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# DCC | Digital Curation Manual

*Instalment on*

*“Investment in an Intangible Asset”*

<http://www.dcc.ac.uk/resource/curation-manual/chapters/intangible-asset>

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## About the DCC

The JISC-funded Digital Curation Centre (DCC) provides a focus on research into digital curation expertise and best practice for the storage, management and preservation of digital information to enable its use and re-use over time. The project represents a collaboration between the University of Edinburgh, the University of Glasgow through HATII, UKOLN at the University of Bath, and the Council of the Central Laboratory of the Research Councils (CCLRC). The DCC relies heavily on active participation and feedback from all stakeholder communities. For more information, please visit [www.dcc.ac.uk](http://www.dcc.ac.uk). The DCC is not itself a data repository, nor does it attempt to impose policies and practices of one branch of scholarship upon another. Rather, based on insight from a vibrant research programme that addresses wider issues of data curation and long-term preservation, it will develop and offer programmes of outreach and practical services to assist those who face digital curation challenges. It also seeks to complement and contribute towards the efforts of related organisations, rather than duplicate services.

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### *Preface*

The Digital Curation Centre (DCC) develops and shares expertise in digital curation and makes accessible best practices in the creation, management, and preservation of digital information to enable its use and re-use over time. Among its key objectives is the development and maintenance of a world-class digital curation manual. The *DCC Digital Curation Manual* is a community-driven resource—from the selection of topics for inclusion through to peer review. The Manual is accessible from the DCC web site (<http://www.dcc.ac.uk/resource/curation-manual>).

Each of the sections of the *DCC Digital Curation Manual* has been designed for use in conjunction with *DCC Briefing Papers*. The briefing papers offer a high-level introduction to a specific topic; they are intended for use by senior managers. The *DCC Digital Curation Manual* instalments provide detailed and practical information aimed at digital curation practitioners. They are designed to assist data creators, curators and re-users to better understand and address the challenges they face and to fulfil the roles they play in creating, managing, and preserving digital information over time. Each instalment will place the topic on which it is focused in the context of digital curation by providing an introduction to the subject, case studies, and guidelines for best practice(s). A full list of areas that the curation manual aims to cover can be found at the DCC web site (<http://www.dcc.ac.uk/resource/curation-manual/chapters>). To ensure that this manual reflects new developments, discoveries, and emerging practices authors will have a chance to update their contributions annually. Initially, we anticipate that the manual will be composed of forty instalments, but as new topics emerge and older topics require more detailed coverage more might be added to the work.

To ensure that the Manual is of the highest quality, the DCC has assembled a peer review panel including a wide range of international experts in the field of digital curation to review each of its instalments and to identify newer areas that should be covered. The current membership of the Peer Review Panel is provided at the beginning of this document.

The DCC actively seeks suggestions for new topics and suggestions or feedback on completed Curation Manual instalments. Both may be sent to the editors of the *DCC Digital Curation Manual* at [curation.manual@dcc.ac.uk](mailto:curation.manual@dcc.ac.uk).

Seamus Ross & Michael Day.  
*18 April 2005*

### **Biography**

Laurie Hunter is Emeritus Professor in the School of Business and Management, University of Glasgow, and an Honorary Senior Research Fellow. His work on digital preservation is a recent development, growing out of a research interest in knowledge workers, intellectual property and intangible assets, which benefited greatly from two visits to the University of Melbourne, and collaborative work with Dr Beth Webster and Dr Anne Wyatt. This led to valuable and enjoyable cooperative work with Dr James Currall and his colleagues in the *espida* project in the University of Glasgow.

Development papers have been delivered in 2005 to the DCC workshop on Cost Models at the British Library, and to the DCC/JISC workshop on Digital Curation and Preservation: defining the research agenda for the next decade, University of Warwick.

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### Introduction and scope

Digital technology has brought new challenges to information professionals, librarians and archivists. The economic properties of digital data and information are that they are 'weightless' or intangible, in contrast to the traditional sources of value to business enterprises. They can be made available simultaneously to many users in a non-exclusive way: that is, possession by one user does not preclude others from using it at the same time. Above all, this diffusion is possible at extremely low marginal cost (the addition to total costs from adding one more unit of output). These advantages, however, are conditional on some initial investment outlays such as maintaining an effective operating environment and ensuring accessibility to users. In the longer term, there is a risk that unless appropriate measures are taken, data will be lost for the future, will become corrupt or inaccessible. The 1996 Task Force on Archiving of Digital Information<sup>1</sup> concluded:

'In addition to managing their operating environment and the migration of information through hardware and software platforms, a third function by which digital archives fulfil their commitment to preserve electronic information is in managing the costs of these activities' (p 30)

The implication is that digital curation is not simply a technical matter but one that needs to be informed by economic and business analysis. No matter how good the technical solutions, unless the economic rationale is present, the preservation process will be imperfect and the potential of new data for future long term use will be eroded.

The perspective I propose to adopt in this chapter is that of an applied economist with particular interests in business strategy, the

management of human resources and intellectual capital, and with some recent involvement in approaches to the valuation of, and investment in intangible assets in a business context. I wish to argue that these elements all have relevance to the long term management of digital information, not in the technical sense, but in the economic and business context of an organisation or institution where resource allocation decisions require to be made regarding preservation. These decisions will require both an understanding of the cost implications and of the benefits or values that may be generated by the information over time, qualified by the risks and uncertainty that characterise all investment decisions.

The aim of this chapter is to explore some key properties of digital assets and digital preservation, viewed as a class of intangible source of benefit. Intangible assets (and investment) have recently been the subject of increased attention from economists, business analysts and accountancy and financial experts. This reflects the recognition that contemporary businesses owe much more of their market value to intangible assets than was formerly the case. All the evidence indicates that this is indeed the dominant trend in the post industrial economy where strategic development and competitive ability lie increasingly in the possession and leverage of intangible assets (Webster, 1999, EC 2003). Teece (2000, p. 3) writes of 'a new fundamental core for wealth creation' in 'the development and astute deployment and utilization of intangible assets, of which knowledge, competence and intellectual property are the most significant'. Many other business strategy experts likewise emphasise the growing importance of intangibles in what is often termed 'the knowledge economy' (Kay 2000: OECD, 1999, 2000). Increased attention to the topic does not mean that there is a broad consensus on issues such as financial reporting of intangible assets

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<sup>1</sup> Report of the Task Force on Archiving of Digital Information (<http://rlg.org/Arch/TF/>)

or the valuation of the assets and their associated income and benefit streams over time. Nevertheless, if we accept that digital information and data are a class of intangible asset, there may be useful lessons to be learned with respect to the issues of long term conservation and management of digital information.

Section 2 of this chapter provides some necessary background on the nature of intangibles and the reason for their increased prominence. Section 3 takes up the transfer of these ideas to the field of digital preservation, explaining the potential relevance and some of the practical or policy inferences that may be drawn. Section 4 looks at ways in which this sort of approach is being applied and developed at the present time and comments on some of the issues posed as this exploratory work proceeds. Section 5 discusses the scope for further development and research needs while section 6 provides a reflection on digital preservation as innovation. Section 7 presents a set of brief summary points.

### **Digital preservation as an intangible investment**

Investment gives rise to capital assets with the capability of releasing services, benefits or income in future periods. Capital can exist either in tangible or intangible form. Tangible assets are typically recognised as land, buildings and physical plant or equipment, while intangible assets comprise ‘non-physical sources of future economic benefits’ (EC 2003, p 18). From our present perspective, decisions to preserve digital information in the long term are investment decisions incurring present (and almost certainly ongoing) costs in the expectation of long term benefits. The preserved data and information comprise an asset if it generates a long term stream of benefits (but a liability if it fails to produce the expected benefits: after all, not all investments are successful). Investment proposals are

typically evaluated by means of a form of discounted cash flow (DCF) analysis that provides estimated comparable rates of return to alternative investment plans, enabling the optimal choices to be made. For this to apply to intangibles, we need a means of measuring the value of future benefit streams.

In the nineteenth and much of the twentieth century, investment was predominantly in tangible forms of capital – and accounting rules and standards developed with this in mind. But with the growth of the service economy and the digital explosion in the last twenty years, an increasing proportion of business assets has been intangible in form – i.e. assets with no physical existence such as intellectual property, operational business practices and routines, corporate and product branding and the knowledge of employees. The post-industrial enterprise is much less dominated by physical assets (consider **Google, Walmart, eBay, Amazon** – but also many much smaller businesses) and their intangible assets are key indicators of competitive advantage and future profitability – the basis of stock market valuation.

In more formal terms, then, what are these intangible assets<sup>2</sup>? Although there is no generally agreed terminology or classification, four main categories would command broad agreement<sup>3</sup>:

- Intellectual capital (patents, trademarks, copyright, licences, R&D in process: preserved digital information would probably fall mainly in this category)
- Human capital (the skills, experience and knowledge of the workforce)

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<sup>2</sup> Accounting frameworks refer to ‘assets’ rather than ‘capital’ but these terms are used interchangeably in this chapter.

<sup>3</sup> For sources and rationale, see Hunter, Webster and Wyatt, 2005a.



- Organisational capital (the systems and routines by which an enterprise manages its business operations)
- Relationship capital (the data, information and knowledge embedded in upstream and downstream relationships with suppliers and customers).

These categories present difficulties of valuation such as

- identification - what precisely are we seeking to value?
- property rights issues (employers do not own employees, who may change jobs and take their human capital with them, including training and experience acquired with the support of the employer; or they may possess tacit knowledge that may or may not be released to the employer). For these reasons, ownership or relative rights to shares in the proceeds may be disputed, and uncertainty about ability to appropriate values makes assured measurement hazardous.
- separability - can the asset be separated from the organisational entity and still retain its value? Does it have a price independently of its organisational setting?

Values attributed to intangible assets are thus likely to be subjective, often embodied in people, and highly uncertain. These characteristics present difficulties for accountants whose professional rules and standards require intangible assets to be (i) identifiable, (ii) under the control of the organisation, (iii) carrying a probability that economic benefits will eventuate, and (iv) having a cost that can be reliably measured<sup>4</sup> –

<sup>4</sup> IAS 38 Intangible Assets: paras. 12,13, 17. Although countries have different standards and definitions, they generally conform to the definitions of the International Accounting Standards Board (IAS).

essentially the conditions required for the valuation of tangible assets. Very few intangible assets meet the requirements for inclusion in corporate balance sheets, since accounting regulators insist that there should be a 'control over future benefits' test and a 'historical cost basis' of measurements as a reliability check. Failing this, expenditure in creating and maintaining intangible assets is largely treated as a current expense, written off in the current accounting period, irrespective of the investment *intention* of the spender. Because it is not reflected in financial reports as investment, there is an information gap in both the balance sheet and the income statement on which investors depend – and all the indications are that this gap is growing.<sup>5</sup> Within the business organisation, the investment aspect is not explicit, with the likely result that managers typically take decisions about intangible expenditure with little information about past returns from similar expenditure or likely future returns from current expenditure.

Companies that recognise the importance of intangible assets for their future prosperity have sought ways of getting round the problem of monetary valuation, and business consultants have sought to assist this by inventing batteries of proxy indicators under each of the four intangible capital categories above. These are mixtures of quantitative and qualitative measures of a firm's performance under each heading, which do not in themselves directly measure value but purport to provide management with a set of levers by which they can improve the contribution of intangible capital to overall firm performance. Unfortunately, many of the measures adopted are open to the criticism that they are subjective and inconsistently defined (which may matter less within one organisation but precludes meaningful benchmarking). More

<sup>5</sup> Webster, (2000): Lev and Zarowin, (1999)

importantly, many of the proxy measures are **assumed** to have a causal link with some measure of performance or value, but in very few cases is there good empirical evidence to confirm causality.<sup>6</sup> Fairly general evidence of correlation does not imply causation – or even direction of causality. Thus if proxy measures are to be adopted in business generally – or by extension in the digital preservation field – serious effort has to be made to minimise subjectivity, clarify and standardise definitions of what is to be measured, and aim to establish evidence-based causal connections.

Finally, given these difficulties, it is not surprising that we should have to conclude that both measurement and management of intangible assets and the associated investment process are subject to considerable risk and uncertainty. This does not mean that we should give up on attempts to measure intangibles – they are too important for this to be so – but we should continue to explore ways in which reliable measurement can be developed to assist the management and investment processes.

### **Relevance to Digital Preservation and Curation**

What then has all this to do with digital preservation and curation? The purely accounting issues just discussed are less relevant for the digital preservation context. However, it is worth bearing in mind that those who take the expenditure decisions on preservation will not usually be part of the cultural heritage community and will be more familiar with accounting practices and conventions. To persuade them of the merits of preservation, it will be useful to remember that intangible assets do not mesh automatically with their accustomed forms of reporting and evaluation, which will tend to breed a conservative approach. The

presentation of a business case which understands this characteristic may well be more positively received.

In a number of other respects, there are some useful pointers for digital preservation:

1) It is important to understand spending decisions about digital preservation and curation as *investment decisions*, with current costs being incurred in the expectation of future benefits. Much will depend on the nature of the information to be preserved and the duration of preservation. As we shall see later, for some types of information, the time-lag between investment and the accrual of benefits may be lengthy, tending to make the investment proposition less attractive for funders.

2) A basic requirement for a preservation programme has to be a clear understanding of the **costs of preservation**, and there are many initiatives and practical exercises being undertaken worldwide to develop better cost models. This was recognised by the Task Force on Archiving (1996) and the challenge has been widely accepted, as illustrated by the summary report of the DCC Workshop on Cost Models, 2005<sup>7</sup>). These are mainly organisation-specific rather than generic, which is not intended as a criticism, since it is sensible to start with individual cases and work towards a more general solution. More significantly, however, these explorations tend to work in terms of financial (accounting) costs, which may not get to grips with the deeper issue of *why* these costs should be incurred, and what are the costs of not securing preservation for the longer term.

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<sup>7</sup> See DCC Workshop on Cost Models for Preserving Digital Assets, July 2005:  
[http://www.dcc.ac.uk/docs/CM\\_Workshop\\_2005\\_Final\\_Report.pdf](http://www.dcc.ac.uk/docs/CM_Workshop_2005_Final_Report.pdf)

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<sup>6</sup> See Hunter, Webster and Wyatt 2005 for a review of practice.

3) This in turn underlines the need to develop understanding and measures relating to the **benefits** (which may be revenue streams or take some alternative form such as future cost savings or non-financial benefits). My personal view is that the benefits issue is critical to the funding of preservation programmes and in comparison with the cost dimension, it is largely unexplored, so it is worth taking a little time to spell it out. Following the DCC classification of the main user groups, we can identify the key players in any digital preservation scenario as follows: (i) the *originators* of data or information, who may derive advantage from knowing that their work will be preserved and made available to others through time. However, because of intellectual property considerations, it is not clear that all will welcome their work being made freely available to all.

(ii) *those who preserve and maintain the information* (e.g. intermediaries such as libraries, curators and archiving agents). Organisations such as libraries will have an interest in being recognised as gateways to specific sources of information: this recognition will reflect professional esteem and reputational value from the provision of a useful service.

(iii) *end-users of the preserved information*, who want access to the original data or information itself, which they may require for a variety of motives, such as education, research, commercial interests or legal requirements. They are in fact the ‘customers’ for the preservation service, but their demands for information may be far removed in time from the preservation decision, and their make-up will not usually be known with any certainty. This is particularly so where end-users in the future will want to use the material for purposes quite different from their original, perhaps even in different disciplinary fields, and their main need will be for effective

curation and access facilities, rather than ‘backroom’ preservation.

(iv) *institutions or agencies that provide financial support* for preservation programmes, who may do so for reasons of institutional gain (or cost-offset) or for long-term public interest. They may support preservation because they see long term cultural or historical interest being served by preservation. In other cases, preservation may be necessary to comply with legal or professional requirements, e.g. in relation to corporate governance: quite apart from cost penalties, failure to preserve and provide ready access to information may result in inability to retrieve critical information rapidly or in the loss of data with a business value. Again, the providing institution may wish to enhance its reputation as a gateway to particular kinds of knowledge or expertise and will be attractive feature to students, visitors and potential staff recruits.

A little reflection suggests that the issue of benefits and their distribution among the key players is relatively complicated since their interests will not necessarily coincide. To illustrate: academic staff and postgraduate students in a research-led university will tend to set a high value on the excellence of its library services, but the costs are extremely high. University senior management might wish to curtail these costs but will recognise the longer term disadvantage for the attraction of good research staff and postgraduates. Preservation and curation are also costly, but the professional curatorial ethic will tend to support preservation, while library staff themselves may see this as a side issue to their main functions. In essence, the various players will have different priorities, and what they see as a priority may be a side-issue for others. Digital preservation will need a robust case to win the necessary resources.

One way to unravel the costs and benefits issue is to regard the parties just identified as the players in a ‘digital preservation market’ that connects buyers and sellers of specific digital services. The market concept is complicated by the fact that some preservation will be undertaken for the long term public interest, with no intention to charge for access (or certainly no intention to make a profit from transactions). The emergence of digital preservation markets is only in its infancy and the shape and structure of future markets is still very much in the melting pot. Yet it is critical to the underlying economics of the fundamental investment decisions relating to long term digital preservation. Understanding that market and its potential (for example in relation to finding new uses for old materials) surely has to be one of the research needs for the future <sup>8</sup>.

4) Structure and characteristics: We cannot leave the issue of costs and benefits there. Just as in the case of intangibles generally, we need to develop a typology for digital information, since there is no good reason to think of such information as a homogeneous mass. Archivists already define four main types of record value:

- administrative/informational
- legal/evidential
- compliance/regulatory
- historical

For the present purpose we have to think in terms of a different classification: partly in terms of what is required for their acquisition, management and preservation (the professional and technical aspects), which will affect costs;

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<sup>8</sup> It is not so long since we witnessed the emergence of new markets such as direct line insurance, e-business developments such as Amazon and eBay, and many others where the entrepreneurial eye has detected new markets ready for development. Similar evolution in the digital environment is to be expected.

and partly with regard to the *economic nature of the material*, reflecting the sorts of value it may have for future users. The first of these is undergoing development in the institution specific studies under way, and helpful guidance exists in the form of the ERPA Cost Orientation Tool (ERPANET 2003)<sup>9</sup>. Costs will vary for many reasons, many associated with the technical and professional choices regarding preservation, such as:

- The duration of the preservation period (does it matter if this is 5 or 50 or 500 years?)
- The scope for scale economies in preservation which depends on how preservation functions are apportioned (centralisation or decentralisation, with consequences for the division of labour across institutions)
- The rate of accession of new material (discrete and irregular or smooth and continuous)
- Specification (exact original replica or usable copy, or capable of decomposition and re-combination to meet new uses)

Benefits will depend on the market’s preferences, where much will depend on whether

- there is an existing market (as in the case of legal or regulatory requirements)
- the market is yet unformed and awaiting development
- there is no market but public interest reasons for preserving, such as a cultural or institutional memory rationale

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<sup>9</sup> See also Nationaal Archief (2005) work on cost models.

- there is a short or long time lag between preservation and first use or preservation and break-even

- market niche specialisms develop (subject areas based on communities of interest form viable market arrangements).

5) Risk and uncertainty: Just as we noted the significance of risk and uncertainty in relation to intangible assets generally, we have to recognise at least as many difficulties in the case of digital preservation. Setting objective and reliable values on preserved digital information is problematical, partly for intrinsic reasons (the nature of the asset), but partly in this case for the uncertainties surrounding both costs of preservation over time and (especially) expected benefits when market structures are mostly embryonic or still to be formed.

All this suggests that in the foreseeable future it will be hard to devise generic models of costs and benefits. Progress in the early stages is likely to be made through the build up of detailed case studies using comparable methodology, from which more general lessons may be learned, particularly about the costs associated with different preservation options and the perception of benefits by different classes of user. As before, the difficulties are not a reason for giving up, but rather an incentive to improve and standardise evaluation methods. In the end, there will certainly be significant programmes of digital preservation which will be supported by finance allocated to maintaining cultural heritage and institutional and community histories. However, if preservation is to widen significantly beyond this, realistic business cases will require to be developed to encourage the release of funds to support it.

### Applications

Because this line of approach is novel, it is hard to find examples of its application in practice. Certainly there has been an interesting development in attempts to measure the rate of return on investment in libraries and museums, reflecting the growing need for accountability in the use of public monies which has spanned the public sector services. Examples include the British Library study, *Measuring our Value* (2004) which uses a Contingent Valuation methodology<sup>10</sup> to estimate both direct and indirect benefits (to users and UK citizens respectively) from the services and the existence of the Library. A main feature of the method is the use of a survey questionnaire which creates a hypothetical market in which interviewees are asked to provide estimates of the value to them of the Library and its services. From this can be derived measures of the value in money terms to the UK economy as a whole, benefits from the Library relative to public funding, and a measure of the economic impact if the Library did not exist. Similar studies are reported from the United States.<sup>11</sup> While there can be little doubt that such studies provide a valuable guide to the return on investment in such major institutions, they really address a different dimension of our problem, since the economic impact includes direct and indirect employment benefits, visitor and tourist trade generated, etc. In fact the British Library study excludes website usage and is not intended 'to capture emerging products such as digitisation and other web-based services'. In smaller institutions and organisations, the methodology, though applicable, would tend to be expensive and less appropriate, especially if a new venture is being established.

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<sup>10</sup> See NOAA (1993)

<sup>11</sup> E.g. Florida Public Libraries, Taxpayer return on investment in Florida Public Libraries, 2004 (<http://dliis.dos.state.fl.us/bld/roi>) : South Carolina Public Library Economic Impact Study (<http://www.libsci.sc.edu/SCEIS/home.htm>.) See also Allen (2004) and Kenney (2004, 2005)

If we return to the case of a digital preservation programme in a smaller organisation, the ultimate driver is arguably the willingness of the key decision takers in an organisation to support these programmes *on an on-going basis*, by assuring that the resources required are made available. From that perspective, the obvious primary barrier is that of cost – or as I prefer to see it, *costs relative to benefits*. The decision takers will need the incentive of a strong business case in favour of preservation programmes, which means some reliable and acceptable system of metrics defining costs and relating them to a quantified evaluation of benefits. Ideally costs and benefits would be expressed in monetary terms but the problems of money-valuation of benefits apply to digital preservation as elsewhere. Where money values are not available or subject to high degrees of uncertainty, a usual route would be to look for proxy measures, as has happened in the broader field of intangible assets <sup>12</sup>.

In this approach it is important to stress future benefits and values rather than monetary revenue: these may include prestige, reputation, public benefit in the form of education, cultural heritage, and many other objectives. What will matter here is that these benefits should be acknowledged as consistent with and supportive of the corporate or institutional strategic goals, for it is this that will be most likely to gain support from the decision takers. No matter how good the technical performance and the subjective estimates of value from the perspective of the proposers, the *alignment* between the preservation programme and the core strategic objectives of the organisation will generally be a key influence on the decision takers. The values need to be clearly framed in a business framework that relates to the specific aims of the organisation. It is for this reason that many of the proxy indicators adopted in the commercial field have proved

questionable: the analysis needs to be conducted in an organisation-specific context, where a bottom up as well as a top down perspective can be applied.

A more promising approach than a scatter-gun measurement of indicators is the exploration of a modified balanced scorecard <sup>13</sup> (BSC) model to provide a multi-faceted perspective on the value of a preserved digital asset (for the moment we need not be specific about the type). The BSC provides a way of bringing important intangibles into a more balanced, more broadly-based decision process than is usual in the standard financial model with an emphasis on short term financial returns. Currall, Johnson and McKinney (2005) are currently exploring the following model of value (Figure 1) with digital asset creators, users and information professionals in Glasgow University:

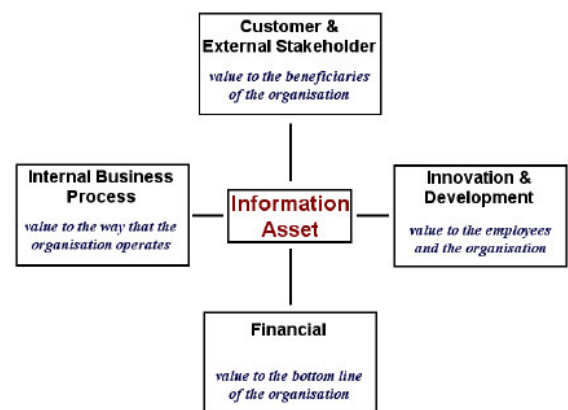


Figure 1: Modified BSC model (Currall, Johnson and McKinney, 2005)

Any specific information asset (or type of asset) is capable of being valued from different perspectives, not simply from a financial viewpoint. How the asset is viewed by the different players can be elicited through questionnaire and/or dialogue with the participants, enabling what *they* see as key

<sup>12</sup> See pp 5-6 above for a critique of such approaches.

<sup>13</sup> Kaplan and Norton (1996, 2000)

elements of value (and sources of risk) in their contribution. Within each of the boxes, it should be possible to identify a limited selection of indicators of value and risk which are capable of i) consistent measurement and ii) being adjusted by management or operator action <sup>14</sup>.

This approach would seem to have real potential on several counts:

i) it is an attempt in a particular context to provide empirical support for the sort of value linkages I have argued to be vital

ii) it uses a technique (with some adaptation) which will be familiar to management decision takers in the organization

iii) the balanced scorecard model is essentially a business strategy tool – its original aim was to move strategy decisions away from the narrow, usually short term focus of financial returns. Analysis along the lines indicated should permit, for at least some types of asset and for some of the elements within the boxes, identification of *alignment* between digital preservation and the longer term strategic objectives of the organisation. Risk (including the risk of not preserving) is also fitted into the picture.

iv) this alignment point cannot be made too strongly. The example is cited of the Information Services unit of a US bank which sought the highest professional standards by benchmarking itself against top level peer group organisations. But having got there, it failed completely to deliver the services that were required by a major business unit and the whole strategy collapsed<sup>15</sup>. The point is that what matters is not the individual excellence of components of the business organization or the

technical excellence of a programme, but the way in which they fit together and align with overall strategy. That too should be helpful in engaging the interest and support of the strategic management levels of the organization <sup>16</sup>.

v) with only a little modification to substitute ‘strategic objectives’ for the ‘individual asset and to integrate ‘information creators’ into the model, it also provides a framework for the management process itself. <sup>17</sup>

Finally, this method is capable not just of looking at particular assets, but promises an ability to contribute to a meaningful typology of digital assets (see earlier discussion). Current work by Currall and his colleagues <sup>18</sup> recognises that value changes over time, and that different types of material will have quite different life/value profiles as different dimensions of value wax and wane. For example, financial or personnel records may require to be kept for legislative compliance for a defined period, during which their value will remain high and constant: but at the end of the compliance period, value may actually become negative as retention exposes the organisation to risk. (This might be offset at a minimal level if the item is important in institutional history). A little reflection will suggest that other forms of material (e.g. a research data set, or e-journals, or committee records) will tend to have distinctive life/value profiles and potentially quite different longitudinal scales.

Although the practical outcomes and transferability value of this approach remain to be proven, the ongoing Glasgow study

<sup>14</sup> See Currall, Johnson and McKinney (2005a) for a detailed account of the methodology as work in process.

<sup>15</sup> Kaplan and Norton (2001)

<sup>16</sup> Currall et al (2005) observe: ‘not all of the areas discovered in our discussions with object creators and information professionals have relevance to the (current ) strategy’ of the university.

<sup>17</sup> My own view is that some information providers may not see it as in their own best interests to cooperate in this activity, due to intellectual property issues. Without an incentive to pull them into the process, the supply process is weakened and the total value will be diminished.

<sup>18</sup> Currall et al (2006).

provides considerable encouragement for this method of assessing value within a framework that incorporates costs, adopts a broad spectrum of stakeholders and seems amenable to a management process. Further results are awaited with interest.

### **Next steps**

The cultural heritage and science communities, as champions of long term digital preservation, can see the risks and costs of failure to preserve, and understand the problems of technical obsolescence and the management of migration. They would prefer an automatic protocol to switch in when data is created that would manage its retention, accessibility, migration and possibly eventual discard throughout its life cycle. Thus not only set-up costs but also ongoing maintenance, storage and management costs have to be figured into the budget. This may be possible with major public institutions serving national or regional interests, with the support of public funds (provided the taxpayers approve). As a general approach in a wider range of organisations, however, the costs of this are likely to be prohibitive relative to the claims of other forms of investment. Many existing programmes are pilots or exploratory, with a short term ad hoc budget and no promise of continuity. To go beyond this, business-level decision makers will have to be persuaded by cases backed with strong evidential support – which will not always be easy since it is likely that some of the eventual markets have not yet been recognised, far less formed (see also below).

From the earlier sections of this paper, it is clear that more needs to be done to develop understanding of digital preservation costs, though a fair start has been made. Less attention has been paid to the benefits side, where the problems of valuation have been spelled out. This aspect is fundamental if there is to be an incentive for purse-holders to provide the funding necessary, especially going

beyond the short term project horizon. This point has been forcefully made by Lavoie (2003) in his excellent paper arguing that economic issues are an essential ingredient in the research agenda for digital preservation. Lavoie's principal point relates to the importance of incentives to invest in preservation, but he notes that for a number of possible reasons, the objectives of preservation may be misaligned with incentives, which will tend to reduce the scale of preservation unless remedial policies are implemented. The present paper makes the point in a different way, but (I think) is quite consistent with the Lavoie economic analysis<sup>19</sup>.

This is particularly relevant to my earlier comments on the fragmentary or unformed nature of much of the potential market for preserved digital materials. Lavoie takes this further by exploring the different market and pricing models that might be used to get round problems of market failure; and this is certainly an area that requires further debate and analysis. In parallel with this, at a practical level, I would argue for an extension of cost-benefit studies of preservation and preservation potential at the level of individual institutions. Existing studies have the limitation that they often produce non-comparable findings because of differences in the methodology, differences in the preservation techniques and differences in the type of material being preserved. It would be helpful if more consistency in methodology could be introduced to provide the beginnings of a proper bench-marking comparison and evaluation. Given that, in time there would be a better chance of defining key differences in types of digital asset, particularly their sources of value and their time-profiles. From this should emerge a clearer topography for the digital preservation field than exists at present. Whether the modified balanced scorecard

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<sup>19</sup> See also Lavoie (2004)



approach or some other alternative will begin to set a standard remains to be seen – but there is no doubt such a development would generate improved incentives for the decision-takers.

In general, I see little possibility of a quick fix. Rather, I believe the present research need is for a widespread programme of (mainly) case-study based empirical projects which will, within their own institutional contexts, provide the basis for well-crafted and empirically supported cases for investment in long term digital preservation. An important feature of these cases will be the need for alignment with the organisational strategy. No less than this will be looked for by the management groups responsible for strategy and its related investment choices. This will almost certainly meet resistance and sticking points, as is often the case with organisational innovations. This aspect is discussed in the following section.

### **Digital preservation as Innovation**

Systematic, large scale programmes of digital preservation may be seen as an innovation requiring significant expenditure, the benefits of which will accrue well into the future and are currently difficult to estimate. Like other innovations, the introduction of a programme of long term digital preservation will face resistance and ‘stickiness’ in dissemination, and it may be worthwhile reflecting a little on the nature of these barriers operating within organisations. The conventional wisdom is that stickiness is almost entirely due to motivational factors such as jealousy, lack of incentive, lack of buy-in, resistance to change, ‘turf protection’ and the ‘not invented here’ syndrome. In knowledge intensive or ‘memory’ institutions, one would like to think that these might be less of a problem than in commercially competitive businesses – though some traces of such factors will almost certainly be present. However, large libraries, research institutions, universities and the like comprise differentiated and often competing

communities of interest<sup>20</sup> that do not share the same priorities, goals or culture, leading to inhibition in innovation processes involving the transfer of ideas and knowledge. Empirical work identifies three important sources of stickiness in this respect:

- lack of absorptive capacity (when recipients of a transfer have an inadequate stock of knowledge to allow them to exploit new sources);
- causal ambiguity (when it is hard to explain the success or failure of a transfer in a new context, even ex post); and
- a ‘distant’ relationship between the originator and the recipient, making communication of ideas tense and difficult (which may stem from the way people see their roles in an organisation, and imperfections in the social interactions between them).

It is not too hard to see ways in which these factors could impinge on the evolution of long term digital preservation processes! We have already noted the possibility of shared lack of understanding and different knowledge bases among the information service professionals and the strategic management levels of the organisation or institution. Current operational needs and shorter term investment opportunities will tend to be more attractive to the latter unless they can be persuaded that the ongoing support of a preservation programme is worthwhile in its own right and a distinctive strategic advantage in the longer term. There is a clear need for a two-way educational process: the strategy managers have to be persuaded of the merits and relevance of preservation, and the proponents of preservation have to learn to develop cases that will use the right language and ideas.

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<sup>20</sup> Communities based not on business or functional units but on collegiality, often across departmental and institutional boundaries (Wenger, 2000)

On causal ambiguity, the long term nature of digital preservation, running in parallel with waves of shorter term changes in technology, market needs and organisational and budget pressures, will tend to make it difficult to draw straight-line connections between implementing preservation methods and benefits to the institution.

The relationship factor again emphasises the community of interest divide between the manager/administrator and the specialist professional, and the need for ongoing dialogue to close the distance gap. My hunch is that this may also be a problem with some of the data and information providers who will see what is involved in the digital preservation process as just another chore, and may need incentive or motivation to engage their cooperation. At the very least, ongoing dialogue is essential.

These points serve as a reminder (if any is necessary) that although digital preservation is in a sense a technical matter *sui generis*, it is embedded in social organisations where both the everyday processes and longer term strategy analysis and planning depend vitally on social interchange and understanding.

### Summary

1. We have observed the increasing recognition of the importance of intangible assets and investment in the business world generally. A major problem lies in the lack of a reliable and objective valuation of intangible assets, which gives rise to deficiencies in the information available to shareholders, business analysts and managers taking investment decisions.

2. Long term digital preservation may be viewed as a form of intangible investment that shares the difficulty of setting values on the expected stream of benefits of preservation over time. This prevents a clear-cut investment case being made for digital preservation as a long term on-going programme in any

organisation, yet the costs of **not** preserving in many cases could be high if action is not taken. More and better information on both costs (under different technical and organisational regimes) and benefits is needed to provide the incentive for the managers of investment to take robust decisions.

3. Digital materials are not homogeneous and the economic and management properties of different types of materials need to be explored in more detail, including empirical measurement of value influences, time scales and potential 'markets' for the future usage. The present relatively immature stage of digital preservation leaves considerable scope for market creation and development, which in turn seems likely to become an important area for research and experimentation.

4. The cultural heritage community has a clear sense of the importance of long term digital preservation programmes, but faces challenges in presenting attractions and incentives for the controllers of investment resources. Greater credibility for investment cases requires the development of business cases based on strong empirical evidence, clear cause and effect relationships and alignment with institutional or business strategic objectives. A promising approach to this is the modified balanced scorecard model currently being pioneered, bringing together the interests of the various stakeholders in a paradigm that bridges the gap between business decision takers and the information professionals.

5. Digital preservation is, of course dependent on technological developments but as argued here, the management and organisational conditions are equally vital. Both dimensions matter and will interact with each other. It is worth remembering, then, that the introduction of long term preservation programmes constitutes an organisational innovation which itself will require to be managed effectively,

especially since there is no guarantee of private and organisation interests coinciding.

## References

- Allen, Nancy, 2004, Business Planning for Cultural Heritage Organizations. Erpanet seminar on business models. [http://www.erpanet.org/events/2004/amsterdam/presentations/erpaTraining-Amsterdam\\_Allen.pdf](http://www.erpanet.org/events/2004/amsterdam/presentations/erpaTraining-Amsterdam_Allen.pdf) [Accessed: 10.7.06]
- British Library, 2004. *Measuring our Value* (<http://www.bl.uk/pdf/measuring.pdf>) [Accessed: 19.12.05]
- James Currall, Claire Johnson, Peter McKinney 2005, 'The Organ Grinder and the Monkey. Making a business case for sustainable digital preservation', EU DLM Forum Conference 5-7 October 2005 Budapest, Hungary. <https://dspace.gla.ac.uk/handle/1905/455> [Accessed: 19.12.05]
- James Currall & Peter McKinney, 2006. 'Profiting from the Value of Information', *DLib Magazine* (forthcoming).
- Collis, D.J and Montgomery C.A.(1998) 'Creating Corporate Advantage', *Harvard Business Review*, May-June 1998, pp 70-83
- Commission of the European Communities, (2003). *Study on the Measurement of Intangible Assets*, Enterprise Director General, Brussels
- DCC/DCP Workshop on Cost Models for Preserving Digital Assets, July 2005: [http://www.dcc.ac.uk/docs/CM\\_Workshop\\_2005\\_Final\\_Report.pdf](http://www.dcc.ac.uk/docs/CM_Workshop_2005_Final_Report.pdf) [Accessed: 19.12.05]
- ERPANET (2003) *Cost orientation Tool – Cost orientation of Digital Preservation* (<http://www.erpanet.org/guidance/docs/ERPANETCostingTool.pdf>) [Accessed: 19.12.05]
- Florida Public Libraries, 2004, *Taxpayer return on investment in Florida Public Libraries*. (<http://dlis.dos.state.fl.us/bld/roi>) [Accessed: 19.12.05]
- Hunter, L, Webster, E and Wyatt, A, 2005a 'Measuring Intangible Capital: a review of current practice', *Australian Accounting Review*, 15:2, pp 4-21
- Hunter, L, Webster, E and Wyatt, A, 2005b, 'Measuring Intangible Investment', Working Paper 18/05, Intellectual Property Research Institute of Australia, University of Melbourne (<http://www.ipria.org/publications/workingpapers/IPRIA%20WP%2018.05.pdf>) [Accessed: 19.12.05]
- Kaplan, RS and Norton, DP 2001, *The Strategy Focused Organization*, Boston, Mass. Harvard Business School Press
- Kaplan, RS and Norton, DP 1996, *The Balanced Scorecard – Translating Strategy into Action*. Boston, Harvard Business School Press
- Kay, John 2000, 'Knowledge: the 21<sup>st</sup> Century Asset'. *Journal of the Royal Society of Arts*, 2000:4, pp 46-49

Kenney, Anne R 2004, Digital Preservation Management: Identifying and Securing the Requisite Resources. Erpanet Seminar on Business Models.

[http://www.erpanet.org/events/2004/amsterdam/presentations/erpaTraining-Amsterdam\\_Kenney.pdf](http://www.erpanet.org/events/2004/amsterdam/presentations/erpaTraining-Amsterdam_Kenney.pdf). [Accessed:10.07.06]

Kenney, Anne R 2005, The Cornell Experience:arXiv.org. DCC/DPC Workshop on Cost Models for Preserving Digital Assets, July 2005. <http://www.dcc.ac.uk/events/cm-2005/> [Accessed 10.07.06]

Lavoie, Brian F. 2003, 'The Incentives to Preserve Digital Materials: Roles, Scenarios, and Economic Decision-Making'. OCLC Office of Research.

(<http://www.oclc.org/research/projects/digipres/incentives-dp.pdf>) [Accessed: 19.12.05]

Lavoie, B.F. 2004, '*Of mice and memory: Economically sustainable preservation for the twenty-first century*'. In Access in the Future Tense. Washington, D.C.: Council on Library and Information Resources.

<http://www.clir.org/pubs/reports/pub126/pub126.pdf> [Accessed: 19.12.05]

Lev, B and Zarowin, P, 1999 *The Boundaries of Financial Reporting and How to Extend Them*, *Journal of Accounting Research*, 37: 353-385

Nationaal Archief of the Netherlands 2005, *Costs of Digital Preservation*. Digital Preservation Testbed: The Hague. <http://www.digitaleduurzaamheid.nl/bibliotheek/docs/CoDPv1.pdf> [Accessed 10.07.06]

NOAA 1993, Panel on Contingent Valuation, *Report: (Arrow, Solow, Portney, Leamer, Radner and Schuman)*.

Federal Register, 58. Washington DC, 1993

OECD, 1999. *The Future of the Global Economy*. Paris, OECD

OECD, 2000. *A New Economy?: The Changing Role of Innovation and Information technology in Growth*, Paris, OECD

South Carolina Public Library: Economic Impact Study (<http://www.libsci.sc.edu/SCEIS/home.htm>) [Accessed: 19.12.05]

Szulanski, G (1996). '*Exploring internal stickiness: networks and networking*', *Strategic Management Journal*, 17 (Winter Special Issue), pp27-43

Task Force on Archiving of Digital Information. (1996). Report of the Task Force on Archiving of Digital Information. Washington, D.C. and Mountain View, Calif.: Commission on Preservation and Access and Research Libraries Group, Inc. (<http://www.rlg.org/ArchTF/>) [Accessed: 19.12.05]

Teece, , D.J, 2000, *Managing Intellectual Capital*, Oxford University Press, Oxford.

Webster, E M, 2000, '*The Growth of Intangible Enterprise Investment in Australia*', *Information Economics and Policy*, 12, 1-25

Wenger, E, 2000, *Communities of Practice: the structure of knowledge stewarding*, in C Despres and D Chauvel (eds) *Knowledge Horizons*, Boston, Mass, Butterworth Heinemann.