

Life Cycle Collection Management

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INTRODUCTION

Life cycle collection management is a way of taking a long-term approach to the responsible stewardship of the collections of the British Library and is one of the library's strategic strands. It defines the different stages in a collection item's existence over time, ranging from selection and acquisitions processing, through to conservation, storage and retrieval. Life cycle collection management 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 the 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.

Eventually it aims to combine the life cycle of both paper and digital collections, in order to reflect the totality of the British Library's hybrid collections.

The paper covers the following areas on the first year of the life cycle collection management project:

- What is it?
- Why do it?
- Who might use it and how can it be used?
- What has been done so far?
- What findings are emerging?
- What is going to be done?

WHAT IS LIFE CYCLE COLLECTION MANAGEMENT?

Life cycle collection management takes a long-term view of the stewardship of the British Library's collections. On the one hand, funding is governed by political short-termism, of a three-year funding cycle, whereas on the other hand the British Library's collections have been built up over hundreds of years and the responsibility for the majority of them is in perpetuity in the future.

Life cycle collection management is evidence-based stewardship that documents the relationship between all the stages in a collection item's existence over time. Firstly, it

defines the different stages in a collection item's existence. Then it seeks to identify the costs of each stage, in order to show the economic interdependencies between the stages of a collection item's management and how they change over a long period. These stages start with selection, acquisitions processing, cataloguing and pressmarking and go through to preservation, conservation, storage, retrieval and the de-accession of duplicates. In this way, it aims to demonstrate the long-term consequences of what the British 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.

Figure 1.

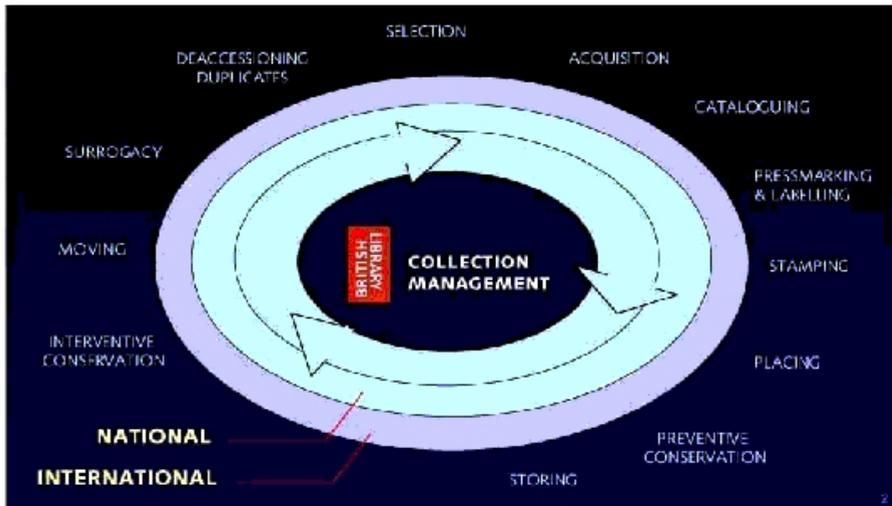


Life cycle collection management

Figure 1 illustrates the stages in a collection item's management. At the top, the process begins with the selection of an item. Then there are all the costs associated with processing that acquisition, from cataloguing to pressmarking, labelling and stamping before putting it on a shelf. The item might have some initial preventive conservation, such as being put in an archival box. Then it is stored. In time, after being used, it might require some interventive conservation. As usage patterns change, it might be moved

from its initial location. A surrogate copy might be made; a duplicate copy might be deaccessioned in time. All these stages are interdependent.

Figure 2.



Life cycle collection management in a national and international context

Furthermore, there is the external dimension as shown in Figure 2. Over and above the British Library's internal management, there are relationships on national levels, with collaborative agreements for specific activities, from collection development to cataloguing. In the UK at the moment, the implications of the RLN (Research Libraries Network) are being defined. These could have a significant impact on the British Library. Moreover, there is the third dimension, namely the international dimension, with current and potential collaborative initiatives, such as the IFLA Universal Bibliographic Control and International MARC Core Programme (UBCIM) and IFLA Universal Availability of Publications Core Activity (UAP).

The British Library-centric illustration in Figure 1 mirrors, for all types of collections, the 'Centripetal Model' suggested by Lavoie (2003). The national and international model in Figure 2, reflects more the 'Centrifugal Model' (again for all types of collections, not just digital)

WHY DO IT?

Life cycle collection management is complex and complicated but there are practical, economic, governance and political reasons for taking this approach.

- The *practical* reasons are for the British Library to document and, if possible, benchmark with other comparable organisations, the links between the stages of the life cycle.
- The *economic* reasons are to establish that resources are most logically apportioned. 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. Similarly, that this amount is calibrated with the amount spent on housing and caring for the material over time, so that items are not inaccessible for being too fragile, waiting for conservation.
- For the purposes of *governance*, it needs to be demonstrated that the British Library's statutory and legal obligation under the British Library Act (1972) to manage its key intellectual assets is being done, consistent with best practice and in the most cost-effective way, now and for the future.
- For *political* reasons, the British Library needs to know what resources are necessary to make the approximately 150,000 legal deposit items per year and the approximately 90,000 electronic titles received under voluntary deposit, accessible and to be able to look after that material in perpetuity.

WHO MIGHT USE IT AND HOW CAN IT BE USED?

The life cycle collection management approach can be used by a variety of people in a variety of ways. Firstly an individual curator or selector can use this methodology. For example, a curator being offered a collection by donation can evaluate the real long-term implications over 100 years of that intake. This point can be illustrated by a couple of examples in the British Library in the last decade. A medieval Psalter bought in very good condition, with a purchase price of circa €1 million, could cost a modest amount over time, for example, the storage of a single item is quite low. On the other hand, a collection of 19th 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 (Stephens, 1994).

Secondly, at a library-wide strategic level, it can be used to ensure the optimum calibration of resources. Life cycle collection management can be used for predictive long-term financial modelling to feed into planning and better benchmarking. It can be

used for decision-making such as for the future storage requirements of collections. It can be used to make external bids for the resources to reflect the implications of long-term responsible stewardship of the British Library's additional intake of traditional and digital collections over time. So, it can be used to make decisions about new collections and different types of media. It can be used to understand what the collections cost over time. It can be used for future bidding. A strong word of caution should be made at this point, with a strong proviso about using this for political lobbying for additional funds. It could very well be a "two-edged sword". Rather than having shown how much it costs to really look after material for the long term in order to argue for resources, a government, ministry or other funding body could respond that if it costs that much, then it should not be done at all.

WHAT HAS BEEN DONE SO FAR?

External Reviews

Before settling on a method for life cycle collection management, a number of external reviews were undertaken to see if any work was applicable from other fields. A literature review of the library, archive and heritage sectors was undertaken. The nearest possible model was a whole-life cycle costing approach in the built heritage sector to manage historic buildings in a sustainable way, but was not found to be directly applicable. The most relevant work was carried out, interestingly, in the British Library in the late 1980s, which defined a blueprint for the phases in the life cycle of tangible collections and was re-used as the basis of this project's formula work (Stephens, 1988).

In the specifically digital arena, the majority of work is currently being done in the areas of research and practical projects in digital asset management and digitisation life cycle costs. For example, Beagrie and Greenstein (1998), Hendley (1998), Russell and Weinberger (2000; for CEDARS) and some interesting business models are emerging from projects such as the EU PRESTO project (Wright, 2002). A number of projects were examined and parallels drawn with data derived from current digitisation projects underway at the British Library (appendix 2).

Secondly, a broad review was carried out of economic, commercial and non-heritage fields, for example eco-life cycle management (in particular environmental impact analysis). Given the time-scales of toxic, and especially, atomic waste management (with the half-life of radioactive substances of half a million years) it was thought there would be applicable management models. Apart from the Department of Long Term Stewardship in the US Department of Energy, again, little was translatable.

Areas where the concept of life cycle costing is known to be used were looked at, namely product development and defence procurement. The technique is used to see whether the gains from a particular product development are sufficient to justify the developmental costs. Two issues of potential relevance to the British Library were identified from this quarter. Firstly, that overheads should be excluded when undertaking a life cycle costing, otherwise they skew the costs to too great an extent; given the large proportion of the British Library budget allocated as overheads (circa €60 million in 2001/02). Secondly, that a number of authors comment on the need for appropriate software to be able to manage life cycle costing effectively.

One of the original objectives of the project was to benchmark, if possible, life cycle collection service and resourcing dependencies with other comparable institutions. Oxford University Library Services has recently embarked on an activity-based accounting exercise and an initial comparison was undertaken.

Whilst much work is being done in some parts of the digital arena, for example, with digitisation projects, nevertheless, it was found that no one seems to have taken a joint approach of trying to combine both traditional (or “paper”) and digital life cycling. It is one of the objectives of this current work, in order to reflect the totality of a library such as the British Library’s collections.

At the time of the LIBER conference, an interesting paper by Chapman (2003) was published, comparing storage costs of a high-density store for traditional formats and a digital archive. The article explicitly declaims that it “examines pricing associated with *one* component of digital preservation, repository storage, at one organisation (OCLC), at one point in time” and compares it to baseline costs “to store comparable collections in analog formats in the Harvard Depository”. Nevertheless it represents a very useful development of attempting a like-for-like comparison between one stage of the life cycle of both paper and digital collection material.

Internal methodology

In this initial phase the project concentrated on that part of the British Library’s collections that currently form the printed national archive, namely, traditional paper-based monographs and serials legally deposited with the British Library. This is because it comprises a large proportion of the collection and the British Library has a legal responsibility in perpetuity for it. Other types of material, for example purchased oriental and occidental manuscripts, may involve different costs or costs in different proportions and are to be investigated in a later phase. Having defined the phases that comprise the life cycle, formulas were devised for the life cycle costs of legally deposited monographs and serials in traditional formats. An internal data gathering exercise was undertaken using the Library’s finance system in conjunction with performance information for the year 2001/2, in order to put figures against each phase.

Life Cycle Collection Management

The project aimed to determine whether the life cycle model for traditional material could be used for the digital life cycle. Three types of digital material currently being produced or acquired by the British Library were defined and analysed in parallel with the work on traditional formats. The three strands of digital activity were: digitised masters, purchased electronic publications and electronic material voluntarily deposited at the British Library since January 2000.

1. The British Library has a number of substantial digitisation projects underway which are producing a large number of digitised masters. A formula was developed from the traditional, paper-based material and applied to large British Library digitisation projects such as the New Opportunities Fund 'In Place' (now entitled Collect Britain).
2. Approximately €1.5 million collection development figures spent on purchased electronic publications in the year 2001/2002 was analysed by both the traditional and digitisation formulas.
3. The UK has had voluntary deposit of offline electronic material since January 2000. Figures from an impact study were extrapolated together with data emerging from a real-time, live pilot to manage voluntarily deposited electronic material were used¹¹.

Therefore, concurrent strands of traditional, paper-based and digital activities were pursued, with the aim of eventually coming together to one, in order to reflect the totality of the British Library's collections.

Traditional life cycle

The example of traditional paper-based material will be used to illustrate what was done. Much thought was given to the time span of the life cycle and three key "life stages" were identified. These were year 1 (when many initial collection management costs 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 British Library has to look after the collections for which it has a legal obligation in perpetuity, 100 years was chosen as a symbolically long time, like the Biblical '40' or the Buddhist '1000'. There is a whole issue as to whether "death" is countenanced at any stage in the life cycle, which was a source of great debate. The project reviewed collection management activities and subsequently defined the phases in the life cycle management of the collections.

1. Monographs

The life cycle costs $K(t)$ for monographs were defined as follows:

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

Where s is the selection cost

a is the acquisition processing cost (excluding the purchase price)

c is the cataloguing cost

pl is the initial preservation cost (such as an archival enclosure)

hl is the initial handling cost (including pressmarking, labelling and placing)

$p(t)$ is the likely preservation cost over time (including interventive conservation)

$cs(t)$ is the collection storage cost over time

$r(t)$ is the likely retrieval and replacement cost over time

The activities are defined in the appendix.

2. *Serials*

The life cycle costs for serials were defined as:

$$K(t) = s + at + c + pl + hlt + p(t) + cst + rt$$

Where selection and cataloguing costs are one-off costs incurred in year 1;

the recurrent annual costs of acquisitions processing, initial preservation and initial handling are multiplied by the number of years in the period t for example, 100 years;

$p(t)$ is the likely preservation costs to be incurred for the first and each subsequent issue during the time between its acquisition and the time it forms part of the collection;

ht is the approximate storage cost for the first and each subsequent issue during the period t ; $t?$ is t "terminal" = $t? + 1 + 2 + 3 \dots t$ This means these are cumulating costs, for example, in year 1 a single serial volume is stored, in year 2 this rises to $1 + 1$, in year 3 to $2 + 1$, in Year 4 to $3 + 1$ volumes and so on.

3. *Life cycle costs*

Having defined the formula, costs were assigned based on management information data for the financial year 2001/2.

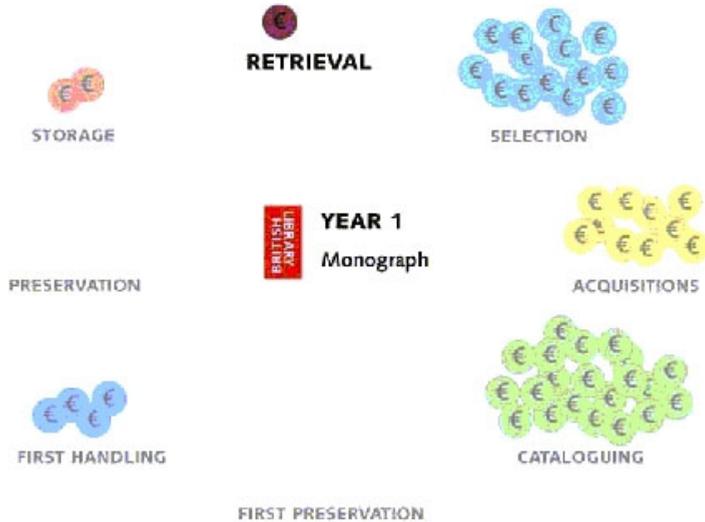
In year 1, excluding the purchase price, the ratios of the amount of money spent on the eight stages of the life cycle cost for monographs are:

selection:acquisitions:cataloguing:1stpreservation: handling:preservation:storage:retrieval

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

So these are the proportionate amounts spent in year 1. See Figure 3.

Figure 3.



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

By year 10, the amount spent on each activity as a proportion of the total costs for those 10 years is shown in Figure 4. 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.

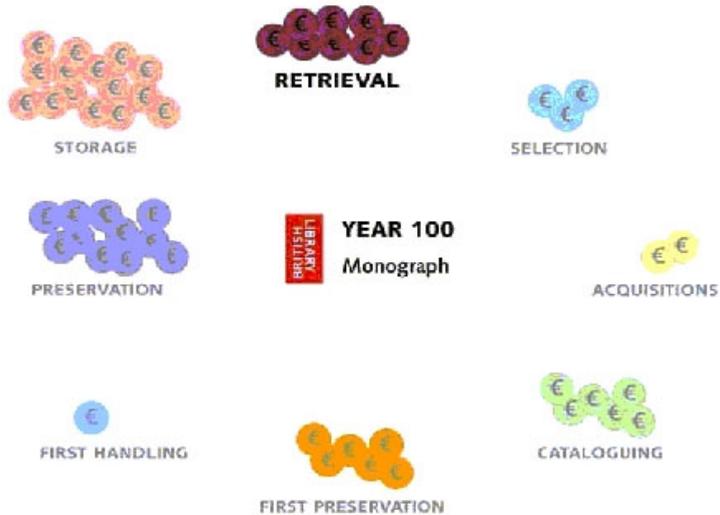
Figure 4.



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)

The cumulative figures over 100 years are particularly informative, as shown in Figure 5.

Figure 5.



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)

These illustrate the total costs over 100 years (that is, they are not just the costs in the hundredth year). In general terms, the costs have moved from the right to the left. For example, 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 are more substantial. It should be emphasised that these are all looked at 2002 € valuation prices.

Aside from demonstrating this proportionality, the headline cost conclusions can be extracted, and the overall costs of traditional material are:

The cost of a monograph over 1 year is	€50.46 =	26% of 100 years
The cost of a monograph over 10 years is	€76.47 =	39% of 100 years
The cost of a monograph over 100 years is	€197.48 =	100% of 100 years

There are different ways of interpreting these initial findings. For example, over 10 years, two-thirds of the costs are incurred in the first year, or over 100 years, a quarter of

the costs are incurred in the first year. Alternatively, over 100 years just under two thirds of the costs are incurred in years 11-100. Similar headline costs were made for serials.

4. Example of how it can be used – additional €100,000 on monographs

The following example demonstrates the application of the life cycle approach and the caution required in interpreting it.

Question. If there was an additional €100,000 spent on acquiring monographs, what are the downstream costs?

Answer. 1478 monographs @ €67.74 = €100,000

Year 1 life cycle costs

1478 x €50.46 = €75,000

Over 100 years

1478 x €197.48 = €290,000

Therefore, €100,00 buys just under 1500 monographs, and the life cycle management costs in year 1 are just under €50 per monograph, which is €75,000, or a ratio of 1 to 0.75.

The life cycle management costs over 100 years are just under €200 per monograph which is €290,000, or a ratio of 1 to 2.9

A word of caution should be introduced again. There are different interpretations of this example, which illustrate the complexity of the issue. The resource-intensive first year could be interpreted as representing about a quarter of the costs over 100 years. Conversely, the average cost for every year of the next 99 years can be interpreted as a modest €1.47 per monograph.

e-life cycle

The project aimed to determine whether the life cycle model for traditional material could be used for the e-life cycle. Three types of digital material currently being produced or acquired by the British Library were defined and analysed in parallel with the work on monographs and serials in traditional format. These four concurrent strands were pursued, with the aim of eventually coming together to one, in order to reflect the totality of the British Library's collections. The three strands of digital activity were:

1. Digitised masters

A number of digitisation projects at the British Library were analysed, ranging from large scale (New Opportunities Fund Collect Britain) to small scale (such as digitisation of subject-specific, analogue sound recordings). From these, a formula was developed (adapted from the one for traditional material) for the life cycle costs of digitised masters.

The life cycle costs of digitised masters were defined as:

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

Where $K(t)$ 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 digitised master and production of service copies

m is the metadata creation cost

$\text{acs}(t)$ is the access cost over time

$p(t)$ is the preservation and storage costs over time

Storage, preservation and access costs were difficult to determine. In particular, their long-term cost implications could not be determined with certainty ahead of a Digital Object Management programme. Therefore, a 10 year life span, with uncertainty over preservation and storage costs, was attempted. The headline costs for digitised master are that overall costs extrapolated over 10 years for the New Opportunities Fund 'Collect Britain' digitised masters files are €77 per object.

Based on the above and data collated from other digitisation projects (appendix 2) across the British Library and other institutions, it was concluded that

- the up-front scanning is a relatively small percentage
- selection and curatorial input can vary from insignificant to 75% of the costs
- checking of intellectual property rights can add significantly to costs
- calculation of storage and preservation costs are currently the most difficult and within the British Library await the Digital Object Management Programme
- preservation assessment of material and remedial conservation are frequently overlooked

2. Voluntary and Legal Deposit of Electronic Material

The figures from the Electronic Publishing Services study on the Impact of Legal Deposit to non-print publications were extrapolated together with data emerging from the VDEP-module of the Digital Object Management programme.

3. Purchased electronic publications

The Collection Development figure of €1,936,346 for 2002/03 for electronic material was analysed by both the traditional and digitisation formulae. The headline costs for purchased electronic material are that overall costs of purchased electronic in year 1 are estimated at €127.95 per item. Due to this being in the early stages of the Digital Object Management programme, storage, preservation and access costs were not included in this figure.

This is the most telling area of comparison to be made between traditional and electronic material, which can be made in the first year only at this stage.

The year 1 life cycle costs for a traditional monograph are €50.46

The year 1 life cycle costs for an electronic monograph (excluding storage, preservation and access) are €127.95

Phase by phase comparison between traditional and electronic are useful, eg

The selection cost for a traditional monograph is €13.43

The selection cost for an electronic monograph is €100.59

WHAT FINDINGS ARE EMERGING?

- “It's a way of thinking”. This was a phrase coined when the project was first aired. It is noticeable how often ‘life cycle’ is being used as a phrase, albeit with multiple meanings, across the library but all alluding to the interconnectedness of the phases of collection management. It is one of those phrases that seems to have as many interpretations and meanings, as ‘digital library’.
- It is a very complex subject with many practical, financial and strategic interdependencies. A project principle established early on was one of simplicity, in that it could easily be huge, unmanageable and undoable. Consequently, an incremental approach is being adopted.

- Whilst moving towards evidence-based librarianship/stewardship, this is not just a management information project. It was acknowledged that all the data would not be available in the first instance, and that estimates and best judgement are legitimate.
- 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.
- The overall conclusion in the digital arena extrapolated from all the three electronic strands of work, namely digitised masters; purchased electronic material and voluntary deposit of electronic material, is that it is very early days for the availability of reliable data. A lot of very interesting comparisons are becoming possible in the early stages. For example between the first year life cycle costs of a traditional monograph and those of an electronic monograph, or a telling example is between the costs of selecting a paper title and the costs of selecting an electronic title.
- Generally, it is the phases of archiving and access costs for digital material that are the most difficult to quantify now. Experience at the British Library with the management of digital objects received under voluntary legal deposit, whereby DigiTool is being used (a product of Ex Libris with whom the British Library is developing its Integrated Library System) as a real time pilot will help in the next phase.
- Therefore, the lack of reliable digital storage, preservation and access costs make it currently premature to elide the strands of e-life cycling with traditional life cycling.

WHAT IS GOING TO BE DONE?

From all the debate and discussion within the British Library about this subject, five key questions have been posed to be addressed in the next phase, which are currently being scrutinised.

1. Are the implications of the money spent on acquiring material clearly understood over time?
2. Can we afford to acquire serials in more than one format i.e. print and electronic? At what point do we make the decision to transfer, and with what degree of confidence, from paper to electronic?
3. Are there different ways of managing the collections, for example, elements of 'just-in-time' instead of 'just-in-case'?
4. Does the life-cycle approach suggest opportunities for greater collaboration with other libraries within the UK and internationally?

5. Should we establish a hierarchy of library collections, to inform prioritisation in the application of the life-cycle collection management approach, for example, with the national published archive at the top and with other countries/formats as variously lower priorities?

Taking a realistic, incremental approach, the plan for year 2 is to amplify the findings so far, to examine them in greater depth and to begin to apply the findings to current live issues, such as web archiving. The plan is to develop a tool kit to embed a life cycle collection management approach, including a communication plan to disseminate the approach across the British Library and the development of a predictive data-modelling tool. The aim is to test the method in greater detail, by investigating specific phases in the life cycle, such as cataloguing, storage and preservation and identify small, opportunistic pilots to apply alternative approaches, such as the implications of a 'just-in-time' approach. The final strand is to identify the best work being done internationally that is applicable to this approach and develop collaborative opportunities with organisations on a compatible scale.

CONCLUSION

Life cycle collection management will never be a substitute for intellectual judgement. There will be cases when it is the better thing to do to take in the boxes of 19th century donated papers with all their downstream costs rather than the one small, exquisite, inexpensive-to-store Medieval Psalter. And some of our greatest collections have been built up by leaps of faith. But it may provide one approach to the long-term stewardship of the British Library's collections.

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WEB SITES REFERRED TO IN THE TEXT

The British Library. <http://www.bl.uk/>

CEDARS – Curl Exemplars in Digital Archives. <http://www.leeds.ac.uk/cedars/>

Collect Britain. <http://www.collectbritain.co.uk/>

DigiTool. <http://www.exlibris-usa.com/digitoolibrary/index.html>

IFLA Universal Bibliographic Control and International MARC Core Programme (UBCIM). Medium term Programme 1998-2001. <http://www.ifla.org/VI/3/annual/98-2001.htm>

IFLA Universal Availability of Publications Core Activity (UAP).

<http://www.ifla.org/VI/2/uap.htm>

OCLC Online Computer Library Center, Inc. <http://www.oclc.org/home/>

PRESTO. <http://presto.joanneum.ac.at/index.asp>

APPENDIX 1

Glossary of collection management terms

Selection – the intellectual process of selecting or (declining to select) material for the Library’s collection. Includes scanning bibliographies, publishers’ catalogues, reviewing items sent on approval and potential donations.

Acquisitions processing – a number of processes related to obtaining collection items for the Library. Includes ordering, receipting invoice processing, ownership marking and for second and subsequent serials issues, labelling.

Cataloguing – the compilation of a list that records, describes and indexes items that comprise the Library’s collection. Includes amendments to the records that form the list.

First handling – a number of processes relating to placing collection items into storage and ensuring that they can be found again when required by Library users or staff. Includes pressmarking & labelling and placing.

Initial preservation – those specific policies and practices involved in protecting library materials from deterioration, damage and decay including provision of boxes for unbound serial parts and pamphlet material, binding new serial volumes, phase boxing and placing material in acid free envelopes.

General preservation – interventive conservation including rebinding.

Retrieval & replacement – the retrieval of collection material required by users from storage and replacing in storage after use. While these activities are not strictly speaking collection management activities it was felt crucial to include them since they involve significant costs and are key to providing access to physical items in the collection.

APPENDIX 2

Examples of British Library digitisation projects

Activity	Percentage of time spent on activity		
	project A	project B	project C
management	7%	7%	2%
selection	4%	0%	3%
preparation	4%	1%	4%
digitisation	12%	41%	42%
metadata	4%	51%	25%
ipr	0%	0%	24%

Project A

Selection was high, because it required very specialised selection by an expert. Metadata was low, because it was derived from existing records.

Project B

No selection was required, but metadata creation took twice as long.

Project C

IPR checking was significantly time-consuming and a manual process.