NDIIPP Partner Perspectives on Economic Sustainability

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Abstract

This article presents results from the National Digital Information Infrastructure and Preservation Program (NDIIPP) Digital Preservation Sustainability Working Group survey, conducted in 2007. The Library of Congress initiated the working group to gather information about significant issues relating to the economic sustainability of activities that support digital stewardship. The group decided the most useful method to collect information was through a series of structured telephone interviews involving several open-ended questions. Eleven NDIIPP partners were invited to participate. Interviews gathered qualitative information about a variety of economic sustainability issues, including developing business cases, implementing business models, measuring costs, and developing a stable economic basis for digital preservation programs. Survey results revealed a mix of consensus and division on various issues and shed interesting light upon the sustainability of preservation programs generally. The article provides an overview of the survey and its methodology, categorizes the responses, and draws some high-level conclusions. While the survey results should be viewed within the context of NDIIPP, they may be useful for archives, libraries, and other preservation institutions as they consider economic sustainability issues.

Introduction

The economic sustainability of digital preservation programs has been among the core concerns of the Library of Congress National Digital Information Infrastructure and Preservation Program (NDIIPP) since the beginning of the program.[1] When NDIIPP was established in 2000, the Li-

brary understood that digital content represented a new—and potentially expensive—challenge for preserving institutions. Resources were needed to build the tools, services, systems, and other infrastructure components necessary for digital stewardship. Additional resources would also be required on an ongoing basis to maintain the security, integrity, and usability of digital collections. *Preserving our Digital Heritage: Plan for the National Digital Information Infrastructure and Preservation Program*, outlined the issue in blunt terms. In a section labeled "Who Pays?" the plan noted that "distribution of costs among the stakeholders . . . will be a crucial sticking point in the development of any sustainable preservation infrastructure," and stated a need for "cost modeling and development and testing of business models" (Library of Congress, 2003, p. 30).

As part of its effort to fulfill this intent, the Library of Congress formed a Digital Preservation Sustainability working group in May 2007. Made up of library staff and volunteers from the NDIIPP partnership projects (see Table 1), the group's objective was to learn more about issues associated with the economic sustainability of activities that support digital stewardship. While the group never adopted a formal definition of economic sustainability, a description offered by Lavoie and Dempsey ("the ability to marshal sufficient resources, on an ongoing basis, to meet preservation objectives" [2004]) fit its interest. After some deliberation, the group decided the most useful method to collect information was through a series of structured telephone interviews involving a limited number of open-ended questions. This qualitative approach seemed suited to the situation. Institutions engage in digital preservation for various reasons, work with different kinds of materials, and have divergent policies. Some programs have been operational for a decade or more, others are comparatively young. Budgets, infrastructures, and other resources vary greatly, as do ideas about how best to sustain those resources. Capturing details about these multiple realities required tapping into individual perspectives to understand the context in which programs operate. Trends and patterns could then be extracted from the survey data.

Table 1. Membership of the NDIIPP Digital Preservation Sustainability Working Group

- Francine Berman, University of San Diego, San Diego Supercomputer Center
- Patricia Cruse, California Digital Library
- Eileen Fenton, Portico
- Michelle Gallinger, Library of Congress
- Kristine Hanna, Internet Archive
- Lisa Hoppis, Library of Congress
- Keith Johnson, Stanford University
- William "Butch" Lazorchak, Library of Congress
- William LeFurgy, Library of Congress
- Beth Sandore, University of Illinois Urbana-Champaign
- Katherine Skinner, Emory University
- Abby Smith, Library of Congress Consultant
- Irene Taylor, Public Broadcasting System

   After reviewing literature with a bearing on economic sustainability of digital materials (Blue Ribbon Task Force, n.d.), the working group developed basic questions relating to business cases, business models, costs, and related topics.[2] Each of these questions had a number of "probe" sub-questions that could be asked to elicit additional details (see Table 2). In terms of interview subjects, the decision was to focus on representatives of eleven current NDIIPP partnership projects (see Table 3); the program had invested significant resources with these partners and all were undertaking large-scale preservation activities. The intent was to have respon-

Table 2. NDIIPP Digital Preservation Sustainability Working Group Questionnaire

1. What is the value proposition or "business case" that you have presented to decision makers and/or funders about the value of your digital stewardship program?
2. How do you describe the value of your content for the institution, its stakeholders, and society in general?
   a. How do you describe the value of your services?
   b. How do you describe the consequences if your program went away?
3. How would you describe your "business model," that is, operational strategy?
   a. What are your top three (or more) revenue streams? How important is fundraising, grants, and other "soft money"?
   b. Who are your primary customers?
   c. Do you have formalized relations with others through Service Level Agreements, MOUs, contracts, or other defined arrangements that specify services? To what degree do you depend on external partners for services?
   d. How mature would you say your business model is? To what extent has it been tested?
4. What are the costs associated with your program?
   a. What are your top five "cost drivers" (staff, contractors, facilities, IT infrastructure, acquisitions, etc.)?
   b. What expenses do you pay for directly? What expenses are paid for by a parent organization (examples are utilities, facility costs, etc.)?
   c. Have you categorized costs for digital stewardship services (such as a breakdown by work flow or life cycle stages)? If yes:
      i. What are your findings?
      ii. What is your methodology?
      iii. How well does the LIFE project methodology (see attached) compare to what you are doing?
   d. If no:
      i. Do you plan to do so in the next 18 months?
      ii. Do you have a methodology in mind? To what extent do you think that the LIFE project methodology could be useful if you were to evaluate costs?
      iii. What do you think is involved in establishing a stable economic model for your program?
   e. To what extent do you think a network of collaborating partners can help in establishing and sustaining such a model?
   f. What role do you think the Library of Congress (or other similar organizations) should play in helping you establish and sustain such a model?
   g. Does your program have concrete plans for operations beyond the time frame of NDIIPP funding?
   h. What are the primary uncertainties regarding the sustainability of your program?
5. What else do we need to know about how your program operates in connection with sustainability issues?
   a. What would you like to know more about in terms of the sustainability challenge?
   b. What would you like to know more about in terms of what others are doing?
   c. What would help you in your effort to manage sustainability issues?

Table 3. NDIIPP Digital Preservation Sustainability Working Group Interviewees

- Larry Carver (National Geospatial Digital Archive, University of California, Santa Barbara)
- Patricia Cruse and Kirsten Nielsen (Web-at-Risk, California Digital Library)
- Eileen Fenton (Portico)
- Myron Gutmann (Data-PASS, Interuniversity Consortium for Political and Social Research, University of Michigan)
- Martin Halbert (MetaArchive, Emory University)
- Kristine Hanna (Internet Archive)
- Chris Jordan, Ardys Kozbial, Robert McDonald, and David Minor (San Diego Supercomputer Center, University of California, San Diego)
- David Kirsch (Birth of the Dot Com Era, University of Maryland)
- Steve Morris and Zsolt Nagy (North Carolina Geospatial Data Archiving Project, North Carolina State University/North Carolina Center for Geographic Information & Analysis)
- Vicky Reich (LOCKSS, Stanford University)
- Nan Rubin (Preserving Digital Public Television, Thirteen/WNET)
- Beth Sandore (ECHO DEPository, University of Illinois at Urbana-Champaign)

dents discuss their NDIIPP project in the context of their overall digital stewardship activities, and the questionnaire was provided to the participants in advance of the interviews. Library staff conducted the interviews and prepared transcripts in collaboration with participating partners. The results of the survey were discussed during the July 2007 NDIIPP partners meeting held in College Park, MD.

After analyzing and categorizing the data, the most effective way to summarize results was to rely on a structure of four topics that interviewees discussed at length: (1) making business cases; (2) operating business models; (3) measuring costs; and (4) establishing sustainable programs. To encourage candor, each of the interviewees was informed that the library intended to use the interview transcripts for internal purposes only. For this reason, no partners are identified with any specific statements or opinions in the analysis below.

Making Business Cases

The first question related to business cases used to obtain funding or other kinds of support needed to undertake or expand digital preservation activities. A business case is here defined as a set of justifications that help organizations decide to start a project or expand an activity. The respondents indicated that making a case for digital preservation—some NDIIPP partners referred to "the value proposition"—is not a simple task. While it is clear that there is a considerable amount of digital information with long-term value, there are many uncertainties about what to collect, how to keep it, how to make it available to users, how much it will cost to maintain, and who will pay. Most of the partners stated that their institutions currently do not have robust budgets or capacities for the long-term management of digital content.

NDIIPP partners interviewed had at least two distinct audiences for the business cases they used to seek additional resources for digital preservation activities. One audience was the parent institution and the other was an external funding body, such as the Library of Congress or the National Science Foundation. Generally speaking, institutional business cases focused on meeting a locally defined need, while those aimed at external funders stressed broader, more nationally-oriented objectives. A particularly interesting finding of the survey was that many partners blended appeals to both internal and external audiences. External success was also leveraged internally. More than one partner stated that involvement with the library was a key component of business cases aimed at internal decision makers. "The partnership with the Library of Congress has been one of the most valuable things in helping us do this [make an internal business case]," said one interviewee. "The Library of Congress has a lot to offer in terms of helping programs establish stable economic models," said another. "The Library's credibility . . . is very important conceptually."

A common type of business case reported highlighted the importance of bridging the traditional work of libraries, archives, and other preservation organizations with the demands of the digital world. Respondents said they stressed that preservation organizations serve an important role for parent institutions and society at large by collecting and making available information for current and future users, and that continuing this role necessitated working with rapidly growing volumes of rich, and at risk, digital material. A pillar of this line of argument for some partners was that digital preservation fulfills an institution's historic mission in preserving specific categories of information, regardless of format. Partner business cases also included statements that digital preservation efforts can yield important benefits for a parent institution in terms of meeting internal needs. Examples given for this include enabling separate parts of a large organization to collect and store digital content through centralized management, and helping an organization meet preservation and access requirements imposed by an external funding body. A related business case justification stressed the high economic investment already made in acquiring information such as scientific data or licensed electronic journals, and the need for a preservation solution to protect that investment.

Most respondents said their business cases stressed access to digital content, since access was easier for funders to understand and appreciate. A number of partners mentioned the importance of making the case for specialized services and expertise that enhanced access. One interviewee described his program's "unique curation capacities," and another spoke of significant effort to "display the content in such a way that it is easily accessible, relevant, and its value is apparent." Someone else spoke of the entirely new kinds of research access that their digital preservation

program could support, such as "meta-analysis," data mining, and data aggregation. Others described how their preservation activities involved forming and managing multiple agreements with libraries and with rights holders to ensure ongoing access to digital materials. These points reflect a common thread in many of business cases discussed: the value of content is interwoven with the services that stewardship organizations provide. It is not enough to simply save the bits; the information must be maintained within a highly specialized knowledge environment.

Many partners described justifications for forming and joining preservation networks to meet broad goals funded at the national level. A number of business case discussions went into detailed considerations of the value of such networks, including the need for economies of scale and the cost-effective benefits of centralized management. Nearly every partner presented information about how working collaboratively with other organizations made sense in terms of tackling digital preservation challenges from a practical standpoint. Some business case arguments addressed community needs for developing new tools, services, and practices to make digital preservation easier and cheaper. Others stated they had demonstrated credible long-term preservation solutions that were both low cost and protected against single points of technical or other failure. Several respondents emphasized the importance of solving problems for stakeholders, such as helping manage restrictions while enabling access to information. Two partners were helping state and local governments address mandates to preserve digital publications and records, an activity the jurisdictions could not otherwise undertake.

Operating Business Models

For the purposes of this paper, the term *business model* refers to how a digital preservation program or activity operates, including how it acquires and allocates its resources. A business model also relates to the methods used to meet the needs of customers, however they are defined. The NDIIPP partners covered by this survey had an overlapping mix of customers, which included information creators, rights holders, academic researchers, students (all grade levels), institutional administrators, government officials (all levels), and consortial partners, including a variety of preservation institutions.

Digital preservation is an emergent activity. There is no established technological model and relatively few established practices or standards at this point. There is a high-level consensus about the need for controlled processes to properly care for information of long-term value; for example, the Digital Curation Centre in the United Kingdom states that "Digital curation, broadly interpreted, is about maintaining and adding value to a trusted body of digital information for current and future use."[3] But there are differences in how institutions work to meet this goal. Vari-

ables include complexity of content types, requirements of individual user communities, and levels of institutional capacity. There are differences of opinion about the relative long-term urgency of format migrations, software emulation environments, and detailed metadata schemes. Some entities rely on a centralized organizational infrastructure while others are comfortable with a more distributed approach. In short, there can be substantial variance among different institutions undertaking digital preservation. This extends to cost: some approaches are more labor and infrastructure intensive than others. These circumstances make it difficult to compare business models against a single set of measures.

The NDIIPP partners surveyed all discussed this uncertain landscape at length. Each of them expressed concern about the dynamic nature of digital stewardship. Content is seen as rapidly evolving, as are the needs of users and other customers. There is pressure on stewards to adapt and remain relevant in this changing environment. A common approach mentioned by all the respondents was to form partnership alliances with other entities for economic benefits, to learn new practices or techniques, and to take advantage of specialized capabilities in areas such as data storage and content collection. This has resulted in diverse quid pro quo arrangements: rather than focusing on purely institutional needs, the NDIIPP partners are contributing to and receiving value from a broader community. According to respondents, since digital preservation is an emerging activity, it typically has been implemented as an "add-on" to existing institutional programs. The technological environment and expertise needed for the work are not compatible with the infrastructure in place for traditional analog collections. Several respondents mentioned that expansion of digital preservation programs required budget reallocations from other activities, which generated resistance. This factor was cited as a hindrance to developing more robust digital preservation business models.

The surveyed partners can be grouped roughly in terms of the maturity of their business models. One set of partners has a preservation track record that began before receiving NDIIPP support, and the other set dates from that support. The more mature programs have a clearer idea about the sustainability of various revenue streams and how to operate over the long term within defined budgets. Some of the newer projects explicitly aim for self-sustaining operational status; others are more concerned with solving a particular problem or influencing community practices. All the respondents were keenly aware of the economic vulnerability of their preservation efforts, and all were engaged in a variety of ways to address the problem. What is striking, however, was the degree to which even the most established NDIIPP partners were worried about the long-term viability of their business models. Respondents worried that budgets could be cut at any time, and stressed that it was essential to keep reminding funders of the value resulting from their efforts. In large

part this nervousness stems from a heavy reliance on "soft money" such as grants and short-term contracts. There was a clearly recognized need to move toward stable funding through a combination of fees and long-term institutional commitments. Mature business models also tended to focus primarily on operations that acquire and maintain content under stewardship, while emergent projects concentrated on developing new tools, services, and practices, including engagement with specific content communities. These approaches are not mutually exclusive, of course; doing one typically means doing at least a bit of the other. Nevertheless, the former tend to focus on improving or extending an existing operation while the latter resemble entrepreneurial "start ups" working to develop a promising idea with less assurance of ongoing life. It is worth noting that this diversity among the NDIIPP partners is quite deliberate on the part of the Library of Congress. Just as a healthy economy requires start-ups and established business, advancing digital preservation requires a mix of players at various stages of development.

The surveyed partners reported a number of revenue streams from within the parent institution and from outside of it. Types of revenue mentioned include:

- institution budget line items/overhead;
- grants (e.g., National Science Foundation);
- contracts for services;
- fees paid by individuals and entities to access and use content;
- fees paid by consortial partners;
- payment for instructional activities;
- donations (cash, equipment, in kind).

Several respondents expressed a desire to establish an endowment to support stewardship activities, although no one had set one up. In addition to exploring revenue sources, some partners mentioned specific strategies to keep costs low, including reliance on open-source software, minimal hardware requirements, and outsourced storage.

Measuring Costs

The group that prepared the survey questions was interested in learning more about the usefulness of cost metrics. Economic sustainability arguably turns on a program's ability to conduct necessary functions within defined cost parameters, and doing this requires some understanding about what those functions cost, now and in the future. But preservation institutions are still working to improve their overall understanding about how best to carry out digital stewardship, and since the related tools, services, and requirements are still in formation, even current costs can be difficult to measure. Despite these challenges, the survey found that all partners have at least a general awareness of their current cost categories. Some

partners have developed detailed internal methodologies for identifying and forecasting preservation costs.

Every partner surveyed described staff as the highest cost: their budgets allocated over 80 percent of resources to staff. Storage was the second largest cost, trailed by an assortment of charges relating to hardware, facilities, and other services. Given that staff costs were so large, respondents were encouraged to provide further details about how staff resources were deployed. Most partners stated that activities associated with ingesting data into holdings were the most labor intensive activities. Work connected with ingest included much time devoted to "data wrangling," which variously involved transferring data from creators; verifying that the data is what it was expected to be; associating metadata with files or objects; preparing submission ingest packages; overseeing ingest into a repository system; and validating ingest results. Often this work entailed substantial human intervention, as the data could vary in terms of file and metadata characteristics. Tools used to manage the data also required frequent adjustments and workarounds. The consensus among interviewees was that their practices were still at a developmental stage: staff was needed to refine systems and wrangle data ingests. A common desire among the partners was for more reliance on automation to make ingest cheaper and more efficient. One partner stated that in reviewing their overall infrastructure, "everything will scale except staff."

Demands on staff also related to providing access to collections through development of metadata, Web access tools, and other means. Some partners noted substantial staff resources went to managing rights and restrictions associated with digital materials. This took the form of protecting against release of privacy-related information and applying the terms of licenses or contracts with rights holders for information under copyright. Other staff costs pertained to activities described as administration, research, project management, information technology support, preservation planning, and legal advice and representation. Several partners talked about the importance of staff outreach to network partners to exchange information about best practices and lessons learned, as well as to manage agreements and other collaborative relationships.

Storage was a cost incurred by all the partners, although they had different methods for acquiring and managing storage resources. The three basic methods mentioned during the interviews were: (1) operating a stand-alone data center; (2) contracting with a third party; and (3) joining consortial relationships for shared distributed storage. Some partners used a combination of methods, primarily to ensure against data loss. In some cases involving licensed online content, storage was regarded as akin to an insurance policy—institutions paying for such content want provisions for continuing access if the provider goes away.

The Life Cycle Information for E-Literature project, a collaboration between University College London and the British Library, developed

a methodology to estimate preservation costs over long time periods.[4] LIFE offers one way to categorize and measure costs, and the group that developed the survey questions wanted to know if the methodology had relevance for the NDIIPP partners. The inquiry generated a range of responses. In some instances these opinions were rooted in fundamental attitudes about quantifying costs associated with digital preservation. Some partners were interested in obtaining a fine-grained understanding about costs associated with their own preservation programs, often because they needed to do so for their own internal planning. In such cases there was a sense that program management and strategic planning could benefit from deconstructing what appeared to be opaque bundles of costs for complex activities such as ingest. Several partners expressed a desire to adapt and apply the LIFE methodology to at least a limited extent. Other partners were less enthusiastic.

LIFE is not alone in studying cost models for digital preservation or in regarding a deeper understanding of those costs as important (Digital Preservation Coalition, n.d.; Chapman, 2003; Oltmans, 2004). And, as noted above, some NDIIPP partners feel strongly that costs transparency is essential to properly tune their business models. Yet perhaps the most surprising finding of the survey was that more than one partner questioned the appropriateness of measuring costs at all. The viewpoint here was that money is only one factor in determining the sustainability of a stewardship program; other factors include policies, incentives, technology, and ultimately the value of services provided. Why, it was asked, should attention be focused exclusively on measuring costs? Focusing on costs was even regarded as potentially dangerous. Providing information about the money going into preservation might be an invitation for cuts, as most administrators believe that access is the primary goal. From this perspective, a program with one bundle of cost is easier to defend if the program can be linked in whole to a clearly understood benefit. Partners making this case also pointed out that no one had yet asked them to measure costs, and there was institutional comfort with bundled budgets for digital stewardship. Another line of argument made by some respondents was that the technology, practices, and goals of digital preservation are in flux and there is no solid basis for predicting what will be done in the future or how much it will cost. It may not, for example, be necessary to perform format migrations as frequently as now projected.

Establishing Sustainable Programs

The final line of questioning asked partners to identify what they thought would be necessary or helpful to enhance the long-term prospects for the economic sustainability of digital preservation, either for their own program or more generally. What was most remarkable about this part of the survey was that it exposed four rich veins of strategic thought. One

group of answers touched upon the need for programs to make an effective business case for digital stewardship, both within parent entities and to audiences beyond. An immediate challenge identified was a pressing need to establish digital preservation as a separate function, rather than as an add-on to a more traditional existing program within the parent institution. One way to do this, suggested a respondent, was to provide access to digital content that is in high demand from users; this not only demonstrates the value of the overall program, it can directly help sustainability through user fees. Other partners stressed making a case for digital preservation with data creators. The key to success here was seen as enabling a "low friction" method to implement preservation services by: (1) showing how they met practical needs, and (2) relying on existing infrastructure to do the job. Some partners saw a need for broad changes in the incentives for information creators to support preservation activities, while others saw a pressing need to obtaining larger amounts of programmatic funding relative to grants and other "soft money."

A second group of answers clustered around the need for more robust stewardship tools, services, and programs. The perception of digital preservation as a new, untested, and unfamiliar activity reduces the confidence that funders and others may have. A closely related point made is that much more effective automation is needed to reduce the current high levels of human intervention in the preservation process. One partner said that it was essential for digital stewards to identify and understand their costs to enable sound strategic planning. Other answers focused on the need to eliminate single points of failure for preservation activities by keeping costs low, technology simple, and content spread among geographically dispersed partners. Some respondents stressed the urgency of meeting and keeping up with rapidly changing user needs, stakeholder requirements, and other expectations placed on digital stewardship programs. Failure to do so could lead to diminished relevancy, which harms sustainability prospects.

The third grouping of responses was in connection to the usefulness of preservation partnership networks such as that assembled by NDIIPP. Everyone agreed that networks were important and useful, and more than one respondent said that effective, large-scale preservation would not be possible without collaborative networks. The major perceived value of networks, both in terms of what they now deliver and what they promise for the future, is that they provide shared services, such as distributed collection, storage, and access mechanisms. They also are seen as enabling economies of scale, which is significant given the current high cost of digital stewardship infrastructure. One respondent likened the challenge of digital preservation to global warming in that solutions to both involve many players acting together, motivated by both self-interest and a desire to contribute to the greater good. At the same time, it is recognized that

more work is needed to improve tools, services, and operational models for preservation networks. There are also differing commitments to sustain networks. One partner stated that it was unlikely that his consortial group could continue once NDIIPP funding is exhausted. Several others, however, stated that they were putting arrangements into place to ensure that their network relationships would continue beyond NDIIPP.

A forth cluster of answers related to the role of the Library of Congress in helping institutions work toward economic sustainability. The Library of Congress was credited for leading by doing—that is, by asserting leadership through active work to preserve content through its partners and by supporting development of improved methods and practices. Another area of acknowledgment for the Library of Congress was in lending its recognition or "brand" to the work. Many partners stated that their connection with the library brought enhanced attention within their parent entities, which led to increased resources. Others said that association with the library gave them expanded reach to stakeholders and enhanced credibility in their efforts.

Conclusion

While the economic sustainability of digital preservation programs are of broad concern, this survey and its findings must be viewed within the context of NDIIPP. The NDIIPP program framed economic sustainability issues in a certain way in forming its overall strategy and in selecting the partners to help address that strategy. Since conducting the survey in 2007, moreover, the program has added new partners from state government agencies[5] and commercial digital content creators;[6] inclusion of these partners would quite likely have changed the results. For these reasons, it is impossible to say with precision just how representative the survey results are for the digital preservation community overall. But it is justifiable to claim that the results outlined here do help illustrate the complexity of issues associated with the economic sustainability of digital preservation activities.

Digital preservation programs are, for the most part, newly formed and function in a dynamic environment of changing technologies, user expectations, and institutional requirements. There are divergent ideas about how best to justify preservation, how to do it, and how to think about costs. Digital preservation will need further maturation to determine if areas of agreement can expand. The work of the Blue Ribbon Task Force on Sustainable Digital Preservation and Access, funded by the National Science Foundation and the Andrew W. Mellon Foundation to "develop a set of economically viable recommendations to catalyze the development of reliable strategies for the preservation of digital information" will also help (see http://brtf.sdsc.edu).

There are grounds for substantial optimism. NDIIPP partners have had nearly five years to investigate preservation models and practices, and solid results are evident. The partners interviewed have developed effective business cases and are actively engaged in making them better. Programs have shown particular strength in linking the value of content to the quality of the institutional stewardship services. These arguments, along with continuing work to meet the needs of information users and other customers, will contribute to the flow of resources to preservation activities. Programs will continue to operate in accordance with varied business models, but the embrace of a distributed, consortial approach should bring about adoption of more common tools, services, and practices. Recognition that "everything but staff will scale" should lead to more robust and efficient repository systems. Programs also are keenly aware of the need to decrease reliance on grants and develop more sources of ongoing programmatic funding.

Measuring digital preservation cost is a divisive issue. To this point there has not been much demand on the part of funders (internal and external) for cost metrics, but it is uncertain if this will continue. Some preservation programs currently feel strongly that categorizing costs is essential for sustainability, and if those programs prosper there may be more incentive for others to follow their lead. The LIFE project blazed an important new path in its efforts to develop a cost measurement methodology, and its follow-on project, LIFE2, is continuing this useful work. There appears to be substantial room for developing other cost measurement methodologies, particularly in exploring different kinds of digital materials and institutional practices. Establishing and maintaining a stable business model is essential, and most of the partners surveyed expressed concern about challenges in this area. The collective sense of the respondents was that there were interrelated paths to stability, such as presenting compelling business cases, building more robust and efficient preservation programs, and working within a network of preservation partners. In addition, the Library of Congress is clearly seen as having a role to play as a digital stewardship advocate and leader.

Notes

1. See the NDIIPP website for the history and background of the program, http://www.digitalpreservation.gov.
2. Many of the sources identified by the group are also listed in the bibliography of the Blue Ribbon Task Force on Sustainable Digital Preservation and Access (n.d.).
3. The Digital Curation Centre focuses upon the broad sweep of preservation institutions and their work: "The digital archiving and preservation community now looks beyond the preservation, cataloguing and cross referencing of static digital objects such as documents. The scientific community has data characterized by structure, volatility and scale. These require us to extend our notions of curation. We must also investigate the principles that underlie appraisal, and lessons learnt about the economics of preservation" (n.d.).
4. Subsequent to the survey, the LIFE project moved to second phase, LIFE2. See http://www.life.ac.uk/.

5. For information on the Preserving State Government Information initiative see Library of Congress (n.d.).
6. For information on the Preserving Creative America initiative see Library of Congress (2007).

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