

A black and white photograph of a person with long dark hair, seen from the side, sitting at a desk. They are wearing a light-colored sleeveless top and a watch on their left wrist. They are holding a tablet computer in their hands, looking at the screen. In front of them is an open laptop with a black screen. To the right of the laptop is a modern desk lamp with a white shade. The background is a bright, slightly out-of-focus window with white curtains.

# **MANAGEMENT OF BORN DIGITAL RECORDS**

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## Purpose

The purpose of this White Paper is to introduce the issue of Born Digital and provide an overview. It is also intended to generate discussion about the kinds of losses that may be experienced by councils as well as provide a starting point to provide solutions for the sector.

## Born Digital – Landscape or Landfill

*"To maintain our transparency and accountability in the public sector, it is vital that the information important to New Zealanders is managed and kept safe for as long as it is needed" - Archives New Zealand Digital Continuity Action Plan*

The ability of Councils to access born-digital information now, and into the future, is at risk. This is because born-digital information (information originally created in digital format) is fragile and can become unusable very quickly.

Born-digital information faces numerous threats to its survival, as outlined in the Archives New Zealand Digital Continuity Action Plan. These include:

- Media decay / obsolescence.
- Hardware obsolescence.
- Software obsolescence.
- Online storage disaster / decay.

**The most pressing threat is incomplete / inadequate capture.** If digital records are not captured and persistently linked with metadata (information labels); there can be no preservation, and therefore **no access**. Maintaining digital continuity is a collaborative activity: not someone else's job, but everyone's job.

The National Archives (UK) identifies five ways that digital continuity loss can be experienced:

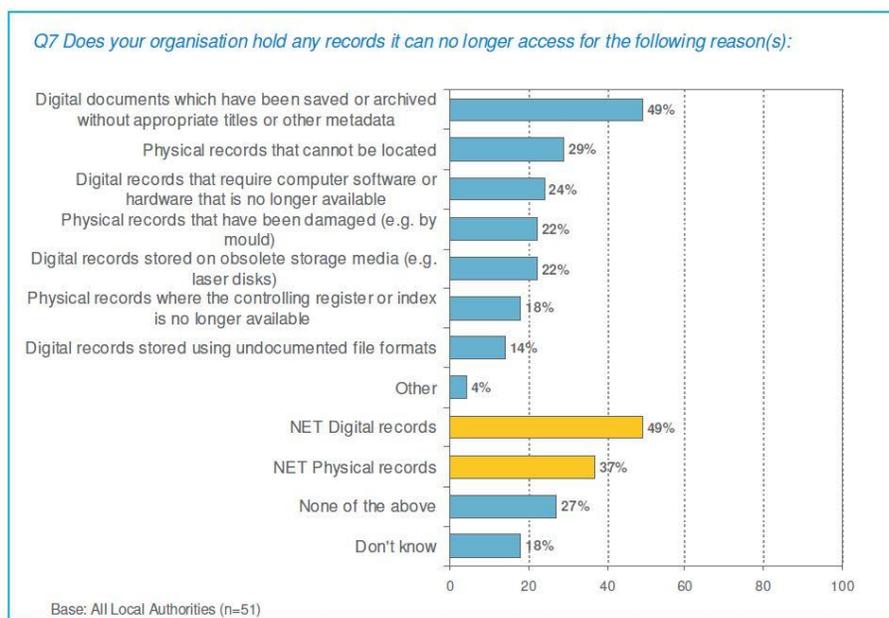
- Can't find
- Can't open
- Can't work with
- Can't understand
- Can't trust....the information you have.

In contrast, **useable information = available + complete:**

- **Usable** - your information meets your requirements for how you want to use it.
- **Available** - you can **find** what you need and have the technology to **open** it and **work with it** in the way you need.
- **Complete** - everything you need to work with, understand and trust the information is present including the content, context and all the necessary metadata.

Unfortunately, a lot of local government information is unusable and destined for the digital landfill. According to the 2010 Government Recordkeeping Survey over half (55%) of local authorities reported they had digital records in a format they could no longer access, and close to half (49%) reported they had digital records they could no longer access<sup>1</sup>.

The figure below gives a breakdown of the reasons for this, as provided by survey respondents<sup>2</sup>:



Fast forward five years and the challenge of managing born digital records is growing exponentially. According to the McKinsey Institute, 90 percent of the world's data has been created in the past two years<sup>3</sup>. This digital deluge creates challenges for Local Government Information Managers across New Zealand.

In this paper we identify some of the challenges facing our sector, provide a framework of understanding these and apply practical steps to move forward by way of a roadmap.

## Key Concepts

### Born Digital:

Information originally created in digital format.

1 Dudding, Amanda and Chris Mayo. "Government Recordkeeping Survey Report 2010 - Local Authorities". Archives New Zealand 2010. Accessed March 30, 2015.

[http://archives.govt.nz/sites/default/files/Publication\\_Local\\_Authorities\\_Report\\_0.pdf](http://archives.govt.nz/sites/default/files/Publication_Local_Authorities_Report_0.pdf)

2 Dudding, A., & Mayo, K. (2010). Government Recordkeeping Survey Report 2010 - Local Authorities (NZ200187). Retrieved from Archives New Zealand website:

[http://archives.govt.nz/sites/default/files/Publication\\_Local\\_Authorities\\_Report\\_0.pdf](http://archives.govt.nz/sites/default/files/Publication_Local_Authorities_Report_0.pdf)

3 Naidu, V. (2015, April 28). The problem with data. Local Government Magazine.

<http://localgovernmentmag.co.nz/infrastructure/the-problem-with-data/>

### **Digital Continuity:**

The ability to ensure digital information is accessible and usable by those that need it for as long as it is needed, despite technology changes. **Source:** Archives New Zealand Digital Continuity Action Plan.

### **Digital Landfill:**

Without active management of information in the digital landscape (ensuring it is preserved and migrated when necessary to the latest formats and media, attaching appropriate metadata, and ensuring documents that are no longer needed are securely and legally disposed of): information that should be available to councils and community groups instead slides into a 'digital landfill'. This is an accumulation of data that takes up space but is of no practical use<sup>4</sup>.

### **Digital Preservation:**

Principles, practices, methods, strategies and managed activities that ensure long term preservation for continued access to digital materials for as long as necessary. (Source: Archives New Zealand Digital Continuity Definitions).

The goal of digital preservation is not to preserve forever, but to ensure the survival of digital materials for the next generation of IT systems. Digital preservation requires action and intervention throughout the life of the digital information - earlier, and more frequently than with a physical collection.

### **Trusted Computing (TC) and Digital Rights Management (DRM):**

TC is a group of technologies which can be used to intentionally limit access to data and facilities on a computer. The hardware for TC is included in most laptop and desktop computers sold today. TC hardware can be useful to local governments by guaranteeing their machines have not been tampered with.

DRM software provides a way for information providers to control access to information while making it available to other people's computers. In conjunction with TC, DRM could provide strong control over access to documents and emails.

DRM can adversely affect the full usability of documents. Information providers can laden documents with restrictions and conditions imposed by the provider. For instance, providers can set a document to being unusable after a period of time without notifying the receiving agency. Local authorities would therefore lack control over incoming documents.

There is also a TC feature that can be used in conjunction with DRM called 'remote attestation' which allows information to be sent to an external server when the item is opened. The agency holding the document may have no way of knowing what information is transmitted. Many TC and DRM systems therefore have the potential to undermine the security of local government systems and the privacy of people who use them.<sup>5</sup>

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4 Bell, Stephen. Unmaking a digital landfill. CIO New Zealand 2010. Accessed May 6, 2015

[http://www.cio.co.nz/article/468571/unmaking\\_digital\\_landfill/](http://www.cio.co.nz/article/468571/unmaking_digital_landfill/)

5 Trusted Computing (TC) and Digital Rights Management (DRM) for Records Managers (- Archives New Zealand. Te Rua Mahara o te Kāwanatanga) <http://archives.govt.nz/advice/continuum-resource-kit/continuum-publications-html/f18-trusted-computing-tc-and-digital-right#1>

### **Implications of Cloud:**

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. The cloud itself is a virtualisation of resources such as networks, servers, applications, data storage and services. Users pay only for the resources they wish to use.<sup>6</sup>

While the cloud provides opportunities for greater access and use of digital information, it also poses challenges to long-term accessibility because:

- Cloud-based systems are not designed to manage information over long periods of time.
- It is difficult to ensure that information is preserved.
- It is difficult to ensure information is disposed of properly when no longer required.
- The proprietary interfaces and programming languages used by cloud service providers can make it difficult to transfer records to another environment.<sup>7</sup>

### **Impact on Public Records Management Requirements:**

Local Authorities have obligations under law to create, maintain and ensure the accessibility of born-digital records. Section 17 of the Public Records Act 2005 not only requires local authorities to create full and accurate records of their business activity, but to maintain them for as long as they are needed, no matter what format they are in.

Certain types of records (described in the Archives New Zealand Protected Records list) must be kept permanently as archives. There are also a number of other pieces of local government legislation with recordkeeping requirements. They are listed in the ALGIM Information Management Toolkit (Module F5 - Information Management Legislation Review).

### **Metadata:**

Metadata is structured information about an information resource that:

- Describes the information resource / object.
- Explains the information resource / object.
- Locates the information resource / object.
- Assists in retrieving, using, and managing the information resource / object.

## **Digital Information at Risk**

Initial research into the local government situation shows that some born-digital information is already lost, or completely gone. In 2013, Archives Central (a Feilding-based local authority archive) worked with participating councils on a preliminary digital systems stock take to identify the main problems. They found:

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<sup>6</sup> Using cloud computing services - implications for information and records management (- State Records NSW) <http://www.records.nsw.gov.au/recordkeeping/advice/designing-implementing-and-managing-systems/Using%20cloud%20computing%20services>

<sup>7</sup> What are the Recordkeeping Implications of Cloud Computing? (- Archives New Zealand. Te Rua Mahara o te Kāwanatanga) <http://archives.govt.nz/advice/public-offices/digital-recordkeeping/what-are-recordkeeping-implications-cloud-computing>

### **Some information is lost or nearly gone.**

For example, Archives Central found CCTV footage used to manage infrastructure assets stored on media that is degrading or can't be played (such as reel-to-reel film, and videotape). It must be re-shot at a cost.

### **Councils keep everything but you can't find what you need.**

Insufficient and inconsistent metadata means increasing uncertainty that all relevant information related to a query has been located: a particular problem for emails and documents managed in shared directories or local drives. In addition, systems and formats are sometimes locked down by vendors, meaning the information they hold is inaccessible.

### **Not all information is coming across when data is moved. Information is lost.**

Information is routinely moved from old to new systems, but not always successfully or completely. Consequences experienced by Councils include; partial transfer of information, or complete loss of subsets of information<sup>8</sup>.

### **Implications of Information Loss**

In the past, digital information often had paper equivalents - but this is becoming less and less the case as we work increasingly in digital format only. In the Local Government sector we aim to maintain good investment levels in technology solutions which create and disseminate information across business activities: however this is not always accompanied by the active management needed to ensure this information survives in the short term; let alone into the long term.

The loss of born-digital information has far-reaching implications. People who work in Local Government need access to digital information to do their jobs. A recent *Local Government Magazine* article explores how much local authorities rely on their ability to make evidence-based decisions in order to effectively manage their infrastructure. This means decision makers need access to the right information, at the right time to maintain the smooth running of business<sup>9</sup>.

Alongside this, there is a growing expectation from the community that Local Government information will be available to them in digital format. Gartner (2014) predicts that over the remainder of the decade, local governments will be expected to become more savvy at harnessing data sources to optimise, transform or create new services.<sup>10</sup>

### **Unlocking the Value of Born-Digital Information**

The Government's expectation is that the value of public sector born-digital information should be unlocked, and made as widely and freely available to the community as possible. This expectation is expressed in two initiatives that local government can voluntarily adopt. The Government ICT Strategy and Action Plan to 2017 says that

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8 Dewson, N. (2014). You can't manage what you don't understand: the role of a digital systems stock take in protecting future local government born-digital archives. *Archifacts*, (October 2014), 15-22.

9 Naidu, V. (2015). The problem with data. *Local Government Magazine*. Retrieved May 12, 2015, from <http://localgovernmentmag.co.nz/infrastructure/the-problem-with-data/>

10 Gartner, (4 October 2014). Top 10 Strategic Predictions for 2015 and Beyond: Digital Business is Driving 'Big Change'. [Online]. Available at: <https://www.gartner.com/doc/2864817> [Accessed 25 May 2015]

public (non-personal, unrestricted) information is a national asset that must be open by default, and available to be re-used for economic and social benefit. The New Zealand Government Open Access and Licensing Framework (NZGOAL) enables the reuse of government information, including for commercial reuse.

While the concept of 'value' is very broad and difficult to calculate in financial terms, recent investigations on the value of data in Australia's public research conservatively estimates the value to their economy to be worth at least AU\$1.9 billion a year. Research data curation and sharing might be worth at least AU\$1.8 billion and possibly up to AU\$5.5 billion a year, of which an estimated AU\$1.4 billion to AU\$4.9 billion is yet to be realised<sup>11</sup>.

The New Zealand Local Government sector has a similar opportunity to harness the value of its born-digital information. Appropriate management and preservation means it will be accessible to councils and community groups, enabling greater use, which in turn increases the value of that information. Pay for it once, then benefit from its content many times over. Once it reaches the digital landfill, however, the opportunity to realise its significant potential value is lost.

Not all information is worth preserving. As well as legislative requirements on what should be kept, the long-term value of local authority digital assets (those which have the greatest promise of returning value to users over time) must be identified and assessed, before evaluating the trade-offs between the benefits and costs in preserving them.

There are some challenges for the sector in assessing information value and enabling digital preservation:

- Uncertainty about selection criteria for assessing long-term value (although retention and disposal schedules are a starting point). Selection is an expression of value, and the value proposition must be revisited over the course of the digital asset's lifetime.
- Incentives between those who preserve, and those who benefit from preservation and access.
- Lack of clear responsibility for digital preservation.
- Little co-ordination of preservation activities across diffused stakeholder communities.
- Separating preservation costs from other costs, i.e. making things available now, and making things available in the future.
- Mandates to preserve can be effective for ensuring access to public records by guiding the policies of public archives - but mandates only work to the extent that there is capacity to fulfill them.
- Difficulty in valuing, or putting a dollar value on costs and benefits of digital preservation.

Once information value is assessed, there are further questions to resolve before preservation can take place:

- Who benefits from the use of preserved assets?

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<sup>11</sup> Houghton, J., & Gruen, N. (2014). Open Research Data: Report to the Australian National Data Service (ANDS). Retrieved from Australian National Data Service (ANDS) website: [www.ands.org.au/resource/open-research-data-report.pdf](http://www.ands.org.au/resource/open-research-data-report.pdf)

- Who selects what to preserve?
- Who owns the asset?
- Who preserves the asset?
- Who pays?

It is not always possible for agencies to make in-roads into the born-digital preservation space on their own. This is where proxy organisations such as ALGIM play a role by broadening the base of demand, and providing efficiency of effort by representing numerous stakeholders who do not have the ability to take timely actions.

### What do we want to Achieve?

**Preserve:** Confidently, reliably and cost-effectively manage and preserve all types of digital content destined for long-term preservation, and embed best practice in digital collection content management.

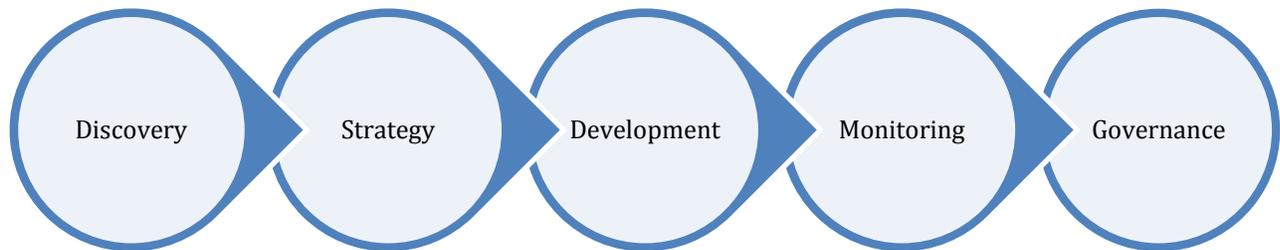
**Maintain information's integrity:** We are aiming for minimal intervention which means minimal alteration, therefore ensuring maximum integrity and authenticity.

**Manage risks:** Those associated with Digital Preservation throughout the digital content lifecycle.

**Collaborate:** We need to maximise the opportunities that arise from collaboration (nationally and internationally), particularly at scale to achieve maximum return on investment.

**Priorities for action:** Technical obsolescence is a long term view; the short-to-medium-term view is media integrity, digital rights management and metadata.

## Digital Preservation Roadmap



### Discovery

One of the greatest problems faced with digital preservation is understanding the size and complexity of the problem we have now and what this may look like into the future.

Undertaking an information audit from a digital perspective is an important first step in discovery of assets that needs remedial preservation now or planned preservation in the future.

When running through the discovery process it is important to think about both the degradation and availability of the technology as well as the skills and understanding that surrounds it.

### Strategy

Standardising the way information is created and maintained now and in the future by ensuring vendors are responsibly procured with exit strategies in place that consider the ongoing digital information preservation and accessibility.

WHY are we doing this, what are the desired outcomes for our stakeholders?

WHAT does digital preservation involve?

WHO is going to take care of this program of work and how can they be supported?

WHEN will value be realised in the immediate work undertaken?

HOW will we realise value in the future?

### Development

Development of ongoing management frameworks for the management of digital information is crucial to ensure the effort of discovery is not repeated rather an ongoing task that forms part of everyday information management.

Tools such as application inventories, data dictionaries, configuration databases and a good change management process are helpful in keeping things in hand.

Development of a good training plan for users in the organisation is essential. Giving people the tools and understanding to treat digital information as not only assets but also an important part of organisational transparency and knowledge that is valued now and well into the future.

## Monitoring

As the saying goes we can't manage what we can't measure so having good monitoring in place at each stage in the information management lifecycle.

Creators, information managers and end users have different parts of the workflow that surrounds digital preservation and each part has unique tasks that improves the digital continuity.

Simple monitoring can be put in place for:

- Software as a Service (SaaS) products in use.
- File Type Reporting.
- Software & Hardware Installation Monitoring.

## Governance

This roadmap and efforts to preserve digital information will require ongoing governance and management to ensure there is a cyclic approach and that activities are planned and ongoing.

A good governance structure will include:

- Key business users.
- Steering group.
- Feedback and reporting on activities.
- Support for activities at senior leadership level.
- Policies and procedures in place and regularly reviewed.

## Quick Tips for Digital Preservation<sup>12</sup>

### Know Your Digital Information

- **Know** what digital recordkeeping systems you have and the technologies that they rely on to function, as sooner or later these technologies will become obsolete, making the information stored in the system at risk of loss.
- **Know** what information is created and kept in each system, the formats in which the information is stored, where it is, how it is described, and why it exists.
- **Know** how the information relates to the business of your organisation, how it is used and how long it needs to be kept to meet business and legal requirements.

### Design Systems to Support Your Information

It is important to recognise long-term information use as a functional requirement when designing or purchasing a new system. In cases where the data will need to be kept beyond the expected life span of the system (usually five to ten years), it is critical that the system is able to export the data in a usable form so that it can be carried forward into future business systems.

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<sup>12</sup> Adapted from: Recordkeeping for Good Governance Toolkit: Guideline 18: Digital Preservation. (n.d.). Retrieved June 2, 2015, from [http://www.parbica.org/content/RGGT18\\_tcm50-74712.pdf](http://www.parbica.org/content/RGGT18_tcm50-74712.pdf)

## Adopt Exit Strategies

When purchasing new hardware or software, make sure your agreements with vendors includes an exit strategy to ensure your information is not locked inside systems your organisation no longer wishes to maintain in the future.

## Limit the Number of File Formats You Use

File formats are the mechanism by which different types of digital information are encoded and stored for use. Because file formats become obsolete over time, it will be necessary to migrate critical business data in old file formats into new or more stable file formats. The more file formats your organisation uses, the more expensive and labour intensive it will be to ensure the longevity of your information assets, and the greater the risk of losing vital information will be.

For guidance on assessing and selecting suitable file formats refer to *Advice on File Formats for the Creation of Digital Records*

[http://archives.govt.nz/sites/default/files/file\\_formats\\_guidance.pdf](http://archives.govt.nz/sites/default/files/file_formats_guidance.pdf)

## Use Open Formats

Open formats are not owned by any software companies and so are less vulnerable to loss through technological obsolescence resulting from proprietary dependencies. As a general rule, open formats are more stable and are easier to migrate. Wherever practicable, use open formats such as PDF, HTML, JPEG etc.

For further information on open formats including further examples, please see *Advice on File Formats for the Creation of Digital Records*

[http://archives.govt.nz/sites/default/files/file\\_formats\\_guidance.pdf](http://archives.govt.nz/sites/default/files/file_formats_guidance.pdf)

## Don't Keep Digital Information Any Longer Than You Need To

Keeping digital information indefinitely is expensive and often technically complex. Although digital storage may appear cheap, storage is not the only cost associated with managing and migrating the information. Even with cheap storage, the rapidly expanding volume of digital information means that keeping data for longer than necessary will involve unsustainable costs.

You need to know how long information needs to be kept and how to find it, and have systems in place that can ensure that the important information is properly preserved while the unimportant information is disposed of in a timely and managed way.

## Know Where All Your Information Is and Keep It Under Control

Councils may store their information in centralised databases, on portable storage media, on back-up tapes, in personal or shared folders, or it may be managed by contracted service providers. Increasingly commonly, it may be stored in the Internet 'cloud', which may mean that the information is actually stored in another country. The more diverse and unmanaged your information storage arrangements, the more your information is at risk of loss.

## Describe Your Information Well

Quality metadata is key to information survival: you can't find, understand, manage or trust your information without it.

You can take steps to improve the management of metadata you already have in your existing systems (see the Records Management Standard for the New Zealand Public Sector for guidance). When deciding on metadata for new or substantially redeveloped systems, it is better and easier to adopt standards that already exist, are well modeled on national and international standards and are well-supported, than it is to build one from scratch.

## Reduce Duplication

Digital information can easily be copied. Often, organisations will have thousands of copies of the same piece of information stored in different places. Managing and storing many copies of the same data is a waste of money and can lead to confusion by staff and clients. Systems and processes need to be put in place that identify and eliminate duplicates, control versions and guarantee the integrity and authenticity of official records.

## Manage Migration

Migrating data from old, soon to be obsolete, file formats and storage media to new or more stable formats is a necessary preservation activity for information that needs to be kept for longer than a few years. Many councils will have routine migration programmes: It's a matter of taking the opportunity to improve on them to ensure information has the best chance of survival when transferred between systems.

Migrations are high-risk by nature, and the processes used will be specific to each system. They will bring up highly technical issues and difficulties that can only be dealt with at the time of migration, in consultation with vendors. Although migration processes are system-specific, you can use standards to make sure, at a high level, the bases are covered in planning. For instance *ISO 13008 Information and Documentation: Digital Records Conversion and Migration Processes* can be used as a starting point for new migration programmes, or for a gap analysis against existing ones.

## Don't Leave It Until It Is Too Late

Ensuring the longevity of critical business information is your responsibility today and cannot be left to your future colleagues to retrospectively fix. Always think about how today's systems and processes can help ensure that critical business information will be available now and in the future when it is needed. Proper management from the point where digital information is created will save a lot of problems in the future.

## Case Studies

### **NASA**

In 1975, NASA sent two Viking space probes to Mars. The data generated by these unrepeatable missions - produced at a total mission cost of approximately \$1 billion - was recorded onto magnetic tape. Two decades later, the tapes were cracked and brittle, despite climate controlled storage, and the formats were unreadable. To access the data, NASA had to track down old printouts and retype everything. NASA has subsequently become one of the world's biggest supporters of digital continuity. Digital Preservation Coalition (2006).

[View more information online](#)

### **Domesday Book (Redux)**

The original Domesday book was an 11th Century survey of England. A new multimedia edition of the book was launched in 1986 and included a 'survey' of the UK in which (mostly school children) wrote about their lives and society. It was linked with maps, colour photos and videos and virtual tours of landmarks. Over 1 million people took part. It was published on Videodisc in 1986 – an expensive, unpopular format that soon became largely inaccessible as the hardware needed to access it became increasingly rare. The data was rescued through the CAMiLEON project. This produced a system (DomesEm) that emulated the original hardware and allowed the information to be viewed.

[View more information online](#)

## Summary

The rubric digital preservation really has three components: curation, archiving, and preservation.

Curation refers to “data curation,” or the process of maintaining, managing, and promoting the use of data from creation through dissemination for discovery and use. Archiving is the specific data curation activity that involves making certain that information is properly selected, stored, and made accessible. It also ensures that the integrity of information, and the physical format encapsulating that information, remains secure and authenticated over time. Preservation is an archiving activity which ensures that specific items of data are maintained over time so that they can be accessed and understood regardless of changes in technology.

Successfully preserving digital collections requires a holistic, life-cycle management strategy that emphasises creation, appraisal, documentation, and reuse. You cannot just preserve a digital object: you must preserve the entire digital ecosystem. When you export data values from a database, you gain access to information. But to truly preserve the context of that information you must preserve the database software’s characteristics, its reports, forms, and query screens, its tools, and any other aspect of the database that makes the data values understandable.

The following aspects are critical to successful archiving and preservation:

- **Identity** - you must know what a resource is, which is why descriptive metadata is critical for digital preservation.
- **Understandability** - a resource must be understandable to an archive’s designated community. If the context or documentation for the resource is lost, understandability is threatened.
- **Authenticity** - an object must be what it purports to be, not just what someone says it is. Authenticity is confirmed when both the content and the source of the content can be verified.
- **Fixity** - a resource must not be accidentally altered or deleted. Insecure storage, data transmission errors, or media degradation jeopardise the fixity of resources.
- **Viability** - the digital resource must be readable from digital media. This quality is jeopardised when media degrade or become obsolescent.
- **Renderability** - a resource must be “displayable” or otherwise made usable. Digital objects cannot be rendered when their file formats become obsolete.

## Winnie-the-Pooh

When developing preservation metadata, we must consider the most significant properties of what it is that we are planning to preserve. What is the essence or property that needs to be retained? For example, when preserving peaches, it is their flavour being preserved, not the fruit as it looks when it is plucked from the tree. A more visual example is in the following excerpt from A.A. Milne’s Winnie the Pooh:

this				take		this take
If	is	shall	really	to		If is shall really to
	flying I		never		it.	flying I never it.

Piglet getting bounced along by Kanga,  
*Winnie the Pooh*, A.A. Milne, p. 103

...transcribed as linear text

There is no “one size fits all” when preserving digital collections. Everyone must keep abreast of developments in the field and make choices appropriate to local circumstances. Actively curate your data, identify what is to be preserved, record preservation metadata, gather files and documentation, consider and document the significant properties of the material, and then store it in the safest way possible until a trusted repository is chosen. Clearly, the significant property of this passage (the essence of the information) cannot be captured by the text alone. A strict linear interpretation of the text not only garbles the meaning of the passage, but it fails to convey the dimension of movement one might feel when bounced around by a kangaroo.

## Thank You

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