Digital Continuity:

Ensuring the continued accessibility of the Queensland Government's digital records

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Executive Summary

It is widely recognised that information and communication technology has radically altered our society. It has fundamentally impacted the way in which governments around the world conduct business and communicate with citizens.

As Queensland Government business becomes increasingly administered and transacted through electronic means, digital records are becoming an essential source of evidence that helps ensure sound decision-making and accountability, and documents and protects the rights and entitlements of the Queensland community.

Digital records are fundamentally dependent on technology to access and understand the information. However over time, technology becomes obsolete as new versions of hardware, software, file formats and media regularly supersede older versions. This obsolescence drastically increases the risks that digital information will be lost, lose its authenticity or become inaccessible, especially when the information needs to be retained for long periods of time. In the digital environment electronic information will not survive being neglected.

Governments and organisations around the world are universally challenged by the long-term management and preservation of digital records, particularly when records need to be kept for lengthy periods such as 50 or 75 years or permanently.

The challenge is exacerbated by the sheer volumes of digital information that are being created, in new and emerging forms. The use of technologies such as Web 2.0, 3D modelling tools, CCTV or automated data loggers[1] continue to increase the volume, complexity and size of digital information created. The exponential growth in volumes is not just a storage problem; it has become an information management and governance problem.

The discipline of digital archiving helps organisations to gain effective control over their digital information. Digital archiving comprises the long-term preservation and management of digital information, to help ensure information remains accessible for as long as it has been authorised to be required. Sound information management practices, forming part of a broader digital archiving strategic framework, are essential in allowing agencies to identify, manage and have certainty in the integrity of the information that they create. Early intervention to manage digital records in a planned and strategic way has been found to be more cost-effective than remedial action taken later down the track.

In 2009, recognising the importance of digital archiving for the Queensland Government, Queensland State Archives undertook to review the current digital archiving methods across the government and develop an approach to this issue, including the potential for a Queensland digital archive. This work was undertaken in accordance with the *Toward Q2 through ICT - Implementation Plan*, in partnership with the Queensland Government Chief Technology Office and Queensland Health.

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[1] Data loggers are electronic devices that record data over time with a built-in or external instrument or sensor. They allow, for example, monitoring of environmental conditions, such as air temperature, wind speed and water levels.

To inform the development of an approach, Queensland public authorities were consulted during 2010 in two main exercises:

- A discussion paper which aimed to raise awareness of the complexity of digital archiving, establish a common language and understanding about the key issues and obtain feedback regarding how agencies are responding, or preparing to respond, to the challenge of ensuring continued access to their digital records over time.

- An online digital archiving survey which gathered quantitative data about the digital archiving activities and strategic planning undertaken by public authorities.

An analysis of the results of this consultation reveals that Queensland public authorities create and manage a wide variety of digital records that require long-term retention and the complexity and volume of digital information held by public authorities is rapidly increasing. Confidence levels of agencies in the continued accessibility of digital information vary however, with 80% of survey respondents acknowledging that at least some of their digital information is at risk of loss.

Public authorities are taking some action to manage and preserve their digital records, however the consultation demonstrated there is a clear need for a strategic whole-of-Government policy direction for digital archiving in order to leverage efficiencies and economies of scale and avoid inconsistent, inadequate and unsustainable approaches. Following the results of the consultation exercise, Queensland State Archives has developed a digital archiving program framework to guide future work to address this need. This framework highlights that successful digital archiving is more than a technology issue. It entails wider business, policy, information management and economic impacts for organisations that need to be strategically considered and managed.

This report outlines the broader context for digital archiving and the current state of practice across Queensland public authorities, and includes a proposed approach to address the challenge of ensuring the continued accessibility of the Queensland Government's digital records.

About Queensland State Archives

Queensland State Archives is the lead agency for recordkeeping across Queensland's public authorities and is the custodian of the State's largest and most significant collection of government records.

As mandated under the *Public Records Act 2002*, the powers of the State Archivist include establishing and managing repositories and other facilities to store, preserve, exhibit and facilitate access to public records and other materials, and to undertake research and issue policy advice on contemporary recordkeeping and information management matters.

1 Introduction

1.1 Background

In September 2009, the *Toward Q2 through ICT*[2] strategy was released outlining the Queensland Government's information and communication technology priorities and targets to help create more accessible, efficient and effective services for the benefit of all Queenslanders.

Under the associated implementation plan, Queensland State Archives (QSA), assisted by the Queensland Government Chief Technology Office (QGCTO) and Queensland Health, are responsible for reviewing the current digital archiving methods across the government, and developing an approach to this issue, including the potential for a Queensland digital archive (Action AG-3.4a).

1.2 Purpose

In accordance with the requirements of Action AG-3.4a under the *Toward Q2 through ICT - Implementation Plan*[3], this report:

- reviews current digital archiving methods across the Queensland Government, and
- outlines a proposed approach to addressing the challenge of digital archiving.

The purpose of the report is to foster a shared understanding of the scope of the digital preservation challenge and build consensus on a robust, sustainable and strategic approach to this issue.

This report builds on information gathered from public authorities in response to the *Digital Archiving Discussion Paper: Informing an approach to the long-term management and preservation of Government digital records*, and the online *Digital Archiving Survey* released in May and August 2010 respectively.

1.3 Terminology

The terms 'digital records' and 'digital information' are used interchangeably throughout this document. While it is acknowledged that not all digital information held by organisations are public records as defined by the *Public Records Act 2002*, the broader term is used to counter the common misconceptions that 'records' are only formal documents such as reports. Records are any recorded information, created or received by an entity in the transaction of business or the conduct of affairs that provides evidence of these activities. In addition, public records are not only records that are available to citizens. The term 'public' should be understood in the same broad sense as 'public sector', not as in 'open to the public'.

Other key terms used in this document are defined in the Glossary (Appendix A).

1.4 Acknowledgements

Queensland State Archives would like to acknowledge the contributions made by its partners Queensland Government Chief Technology Office (QGCTO) and Queensland Health, and by the many public authorities that participated in this work by responding to the Discussion Paper and completing the Digital Archiving Survey.

[2] Available at http://qgcio.govnet.qld.gov.au/SiteCollectionDocuments/Strategies/TowardQ2throughICT.pdf

[3] Available at http://www.qgcio.qld.gov.au/SiteCollectionDocuments/Strategies/Toward Q2 through ICT Implementation plan Sept 2010 v10.pdf

2 Understanding digital archiving

The development of a robust, sustainable and strategic approach to digital archiving is becoming a pressing challenge for governments around the world. This need is driven by:

- growing reliance on electronic methods of conducting business
- exponential growth in the volumes of digital information
- increasing complexity of digital information.

As Queensland's 600 public authorities move increasingly towards electronic means of service delivery and client engagement, the Queensland Government has a responsibility to ensure that evidence of this business is appropriately managed to support decision-making and accountability, and to form part of the history and cultural heritage of our state.

A comprehensive approach to digital archiving must be based on the understanding that different information needs to be retained for different periods of time. Some information only needs to be retained for short periods of time, whereas other information – particularly where it reflects decisions or actions that have long-term impacts or involves the rights and entitlements of individuals – needs to be retained for longer periods of 20, 50 or 75 years, for example. In some instances the records must be retained permanently. Digital archiving focuses on ensuring that digital information remains accessible for as long as it is required.

Digital archiving comprises the long-term management and preservation of digital information. It involves specific activities to ensure digital information remains accessible, authentic and meaningful despite the obsolescence of hardware, software and media. Digital archiving activities include the identification, appraisal, description, storage, preservation, management, retrieval and provision of access to digital records.

A common misconception is that digital archiving is exclusively a technological issue relating to the storage of digital information. Although technology is an important aspect to digital archiving, there are also wider business, policy, information management and economic impacts of digital archiving to be strategically considered and managed by a public authority.

2.1 A complex problem

Digital archiving presents a multifaceted challenge due to the complex nature of digital information and the many formats in which it exists. Ensuring that digital information can remain accessible, understandable and authentic for the required retention periods is difficult as software and hardware change frequently, and new versions are not always compatible with older versions.

To complicate matters further, digital information exists in a multitude of formats and systems, from relatively simple email or word-processed documents to complex and automated ICT systems, and its volume is growing.

Because of these dependencies and the rapid rate of change of hardware, software and media, digital archiving has been described as an ongoing job, in some contrast to the analogue world. With paper records, the content or information is bound to the carrier (paper) and the nature and extent of the record, by virtue of its tangibility as an object, is clear. By preserving the paper, therefore, the information is generally also preserved.

2.2 The need for early intervention

Focussing on the technological issues alone is not enough to solve the problem of digital archiving. The growing volume and complexity of digital information means that early intervention, and the implementation of appropriate information management and governance practices early in the lifecycle, is essential to ensuring that digital information is managed appropriately over time.

Without this early intervention and planning, digital records are at risk of losing their trustworthiness, integrity and authenticity, or simply becoming lost or inaccessible. Such loss can carry significant impacts including:

- organisational inefficiency and increased costs
- legal liability
- inconsistent client service
- lack of accountability
- inadequate business intelligence and continuity
- diminished historical resources available to future generations
- erosion of the community's trust in the government.

The 'performance' model of digital preservation... it's not just about the bitstream!

The storage of and access to digital records involves the interplay between a bitstream (i.e. the 1s and 0s of the information), the carrier used to store the bitstream (e.g. the hard disk or removable media) and the software needed to interpret the bitstream. This software may itself be dependant on a particular operating system and reading the carrier also requires compatible hardware and software. This network of interactions and relationships is both dynamic and precarious.

Because of these dependencies, a digital record can best be understood not as an object but as a performance in which the user experiences the product of this interplay between bitstream, hardware and software. Therefore, digital archiving is not simply about preserving an unchanging bitstream; it is about being able to ensure that the performance can be reproduced in the future and that the core characteristics and authenticity of the information is maintained throughout time.[4]

Preservation challenges can arise for all of the core components which enable the performance. For example, two problems can occur in relation to the media on which a bitstream is stored: the media itself can become unstable or corrupted, or the device required to read the media is no longer available (e.g. floppy disk drives).[5] Consequently, a process of media refreshment (i.e. moving the bitstream to new media) is required simply to maintain the bitstream.

In addition, while most software is upgraded on a regular basis, and generally new applications are able to read the files created by previous versions, this ability to interpret older versions is often not supported over time. This means that files that have not been migrated to newer formats as they are no longer required for current business purposes, for example, are at risk of becoming inaccessible. In the future, such files may 'not be readable by the latest version of the software, and the older version software may no longer be available, or may not run on a current computer, or under a current version of the operating system'.[6]

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4 National Archives of Australia, *An Approach to the Preservation of Digital Records*, available at http://www.naa.gov.au/images/an-approach-green-paper_tcm2-888.pdf, December 2002, accessed 2 November 2010. Furthermore, defining the 'core characteristics' which need to be maintained is also an area of ongoing research and debate in the digital preservation community.

5 Cornell University Library, *Digital Preservation Management: Implementing Short-term Strategies for Long-term Problems*, available at http://www.icpsr.umich.edu/dpm/dpm-eng/oldmedia/index.html, version 1 2004, accessed 2 November 2010.

6 Cornell University Library, *Digital Preservation Management: Implementing Short-term Strategies for Long-term Problems*, available at http://www.icpsr.umich.edu/dpm/dpm-eng/oldmedia/index.html, version 1 2004, accessed 2 November 2010.

2.3 The value of government information

The value of government information can be significant. The move to increasing public disclosure of information is based on the recognition that information has value not just to the organisations that create it, but in driving broader economic growth. For example, an independent study has found that the United Kingdom Ordnance Survey underpins £100 billion per year of economic activity, and in 2006, the UK Office of Fair Trading estimated revenues from the public sector information market to be £590 million per year.[7]

This trend, driven in Queensland by the Right to Information reforms but also seen federally and in other countries, means that government information will be open to public scrutiny more than ever before. Sound information management practices, forming part of a broader digital archiving strategic framework, will be essential in allowing agencies to identify, manage and have certainty in the integrity of the information that they publish.

Although the field of digital preservation is still in its relative infancy, taking steps as early as possible to preserve digital records is significantly more efficient and cost-effective than remedying deficiencies at a later stage.[8] For example, a recent study conducted in the Netherlands revealed that the process of 'repairing' records due to deficient metadata may cost a nearly 3000% increase in the expenditure originally required to create records with adequate metadata.[9]

While it is difficult to estimate the full costs incurred by not addressing the challenge of digital preservation now, there are clear indicators that the cost of establishing a sound, strategic, digital preservation capability is far cheaper than having to avert recordkeeping crises caused, for example, by impending technological obsolescence and unexpected system failures.[10] In any event, such crisis management does not represent a sensible alternative to a planned, coordinated and sustainable approach to the preservation of digital information which is based on a sound cost-benefit assessment.

The development of comprehensive digital archiving approaches is essential to contain future cost growth and is an investment in ensuring the value-creating capacity of government information assets remains available in the future.

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[7] The Ordnance Survey is Great Britain's national mapping agency. Both figures cited are from Ed Mayo & Tom Steinberg (2007) *The Power of Information: An independent review*, available at http://www.opsi.gov.uk/advice/poi/power-of-information-review.pdf, June 2007 accessed 15 November 2010.

[8] Digital Preservation Coalition, *Mind the Gap: Assessing Digital Preservation Needs in the UK*, available at http://www.dpconline.org/advocacy/mind-the-gap, 15 February 2006, accessed 2 November 2010.

[9] Charles Beagrie Ltd and JISC, *Keeping Research Data Safe Factsheet: Cost issues in digital preservation of research data*, available at http://www.beagrie.com/KRDS_Factsheet_0910.pdf, accessed 2 November 2010

[10] Charles Beagrie, *Keeping Research Data Safe: A Cost Model and Guidance for UK Universities*, available at http://www.jisc.ac.uk/media/documents/publications/keepingresearchdatasafe0408.doc, 1 April 2008, accessed 2 November 2010.

2.4 The challenge of volume

Many research studies have pointed to the exponential growth in the volumes of information being created and managed in organisations, with enterprise data on average growing at 40% to 60% every year.[11] Tellingly, one commentator has found that while the cost of raw hard disk space is approximately 100 times less than it was 10 years ago, the money spent on enterprise storage has remained relatively unchanged. Added to that, the market for software to manage storage has grown dramatically (Figure 1).[12] That is, organisations are spending the same amount on storage, even though the raw material is one percent of its price a decade ago. This illustrates the massive growth in volumes of digital information worldwide and that, although storage may be cheap, cost benefits cannot be realised without effective management and control of the information being stored.

The exponential growth in volumes is not just a storage problem; it has become an information management and governance problem. These volumes and the rate of growth are now causing real widespread business problems for many organisations such as the inability to access or locate information, demonstrate the authenticity of information, and ensure sustainable resourcing. Technological measures alone are not sufficient to address these issues. The Queensland Government is not immune to this growth and the associated business and information management challenges.

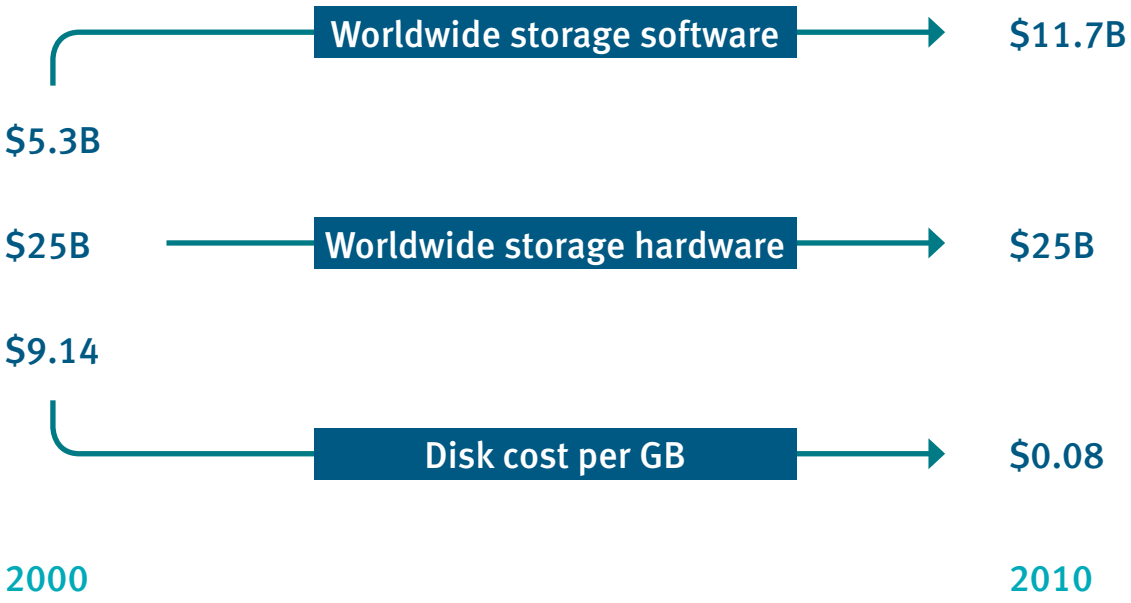

Figure 1: Storage costs[13]

[11] Lucas Mearian, 'Data growth remains IT's biggest challenge, Gartner says' *Computerworld*, available at http://www.computerworld.com/s/article/9194283/Data_growth_remains_IT_s_biggest_challenge_Gartner_says 2 November 2010, accessed 11 November 2010.

[12] Barclay Blair, *The Origins of Information Governance by the Numbers*, available at http://barclaytblair.com/origins-of-information-governance-powerpoint/ 28 October 2010, accessed 11 November 2010.

[13] Barclay Blair, *The Origins of Information Governance by the Numbers*, available at http://barclaytblair.com/origins-of-information-governance-powerpoint/ 28 October 2010, accessed 11 November 2010.

2.5 The recordkeeping context

Digital records are not new, but for a long time organisations considered that the 'official record' was the paper version. Contrary to this assumption, the *Public Records Act 2002* defines a public record as 'recorded information created or received by an entity in the transaction of business or the conduct of affairs that provides evidence of the business or affairs'. This definition covers records in all forms, including digital.

This Act provides the legislative framework for the management and retention of records in the Queensland public sector. It requires all public authorities, including state government departments, local governments, government-owned corporations, universities and statutory entities, to take action to ensure that information that can only be produced or made available with information technology 'remains able to be produced or made available' (Section 14).

Public authorities must also create 'full and accurate' records of their business activities, have due regard to standards and guidelines issued by the State Archivist, and only dispose of records with the approval of the State Archivist. The periods for which records need to be retained before they can be lawfully disposed of are set out in Retention and Disposal Schedules authorised by the State Archivist. There is no default retention period. The appropriate retention period for each group of records created and kept by a public authority is based on an analysis of the business and legislative requirements for that record type.

Some types of records are to be retained permanently due to their ongoing legal, historical or cultural importance. These permanent records ultimately form part of the archival record of the state, coming into the physical care and custody of Queensland State Archives. However, in the absence of a digital archive repository, the related policy standards framework, sustainable resources and governance models, QSA is presently unable to accept, manage or provide access to the Queensland Government's permanent public records created in digital form.

2.6 National and international initiatives

Queensland is not alone in the need to develop approaches to the ongoing management and preservation of digital records. Many leading international authorities, such as UNESCO, have recognised that digital evolution has been too rapid and costly for governments and institutions to develop timely and informed frameworks encompassing information management and preservation strategies. UNESCO has asserted that the lack of an overarching framework threatens the economic, social, intellectual and cultural potential of an organisation.[14]

While a number of tools and approaches have emerged for digital preservation, there is no single 'out of the box' solution or policy approach that can be selected and deployed. As the US Association of State Chief Information Officers stated in 2007:

> *...there is no 'silver bullet' for solving the set of issues. New knowledge must be developed, pilot approaches must be tested and the efforts that are currently in progress for developing technology solutions need to be coordinated and communicated to the appropriate user community.*[15]

However, a range of standards have emerged in recent years that provide guidance on the essential elements and functionality of a digital archive. Three key standards are:

- *ISO 14721:2003 Open Archival Information System -- Reference model*
- *Trustworthy Repositories Audit & Certification: Criteria and Checklist*[16]
- *PREMIS (PREservation Metadata: Implementation Strategies)*.[17]

The *Open Archival Information System (OAIS) reference model* is a conceptual model that outlines how digital objects can be prepared, submitted to an archive, stored, managed and maintained for long periods, and retrieved as needed, although it does not prescribe any technical approach to preservation.

The *Trusted Repositories Audit & Certification (TRAC) framework* provides tools for the audit, assessment, and potential certification of digital archives, establishes the documentation required for audit, delineates a process for certification, and establishes appropriate methodologies for determining the soundness and sustainability of digital archives. It is widely recognised as a defacto standard within the digital preservation community and work is currently underway to transform this framework into a formal international standard.

PREMIS, another defacto standard within the digital archiving community, is concerned with the metadata needed to track preservation activities applied to information. It encompasses a data dictionary for preservation metadata and a schema for representation in XML. The data dictionary defines a core set of semantic units that digital archives should know in order to perform preservation functions.

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[14] United Nations Educational, Scientific and Cultural Organization (2003) *Charter on the Preservation of the Digital Heritage*. Available at: http://portal.unesco.org/ci/en/files/13367/10700115911Charter_en.pdf/Charter_en.pdf

[15] National Association of State Chief Information Officers (2007) *Electronic Records Management and Digital Preservation: Protecting the Knowledge Assets of the State Government Enterprise Part II: Economic, Legal and Organizational Issues*.

[16] See http://www.crl.edu/archiving-preservation/digital-archives/metrics-assessing-and-certifying for further information.

[17] See http://www.loc.gov/standards/premis/ for further information.

3 Current state: digital archiving in the Queensland Government

3.1 Methodology

To ascertain the current digital archiving methods in use across government, two key consultation exercises were undertaken. A discussion paper was developed and released to gain a broad understanding of the issues facing public authorities throughout Queensland, followed by an online survey designed to gather additional quantitative information. The scope of this research encompassed public authorities as defined by the *Public Records Act 2002*, including government departments, government-owned corporations, local governments, statutory entities and universities.

These activities were supported by a forum for public authorities and an analysis of current Retention and Disposal Schedules, authorised by the State Archivist, to gain insight into the variety of digital records created by public authorities that may require long-term preservation.

3.1.1 Digital Archiving Discussion Paper

As a first step, QSA released the *Digital Archiving Discussion Paper: Informing an approach to the long-term management and preservation of government digital records* to over 100 Queensland public authorities in May 2010.[18] The discussion paper was designed to raise awareness of the complexity of digital preservation, establish a common language and understanding about the key issues and obtain feedback regarding how public authorities are responding, or preparing to respond, to the challenge of ensuring continued access to their digital records over time.

In total, 50 responses to the discussion paper were received, representing 53 public authorities.

3.1.2 Digital Archiving Survey

QSA engaged the Office of Economic and Statistical Research (OESR), Queensland Treasury to conduct an online survey of 178 public authorities during August 2010. *The Digital Archiving Survey* (Appendix C) examined agencies':

- current preservation activities including the development of strategies and plans
- perceived risks of the loss of digital information
- volumes of digital information
- perceived threats and barriers to digital archiving action.

The survey was designed to gather specific quantitative information to complement, extend and clarify the qualitative information gathered in response to the discussion paper. Building on the qualitative results obtained through the discussion paper process ensured that the survey questions were suitable given the current levels of digital archiving understanding in public authorities.

Responses were received from 129 public authorities; with a further two noting that a joint response had been submitted on their behalf by another agency, giving an overall response rate of 74%.

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[18] Available at http://www.archives.qld.gov.au/downloads/QSA Digital Archiving Discussion Paper.pdf Questions raised in the discussion paper are summarised in Appendix B.

3.2 Key findings

The consultation showed that nearly all of the public authorities that responded to the discussion paper and completed the survey have significant records in digital form that need to be kept for lengthy periods and that their volumes of digital information are expected to grow. However, it was also revealed that there is a distinct lack of digital archiving maturity and capacity across the public authorities surveyed.

While most public authorities have implemented some actions to ensure that their digital records remain accessible, those that are being implemented are largely ad hoc and are undertaken in the absence of guiding strategies or plans. In addition, these activities are only part of a solution in that they do not fully address the challenge of maintaining accessibility and usually do not cover all of the information held by the organisation. Less than one quarter of responding agencies have confidence in the accessibility of all their digital information for its full retention period.

The issue of ensuring the continued accessibility of digital records is a significant challenge for all governments around the world. These findings are therefore not surprising given the general lack of investment in digital archiving within Australia and internationally, combined with the fact there is currently no whole-of-Queensland Government digital archiving approach, including governance and capability frameworks in place.

Overall, the responses indicated a strong desire for Queensland State Archives to take a leadership role and provide direction on appropriate approaches and techniques for ensuring the continued accessibility of digital information. There was also clear recognition of the need for greater organisational awareness and commitment within public authorities in order to plan and implement effective and sustainable solutions.

A key message emerging from the consultation is that the need is not just for 'building a digital archive' or a single repository. Rather, public authorities are calling for a broader strategic approach which supports the effective governance and management of all digital information over its lifecycle. Such an approach also recognises that without appropriate lifecycle management of information assets, public authorities will not be able to identify and transfer records of permanent value into a central digital archive. These findings are explored further in the Approach section of this report (Section 4).

More detailed findings from both the discussion paper and survey are outlined below.

3.3 Consultation results

As both the discussion paper and the survey examined similar areas, findings from both consultation exercises are incorporated under the following five thematic headings:

- types of records
- volume
- confidence in continued accessibility
- current digital archiving methods
- challenges and barriers.

3.3.1 Types of records

Information was collected on the types of digital records currently held by public authorities, in particular records requiring retention for periods longer than 20 years. This was supplemented by an analysis of recently-authorised Retention and Disposal Schedules. The 20-year period was selected as it is highly likely that any information requiring retention for this length of time or more will need active preservation action to ensure its continued accessibility.

The findings highlighted the diversity of digital information held by public authorities requiring retention for longer periods. Generally, activities which document medical procedures, land use, environmental management, children at risk or in care, police administration and judicial matters each generate large volumes of information with longer retention periods. Specific examples include:

- airborne and terrestrial laser scanning records
- digital plans of structures such as 3D modelling for bridges, tunnels, buildings and roads
- risk management records where children are involved
- personnel records including related issues such as workers' compensation
- cemetery management data
- vaccination tracking data and medical image stores
- digital audio recordings of court proceedings
- land and native title records
- forensic pathology, biology and laboratory records
- information relating to criminal offences, covert operations, witness protection and coronial matters
- records relating to asbestos management
- information relating to the implementation and management of water and environmental programs.

These records hold significant value for the state and the public, whether by supporting the maintenance of law and order and the health and safety of the community, providing evidence of environmental changes, or in the opportunities that arise from information reuse and the discovery of longitudinal trends. The creation and collection of this information also represents significant investments by government. For example, airborne laser scanning requires especially equipped aircraft in order to be able to collect the data, and hydrographic surveys require specialised boats and equipment.

These findings also highlight that much of the digital information requiring preservation is currently held in business systems or other non electronic document and records management systems (eDRMS) environments. This indicates that a digital archiving approach must be sufficiently broad in scope to address the management needs of information stored in, or generated by, these diverse environments, and not just document-type objects that are, or can be, managed in electronic document and records management systems.

3.3.2 Volume

As indicated in Section 2.4, the growing volumes of digital information are presenting serious challenges to its management over time, while making effective management of these assets a matter of great urgency. For this reason, responses were sought on the volumes of electronic information held by agencies.

In the qualitative discussion paper feedback, many public authorities indicated that growing volumes were presenting a significant challenge. As it is not possible to determine exact quantities of the volume of digital records requiring preservation across government as distinct from broader information holdings, due to lower levels of maturity in implementing recordkeeping practices in the electronic environment, the survey instead sought details on overall volumes of digital information and rates of growth.

Over 50% of respondents (66 public authorities) provided estimates for 'all' of their digital information, with a further 16 public authorities providing partial estimates of their digital information holdings. Reflecting the diversity of size of public authorities, responses ranged from 'less than 100 gigabytes' for a small statutory entity to 1.26 petabytes for a larger government department, with many indicating various caveats and provisions on the figures. For example, many public authorities reported on eDRMS volumes only. Of the 82 agencies that provided a figure for estimated volume, only 45 were 'very confident' in the accuracy of their estimation.

Information was also sought on rates of growth, as indicated in Figure 2. Mirroring discernable worldwide trends, it is possible that some public authorities may have greatly underestimated their rates of growth. Additional information provided by the Queensland Government Chief Technology Office indicates that central government storage allocations are growing at 66% per annum compound. This may also be the case for the other public authority sectors, however there is presently no evidence available on which to make a judgement.

It is worth noting that these rates indicate an exponential growth curve.

Effective records management and information governance practices early in the lifecycle, including analysis of what information is required to be created and kept, and proactive deletion of information in accordance with authorised Retention and Disposal Schedules, are essential for improving control over the growth of digital information in public authorities. The survey findings on volumes and rates of growth indicate that the majority of agencies face significant challenges in quantifying and maintaining effective control over and managing their digital information holdings as assets.

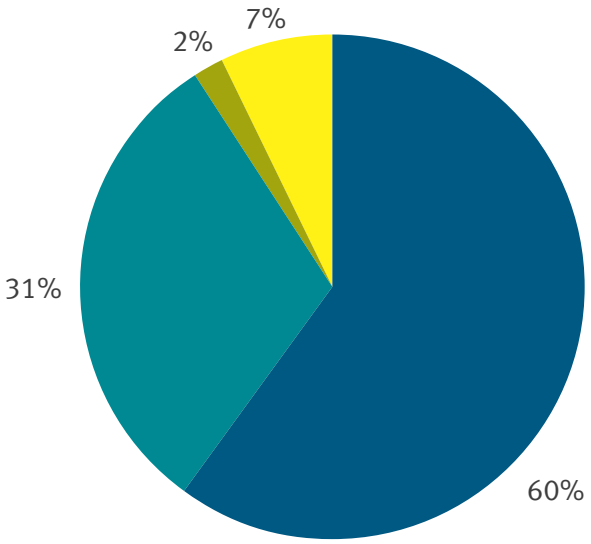

Figure 2: Estimated annual rate of growth of digital information within responding Queensland public authorities

It can be difficult to comprehend the size of digital information.

As an example, one kilobyte can be roughly equated to one page of text and one megabyte to one small photo. Towards the larger end of the scale, a terabyte, approximately 1 million megabytes, could hold 1000 copies of the Encyclopedia Britannica; 10 terabytes could hold the printed collection of the Library of Congress. A petabyte, approximately 1000 terabytes, could hold approximately 20 million four-door filing cabinets full of text or 500 billion pages of standard printed text.[19]

The worldwide volume of digital information created and replicated in 2010 has been estimated at 1.2 million petabytes, which has been likened to stacking DVDs from at least the earth to the moon and back.[20]

[19] What's a Byte, *Megabytes, Gigabytes, Terabytes... What Are They?*, available at http://www.whatsabyte.com/ accessed 11 November 2010.

[20] IDC, *The Digital Universe Decade – Are You Ready?*, available at http://www.emc.com/collateral/demos/microsites/idc-digital-universe/iview.htm May 2010, accessed 11 November 2010.

3.3.3 Confidence in continued accessibility

Confidence levels that digital records will remain accessible over time varied across the public authorities surveyed. In general, respondents demonstrated slightly lower levels of confidence when responding to the discussion paper than in their responses to the survey.[21]

In feedback on the discussion paper, some agencies explicitly indicated low levels of confidence and identified specific issues such as information stored on obsolete media, for example floppy disks, or in offline storage that has not been assessed or managed. Responses which indicated greater confidence tended to base this on the use of what are only partial solutions to the problem, such as an eDRMS or the practice of migrating data and records when business systems are upgraded. Confidence appeared to be particularly low for records that are not within the control of an eDRMS.

As shown in Figure 3, 79% of respondents to the survey (101 agencies) are confident of the ongoing accessibility of at least some of their digital information. However, only 26 agencies are confident that all of their digital information will remain accessible for its full retention period. Therefore 80% of respondents, or 102 agencies acknowledged that at least some of their digital information is at risk of loss. Two per cent of agencies indicated that access had already been lost to some information.

Where respondents indicated that information has become inaccessible, or is known to be at risk, they were also asked to specify the causes of this. Responses to this question are shown in Figure 4. The most common reasons were that information is in older, unsupported systems, or that file formats have, or may, become inaccessible.

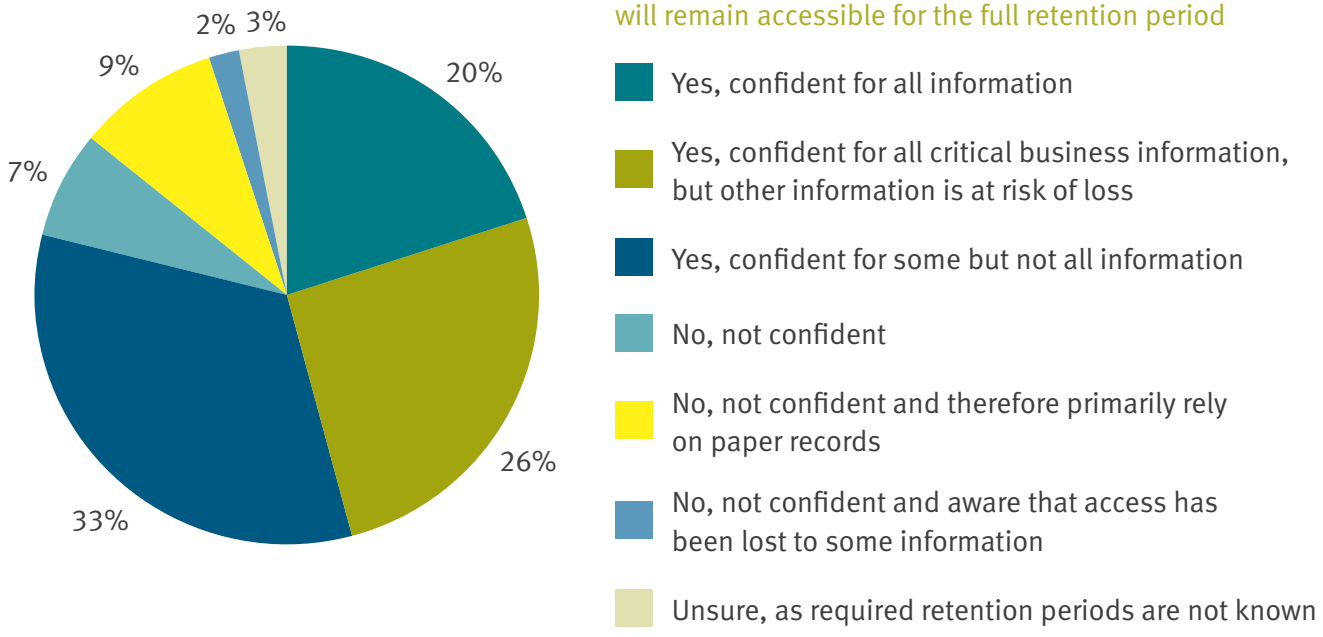

Figure 3: Confidence that digital information will remain accessible for the full retention period

[21] The difference in levels of confidence between the survey and discussion paper could result from a number of factors. For example, the discussion paper was sent to a smaller number of agencies with more mature practices, which may have been more aware of the challenges. Another reason could have been the order of questions: in the survey questions regarding levels of confidence appeared after questions about strategies implemented, which may have also affected perceptions.

The most common element in the 'other' responses point to staff factors, for example a lack of staff knowledge of legacy systems, or a lack of corporate memory through staff turnover. One agency noted that they were 'overwhelmed by the rate of growth and volume'. Another organisation noted that the obsolescence of technology is not a critical issue for them as they have only existed for a decade. However, the obsolescence of systems, file formats and media will become a growing problem as time passes and organisations have a longer 'history' of technology use requiring management.

Some comments also identified machinery of government changes, for example amalgamations, as risks. Such organisational change can leave agencies with greater complexity in their technological environment, including varied legacy systems.

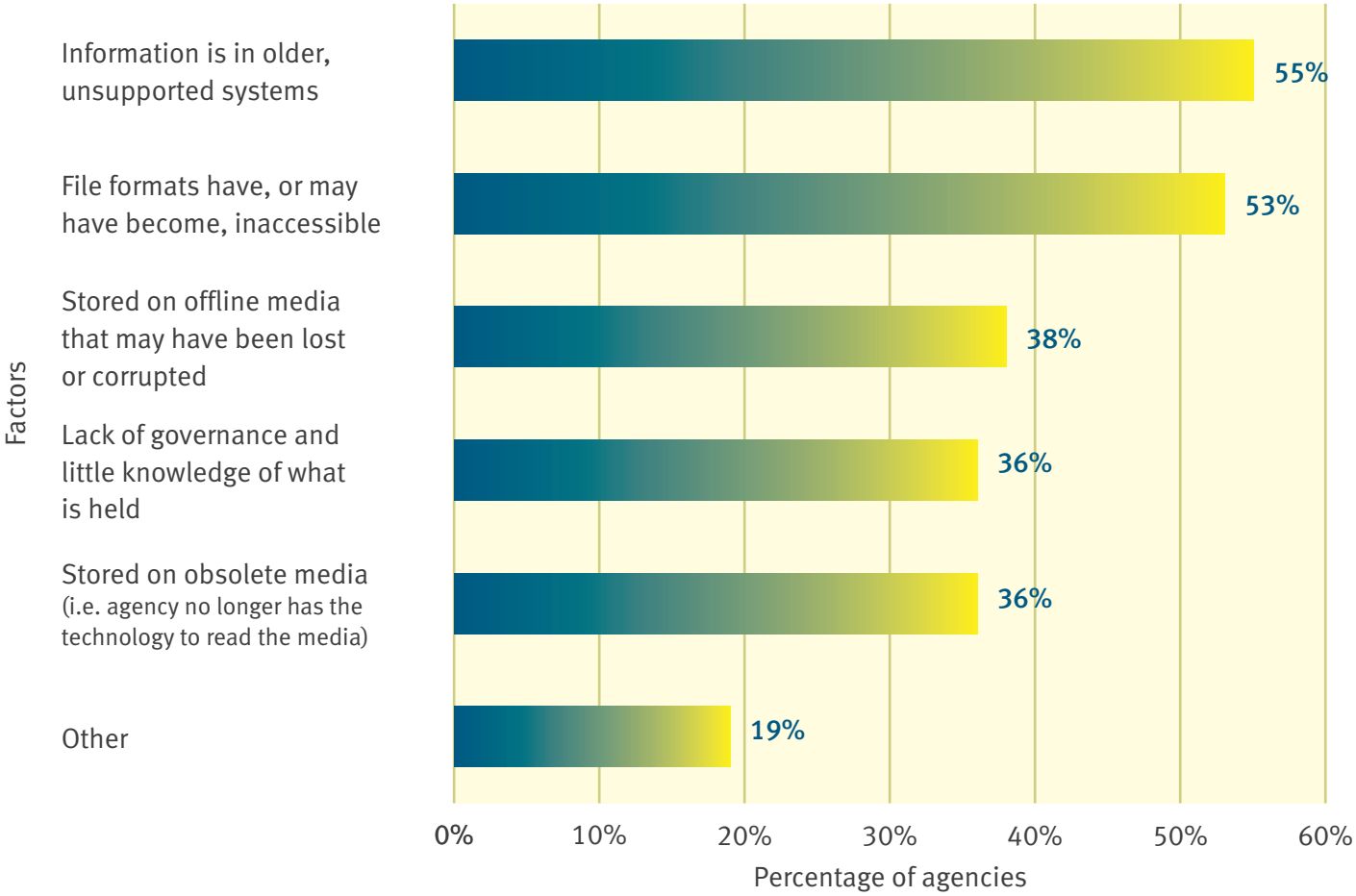

Figure 4: Factors causing digital information to become, or be put at risk of becoming, inaccessible

3.3.4 Current digital archiving methods

Both the discussion paper and survey investigated the extent to which public authorities are implementing strategies to ensure the continued accessibility of their digital information. Responses to the discussion paper indicated that projects to address immediate business needs are often implemented without consideration of the need for lifecycle management of the information. For example, when systems are selected during procurement, the need to export and preserve information beyond the life of the system is usually not considered.

A number of discussion paper responses also indicated limited understanding of the appropriateness of strategies for ensuring the long-term accessibility of digital records over time. This finding was confirmed by the survey results. While only one agency indicated that no action was being taken to ensure the continued accessibility of its digital records, the most common actions were to:

- migrate data as systems are replaced - 95 agencies (74%)
- implement an electronic document and records management system (eDRMS) - 86 agencies (67%)
- rely on backups - 70 agencies (55%).

Migrating data as systems are replaced is appropriate when the information is still required for current business processes. However, for information with very long retention periods, it may become unsustainable over time as the volume of data to migrate with each system change increases. Nor is this approach viable for information that must be retained despite the business function or activity to which it relates no longer being performed, and consequently there no longer being a current system to hold it.

QSA strongly supports the implementation of eDRMS by agencies for the effective management of document-based records and information. However, while an eDRMS generally contains viewers for a wide range of file formats, it may not provide access to older or obsolete formats. In addition, an eDRMS does not generally address the management needs of non-document-based records or records held in other core ICT business systems.

The reliance on backups is the most risky of the approaches noted. A backup system is a system that, for disaster recovery or business continuity purposes, copies electronic data onto a separate data storage medium. Information that is stored on backup systems acts as a reserve copy of the original, to be accessed if anything happens to the original data or system. Backup systems are designed to support recovering lost data to the last known good version and ensure that systems can be restored in the event of a disaster. However, backup systems and media have their own hardware and software dependencies, such as tape drives and compression software. This means that information on backup systems is unlikely to remain accessible beyond relatively short periods of time (e.g. less than five years), fulfilling its designated purpose but not providing a resilient archiving solution.

Figure 5 provides additional details on the different approaches implemented by public authorities.

The comments against the ‘other’ category were usually variants on the existing options, such as ‘use viewer technology’, ‘paper copies kept until retention date’, ‘migrate all our subsets of data from legacy application systems on decommissioning into data warehouses for historical reference’, and ‘engage a third party to perform restores of data on obsolete infrastructure’.

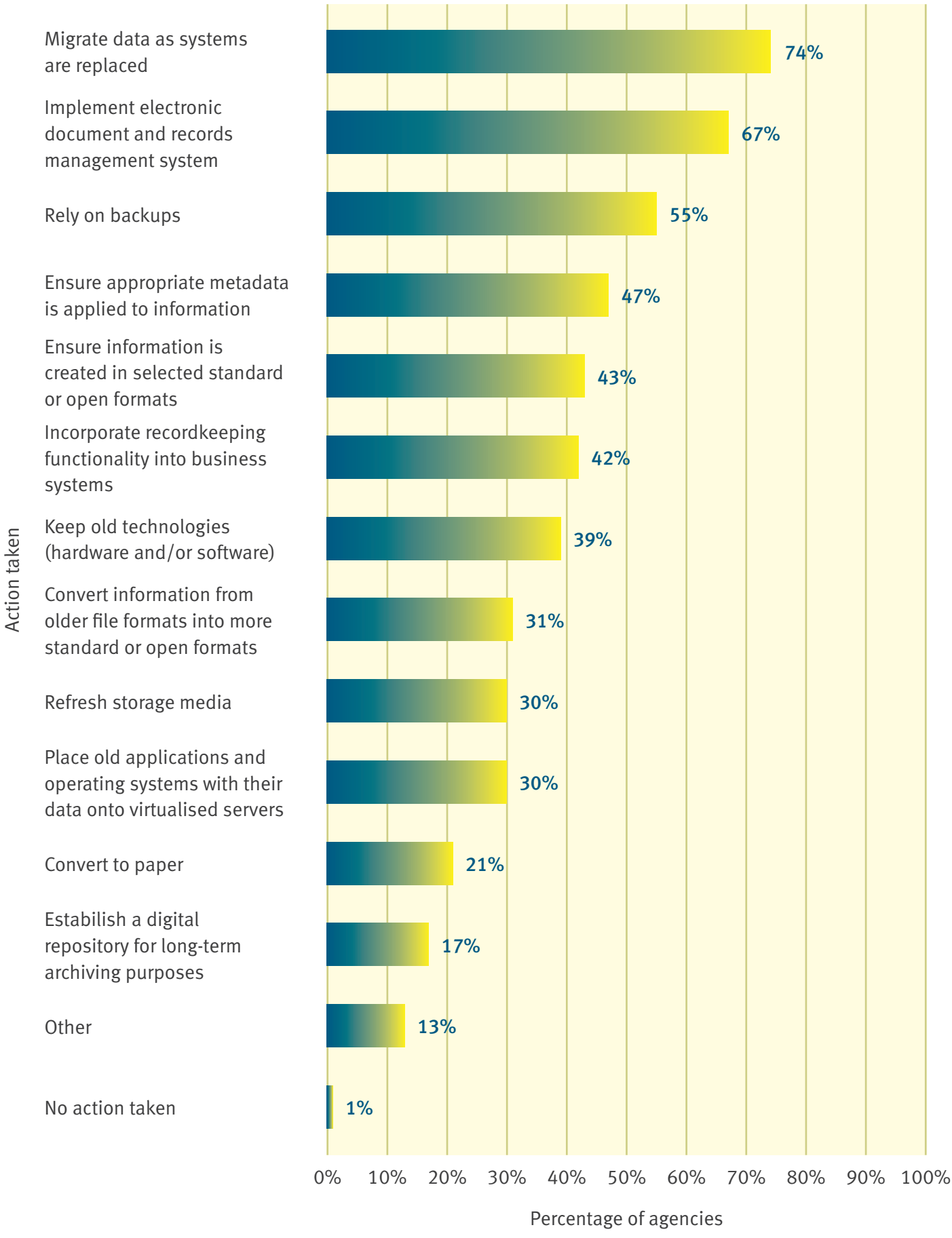

Figure 5: Actions taken by public authorities to ensure the continued accessibility of their digital information

A number of public authorities, both in their responses to the discussion paper and survey, indicated that they continue to rely on paper records. This approach is not viable or sustainable in the longer term as business is increasingly performed in the electronic environment. While simple digital records can be printed to paper this approach does not address the need for the appropriate management of records of government business transacted through business systems, or the growing volume and complexity of digital information.

While both the discussion paper and survey determined that there is some digital archiving activity being performed by public authorities, such activity is rarely strategically driven. A large majority of survey respondents (123 agencies or 96%) indicated that they do not have a digital archiving policy or strategy; although 21 of these indicated that they are currently in the process of developing one. Of the public authorities that are in the process of developing a policy or strategy and the public authorities that indicated they already have a policy or strategy (four respondents), it appears from the policy titles provided that only a limited number explicitly focus on digital archiving and the majority are incorporated into general information management or recordkeeping policies and procedures.

3.3.5 Challenges and barriers

A successful strategic approach to digital archiving must understand and address the barriers that agencies face. A range of challenges were identified in feedback to the discussion paper, which can be broadly grouped into three themes:

- **environmental challenges:** including advances in technology, growing volumes of data, the increasing dynamism of information, the speed of change and the business strategies of vendors which are generally focused on the development of new technologies and upgrades but not on maintaining legacy systems
- **organisational factors:** including lack of organisational understanding and prioritisation of the problem, lack of resources such as appropriately skilled staff and workforce planning for new skills and the impact of machinery of government changes resulting in many agencies inheriting a range of legacy systems
- **information management and recordkeeping challenges:** including lack of maturity in information management and recordkeeping culture, managing the range of records across an organisation, demonstrating the evidential integrity of records, managing composite records and records shared across organisations, lack of recordkeeping controls in certain systems and challenges in implementing disposal practices in the electronic environment.

The survey sought to confirm the extent of these challenges. Respondents were asked to nominate, from a specified list, what factors prevent and/or hinder their agency from implementing strategies to ensure the continued accessibility of digital information. Responses to this question are shown in Figure 6. On average, each public authority nominated between three and four factors; the most recurrent of which were a lack of organisational awareness, digital archiving not being identified as a priority issue and the absence of a clear mandate or requirement for digital archiving activities.

Responses to the ‘other’ category mostly indicated resourcing issues, including budgetary and staffing concerns. However, a lack of resources is conceivably symptomatic of a lack of organisational awareness of the problem, or of it not being seen as a priority issue.

Respondents were also asked to nominate the single most important factor in order to determine whether there was consensus on the key barriers to implementing digital preservation strategies. The only option selected by more than 20% of respondents was ‘other’, indicating that there is no single factor. However, the next most common option (selected by 17% of respondents or 22 agencies) was ‘lack of clear mandate or requirement for digital archiving’, therefore showing a desire for stronger leadership in this field.

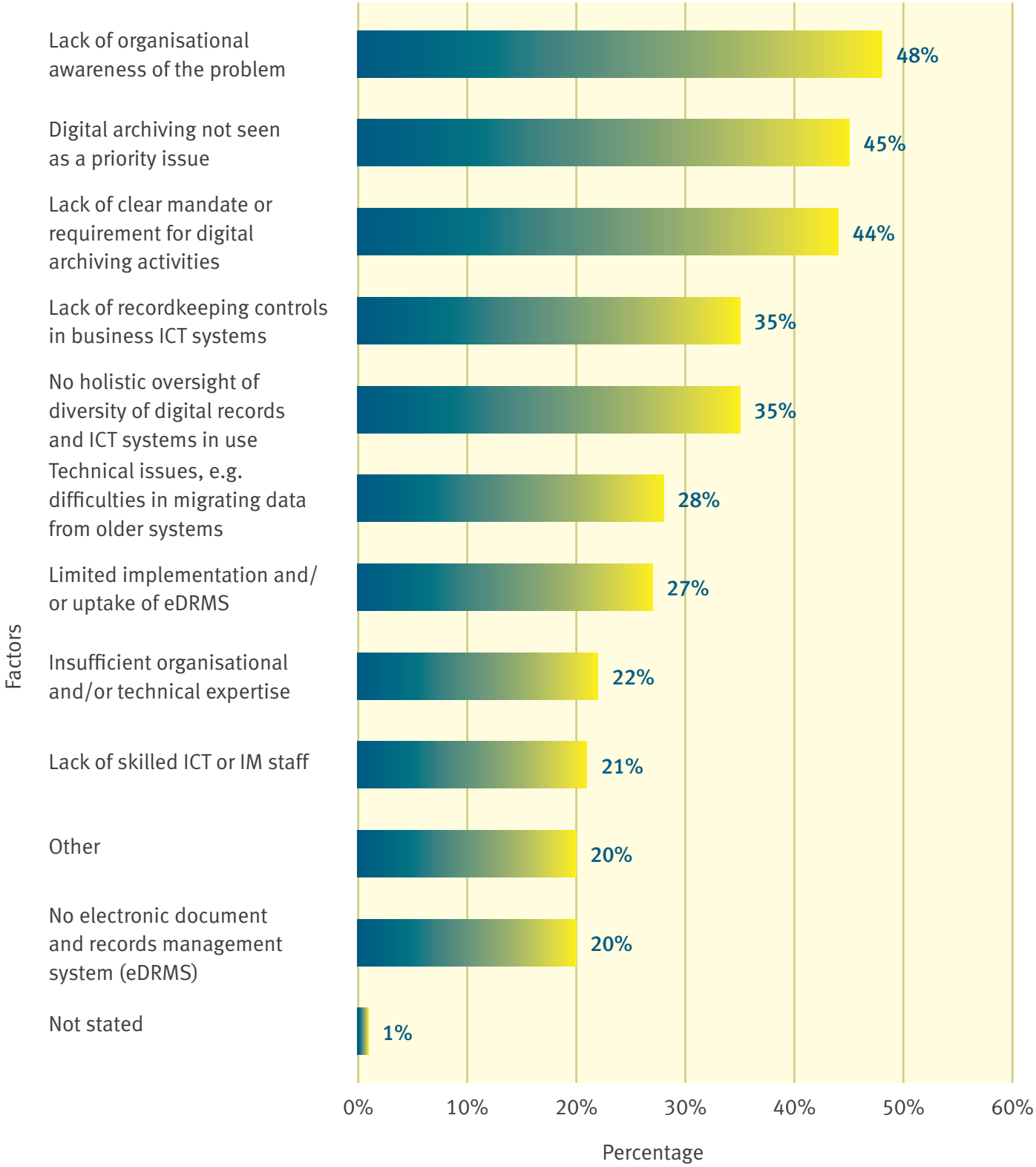

Figure 6: Factors that prevent or hinder the implementation of strategies to ensure that digital information remains accessible over time

3.4 Summary

The current state analysis of digital archiving across the Queensland Government shows that:

- Queensland public authorities create and manage a variety of digital records that legally require long-term retention
- the complexity and volume of digital information held by public authorities is rapidly increasing
- the current levels of confidence in the continued accessibility of digital information are not supported by strategic, coordinated and effective responses.

These findings are broadly in line with the experiences of governments around the world.
The consultation clearly demonstrated there is a strong desire, and urgent need for a coordinated, comprehensive and strategic approach to digital archiving across the sector.

4 An approach to digital archiving for the Queensland Government

The consultation undertaken during 2010 clearly demonstrated strong need and support for a whole-of-Government approach to digital archiving led by Queensland State Archives. A key message from the feedback is that a digital archive must be developed as part of a broader strategic framework in order to leverage efficiencies and economies of scale across public authorities.

These findings are corroborated by the experience of the broader archival community, within which a number of domestic and international government archival authorities have also taken steps to research, define and implement a trusted digital archiving approach in their respective jurisdictions.

Based on the results of consultation and other research, Queensland State Archives has commenced the development of a digital archiving program framework (see section 4.1). This approach outlines the key focus areas that must be addressed in a planned and sustainable manner to ensure the future development of coordinated and strategic solutions for digital archiving, meeting the needs of public authorities and the Queensland Government.

4.1 Digital archiving program framework

The feedback received from public authorities in response to the discussion paper and survey is clear: public authorities see a critical need for an approach to digital archiving that addresses a broad range of issues and archival custody options; not just the implementation of technologies or the development of a digital repository.

Three key themes emerged from the consultation which must be considered to enable whole-of-Government digital archiving. These are outlined in Table 1.

Researching, developing and implementing whole-of-Government digital archiving services, policies and tools that:
are well designed and align with a strategic Queensland Government vision
cover both long-term temporary and permanent digital records, with consideration given to a range of service delivery models for archival custody (e.g. in-house within public authorities, centrally at Queensland State Archives, and through third-party digital archiving service providers)
provide clarity regarding the costs and benefits associated with digital archiving
are secure, trustworthy and compliant with international standards on digital archiving and supported by forward-looking legislation
Building agency readiness for implementing trusted, whole-of-Government digital archiving policies and practices through:
greater capability in appraisal and retention and disposal practices to help agencies gain control over the volumes of their digital information
the development of digital recordkeeping maturity in areas such as recordkeeping for business systems, eDRMS, websites and evidentiary requirements for authentic digital records
Establishing a well-managed and governed program of work that involves:
effective and sustained engagement across QSA's broad client base, ranging from small committees to state government departments
strategic advocacy and awareness-raising with senior executives and key stakeholders
robust governance models

Table 1: Key themes for a digital archiving program of work

In response to these findings, the digital archiving program framework (Figure 7) has been created to guide the development of a program of work to research, develop and implement trusted digital archiving across government.

Figure 7 - Digital archiving program framework

- Service delivery capability
- Digital archiving strategic approaches
- Agency readiness for digital archiving
- Governance and program management

The concentric rings of the framework represent the key focus areas for a digital archiving program of work. These are further outlined in Table 2.

Service delivery capability

Development of a range of archival custody options including ensuring appropriate and coordinated access to the records. Options include the capability for:

- public authorities to conduct digital archiving in-house
- external organisations to provide digital archiving services for long-term temporary public records (i.e. outsourcing)
- QSA to preserve the permanent records of the state.

Digital archiving strategic approaches

Research, development and implementation of an approach for archiving digital records that considers the:

- enterprise architecture and design – researching, designing, developing and implementing a digital archiving strategy, enterprise architecture and standards, policies and processes for the Queensland Government, including the business functions as mandated by the Open Archival Information System standard; information architecture and metadata; applications; technology; and security
- legislative framework – ensuring the processes for the archiving of digital public records are enabled and supported through legislation
- capability/skills – developing and implementing strategies aimed at building an understanding of digital archiving within agencies and facilitating opportunities to develop a workforce that is appropriately skilled in digital archiving
- economics – researching and investigating the costs and benefits to ensure economically sustainable digital archiving approaches
- environmental monitoring – researching local, national and international emerging trends in technology and best practices in digital archiving
- compliance – establishing processes to ensure sustainable accreditation with jurisdictional, national and international standards for trustworthiness and digital archiving.

Agency readiness for digital archiving

The building of strategic business leadership and foundation-level digital recordkeeping maturity across government which includes:

- recordkeeping awareness – raising awareness and understanding about digital recordkeeping and digital archiving across the Queensland Government
- authenticity, legal and evidential processes – researching and ensuring the alignment of digital recordkeeping policies and practices with legal processes and evidential requirements

- recordkeeping capability and maturity – developing and implementing strategies to improve the capability and maturity in digital records management practices across the Queensland Government, particularly in the areas of eDRMS, records in business systems, website records and composite/ interagency records
- digital recordkeeping policies – developing and implementing policies and advice to guide agencies in implementing sound digital recordkeeping strategies and practices
- retention and disposal – building capability in appraisal and disposal in the electronic environment, particularly to help agencies gain control over their large volumes of digital information and to ensure that authorised retention and disposal schedules are in place for all agencies so that they are aware of the retention requirements for their records.

Governance and program management

A program of work that is effectively managed through:

- program governance including gating processes, appropriate governance structures and risk management
- change management – focusing on the necessary cultural change required within Queensland State Archives and across the Queensland Government
- stakeholder engagement – achieving effective levels of communication, engagement and collaboration with domain experts and stakeholders including vendors
- partnerships and procurement – ensuring strategic partnerships and the procurement of resources and services is in line with Queensland Government policies and requirements
- resources – identifying and securing sustainable program resources
- benefits management – ensuring outcomes and benefits are understood, monitored and realised.

Table 2 - Components of the digital archiving program framework

4.2 Next Steps

> *The long-term accessibility of digital resources cannot happen automatically and without cost; it will only happen as the result of deliberate decisions on the part of individuals and organisations to invest the resources necessary to shepherd digital information safely across time.*[22]

Preserving data for use tomorrow requires decisions today.[23] As evidenced by the high response rate to the consultation activities undertaken by Queensland State Archives, Queensland public authorities recognise that coordinated action is required to sustainably and cost-effectively manage the ever-growing volumes of information being created and ensure accessibility to digital records over time. To develop and implement a program of work to address this requires ongoing funding and resources, sound research, and suitably skilled personnel.

Queensland State Archives will work to secure the required resources and build the foundations of the program through developing a whole-of-Government direction for digital preservation, in line with the *Toward Q2 through ICT – Implementation Plan* (updated September 2010), by 2013 (Action AG-3.4b).

This direction will be based on Australian and international best practice research, and the framework outlined in Figure 7. The activities outlined in Figure 8 indicate the priority next steps for Queensland State Archives over the next three years.

These priority actions recognise that digital archiving is not simply a technological process, but a complex and multifaceted undertaking which necessitates a business-led response. It requires considered deliberation on key policy issues to ultimately shape a cost-effective, sustainable approach for managing digital records across the information lifecycle.

The range of actions also recognises that successful digital archiving for the Queensland Government is reliant on the digital recordkeeping skills, knowledge, capability and practices of Queensland public authorities, including their ability to effectively control and manage the significant volumes of digital information that they create and store.

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[22] Blue Ribbon Task Force on Sustainable Digital Preservation and Access, *Sustaining the Digital Investment: Issues and Challenges of Economically Sustainable Digital Preservation – Interim Report*, available at http://brtf.sdsc.edu/biblio/BRTF_Interim_Report.pdf, December 2008, accessed 4 November 2010

[23] Blue Ribbon Task Force on Sustainable Digital Preservation and Access, *Sustaining the Digital Investment: Issues and Challenges of Economically Sustainable Digital Preservation – Interim Report*, available at http://brtf.sdsc.edu/biblio/BRTF_Interim_Report.pdf, December 2008, accessed 4 November 2010

An analysis of other state, national and international jurisdictions that have taken steps to develop digital archiving approaches indicates that successful outcomes generally involve multi-year programs of work and occur incrementally due to the complexity of the challenge and the number and diversity of stakeholders involved.[24]

This analysis also reveals that the steps outlined in figure 8 are an appropriate preamble to the broader program of work to be undertaken. They will provide a firm basis for making decisions regarding appropriate tools, methodologies and implementation approaches.

Public authorities have shown they understand the responsibility of the Queensland Government to ensure that digital public records are preserved and remain accessible into the future and that there is an urgent need to initiate this strategic work.

To this end, Queensland State Archives is committed to working in partnership with public authorities and other experts on the development of comprehensive and effective digital archiving strategies for the Queensland Government that yield positive outcomes for both government and the community.

Figure 8 – Digital archiving program next steps

[24] Library of Congress, *Preserving our digital heritage: Plan for the National Digital Information Infrastructure and Preservation Program*, available at http://www.digitalpreservation.gov/library/resources/pubs/docs/ndiipp_plan.pdf, October 2002, accessed 4 November 2010

Appendix A – Glossary

Accessible records	Records that can be identified, located and viewed as required.
Archives	Those records that are appraised by Queensland State Archives as having continuing value and that have been selected for permanent retention. Adapted by QSA from AS4390, Part 1, Clause 4.5
Born-digital	Information created in electronic format. This term is used to differentiate materials from those that have been created as a result of converting analogue or paper originals into electronic form through the process of digitisation. Adapted by QSA from the SAA Glossary of Archival and Records Terminology and Jones & Beagrie, Definitions and Concepts
Data centre	A data centre is a facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, environmental controls (e.g., air conditioning, fire suppression) and security devices.
Digital Archive	A Digital Archive fulfils the same role in a digital world as traditional archives have in the paper world. It is broader than a digital repository storing digital items. A Digital Archive ensures that digital records are professionally created, managed and preserved with their content, structure and context intact. This supports the evidential integrity of the record, accessibility and useability over time. A Digital Archive encompasses the technical infrastructure, standards, policies and procedures and support services for managing and providing access to digital objects and their associated metadata. Adapted by QSA from the National Archives of Australia, Glossary
Digital archiving	The identification, appraisal, description, storage, preservation, management and retrieval of electronic records, including all of the policies, guidelines and systems associated with those processes, so that the logical and physical integrity of the records is securely maintained over time. Adapted by QSA from the Council of Australasian Archives and Records Authorities' Digital Archiving in the 21st century.
Digital preservation	An essential and necessary component of digital archiving ensuring longevity of an electronic object. Digital preservation covers the processes and operations involved in ensuring the technical and intellectual survival of authentic electronic records over time (such as the ongoing monitoring, migration and storage of records and managing the metadata which describes the origin and successive treatment of the record). Adapted by QSA from the Council of Australasian Archives and Records Authorities' Digital Archiving in the 21st century
Digital records	See electronic records.
Electronic records	Records created, communicated and maintained by means of electronic or computer equipment. Adapted by QSA from AS4390, Part 1, Clause 4.13

Records	Recorded information created or received by an entity in the transaction of business or the conduct of affairs that provides evidence of the business or affairs and includes: a) anything on which there is writing b) anything on which there are marks, figures, symbols or perforations having a meaning for persons, including persons qualified to interpret them c) anything from which sounds, images or writings can be reproduced with or without the aid of anything else, or d) a map, plan, drawing or photograph. Records are information objects that document business activities and transactions. To be regarded as evidence a record must be complete. Complete records comprise contextual and structural data as well as content data. a) Contextual data is information about the creation and use of the data. The context refers to the business function and activity in the course of which the record is created. Contextual data is concerned with the who, what, where, when and how of the creation and management of the information object. Contextual data may be intrinsic or extrinsic to the information object. b) Structural data includes formal internal structures of the information object and the structural relations between records in an electronic record that are used by the interaction of software and hardware to constitute the equivalent of the physical record in the paper environment. Structural data may be intrinsic or extrinsic to the information object. c) Content data is the information contained within the information object. The content is intrinsic to the information object and is what the record is about.
Retention and Disposal Schedule	A document issued by the State Archivist authorising the disposal of public records. It defines the temporary or permanent status, retention periods, disposal triggers, and consequent disposal actions authorised for classes of records described in it.
Retention period	The minimum period for which the records must be retained before authorised disposal can occur. For example, 'Retain for 7 years after expiry or cancellation of agreement.'

Appendix B – Discussion paper questions

Q1: What sorts of digital records does your public authority need to manage for longer periods (more than 20 years?)

Q2: Is your public authority confident that all of its digital records will remain accessible for as long as required? What evidence supports this level of confidence?

Q3: Has your public authority implemented any strategies to ensure records remain accessible over time? If so, what are these strategies? Do they cover all of your organisation's information, or only selected areas?

Q4: Are there specific challenges your public authority is facing that create barriers to ensuring sustainable digital preservation of public records?

Q5: What challenges does your agency face in effectively managing records in the electronic environment? For example, has your agency identified all of its electronic public records and their authorised retention periods? Has your agency calculated the storage volume of its electronic records? Is your agency able to demonstrate the authenticity of its electronic records when legal proceedings arise?

Q6: In addition to the guidance already released by Queensland State Archives, what further guidance and support is required to ensure records are well-managed in the electronic environment?

Q7: Does your public authority agree with the proposed program elements, plan and principles? If not, why not?

Q8: Are there any significant aspects that are not covered? If so, what are these and why does your public authority consider they are required?

Q9: Does your public authority have any other comments to make in regard to the issues raised in the Discussion Paper?

Appendix C – Digital archiving survey

Background information

Under the *Public Records Act 2002* (the Act), public authorities have a responsibility to ensure that digital records under their control remain accessible for their authorised retention periods.

Also mandated within the Act are the State Archivist's functions which include identifying public records of enduring value and requiring that these be retained in a useable form, whether or not the records are in the custody of the Archives.

However, the rapid rate of technological change presents challenges in ensuring that digital information remains accessible for as long as it is legally required. Many digital records need to be retained for far longer than the life of an ICT system or storage medium.

In September 2009, the *Toward Q2 through ICT* strategy and implementation plan were released to articulate the Queensland Government's information and communication technology priorities and targets. Recognising the need for a whole-of-government approach to ensuring the accessibility of digital records into the future, Queensland State Archives was tasked with reviewing the current digital archiving methods across the government, and developing an approach to this issue, including the potential for a Queensland digital archive.

Survey scope and purpose

Digital archiving is defined as the identification, appraisal, description, storage, preservation, management and retrieval of digital records, including all of the policies, guidelines and systems associated with these processes, so that the logical and physical integrity of the records is securely maintained over time, despite the obsolescence of technology. That is, digital archiving is not simply the process of moving data from online, more expensive storage to cheaper, offline storage.

Digital records encompass records that have been 'born-digital', for example those created in business systems and online, not just those that have been created through the process of digitisation or scanning. They include records in licensing systems, financial management systems, human resource management systems, websites, social media technologies, etc.

This survey seeks to gather more specific information from public authorities on their strategic planning and policy for digital archiving, the digital archiving activities currently being undertaken and the challenges faced in undertaking such activity. It builds on feedback received in response to the Digital Archiving Discussion Paper issued to a range of public authorities in May 2010 (a copy of the Discussion Paper is available at http://www.archives.qld.gov.au/government/Consultation.asp).

The survey only covers digital archiving activity, not the full range of an agency's recordkeeping responsibilities. Queensland State Archives undertakes a recordkeeping baseline survey every two years for reporting on general recordkeeping practices. The next baseline survey will occur in 2011.

This survey is being conducted for Queensland State Archives. The results of the survey will help to identify the scope of digital archiving challenges and will be used to inform planning for a digital archiving approach for the Queensland Government.

The findings of the survey will be published in a report for Government which will be available to survey respondents by December 2010. Reporting will be at an aggregate level and specific agencies will not be identified.

Instructions:

1. The questions in this survey are aimed at gathering information on digital archiving activity. Thus it will be necessary for Chief Information Officers, information technology staff and information and records managers to collaborate on the response.

2. For some questions, respondents are required to select only one option. We recognise that a range of practice may occur within a single agency. Please select the response that best fits your agency's circumstances.

3. For any enquiries regarding the content of the survey, please contact Ms Rowena Loo or Ms Anna Morris, Principal Research Analysts, Queensland State Archives on telephone 07 3131 7951.

4. For enquiries regarding the lodgement of the survey, please contact the Office of Economic and Statistical Research, Queensland Treasury on telephone 1800 068 587.

Preservation activities

1. Due to the rate of change of hardware, software and media used to store digital information, there is a risk that access to digital information can be lost because of technological obsolescence. Has your agency undertaken any actions to ensure the continued accessibility of digital information? Select all that apply.

NOTE: This question seeks information on digital archiving related activities being undertaken by public authorities. Inclusion as an option does not imply that the activity is necessarily endorsed by Queensland State Archives as a comprehensive or appropriate approach for digital archiving.

- ☐ Migrate data as systems are replaced
- ☐ Keep old technologies (hardware and/or software)
- ☐ Ensure information is created in selected standard or open formats
- ☐ Convert information from older file formats into more standard or open formats
- ☐ Establish a digital repository for long-term archiving purposes
- ☐ Ensure appropriate metadata is applied to information
- ☐ Place old applications and operating systems with their data onto virtualised servers
- ☐ Incorporate recordkeeping functionality into business systems
- ☐ Implement electronic document and records management system
- ☐ Refresh storage media
- ☐ Rely on backups

☐ Convert to paper

☐ No action taken (Skip to Q4)

☐ Others (please list)...

2. Are such actions (select the most appropriate)

☐ Coordinated and prioritised across the agency

☐ Implemented on an ad hoc basis (for example, only for specific information, in particular areas, or to address issues as needs arise)

3. How is funding allocated for such activity? Please select all that apply.

☐ Incorporated into project funding when replacing or upgrading systems (e.g. for data migration)

☐ Allocated for specific projects to address issues with legacy systems and/or media

☐ When planning lifecycle management for systems and information

☐ Not known

☐ Other (please list)...

4. Does your organisation have a digital archiving policy or strategy?

☐ Yes (skip to Q6)

☐ No

☐ In development (skip to Q6)

5. If no, does your organisation have any other policy or strategy that explicitly refers to digital archiving or supports the need to ensure access to digital information over time?

☐ Yes – please give title of policy/strategy and the date endorsed _____

☐ No (skip to Q7)

☐ Don't know (skip to Q7)

6. Does the policy or strategy cover (select the most appropriate)

- ☐ All digital information
- ☐ Critical or specific business information
- ☐ Specific business units or offices
- ☐ Specific ICT systems
- ☐ Others (please list)...

Risk of loss of digital information

7. Under the *Public Records Act 2002*, public records, including those in digital form, can only be disposed of with authorisation from the State Archivist. There is no 'default' retention period and records may be required to be retained from as 'when reference ceases' to 20, 50 or 70 years, or may be required to be retained on a permanent basis, as indicated in authorised Retention and Disposal Schedules.

Are you confident that your agency's digital information will remain accessible for its required retention period? Select the most correct response.

- ☐ Yes, for all information (skip to Q9)
- ☐ Yes for all critical business information, but other information is at risk of loss
- ☐ Yes for some, but not all, information
- ☐ No, not confident
- ☐ No, not confident and therefore primarily rely on paper records
- ☐ No, and are aware that access has been lost to some information
- ☐ Unsure as required retention periods are not known

8. If digital information has become inaccessible or is known to be at risk of becoming inaccessible, what factors have caused this? Select all that apply.

- ☐ Information is in older, unsupported systems
- ☐ File formats have, or may become, inaccessible
- ☐ Stored on offline media that may be lost or corrupted
- ☐ Stored on obsolete media (i.e. agency no longer has the technology to read the media)
- ☐ Lack of governance and little knowledge of what is held
- ☐ Others (please list)...

Volumes

9. Can you provide an estimate of the total volume of digital information held by your organisation? (specify unit of measurement, e.g. terabyte, petabyte, etc.)

NOTE: If unable to provide a figure for the total volume but volumes are known for specific information, indicate these in the comments field.

☐ Yes – estimated to be _____

☐ No (skip to Q12)

Any additional comments _____

10. If yes, how confident are you in the accuracy of this figure:

☐ Very confident / accurate to 10% variance

☐ Somewhat confident / accurate to within 25% variance

☐ Not confident

11. Indicate your agency's annual rate of growth of digital information, or if unable to specify, please select a range:

☐ _____

☐ 0 – 30%

☐ 31 – 50%

☐ 51 – 70%

☐ 71% - 100%

☐ More than 100%

☐ Not known

Any additional comments _____

Threats and barriers

12. What factors prevent and/or hinder your organisation from implementing strategies to ensure digital information remains accessible over time?

Select all that apply

- ☐ No holistic oversight of diversity of digital records and ICT systems in use
- ☐ Lack of recordkeeping controls in business ICT systems
- ☐ No electronic document and records management system (eDRMS)
- ☐ Limited implementation and/or uptake of eDRMS
- ☐ Insufficient organisational and/or technical expertise
- ☐ Lack of skilled ICT or IM staff
- ☐ Lack of organisational awareness of the problem
- ☐ Digital archiving not seen as a priority issue
- ☐ Lack of clear mandate or requirement for digital archiving activities
- ☐ Technical issues, e.g. difficulties in migrating data from older systems
- ☐ Others (please list)...

13. What single factor has the most impact on your agency's ability to implement strategies to ensure digital information remains accessible over time?

Select one option only

- ☐ No holistic oversight of diversity of records and systems in use
- ☐ Lack of recordkeeping controls in business systems
- ☐ No electronic document and records management system (eDRMS)
- ☐ Limited implementation and/or uptake of eDRMS
- ☐ Insufficient organisational and/or technical expertise
- ☐ Lack of skilled ICT or IM staff
- ☐ Lack of organisational awareness of the problem
- ☐ Digital archiving not seen as a priority issue
- ☐ Lack of clear mandate or requirement for digital archiving activities
- ☐ Technical issues, e.g. difficulties in migrating data from older systems
- ☐ Other (please indicate)...

14. Would you like to make any other comments in relation to digital archiving? ____

Respondent Contact Details

Agency	
Name of Officer(s) Completing the Survey	
Position	
Telephone Number	
Email Address	

Sector of public authority

- ☐ Local Government
- ☐ Tertiary Institutions or Grammar Schools
- ☐ Government Owned Corporations
- ☐ Government Departments
- ☐ Other public authority (including Commissions, Tribunals, Boards, Offices, and other Government Bodies)

Thank you for taking the time to complete this survey