JISC

Setting institutional repositories on the path to digital preservation

Final project report from the JISC KeepIt Project

Project Information			
Project Acronym	KeepIt		
Project Title	Kultur, eCrystals, EdShare (and NECTAR) – Preserve It!		
Start Date	April 2009	**End Date**	September 2010
Lead Institution	University of Southampton		
Project Director	Les Carr		
Project Manager & contact details	Steve Hitchcock Email: sh94r@ecs.soton.ac.uk		
Partner Institutions	University of the Arts London, University of Northampton		
Project Web URL	http://preservation.eprints.org/keepit/		
Programme Name (and number)	Information Environment Programme 2009-11 (Preservation strand)		
Programme Manager	Neil Grindley		

Document Name			
Document Title	*Final report*		
Reporting Period			
Author(s) & project role	Steve Hitchcock, Project Manager		
Date	28 June 2011	**Filename**	finalreport-keepit10.doc
URL			
Access	√ Project and JISC internal	√	General dissemination

Document History		
Version	**Date**	**Comments**
0.1	9 May 2011	First draft version, for partners and programme manager
1.0	28 June 2011	Final version

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JISC KeepIt Project: Kultur, eCrystals, EdShare (and NECTAR) – Preserve It!

Steve Hitchcock, Project Manager
IAM Group, Building 32, School of Electronics and Computer Science, University of Southampton, SO17 1BJ, UK
Email: sh94r@ecs.soton.ac.uk

This is the final version (1.0) of the report, **28 June 2011**.

Project reporting resources:

520 tweets, 90 blog posts, 35 presentations on Slideshare, and 17 items including papers in the ECS Southampton repository (ongoing)

- **Web**: http://preservation.eprints.org/keepit/
- **Blog**: Diary of a Repository Preservation Project http://blogs.ecs.soton.ac.uk/keepit/
- **Papers and presentations, Repository**: http://www.ecs.soton.ac.uk/research/projects/640
- **Presentations, Slideshare**: http://www.slideshare.net/SteveHitchcock/presentations
- **Wiki**: Training resources and bibliography http://wiki.eprints.org/w/Repository_Preservation_Exemplars
- **Twitter**: @jisckeepit

This report is based on the Twitter record for the project, and reproduces regular selections from the archive, just as we predicted –

TwapperKeeper has archive of @jisckeepit tweets http://bit.ly/e7Gy9C Useful for writing project reports
Tue Mar 08 12:03:30 +0000 2011 - tweet id 45092272068497408 - #4

Abstract

Digital preservation starts with detailed knowledge and awareness of your own content. The scope for content of institutional repositories has grown from research papers to presenting data supporting the research, also covering teaching materials, and artistic creativity. Four repositories representing each content type - the exemplars - joined the KeepIt project to investigate how effectively each could support the goals of a general repository: trustworthy storage, and preservation. This final report from the project reveals the results, outcomes and implications of the work.

We tackled this at two levels: directly with our exemplar repositories, and indirectly by our repository managers exemplifying their different approaches to their own peers. A major component of the project is a record of each process and development in the project blog, through a range of voices from the managers of the exemplars to the project manager.

Recent years may be seen as a golden period for the development of digital preservation tools. Tools are available to support a full preservation programme for repositories, from policy-making to costings, technical content management, and risk analysis. To introduce the exemplars to these tools, we designed a 5-part course, with each section focused on a single tool. The fully documented course can be followed by anyone whether they joined the course or not.

A trend in digital preservation has been to combine preservation tools in supra-applications with dedicated interfaces. In particular this has been applied to tools for file format identification and management. We combined these tools within the EPrints repository interface. All four exemplars applied the EPrints preservation apps. These are available for download and will be included in the forthcoming EPrints app store or Bazaar, and there are versions to try on the Amazon cloud service.

So what did the exemplars do about preservation? A series of blog posts at the conclusion of the project shows what they chose, how far they got, what effect the project had on the repositories and how they intend to continue this work. All see preservation as an ongoing practical commitment, providing it can be managed within the scope of existing work and resources. We can expect to see progress where it fits with repository development and emerging requirements. We cannot expect to see all repositories take the same path towards preservation at the same speed. This will depend on type of repository content, but also on other factors including institutional issues, scale and growth of repository content.

Table of Contents

Acknowledgements

The KeepIt Project was funded by JISC under the Preservation strand of its Information Environment programme 2009-2011. Programme manager Neil Grindley has provided valuable guidance throughout.

We are grateful to the managers of the KeepIt exemplar repositories for their commitment and contributions to the project, and in turn to their leaders for supporting their participation through the project advisory group. As I never fail to remind them, the project is over but they can continue to be exemplary.

In particular we owe many thanks to our KeepIt course presenters: Sarah Jones, Harry Gibbs, Ed Pinsent, Neil Beagrie, Brian Hole, Stephen Grace, Gareth Knight, Andreas Rauber, Hannes Kulovits, David Tarrant, Adam Field and Martin Donnelly. They must take credit not just for their courses but also for the preservation tools on which they were based and which they built and have given freely to the community.

Executive Summary

The foundations of digital preservation, culminating in the Open Archival Information System (OAIS), have been established for nearly a decade. Since then there has been a wave of innovative tools to support the practice of digital preservation for all sorts of content in all types of archives and repositories.

The JISC KeepIt project was focussed on engaging digital institutional repositories (IRs), typically serving institutions of higher education, in digital preservation practice. We worked with four repositories – our exemplars – representing both the original type of IR, focussed on the collection of published research papers, typically with a strong emphasis on sciences (often called open access repositories), and the latest generation of IRs collecting data and teaching materials, from the sciences to the arts and humanities, that is, the valuable outputs produced right across the whole institution.

Figure 1. Miggie Pickton gives a KeepIt presentation to a main track session at *Open Repositories 2010* in Madrid, 7 July

In KeepIt we showed, by designing a 5-part training course in conjunction with the exemplars, it is possible to build a complete digital preservation workflow for use by these IRs using currently available tools. These are not simply technical tools. OAIS shows that preservation involves management, administrative and economic assessment. The available tools, and our training course, cover all of these angles.

The course was attended by our exemplar repositories and others representing up to 13 institutions, at least one of which has, like our exemplars, gone on to implement one or more of the preservation tools they encountered. There is a complete record of these training materials available through the project blog, the local repository and Slideshare.

Not only do we have digital preservation tools, we can see these tools are being adapted for different use cases by integrating the tools in different application interfaces. In KeepIt, given that our focus was IRs, we integrated some established tools for format preservation workflow within the interface of EPrints, one of the most widely used software platforms for building IRs. All of our exemplars, but not all of our trainees, use EPrints. The aim was to enable access to a range of interconnected tools, and the results they produce, in a familiar working environment.

Our exemplars all made progress, finding a starting point for digital preservation of the respective repositories. Each made different choices of tools, and each choice can be seen in the context of the type of repository, type of content, stage of development and maturity, size and content growth, and thus their perception, identification and location of risk to repository content. All of our exemplars were encouraged to blog about their progress, so there is a first-hand record of their decisions and experiences.

Having the tools, training and support is not enough, however. Repositories have to be ready, willing and able - technically, financially and managerially – to encompass digital preservation within the scope of their existing content collection activities. We tried to set realistic expectations for the exemplars of working with one or two tools initially, yet even with this limited scope we had mixed results. Time is always a factor. The project was funded to free a small amount (10%) of the time of the participating repository managers, with a view to them exploring and recognising the scope for more substantial support for preserving their repositories subsequently.

Yet KeepIt also shows we should not become over-anxious or impatient for formal preservation of digital repositories. While there might occasionally be signs of this in the specialist preservation community, and perhaps even in the funding of projects such as this, it doesn't actually make preservation happen faster. All IRs are founded on some assumption of content management and institutional support – a vital part of preservation – even if that has to be formalised more fully for most IRs. For growing, successful repositories more will need to be done to support preservation, but for those repositories it will be a natural process and the consequence of expansion and maturity. It will not be viewed as optional or different, simply an extension of professional content management.

Finally, we would expect to see an emerging market for preservation services aimed at maturing digital repositories, but it would be a mistake to think this will mean that repositories need not be concerned with, or competent in, preservation. Repositories need to be just as well informed about their content and the need for preservation whether they choose to outsource some of these tasks or manage preservation institutionally. As with management, the art of digital preservation is about making the necessary assessments, judgements and decisions as much as it is about finding someone to act on them. Our KeepIt exemplars and our trainees have demonstrated they are capable of the former, even if they are still seeking a stronger platform and opportunities for the actions they choose.

1 Background

Digital repository content. Science, arts, research, teaching. Collect it, store it, use it, preserve it, keepit http://bit.ly/keep-it

Mon Jul 06 10:41:41 +0000 2009 - tweet id 2495300234 - #456

In its most general context, a repository is defined in various dictionaries as:

> "a place, room, or container where something is deposited or stored"; or "where something may be placed for safekeeping." Given examples of such places are: a warehouse, a museum. More precisely a repository is "One that contains or is a store of something specified". A repository need not be just a physical entity, but could be "a person to whom something is confided or entrusted".

Digital repositories that are the focus of the KeepIt project may be seen as a special case of this general description, in that they are designed to store digital information, but in other respects they remain true to the intent of safe, trustworthy storage. Further, digital repositories conform to this definition in recognizing that ultimately it is design and management by a person or people responsible for the thing that is entrusted that fulfils this objective.

Digital institutional repositories (IRs) are supported by an institution for the purpose of collecting and presenting the digital outputs of the members of that institution, and the exemplar repositories participating in KeepIt are each an IR for a specified form of content. In effect, the institution aligns its reputation, quality, longevity and other characteristics, whatever these may be, not just with the content its members produce but also with its commitment to maintain access to those contents through effective management of the repository.

IRs may have grown out of many formal initiatives and development programmes, notably such as those supported by JISC in the UK, but the founding idea was based on a recognition in the mid- to late-1990s that researchers and academics were already volunteering free copies of their published papers on the Web in addition to formal publication in journals and conferences. In many cases these used Web servers provided within institutions but where the institution did not manage the content. As a response to that recognition, IRs express the idea that there is a better, more reliable, way for an institution to grow its digital content and ensure it could be accessed and consulted whenever needed.

Since those early days the scope of IRs has grown, from research papers to presenting data supporting the research, also covering teaching materials, and artistic creativity. It is hard to find a single IR that represents all of these data types in one place, perhaps unsurprisingly given the range of challenges this would present, but emerging repositories dedicated to these individual types and attached to an institutional identity can be found. As our first Tweet revealed, we involved four of these repositories, as exemplars representing each data type, in the KeepIt project to investigate how effectively each could support the goals of a general repository - trustworthy storage, and preservation - but also to gain some insights into the possible impact on such goals of combining all these data types in a single supra-IR.

Final report from Preserv 2 project http://bit.ly/3rPmH More inspired development. Just need to apply it to real repositories. Hence KeepIt.
Thu Aug 13 17:53:40 +0000 2009 - tweet id 3290455532 - #423

The KeepIt project followed the JISC Preserv 2 project, and involved some of that project team, which had investigated the provision of preservation tools and services for digital repositories, with the emphasis on services rather than repositories. By design, principally through the JISC programme call for projects under the Preservation strand of its Information Environment Programme 2009-2011, the KeepIt project provided an opportunity to connect those preservation tools, developed not just in Preserv 2 but in many other JISC and international projects, with these emerging classes of digital repository.

With hindsight, we might view these tools as representing a golden period for digital preservation, such is the array and completeness, at least in terms of scope of functionality rather than the last word in usability, of this tool set. Beyond digital preservation specialists, however, take up of these tools has been limited among digital creators and others such as repository managers. This may be less to do with the tools and more to do with the perception of digital preservation as a complex activity, a problem that we recognized in KeepIt. Even recently preliminary results from a survey by the Library of Congress called for greater outreach in training for digital preservation (DP). But the problem is typically over-specified and thus more daunting than necessary.

.@bookfinch Shorter summary of DP: know what you have and value, assess risk, take action to avoid risk, repeat. Problem: people don't do it
Thu Jan 13 12:30:50 +0000 2011 - tweet id 25530206525591552 - #27

LoC Digital Preservation Outreach and Education (DPOE) Training Needs Assessment Survey: Executive Summary http://bit.ly/eUCCdS
Tue Feb 01 10:42:23 +0000 2011 - tweet id 32388284466331648 - #24

Implicit in this Twitter-length summary of DP is that it starts with detailed knowledge of your own content, not with specialized tools and procedures. All the needs and requirements of preservation stem from this knowledge, enabling a repository manager, for example, to then select appropriate preservation tools and services. Too often the imagined starting point for repository preservation seems to be to outsource the requirement for digital preservation to specialists, but then this would founder on the inability to specify even the basic parameters of the work to be outsourced. Remembering our original definition of repository, this is the consequence of the repository manager - not the specialist - being entrusted with the responsibility for the content. The key insight here is digital preservation starts not with outsourcing but with content awareness.

In essence, this is the problem that KeepIt set out to help the managers of different types of institutional repository to resolve. We tackled this at two levels: directly with our exemplar repositories, and indirectly by our repository managers exemplifying their different approaches to their own peers.

2 Aims and Objectives

The original project proposal (Hitchcock, 2009) set out the key objective: To establish long-term content management practices for all and any (content or) data that has been and might be deposited in an institution's repositories, through the application of policy-backed analysis and strategy for the repositories, and the matching application and adaptation of proven preservation tools and services.

This will be achieved by:

- Identifying
    - data management requirements of the repository in conjunction with the repository manager and informed by policy, growth, development projections, and budgeted costs
    - a preservation strategy for the repository
    - appropriate preservation tools and services; then implement or adapt for implementation
- Testing and validating the strategy against services
- Evangelising – managers of funded exemplar repositories to report the methods to their peers

3 Methodology

The starting point for the method was to identify exemplar repositories that represent "all and any data that has been and might be deposited in an institution's repositories". For institutions of higher education we considered data types suitable for deposit to range from research papers to science data and teaching and learning materials, across all academic disciplines from the sciences to the arts. Since no known single repository covers all data types, repositories were selected to cover each major data type.

NECTAR, University of Northampton http://nectar.northampton.ac.uk/
Institutional repository: research papers, open access
Repository manager, KeepIt lead: Miggie Pickton
KeepIt blog tag http://blogs.ecs.soton.ac.uk/keepit/tag/nectar/

EdShare, University of Southampton http://www.edshare.soton.ac.uk/
Institutional repository: teaching and learning materials
Repository manager, KeepIt lead: Debra Morris
KeepIt blog tag http://blogs.ecs.soton.ac.uk/keepit/tag/edshare/

University of the Arts London Research Online http://ualresearchonline.arts.ac.uk/
Institutional repository, creative arts
Repository manager, KeepIt lead: Stephanie Meece (previously Andrew Gray)
KeepIt blog tag http://blogs.ecs.soton.ac.uk/keepit/tag/ual-research-online/

eCrystals– Southampton, and EPSRC UK National Crystallography Service
http://ecrystals.chem.soton.ac.uk/
Repository: scientific data, crystal structures
Repository manager, KeepIt lead: Simon Coles
KeepIt blog tag http://blogs.ecs.soton.ac.uk/keepit/tag/ecrystals/

Another criterion in selection was an interest in and willingness to engage in applying practical preservation to the repositories.

The exemplars do not represent special cases, and had different degrees of prior experience in digital preservation, from none, to some local investigation, to participation in other preservation projects.

Nor was there a requirement to use any particular repository software, although it is probably not simple coincidence that all use EPrints since, as the home of EPrints at the University of Southampton, that is the community we work with.

The project began by profiling each exemplar, in terms of "data management requirements", "policy, growth, development projections, and budgeted costs", and using that to outline an initial "preservation strategy" and actions. Exemplars were asked to specify their objectives as a reference for their later work in the project.

A key component of the method was to record each process and development in the project blog, through a range of voices from the managers of the exemplars to the project manager. Hence the initial profiles and their objectives can be found for each specified exemplar repository using their individual blog tags (or the tag linking all exemplar blogs http://blogs.ecs.soton.ac.uk/keepit/tag/exemplar-profiles/)

To introduce the exemplars to a range of "appropriate preservation tools and services", we designed a 5-part course, with each section focused on a single tool and presented, in most cases, by the developer of the tool. This provided the necessary expertise. In addition we attempted to work with presenters to tailor presentations for repository managers rather than the more conventional audience of archivists, and each session included group practical work.

In its completeness the course aimed to demonstrate that there are tools available to support a full preservation programme for the repositories, from policy-making to costings, technical content management, and risk analysis.

Where there were gaps in the preservation workflow supported by the tools, we would develop additional tools. In this case we were able to link file format identification, preservation planning and management tools within a repository interface.

An important principle of the project was that we would not prescribe best preservation practice for a specific repository but enable the exemplars to explore all options. We worked with the managers of the exemplars to design the project and the training course. It was not anticipated that any exemplar would implement more than 1-2 tools from the course and within the timescale of the project, but that they would be capable of incorporating more tools as requirements and time permitted. We expected the selection of tools used initially by each repository would be revealing.

Finally, the exemplars would 'evangelise' the outcomes to their peers. The key difference with other repository preservation projects is that this would include the first-hand experience of the repositories rather than just that of the preservation specialists. The project blog was important here, but also more formal papers and presentations were given to primary repository audiences.

4 Implementation

Now fully subscribed - KeepIt course on preservation tools for digital repositories http://bit.ly/7PRDhq Single sessions may be available
Thu Jan 14 15:35:09 +0000 2010 - tweet id 7751352859 - #346

The fulcrum of our approach was the KeepIt course, aimed at our exemplar repositories but also open to other repositories seeking to improve their support for preservation. This took place in four single-day modules and one module over two days, across various locations and over three months around the middle phase of the project at the start of 2010. This allowed us to involve the exemplars in the design and planning of the course, and for them to act on selected tools and outputs after it.

Throughout the course the focus was on tools rather than theory. Unlike some other courses on DP the assumption was that participants were not making personal career choices, simply seeking to understand and use tools that could supplement their day-to-day activities with repositories. The broad course structure included organisational issues, preservation costs, leading to more technical concerns such as content properties, metadata and format management, concluding with risk assessment. What we found was that widely and freely available tools were available to support every course activity. Analysis showed that around 70% of these tools had been developed in JISC projects.

In one area, file storage and file format management, we were able to develop and combine existing tools for use with EPrints repositories, which were used by all of our exemplars. In turn, a series of tutorials on these tools, lasting from 90 minutes to 2 days, were presented at international events, reaching a wider audience of repository and preservation practitioners.

That's a 1-2 day preservation tutorial (sans Plato and colleagues from Vienna) condensed into 90 min. It worked. Brilliant work Dave T #or10
Fri Jul 09 09:09:22 +0000 2010 - tweet id 18104652611 - #176

Corfu, Southampton, Madrid, now Vienna - Plato-EPrints preservation workshop accepted for iPres 2010. Thx Hannes, Andi, Dave
Tue Jun 29 09:24:51 +0000 2010 - tweet id 17320060098 - #195

In part this work also proposed new approaches based on applying linked data principles to data used to assess file format risk, and was influential in focussing wider community effort on this issue.

@davetaz talks at #ipres09 in 1h: using linked data and Semantic Web to manage format risk. Much anticipated. Full paper http://bit.ly/3SwTL
Tue Oct 06 21:35:39 +0000 2009 - tweet id 4665378668 - #402

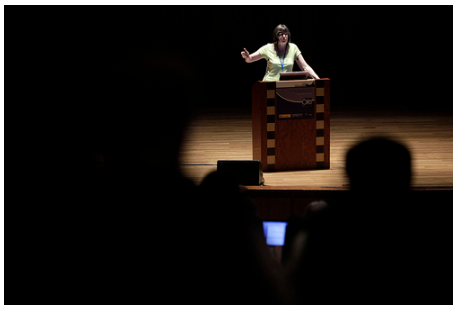

Figure 2. Miggie Pickton and audience shadows at OR10

Ultimately the key work of the project was to reach out and exemplify best preservation practices to other repositories through reports and presentations by the exemplars, and presentations were given to key repository audiences in the UK and abroad.

Miggie says there were 140 people at her KeepIt talk. She counted from the podium. You thought the audience were watching the speaker? #or10
Wed Jul 07 15:13:26 +0000 2010 - tweet id 17955999362 - #179

5 Outputs and Results

The bald facts of outputs from the project:

> **520 tweets, 90 blog posts, 35 presentations on Slideshare, and 17 items including papers in the ECS Southampton repository.**

In other words, progress of the project was being continually recorded. In this section we will seek to highlight the main contributions, noting that all outputs should be traceable from the original sources.

As we know from the previous section, the principal outputs of the project include a fully documented course on the application of preservation tools, enhanced preservation and storage applications for use with EPrints repositories and a series of tutorials to accompany those, leading to documented application of selected tools by our exemplar repositories.

5.1 KeepIt Wiki and bibliography

First, how did we design our KeepIt course and involve the repository managers in the process? We constructed a wiki (http://wiki.eprints.org/w/Repository_Preservation_Exemplars) including a list of training resources, with details of other courses on digital preservation and of preservation tools. The wiki also included a bibliography of published papers classified to the structure of the project's exemplars – arts, data, science, teaching, also theses – later supplemented with a live feed to update the bibliography. This complements a similar bibliography produced by our predecessor Preserv project classified according to preservation topics rather than data type (http://preserv.eprints.org/Preserv-bibliography.html). With this edited background material we were able to work as a team to select the topics and tools to take forward.

Bibliography with new angle on preservation http://bit.ly/P9LMr. Follows content structure: arts, data, science, teaching, theses. A wiki.
Wed Jul 29 09:18:13 +0000 2009 - tweet id 2906942468 - #433

KeepIt bibliography now has latest papers (unclassified) in live feed from Connotea http://bit.ly/P9LMr
Fri Jun 04 10:13:05 +0000 2010 - tweet id 15405823984 - #220

5.2 KeepIt course

The full course can be followed by anyone whether they joined the course or not. Each course section was blogged with the presentation embedded in the blog. The course was more than a series of presentations, however. Each course element included extensive practical work to reinforce the presentations. The documentation for the practicals, because it is less visual and embeddable in a blog post, has been collected in our repository. The best way to recreate the course is to follow the chronology in the blog and then locate the supplementary materials in the repository to test your understanding.

Here is the course summary:

- Module 1, Southampton, 19 January 2010: digital preservation, repositories and institutions
- Module 2, Southampton, 5 February 2010: institutional and lifecycle preservation costs
- Module 3, London, 2 March 2010: Primer on preservation workflow, formats and characterization
- Module 4, Southampton, 18-19 March 2010: Putting storage, format management and preservation planning in the repository
- Module 5, Northampton, 30 March 2010: Trust

The following summary based on tweets give a flavour of the course, a sense of its scale and impact, and provide links to the collected materials based on presentations in Slideshare, the repository listing, or the tagged blog posts. The blog posts include not just reports of each session but also first-hand reactions from the managers of our exemplars, and in some cases from other repositories represented on the course. The aim was that each tool presented would have one blogged response from a participant, and that was largely achieved.

Ed Pinsent, tutor on KeepIt course 1, on how feedback from his session on AIDA produced 'pure gold' http://bit.ly/bYzL9Q
Fri Jan 29 09:43:48 +0000 2010 - tweet id 8361940909 - #339

KeepIt course 3: A simple 10 min game reveals all the key issues to be covered in module 3 http://bit.ly/auZ2mV
Mon Aug 23 14:30:41 +0000 2010 - tweet id 21918223526 - #144

Putting a preservation plan into EPrints. Here is the clever part ... how to upload a plan from Plato to a repository http://bit.ly/cePNzO
Tue Sep 21 15:01:13 +0000 2010 - tweet id 25125974874 - #113

KeepIt course: "did you really think it would only be you left by the last module". Yes, but I was wrong. Course 1, 16; course 5, 16 #dprc
Wed Mar 31 09:35:48 +0000 2010 - tweet id 11358555910 - #290

KeepIt course 5: revision, evaluation and concluding thoughts - the last hurrah. Complete course slides now at http://bit.ly/8XMesd #dprc
Thu Apr 08 12:32:55 +0000 2010 - tweet id 11820920105 - #282

KeepIt course source materials-inc. exercises, worksheets-now available http://bit.ly/afof8g so course can be experienced by all users #dprc
Wed May 12 09:04:39 +0000 2010 - tweet id 13840743514 - #240

KeepIt course: Digital preservation tools for repository managers: the complete record http://bit.ly/c5xC1X
Thu Sep 30 11:01:38 +0000 2010 - tweet id 25968746174 - #103

Even though the course was spread over five events during three months and across far-flung venues, as we learned above, the participants kept returning. That was not inevitable in these circumstances, and is testament to the course presenters, who kept the topic alive, relevant and practical. At the end of the course participants all completed a course evaluation, which we reported at ECA. That evaluation shows a strong response to all tools, presentations and practical sessions, and explains why participation remained steady at the original level throughout the course (Hitchcock, *et al*., 2010).

We shall see in the next section how some of the participating repositories responded to the course through their own developments. It is not just the project's exemplar repositories that have taken practical preservation steps as a result of the KeepIt course.

5.3 EPrints preservation apps and tutorials

While preservation tools could be found to fulfil every aspect of our course, not all are ideally suited for direct use with repositories. A recent trend has been to combine tools in a supra-application with a dedicated interface. In particular this has been applied to tools for file format identification and management. For our repositories we combined these tools within the familiar, to our repository managers at least, EPrints interface. Dave Tarrant led the development, and recognising the insights, integration and benefits this approach has brought to the wider preservation community, Dave was subsequently invited to join the Technical Advisory Board of the Open Planets Foundation, which acts as a centre of expertise and coordinating body for developing support for digital preservation.

EPrints preservation apps: from PRONOM-ROAR to Amazon and a Bazaar-new blog post http://bit.ly/bfclqQ
Mon Nov 15 15:58:34 +0000 2010 - tweet id 4201602428698625 - #63 Outputs

Try the EPrints preservation apps in the cloud-two test repositories running on Amazon. Full instructions here http://bit.ly/aNSR40
Mon Nov 15 16:02:43 +0000 2010 - tweet id 4202645212372992 - #61

Dave Tarrant has joined the Architecture and Technical Advisory Board of the Open Planets Foundation http://bit.ly/gmmjZR
Wed Jan 05 14:28:30 +0000 2011 - tweet id 22612261826732032 - #29

Last gasp KeepIt, new article in Ariadne on Characterising and Preserving Digital Repositories: File Format Profiles http://bit.ly/fDW2Cp
Wed Mar 02 15:02:06 +0000 2011 - tweet id 42962892269686784 - #8

After the KeepIt course we encouraged the exemplars to implement at least 1-2 of the tools covered. All chose to use the EPrints preservation apps.

We assisted each of the exemplar repositories to install and run the tools, enabling them to produce the content profiles that were reported in the *Ariadne* article (Hitchcock *et al*., 2011). We have tended to emphasise the role of format identification in a preservation workflow culminating, potentially, in format migration as part of a managed plan. The need for format migration has been questioned, but what should not be overlooked is the importance for preservation of knowing what you have, and this means knowing this in terms of file formats. The tools included in the EPrints apps do this.

The EPrints apps are not solely for the exemplars. They are available for download from the EPrints 'Files' repository, and will be included in the forthcoming EPrints app store or Bazaar. For those who wish to try before installing, there are versions running on the Amazon cloud service. To help those wishing to try this, documentation from the KeepIt course is available, and alternative, shorter versions from a series of tutorials given at international meetings can also be found.

KeepIt and EPrints, PLANETS and Plato: digital preservation. Got all that? All at ECDL, together. Now all here too http://bit.ly/10x9cV
Mon Sep 28 08:30:25 +0000 2009 - tweet id 4438301441 - #411

Last chance to join full day tutorial on practical repository preservation, @iPres, Vienna, Sunday 19 Sept http://bit.ly/cmghhA
Wed Sep 08 10:38:52 +0000 2010 - tweet id 23903186398 - #137

5.4 Exemplification

Nothing was more important in the project, part of a JISC programme focused on repository preservation exemplars, than the process of exemplification. Digital preservation has seen extensive development in the last decade, but could it reach more users? The way to judge this, rather than by prescription, is to provide guidance and then to see what the exemplars choose to do for themselves. The corollary was that the exemplars would report progress to their peers, in this case other repository managers.

Among these presentations two that reached the key target audience were at the Open Repositories 2010 conference in Madrid, and at one of the bi-annual schools held by the UK-based Repositories Support Project (RSP).

KeepIt exemplars reveal seven steps to preservation readiness-blog record of presentation at #or10 http://bit.ly/9oMCAC
Wed Jul 14 09:29:31 +0000 2010 - tweet id 18507389118 - #170

Not too late to view DAF case study by Miggie Pickton of U. Northampton at RSP Winter School (9-11 Feb 2011). Slides http://bit.ly/dKQNAC
Thu Mar 24 16:32:44 +0000 2011 - tweet id 50958234206478336 - #1

In addition to the presentations, there were the perennial blog posts. So what did the exemplars do? A series of posts at the conclusion of the project shows what they chose, how far they got, what effect the project had on the repositories and how they intend to continue this work. The clear impression is that all see preservation as an ongoing practical commitment, providing it can be managed within the scope of existing work and resources. In other words, we can expect to see progress where it fits with repository development and emerging requirements, but don't seek to impose too much too fast. Nor, on this evidence, can we expect to see all repositories take the same path towards preservation at the same speed. To some extent, as the project shows because we worked with different types of repository, this will depend on type of repository content, but many more factors - including institutional issues, scale and growth of repository content - are involved in this.

The following tweets summarise the principal choices of the exemplars and point to the relevant blog posts to find out more. While all exemplar repositories installed the EPrints apps, one chose to supplement that tool by adding specialist format identities (CIF+CML), with another seeking to use it to investigate content profiles among similar educational repositories collecting teaching materials. Individually they chose variously to use tools to plan preservation costs, to audit content across an institution (using the Data Asset Framework, DAF) to assess the benefit of offering to store research data in the repository, and to perform structured risk assessment for the repository and its contents (DRAMBORA).

If you followed our account here of adding CIF+CML to DROID and didn't understand all of it, this new blog may explain http://bit.ly/djZ0Fb
Thu Sep 16 16:17:06 +0000 2010 - tweet id 24677548458 - #119

A DAF investigation of research data management practices at The University of Northampton. Full report http://bit.ly/a0spfE
Thu Oct 14 12:18:00 +0000 2010 - tweet id 27334876753 - #92

Repository file type analysis for educational repositories http://bit.ly/96i1Wp
Thu Oct 28 15:24:54 +0000 2010 - tweet id 28999027352 - #89

UAL repository: "The EPrints Formats/Risks plugin provided the most tangible value for us – it was quick and efficient"
Fri Oct 29 13:13:30 +0000 2010 - tweet id 29086206494 - #84

KeepIt exemplars have different approaches to preservation-eCrystals takes a costs based analysis. New blog post http://bit.ly/9MWixz
Tue Nov 09 16:49:34 +0000 2010 - tweet id 2040107536220160 - #70

"Different repositories make different preservation choices, and they are entirely pragmatic in these choices. There is no single approach"
Tue Nov 30 12:22:34 +0000 2010 - tweet id 9583060303482880 - #43

KeepIt sum: 4 repositories+1 training course on preservation tools+1 EPrints preservation app=exemplar preservation repositories
Tue Nov 30 15:04:07 +0000 2010 - tweet id 9623714819743744 - #40

6 Outcomes

Having learned in the previous section what the project did and what it produced, what effect has it had on the exemplars and on others? As we shall see, these impacts centred on the tools we introduced, the KeepIt course and the participants, and the exemplars.

Perhaps the exemplar to see the most impact, because it reached higher levels of the management of the institution, was NECTAR at Northampton University. It chose to use the DAF tool to investigate

increasing the scope of the repository to include research data (Alexogiannopoulos, *et al*., 2010). As was revealed, this choice will have lasting impact on the repository.

KeepIt course 1, result 1: senior directors at Northampton U. support use of DAF http://bit.ly/cFcsas #dprc
Mon Feb 08 16:43:38 +0000 2010 - tweet id 8815746068 - #330

KeepIt @ #or10 Miggie: DAF has been a cracking project, and will inform development of NECTAR repository at Northampton for years to come
Wed Jul 07 07:50:05 +0000 2010 - tweet id 17932659847 - #188

“Our DAF project has provided an evidence base for the development of a future research data policy and of services” Northampton U.
Fri Oct 01 15:18:20 +0000 2010 - tweet id 26089159775 - #98

The EPrints preservation apps will soon be available in the app store for this repository software, but is also attracting interest from potential preservation service providers.

Spanish correspondent mails-want to use EPrints preservation toolkit, "creating a start-up trying to offer preservation services". Exciting
Thu Feb 17 12:23:10 +0000 2011 - tweet id 38211853620346880 - #6

Through feedback received since the KeepIt course, we can see it has influenced new approaches at a number of institutions, not just the project exemplars. Notably, the repository team at LSE used DRAMBORA, a risk assessment tool, not just to identify risks for the repository but they succeeded in making the positive case for additional resources to act on those risks. This is evidence that institutions will consider growing repositories as essential infrastructure and will act to strengthen and preserve them when presented with a substantive case. LSE can be considered an honorary exemplar repository in KeepIt!

KeepIt course: There's now a substantial group of repository managers out there ready and able to apply appropriate preservation tools #dprc
Wed Mar 31 09:51:57 +0000 2010 - tweet id 11358973011 - #288

Susan Miles-KingstonU-reports KeepIt course helping with policy, opening conversations about new collections and data types-inc. music #dprc
Thu Jun 03 15:29:49 +0000 2010 - tweet id 15332693806 - #221

Arshad Khan of ESRC ReStore Web archiving project reports using EPrints preservation tools + Plato in virtual test environment #dprc
Wed Jun 09 17:20:14 +0000 2010 - tweet id 15790661226 - #215

LSE uses DRAMBORA to make case for greater investment in its repository. New blog from KeepIt course participant Ed Fay http://bit.ly/avAmEL
Mon Jul 19 14:44:46 +0000 2010 - tweet id 18920932158 - #166

Exemplary approach RT @digitalfay presentation about LSE Library digital preservation practice is up now http://bit.ly/gBk1dn #starting_dp
Mon Feb 07 12:02:16 +0000 2011 - tweet id 34582715370045440 - #18

Among the project exemplars we had other breakthroughs, but it’s not all been straightforward. Adoption of specific tools has not always progressed as fast as expected, and resources in terms of time and cost are not always forthcoming to speed the process. As we sum up and reflect on the main findings of the project, this will be a topic we will return to.

NECTAR and the KeepIt project – reflections: We have the knowledge and confidence to use preservation tools as needed http://bit.ly/9YeaDH
Fri Oct 01 15:47:27 +0000 2010 - tweet id 26091816367 - #97

KeepIt course 5: Stephanie Meece on DRAMBORA-best suits the needs of UAL Research Online at this point http://bit.ly/d1jPrK #dprc
Thu Jun 17 15:15:15 +0000 2010 - tweet id 16396110035 - #209

UAL repository: "it isn't realistic to expect a small repository team to complete the full DRAMBORA process in their daily activities."
Fri Oct 29 13:20:28 +0000 2010 - tweet id 29086799787 - #83

Finally, a small project can have an effect within a large preservation institution. Following work begun in the earlier Preserv project on open format registries, and progressed in this project through formal papers (Tarrant, *et al*., 2011), we have seen the UK National Archives, provider of one of the largest format registries, adopt and advocate this approach.

Why TNA making its registry of file formats available as linked data is a good move-see this iPres 2009 paper http://bit.ly/3SwTL
Fri Oct 01 16:10:52 +0000 2010 - tweet id 26093920572 - #95

Reprised paper Where the Semantic Web and Web 2.0 Meet Format Risk Management: P2 Registry-iPres 2009, now IJDC 2011 http://bit.ly/hRRFpC
Fri Mar 11 17:21:22 +0000 2011 - tweet id 46259432216203264 - #3

7 Conclusions

Digital preservation starts with detailed knowledge of your own content, not with specialized tools and procedures. All the needs and requirements of preservation stem from this knowledge, enabling a repository manager, for example, to then select appropriate preservation tools and services.

Recent years may be seen in retrospect as a golden period for digital preservation tools, such is the array and completeness, at least in terms of scope of functionality, of the available tool set. Beyond digital preservation specialists, however, take up of these tools has been limited among digital creators and others such as repository managers. The KeepIt project provided an opportunity to connect these preservation tools with the emerging classes of digital institutional repositories.

To introduce the project's exemplar repositories to a range of preservation tools we designed a 5-part course, with each section focused on a single tool and presented, in most cases, by the developer of the tool. The course aimed to demonstrate that tools are available to support a full preservation programme for the repositories, from policy-making to costings, technical content management, and risk analysis. The full course can be followed by anyone whether they joined the course or not. Each course section was blogged with the presentation embedded in the blog.

All aspects of the project were being continually recorded. A key component was to record each process and development in the project blog, through a range of voices including the managers of the exemplars. The principal outputs of the project include the fully documented course, enhanced preservation and storage applications for use with EPrints repositories and a series of tutorials to accompany those, leading to documented application of selected tools by our exemplar repositories.

A recent trend has been to combine preservation tools in a supra-application with a dedicated interface. In particular this has been applied to tools for file format identification and management. For our repositories we combined these tools within the familiar EPrints repository interface.

So what did the exemplars do? Perhaps the exemplar to see the most impact, because it reached higher levels of the management of the institution, was NECTAR at Northampton University.

The clear impression is that all exemplars see preservation as an ongoing practical commitment, providing it can be managed within the scope of existing work and resources. In other words, we can

expect to see progress where it fits with repository development and emerging requirements, but don't seek to impose too much too fast. Nor, on this evidence, can we expect to see all repositories take the same path towards preservation at the same speed. To some extent, as the project shows because we worked with different types of repository, this will depend on type of repository content, but many more factors - including institutional issues, scale and growth of repository content - are involved.

Through feedback received since the KeepIt course, we can see it has influenced new approaches at a number of institutions, not just the project exemplars. This is evidence that institutions will consider growing repositories as essential infrastructure and will act to strengthen and preserve them when presented with a substantive case.

8 Implications: Repositories can do it for themselves

The implications of the findings of the project are primarily for the exemplars and thus other similar repositories, but also for the wider preservation community.

8.1 Digital preservation starts with detailed knowledge and awareness of your own content

For repositories this means the content for which they have been given responsibility. The first thing to note is that responsibility is determined by policy and agreements with different parties, such as institutional managers, authors and contributors. Content awareness resolves to a detailed knowledge of what you have, in terms of a range of factors, and why you have it.

As with management, the art of digital preservation is about making the necessary assessments, judgements and decisions as much as it is about finding someone to act on them. In essence, this is the problem that KeepIt set out to help the managers of different types of institutional repository to resolve. Repositories need to be just as well informed about their content and the need for preservation whether they choose to outsource some of these tasks or manage preservation institutionally. Our KeepIt exemplars and our trainees have demonstrated they are capable of the former, even if they are still seeking a stronger platform and opportunities for the actions they choose.

8.2 The issues raised by preservation are the same as those raised by content management

Digital repositories are fundamentally driven to provide access to content, but how that is done in practice and how effectively that content is managed for this purpose does affect overall success now and in the future. There is a tendency to believe that preservation is about content in the future, but what we have found is that the issues raised by preservation are the same as those raised by questions about content management today. Considering preservation informs those decisions now; equally, questions about preservation can be answered in current approaches to content management.

The scope of preservation is often drawn widely, as seen from our course, and that can lead us to recognise new opportunities for repositories. Two striking examples of this are moves towards greater capture of research data, in particular to support published research findings, and data provenance.

8.3 Data curation is likely to be a natural progression for a preservation-focussed repository

The work of NECTAR at the University of Northampton indicates the growing prevalence of the idea that repositories could be used for data curation, even if content (e.g. open access) repositories and data repositories remain separate within institutions to serve different metadata, interoperability and

author requirements (e.g. open vs closed). The idea has wider roots, of course, but is still in its infancy. If repositories are the new wave of scholarly communication, then data repositories in the cloud could be the next new wave. It is not a simple issue to tackle, and there are numerous projects more focussed on this than KeepIt. Data curation is likely to be a natural progression for a preservation-focussed repository. It is an opportunity for those prepared to grasp it, not an inevitability: "who's going to do data curation … we can have a pretty good idea who's not going to do it: anybody who isn't *right this very minute* planning to do it." (Salo, 2009)

Should institutional repositories do data curation? Data repositories: the next new wave http://bit.ly/PCttp
Wed Sep 23 20:45:29 +0000 2009 - tweet id 4324707372 - #412

8.4 Provenance of data should be a key role for research institutions

Provenance is an area we covered only briefly in the KeepIt course, and it concerns the revelation of truth in information curated over time. In an information-overloaded world it appears to be a critical role for research institutions to aspire to enable the search for truth in research, and a natural consequence for repositories with a reputable approach to data curation to provide the basis for this.

"As data becomes plentiful, verifiable truth becomes scarce" That's a great line for KeepIt. Here's where it comes from http://bit.ly/b73nq8
Fri Feb 26 16:43:25 +0000 2010 - tweet id 9685716236 - #308

8.5 Preservation tools are delivering specialist expertise directly to the user

Whether called apps or microservices, recent developments in digital preservation reveal a focus on tools. What these tools seek to do is effectively to incorporate and deliver specialist expertise directly to the user rather than through a service provider.

For institutional repositories it is important that the functionality is delivered through appropriate interfaces for non-specialist users. It is possible to find bundled preservation tools – such as FITS http://hul.harvard.edu/ois/digpres/tools.html, or EPrints preservation apps – that combine preservation functions into a single controllable resource. The key is not just in the combination of tools, but the presentation and the target user.

"Our exemplars show there is a ready buy-in for preservation tools, providing these are set within the repository"
Tue Nov 30 12:19:35 +0000 2010 - tweet id 9582311678935040 - #44

Neil Jacobs, JISC IE Team blog: Micro-services? (or apps?) http://bit.ly/ee8Qzk Yes. KeepIt shares its experience, see comments on this post
Thu Dec 09 17:21:59 +0000 2010 - tweet id 12919900821520386 - #34

8.6 JISC should promote its role in the development of digital preservation tools more loudly

We have postulated that the KeepIt course represented all the tools a digital repository needs for a working, practical approach to digital preservation. As we have noted already in this report, over 70% of those tools used in the course were developed by JISC projects.

At a recent JISC end-of-programme event (Innovation takeaway, Aston University, 7 April 2011) for the Information Environment Programme 2009-2011 (INF11) of which KeepIt was a part, keynote speaker Margaret Coutts from the JISC Infrastructure and Resources Committee questioned the impact of digital preservation on digital repositories (Johnson, 2011). As is often the case with digital preservation, the situation was presented as 'urgent'. Without reference to the range of tools available for digital preservation, calls for urgency can lead unnecessarily to incoherence and reduced uptake.

JISC should do more to promote its achievements in digital preservation both within and outside the organisation. This would have the dual benefit of recognising its contribution to the field, but also of bringing the products of this work to wider attention and use. Too often we hear references to digital preservation that have not changed since JISC's various preservation programmes began in 2003.

8.7 Creating a sense of capability will assist those new to preservation practice

With a full array of preservation tools comes capability. We need to be careful with some of the convenient canards, such as urgency and scaremongering, often used to promote digital preservation. These do not assist those new to preservation practice, such as those managing content in digital repositories. We can now talk about and support better alternatives. We know because our exemplars have used the tools and capabilities provided.

Steve Bailey's observation that DP is a now success story, not a scare story, resonates with our #eca2010 talk http://bit.ly/dmTiqr
Wed May 05 11:23:55 +0000 2010 - tweet id 13420645283 - #250

Porter: 'create a sense of urgency'. No, create a sense of capability. That's what many JISC DP projects have done #brtf
Fri May 07 10:09:31 +0000 2010 - tweet id 13540335166 - #242

8.8 Converged multi-data type repositories are likely to increase complexity for preservation

An implicit assumption for KeepIt has been the possible convergence of repositories managing different types of data within the institution. We began with four exemplars representing the major types of content-based IRs because we were unable to find one that combined these. Nor has such a repository emerged during the project. The project does not reveal whether such a converged-IR is more or less inevitable or desirable. What we can envisage, notably through our profiling of the exemplars (Hitchcock, *et al*., 2011), is the growth in complexity that is likely to result from convergence, with a consequent increase in the degree of difficulty of preservation.

Latest blog: if these exemplars represent a future IR, consider how the combined format profiles might look when contemplating the prospect
Thu Nov 18 11:17:01 +0000 2010 - tweet id 5217909911588864 - #56

The final two implications of the findings of the KeepIt project are perhaps the most important. These concern whether digital repositories should be aiming to be specialist preservation repositories and archives, or preservation-ready repositories that are ready to work with existing centres of preservation expertise. It concerns the speed at which repositories might travel to their chosen destinations, recognizing that each will be different for different types of repository, as we have discovered. None of this obviates the need for digital repositories, especially IRs with their responsibility to institutional supporters and users, to *do* preservation, to the extent that *doing* preservation understands taking responsibility for specified digital content, assessing risk and taking decisions on the necessary actions, whether these actions are performed by the repository or by others.

8.9 Preservation should not be prioritized prematurely, especially among relatively new content repositories

Organisational integration, content growth and demonstrated sustainability are among the pre-requisites for digital preservation. We can issue statements to this effect, but in reality this is unnecessary because it happens naturally. The only reason we may have thought otherwise is because some tell us preservation must be a priority.

To work towards understanding how this works in practice, we set out six conditions (below) for how and when digital repositories will tackle preservation, and postulated the degree of ease, or difficulty, they would experience in doing so depending on how many conditions were met.

You will want to do digital preservation if you have:

1. a lot of digital content
2. collected over years
3. a specified responsibility and resources for that content
4. an understanding of how that content is used now
5. how it will be needed in future,
6. how the type of content you collect may change going forward

Based on observations of each of our exemplar repositories, we used this approach to try to predict and explain the preservation choices they made, suggesting there is some validity.

Preservation planning depends on repository context http://bit.ly/avYDB. The sobering part is it depends on your organisational planning
Fri Nov 20 11:52:54 +0000 2009 - tweet id 5886949307 - #381

For IRs, sustainability, particularly with regard to growing content and usage, must precede a preservation plan http://bit.ly/6SB1Ju
Mon Nov 30 11:57:57 +0000 2009 - tweet id 6199330797 - #374

DIGITAL PRESERVATION is NOT so DIFFICULT-Conditions for digital preservation. New blog http://bit.ly/afFHZQ
Fri Jul 23 10:42:43 +0000 2010 - tweet id 19329540808 - #163

8.10 Digital institutional repositories will not instantly become preservation repositories, and repository managers are not archivists, but they both have a role in preservation

To succeed with digital preservation, the former must become the latter, or so it seems. Digital repositories are still a relatively recent phenomenon, and the role of repository manager still an emerging one in the institution. To find out what repositories and repository managers do, in the UK consult the RSP or the UK Council of Research Repositories (UKCoRR). While there may be some overlap with archives and archivists, the two are quite different, one a generalist the other a specialist. In the changing landscape of digital content it is difficult to be precise about the difference, suffice to say it is a difference in purpose and emphasis and the skills that the different roles require, and that those involved will quickly recognise the difference.

This distinction and its ramifications became evident in the review of the paper presented at OR10 when it was later revised for publication in the *Journal of Digital Information* (Pickton, *et al*., 2011).

Referee 1: The paper falls short of providing a thorough analysis of what it would take for any of these repositories to execute a full preservation plan
Referee 2: The paper summarizes results from the KeepIt project. Thus a more appropriate title might be: Results of appraising preservation repositories.

Both referees are correct up to the point of referring to the KeepIt exemplar repositories as ‘preservation repositories’ and setting the requirement of a full preservation plan. To overlay an ideal in this case is to overlook what was learned.

Our focus was on different types of IRs, and taking those IRs on a path towards preservation, not on 'preservation repositories'. What we learned is that this is a long path, which IRs will navigate in a direction and at a speed according to their requirements. We may have set out in the project proposal intending to produce preservation-ready IRs, but what we have instead are repositories that understand the path, and its pitfalls, and have begun their different routes along it.

That is an important finding, and an important distinction. It will have to be learned by others. There are, and probably always will be, vastly more digital content repositories – such as IRs, research and data repositories, and Web content repositories generally - than 'preservation repositories'. If we are to have preservation-ready content repositories then many more need to be aware of this path, and be allowed to navigate it without instantly imposing on them all the requirements of specialists.

Chris Prom, an archivist and expert evaluator of preservation tools, appears to have got it right. He suggests that trust will come from the institutions that take responsibility for the content they produce. That ultimately will be critical. Primary responsibility for content lies with the content manager, even if some of the actions required are outsourced to a service provider. As someone said in response to this point at a public meeting, it's a lesson learned the hard way by BP in the Gulf of Mexico oil spill in 2010.

While it is a long, winding path for a digital content repository to support trustworthy preservation, we have to show them the way along it, and be patient. Repositories have to do it for themselves, and they will get there, at the latest when they absolutely have to.


hackingtheacademy @chrisprom argues digital archival programs will be recreated by academies with trusted repository and OSS-that's KeepIt
Thu May 27 21:02:12 +0000 2010 - tweet id 14859051144 - #223

Preservation @ #or10. Another way archival and KeepIt talks differ: archival is what we (archivists) can do; KeepIt is about what YOU can do
Wed Jul 07 08:50:09 +0000 2010 - tweet id 17935068213 - #182

Michael Day #dlorg panel: "increasingly believe repos can't be responsible for preservation." Exp'ce of Preserv thru KeepIt says they must
Mon Feb 07 14:52:11 +0000 2011 - tweet id 34625478165798912 - #15

Point to refs: need to distinguish preservation of content-driven repositories (IRs) from 'preservation repositories'. Note for final report
Wed Mar 30 14:45:07 +0000 2011 - tweet id 53105479819329537 - #2

9 Recommendations

These recommendations arise directly from the Implications of the project work and findings identified above:

- Digital content repositories can and must be responsible for preservation, but we must not confuse the differences between content repositories and preservation repositories.
- JISC can do more to promote its substantial contribution to digital preservation, most obviously in terms of promoting the tools that have been developed and those that continue to be developed.
- Promotion and awareness of digital preservation should emphasise capability over urgency

10 References

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http://uollibraryblog.wordpress.com/2011/04/08/jisc-information-environment-event-april-2011/

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https://journals.tdl.org/jodi/article/view/1767 This paper first presented at *Open Repositories 2010*, Madrid, July http://eprints.ecs.soton.ac.uk/21240/

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http://scientopia.org/blogs/bookoftrogool/2009/08/27/if-not-now-when/

Tarrant, D., Hitchcock, S. and Carr, L., Where the Semantic Web and Web 2.0 meet format risk management: P2 registry, *International Journal of Digital Curation,* Vol. 6, No. 1, 2011,
http://www.ijdc.net/index.php/ijdc/article/view/171 also in *iPres2009: The Sixth International Conference on Preservation of Digital Objects*, October 5-6, 2009, San Francisco
http://eprints.ecs.soton.ac.uk/17556/

Tarrant, D., Hitchcock, S., Carr, L., Kulovits, H. and Rauber, A., Connecting preservation planning and Plato with digital repository interfaces, in *7th International Conference on Preservation of Digital Objects (iPRES2010),* 19-24 September 2010, Vienna http://eprints.ecs.soton.ac.uk/21289/

For the complete list of publications arising out of the KeepIt project, see this list generated from the ECS Southampton repository http://preservation.eprints.org/papers/