

# Real Time, Deep Time, Life Time: Spanning Digital and Traditional Collections Life Cycles

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## Abstract

The starting point for this paper is the philosophy and practical application of life cycle collection management being developed by the British Library and by other institutions around the world.

From a stewardship perspective, the British Library is trying to take a format-neutral approach to the care and custodianship of its collections. Identifying the similarities between traditional and digital collections and bridging gaps in the preservation differences between traditional and digital collections is a significant cultural and technical challenge.

Life cycle collection management is a way of taking a long-term approach to the responsible stewardship of any collection. It defines the different stages in a collection item's existence over time, ranging from selection and cataloguing through to preventive conservation, storage and retrieval. It then seeks to identify the costs of each stage in order to show the economic interdependencies between the phases over time. It thereby aims to demonstrate the long-term consequences of what a library takes into its collections, by making explicit the financial and other implications of decisions made at the beginning of the life cycle for the next 100 plus years. This can be used for practical reasons (by individual curators and selectors) and for economic, governance and political purposes.

The paper outlines the latest developments in the life cycle approach to the British Library's traditional and digital collections. The preliminary findings about the traditional paper-based collections were presented at the LIBER conference in Rome in 2003. The early application of the approach to the management of digital collections (namely digitised masters) was presented at the National Preservation Office/Kings College London conference in London later that year. Current strands include potential application to the web archiving programme and to both major and minor digitisation projects and the development of a predictive data tool.

A recent development on the digital side is the collaborative partnership between the British Library and University College London in the JISC-funded LIFE project ("Lifecycle Information for E-literature") begun in early 2005. It is anticipated that there will be an emphasis on the life cycle of electronic and print journals, and on the real-time pilot of electronic material received under voluntary legal deposit.

A recent development on the traditional side is that one of the overarching themes to emerge from an international meeting convened by the British Library (funded by the Andrew W Mellon Foundation) aimed at setting an Applied Conservation Research framework for libraries and archives in the UK was the life cycle of collections. This spanned the deterioration mechanisms of paper- and parchment-based collections (including the natural ageing of materials and evaluation of past preservation strategies and techniques used in conservation); real-time predictive modelling of the effects of the environment and other agents of deterioration on collections; and the past and future life cycle of use.

These new UK developments in the life cycle approach to traditional and digital collections are put in the context of wider advances in the subject being developed in Europe and North America.

Throughout, developments and ideas that span the management of both traditional and digital collections are highlighted. Given that much of the evidence points to our being in a transition phase, an elision of life cycle management of digital and traditional formats would seem the logical aspiration. There is not necessarily a tension between paper/print and digital, but rather that they are increasingly interdependent and increasingly complementary. Similarly, there is not necessarily always a tension between preservation and access, but they can be complementary, with a critical starting point for preservation being the future usability of collections.

The emphasis throughout is on the need for the stewardship of digital and traditional collections to confidently focus on Deep Time and the "Long Now" as opposed to the short-term and immediate expediency. The aim is to confidently steward organic and inorganic, dynamic collections.

## The Cycle of Life and Life Time

Key the phrase "life cycle" into Google and of the 8,600,000 hits, the first is life cycle of a pacific salmon, followed by butterfly, frog, the life cycle of HIV, of SARs and the ebola virus, life cycle assessment based on economic environmental impact, then moth, plants, before the natural life cycle of e-mail lists and the life cycle of a public charity. Lifecycbooks.com looks intriguing from the view point of managing library collections, but is a publisher of pro-life

and abstinence-only educational literature. Then it is back to the familiar territory of the life cycle of intestinal roundworms for humans and pigs, spiders, ants and giant sea bass and lots more butterflies, desert tortoise, koalas, turtles, rock lobsters, penguins, boreal toads, yeast ferns and ... many more butterflies.

The majority of subjects are organic and organisms, followed by the application of such an organic concept to inert matter such as whole life cycling in sustainable architecture, waste recycling and the life cycle costs of new product development.

One way of looking at traditional and digital documentary collections is as largely organic and inorganic collections respectively, or perhaps as carbon-based and non carbon-based. Without overly anthropomorphising collections, nevertheless, there is a useful organic dynamism in the metaphor of life cycle. The idea of “life” and the changes through the different stages of life can be helpfully applied to collections because it brings in sustainability, deterioration, entropy and even death of items.

The two main themes of life and time are intertwined throughout this paper. Firstly, life in the sense of the whole life span of collections, from their historic past life to their current usage to their projected life expectancy. So, for example, questions being addressed in many libraries are what is the projected life span of a printed serial? what is the projected life expectancy of an electronic serial? and what are the relative risks and costs in managing the two in the short, medium and long term, given their relative past lives and future use? Life occurs in the sense of the afterlife of electronic material produced as short-term academic courseware and the afterlife of paper-based material produced essentially as ephemera, such as newspapers.

Secondly, time, and the effects of time, occur in many ways. In the sense of the real time deterioration of both digital and traditional collection materials as opposed to accelerated ageing projections. Time in the sense of long termism and “Deep Time”<sup>1</sup> and the continuity of trusted repositories and institutions such as the British Library. In another sense, the life cycle concept throws up the challenge whether to manage collections in a “just in time” manner as opposed to a “just in case” way, thereby acquiring material only when a reader requests it rather than taking an encyclopaedic approach and collecting material just in case a reader requests it.

The management of paper-based and electronic material is examined through the prism of the life cycle collection management, bringing in developments in Europe and the US. Different life cycle approaches are being developed in Europe and North America, as, for example, assembled at the LIBER conference (Ligue Internationale des Bibliothèques Européennes de Recherche) in St Petersburg in 2004. At Harvard University Library Stephen Chapman<sup>2</sup> compared digital and physical storage cost. At JSTOR Eileen Fenton<sup>3</sup> used the life cycle approach to analyse the non-subscriptions costs of print and electronic periodicals to libraries to project how the anticipated costs for the two formats will compare over time. At the Royal Library in the Netherlands Erik

Oltmans<sup>4</sup> compared the projected life cycle costs of emulation and migration for the Dutch *e-Depot* project. In the UK, CEDARS<sup>5</sup> the Hedley<sup>6</sup> JISC/NPO digital preservation research study, and the Arts and Humanities Data Service (AHDS) have proposed life cycle management models in particular for digital material.

Specific developments in the UK and the British Library are detailed, for example, in digital life cycling, web archiving, digitisation and e-journals and in paper-based life cycling, “telling the story” of conservation and preservation, and its use in applied conservation research. Developments and ideas that span the management of both traditional and digital collections are highlighted throughout. Given that much of the evidence points to our being in a transition phase, an elision of life cycle management of digital and traditional formats would seem the logical aspiration. There is not necessarily a tension between paper/print and digital, but rather they are increasingly interdependent and increasingly complementary. Similarly, there is not necessarily always a tension between preservation and access, but they can be complementary, with a critical starting point for preservation being the future usability of collections.

## Life Cycle Collection Management

The starting point for this paper is the philosophy and practical application of life cycle collection management being developed by the British Library and by other institutions around the world.

From a stewardship perspective, the British Library is trying to take a format-neutral approach to the care and custodianship of its collections. Identifying the similarities between traditional and digital collections and bridging gaps in the preservation differences between traditional and digital collections is unquestionably a significant cultural and technical challenge. Undoubtedly, there will be some issues that remain significantly different but at the moment, we are trying to see areas of overlap in their stewardship.

Life cycle collection management is a way of taking a long-term approach to the responsible, evidence-based stewardship of any collection. It defines the different stages in a collection item’s existence over time. These stages range from activities undertaken before the item even arrives in the collection, namely selection, through to the activities undertaken when the item first arrives, such as being catalogued, through to the activities that happen during the time the item is in the collection, such as preventive conservation, storage and retrieval.

Life cycle collection management seeks to identify the costs of each of those stages in order to show the economic interdependencies between the phases over time and to show they change over a long period. The aim is to demonstrate the long-term consequences of what a library takes into its collections, by making explicit the financial and other implications of decisions made at the beginning of the life cycle for the next 100 years or longer.

This can be used for practical reasons (by individual curators and selectors) and for economic, governance and

political purposes. For practical reasons it can be established that resources are being apportioned and calibrated between the activities in the most logical way. For example, that the proportion assigned to acquisitions at the beginning of the process, is appropriately proportionate to the amount spent on cataloguing, so that there are no backlogs of inaccessible items waiting to be catalogued. And that this is similarly calibrated with the amount spent on housing and caring for the material over time, so that items are not inaccessible for being too fragile, awaiting conservation. For practical reasons, an individual selector or curator needs to be aware of the long-term consequences of their decisions to take particular items into the collections (the life cycle approach has recently become a professional competency for the 21<sup>st</sup> Century Curator in the British Library, which is part of a joint project with the New York Public Library).

For economic and political reasons, the British Library wants to know what resources are needed, for example, to make the approximately 150,000 legal deposit paper-based items per year, the c.90,000 electronic titles received under voluntary legal deposit, accessible and to be able to look after that material in perpetuity. This is carried out with the caveat that such information could be used by sponsoring bodies to argue *against* the long term stewardship role, for example, if the figures (taken out of context) look too large.

There is an external dimension to the use of life cycle information for potential collection development and collection management collaboration with other organisations nationally and internationally, especially in the UK the recently created Research Libraries Network (RLN).

The preliminary findings about the British Library's work on traditional paper-based collections were presented at the LIBER conference in Rome in 2003.<sup>7</sup> The early application of the approach to the management of digital collections (namely digitised masters) was presented at the National Preservation Office/Kings College London conference in London later that year.<sup>8</sup> Current strands of the life cycle approach include whether to apply the technique to web archiving and its application to e-serials. For paper-based material, strands include the development of a predictive data tool and its use as a unifying theme to communicate Conservation and as an overarching theme for applied Conservation Research.

### Life Cycle and Time Span - Traditional Collections

There are slightly differing approaches to defining the different stages of the life cycle, some of which are based on methods of resource accounting.

The British Library defined eight life stages. These were selection; the processing of acquisitions (excluding the purchase price), cataloguing; any initial preservation (such as archival enclosures); the initial handling of the item (including pressmarking, labelling and placing); longer-term preservation (including conservation treatments); storage; then retrieval and replacement of the item from storage.

Three key “life stages” were identified for the time span of the cycle. These were Year One (when many initial collection management costs such as selection, acquisitions and cataloguing are incurred), Year 10 (when a first review or technological change may incur costs) and Year 100 (as a useful indicative time-scale for forecasting downstream costs). Given that the BL has to look after the collections for which it has a legal obligation in perpetuity, 100 years was chosen as a symbolically long time.

There is a whole issue as to whether “death” is countenanced at any stage, and what did “death” entail – the physical unusability of the item? or its disposal or deaccession?

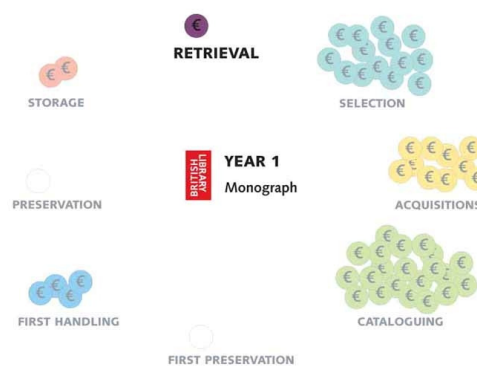
The concept of value was consciously omitted from the process in the first instance, as was the amount of usage an item received, in order to make the collation of data achievable. The inclusion of these two key elements affecting the lifespan of collections could be incorporated at a later stage.

The costs of the eight phases in the first year were analysed and the ratio of the amount of money spent on each phase was calculated. This was repeated for the costs and ratios for year 10 and year 100 (Appendix 1).

Figures 1- 3 show the changing proportions of the amount spent on the different phases in year one, year 10 and year 100 respectively.

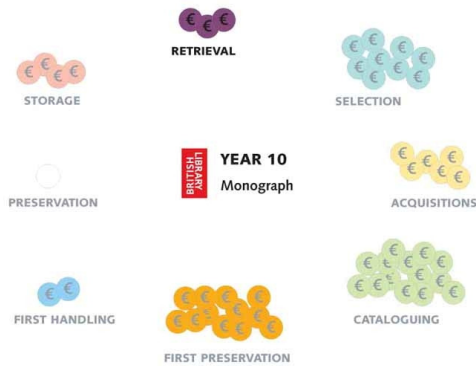
When the figures were assigned to the eight phases for each of the three different life stages, the most significant variant was found to be time. Over time, the costs shift from staff costs in the activity-intensive first period, to overhead and maintenance costs. This was applied to paper-based monographs, and then also to serials, which had differences due to number of cumulative serial parts.

The key finding was that the proportionality between the phases was the most important thing, not the specific time periods *per se*.



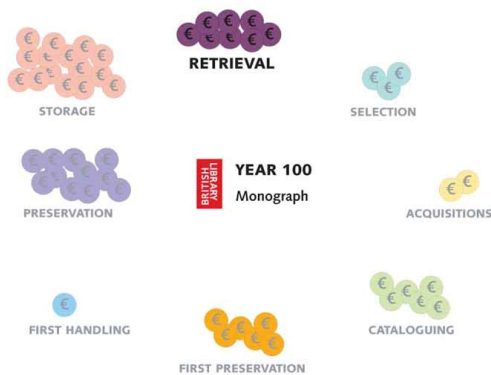
Year one; amount spent on each of the phases of the life cycle in the first year for a printed monograph (excluding purchase price)

Figure 1



**Year ten; the amount spent on each of the phases of the life cycle as a ratio of the cumulative total over the first ten years for a printed monograph (excluding purchase price)**

*Figure 2*



**Year 100; the amount spent on each of the phases of the life cycle as a ratio of the cumulative total over the first 100 years for a printed monograph (excluding purchase price)**

*Figure 3*

To give a previously cited example at the British Library—a medieval Psalter bought in very good condition, with a purchase price of say £1million, could cost a modest amount over time, for example, the storage of a single item is relatively modest. On the other hand, a collection of 19<sup>th</sup> century papers that were bequeathed to the Library, carried no ‘purchase’ price as such, but being several boxes full, required a lot of cataloguing and initial preservation to stabilise them and so worked out at over £50,000 over time.

The life cycle approach is both a data management tool and a philosophical approach – one of the early mantras of the project at the British Library was “it’s a way of thinking”. It is a way of thinking about all the interdependent activities that are necessary to collect, make accessible and preserve collections in the short, medium and long term. The life cycle approach can embrace both a hard, “process-engineering” management tool for looking at all the processing of collection material (ie acquisitions, cataloguing, labelling etc) and can also reflect softer,

instinctive decision-making. During development of the British Library approach this was summarised as “head and heart”. On the one hand is the “head”, symbolised by applying methodologies from the retail sector and supermarket processing of material being seen as analogous to the life cycle management of collection material. On the other hand, “the heart” leads to some collection decisions that are sometimes opportunistic (when unique material is offered to the Library), sometimes a leap of faith and/or judgment (that the material would be significant in the future) and should not necessarily only be governed by strict life cycle, downstream cost considerations.

## Life Cycle and the Short Now - Digital Collections

The British Library holds an increasing amount of electronic material. It comprises digital material from an increasing number of sources. These range from material received under voluntary legal deposit ahead of the legislation that received Royal Assent in October 2003 and that received since legislation (c.1.5 terabytes), to purchased electronic journals (c.1 terabyte) to pilot projects to collect e-correspondence and literary e-manuscripts, to collaborative archiving of web sites, as well as digitised masters it has created. Within the Sound Archive collections, there is c.120 terabytes of audio CDs and c.150 terabytes of CD-Rs. Apart from the audio collections, the largest amount of digital material that needs storing in the British Library to date is the c.20 terabytes of digitised masters. Until the umbrella Digital Object Management Programme is in place, the policy is that lossless compression should be used and as an interim solution, that the masters should be stored on DVD-R, with a simple tracking mechanism.

Using the formula from the traditional, analogue collections, the phases were adapted to be applicable for the life cycle approach to digitised masters. This was partly to help with the decision making about whether digitised masters should be retained. Comparative, international best practice says that a digitised image should be captured at the highest possible quality and retained. This approach is based on the economics of converting once (or, at least, only once a generation) and producing a sufficiently high-level image to avoid the expense of reconverting at a later date when technology advances. This economic justification is particularly compelling given that the labour costs associated with identifying, preparing, inspecting, and indexing digital information far exceed scanning costs.

The total cost of a digitised item over a period of time was identified by applying the formula used for paper-based collections (Appendix 2). The phases were modified to; selection; checking intellectual property rights; conservation check and remedial conservation costs of the analogue item; retrieval and reshelving; capture of digitised master; quality assurance of digitised master and production of service copies; metadata creation; access; preservation and storage costs over time.<sup>ibid.8</sup>

On the digital front, the next steps in Life Cycle Collection Management at the BL being considered are its application to small and large digitization projects; to web archiving and to e-serials, the latter both in a JISC-funded project L.I.F.E. and potentially in a European Taskforce on Permanent Access to the Records of Science. The web archiving programme has a number of strands, including a consortium of six institutions working collaboratively on a project to develop a test-bed for selective archiving of UK websites (using PANDAS software developed at the National Library of Australia). The British Library's web archiving programme has identified preservation and access as the two most pressing phases in the life cycle requiring investigation.

A recent development on the digital front is the collaborative partnership between the BL and University College London in the JISC-funded L.I.F.E. project ("Lifecycle Information for E-literature") begun in early 2005. There is to be an emphasis on the life cycle of electronic and print journals, and on the real-time pilot of legal-deposit electronic material. It is one project under the JISC Institutional Digital Preservation and Asset Management Programme 2004.

Some of the key questions for research libraries are

- What are the long term costs of preserving digital material?
- Who is going to do it?
- What are the long term costs for a library in Higher Education/Further Education to partner with another institution to carry out long term archiving?
- What are the comparative long term costs of a paper and digital copy of the same publication?
- When will there be sufficient confidence in the stability and maturity of digital preservation to switch from paper to digital for publications available in parallel formats?
- What are the relative risks of digital versus paper archiving?

This links to work undertaken by the British Library last year on the storage of paper-based and digital material to 2020. In order to quantify its future storage needs for paper-based material, the British Library engendered the flip-over debate, namely at what point will there be sufficient confidence in the stability and maturity of digital preservation to switch from paper to digital for publications available in parallel formats? The research included an international comparison of national and major research libraries around the world about their current and future digital and paper-based projections. These findings<sup>9</sup> informed the quantification of the future paper-based storage needs of the British Library. A major building programme of high density, highly automated storage is underway. Concurrently, the design and construction of the British Library e-infrastructure and the Digital Object Management programme to manage the storage and management all its digital collections (which Adam Farquhar speaks about)<sup>10</sup> is underway.

This storage research took one key stage in the life cycle and compared the digital and paper-based projections over the short term. This proved to be a very worthwhile approach; similarly Stephen Chapman at Harvard has compared the storage costs of digital material in the OCLC Digital Archive and print-based material in the Harvard High Density Store. The aim of the life cycle work at the British Library is eventually to have one method for both digital and print-based collections, and these comparisons of a particular stage, namely storage, in the life cycle has been a significant, pragmatic step towards that goal.

In project L.I.F.E, the life cycle approach will be used for exemplar case studies at the two institutions. At UCL it will be applied to e-serials. At the British Library it will be applied to legal deposit material (received under the voluntary code) especially e-journals. The outcome of this phase of activity will be to produce tangible data, in a UK Higher and Further Education sector on the effect of using a trusted life cycle model to determine acquisition, format, retention and possible disposal of titles in both paper and e-formats, where such collections are of high importance to HE/FE research, learning and teaching.

A further check on the validity of the approach will be made. One component of the British Library's Digital Object Management Programme is a "Risk Analysis of Digital Material" which is producing a hierarchy of the vulnerability of all its digital collections in order to highlight the most urgent preservation priorities (which Deborah Woodyard speaks about).<sup>11</sup> The L.I.F.E. project will build on the findings of this work, to test the viability of the selected approach.

The storage research was a working example of bringing together issues of stewardship of digital and traditional collections. The author is a believer in trying to bridge digital and physical collections management in a format-neutral approach, despite the cultural and technical differences.

### **Real Time, Accelerated Time, Life Time - Applied Conservation Research of the Future Life of Physical Collections**

The idea of the cycle of life of a collection or an individual collection item is becoming an overarching theme for other aspects of preservation and conservation of physical items at the British Library.

A very recent development on the traditional side is that one of the overarching themes to emerge from an international meeting convened by the British Library (funded by the Andrew W. Mellon Foundation) aimed at setting an Applied Conservation Research framework for libraries and archives in the UK was the life cycle of collections. This meeting of European and North American scientists, preservation administrators and educationalists, sought to reach consensus of the highest priorities for applied conservation research to care for paper- and parchment-based library and archive collections. The themes that emerged were<sup>12</sup>;

1. Life-cycle prediction, natural ageing of materials, evaluation of preservation strategies.
2. Effects of the storage environment and selection of the optimum environment for different materials.
3. Non-destructive methods of assessing damage to materials.

Time was a recurring theme of the meeting. There was a loss of faith in the “false” time of accelerated ageing tests and a parallel enthusiasm for real time study of environmental factors and other agents of deterioration, with the aim of producing predictive tools (along the lines of the Time Weighted Preservation Tool).<sup>13</sup>

The meeting spanned the deterioration mechanisms of paper- and parchment-based collections (including the natural ageing of materials and evaluation of past preservation strategies and techniques used in conservation); real-time predictive modelling of the effects of the environment and other agents of deterioration on collections; and the past and future life cycle of use.

The life cycle theme within this UK and international framework spanned real time experimentation that may, for example, lead to the real time, comparative study of legal deposit newspapers and monographs in the six copyright libraries across the UK. This could translate into real time capture of pH of new material and monitoring how the different environments and usage levels of, for example, newspapers in the six copyright libraries affects the material and changes how it should be preserved. At what point in the life cycle is deacidification most effective? Is it preferable to deacidify all legal deposit material on acquisition, that is, at the beginning of the life cycle irrespective of their initial pH? How long over do the effects of deacidification last? And at what point in the life cycle would it best be repeated?

Similarly the life cycle of conservation treatments of paper- and parchment-based material, both in terms of materials used and techniques employed, was deemed ripe for study to inform future preservation and conservation strategies and treatments.

A tripartite approach is being worked up. Firstly, retrospective, legacy conservation. Secondly predictive work, reflecting the needs of the “short now”. And thirdly, prospective work for the “long now” or deep future.<sup>14</sup> It can be divided into work on the past life of legacy paper collections, work on the current intake and work on the future life of paper collections.

By telling the story of the past, present and future life of collection items and by telling the story of the life cycle of the materials and techniques used to conserve collections, we can extend understanding of those elements that will have an impact on the future of the written memory to a wider audience.

### **Life Cycle of Collections - Theme for Centre for Conservation Visitor and Learning Centre**

The idea of “telling the story” about the collections and explaining all the effects of all the stages in the life about a

collection item has recently become the overarching theme for the visitor and learning centre in the new British Library Centre for Conservation, due to open in 2007.

A new Centre for Conservation is being created at the British Library, the vision for which combines state-of-the-art book conservation studios and technical sound studios; public access with behind-the-scenes tours and an educative outreach programme; conservation training in collaboration with a partner university and a clear national focus for the application of scientific research on materials to the conservation of library holdings.

“Life cycle” is the unifying theme of the visitor display area in the new Centre for Conservation, from the life of an individual Library collection item to the Life cycle of British Library collections to the life cycle of a visitor’s collections to the life cycle of materials and techniques used in conservation to the life cycle of a conservator

To take an example from the British Library’s collections, namely the Codex Sinaiticus. The earliest New Testament in existence, the Codex Sinaiticus is the subject of a planned virtual reunification project. The parts of the codex in the different locations, such as University of Leipzig Library in Germany and in the British Library, will be digitised and brought together again for a virtual reunification. Telling the life story of the Codex Sinaiticus in the Centre for Conservation display would recount the story of how it came to be in four different places, how that has affected the condition of the sections and how analysis and a virtual reunification will impact on its future life.

The life cycle theme exemplifies organic dynamism, entropy and the effects of time.

For the life cycle of the British Library’s collections, it would cover the life of use in the Library - how a book arrives in the British Library; how a book is used in the reading rooms or on exhibition; what causes damage to book (light, handling, and other physical and chemical agents of deterioration; how damage is minimised by large-scale preservation, preventive measures (from the environment, to cradles in the reading rooms); and then the future life of collections and responsibility in perpetuity.

The life cycle of materials and techniques used in conservation echoes the theme for applied conservation research. With changing knowledge, we find that what was used in good faith in one generation is found in time not to be the best solution – for example, cellulose acetate microfilm or soluble nylon.

### **Afterlife – Spanning Digital and Traditional Life Cycles**

Seneca wrote a discourse “On the shortness of Life” subtitled “Life is long if you know how to use it”. The original Stoic, Seneca says that “Life is divided into three periods, past present and future. Of these, the present is short, the future is doubtful, the past is certain”.

The three periods, the past, present, future trilogy obviously sum up what we are about. The present is short and the present always feels short, but I would posit that the

transition period we are in makes the short present a particular time.

Perhaps this can be illustrated with an example from the British Library. We are developing our strategy for newspapers, of which we have an estimated 750 million pages of newsprint. The strategy is very wide ranging, encompassing everything from physical storage to electronic access to the cellulose acetate microform legacy.

The technological production of newspapers has, and is, changing rapidly. There are many legal and commercial issues, let alone technical infrastructure reasons, why we cannot today take the digital version of the newspaper as sent to the printing presses, as the British Library's copy. But maybe within five years this may be possible. One approach is to develop a strategy for the newspapers up until the roughly present, so a preservation, access, storage strategy for the legacy collection of newspapers of the past up until about now. Then develop a different strategy for the future for the different machine output newspapers from about now. So, the present "now" is indeed short – not so much the eye blink of this instant, but for newspapers say five years? So a present of five years, a past of 250 years and a future in perpetuity.

Seneca goes on that "Life is very short and anxious for those who forget the past, neglect the present and fear the future". Life cycle collection management seeks to address those anxieties.

## Conclusion - Life Stories

Current challenges for managing digital collections include those of digital art, the instability of references in medical literature, the afterlife of courseware, the rise in "social" publishing and the development in personal electronic portfolios. These latter developments, together with personal websites, weblogs, and personal music management can be seen as digital life stories, some of which will need preserving and are leading to market developments. Research from a personal archiving company reported in the news early this year in the UK, showed that "it's official – [women] would run out of a fire with their photographs" – that is their most valued item and increasingly they are digital. Personal archiving, individual memories, personal life stories are all a growth area and when the commercial opportunities of that market are apparent, companies will undoubtedly solutions to preserving that type of life material. In an institutional context, e-mss and e-correspondence are an increasingly important strand for a national library.

In the RLG DigiNews interview on digital repositories with Clifford Lynch August 15 2004, he talks about their needing to be "continuity" behind them.<sup>15</sup> A life cycle approach is about sustainability to achieve that continuity. The British Library, for all changes it is undergoing both internally and externally, is an institution of continuity. We work with a collection that contains information carriers spanning almost 2500 years from 300BC to today, and has a national legal responsibility in perpetuity to curate and conserve those information carriers. So "deep time" has a

redolence and is a daily working overlay on what we do. Life cycle takes a variable lifespan approach and so can equally encompass the Digital Object Management timeframe<sup>ibid. 10</sup> and the present technical manifestation of long term, deep time, long now responsibility.

The life cycle approach underlines that managing electronic material is not just about technical developments and metadata. There is a much "wider social and cultural context - curation, maintenance, incentives and funding"<sup>16</sup> – these are not "just" technical problems awaiting technical solutions

In caring for physical collections we can intervene at different points in the life cycle, either at the beginning to prevent damage or later on to repair damage by interventive conservation. We sometimes try to metaphorically pickle the collection item in aspic in order to slow down the rate of deterioration – in the case of the Declaration of Independence, it was first stored in helium and now in argon; at the British Library we are planning low oxygen storage, primarily for fire prevention but with a potential preservation dividend of extending the longevity of the collections. These interventions aim at slowing down the decaying process—whether due from use, physical or chemical factors or any of the other natural or custodial agents of deterioration.

Life cycle collection management can be a unifying theme for confidently caring for traditional and digital materials, organic and inorganic collections. Hierarchy of life expectancy of vulnerable formats being developed suggests that in the digital field, the earliest material is the most vulnerable.<sup>ibid.11</sup> Therefore intervention at the beginning of the lifecycle is overdue and more interventive action is needed now to prevent total loss. It can help with the need for the stewardship of digital and traditional collections to confidently focus on Deep Time and the "Long Now" as opposed to the short-term and immediate expediency.

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## Appendix 1

### Monographs

The formula developed at the British Library for monographs is;

$$K(t) = s + a + c + pl + hl + p(t) + cs(t) + r(t)$$

whereby the life cycle costs  $K(t)$  over time for monograph are defined as;

- s = selection
- a = acquisitions processing (excluding the purchase price)
- c = cataloguing
- pl = initial preservation (such as archival enclosures)
- hl = initial handling (including pressmarking & labelling and placing)
- p(t) = longer-term preservation, including conservation, over time
- cs(t) = collection Storage over time
- r(t) = retrieval and replacement over time

The annual costs were then calculated for the phases. In the first year excluding the purchase price, the ratios of the amount of money spent of the life cycle cost are -

### Year 1

selection: acquisitions: cataloguing: 1<sup>st</sup> preservation: handling: preservation: storage: retrieval

14 : 10 : 21 : 0 : 4 : 0 : 2 : 1

These are the proportionate amount spent in year one as shown in figure 1.

By year 10, the amount spent on each activity as a proportion of the total costs for those 10 years are shown in figure 2. So, for example, the amount already spent on cataloguing stays the same as that spent in year 1, but it is a smaller percentage of the total costs over 10 years.

Year 100 is shown in figure 3. As a proportion of the total amount of life cycle costs over 100 years, selection is now relatively small. It is the same amount as in year 1, but is a smaller proportion of the total over 100 years. Storage, preservation and retrieval have become more substantial. The most significant variant is time. Over time, the costs shift from staff costs in the activity-intensive first period, to overhead and maintenance costs. This methodology was also applied to serials.

## Appendix 2

### Digitised Masters

The formula developed at the British Library for the life cycle of digitised masters is;

$$K(t) = s + ipr + cons + r + cap + q + m + acs(t) + p(t)$$

whereby  $K(t)$  is the total cost of digitised item over a period of  $t$  years

- s is the selection cost
- ipr is the cost of checking intellectual property rights
- cons is the conservation check and remedial conservation costs
- r is the retrieval and reshelving costs
- cap is the cost of capture of digitised master
- q is the cost of quality assurance of digitized master and production of service copies
- m is the metadata creation cost
- acs(t) is the access cost over time
- p(t) is the preservation and storage costs over time

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## Biography

**Helen Shenton** is Head of Collection Care at the British Library, responsible for Conservation, Preservation, Collection Storage and elements of Digital Preservation. She joined the British Library in 1998 after 14 years in the Conservation Department of the Victoria and Albert Museum. Helen trained at the London College of Printing and with the Arts and Crafts bookbinder and conservator



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Helen is a founding Board member of the Digital Preservation Coalition. She is a board member of the National Preservation Office, the IFLA Preservation and Conservation Committee, as well as other bodies such as Lambeth Palace Library. She chairs the NPO Preservation Administrator's Panel and LIBER's Preservation Division.

Helen has taught and examined Masters degree courses in Conservation and Preservation, edited journals, lectured and published on a range of subjects, such as national preservation strategies, conservation, life cycle collection management and digital preservation.

Helen is a Fellow of the International Institute of Conservation and a Fellow of the Royal Society of Arts.