Assessing the effectiveness of a resource-sharing service: the user view

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- **Purpose**
  NILDE (Network for Inter-Library Document Exchange) facilitates collaboration between libraries using the Internet and technologies that optimize inter-library document exchange. "Listening" is essential for building a service to meet stakeholder needs and with this aim in mind, after the launch of NILDE 4, the web surveys were carried out during 2011 and 2013. This paper focuses on the results of this analysis and on ways to improve a nation-wide resource-sharing service.
- **Design/methodology/approach**
  The methodology is based on the analysis of quantitative data obtained from all ILL transactions carried out during the period of use of the new software, a comparison with the qualitative information obtained from the surveys, and a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats). This proved to be an effective methodology and a new survey was launched in 2013, to verify whether the choices made and the projects undertaken were in line with user expectations.
- **Findings**
  The results turned out to be particularly interesting and a source of hints for planning future improvements. Periodical monitoring of quantitative data, as well as listening to end users, makes it possible to determine choices and optimize resources. SWOT analysis is a very good planning tool because it helps to assess the information gathered and to identify the elements inside and outside the service which may affect future action.
- **Originality/value**
  Italian studies for assessing user satisfaction of library services, based on user surveys, often relate to a single library or a single University. The NILDE survey was delivered nationwide to all the registered users of NILDE. This is the most extensive survey for the number of libraries and the various types of end users involved.

Introduction

The NILDE system was initially developed at the Italian National Research Council (CNR) Bologna Research Area Library with the aim of improving ILL services based on Internet technologies and to promote cooperation amongst Italian libraries (Mangiaracina, 2002; Mangiaracina et al., 2008).

The initial expectations were met and yet have led librarians to perceive NILDE as an essential daily working tool, used in an increasing number of libraries. Its most distinguishing feature is its value system based on a spirit of cooperation, teamwork, participation, collective intelligence, user feedback, and continuous improvement, i.e., the distinctive values of the so-called 2.0 phenomena. At present, 830 libraries belong to the NILDE network, of which 77% university, 9% health research institutes and hospitals, 8% public research institutions, and 6% other public and not-for-profit organizations.

In 2005 a functionality was added to the software which enabled end users to interact directly with NILDE, which is presently used by more than 18,000 end users registered at their libraries. The direct use of NILDE has obvious advantages for all users (Cocever and Chiandoni, 2008). Advantages for the libraries are:

- the possibility of receiving completed request forms in the correct format through a single channel;
- the use of a communication system through which users are automatically updated on the status of their requests in real time;
- the availability of detailed statistics on user transactions and on user profiles;
- access control to the service based on institutional authentication (for the libraries which form part of the Italian IDEM Federation).

Advantages for the users are:

- thanks to the interoperability with bibliographic databases, the possibility of loading automatically bibliographic records into the NILDE request form;
- a personal workspace where it is possible to use an embedded reference manager system (since 2011);
- the availability of an automatic communication flow, which provides real time updates on the status of transactions;
- the use of institutional credentials to access the services to avoid multiple authentication (for the institutions belonging to the IDEM federation).

NILDE system background

The current NILDE 4.0 software was released in 2011; it incorporates new features and innovative user-interaction styles, in order to make NILDE an even more user-oriented and friendly tool for ILL and scholarly activities (Mangiaracina and Tugnoli, 2012).

NILDE's present features comprise:

- a complete suite of ILL-manager software modules, to support borrowing and lending among libraries, including statistics/history to trace ILL performance indicators, such as fill-rate and turn-around time;
- a secure electronic transmission module (Pdf files are "digital hard-copied", that is, automatically transformed into graphic files, in order to comply with ILL clauses in electronic

licenses that usually do not allow the sending of the publisher's original pdf file, but only of a printed copy);
• a dedicated end-user module to manage personal bibliographical references, allowing users to easily import, organize and export references, and to initiate an ILL request from any bibliographic electronic resource, based on the Open-URL standard;
• federated end-user authentication based on the Shibboleth framework;
• multilingual support: at present, the NILDE user interface is available in Italian, English, Spanish, French and Greek.

The NILDE end-users module, initially conceived as a basic tool simply for managing user requests to the library ILL service, has evolved into a reference manager, which allows the user to organize their own bibliography as well as to formulate a request to the library service, if the document is not locally accessible. Bibliographic references can be inserted either manually by the end-user or automatically from any OpenURL compliant bibliographic database. The most important feature added to the end-user module is the facility to manage their entire bibliography by labelling, sorting and exporting references as well as inserting, modifying and deleting them.
The user is also allowed to send DD/ILL requests during new insertions or to request any item which is already in their bibliography. In this case NILDE provides functions to track and revoke requests, e-mail notifications about their delivery status, cost acceptance policies, and a history section where all their DD/ILL requests can be found.

End-user institutional federated authentication based on the Shibboleth framework is also supported. In the legacy approach, the previous NILDE software assigned a system login/password to newly registered users. In a federated approach, a user registers only once at their home organization (i.e. their university), receives a username and password, and then uses these to access any other resources. The authentication process is always carried out by the user's home organization, while authorization is up to the external service, such as NILDE. Since the Shibboleth solution is being adopted by an increasing number of scientific information providers, such as ISI Thomson, Elsevier, Ex-Libris, JStor, Ebsco, Proquest, DSpace, etc... this fact strengthens the integration of the ILL service with most of the electronic resources available to the end-user and makes NILDE an even more simple and direct tool for end users.

Assessing the effectiveness of a resource-sharing service: previous actions

Success in the direct use of NILDE is well documented by the steadily growing number of NILDE end users, as shown in the figures below: figure 1 shows the trend of new user registration from 2011 to 2013 (first semester 2013) and figure 2 demonstrates a similar trend in user initiated ILL requests during the same period.
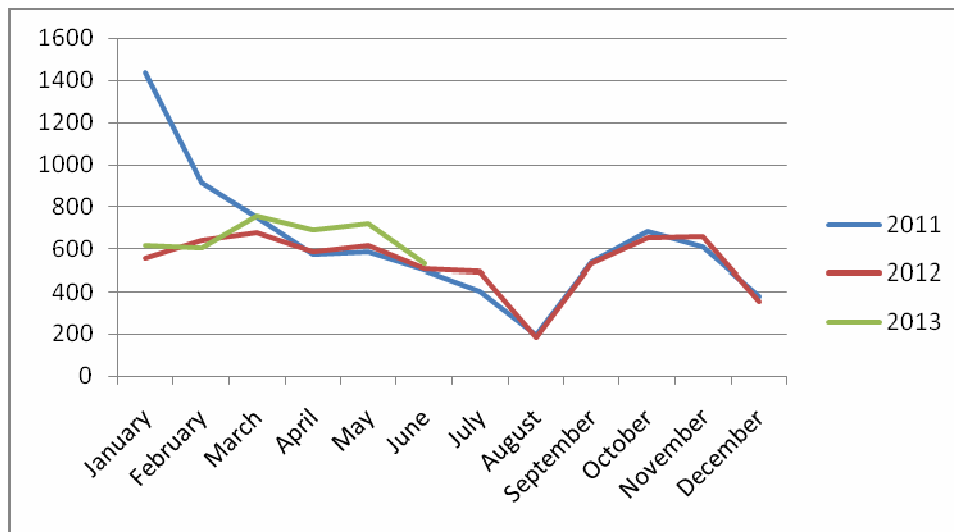
Figure 1. Trend in new end-user's registrations

Figure 2. Trend in end-user direct ILL requests

However, in 2011 less than a third of networked libraries handled requests submitted directly by their end users; such a low use of the direct user mode seemed to place doubt upon its real usefulness.

A "listening" approach is essential for building a service to meet stakeholder needs and with this aim in mind, after the launch of NILDE 4, two web surveys were carried out in 2011, one with librarians and one with end users. The surveys were designed to help explore the motivations which underlie user behaviours (Chiandoni et al., 2013). The question regarded the low use of the direct user mode of NILDE: was it caused by user dissatisfaction or more by insufficient promotion by the library staff?

The most important features highlighted by the outcome of the 2011 surveys were (Chiandoni et al., 2013):

User viewpoint
- appreciation of the new interface;
- low use of the reference manager embedded in the new release (64% state they do not use specific reference managers, it is doubtful whether this tool is really useful; maybe it would be more useful to focus on the interoperability with existing software);
- urgent requests to receive the publisher's original electronic file;
- expectations towards ever higher disintermediation (users appreciate a web service connected to the main information sources, i.e. databases, which is user friendly and supplies a help guide to make independent problem solving possible); this mirrors a widespread attitude among Web users, who are accustomed to independent searches for specific needs and likely to use tools where no direct assistance is provided.

Staff viewpoint
- appreciation of the new interface;
- the need for more and more usable and simplified procedures which empower users to tackle and solve problems; this is the case with small structures where staff often perform various multiple tasks at the same time;
- difficulties in communicating and promoting services and understaffing are the main obstacles that prevent a widespread diffusion of the direct user module; some comments posted on the blog highlight that:

  o email and direct contact are preferred;
  o email is considered to be a more convenient channel;
  o user education is not organized;
  o some categories, such as academics, find it difficult to understand the advantages;
  o end users are suspicious.

It seems however less a matter of user mistrust and exertion than a matter of staff resistance to change, as they do not want to give up work habits that are considered to be more viable and agreeable.

After the surveys held in 2011 there were initiatives aimed at popularizing the direct use of NILDE. Four targeted staff training courses were organized at a national level. Many other courses were organized in the main Italian Universities. The goal was to explain the functionalities of the NILDE-Users module.

The conference held in Bari in 2012 (Bari Conference Proc., 2012) was a great opportunity to show librarians the analysis of the data collected during the 2011 surveys and the strengths and weaknesses of the NILDE network. In this instance particular attention was drawn to the issue of lack of communication and motivation of librarians and on their resistance against a full use of the software.
The impact of all these advocating activities can be seen in table 1 and in figure 3, which show how the libraries who enabled users to submit their requests through NILDE in 2012 had enhanced their service one year later and had grown by 32%.

NILDE	Year 2012	Year 2013	% increase
Number of participating Libraries	755	830	+ 10%
Libraries with at least 10 end users	178	235	+ 32%
Number of end users	10,974	17,792	+ 62%

Table 1. NILDE figures of libraries and end users
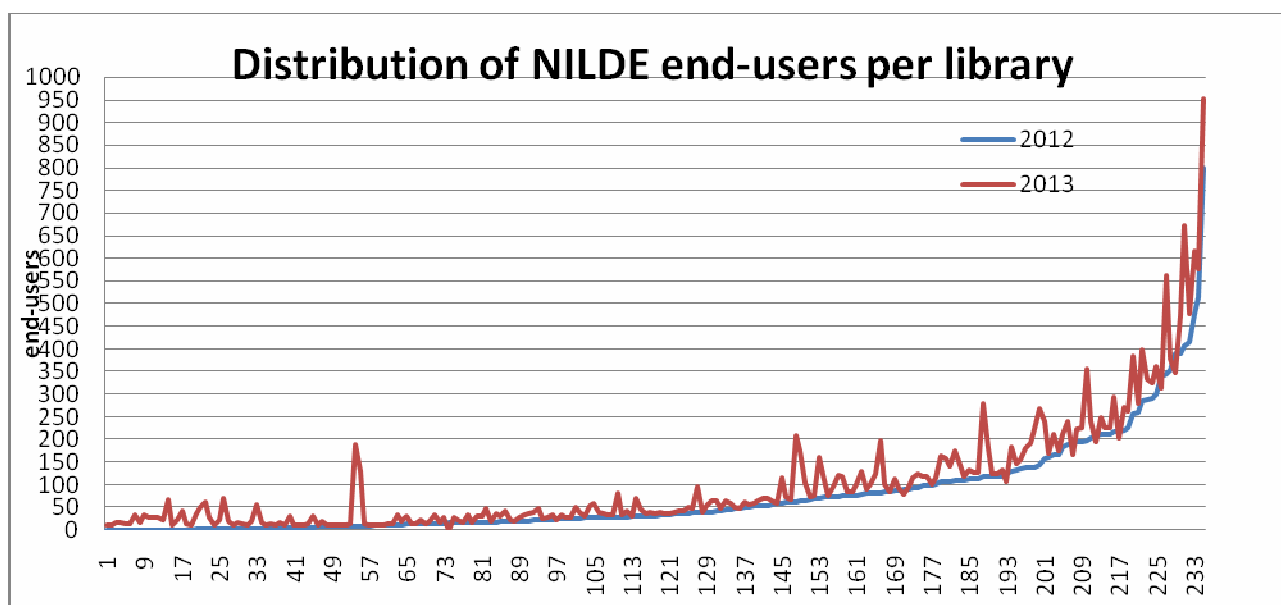
Figure 3. One-year increase of end-user distribution per library

There is still however a big share (more than 2/3) of networked libraries which do not use the end-user module. Analysis of the quantitative data from ILL transactions proves that there is a significant difference between the libraries who enable users to submit requests directly and the other libraries and shows that the average number of ILL requests more than doubles when there is a direct use of the software, as can be seen in table 2. This phenomenon may have multiple explanations. It could be that libraries which have not chosen NILDE to communicate with their users may employ other channels to forward ILL requests (or may use email to a great extent, both to receive user requests and to forward them to other libraries). On the other hand, it may be that users who have the NILDE service available and who are satisfied with it are encouraged to exploit it and therefore the direct use of NILDE promotes an increase in library ILL requests (and consequently a greater use of library services).

One-year NILDE ILL transactions		%	Average number of requests/library
Number of participating libraries	796		
Total ILL requests	219.259		275
Number of libraries **allowing** DIRECT USE by their end-users (with at least 10 end-users)	235	30%	
Total ILL requests from libraries **allowing** DIRECT USE	106.034	48%	451
Number of libraries **not allowing** DIRECT USE by their end-user (or, with less than 10 end-users)	561	70%	
Total ILL requests from libraries **not allowing** DIRECT USE	113.225	52%	202

Table 2. Library differences in ILL transactions volumes, depending on the direct use of NILDE by end-users (one year period from 7/1/2012 to 6/30/2013)

Although libraries which implement the direct use mode may seem more virtuous than the others, much more can still be done in terms of service quality improvement: in fact, only 1/3 (32,385) of user-initiated ILL requests have bibliographic metadata loaded from a database, which means that the remaining 2/3 (69,826) of bibliographic references were manually entered by the end-users. Moreover, 91% of the references entered through the OpenURL protocol come from Pubmed, while the connection between NILDE and other bibliographic databases, even the most popular ones such as Web of Science or Scopus, is of little consequence, as shown in table 3.

Bibliographic Databases linked to NILDE	# references	%
Entrez:PubMed	29,419	91%
OVID	772	2%
CAS:CAPLUS	619	2%
ISI WOS	494	2%
Elsevier:Scopus	271	1%
ACNP	186	1%
ESSPER	107	0,3%
Others	1062	3%
TOTAL	**32,385**	**100%**

Table 3. Most used databases with NILDE

The quantitative data highlight the effectiveness of staff training initiatives over the last year, but they also emphasize the overall underuse of the software by end users. We wonder for instance why users prefer to enter manually the bibliographic records of their requests, given that they could load the metadata directly from bibliographic databases, or else why the embedded reference manager is not perceived as a value added to the service. To answer these and other questions another survey targeting end users only was carried out in 2013.

Survey methodology

Quantitative data analysis is an important tool for monitoring the performance of a nationwide resource-sharing service such as NILDE and for supporting decisions about future developments and strategies. Other studies based on NILDE data analysis were carried out in previous years, for instance, the analysis of library performance in terms of turnaround time, reciprocity factors and requested/supplied document imbalance within the NILDE network (Filippucci et al., 2009); analysis of the ILL most requested serial titles and their relationships with subscriptions (Bernardini and Mangiaracina, 2011).

The analysis of the quantitative data gathered from use of the service and of the qualitative data collected through the end-user surveys is likewise essential to understand how the service is used and how it can be improved.

A focus on library-user satisfaction in Italy was introduced at the AIB (Associazione Italiana Bibliotecari) annual congress in Villasimius in 1984 (Santocchini, 2010). The relationship between library and perceived service quality by the user have been recently investigated by Di Domenico (2006) and Ventura (2006). Oliva (2012) discusses a thesis about customer satisfaction in Italian academic libraries: more specifically the second part of the work refers to a 2012 survey of user satisfaction at the Milano-Bicocca University library: qualitative and quantitative results are then presented and discussed. Italian studies for assessing user satisfaction of library services, based on user surveys, often relate to a single library or a single University.

However, a careful approach is needed when conducting such surveys on a nationwide scale, since the NILDE network represents a heterogeneous environment, where there are public, academic, healthcare sector, and scientific research institution libraries, which are no longer connected to restricted subject areas and which are without comparable numbers and types of users.

The 2013 survey was delivered nationwide to all the 17,792 registered users of NILDE: this is the most extensive survey for the number of libraries and the various types of end users involved.

The data were collected via the web and the questions were hosted on a special Wordpress blog. A blog enables users to add free comments instead of merely answering the close-ended questions of the survey and this is why it was chosen.

All comments, and especially the critical remarks, were particularly precious inasmuch as they provided useful hints on how to improve the service and started a discussion among stakeholders, i.e. librarians and end users.

The two-part survey was created as a Google form (available within Google Drive).

The first set of questions, eight in all, was aimed at gathering both quantitative and qualitative feedback from end users on the NILDE service and at finding out how they had come to know about the NILDE service. The second set of questions, six in all, was designed to know end users better (age, gender, role etc.).

The initiative was publicized through a message on the NILDE homepage, visible to everyone who accessed the web site while the survey was open. During that period (27 May 2013 – 9 July 2013) the libraries in the NILDE network were asked twice to remind their users of the survey through the communication channels normally used for similar purposes.

The outcome of these reminders was successful: 1,178 people, representing 17% of active users, completed the survey. Active users were defined as users who had requested at least an article through the NILDE service between 1 January 2013 and 30 June 2013; their total number amounted to 6,987. The percentage of responses was weighed against active users, on the assumption that they were more loyal and sensitive to service improvement than the total number of users, who amounted to 17,792.

When the survey was closed, the final data, available in real time and also displayed in chart form, was linked to the NILDE homepage.

Survey results and discussion

The data gathered by the 2013 survey make it possible to build a profile of the users who are loyal to NILDE. The term "loyal users" is applicable because the respondents to the survey were the most intensive users: 70% requested more than 4 articles in the first six months of 2013, 38% more than 10. This is even more apparent when compared to the figures extracted from the NILDE database (see Table 4).

# ILL REQUESTS	NILDE active users jan.-june/2013	Survey participants
1-3 ILL requests	41%	23%
4-10 ILL requests	27%	32%
more than 10 ILL requests	21%	38%

Table 4. Comparison of survey respondents with their usage of NILDE

Quantitative data are important, but it is also important to point out that these users perceive the service as a useful tool for their work. The question "To what extent has NILDE contributed to your research in 2012/searches?" scored an average of 3.64 on an assessment scale ranging from a minimum of 1 to a maximum of 5. The typical user is a female researcher in science and technology, between 25 and 34 years of age, working at an Italian university located in the Centre/North of the country.Analysis of the sample taking part in the survey highlights another very interesting feature: libraries play a major role in promoting and advocating. As mentioned above, while the survey was open the organizers urged the libraries several times to prompt their users and in figure 4 there are peaks of participation corresponding to library outreach initiatives.
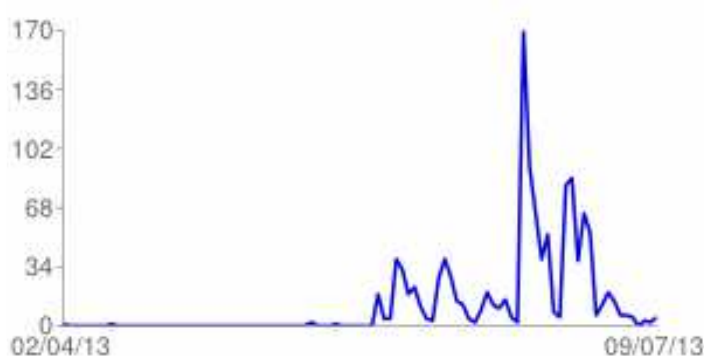
Figure 4. Peaks of survey participation (in correspondence with library solicitations)

These initiatives had in some cases greater impact; this is highlighted when comparing the data related to the participants to the total number of active users.

| USER AFFILIATIONS	NILDE active users jan.-june/2013	Survey participants
Universities	72%	54%
National Health Service Institutions	20%	11%
Public research Institutions	5%	26%
Private research Institutions	2%	3%
Others	1%	1%

Table 5. Comparison of survey respondents with their affiliations

Table 5 shows that the percentage of the survey participants affiliated to public research institutions is much higher than what it was compared to the total number of active users on 30 June 2013. These libraries were clearly more effective in promoting the survey.

Generally speaking communication turns out to be of paramount importance for libraries, which perform a key function in informing users about services. In this respect it is significant that 49% of the end users stated that they had been informed about NILDE by the library staff and 24% through their web site. If on the one hand the survey represents the most loyal segment of users, on the other hand to some extent it also represents the subset of networked libraries that mostly perceive NILDE as an important service for their target community.

When profiling loyal users, the prevalence of the feminine gender stands out as a remarkable element (see figure 5). The percentage is slightly higher, but it is in stark contrast with the trend of women researchers in Italy; according to the She figures 2012[1] for the Higher Education Sector, the percentage amounts to 38%.

The reason for such a high number of women who have taken the survey could be that women's productivity in science is higher; conversely, a research carried out in 2009[2] shows that women's academic productivity is increasing though still lower than their male counterparts.
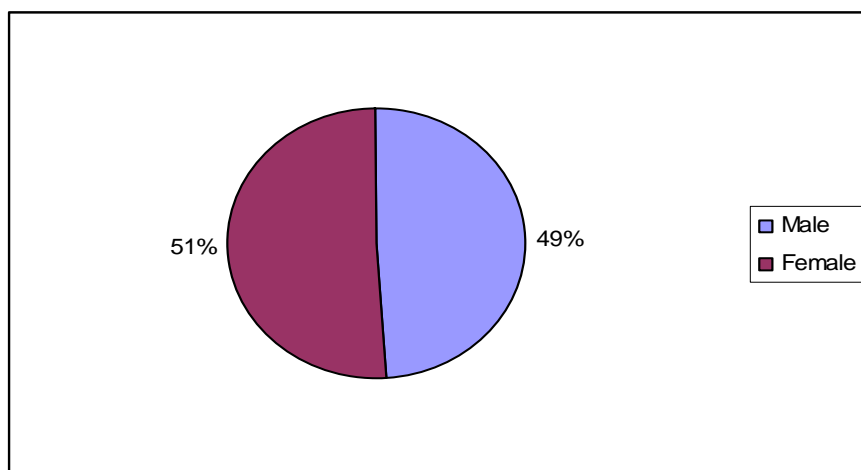
Figure 5. Survey respondents by genre

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[1]   She figures 2012: gender research and innovation. European Commission, 2013
<http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1282>

[2]   Abramo G., D'Angelo C. A., Caprasecca A. Gender differences in research productivity: A bibliometric analysis of the italian academic system, Scientometrics, v. 79, nr. 3(2009), pp.517-539.

It is significant that among the participants, 69% of the women were between 25 and 44 years of age, while men within the same age range amounted to 56%. On the contrary women over 45 were 29% while men over 45 were 41%. The users of NILDE consequently mirror the general trends; women are increasingly present in the Italian scientific research landscape, especially with ages between 25 and 44, i.e. 62% of the participants in the survey.

As mentioned before, the survey was aimed at getting to know users better and consequently some questions were asked about their behaviour when seeking papers.

67% chose mainly NILDE and 23% of them NILDE exclusively. It is interesting also to notice that 81% state that they always - or almost always - surf the net to check whether papers are freely available. This behaviour is obviously encouraged by the outcomes of Web searches; very many digital documents are freely downloadable. The consequence of increasing Open Access to research outputs is, ironically, a prospective decrease in interlibrary loan services. In the information society, the transition from a former economy based on shortage to a net economy based on plenty is questioning current paradigms and economic models. Libraries also have to readjust their objectives and to focus on the documents which they own as the sole depositary and which are difficult to find. Some comments on the blog which hosted the survey stress one of the main strengths of NILDE, i.e. the possibility to find papers which are old and therefore not in electronic journals, and not available elsewhere. The interoperability of NILDE with the main national online catalogues (see, for example, Mangiaracina and Tugnoli, 2012) makes it easier for staff to search for documents and check their availability. The effectiveness of the service is therefore dependent upon the comprehensiveness of these sources, and libraries have a prime role inasmuch as they update and maintain their catalogues.

As for other behaviours, purchasing papers is the least chosen option (84% state they never do it); next, using the credentials of other institutions (86% never do it or do it rarely).

The starting point for improving a service effectively is to ask users first. Therefore, there were questions about the most important features and fuctionalities of a document delivery service, first generally speaking and then focusing on the specific characteristics of NILDE.

A four-point grade scale was used to assess first a document delivery service in general terms; scores ranked from 1 (very low importance) to 4 (very high importance); the average responses are shown in figure 6.
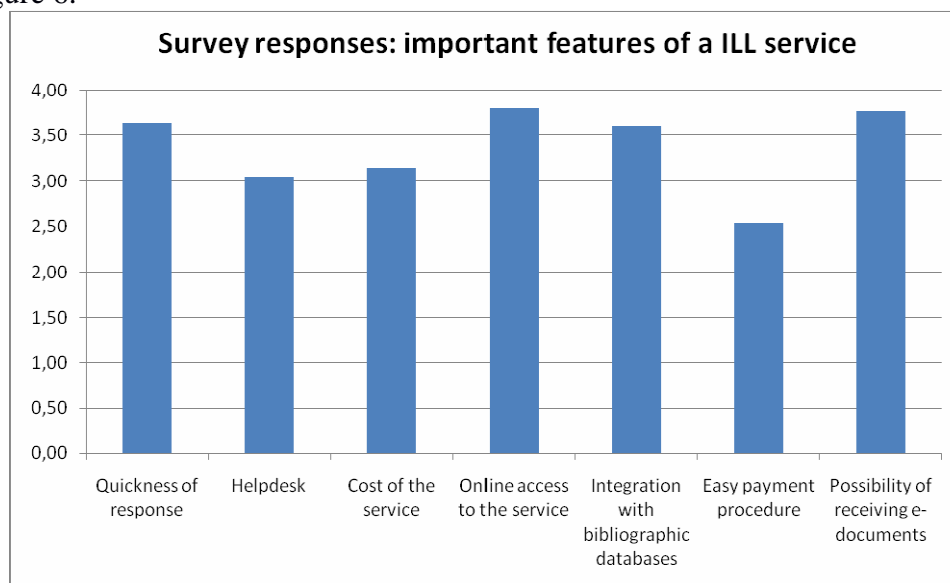
Figure 6. Assessing the most important features of a ILL service

The most important features are, in order of importance, the online access to the service, the availability of electronic papers, the response time and the integration with bibliographic databases. Users consequently expect a service which enables them to obtain documents quickly through a single tool linked to bibliographic databases, where the descriptive metadata of the requests are extracted automatically, and which make it possible to track the transactions until the articles are delivered electronically.

NILDE is in fact a web service that performs all the above-mentioned functions, while a rapid response is ensured by a virtuous mechanism whereby the delivering libraries spontaneously maintain a high standard of performance. The availability of electronic documents directly to the users is contrary to the present copyright law; 55% of the respondents declare they know about it, but, if that were true, there would not be such an urgent request of electronic papers, which was echoed both in responses and in blog comments. Users often complain about having to receive the paper document, suddenly plunging back into the space-time constraints of physical reality, and they perceive it as if it were the library's fault. Researchers need to perform their activities anywhere and at any time and they are connected through the web to research laboratories disseminated over vast geographic areas; it is therefore understandable that such constraints are not considered to be acceptable. Here too, librarians have the task of informing and making users aware of the constraints of copyright law, which often does not protect the rights of authors who need to re-use research outputs for their own work, but protects the economic interests of the commercial publishers which control the scientific literature market.

The response to the features of NILDE which need to be improved back up what has been said above: the starting point for requests must be the tool used for bibliographic searches (25% of the responses); one concern is the need to exploit the Web to its full potential also through applications for mobile devices (15% of the responses); one of the main concerns is interface usability (11% of the responses). Software underuse is a particularly evident problem regarding the interoperability with bibliographic databases, which is already there but which is patently unknown to users. It will be useful to undertake initiatives aimed at exploring the motivations for this gap soon, starting from librarians themselves who have the task of imparting knowledge useful for the optimal use of bibliographic services.

SWOT analysis

Analysis of the quantitative and qualitative data collected led to identification of the critical features which need priority action. An excellent planning tool is SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis, as it helps to sum up the features which may affect the outcome of ongoing and future initiatives both positively and negatively. It is also very important to analyze the external context which presents favorable or unfavorable circumstances which cannot be overlooked, lest the outcome of ameliorating initiatives be jeopardized.

Below a SWOT analysis of NILDE based on the aforementioned considerations.

STRENGTHS	WEAKNESSES
1. Strong cohesion and cooperation among participants. 2. Widespread adoption in Italy 3. Excellent performance (turnaround times, positive responses…) 4. High end-user appreciation 5. Regular and competent technical support 6. Connections with the main national catalogues 7. Interoperability with bibliographic databases 8. Continuous improvements 9. Frequent training initiatives 10. Relatively low cost of the service	1. Low direct use by end users 2. Partial subject coverage due to the specific organizations involved 3. Publishers' unwillingness to recognize the reliability of the NILDE software which prevents the direct forwarding of electronic documents to end users 4. Staff resistance and organizational difficulties 5. Low level of cooperation outside Italy
OPPORTUNITIES	THREATS
1. Budget cuts affecting journal subscriptions 2. Few competitors in Italy 3. Wide-spread use of web services, especially among researchers 4. High interest in cooperation initiatives by the libraries 5. Excellent technological infrastructures supporting research networks 6. Ongoing development and updating of the main national online catalogues (ACNP, SBN) 7. Interest in NILDE by the managers of the main online national catalogues 8. Publicly perceived importance of scientific research for the development of Italy	1. Increased Open Access and peer2peer 2. Organizational problems caused by understaffing in libraries 3. Greater restrictions by publishers 4. Lack of harmonization of European copyright laws 5. Economic crises and shrinking budgets 6. User distrust of public services 7. Researchers' propension to leave Italy

Conclusions

Assessment of the NILDE service over the last few years is based on a comparison between the quantitative data gathered from the NILDE databases and the qualitative data collected through the surveys. The results turned out to be particularly interesting and a source of hints for planning future improvements.

In 2011 the quantitative data stressed the high productivity of the few libraries which had a significant number of users submitting requests directly; the survey highlighted, on the one hand, user appreciation and, on the other, staff resistance as users were not considered ready to use the system directly.

Library staff training was carried out in 2012 and led to an increase both in active users and in libraries enabling users to submit requests directly, yet there is still much more to do. Less than a

third of the networked libraries are involved, and the results of staff encouragment still have to be seen. Re-engineering a service depends upon many factors and requires time, because librarians also have the task of being the agents of change, and this involves not only users, but those in charge of their structures, whose support cannot be taken for granted.

The 2013 survey made it possible first of all to identify the features of the typical user loyal to NILDE: a female researcher in science and technology between 25 and 34 years of age working at a University in the Centre/North of Italy. Much could be done to involve also other potential segments of users, such as students in the case of Universities. However, as mentioned above, NILDE has an extremely heterogeneous target audience and all initiatives can only be started by single libraries on an individual basis. An important feature, highlighted in the 2013 survey, is that organizational problems can occur even in libraries which adopt and promote the direct end-user mode.

One of the features most requested by the survey participants is integration of NILDE with bibliographic databases, which is, in fact, already possible; this incongruence had already been highlighted by the quantitative data too. Future staff training will have to include the technologies that enable data interoperability, to make it easier for librarians to interact with system administrators, who have to configure the connections.

The unavailability of the electronic document for the end user, widely indicated as a big issue, cannot be easily solved, because it stems from the constraints of copyright law, and thus is beyond NILDE.

In the near future, resources will have to be invested to create NILDE applications for mobile devices. Periodical monitoring of quantitative data, as well as listening to end users, makes it possible to determine choices and optimize resources. SWOT analysis is a very good planning tool because it helps to assess the information gathered and to identify the elements inside and outside the service which may affect future action.

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