

Report--CONSER PURL Pilot

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I. PURPOSE

The purpose of the CONSER PURL Pilot was to test cooperative maintenance of URL links to freely-available e-resources through an OCLC-hosted PURL server.

II. SUMMARY

Beginning January 21, 2002, seven CONSER institutions participated in the pilot. By the end of March, participants had entered 1170 PURLs and had processed error reports for ten weeks. The participants felt that the CONSER PURL Server was easy to learn and to use, and that the CONSER PURL Server should become a PCC PURL Server, for use by all PCC members wishing to have a coordinated method of maintaining the URLs in free resources.¹

III. OUTLINE OF SPECIFIC RECOMMENDATIONS

1. CONSER should continue to use the PURL Server. CONSER PURL participants should receive credits for the creation/maintenance of PURLs.
2. CONSER should recommend to PCC:
 - o Expansion of the PURL Server to BIBCO participants;
 - o Creation of a PCC oversight group to consider training, documentation, or policies needs, including general database concerns (e.g., the problem of never-maintained PCC PURLs or duplicate PURLs);
 - o Continuation of the current policy permitting use of the PURL Server for records for freely-available e-resources, so that PCC participants could use PURLs in both PCC and non-PCC records as needed.
3. CONSER should recommend that OCLC consider:
 - o Revision of PURL registration (if necessary) so that PCC may expand use of the PURL Server to all BIBCO participants;
 - o Continuing to maintain the PURL Server as a separate service so that non-OCLC BIBCO participants can participate;
 - o Integrating some functionality into the OCLC online cataloging service to
 - (minimally:) allow OCLC users to find the OCLC PCC PURL Server;
 - allow catalogers to check for duplication & then create PURLs while cataloging a new resource;
 - allow users to view PURLs and related URLs in a structured manner through OCLC;
 - o Enhancing single-PURL creation by
 - Moving explanatory text to the bottom of the PURL search screen, so catalogers do not need to scroll to the bottom of the page for each use;
 - Putting a button to the "create" screen from the search screen used to check for duplicates. (Also consider having a navigation bar, to allow one to move quickly from one screen to another);
 - Showing the e-resource in a separate window rather than in the same window, during the PURL creation process. (That will prevent problems that occur when e-resources grab control of the window.);
 - o Enhancing batch creation and modification to make them easier to use
 - Allow users to enter a list of URLs in plain text (i.e., without the XML tags) ;
 - Consider a "find and replace" batch-modify, to correct domain name changes that affect hundreds of URLs;
 - o Enhancing the PURL error reports by
 - Creating a monthly report to identify PURLs for the same URLs (to catch duplicates from batch-PURL creation or convergences as PURLs are modified over time);
 - Creating a mechanism to check for duplication during one-at-a-time PURL creation;
 - Reducing false-drops by changing the time-out period.

IV. BACKGROUND

A. THE PROBLEM

URL maintenance is an area of ongoing concern for records with URL links. While some CONSER libraries have implemented maintenance procedures, correction often involves only local ILS records. Even when the OCLC master records are corrected, local access to e-resources may be disrupted, as the correction only affects one record. The same correction must be replicated in each copy of the record in order for users to benefit from the change.

One well-defined category of URL links is that for freely-available resources. This category was defined in this pilot to include e-resources represented by URLs, available to all libraries, and selected for cataloging by a CONSER/PCC library. Common examples of freely-available e-resources include international, non-US, US state, and local documents; e-resources created through grants and made available by educational institutions for general use; and web sites for NGOs. Excluded from the category are e-resources represented by GPO PURLs or other URL alternatives; links for these e-resources are already being maintained. Also excluded are e-resources with licensing or other access restrictions, since other mechanisms (e.g., DOI) are being developed to stabilize access to these resources.

Just how many records have links for freely-available resources is difficult to ascertain. However, some guideposts may be found. As of April 2, 2002, CORC reported 630,412 records with 856 fields. A small segment were PCC records—over 57,000; with about 25,800 CONSER records.² These totals underestimate the extent of URL links in PCC records, since URLs in non-856 fields and in certain 856 fields were excluded from the count and since some records have more than one URL. But, on the other hand, not all of these records represent freely-available resources. Yet even if only 15% of the PCC records have links to freely-available e-resources, then at least 8,000 PCC records would be candidates for inclusion in the OCLC PURL Server.

B. CONSER/PCC CONSIDERATIONS

The first question is: Why CONSER/PCC? That is, why should CONSER/PCC take a leadership role in URL maintenance for freely-available e-resource links through an OCLC-hosted PURL Server?

The response lies, in part, in the interest CONSER specifically (and PCC more generally) has in the accuracy and usability of its records. As previously mentioned, over 25,000 CONSER records have 856 fields, either as related links (using the single-record approach) or as primary links. This information, as much as any other, affects the usability of CONSER records. It is therefore important to make sure that this information remains current.

In some ways, change to the URL has a more immediate effect than some other types of descriptive/linking change. Outdated frequency data may mislead some record users, but may not affect access to issues of a serial. But if the URL on a record in our catalogs has moved, then our library users may no longer have access to the resource.

Another aspect of this question has to do with cooperation. As Bill Anderson so succinctly put it (CCM, Module 21), "Cooperation is key to CONSER's effective operation." CONSER has extensive experience with cooperative ventures and the need to work through complex problems in a way that promotes the quality of the CONSER database and trust in the work of other members. CONSER, and by extension PCC, is well-positioned to provide leadership in this sort of cooperative activity.

To what extent does PURL creation and maintenance fit the CONSER model? For freely-available e-resources, the OCLC PURL software offers an alternative that promotes currency of the national-level record and all local records by centralizing maintenance. At the same time, maintenance responsibilities are distributed among PURL participants, so that the burden of URL maintenance need not fall on any one institution.

Cooperation in e-resource maintenance would seem to fit well with the types of maintenance activities CONSER has always undertaken.

C. PURLs

Two additional questions follow right on the heels of the first: What are PURLs? And why use them?

The Persistent Uniform Resource Locator or PURL system was developed by OCLC in 1996 to establish a stable name for a resource. The structure of a PURL is:

[http://\[URL for PURL server\]/\[subdirectories\]/\[number\]](http://[URL for PURL server]/[subdirectories]/[number])

For example, a CONSER PURL looks like this:

<http://bibpurl.oclc.org/web/1022>

In a bibliographic record, the CONSER PURL is entered as the first subfield \$u:

856 4_ \$u <http://bibpurl.oclc.org/web/1022> \$u <http://www.mihan.net/>
 [Note: The second \$u shows the original URL; it is not maintained over time]

The PURL software provides a simple register that lists PURL, maintainers, dates of creation/ change, current URL, previous URLs, and comments associated with each of the previous URL. The CONSER PURL Server permits the following activities:

- Registration of new participants
- Log in/log out for registrants
- PURL/URL look-up service: To search the registry
- PURL creation
 - for single URL: To allow registrants to create a new PURL
 - for multiple URLs: To allow registrants to create a group of PURLs through a single request
- PURL modification
 - for a single URL: To allow registrants to associate an existing PURL with a new URL, if a website moves
 - for multiple URLs: To allow registrants to re-associate existing PURLs with a group of new URLs, if websites move
- Reports:
 - Link validation: For whole PURL database or for specific segments (based on authorization number, or based on OCLC symbol)
 - Total new PURLs: Report of sum total & listing of PURLs/URLs for whole PURL database or for a segment of the database (by date range, authorization, OCLC symbol, maintaining agency)
 - Total modified PURLs: Report of sum total & listing of PURLs/URLs that have been modified (by date range, authorization, OCLC symbol, maintaining agency)

As previously mentioned, a PURL has very little associated metadata. Looking at the PURL Server alone, one cannot see any descriptive information about the resource: title, publisher, limitations on use. Of course, if the PURL is searched in CORC, then any related OCLC records will display; so the information is indirectly available.

So, why use PURLs?

A short answer might be that OCLC is willing to host the PURL Server and support this cooperative tool. If OCLC determined (based on its interactions with the standards community) that PURLs should be replaced by another naming device, then OCLC might have a strong interest in helping CONSER/PCC migrate to that something else.

But other arguments could be adduced in favor of use of the PURL. For this particular category of e-resource, an OCLC-hosted PURL Server has several advantages not available through some other services. Most important, the OCLC-hosted PURL Server provides an environment for international cooperation. One might argue that the DOI (Digital Object Identifier) service would also offer an environment for cooperation. However, given the costs of DOI participation, the probability is slight that

all of the information providers who supply free access to e-resources would be willing to incur annual costs. On another tack, because OCLC is using the PURL with other library communities (e.g., the digital preservation initiatives), the PURL software is likely to continue to develop.

V. PURL Pilot

In May 2001, CONSER approved a pilot to test the use of PURLs for freely-available e-resource links in OCLC records. Staff at seven CONSER libraries volunteered for the pilot:

- Columbia (Charlene Chou)
- UCLA (Valerie Bross, Gergana Kodjebacheva, Luiz Mendes, Angela Riggio, Rita Stumps)
- UCSD (Becky Culbertson, Renee Chin)
- U of Chicago (Renette Davis, Merle Steeves, Renee Martonik, Mark Kennel, James Server, Michael D. Brown)
- U of Florida (Naomi Young)
- U of Oregon (Mary Grenci)
- U of Washington (Steve Shadle)

Between May and December, 2001, CONSER participants developed detailed procedures. At the same time, OCLC (under coordination of Eric Childress and then Susan Walker) revised existing PURL software to better accommodate CONSER activities, including weekly error reports for participants.

OCLC installed the new CONSER PURL Server on January 17, 2002. CONSER participants registered and began using the PURL Server after ALA midwinter, the following week. OCLC implemented PURL error reports the following month, on February 25th.

During the ten weeks covered by this report (Jan. 21-Mar. 31), participants created 1170 PURLs, and modified 48. The PURLs covered a variety of e-resources: monographs, integrating resources, and serials. Appendix A summarizes PURL activity of the participants. All of the participants in the pilot reported that the CONSER PURL procedure was easy to learn and that the PURL Server was easy to use.

VI. Benefits of the CONSER PURL Pilot

Participants in the CONSER PURL pilot reported several current and potential benefits:

- (1) Efficiency in correcting multiple copies of the record: Records with links to freely-available e-resources are found in our catalogs; and also, increasingly, in non-MARC spin-off databases. Currently, each instance of a URL must be changed separately.
- (2) Distribution of workload: As our collections of records for freely-available e-resources grow, error correction takes more time. For those resources shared among libraries, the OCLC-hosted PURL Server provides the cooperative advantage.
- (3) Flexibility for maintenance activities: The PURL Server moves URL maintenance outside the OCLC bibliographic record. This opens the possibility of extending maintenance to other members of the library community, while protecting bib record description and subject access of CONSER records.
- (4) Convenient link validation reports: OCLC provides weekly e-mail error reports for the CONSER participants. These reports include summary information as well as details.
- (5) On-the-fly institution-specific reports: In addition to link-validation reports, the CONSER PURL Server could create a number of other reports—lists of PURLs by user, institutional symbol, date range, partial PURL or partial URL, maintainer, or explicit maintainer.
- (6) Easy application within the cataloging process: The OCLC PURL Server responds quickly both for look-up, PURL creation, and PURL modification tasks. Usually, PURL creation adds less than two minutes to the cataloging process.
- (7) Local OPAC display: Very long URLs may create display or access problems in some ILSs (if the URL wraps to another line). The PURL provides a brief alternative.

- (8) Perk for PCC libraries: For PCC libraries that have not yet invested in a local service (e.g., local PURL Server or Handle system), an OCLC-hosted PURL Server provides an opportunity for enhanced maintenance of e-resource links.
- (9) Better historic record: PURL preserves an historic record of URL changes to e-resource location that, in conjunction with the Internet Archive, allow libraries to track e-resources.

VII. Limitations of PURL Pilot

Participants noted several limitations of the pilot. First, the time period for the pilot was relatively short. While we all tested the software, the time was not necessarily long enough for all questions to emerge. Second, the number of participants was small, under 25 people at seven CONSER libraries. So, the effect of simultaneous use of the PURL Server was not tested. Third, the number of PURLs is still small, and may have skewed our experience with the error reports. Three of the seven participants had under five "404" (URL moved) errors.

VIII. Conclusions

PURL Server and PCC:

Participants in the pilot generally felt that the pilot was successful. The Pilot provided a period where the functionality of the PURL Server could be tested in a cooperative setting, where documentation could be developed, and where common questions could be addressed. But now we need to consider the previously-mentioned limitations inherent in such test situation--the brevity of the pilot period and the small number of participants.

To address these limitations, participants recommend expanding use of the OCLC PURL Server for this next year. First, the Pilot participants recommend that CONSER continue to support use of the OCLC PURL Server and encourage more CONSER members to use PURLs in records for freely-available e-resources. Second, the participants recommend that PCC expand use of the PURL Server by including BIBCO institutions. Third, the participants hope that CONSER will support a recommendation that PCC take over oversight of the OCLC PURL Server.

As the PURL Server expands, the need for oversight will increase. Issues requiring coordinated management include (1) training for participants; (2) documentation for participants; (3) changes over time (how to redistribute responsibility when libraries de-select e-resources; how to deal with "residue"-PURLs that are not corrected within a year); (4) PURL database maintenance (e.g., to weed out duplicates) and (5) cataloging questions.

Regarding this last category, even during the brief pilot period, questions about PURLs melded into questions about cataloging e-resources over time. In fact, one of the benefits of the PURL maintenance is that one learns very quickly about limitations in existing rules and guidelines. If a PCC oversight committee were in place, these gaps could be more easily identified and the options articulated.

The PURL participants also considered and rejected certain recommendations. These recommendations are worth mentioning, in case they come up again. First, should a PCC PURL Server be limited to pcc records? The group consensus was that this would not be helpful. As with linking relationships in CONSER/non-CONSER records, the same PURL links may be spread over both pcc and non-pcc records. Second, should PURL maintenance be opened to all catalogers? Here, most members of the group felt that this would not be a good idea at this time. The PURL Server is very easy to use technically; but this technical simplicity masks complexities of responsible use.

PURL Server and OCLC:

Included among the recommendations in Section III are enhancements that we hope OCLC might consider. As it is, the stand-alone OCLC PURL Server has proven useful and effective. However, we would urge OCLC to consider also integrating aspects of the PURL Server into the OCLC interface so that catalogers can incorporate PURL creation directly in the cataloging workflow.

Maintaining a stand-alone PURL Server is important because it makes possible inclusion of non-OCLC BIBCO participants. In addition, libraries where initial URL maintenance is generally done outside the Cataloging unit could continue to involve this staff without fear of inadvertent changes to the OCLC master record. But some additional modifications of the software or its configuration would be helpful. In particular, if non-OCLC BIBCO catalogers are included, then some authorization mechanism would be needed, to allow them to register.

Another concern expressed by pilot participants is the problem of duplicate-checking and a possible increase in duplicate PURLs (i.e., PURLs representing the same URL) over time. Duplicate PURLs occur for several reasons. First, during the initial check, a cataloger may miss an existing PURL, due to the use of equivalent expressions. For example, ".../index.html" and ".../" often represent the same site. If a cataloger enters part of a URL in the PURL search form without care, then a duplicate may be created. Second, convergences may occur during the PURL modification process. Finally, batch-creation or batch-modification processes may result in duplicate PURLs. To assist in PURL duplicate detection, a report of duplicates would be valuable.

Some other modifications to the software, though not essential, would enhance productivity. First, if each task page had buttons to move to the other pages, we could move more quickly between tasks. For example, after checking for duplication on the "PURL Search Form," the next step is usually PURL creation; a button under the search box could speed the process along. Second, URL/PURL confirmation could be enhanced if the e-resource displayed in a separate window. One recurring problem now is that some e-resources grab control of the browser, so returning to the PURL screen from the e-resource is difficult.

In addition to the separate PURL Server component, greater integration with OCLC's cataloging service would assist both PURL creators and other OCLC users. Right now, only those who know about the CONSER PURL Server are able to see the history of a PURL, its current URL, and past associated URLs. If a CONSER PURL fails, trouble-shooting may be difficult for the general OCLC cataloger or for public services staff who use the OCLC system. At a minimum, a link on the OCLC CORC navigation bar could help steer non-CONSER catalogers to the CONSER PURL site. But even better would be to provide a view of the PURL record from within the OCLC service.

More radical integration would permit catalogers to create a PURL while cataloging.

Such integration would build PURL creation directly into the cataloging process for OCLC catalogers. Since OCLC is planning to use PURLs for other preservation initiatives involving CORC-like interfaces, perhaps the integration of some PURL functions might be folded into that effort.

CORC has several tools that might be modified to support PURL creation, display, and maintenance. First, CORC has a mechanism for identifying duplicate URLs. When CORC catalogers create a new record, the system checks for (and identifies other) uses of the same URL. This duplicate URL check is useful. If it could be directed toward the PURL Server and invoked at the time of PURL creation, then catalogers might avoid entering different PURLs for duplicate URLs.

Second, in Edit mode CORC has drop-down action menus at the end of each field in editing mode. If "create PURL" could be added to these action menus, then PURLs could be selectively created for those with appropriate authorization. A second option, to view the record for an already-created PURL, could also be included.

Third, in display mode, CORC does provide hyperlinked help to MARC fields. Perhaps similar look-up assistance could be added so that non-catalogers (acquisitions staff or reference staff) could also view information from the PURL records.

Conclusion:

Despite its brevity, the pilot demonstrated that the CONSER PURL Server could be used as a tool for creation and maintenance of PURLs in a cooperative setting.

Afternote

I would like to thank Eric Childress and Susan Walker for their help in setting up the CONSER PURL Server and for moral support during the pilot. Eric Childress provided essential support of our initial request for consideration of an OCLC-hosted CONSER PURL Server. Susan Walker's ideas for enhancement of the PURL software were excellent: email link validation reports; documentation ("Getting Started"); display of the PURL on the first screen for PURL creation; a variety of usage statistics reports. In addition, her helpful answers to our many questions was much appreciated.

Credit for ideas in this report goes to CONSER PURL Pilot volunteers; particularly to: Becky Culbertson, Renee Chin; Renette Davis, Mary Greci, and Naomi Young. Thanks are also due Luiz Mendes, Angela Riggio, Ron Watson, Steve Shadle, and Becky Culbertson for editorial revisions & suggestions.

vb 4/15/2002

APPENDIX A: SUMMARY STATISTICS, JAN.-MAR. 2002

	Columbia*	UCLA	UCSD	U Chicago	U Florida	U Oregon	U Wash
PURL Creation							
Serial	1	312	52	28	13	24	11
Monograph		170	5	6			
Integrating Resource	1	517		5		2	
PURL Modification							
Serial		4	1				1
Monograph		10					
Integrating Resource		18	3				
PURL Withdrawal							
Serial		3					
Monograph		2					
Integrating Resource		6					

Total created*	1170
Total modified	37
Total withdrawn	11

*23 additional PURLs created but not yet used in bib records and not reported during pilot

APPENDIX B: Some interesting additional information

For comparison, I asked Theodore Defosse for information about GPO's PURL Server. His responses were quite interesting:

- How many PURLs are currently maintained by the GPO PURL Server?
18,444 GPO PURLs [date of response: 30 March 2002]
- How often does GPO run link validation?
Weekly, over 2-3 days
- What kinds of errors are common?
"In the past, we typically just received about 10-15 '404' messages per report, with a few '500's' from Army sites (for security reasons). The ones that are worrisome are the '001' messages, as over 20 percent seem to be of this variety. Most always work, but there are a few which do not. The only ones which seem to always consistently work are the '200' messages. The '024' are also problematic, as the message seems to say nothing conclusive: whether they're dead, available, or need redirection, etc.

"As for in-house documents, the problems they pose is that our congressional databases do not return a message that the script can interpret as a '404'. Because of this, it took a while for us to discover a large number of congressional documents that went to a temporary URL..."
- What do you think would most improve the link-checking software?
"Our problems are probably unique as we had to make modifications to it [the PURL link-checking software] when GPO put in that exit page, plus we made initial modifications to their link-checking software when we first started using PURLs...

...
"That said, it would be nice if both PURL and URL were hotlinked, or, in the case of GPO, if it bypassed all the PURLs we created for in-house documents. Every PURL error regarding a GPO document has, at least 99 percent of the time, been a result of a typo, or use of a

'temporary database URL', etc. Addresses within our databases are actually already supposed to be permanent, with the PURL more a safety measure for whenever we use a new database."

APPENDIX C: SOME COMMON CODES REPORTED THROUGH LINK VALIDATION

The preceding appendix (Appendix C) includes references to errors reported by the link validation software. For the benefit of those unfamiliar with HTTP status codes, here are a few of the more common types, with an English language gloss. A full list of may be found at:

"Status Code Definitions (<http://www.w3.org/Protocols/rfc2616/rfc2616-sec10.html#sec10>)

"Status Codes" (<http://uclibs.org/maint/validate/status-codes.html>)

001	<i>Cannot resolve name</i>	URL contained a host DNS name that could not be resolved
004	<i>Timed out</i>	Communication with http server responsible for the resource identified by the URL timed out
024	<i>Disallowed: /robots.txt</i>	User submitted an entry that is disallowed because of an entry in /robots.txt file
200	<i>OK</i>	Request succeeded
401	<i>Unauthorized</i>	Request requires user authentication
404	<i>Not found</i>	Server has not found anything matching the request. No indication of whether the condition is temporary or permanent
410	<i>Gone</i>	Requested resource is no longer available at the server and no forwarding address is known. This condition is expected to be considered permanent
500	<i>Internal server error</i>	Server encountered an unexpected condition which prevented it from fulfilling the request

APPENDIX D: ALTERNATIVES TO URLS

In addition to PURLs, several alternatives to URLs are available. Handles, DOIs (an application of Handles), and OpenURL have received quite a bit of attention. Below is a brief comparison of these alternatives.³

(1) Handle System

The Handle system was developed by the Corporation for National Research Initiatives (CNRI) and first applied to a computer science technical reports project in 1994-1995

(<http://www.nla.gov.au/initiatives/persistence/P1part1.html>). The structure of a Handle is:

[Handle naming authority]/[name]

An example of a Handle might be:

cnri.dlib/april96-c.arms

...where the first part of the Handle identifies this as a CNRI Handle for an article in D-Lib magazine.

Handle servers provide a resolution service, management tools, and a proxy server. The proxy server is necessary, since Handles do not themselves include the http protocol.

Unlike URLs or PURLs, Handles may point to multiple locations, including an email address for contact information. And since Handle servers are registered centrally, a Handle may be resolved by any Handle server. That is, "cnri.dlib/april96-c.arms" may be directed to the CNRI handle proxy server (<http://hdl.handle.net/cnri.dlib/april96-c.arms>) or to the Library of Congress proxy server

(<http://hdl.loc.gov/cnri.dlib/april96-c.arms>). Both of these URLs resolve to: <http://www.dlib.org/dlib/april96/loc/04c-arms.html> where the D-Lib magazine article is located.⁴

(2) DOI System

The Digital Object Identifier (DOI) was developed by CNRI with the Association of American Publishers, implemented in 1997, and is currently managed by the International DOI Foundation. Based on Handle technology, the structure of a DOI is:

[directory code].[registry code]/[DOI suffix]

An example of a DOI might be:

10.1045/january2000-levy

...where 10 means "DOI"; "1045" is the code for D-Lib magazine; and "january2000-levy" identifies a specific article. The structure of the DOI suffix is up to the publisher; it may be structured or arbitrary.⁵

In addition to the ability to point to multiple locations, a DOI resolver stores metadata associated with a resource. The metadata elements of the INDECS standard (Interoperability of Data in E-Commerce Systems) were adopted for this purpose. Associated DOI metadata include administrative (id of registrant, authority for metadata, history of descriptive/rights metadata); descriptive (title, type (tangible or intangible), sensory mode (audio, visual, etc.), primary agent (e.g., creator), agent role), and rights management data.

According to the International DOI Foundation (IDF), current cost of obtaining a registry code prefix is \$1,000 (US); in addition, DOI registrants either work directly through the IDF as Registration Agencies (current annual fee is \$30,000/yr) or indirectly through associated Registration Agencies (which determine their own fee structures).⁶

(3) OpenURL

OpenURL is an identifier that works in conjunction with SFX, or similar services. The structure of an OpenURL is:

[base URL] ? [Query]

A simple example of an OpenURL might be:

<http://sfxserver.somewhere.org/menu?id=doi:10.1045/january2000-levy>

... where "sfxserver.somewhere.org/menu" is a local resolver that can interpret an OpenURL; and "doi:10.1045/january2000-levy" identifies the type of identifier (doi), the naming authority (d-lib magazine) and the resource id (january2000-levy).

OpenURLs may take other forms, depending on whether the query is a traditional "dumb" location or a metadata identifier ("genre=article&issn=1064-2776&volume=3&issue=10...").

For OpenURLs to be effective, several factors must be in place. First, the information provider must provide a hook to the resource. Second, the hook must be embedded in an OpenURL in a source (e.g., an OPAC record) that points to a local resolver. Third, a local resolver must be set up to intercept and interpret the OpenURL. OpenURL currently supports seven genres of resources: books, articles, proceedings, preprints, conferences, journals, and bookitems (parts of books).⁷

While all of these alternatives to URLs have some benefits, none of them actually solve the three critical problems that face those of us cataloging most freely-available resources. These three problems are: (1) the ongoing existence of the resource; (2) mutability of the resource; and (3) stable location of the resource. After all, unless the library has access to an archived version of the resource, there is no guarantee that information will persist unchanged; or that if it does persist, that it will stay in the same place.

What we can do is to try to minimize frustration of users of our records by keeping information up to date. In the case of PURLs in an OCLC record, since various libraries might choose to retain or delete URLs for use in their own catalogs, the fact that each PURL for a freely-available resource points to a single location may not be a critical problem.

ENDNOTES

¹ Based on responses to a questionnaire sent to the PURL Pilot volunteers on 29 Mar. 2002

² On Apr. 2, 2002, a Passport for Windows search reported 57,068 records ("fin ir internet and so dlc"). This search included only PCC records; but did not all records with 856 fields—just those with 856 second indicator blank, 0, or 1. 856 fields for related e-resources (second indicator 2) were not reported. The search for CONSER records repeated the first search, with an additional limitation by format ("fin ir internet and so dlc and ft ser").

³ Much of the information in this appendix is taken from an excellent publication by the National Library of Australia:

National Library of Australia, "Persistent Identification Systems: Report on a Consultancy Conducted by Diana Dack for the National Library of Australia," May 2001, <<http://www.nla.gov.au/initiatives/persistence/PIcontents.html>> (Mar. 7, 2002).

⁴ Two documents provided details for this segment:

Library of Congress, National Digital Library Program, "The Relationship between URNs, Handles, and PURLs," Aug. 12, 1997, <http://memory.loc.gov/ammem/award/docs/PURL-handle.html>, (Mar. 28, 2002)

Sam X. Sun and Laurence Lannom, "Handle System Overview," Feb. 2002, <<http://www.handle.net/overview-current.html>> (Mar. 28, 2002)

⁵ Priscilla Caplan, "DOI or Don't We?" *The Public-Access Computer Systems Review*, 9, no. 1, 1998, <<http://info.lib.uh.edu/pr/v9/n1/cap19n1.html>> (Mar. 6, 2002)

⁶ International DOI Foundation, "Overview: the Digital Object Identifier (DOI) System," 23 Feb. 2001, <http://www.doi.org/overview/sys_overview_021601.html> (Mar. 28, 2002)

⁷ Herbert Van de Sompel, Patrick Hochstenbach, and Oren Beit-Arie, "OpenURL Syntax Description" 16 May 2000, <<http://www.sfxit.com/openurl/openurl.html>> (Mar. 6, 2002); also: Herbert Van de Sompel and Oren Beit-Arie, "Open Linking in the Scholarly Information Environment Using the OpenURL Framework," *D-Lib Magazine*, v. 7, no. 3, Mar. 2001, <<http://www.dlib.org/dlib/march01/vandesompel/03vandesompel.html>> (Mar. 6, 2002)