STORS –
The development and implementation of an open repository service for Tasmanian electronic documents

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Abstract:

The Stable Tasmanian Open Repository Service (STORS) is a joint State Library of Tasmania and Service Tasmania Online initiative that began operation in July 2003. STORS allows government and non-government publishers in Tasmania to contribute electronic publications and documents to a central repository where they are both immediately accessible and maintained for posterity. STORS provides a persistent URL for each document as well as ongoing file conversion, a file checksum, and links reflecting document versions or relationships. The major operational problems that have emerged relate to file conversion and the complexities inherent in composite HTML documents.

State Library of Tasmania background

The State Library of Tasmania has, since its inception, been charged with the responsibility to collect and provide access to Tasmanian information and publications. The *Library Act 1984* formally set out legal deposit requirements for all 'books' produced by Tasmanian publishers, and in a far-sighted move the Act defined a book as "… or any other matter or thing whereby words, sounds, or images are recorded or reproduced" (Tasmania. Department of Premier and Cabinet, 2003). Given the broad definitions within the Act, the State Library has been able to include emerging electronic information formats within its collection and preservation responsibilities for some time.

In 2000 the State Library became the lead agency for the *Service* Tasmania Online web service (www.service.tas.gov.au), a State Government initiative that emphasised the delivery of the full range of government services more efficiently and effectively to the community. This partnership placed high value on community access to government information and complemented the long-held responsibility of the State Library to provide access to Tasmanian information.

On the basis of this new partnership, the State Library began to investigate how to deal with Tasmanian electronic documents in a way that would meet the contemporary problems of distribution, dissemination, and format usability, as well as generational preservation. In 2002 an internal project, with funding provided by both the State Library and Service Tasmania Online, was established to define and establish such a service. The broad characteristics defined for such a service were that it should be able to act both as a repository, to store and provide access to contemporary electronic documents, as well as an archive, to retain electronic documents in perpetuity.

Our Digital Island

The problem of generational permanence regarding general web content had led the State Library of Tasmania in 1998 to develop a service to capture and store Tasmanian web sites and web pages. This service, called *Our Digital Island* (www.statelibrary.tas.gov.au/odi) adopted a pragmatic methodology to preserve a selection of Tasmanian web sites that would have otherwise disappeared totally from the web and subsequently become lost to future generations.

The pragmatic approach adopted for *Our Digital Island* saw the State Library use web capture software such as WebSnake and HTTrack to pre-emptively download web sites from Tasmanian web servers. These sites were then reinstalled onto a State Library server where they were modified to operate independently of the original site and where they would be kept in perpetuity by the State Library.

The legal deposit obligations within *Libraries Act 1984* require that web and other online publishers provide the State Library with a copy of the electronic resource. This has in fact rarely occurred, but has allowed the State Library to unilaterally capture web sites without gaining prior permission from the Tasmanian publishers. From the publisher's perspective, *Our Digital Island* is a passive archive, in that the acquisition of content occurs after the publication of a resource, and occurs through actions taken by the State Library independently of a formal business relationship with the publisher.

Although there were many technical issues and some limitations (only a proportion of all Tasmanian web content has been captured), *Our Digital Island* has proven to be very successful, in that a significant number and range of Tasmanian web sites have been captured

that would otherwise simply have disappeared. To date over 600 Tasmanian sites have been captured.

Since the inception of *Our Digital Island* the State Library had become conscious of more and more documents being published on web sites that were supplementing or replacing printed documents. Over time the State Library began to specifically capture these electronic documents (eg, annual reports, environmental impact statements, policy documents, etc) as specific entities in their own right using *Our Digital Island* processes. However by 2002 it had become clear that this approach only partially addressed the needs of generational permanence and did not address the contemporary needs of distribution, dissemination, and format usability.

Digital archives - rationale and characteristics

The State Library specifically set out to develop a digital repository and archive that was State-based in scope and content. A great deal of work, as evidenced on the PADI website (National Library of Australia 2003a), has already been devoted to digital preservation problem definition, conceptual modelling, and prototype development.

The OAIS reference model (Consultative Committee for Space Data Systems 2002) divides the archive environment into four basic components: the producer (of digital content), the archive itself, archives management, and the consumer (the user of the archival content). In terms of this model the State Library has to meet a very wide producer environment (government, non-government, private, commercial) and a wide consumer group that essentially encompasses the entire online community.

These were formidable challenges, since many of the digital archival systems currently in place or emerging internationally have narrower producer definitions (eg. scholars, internal organisation publishers) and a smaller more homogeneous target consumer group (eg. the academic community, a specific organisation, etc).

Many international archival system developments, and the OAIS model itself, are predominantly influenced by the need to address the issue of generational permanence. Constructs such as NEDLIB (van der Werf-Davelaar 1999) and Fedora (University of Virginia Library 2003) focus on the structure and processes of the archival system that ensure that a digital resource is retained and usable by future generations.

Other archival systems have emerged as a response to the contemporary issue of access and distribution. For example the EPrints initiative addresses the need to provide access to scholarly content that would otherwise be locked up by copyright and other publishing restrictions (EPrint.Org 2003).

There is of course some cross-over between systems that address the issues of contemporary access and generational permanence, and there are characteristics of both in many systems. For example, Cedars (eg Cedars Project 2003), Safekept (National Library of Australia 2003b), and Dspace (Smith 2003) all include objectives to provide immediate access as well as generational access.

The State Library identified only one current archival project, NEDLIB, with defined jurisdictional scope. However NEDLIB was focused primarily on objectives related to generational permanence and did not adequately resolve the contemporary access issues that were a major State Library concern.

A state-based digital archive model

A state-based digital repository and archive could follow many structural forms, ranging from a single archive maintained by one institution, to multiple repositories provided by a variety of organisations, with coordinated collecting areas, and with unique or overlapping collection policies. The duplication of content can in fact be actively encouraged as with the LOCKSS initiative (Reich 2001), where such duplication provides added safety and coverage.

The State Library felt a federated archival model, based on multiple individual repositories, networked via formal business agreements between all representative sectors or publishing groups, presented an unacceptable risk in terms of continuing and indefinite archival outcomes. It was felt that the ability of other partner organisations to deliver long term archival operations could be comprised through changes over time to their business objectives, work and funding priorities, and resourcing levels. This contrasted to the State Library of Tasmania, where the concept of an enduring repository fell within the core business operations and underlying objectives of the State Library, and where such a repository would be expected to be supported indefinitely.

This was something that could not be assumed for any other institution or organisation in Tasmania. The arguments for a federated archival system adopted by projects such as Cedars fail to recognise this basic issue. Although a federated archives model provides some redundancy and workload reduction, it also assumes a reliable enduring commitment by the participants to those archival tasks. This was not an assumption the State Library was prepared to make.

Content acquisition models

The content acquisition methodologies for archival systems can be based on contributions by authors, or publishers, or institutions, or sectors, or third parties such as libraries. Such contributions could also be voluntary or mandatory, depending on the institution or sector.

Experience from *Our Digital Island* had shown the State Library that a content acquisition model that relied on third party contributions was not advisable. This is largely because the only sure knowledge of the existence of online content resides with the publisher themselves. The creation of a new online resource is not formally communicated by publishers to other interested bodies such as libraries as a matter of course. The identification of new resources on the web to be added to a repository is a Herculean task if done manually by libraries, and a difficult process prone to error if done via automated harvesting or spidering tools.

The State Library felt that the safest way to identify content that should go in the archive was to develop an archive that utilised the publisher or their agent in the content acquisition process.

The concept of an active repository

The State Library could have simply developed a repository that mandated publisher contribution, based on the legal deposit obligations incumbent on all Tasmanian publishers. However, this was essentially a negative message that would be difficult to both enforce and promote. Instead it was recognised that the archive would be more effective and sustainable in the long term if there were advantages for the publishers in contributing content.

To ensure publisher engagement, it was decided to provide benefits in using the repository that would encourage publishers to submit items at the beginning of the formal publishing cycle (i.e. when an item firstly becomes available), rather than at the end (when items are no

longer required or no longer going to be kept on the original server). Receiving items early in the publishing cycle would more safely ensure the presence of items in the repository. A much higher-risk option would be to identify and capture items when they become outdated and before final deletion. Any item missed for inclusion in the repository at this final stage of the cycle would be unlikely ever to be retrieved.

To encourage publishers to submit items early in the publication cycle, the archive should provide publishers with both secure storage of the item and with the ability to use this location as the online source for general viewing and access. To do this the repository needed to provide a working web address, or URL, immediately upon contribution.

The State Library also recognised that there would be another major encouragement for publishers to use the system if the immediate URL provided to publishers could also act as a persistent or enduring URL. This would mean that publishers would no longer need to store a digital object locally, maintain links or web references to that local location, and update those links should the local publishing address change (through changes to a server name, directory structure, etc).

This issue of content acquisition led the State Library to formally define its proposed archive as an active repository, in that it had to be based on content acquisition through publisher involvement and engagement, and that encouraged and facilitated the contemporary use of its content. The active repository concept would still permit long term storage and preservation, and the State Library could still act as a third party contributor to catch content otherwise missed in the repository. However, the business rules and functionality supporting the repository would be designed to promote and facilitate publisher content contribution.

This type of active repository would also address the inherent instability of modern web publishing. This instability is evidenced by the simple fact that published documents can disappear from public view on the web at any time, with immediate effect, through unilateral actions taken on purpose or accidentally by the original publisher or server administrator. A third-party active repository with enduring URLs helps guarantee both the contemporary survival of the resource as well as reliable access to that resource.

The problem of context

Once a digital repository provides open web access to material within its collection, the problem of understanding the currency and context of the information that is accessed becomes extremely important. When accessing an electronic document on the web, it is not necessarily obvious to the user looking at the document itself whether it is still current and accurate, or whether there are previous or subsequent versions. The link followed by the user to access the document in the archive could come from an outdated link on the publisher's web site, from a web search engine, from their own bookmarks, etc. The user could then readily but incorrectly accept that item as current and accurate.

The solution identified for the State Library repository was to design the repository so that it would provide a contextual status screen for each document when it was accessed. This status screen would let the user know if the item was outdated or superseded, and provide links to updated items if they existed in the archive.

To achieve this, the contributor would need to be able to indicate during the submission process if there was a date by which the resource would become invalid or outdated, if a contributed document replaced an earlier resource, or if an existing resource was now replaced by a newer submission.

The provision of a safe and enduring URL, plus the capacity to provide contextual information were both seen as major advantages for publishers, in that the archive would reduce their workloads in document and user access management over time. They would no longer need to worry about a document's location (it would be in a safe place), a document's web address (this would be a stable unchanging URL provided by the archive), and contextual misunderstandings over time (the archive would alert users to outdated information). All of these tasks would otherwise have to be performed by the original publisher on their internal systems, and would constitute a recurring drain on their resources.

The problem of format usability

To meet the State Library and Service Tasmania objectives of widespread access to published online information, the state repository needed to convert items contributed in proprietary formats into a common standard that was genuinely readable by the base web software generally in use by the community. This reflects the concept of being 'independently understandable' from the OAIS model. In a contemporary context, the State Library has taken this to mean that items should be available in a format that would be readable by all common web browsers without additional plug-ins or special applications. Given the type of browsers currently in common use, the State Library identified HTML4 as the format most 'independently understandable' by the designated audience at this time. The State Library decided to place no restrictions on the type of proprietary formats submitted, based on the assumption that items that are published and openly available self-select for well-known and common file formats.

Routine file conversion by the repository offered an additional advantage to publishers, in that they would not need to undertake such conversions at their own expense. For example, the Tasmanian Government web publishing guidelines (Tasmania. Department of Premier and Cabinet 2002) recommend that, to ensure true community access, PDF documents are also provided in alternate formats. However this is not compulsory and many government publishers only provide PDF output without providing alternate formats. An archive that itself offered this type of functionality could well offer government publishers a solution that increased their level of compliance without increasing their publishing costs.

The issue of generational access and format translation is a major feature of the design of many international archival systems and the OAIS model itself. The State Library acknowledged this archival need but chose to simply position itself for future enhancements in this area rather than aggressively develop internal solutions. There were pragmatic imperatives and financial timeframes that drove the need for the State Library to develop a working system within a short time frame. This decision also reflects the assessment by the State Library that this problem was beyond its resources to resolve, and that it will need to rely on external software developments and cooperative assistance to provide effective solutions.

In this area the State Library has noted the approach taken by the National Archives of Australia with its proposed archival system, which will convert proprietary formats into XML renditions or data streams that are themselves neutral and enduring (National Archives of Australia, 2003). The State Library hopes to utilise such an approach within its repository system when this software becomes available from the National Archives of Australia.

Document verification

In common with many archival systems, and the OAIS model, the State Library felt that a repository/archive needed to address the issue of document authenticity. It is not technically difficult to alter the content of some electronic file formats, without those changes being identifiable by subsequent users. In the active repository context, authentication would also provide a tangible benefit to publishers.

An authentication system would provide publishers with a means by which they could insure themselves against future document spoofing, in that suspect versions of a document could be tested against the original version of the document held in the repository. The simple way chosen to achieve this was to provide each document with a checksum upon contribution. Once received, this checksum could be used in the future to verify the authenticity or legitimacy of electronic documents that purport to be true copies or versions of the original.

Summary of State Library repository functional objectives

The outcomes from this specification process resulted in seven design objectives being set for a Tasmanian digital repository and archive. These were to:

1. provide reputable, objective, and reliable storage,
2. be based on self-contribution by the publisher,
3. provide immediate business benefits for contributors,
4. provide immediate and ongoing access to the document once submitted,
5. address the problem of document context,
6. provide benefits for the public through effective access to archive content, and,
7. provide document verification through checksum provision.

The Stable Tasmanian Open Repository Service

In late 2002 special project funds were provided to develop a joint service that met the needs of both Service Tasmania and the State Library of Tasmania. This service was in due course titled the Stable Tasmanian Open Repository Service, or STORS. Software development began in January 2003 with a target launch date of July 1 2003.

From March to June 2003, the State Library oversaw the software development of the STORS service, utilising as a base the learning objects repository that had been developed in a partnership between the Tasmanian Department of Education and Dytech Solutions, a local IT software developer. This learning objects repository software provided core functionality, in that it allowed an electronic resource to be entered into a file system with a complementary metadata record that described the resource. That resource could then be delivered whenever an appropriate search or retrieval request was made into the repository by an end user (typically a teacher or student).

To this core functionality, the resolver service, versioning, file conversion, and checksum functionality had to be added. However the business rules that would govern the actual use of STORS were still to be developed. The business rules covering content scope and contribution processes were fundamental to the actual operation of the archive, and presented many issues for system design and operational planning.

STORS business rules – content scope

From the beginning it was obvious that the type of content that would be eligible for STORS should reflect the overall collecting policy of the State Library. Following legal deposit obligations, this meant that STORS should accept all material that was produced or otherwise published in Tasmania. This applied to both government and non-government sectors. The State Library interpreted the concept of 'published in Tasmania' in the online environment to mean that the item was made available from a web server located in Tasmania. Intranet and extranet content was deemed not to be published (available to the public) and therefore was not in scope.

It was also necessary to provide the Tasmanian community with a definition of the type of electronic resource that would be accepted into STORS. Given the complexity and volatility of technology, it proved to be difficult to provide a simple and absolute definition. The State Library was not able to initially provide the functionality that would allow STORS to be used as a repository for entire web sites, for complex multi-part programmes, or for databases that require underlying software or proprietary applications to operate. Rather, the Library's objective was to focus initially on document-like objects, in that the item must be a self-contained electronic resource, definable in scope and content by a single title or name, and able to be delivered and used by prevailing web browser software.

Another issue concerning scope related to commercial or other material where free availability via STORS would harm the financial interests of the publisher. The State Library felt that it was extremely important to preserve this material in the repository and not discourage such publishers from using STORS for this purpose. Although an open repository, it was decided that STORS should provide the capacity for contributors to restrict access to commercial publications submitted to STORS, either for a period of time set by the publisher, or to certain computers located within the State Library of Tasmania.

STORS business rules – contribution processes

The contribution process is vital to the operations of STORS, and the business processes governing contribution were given detailed consideration. It was important to allow both government and non-government contributions, and to cater for regular and repeat contributions by established publishers as well as occasional contributions by unknown publishers. In addition an appropriate measure of control over content was required that met both publisher needs and library capacities.

The decision was taken to allow direct and unmediated contribution to the repository for known publishers. These publishers would, however, first have to register with STORS. They would then be provided with a login and password that allowed unmediated contribution.

Government agencies were taken to be the first class of publishers who could be provided with unmediated contribution rights, and would be encouraged to simply register with STORS and then allowed to use the system. Other classes of publishers or organisations will be invited to register for unmediated contribution rights as time progresses.

STORS still needed to be able to accept contributions from publishers who are not registered and a simple guest login that does not require a password is provided for this purpose. However contributions from this login will be vetted by the State Library before they become available through STORS. This is necessary to ensure that such content, provided via

anonymous contribution, is within the scope of STORS, and not illegal or in some way malicious or harmful.

System architecture and infrastructure

The STORS repository model has a very simple systems architecture. During contribution a core metadata record is created within a database that contains basic contribution information. As part of the process, a unique ID is created which is then used to construct the enduring URL. The actual digital object is placed in a discrete and separate file system for safe storage.

STORS requires only a simple metadata record because the fundamental purpose of this metadata is content acquisition and repository management, rather than open discovery. STORS enables and expects descriptive and indexing metadata to be provided and managed by external systems, rather than through STORS itself. STORS content can also be harvested by free-text trawling software and subsequently retrieved through web search engines.

The simple STORS metadata record contains the following fields: title, contributor, contributor email, copyright owner approval indicator, date of contribution, item currency information, restriction information, links to other STORS documents that supersede or are superseded by this resource, MD5 checksum, unique ID, and persistent URL. This metadata set was chosen to minimise demands on the contributor (especially as user tests showed that additional bibliographic details could not be understood or successfully created by general publishers), while still providing that basic core of data that would enable the archive to act as an active repository.

To facilitate file system document storage, the State Library purchased 500 Gb of disc storage that was installed as part of a Storage Area Network managed for the State Library of the Department of Educations Information Technology Branch. The extent of disc storage required will be monitored over time.

A specific web server was purchased to run the STORS software itself and to provide web entry and resolver functionality. This web server was of moderate capacity, since it did not seem likely that there would be high numbers of concurrent users accessing or contributing to the STORS system at any one time.

Security and preservation issues

A detailed risk and threat assessment was undertaken during the development of STORS and risk mitigation strategies adopted to remove or reduce acknowledged risks to acceptable levels. The major risk identified related to the potential impact of computer viruses and other malicious programmes on an enduring repository. Another major identified risk, in terms of impact rather than likelihood, was that it was possible that a hacker of some type could access the system and destroy or alter preserved documents.

The effects of a malicious software program could occur at the time of submission or much later in time when that item was subsequently accessed by an end user. Such an event could possibly infect/impact the server itself, or the file system where the documents were stored.

To address this issue, all contributed material will be checked by constantly updated virus checking software upon contribution, and material found to be infected will be quarantined immediately. The contributor will then be alerted in case they did not realise that their contribution was in some way infected.

A system will also be developed that uses the checksum generated at the time of contribution to routinely check the validity of the items already in the archive. Any variation in the checksums will indicate a possible problem and allow for appropriate investigations and remedial action to be undertaken.

Changes to normal back-up routines were also required to ensure that clean and redundant backups of the file system were produced at frequent intervals. This is in case it proves necessary to roll back the file system to a period prior to the identification of an infection event. Supplemental backups based on optical media are also taken by the State Library outside of the normal digital tape systems attached to the server farm.

There is no doubt that long term (multiple-decade) storage will require a constant review and updating of the backup mechanisms and medium used. Because the preservation of Tasmanian information for future generations is a core business objective of the State Library, this is not seen as an unacceptable burden but rather as a recognised cost of operation.

A much greater challenge will be the issue of long term data migration. Solutions based on the provision of emulation software are seen by the State Library as well beyond its capacity to develop or anticipate. Strategies based on data migration through XML should provide good medium-term outcomes, but the State Library believes that its best long archival outcomes will occur through STORS enhancements that follow detailed compliance with the OAIS model.

Legal issues

As most material contributed to STORS will become openly available over the web upon contribution, the State Library recognised that it acted in some ways as a content provider. In consequence, the State Library had to develop policies that reduced any risks concerning liability should the provision of an item contributed to STORS prove to be unlawful.

A basic requirement added to the contribution process was that the person who submitted the item should attest that they had gained permission or authorisation from the copyright owner for that contribution. STORS also added a condition of use whereby it reserved the right to reject or embargo any material that was deemed harmful, pornographic or contravened Tasmanian or Australian law. The State Library also ensured that the STORS web site met the requirements determined by the Australian Broadcasting Authority for internet content providers (Australian Broadcasting Authority, 2003).

Implementation

During the first half of 2003, the Archives Office of Tasmania developed a new set of disposal schedules for government records, and the STORS system was identified as an accredited storage location for certain government published records/documents. For this reason, it was important that a basic working version of the STORS repository was available to coincide with the expected promulgation of these disposal schedules in July 2003. For this reason, a simple version of STORS aimed principally for government publishers became available on 1 July 2003 (www.stors.tas.gov.au).

This simple version of STORS lacked the full range of desired functionality, but was sufficient for government use and marked the beginning of what is expected to be a continual process of improvements and enhancements to the service.

Formal launch and promotion

The STORS web service is to be launched formally by the Tasmanian Minister for Education, the Hon. Paula Wreidt, in late 2003. The public launch will signal the provision of functionality that allows non-registered or 'guest' publishers to contribute content, as well as a number of minor improvements and functional enhancements.

Of greatest importance is that this public launch will initiate the process of promotion and promulgation of the STORS service amongst government and the Tasmanian community. This promotion is seen as a significant requirement to encourage content growth, and the benefits to publishers of using an active archive for immediate and long-term access will be stressed, as will the use of STORS to satisfy legal deposit obligations.

A detailed promotional strategy is planned for government publishers. The first stage will be a formal communication to departmental CEOs, informing them of the presence of STORS, its scope and benefits to their department, and their departmental obligations in terms of legal deposit and archival safe keeping. Secondly, STORS personnel will directly contact the units within government departments that are responsible for document production (e.g. communication units, publicity areas, etc) as well as those units responsible for information management (e.g. libraries, records sections). Both areas will receive publicity material as well as a demonstration and information session by State Library personnel. With regard to the information management units, a strategy will be pursued that seeks to encourage their full adoption of STORS, not just as an information tool that simplifies their work tasks, but also as a service that will increase or reinforce the value of their unit to the organisation as a whole.

Promotional and publicity material will also be provided for non-government sectors. The State Library will follow the same outreach and publicity processes used to promote legal deposit for print items, including routine visits and print/email communications with Tasmanian printers and publishers. Routine claims for legal deposit items will inform publishers about STORS and how it can be used, and specific claims for digital items will be sent to publishers, with instructions on how to use STORS to meet their legal deposit requirements.

Once an early user base has been established, the State Library will pilot a STORS User Group, partly to seek user consultation regarding future enhancements, but also to provide publicity opportunities and to promote the general concept of digital preservation. It is hoped that this may also be a way to engage other major institutions such as the Archives Office of Tasmania, University of Tasmania, the Tasmanian Branch of the National Archives of Australia, etc. Over time the State Library, through its publicity section, will provide press releases and utilise other media opportunities to expand community knowledge of STORS.

Preliminary consultations have indicated a high degree of interest among government departments, particularly from those personnel involved in web document production and management, and from library and records staff. Such staff have indicated that they see STORS as a tool that will enable them to better control existing and out-of-date government documents.

Early operational issues

Initial experience has shown that the complexity of converting PDF to HMTL4 is such that it may not be currently possible to turn this into an automated process. The impact of file conversion as a manual process with a recurring workload for the State Library will be need to be kept under continual review.

Early experience has also indicated that composite HTML documents are difficult to upload reliably with the first version of the software. It may be that a better solution will be to revert to the same software that has worked successfully with *Our Digital Island*. This would mean that once the contributor sends an HTML page to STORS, HTTrack or similar software would be used by State Library staff to retrieve all the necessary linked components.

Conclusion

One of the major issues identified after the first three months of operation is that the complexity of certain electronic documents is such that more interaction with contributors will be required than had been first envisaged. There are unfortunately cases where the contributed documents are complex, problematical, or outside the basic rules that can be programmed into a single fully-automated non-interventionist software application. The continued enhancement of software and refinement of business processes will be required to address this problem.

However, the success of STORS is that there now exists a growing body of electronic resources that are preserved for future generations, that are available via the web through a stable URL, and that can be viewed through commonly available file formats. The three key contemporary web problems of distribution, dissemination and format usability identified throughout this paper have been addressed pragmatically and successfully at the state level. The process of addressing the issue of generational preservation of Tasmanian digital publications has also begun.

It is satisfying to note that no fundamental technological problem has been identified to date that should prevent the expansion of STORS system functionality to meet a high level of content growth, and to deal with new needs as they emerge.

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