DIGITAL CUSTODIANSHIP: PATHWAYS TO REFORM

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Abstract

Digital custodianship is an area of much discussion and debate within the Australian public and private sector communities and will continue to be as the importance and relevance of digital information grows. Custodianship can be defined as the 'act of ensuring appropriate care and maintenance of information'.[1] This topic paper will bring awareness to some of the current challenges facing digital custodianship and encourage open discussion within the Australian community.

I would like to discuss several issues in relation to digital custodianship, namely, accountability, reliability and sustainability of technology, authenticity, digital data standards, and data management and maintenance. These issues are relevant to future discussion and debate on information sharing, including how information is managed in electronic environments. They are interlinked with the fundamental notion of who is responsible for the development and management of online datasets and digital information.

Currently, within the Australian community there is a lack of an appropriate governing framework to give guidance and support to businesses and government bodies that are facing digital custodianship issues. There is an underlying need for further research and commitment from both public and private sectors in relation to digital custodianship, so that progress and change within the Australian community can be achieved. If a governing framework is not established, digital custodianship can become a segmented silo effort by individual organisations with no benchmark to follow for effective custodianship policy development. Furthermore, new and innovative methods of process and technique, both nationally and internationally need to be explored, in order to achieve a set of best practice standards and guidelines. There is a need for a unified and collaborative approach within the Australian business community to many of the issues surrounding this broad topic as an increasing amount of data becomes present in the digital environment.

Introduction

In broad terms, 'custodianship' refers to the act of ensuring appropriate care and maintenance of information. Custodianship does not necessarily mean that all data is captured and maintained by the custodian, but the custodian maintains the responsibility for quality and availability of the data.[2] Custodianship provides a means of achieving accountability for, and reliability of, information sources.

There is no major difference between the terms 'digital custodianship' and 'custodianship'. However, digital custodianship refers specifically to the method and technique of data management. In other words, it refers to an organisation acting as the primary custodian for digital datasets and providing access to these datasets in an electronic environment. A digital dataset can be anything from a (spatial) database, inventory, index, map, personal information, engineering model,

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1 Australia New Zealand Land Information Council, *'Guidelines for Custodianship'* (1998), available at: http://www.anzlic.org.au/get/2374980712.

2 NSW Natural Resources Information Management Strategy (NRIMs), *'New South Wales Custodianship Guidelines for Natural Resources Information'* (1998), available at: http://www.nrims.nsw.gov.au/policies/custodian.html.

architectural design, collection of models, photograph or other image, or a separately available layer in, or component of, a layer system; it can also describe certain common properties of entities using an agreed set of attributes and standards.[3]

During my current work I have started to explore and research the concept of digital custodianship from a spatial data perspective. I am finding that digital custodianship has a unique range of issues and concerns, such as copyright, data standards and security, which present new policy challenges that physically stored and accessed datasets don't have.

Today I want to briefly discuss several of these policy challenges, and explore how organisations are dealing with the emergence of information in the electronic environment. This topic paper aims to raise awareness to the numerous difficult policy challenges facing public and private sector organisations, and to act as a catalyst to encourage open discussion among the business community.

Accountability

Firstly, when we refer to custodianship as being the collection and management of data by an organisation, or part of an organisation, on behalf of the wider community or the larger organisation, then the question of who is responsible for the development and management of datasets is raised.

Generally speaking, the responsible agent is obvious in traditional data storage methods, such as the physical archiving or storage of information at a specified location. In this case, the custodian is the organisation that has collected and managed the physical storage of the information. In the digital environment, the issue of responsibility is not always clear cut. The question of who is the custodian and who is responsible for the digital document may not be as evident. A digital custodian does not have to be the primary maintainer of the digital data. The data may be maintained by an external agent, while the custodian provides a governing framework for this data. Therefore a shared and collaborative effort between the custodian and data provider can be the approach taken in relation to accountability.

The *Australian Government Custodianship Guidelines* developed at the Office of Spatial Data Management (OSDM) clearly states that, 'A custodian has various rights and responsibilities with respect to a particular dataset, including:

- Determining priorities for data capture
- Managing and operating data acquisition and integration processes
- Complying with standards
- Storing the data
- Maintaining and revising the data
- Ensuring data security
- Providing metadata
- Promoting data use
- Facilitating data access
- Administering data distribution
- Charging for data or recovering costs associated with data supply, consistent with agency and jurisdictional policies
- Consulting with users

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[3] *ibid.,* http://www.nrims.nsw.gov.au/policies/custodian.html.

- Preserving the data over time
- Complying with legislation, policies and guidelines

The day to day operation of these responsibilities may be delegated but the ultimate responsibility rests with the nominated data custodian.'[4]

One of the weaknesses within the OSDM custodianship guidelines is that, 'both the identification of custodians and their associated rights and responsibilities have not always been clearly articulated and are not necessarily clearly understood and acted upon.'[5] This statement by the OSDM reflects the current complexity, and misunderstanding which surrounds the notion of responsibility and accountability within digital custodianship.

Consequently, the business community faces a myriad of accountability challenges in relation to digital custodianship. Many of these business challenges raise questions which include:

- Who are the identified custodians of the datasets?
- Does the custodian have to host, and be held solely responsible for the digital dataset?
- Can the responsibility of digital data management and maintenance be transferred to a third party? If so, what are the legal implications?

From my observation, government agencies are finding themselves in new territory, and policy and procedural documentation on digital issues are not keeping pace with the technological progress and advancements that are occurring. New technology, such as electronic archive databases, is being used by organisations, but the governance and organisational guidelines surrounding digital products are not being developed simultaneously.

It is interesting to note that in the last three decades, there have been two separate approaches taken to custodianship:

- *Custodial digital archives.* The U.S. National Archives and Records Administration (NARA) has been the world leader in assuming both physical and legal custody of digital records. Its digital records collection ranges from American historical documents, to Federal government records and reports.
- *Non-custodial digital archives.* The National Archives of Australia has been an early leader of the approach of leaving custody of digital archives to their originating agencies.[6] The National Archives is an agency of the Australian government, which aims to collect data, ranging from historical records, photographs, maps, to models and plans, from nation-wide governing agencies.

The main difference between both of these approaches is that the custody of digital data can either be primarily managed by one single agent, as per the NARA model, or the responsibility can be shared, as per the National Archives.

A study of the National Archives of Australia reveals that roles and responsibilities of digital data are shared between the National Archives and government agencies. While the National Archives creates the fundamental digital framework policies, standards, guidelines, and provide advice and training on record management, individual agencies create and maintain their own records. This

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4 Australian Government, Office of Spatial Data Management, '*Australian Government Custodianship Guidelines'* (2007), available at: http://www.osdm.gov.au/OSDM/Policies+and+Guidelines/Custodianship/default.aspx.

5 *ibid.,* http://www.osdm.gov.au/OSDM/Policies+and+Guidelines/Custodianship/default.aspx.

6 South Carolina Department of Archives and History, *'Custody of Digital Records: Options and Implementation Considerations'* (2006), available at: http://arm.scdah.sc.gov/NR/rdonlyres/CB623A26-CFFC-4103-B56F-0FB50EDD4A21/0/ghunterReport.pdf.

presents an innovative method of dividing and governing the digital information in collaboration with individual agencies that specialise in certain datasets.

On an international level, this Australian model is also the preferred digital custodial approach at the National Archives of UK, which clearly states in their *Custodial policy for digital records*, that,

> Departments and agencies are responsible for the effectiveness of their records management programme. The National Archives is responsible for the guidance and supervision of the public records system, the provision of preservation facilities and public access for records of historical value transferred to it. It is also responsible for the provision of standards and guidance. It will also act as an advocate for the archival and records management issues and solutions in government, promoting a cross government viewpoint where appropriate.[7]

There are many benefits to this approach in relation to responsibility and accountability, namely there is a sharing of time, costs and resources, which can alleviate budget restraints. Furthermore, the splitting of roles and responsibilities encourages collaboration and consultation amongst the agencies and the National Archives. This strategy can be seen as a highly attractive solution for many organisations who are struggling to balance digital custodianship issues with realistic project budgets, resources and timelines.

Reliability and sustainability of technology

The notion of continuous reliability and sustainability of digital data is highly applicable and important to the concept of digital custodianship. This is because digital reliability relates to the planning, resource allocation, and application of digitisation methods and technologies necessary to ensure that digital information of continuing value remains accessible and usable.[8] One of the key issues facing both hardware and software is the problem of obsolescence in retrieval and playback technologies. Active intervention is required to ensure digital records remain accessible. Media will require refreshment before it suffers fatal degradation and the logical [software] format of the objects may require migration to more current or open formats.[9] This dynamic creates an unstable and unpredictable environment for the continuance of hardware and software over a long period of time and represents a greater challenge than the deterioration of the physical medium. For example, many academic libraries are facing technology challenges regularly as the information that they carry is both digitised and 'born' digital resources which need to be kept current in the online environment. For instance, Florida Atlantic University has an established digital library where they have identified that, 'long-term access to digital materials requires continuing preservation efforts as storage formats, retrieval, and playback technologies are subject to rapid cycles of deterioration and obsolescence.'[10] Therefore, there is the need for organisations to establish a continuing commitment to the issue through careful planning and remaining realistic about the life span of software and hardware products they are using.

From a business perspective, the task of ensuring that digital hardware and software stays current, updated and live can be quite a costly exercise for many organisations, especially small to medium business groups that have tight resource and budget allocations. Innovation and advancement in the computer hardware, storage and software industries reveals that information technologies are essentially classified as obsolete every eighteen months.[11] The reality facing many organisations is

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7 The National Archives UK, *'Custodial policy for digital records'* (2005), available at: http://www.nationalarchives.gov.uk/documents/custodial_policy.pdf.

8 Hedstrom, M., *'Digital preservation: a time bomb for Digital Libraries'* (1997), available at: http://www.uky.edu/~kiernan/DL/hedstrom.html.

9 *op.cit.,* http://www.nationalarchives.gov.uk/documents/custodial_policy.pdf.

10 Florida Atlantic University, *'Digital Preservation @ Digital Library'* (2007), available at: http://www.library.fau.edu/depts/digital_library/digipreservations.htm.

11 Terry Kuny, 63rd IFLA Council and General Conference, *'Digital Dark Ages? Challenges in the Preservation of Electronic Information'* (1997), available at:

that technologies and devices can disappear as providers continuously move to better product lines. Subsequently, the question we have to ask ourselves is how do organisations continue to provide digital content in an ever changing and costly technological environment?

In my research, I am finding that microfilm remains the preferred choice for long-term projects that are seeking to preserve large numbers of documents. This is due to the high storage saving rate, long life expectancy, and also the wide tonal range making it capable of capturing manuscripts through to engineering plans.[12] Perhaps, a combination of digital capture and microfilm methods should be implemented until more stable and concrete preservation and sustainable technology policies are developed.

This issue can be summed up by two key components, time and money, both of which shape organisational responses. When hardware and software becomes outdated, resources may need to be purchased in order to transfer the data to current software and hardware options, and this causes problems for organisations that have a lack of resources to complete the task. Furthermore, the 'copying' of digital information isn't just about moving from one medium to another, it also involves the translation into new formats or structures. For many businesses, this process can be the most time and resource demanding exercise.

Authenticity

The internet and the development of new digital technologies have led to fundamental changes in the ways that digital data is created, accessed, and protected. From a public sector perspective, the NSW State Records Authority states that,

> Government and the community expects that the custodian of its archives will protect and preserve them in such a way that they can be relied upon to reflect an accurate picture of Government's activities and can be trusted as 'official', conveying the meaning and intentions of the records creators. This expectation can only be met by ensuring the authenticity of the records being preserved.[13]

Hence the issue of authenticity as it relates to digital custodianship is significant to raise, and it brings with it a myriad of questions to be addressed. Furthermore, authenticity touches on several issues of importance, namely, copyright protection, digital security, access control issues, restrictive licensing and intellectual property regimes, all of which aim to provide digital management solutions so that the authenticity of digital data is preserved. Several questions that should be addressed by the business community include:

- How does an organisation guarantee the authenticity and protection of its digital content?
- What security and copyright measures can be utilised?
- What sort of digital items are protected by copyright?
- How does an organisation implement version control?
- Can digital data be protected successfully in a virtual platform, so that organisations have control over who accesses and how the data is used?

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http://74.125.155.132/scholar?q=cache:BQcnh_S3UpgJ:scholar.google.com/+author:%22Kuny%22+intitle:%22The+digital+dark+ages%3F+Challenges+in+the+preservation+of+...%22+&hl=en.

[12] U.S. Library of Congress, *'Technical Standards for Digital Conversion of Text and Graphic Materials'*, available at: http://memory.loc.gov/ammem/about/techStandards.pdf.

[13] NSW State Records Authority, *'Digital records preservation in the NSW public sector: a discussion paper'* (2007), available at: http://www.records.nsw.gov.au/recordkeeping/topics/digital-recordkeeping/digital-records-preservation-discussion-paper/digital-records-preservation-discussion-paper.

In addition, government agencies are emphasising the importance of the creation and capture of metadata as a fundamental support to a record's authenticity. Therefore, the custodian of the data must ensure that there are stringent security and control procedures implemented and monitored to guarantee the authenticity of the digital content.

Generally speaking, as an increase of information becomes available online to the wider community, the fear of copyright infringement, digital security loopholes and version control errors is argued to be much greater risks in a digital context. From an archival viewpoint, increasingly restrictive intellectual property and licensing regimes will ensure that many corporate material assets never transform into online collections. The issue is whether corporate owners will develop a public-spirited interest in providing archives for the reference of future generations and whether the resources will be accessible to the public.[14]

For instance, the online spatial GIS community is currently debating issues surrounding digital mapping data, such as provider rights, accuracy and data protection. One perspective strongly voiced, is that large organisations must be careful where, how and who they get their digital information from and whether they are allowed to republish other people's data on their own platforms.[15] This can prompt an array of questions that need to be answered, including:

- How accurate is the data?
- Where has the data been sourced?
- How credible and current is the data?
- Do small external companies have the rights to republish the data?

Legal and ethical concerns exist if data being provided is sensitive and available openly to the public, and has not been approved by the custodian, or the custodian is not made aware that their data sources are in public use. On the other hand, the ability to challenge the exclusivity of spatial data owned by data providers is being praised by some as a step toward open access of information to the public.

Briefly speaking, digital management solutions, such as copyright protection, digital security, and access control, are tools which are being implemented widely by both public and private sector organisations with the aim of preserving authenticity of digital data in the public arena. Many organisations are using digital tools which include digital watermarks, Information Rights Management, and metadata control, in order to imbed or tag their digital products and information as unique and authentic. Complex legal and contractual issues are emerging and becoming a concern with digital data that is being indexed, or used without authorisation from the custodian of the data. Therefore formidable challenges exist in the formalisation and intellectual description of rights and in developing common contractual languages.[16] The management of diverse licensing and contractual arrangements are becoming key areas that organisations need to invest time and money in so that effective licensing, security and authenticity of documents is achieved in the electronic arena.

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[14] Terry Kuny, 63rd IFLA Council and General Conference, *'Digital Dark Ages? Challenges in the Preservation of Electronic Information'* (1997), available at: http://74.125.155.132/scholar?q=cache:BQcnh_S3UpgJ:scholar.google.com/+author:%22Kuny%22+intitle:%22The+digital+dark+ages%3F+Challenges+in+the+preservation+of+...%22+&hl=en.

[15] Fee, J., *'Google Maps Now Uses Their Own Map Data'* (2009), available at: http://www.spatiallyadjusted.com/2009/10/07/google-maps-now-uses-their-own-map-data/.

[16] *op. cit.,* http://74.125.155.132/scholar?q=cache:BQcnh_S3UpgJ:scholar.google.com/+author:%22Kuny%22+intitle:%22The+digital+dark+ages%3F+Challenges+in+the+preservation+of+...%22+&hl=en.

Digital data standards

I would now like to briefly discuss digital data standards, another area important to digital custodianship. Digital data standards are necessary to ensure effective management of digital datasets. In the electronic arena it becomes more crucial that digital data follow an organisational standard that creates a stable nexus for hardware, software and administration. Compliance with digital data standards will ensure that data submitted can be processed with minimum delay and be maintained to a high level.[17] Digital data standards promote compatibility and interchange of data among its users. Furthermore, digital data standards ensure a higher confidence level to managers of an organisation that are making decisions based on the digital data.

From a spatial data perspective, the Environmental Systems Research Institute (ESRI) is one example where national and international standards are a key tool in ESRI's focus on digital data. The work that ESRI is doing on spatial data standards and GIS interoperability demonstrates an example where national and international standards have been incorporated to enable organisations to focus on managing digital data. As the ESRI White Paper on *Spatial Data Standards and GIS Interoperability (2003)* states, 'ESRI has developed its products based on spatial open standards to ensure a high level of interoperability across platforms, databases, development languages, and applications.'[18]

Another example from a spatial digital dataset is the work of the ACT Planning and Land Authority, the organisation which has created *Digital Data standards for the Cadastral Database*.[19] It provides stakeholders, such as surveyors, land developers and other government agencies, with clear guidelines and standards to follow when submitting their work for inclusion in the ACT Land Information System. Having a standardised approach should result in a common understanding of what is required and a consistency in the way data is submitted.

During my research, I have identified that the National Library of Australia which deals with a wide range of digital datasets, such as maps, photographs, artworks, sheet music, publications, and manuscripts, has set standards and requirements. The document *Digital capture and image creation — standards and equipment*[20] clearly explains the tonal resolution (pixel depth) and spatial resolution for the different material types it houses.

International standards are also an important avenue for organisations to follow and implement in their own internal frameworks. International standards ensure that organisations are abiding by best practice standards at a global level. This is another way of promoting an interoperable framework on an international scale, and will ultimately benefit the organisations and their customers from quicker and more efficient data access and transfer. For example, the ISO 9000 Series focuses on addressing quality management practices. ISO 9000 family does this by looking at what an organisation does to fulfil:

- Customer quality requirements;
- Applicable regulatory requirements;
- Enhance customer satisfaction; and,

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17 ACT Planning and Land Authority, *'Digital Data standards for the cadastral Database'* (2008), available at: http://www.actpla.act.gov.au/__data/assets/pdf_file/0003/6384/Digital_Data_Standards.pdf.

18 ESRI, *'Spatial Data Standards and GIS Interoperability: An ESRI White Paper'* (2003), available at: http://www.esri.com/library/whitepapers/pdfs/spatial-data-standards.pdf.

19 *op. cit.,* http://www.actpla.act.gov.au/__data/assets/pdf_file/0003/6384/Digital_Data_Standards.pdf.

20 National Library of Australia, '*Digital capture and image creation — standards and equipment'*, available at: http://www.nla.gov.au/digital/capture.html.

- Achieve continual improvement of its performance in pursuit of these objectives.[21]

Therefore, it provides practical guidelines for organisations to ensure the effective running of management practices within their organisations, regardless of how big or small the business is, and whether they are in the private or public sector. In other words, the ISO 9000 standards provide a tried and tested framework for taking a systematic approach to managing the organisation's processes so that they consistently turn out product that satisfies customers' expectations.[22]

Perhaps the key message to take from this research is that it is important for custodians of digital data to invest and create digital data standards for their workplace. Ultimately this will ensure a consistently high quality standard for digital data that their customers will benefit from in the digital arena.

Data management and maintenance

An important part of digital custodianship involves the maintenance and management of datasets to specifications and standards. The Queensland Spatial Information Infrastructure Council states in its custodianship policy document that a key aspect of maintenance is to ensure that over time the dataset is not degraded through lack of attention.[23] Therefore analysing how routine maintenance is organised and run within organisations is crucial to having a successful digital custodianship framework.

In my research I have found that different organisations have different approaches to this issue. If we take the earlier mentioned example of the National Archives of Australia (NAA), we find that the NAA allocates the data maintenance to its agency partners, while it concentrates on coordinating a successful overarching governance framework for the digital data. This is a novel way to share time, cost, and resources between organisations. Consequently this shared approach can result in each organisation focusing on one task, the maintenance or management side, and achieving a strong business result.

Another interesting and innovative example lies in the approach taken by the National Library of Australia. Rose Holley has written an article on *Public Collaborative OCR Text Correction in Australian Historic Newspapers*,[24] which reveals how the National Library has managed to involve the public in updating and maintaining the library's online newspaper collections. This project is growing into a successful venture in which unpaid volunteers from the public play a major role in correcting the errors that OCR software can't get right.[25] Some of the key benefits which were identified include that the data quality is improved for all users, keyword search improves, the community becomes involved and engaged, and users become empowered. In comparison, this style of end-user involvement in the maintenance and management of digital data is also successful on a global scale through reference sites such as Wikipedia which relies on clients to correct, update and maintain information in an interactive environment. These two approaches clearly demonstrate that innovative thinking can make the process of data management and maintenance an effective and efficient process for organisations.

It is only fair to say that current methods of digital data management and maintenance are primarily manual based, labour intensive, costly, and time consuming. Perhaps the key to effective data

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21 International Organization for Standardization, *ISO 9000 and ISO 14000*, available at: http://www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000.html.

22 *ibid.,* http://www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000.html.

23 Queensland Spatial Information Infrastructure Strategy, *'Standard 4: Custodianship'* (2001), available at: http://www.qsiis.qld.gov.au/QSIC/QSIC.nsf/CPByUNID/05CBFF3E05FA6A8E4A2570C000822497.

24 Holley, R., *'Many Hands Make Light Work: Public Collaborative OCR Text Correction in Australian Historic Newspapers'* (2009), available at: http://www.nla.gov.au/ndp/project_details/documents/ANDP_ManyHands.pdf.

25 Government 2.0 Taskforce, *'Recognising the volunteers: Jhempenstall is my hero — who is yours?'* (2009).

management and maintenance revolves around the creation of management tools which integrate descriptive control with storage technologies. In other words, research and development of tools that would imbed more intelligence about the preservation status of digital material into the objects themselves would make monitoring and maintenance of large digital collections more automatic.[26] For example, the MOMspider (Multi-Owner Maintenance Spider) can identify maintenance issues such as broken links, modified and moved documents, or objects which have expired.[27] The key is to include maintenance and management solutions into the technology that is being used as a platform for the digital information. This would reduce the overhead of data maintenance, and it would serve a strong purpose in the continual management and maintenance of the digital data.

Possible solutions

What must the Australian business community do to address the challenges of digital custodianship? In my research I have identified that there are a few strategies that should be undertaken in order to improve the knowledge, options and quality of information that is currently available to organisations facing this real challenge.

Perhaps one of the key steps that needs to be encouraged is an increase of research in the area of digital custodianship. Further projects should be undertaken by organisations and business communities which focus on the challenges of digital custodianship. The research needs to include documentation and accounting for costs and resources which are used in order to better understand the overheads of implementing digital custodianship practices in organisations. Furthermore, a sharing of successes and failures related to implementing digital custodianship practices should be encouraged so that we can better understand what works and what doesn't.

Secondly, a more cohesive collaborative effort among common business communities and entities, such as libraries, might help to eliminate duplication of data efforts and consequently reduces cost and resource allocation. It is this unified and 'working together' approach which will help to build a valuable, coordinated and useful online information resource. Efforts such as the U.S. National Digital Library Federation[28] and the Canadian Initiative on Digital Libraries[29] are examples of important first steps.

In a digital era where an increasing amount of information is becoming available online to view and distribute, it is becoming clear that more work and research needs to be done to determine a digital custodianship policy approach. Perhaps Terry Kumy is right in saying that,

> … It is necessary to believe, perhaps as an article of faith, that the efforts of librarians and archivists will be appreciated in the future. The traces of information that we are able to save from our digital vellum will be valuable sources of information to the future. The objective is a noble and necessary one even as the problems may appear insurmountable.

In summary, this paper only scratches the surface of many of the interrelated issues which have been mentioned in relation to digital custodianship. The paper highlights the reality that this topic is continuously evolving. Perhaps with further support and research opportunities, digital custodianship will become a clearer picture for many organisations. With the sharing of ideas and innovative approaches, organisations can confidently tackle the topic and create valid, resilient digital custodianship guidelines that aim to provide solid rules and regulations for the business community.

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[26] Hedstrom, M., *'Digital preservation: a time bomb for Digital Libraries'*, available at: http://www.uky.edu/~kiernan/DL/hedstrom.html.

[27] Ackerman, M. S. and Fielding R. T., *'Collection Maintenance in the Digital Library'* (1995).

[28] Digital Library Federation (2009), available at: http://www.diglib.org/.

[29] Canadian Initiative on Digital Libraries (1997), available at:http://epe.lac-bac.gc.ca/100/206/301/lac-bac/cidl-ef/2007-09-28/cidl/index-e.html.

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