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Turnaround Time Between ILLiad's Odyssey and Ariel Delivery Methods: A Comparison

Ruth S. Connell
Karen L. Janke

ABSTRACT. Interlibrary loan departments are frequently looking for methods to reduce turnaround time. The advent of electronic delivery in the past decade has greatly reduced turnaround time for articles, but recent developments in this arena have the potential to decrease turnaround time even further. The ILLiad interlibrary loan management system has an electronic delivery component entitled Odyssey. Odyssey has a setting that allows articles to be sent to patrons without borrowing staff intervention. Using the tracking data created by the ILLiad management system, the turnaround time data for two delivery methods, Ariel and Odyssey, was captured for two different aca-

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demic institutions. With the Trusted Sender setting turned on, Odyssey delivery was faster than Ariel for the institutions studied. [Article copies available for a fee from *The Haworth Document Delivery Service: 1-800-HAWORTH*. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2006 by *The Haworth Press, Inc.* All rights reserved.]

KEYWORDS. Odyssey, Ariel, ILLiad, interlibrary loan, document delivery, turnaround time

INTRODUCTION

Electronic document delivery has been a vital component to interlibrary lending and borrowing operations since the mid-1990s through the use of popular software programs such as Ariel, Prospero, and ILLiad. Ariel allows lending libraries to scan and send articles as .TIFF files to borrowing libraries via the Internet, eliminating mailing time and postage costs between the lending and borrowing libraries.¹ With the release of version 3.01 in 2001, Ariel includes patron delivery via e-mail or the Internet.² The ILLiad software also allows for articles to be received via Ariel. Once the .TIFF files are imported into ILLiad they are converted to .PDF, posted to a web server, and patrons are notified by e-mail that their article is available. Patrons can then go to the Web to view or print their request.

A new option for electronic article delivery emerged with the development of the Odyssey component of the OCLC ILLiad management software, released in April, 2003 in ILLiad version 6.2.0.1. Odyssey is a protocol that allows libraries using ILLiad to scan and send articles to one another from within the ILLiad software, essentially creating a conversation between two ILLiad servers that includes each library's transaction number as well as OCLC interlibrary loan number, if applicable.³

Perhaps the most important innovation in electronic document delivery using Odyssey is the Trusted Sender setting. If fully enabled, a borrowing library's ILLiad server can receive an article sent from a lending library via Odyssey, convert it to PDF format, deliver the article to the web, and notify the customer, all without staff intervention. A borrowing library must decide which of three levels of staff review/trustworthiness they use when implementing Odyssey: Always, Trusted, or Never. If set at 'Never,' all articles must be reviewed by a staff member before

conversion to PDF and notification of the patron can be made. All articles sent via Ariel are also subject to the required review process. If set at "Trusted," only articles from those libraries previously designated as Trusted Senders will be posted to a web server without staff intervention. If set at "Always," every article from every lender will be sent directly to the Web without staff intervention.

LITERATURE REVIEW

Turnaround time is one component to consider when measuring the performance of interlibrary loan departments, as well as measuring patron satisfaction with interlibrary loan service. For this study, turnaround time is defined as the period of time beginning when a patron submits an article request and ending when the patron is notified that the article had arrived. Turnaround time has been shown to be an important component of user satisfaction, though it is not the only determining factor.⁴ In 1996, Weaver-Meyers and Stolt discovered that although turnaround time has little relationship to patron satisfaction, there is a strong correlation between a patron's satisfaction and their perception of timeliness, defined as the "window of usefulness."⁵ Fong's analysis of the unsolicited comments from the participants in the Weaver-Meyers/Stolt study indicates that there was a "strong desire for speedier delivery," at least by those participants who left free-form, anonymous comments.⁶ Yang's 2002 study of customer satisfaction at Texas A&M University also indicates that user expectations for prompt turnaround have not waned, but expectations vary in what is acceptable turnaround time. Confirming results reported by Weaver-Meyers and Stolt, Yang also found that users do not require their turnaround time expectations to be met in order to rate service as "Satisfactory" or "Very satisfactory."⁷

Despite these results, libraries remain focused on using reducing turnaround time, often with the aid of new technologies. According to the 2002 ARL Assessing ILL/DD Services Survey, the time it takes from when a borrowing library sends an article request to a lender to when the borrowing library receives the item from the lender accounts for the majority of the turnaround time.⁸ The impact of electronic transmission (e.g., via Fax or Ariel) on reducing turnaround time has also been well-documented.⁹ However, because Odyssey is a relatively new delivery method, no turnaround time study has been done comparing

the turnaround time of unmediated electronic delivery (Odyssey with Trusted Sender) with mediated electronic delivery methods (Ariel or Odyssey without Trusted Sender).

PARTICIPATING LIBRARIES

Indiana University Purdue University Indianapolis (IUPUI) is a public, urban research university created in 1969 as a partnership by and between Indiana and Purdue Universities, with IU as the managing partner. Indianapolis is the capital and largest city in Indiana (population 860,000) and is centrally located in the state, approximately 180 miles southeast of Chicago, IL and 175 miles west of Columbus, OH. IUPUI has a Carnegie Classification of Doctoral/Research Universities—Intensive, with over 29,000 students and over 180 degree programs. The five libraries on the IUPUI campus (Medical, Law, Dental, Art, and University) are part of the Indiana University library system. Medical, Law, Dental, and University Library have separate interlibrary loan operations and separate OCLC symbols. The collections of the Ruth Lilly Art Library are listed under the University Library OCLC symbol, IUP, and are part of University Library's interlibrary loan operations. University Library serves approximately 26,000 students, including the undergraduate population, university administration, and all graduate and professional programs except for Law, Dentistry, and Medicine.

University Library's interlibrary loan operations consist of two full-time equivalent clerical staff and the equivalent of 2.0 full-time equivalent student workers (undergraduate and library science graduate students). There is a 0.5 full-time equivalent librarian administrator. In FY July 2004-June 2005, IUP received 9,861 interlibrary loan borrowing requests and filled 6,716, or 68%. During the same period, it received 23,677 lending requests and filled 15,317, or 65%. Turnaround time for all borrowing articles received via all methods was 7.46 days in FY 04/05.¹⁰ IUP has been using Ariel since 1998, Prospero from 2000-2003, OCLC ILLiad management software since August 2003 and the Odyssey component of ILLiad since February 2005.

Valparaiso University is a private 4-year liberal arts institution serving a primarily undergraduate student population with some graduate programs as well. The university is located in Valparaiso, Indiana, approximately 50 miles from Chicago. Valparaiso University has a Carnegie Classification of Master's Colleges and Universities I. Enrollment

consists of over 3,000 undergraduate students and over 300 graduate students, including a law school with an enrollment of over 500 students. The law school is served by a separate library with its own interlibrary loan program, and is not included in this study. VU's Christopher Center for Library and Information Resources uses the OCLC symbol IVU and employs one full-time paraprofessional Interlibrary Loan Manager and 1.25 full-time equivalent student employees. The Reference Services Librarian oversees the department and assists with day-to-day operations during busy time periods, and when the interlibrary loan paraprofessional is on vacation. During the time of this study, the Librarian spent about five hours per week working in ILL.

From August 11, 2004 until August 10, 2005, IVU received 10,015 borrowing requests and filled 7,905, or 79%. During the same period, they received 3,347 lending requests and filled 2,424, or 72%.¹¹ Turnaround time for all borrowing articles received from all sources was 10.79 days for the year listed above. For five months of this time period, IVU was not using Ariel or Odyssey, so all articles were received via surface mail or fax. IVU has been using ILLiad since August 2004, and Ariel and Odyssey since February 2005.

METHODS

IUP and IVU tracked the turnaround time for unmediated delivery via Odyssey and mediated delivery via Ariel over a three-month period from February 14 to May 15, 2005. The sample was taken during one of the busiest times of the semester to maximize the sample size. The ILLiad management system consists of a relational database, and each step in the interlibrary loan process is recorded in the database. Tracking turnaround time does not require exhaustive record-keeping by interlibrary loan staff, rather manipulation of the existing data using SQL queries to retrieve the information from the ILLiad database. Therefore, neither institution's interlibrary loan staff was required to alter their daily work habits in order to calculate turnaround time. The three-month period of study resulted in a combined sample of 2,195 articles.

Both institutions implemented Odyssey in February 2005. Because IVU did not have electronic delivery via any method until January of 2005, their interlibrary loan department had used a Custom Holdings path based solely on cost and location, regardless of the format of the item being supplied. In early February, in order to maximize receipt of articles via Odyssey and Ariel, the IVU Reference Services Librarian

created a Custom Holdings path for photocopy requests to identify libraries that did not charge interlibrary loan fees and supplied photocopies using Odyssey or Ariel. IUP had already prioritized holdings groups, who were free lenders and delivered via Ariel. Because Ariel is so widely used and Odyssey is an emerging delivery method, we decided it would be more difficult to receive articles sent via Odyssey. It was necessary to get as many articles sent via Odyssey as possible to collect enough data to make this study statistically reliable. Therefore, both institutions set their Custom Holdings paths to direct article requests to Odyssey institutions first, and then to libraries who send via Ariel. For example, the IVU photocopy Custom Holdings path was set up to identify lenders in this order:

1. Odyssey libraries located anywhere that do not charge
2. Ariel libraries located in Indiana that do not charge
3. Ariel libraries located anywhere that do not charge
4. Indiana libraries that do not use electronic delivery and that do not charge
5. Libraries in the Midwest that do not use electronic delivery and that do not charge
6. Libraries in the contiguous United States that do not use electronic delivery and that do not charge
7. Libraries in Hawaii, Alaska and Canada that do not use electronic delivery and that do not charge
8. Libraries that charge.

At the end of the three-month data-collection period, the IUP Interlibrary Loan Librarian created two SQL queries to retrieve the ILLiad transaction data. The first SQL query determined turnaround time for Odyssey with the trusted sender option turned on; in other words, unmediated turnaround time (see Appendix 1). The second query returned data to determine mediated electronic delivery turnaround time for both institutions. For this study, mediated requests are the equivalent of Ariel requests, although if an institution used Odyssey without the trusted sender option turned on, these articles would also be a part of this mediated subset (see Appendix 2).

In order to address the question of staff time devoted to electronic delivery processing, both IUP and IVU tracked the amount of time necessary to process article requests delivered electronically from other institutions by using a log sheet located at the Ariel receiving station. Each staff member who processed electronic delivery articles recorded

the date, start time, stop time, number of articles delivered to the Web, and number of articles with quality problems that were not delivered to the patron. The manually created log sheets were transferred to a Microsoft Excel spreadsheet in order to determine the total time spent processing during each session, as well as the averages for the number of articles sent to the Web, the number of articles not sent to the Web, and number of articles processed in one hour.

RESULTS

The following questions were studied:

- Is there a significant difference in the turnaround time between mediated and unmediated electronic delivery methods?
- How much staff time is devoted to processing electronically delivered articles that could be re-allocated if more articles were sent via Odyssey with Trusted Sender?

The SPSS statistical package was used to analyze the data and test if unmediated article delivery by Odyssey with Trusted Sender is significantly faster than mediated delivery by either Ariel or Odyssey without Trusted Sender. We used an independent samples *t*-test when analyzing the data, eliminating requests that took longer than 27 days to deliver by any method. We removed these outliers because these requests had problems unrelated to the turnaround time we were studying. This eliminated only 23 of 2195 requests (1%). Looking at the aggregate data, requests delivered via Odyssey (unmediated delivery) had a shorter turnaround time than those delivered via Ariel (see Table 1).

The data indicate a significant difference ($p < 0.001$) between delivery methods for the data as a whole. We then analyzed the data separately for each institution (see Table 2). The data indicate a significant difference ($p < 0.001$) between delivery methods for IUP alone. The difference in turnaround time by delivery methods is not significant for IVU alone.

IVU tracked staff time for electronic delivery processing over 26 sessions. The interlibrary loan paraprofessional is able to process an average of 40 articles per hour; an average of 1 article per session had quality problems and was not sent to the Web. Student workers also processed incoming Ariel articles, but their data was discarded due to improper recording. IUP's results were similar. Over the course of 66 sessions, IUP processed an average of 43 articles per hour, including an

TABLE 1. Turnaround Time by Delivery Method

Delivery Method	Mean Turnaround Time (in days)	N (Requests)	t-stat	Degrees of Freedom	Significance
Mediated	7.3	1,772	5.417	2,170	<0.001
Unmediated	5.9	400			

TABLE 2. Turnaround Time by Delivery Method and Institution

College	Delivery Method	Mean Turnaround Time (in days)	N (Requests)	t-stat	Degrees of Freedom	Significance	Number of Lenders
IUP	Mediated	7.5	1,319	6.615	1,513	<0.001	187
	Unmediated	5.2	196				22
IVU	Mediated	6.8	453	0.367	655	0.714	124
	Unmediated	6.7	204				14

average of 1 article per session with quality problems. Using these figures, it is possible to calculate the cost savings from Odyssey delivery because of the savings in staff time. Using the lowest rate of electronic delivery staff time of 40 articles per hour and a total of 400 articles received via Odyssey, 10 hours of labor were saved between both institutions. An average wage of \$7/hour would represent a savings of \$70.

DISCUSSION

Although the aggregate data indicates show that unmediated electronic delivery was faster than mediated electronic delivery at both institutions studied, this difference was significant in only one of the two institutions. One possible explanation for this difference could be that IVU processes electronically delivered requests twice as often as IUP (twice a day, as opposed to once a day), decreasing the amount of time that mediated article requests wait in the system before staff process for delivery. The number of times per day that articles are processed is an indication of the impact of the ratio of number of staff to total request volume. IUP has 4 full-time equivalent staff to 33,538 requests, a ratio

of 1:8,385. IVU has 2.25 full-time equivalent staff to 13,362 requests, a ratio of 1:5,938.

For many interlibrary loan departments, it is of utmost importance to send patrons photocopied or scanned articles that are complete and of high quality. Traditionally, articles that are checked in quality control can be intercepted before being sent to the patron in an incomplete state. Setting the OdysseyAutoElecDel key value to “Always” means that an interlibrary loan department relinquishes quality control and is trusting lending libraries to send complete articles. Does turning on the Trusted Sender setting adversely affect the quality of documents delivered to patrons? In the case of IUP, of all the 196 Odyssey-delivered articles, only 1 patron contacted the interlibrary loan office to request a re-send of an incomplete article. This is 0.5% of all Odyssey-delivered documents. Similarly, of the 1,319 staff-mediated articles that were received and supposedly reviewed by staff before being sent to the patron, 4 patrons (0.3% of all mediated documents) contacted the interlibrary loan office to ask for a re-send, despite the article passing through quality control.

What does this study say about quality control and electronic delivery of articles? We speculate that the reasons for the few requests for re-sends of Odyssey-delivered documents are one or both of the following. The Odyssey-delivered articles may actually be of high quality. Unless we were to examine each Odyssey-delivered article to confirm that the articles are complete, we cannot prove this. If the quality is high, one possible explanation is that Odyssey senders are philosophically invested in the promise of Odyssey with Trusted Sender as a method of article delivery that reduces staff time and turnaround time. Odyssey lenders are also aware of the potential for the article to bypass the review process and go directly to the borrowing library’s patron, and may therefore exercise extra caution when sending. Another explanation may be that the unmediated electronic documents are of no higher quality than mediated electronic documents, but for some reason, patrons do not complain. Yang’s customer satisfaction study shows that quality is only one component of user satisfaction with interlibrary loan service. In fact, when asked to choose reasons they are satisfied with interlibrary loan and document delivery services, “The quality of the scanned item is good” was rated as a reason for satisfaction only 34.3% of the time, eighth behind other reasons such as electronic delivery, no cost, turnaround time, convenience, e-mail notification of request availability, request tracking, and helpful interlibrary loan staff.¹² Perhaps patrons assume articles are of high quality and do not emphasize this when stat-

ing the reasons they are satisfied, but another explanation could be that interlibrary loan departments over estimate the importance of error free article delivery to patrons. A word cut off at the end of a sentence might not have enough of an impact to warrant contacting the interlibrary loan office to request a re-send, or the anticipated time delay in requesting the re-send is a deterrent. The patron status may also indicate the prevalence of this reason. All of the re-send requests at IUP came from faculty members. A future study measuring satisfaction as it relates to a potential tradeoff between turnaround time and quality of items received would be helpful for libraries to consider when deciding to turn on Odyssey with Trusted Sender.

CURRENT ENVIRONMENT AND FUTURE IMPLICATIONS

A new Odyssey scanning interface may hold the key to wider implementation. As of August 2005, the current Odyssey scanning interface in ILLiad 7.0.3.0 does not allow for advanced manipulation of scanned images. Interlibrary loan staff currently cannot re-scan a single page as needed, but rather must re-scan the entire article from page one. However, with a future release of ILLiad 7.1 scheduled in the fourth quarter of 2005, these barriers may no longer be a factor. After the ILLiad 7.1 release, the only barrier to obtaining a turnaround time and/or cost benefit from Odyssey with Trusted Sender is each interlibrary loan department's ability to relinquish the control gained from mediated electronic delivery. Further enhancements to ILLiad that would give borrowing libraries another level of quality control would include an option to turn off the Trusted Sender unmediated delivery with specific patrons. This would give libraries the choice to prohibit Trusted Sender articles from being sent to specific patrons or patron types (e.g., faculty) that are known to have stringent quality requirements.

At its core, this study shows the differences in turnaround time for two interlibrary loan departments from two different types of academic libraries, one using a population of 199 lenders (IUP) and the other using a population of 133 lenders (IVU). This is a small number of lenders in the total population of possible lenders, or even of all lenders used by a borrowing library in one year. As of writing, there were 732 units listed in the "ILLD" group in the OCLC interlibrary loan Policies Directory, which is automatically set when a library licenses ILLiad. Of these, 73 (10%) identify themselves as delivering via Odyssey. How-

ever, this component of the Policies Directory is dependent on individual library's input and may not accurately reflect the current practices of many libraries.¹³

Even if a library does not see an improvement in turnaround time, they can still gain from savings in staff time devoted to electronic delivery processing. Of all costs associated with interlibrary lending and borrowing, staff costs represent the largest component of interlibrary loan unit costs.¹⁴ Both institutions in this study recorded a similar amount of staff time devoted to the manual process of quality checking Ariel articles and delivering them to the Web using ILLiad, between 40 and 43 articles per hour. If the time devoted to mediated electronic article delivery processing could be reduced by switching to Odyssey with Trusted Sender, the cost savings could be dramatic. The number of ILLiad libraries and the amount of traffic on the OCLC Resource Sharing system that originates from ILLiad libraries is not inconsequential. For example, of all interlibrary loan requests that were placed on the OCLC Resource Sharing system in January, 2005, 42% originated in ILLiad systems.¹⁵ Although the number of requests varies each month, approximately 1 million requests were placed in October 2004, so it is not difficult to estimate that the number of requests that are coming from and going to other ILLiad libraries is in the hundreds of thousands.¹⁶ Reducing the staff time for these requests could represent a considerable savings. More specific data about the type and origin of requests on the OCLC Resource Sharing, or a larger study across multiple/high volume institutions could further serve to quantify the impact of Odyssey with Trusted Sender.

CONCLUSION

Unmediated delivery via Odyssey with Trusted Sender was faster than mediated delivery via Ariel for the combined data set collected during this study. In addition, mediated delivery via Ariel required considerable staff time that unmediated delivery via Odyssey with Trusted Sender did not. Ariel is at a disadvantage because there is no unmediated option available. In order to take advantage of the cost and time benefits of unmediated delivery, ILLiad libraries should use Odyssey with Trusted Sender. As more libraries adopt Odyssey, the advantages to libraries using unmediated delivery will increase.

NOTES

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5. Weaver-Meyers and Stolt, 35-37.
6. Fong, "The Value of Interlibrary Loan: An Analysis of Customer Satisfaction Comments," *Journal of Library Administration* 23, no. 1/2 (1996): 49.
7. Yang, 85-87. doi:10.1300/J110v14n04_07.
8. Jackson, Kingma, and Delaney, 53.
9. Mary K. Sellen, "Turnaround Time and Journal Article Delivery: A Study of Four Delivery Systems," *Journal of Interlibrary Loan, Document Delivery & Information Supply* 9, no. 4 (1999). doi:10.1300/J110v09n04_08; Jackson, Kingma, and Delaney, 52.
10. Fiscal year statistics are from the reports that are part of the ILLiad system. The reports used for borrowing statistics were Fill Rate Statistics and Turnaround Time. The Fill Rate Statistics report was used to calculate the lending statistics.
11. The IVU statistics do not follow the traditional fiscal year dates due to a move to a new library building and the implementation of ILLiad during the first month of the fiscal year.
12. Yang, 84. doi:10.1300/J110v14n04_07; In Yang's survey, 213 responses were collected for the question "If you are satisfied with Interlibrary Services and deliverEdocs, it is because": and were encouraged to choose as many answers as applicable. The reasons that rated lower than "The quality of scanned item is good" were: I can resubmit the requests online (32.7%, n = 70), I can renew the requests online 24/7 (28.6%, n = 61), and I can cancel my requests online 24/7 (24.9%, n = 53).
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APPENDIX 1. SQL Query for Unmediated Turnaround (Odyssey with Trusted Sender)

USE ILLData

SELECT DISTINCT
t.TransactionNumber, u.Status, t.LendingLibrary, datediff(mi,a.datetime,
b.datetime) AS TimeInMin

FROM
dbo.transactions t
left join dbo.usersALL u on t.username = u.username
left join dbo.tracking a on t.transactionnumber = a.transactionnumber
left join dbo.tracking b on a.transactionnumber = b.transactionnumber
left join dbo.History h on t.transactionnumber = h.transactionnumber

WHERE
(a.changedto = 'Submitted by Customer' or (a.changedto = 'Request Added
through Client') or (a.changedto like 'Imported from%'))
AND b.changedto like 'Delivered to Web'
AND t.TransactionNumber not in (select distinct TransactionNumber from
Tracking where ChangedTo = 'In Electronic Delivery Processing')
AND t.TransactionNumber not in (select distinct TransactionNumber from
History where Entry = 'EMail Added: Requested Item Delivered
Electronically')
AND t.RequestType = 'Article'
AND t.ProcessType = 'Borrowing'
AND b.DateTime >= '2/14/2005' And b.DateTime < '5/15/2005'
AND u.NVTGC = 'IUP'

ORDER BY t.TransactionNumber

APPENDIX 2. SQL Query for Mediated Electronic Delivery (Ariel or Odyssey without Trusted Sender)

USE ILLData

SELECT DISTINCT
t.TransactionNumber, u.Status, t.LendingLibrary, datediff(mi,a.datetime,
b.datetime) AS TimeInMin

FROM
dbo.transactions t
left join dbo.usersALL u on t.username = u.username
left join dbo.tracking a on t.transactionnumber = a.transactionnumber
left join dbo.tracking b on a.transactionnumber = b.transactionnumber
left join dbo.History h on t.transactionnumber = h.transactionnumber

WHERE
(a.changedto = 'Submitted by Customer' or (a.changedto = 'Request Added
through Client') or
(a.changedto like 'Imported from%'))
AND b.changedto like 'Delivered to Web'
AND t.TransactionNumber in (select distinct TransactionNumber from
Tracking where ChangedTo = 'In Electronic Delivery Processing')
AND t.RequestType = 'Article'
AND t.ProcessType = 'Borrowing'
AND b.DateTime >= '2/14/2005' and b.DateTime < '5/15/2005'
AND u.NVTGC = 'IUP'
ORDER BY t.TransactionNumber

ANNOUNCEMENT

What are IFLA interlibrary loan coupons?

The International Federation of Library Associations (IFLA) Voucher Plan makes it easy for you to pay for your international interlibrary loan requests, by using a coupon instead of cash, checks credit cards or money orders.

How do I use them?

You attach one voucher to your request form each time you request an item from a library in another country. The supplying library accepts the voucher as payment for the transaction, and retains it to re-use it for another transaction when it wishes to borrow from another library. If you use an electronic system to transmit the request, you can mail the coupon.

What do they cost and where do I get them?

If you have an account that can pay in Euros your library may purchase vouchers from IFLA Headquarters for 8 Euros each. For details:
<http://www.ifla.org/VI/2/p1/vouchers.htm>.

If you want to pay in U.S. dollars, you can buy vouchers from BCR. You do not need to be a member. For details:
<http://www.bcr.org/resource-sharing/ifla-vouchers.html>.

For complete information: e-mail: voucher@ifla.org

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