necessity, is stored on analog devices which may be subject to electrical leakage or mechanical malfunction.

“Digitisation” is usually taken to mean the migration of content by digital means from an analog carrier – so described – into a surrogate digital file. In the process some sonic or visual information is lost, despite best efforts to minimise it. In the process the nature of the intellectual work is changed. A pixel-based copy of the analog images on a motion picture film has a different visual texture.

In the digitising process, the link between content and carrier – and context, when it’s relevant – is broken. To that extent, the work itself is changed. As Marshall McLuhan famously said, “the medium is the message”. Many image and sound carriers are artefacts, and their physical nature has shaped the creative form of the recorded work which they contain. They are information bearing objects, and much of the information they hold exists outside the visual and sonic content. This is a discussion I won’t pursue here, but it does emphasise the importance of recognising the artefactual value of carriers and not focussing solely on the content.

SUSTAINABILITY

Audiovisual archives, as recognisable entities, have been around for more than a century. Somehow I don't think they are about to be replaced by some vast, impersonal data base. The human element will always matter: expertise in selection and collection development, in the provision of access, and in the standards and practicalities of preservation. Because there will always be a physical aspect to our work – the need to preserve analog originals, to preserve the historical progression of technology, to present collections in the right context and surroundings, to make them relevant to new generations – archives will always be real places, not virtual ones.

Preservation depends on institutional continuity and stability, and hence on the values, standards, scholarship, skills, corporate memory and ethos which that engenders. How do we protect that continuity from the uncertainties of political change? How effectively do we advocate for the growth, funding and awareness of our institutions, in a world where simplistic – and cheaper – alternatives seem to lurk around the corner? Are our collections and services accessible enough to justify continued financial support? For it is access, not preservation, that the public sees and helps to develop a supportive constituency.

We have accumulated, by experience, trial and error, a great deal of knowledge about the preservation of what we now often call legacy formats – analog tapes and discs, film and paper – although some are now turning out to not be legacy formats after all. We understand, I hope, the crucial importance of preserving the original for its lifetime. When carrier breakdown or content retrievability requires migration, the preservation pathways are now analog to digital.

Born-digital works, of course, always need to be preserved in digital form, irrespective of the future uncertainties.

But what do we know about the long term sustainability and retrievability of digital formats? We have learned by experience of the risks, about what can fail, and about surviving in a constantly evolving software and hardware environment. But let's be reminded of the concept of entropy, which arises from the second law of thermodynamics:

Entropy is a measure of the state of disorder of a system. Digital storage media are a highly complex and very ordered means of information storage: very vulnerable to entropy. In print, celluloid, vinyl and shellac media entropy is slower. Analog seems to be relatively neglect tolerant. (Edmondson, 2016: 54)

Archives make an implicit commitment to refresh their digital files every five years or so. If they don't, they could rapidly lose their collections. And we need to hold that thought in tension with analog reality: properly stored, films and discs can last hundreds of years without refreshment. Even badly stored and with no management attention, experience shows that they can often survive for many decades. The analog holdings that archives now care for are what have survived the disruptions and destructions of two world wars, countless other conflicts, economic depressions, revolutions, invasions, market forces, pillage and simple neglect. So much for the 20th century.

Now in the 21st century we are making a wager on the digital future – we're betting that somehow the social, technological and political conditions of this century will be different, that they will be stable and reliable enough to ensure that, around the world, the audiovisual heritage will be refreshed every five years, and will survive whatever viruses, cyber attacks or hijacking that might be pitted against

it. That's every five years forever, or until some other, as yet unimagined, technology takes over.

We know we have no choice but to do what archives have always done – collectively confront the challenge and find solutions. We'll favour open source software so that we aren't held hostage to the mega-proprietors. We'll strive to educate and dispel mythology. We'll collaborate in international projects like InterPares and PERSIST. (www.unesco.nl/digital-sustainability) We will advocate legislation that underpins our activities and our professional independence, and enables fair and universal access to our collections. And we will seek stable, permanent and realistic funding for our institutions.

CONCEPT OF PRESERVATION

“Preservation” is a term much misused, even by archivists. Here's a standard UNESCO definition: “Preservation is the totality of things necessary to ensure the permanent accessibility – forever – of an audiovisual document with the maximum integrity”. (Edmondson, 2016: 54)

There are many definitions of *digital* preservation. Just google it. Here is an authoritative one:

Digital preservation combines policies, strategies and actions to ensure access to reformatted and born digital content regardless of the challenges of media failure and technological change. The goal of digital preservation is the accurate rendering of authenticated content over time. (American Library Association, 2017)

Does the first definition implicitly embrace the second, or not? And does preservation have different conceptual time frames: short term, medium term, forever? It's an open

question and could occupy many hours of discussion. But let's be clear. Preservation is an ongoing task, not a finite one. Nothing has ever *been* preserved: it's just *being preserved*.

In the digital realm that's fundamentally and constantly true. To digitise for access is to most conveniently meet current demand. To digitise for preservation is to lock in standards and assumptions that will be overtaken by technological progression.

THE POST DIGITAL AGE

Whether or not we are still in the “digital age”, some commentators believe we have moved on to the “post digital age”. This is not a denial of the immense changes that digital technology has made, and will continue to make, to society, but it is a paradigm shift which no longer sees “digital” as being synonymous with “progress”. It reflects a disenchantment with digital information systems and media gadgets, and a disconnection with the intrusive global digital networking of communication, technical infrastructures, markets, geopolitics and security systems. It sees the assumed dichotomy between digital and analog as false: it seeks to meld the abstractions of digital information systems with the hands-on, human realities of the physical, analog world.

There may be an element of nostalgia, but it is more than that. Perhaps it's best reflected in the dictum of the world's most successful investor, Warren Buffett, who has famously said that he never buys businesses whose operations he doesn't understand. Very few of us understand how a computer really works, and we don't know how to fix one if it fails. But most of us can understand the workings of a disc

turntable, a film projector, many household appliances and even motor vehicles. When they fail we might not necessarily have the skill to fix them ourselves, but we can usually *understand* what needs to be done.

It's in this light that we can ponder the resurgence of the vinyl disc and the audiocassette, of the traditional printed book in the age of the e-book. I was present recently when, in Canberra, a capacity crowd came to the National Film and Sound Archive to witness a musical group making an acoustic cylinder recording and an electrical lacquer disc recording – and to hear them played back. There is something intrinsically fascinating about a highly understandable technology and the creativity involved in exploiting the technology's inbuilt capacities and limitations.

Television and the internet have failed to replace the exhilaration of the live concert or the live orator. Skyping has not replaced the need for live meetings. The mechanical wrist watch with the analog dial is flourishing. And for all the global pervasiveness of electronic banking and credit card use, the production of bank notes is expanding. Instinctively we have greater trust in money as a physical object than as figures on a computer screen, especially in uncertain times.

There's a joke about a tourist in Paris racing into the Louvre and exclaiming "Quick, I'm double parked. Where's the Mona Lisa?" But it underscores a fundamental truth. You can study the detail of this painting much more effectively on a computer screen than in the Louvre itself – assuming you could fight your way through the crowd which always surrounds it. But a two dimensional digital surrogate is ultimately no replacement for the real thing.

CHALLENGES

Our challenge is to be at home in the post digital age.

We embrace digital technology for all that it offers us and requires of us. Indeed, we have no choice. But we err if we see it as the new versus the old, as one replacing the other. It's not either/or, but both/and.

What we have recently come to call "legacy collections" will continue to grow because new works in analog formats will continue to be made. The related skills and technologies will need to be maintained.

The challenge of migrating content from deteriorating carriers will remain and grow. It's a race we are losing and will continue to lose without sufficient resources, legislative support and the key to proprietary software. That points to things like fundraising, publicity and advocacy, but it also points to something that perhaps we have not done so well in the past.

I call it protecting and nurturing the intangible heritage of audiovisual archiving – the transfer of disappearing skills, the capturing of memory through oral history, the growth of training courses, the culture of live events which celebrate our heritage. This develops a diaspora of interested people surrounding our institutions from which volunteer workers, sponsors and fundraisers can be drawn.

Despite the best advocacy efforts of our professional associations, we in the collecting professions –archivists, curators, librarians– have an image problem. The media stereotype of the timid, bespectacled librarian is well established. And unfortunately research confirms that the stereotype has some validity. Studies using personality-type inventories like the Myers Briggs Type Indicator and the

Keirseley Temperament Sorter give a more nuanced picture than the stereotype, yet it's too close for comfort.

In summary, we differ from the general population. We are typed as “guardians”: dependable, process-driven, methodical managers of goods and services, reliable back-room people, intuitive and introverted. We're among the best educated but the lowest paid. We resist change. We fail to obtain the resources and status needed for our work, because the studies actually suggest we are poor advocates for our own cause. We rate three times lower on the ‘advocacy’ scale than the general population. We have a low self image. We are not political animals and we shy away from confrontation.

That does not mean that we *can't be* good advocates. Not at all. It's just not our preference.

The skills of advocacy, such as they are, can be learned. It's basically making the effort to reach out to others. We relate to people and try to meet their needs every day in the course of our work. Meeting with politicians, or fronting the media, or public speaking might not be our natural preference. But we are all – and I mean all – capable of them. We might feel we're a poor match for professional lobbyists and public relations experts – and there is a place for such expertise – but if I were a politician or journalist I would much rather listen to an archivist who believes passionately in her work, and does it well, than to a professional lobbyist who has no such commitment or depth of knowledge.

I see the post-digital age for archives as one of widening strategies, skills, technologies and issues. Like the history of the audiovisual media itself, our history has always been one of constant adaptation to technological change. In that sense, nothing has changed. The future promises to be an exciting ride, though perhaps a bumpy one!

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