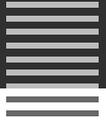


# Resource Discovery Services versus OPACs in Information Searching



***In order to learn more about the strengths and weaknesses of Resource Discovery Services (RDSs) and Online Public Access Catalogues (OPACs), we selected three universities from Spain which met the following requirements: 1) they taught Library and Information Studies, since our expertise in this scientific field would enable us to determine the relevance of the results retrieved, and 2) they had implemented different tools. We conducted several subject and author searches in RDSs and in OPACs, with the overall objective of exploring the efficiency of the search process and the relevance of the results retrieved when using each tool. The specific objectives were: to determine the comprehensiveness of the relevant results retrieved in a parallel search of OPACs and Resource Discovery Services; to analyze these results; to identify the filter functions for selection and how they were organized in RDSs and OPACs; to determine the ease with which the results could be refined and/or the search could be widened by making use of facets, indexes, or advanced search features; and to assess the implementation and usefulness of recommendations of related documents and user opinions/reviews in the form of tags, comments and ratings.***

## Introduction

As it was pointed out by Rodríguez-Yunta (2015) there have been many studies that have highlighted the limitations of Online Public Access Catalogues (OPAC) as intermediary tools in information retrieval. It is well known that catalogues have traditionally provided detailed and high-quality information on printed books, even if they often do so through a format that does not facilitate data aggregation and collaborative work. They have also included information about journals that is of variable quality and of little use to users. Often they have not provided information on journal articles, and their descriptions of electronic resources have been irregular.

The path toward a new generation of catalogues has only been recently cleared. Various techniques have been used to this end: the integration of descriptions of journals and electronic resources; the addition of web 2.0 applications to the catalogue, making it a social and participatory OPAC; and the implementation of federated search tools for library materials, which have evolved towards Web-Scale Discovery Services or Resource Discovery Services (RDSs).

Libraries can deploy a Web wrapper that allows them to camouflage their catalogue under another user interface. This situation seems to be the predominant one today. The abandonment of OPAC in favour of a new generation of tools (RDSs) is a potential trend, but at present it does not seem to have cemented its position.

Various studies (OCLC, 2009) have found differences between the priorities of end users and the priorities of librarians in relation to the quality of data from catalogues. Accordingly, as Fagan et al. (2012) observe, the implementation of RDSs, which mask the catalogue without replacing it, can be considered a compromise between the preferences of both of these parties.

From an architectural and visual point of view, RDSs stand out mainly for their use of faceted searches for catalogued items, which allow users to add or remove access points and expand or limit their searches. However, beyond facets, the usefulness of RDSs lies in their ability to combine multiple sources of metadata into a single simple search box. The combination of MARC records, OAI repositories, databases, images, multimedia materials and other online resources leads to the achievement of exhaustive results with unprecedented ease (Rodríguez-Bravo et al., 2014).

Access to volumes of information previously hidden in the silos of catalogues or private databases, hitherto with no possibility of their being recovered from a single point of access and simultaneously, is a revolution for both researchers and inexperienced users. Accordingly, Breeding (2011) noted that RDSs are designed for finding and not just for searching. RDSs

are poised to play an important role in the discovery of information in the 21<sup>st</sup> century. The effort that libraries have made implementing these services seems to have paid off in relation to the increase in the use of the collections (Rodríguez et al., 2017).

RDSs differ from the metasearch engines in that the latter search through multiple databases and then aggregate the results. With the use of federated search software, the results offered depend both on the algorithms of the search and of the relevance rankings of the metasearch engine and on the ones from each search tool used. Conversely, RDSs import metadata to a single index and apply a single set of search algorithms and a unique formula for ordering of results.

Two routes lead to the desired result of providing a unified access to all the resources that the library owns or contracts (Anglada, 2012): Catalogues extend to including searches for journal articles (WorldCat) and large indexes of journal articles encompass library catalogues and institutional repositories (Summon, Primo Central, EDS).

Previous works have made inquiries into the evolution of the catalogues of Spanish university libraries (Ávila, Ortiz and Rodríguez, 2015; Pintos, 2016; Rodríguez and Travieso 2013; Rodríguez et al., 2014). The purpose of these was essentially to understand which libraries have implemented RDSs, which tools had been chosen, and what features they offer.

By January 2016 almost 80% of Spanish libraries had installed an RDS, among which the following systems predominate: Summon Discovery and Ebsco Discovery service (EDS). There are also some libraries that implemented Primo Discovery and WorldCat Local (Pintos, 2016). Likely, the UK library discovery market is dominated by 3 products: EDS, Primo and Summon in 2012 – 2013 (Spezi, Creaser and Conyers, 2015).

## Objectives and methodology

In order to investigate the strengths and weaknesses of RDSs and OPACs, I have selected universities that meet the requirement of implementing different RDSs and offering degrees on Information Science because my familiarity with this area facilitates the task of judging the relevance of the results found. The present paper is the second part of a previous one that looked also into several Portuguese universities (Rodríguez et al., 2015).

The universities selected were: University of León (ULE), University of Murcia (UMU) and University Politécnica of Valencia (UPV). The tools that these institutions have implemented are WorldCat Local, Summon and Primo Central respectively. It should be noted that from 2015 Summon and Primo belonged to the same company because of the acquisition of Ex Libris by ProQuest but still remain different products.

Setting out from conducting of various subject and author searches in the single, global search box and in the advanced search fields of both tools, the general objective of this work is focused on examining the efficiency of the search process and the relevance and characteristics of the results obtained in both tools.

The specific objectives are:

1. To determine the exhaustiveness of the relevant results in the parallel querying of OPACs and RDSs implemented in Spanish universities.
2. To determine the ease of refining results and/or broadening searches by making use of facets, indexes or advanced search.
3. Inquire into the currency, document type and language of the first 25 relevant documents recovered in searches.
4. Identify the filter (selection) features in the RDSs and the OPACs.
5. Inquire into the existence and use of recommendations of related documents and contributions/assessments from users in the form of tags, comments and ratings.

I began with a search for concepts in the simple search box of the RDSs and the OPACs to assess differences in the number of documents retrieved in both tools. The results obtained were filtered using the advanced search options.

The RDSs' and OPACs' filter or selection features were explored through three subject and two author searches. The goal was to combine general and specific topics. The subject search terms were: "automatic indexing," "interfaces evaluation" and "digital libraries".

In the case of the authors, I chose two Spaniards, one with distinctive last names and the other with common last names: Isidoro Gil Leiva and José Vicente Rodríguez Muñoz respectively. The searches were conducted between 16 January and 10 February 2017.

## Results

Following the analysis of RDSs conducted in 2013, 2014, and 2015 (Rodríguez and Travieso, 2013; Rodríguez et al., 2014, 2015) I highlighted that the parallel maintenance of two user interfaces produced a vagueness that only served to cause confusion to the users, who does not know where to direct their search. Certain improvements in this area have been picked up in the analysis carried out on this occasion. The library home pages of the three universities explored display a single simple search box that allows the visitor to search across all the available resources.

The University of Murcia's site makes the task easiest for the user. The first page shows that you can "search the catalogue" or "search everything." The University of León's library main page provides a search that is differentiated according to the "ULE catalogue," the "Portal" or the "ULE WorldCat" RDS.

The University Politécnica of Valencia offers access to the RDS from two different pages. In one of them, the simple search box launches the search in a RDS called "Polibuscador." From another page, or once the search in the first page has been

conducted, you can restrict the search to the "catalogue," "digital library" or "course bibliographies," or you can conduct a "global search."

This study found the existence of simple and advanced search options on all pages of the three universities. The existence of a simple search box on every page that is supplemented with a link to the advanced search box is to be welcomed. In 2017 it is possible to detect an attempt to reach out to the user, though in my view it is only well executed by the University of Murcia.

### Exhaustiveness and relevance of the results

It is possible to state that RDSs are a step forward in the fulfilment of libraries' ultimate goal, which is helping users discover content accessible from the library in any format. However, this objective should be achieved without prejudice to the relevance of the response (Freund, Poehlmann and Seale 2012).

Results are ordered by relevance by default, though it is possible to modify the order according to other criteria such as the date of publication. At the ULE, ordering by "Library and relevance" is activated by default.

The sorting algorithms are far from clear, nor are the documentary repositories where the RDSs carry out their searches transparent. The results obtained using the global search box of the RDSs and OPACs are included in Table 1.

University	UMU		UPV		ULE		TOTALS
	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
Automatic indexing	105	6	29	2	87	3	232
Interfaces evaluation	2624	0	380	7	237	5	3253
Digital libraries	4696	67	853	161	121	135	6033
Isidoro Gil Leiva	64	16	67	31	11	4	193
José Vicente Rodríguez Muñoz	1587	63	584	10	70	6	2320
TOTALS	9076	152	1913	211	526	153	12031

Table 1. Results of the search in all fields

The results show that the retrieval of records is much higher in the RDSs than in the OPACs. As we know, searches in OPACs are usually limited to the collection held by the library and, traditionally, to books, though in recent years they have been supplemented with doctoral theses, chapters of monographs, papers in conference proceedings, journal articles and electronic resources, in addition to documents in other formats such as audio and video documents. In contrast, RDSs offer documents taken from highly varied repositories, indexes and databases as well as documents that are held at or subscribed to by the library.

We also know that there is no system that offers 100 % recall and 100 % retrieval precision. As a result, the more results retrieved, the higher the level of noise. However, thanks to the ordering by relevance, the user can limit that noise by beginning his or her query with the results presented in the first pages.

With respect to RDSs, I observed substantial differences between the number of documents retrieved from the University of Murcia and the number retrieved from the University Politécnica de Valencia and University of León. This situation could be due to Summon's providing access to more repositories of documents than Primo Central and WorldCat Local do. The companies that own the RDSs do not provide sufficient information in this respect, as has already been noted.

In terms of searches by subject concepts, it is possible to reach the conclusion that the more general the search concept, the higher the number of results retrieved. Accordingly, the search for "digital libraries" returned more results than that for "automatic indexing" in all the universities and both for the RDSs and the OPACs.

For subjects that contain a combination of concepts, of which one is very general —"interfaces evaluation—" recovery is not particularly homogeneous. In the case of University of León, it emerged that it was possible to find more documents with these terms than when searching for "digital libraries." In that case, this high number of results from the RDS contained a large number of irrelevant results, as will be seen later. In contrast, Murcia's OPAC did not return anything.

With respect to author searches, I observed that the number of results has a close relation with the number of parts that make up the name of the author and how common these components are. Consequently, the search for the names of two authors from the same university and with a similar output returned a much greater response in the case of "José Vicente Rodríguez Muñoz," with its compound first name and common last names, than in the case of "Isidoro Gil Leiva," whose first and last names are much less common. The relevance of the results proved to be much higher in the case of Isidoro Gil Leiva and the recall much greater in the case of José Vicente Rodríguez Muñoz.

In some cases, catalogues still required the insertion of the surname first in their searches. This is the case of the University of Murcia's catalogue. The subject field of ULE's advanced search also requires this order of names and surnames.

There are two basic possibilities for filtering or selecting relevant search results when there are so many that comparing records becomes difficult: making use of the advanced search or using the facets, and in particular filtering by topics, subjects or disciplines, authors, dates, languages, document types, and so on.

All the RDSs used provide different filters, which I will discuss later. I tested limitation by subject facets, and observed that only the University of Murcia provides disciplinary searching. I performed a test of limiting the search to library science and computing for subject searches; the percentage of results that were relevant exceeded 75 %.

The other RDSs did not provide searching by disciplines, but rather by keywords, mixing Spanish and English terms in a fairly inconsistent manner and making it more difficult to obtain relevant results. This situation was also highlighted by Breitbach (2012).

In these cases, the use of advanced search fields for searching seemed more efficient and, therefore, was the chosen option. The results of the searches by subject and author fields are presented below (Table 2).

University	UMU		UPV		ULE		TOTALS
Tool	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
Automatic indexing	14	6	8	0	5	3	36
Interfaces evaluation	10	0	13	4	5	5	37
Digital libraries	308	63	252	155	87	81	946
Isidoro Gil Leiva	35	6	62	31	8	4	146
José Vicente Rodríguez Muñoz	84	13	47	10	12	6	172
TOTALS	451	88	382	200	117	99	1337

Table 2. Results of searches by subject or author fields

The results obtained by limiting searches to a specific field — subject or author — are substantially lower than those obtained from the global searches. The field searches returned more results from the RDSs than they did from the OPACs. Most of them came from a concept search for "digital libraries." Once again, the University of Murcia's tool retrieved the most documents.

The following table presents the percentage of results returned by field searches relative to those of the global searches in order to evaluate the ability of advanced searches using the subject and author fields to act as a filter.

University	UMU		UPV		ULE		TOTALS
Tool	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
TOTAL SEARCHING IN ANY FIELD	9076	152	1913	211	526	153	12031
TOTAL SEARCHING SUBJECT AND AUTHOR FIELDS	451	88	382	200	117	99	1337
PERCENTAGE SEARCHING IN FIELDS RELATIVE TO GLOBAL SEARCH	4.96 %	57.89%	19.96%	94.78%	22.24%	64.70%	11.11%

Table 3. Percentages of the results of searching by field/Results of searching all fields

I observed that in the RDSs, field searching filters the results by eliminating between 95 % of them in the case of UMU and 80 % in the cases of UPV and ULE. The greater the number of global search results, the higher the percentage by which they were reduced.

In the OPACs, where the results were less extensive, the decline is much less, particularly in the case of UPV. I therefore consider field searching to be an adequate filter or selection mechanism.

University Tool	UMU		UPV		ULE		MEANS
	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
Automatic indexing	100%	100%	96%	100%	100%	100%	99.33%
Interfaces evaluation	40%	----	64%	71.42%	40%	100%	63.08%
Digital libraries	96%	80%	92%	92%	96%	100%	92.66%
MEANS	78.66%	90%	84%	87.80%	78.66%	100%	85.02%
Isidoro Gil Leiva	88%	37.50%	60%	28%	100%	100%	68.91%
José Vicente Rodríguez Muñoz	56%	12%	28%	10%	16%	100%	37%
MEANS	72%	24.75%	44%	19%	58%	100%	52.95%

Table 4. Relevant results from searching in all fields: First 25

It is worth highlighting the relevance of the results provided by ULE's OPAC; 100 % of its results were relevant on all searches. Moreover, the results obtained from UMU's RDS were also very positive. I also observed a higher level of relevance in subject searches than in author searches. In these last searches, only ULE's OPAC and UMU's RDS reached levels that were similar to the subject searches and that could be considered adequate owing to their achieving a percentage around or above 75 %.

However, there were significant differences between some searches and others. The search for "interfaces evaluation" produced the most noise because it used two concepts — one of which ("evaluation") was very generic — that must be combined.

In the case of authors, differences in the results obtained from each were observed. These were due to the name of the second author having more parts as a result of the composite first name. In addition, both of this author's first names and last names are very common, reducing retrieval accuracy, as was described earlier.

The UPV's results returned many works that the authors searched for edited but did not author, which in my view distorted the results. This situation was repeated in the University of Murcia's OPAC.

I detected duplicates in the search results for all the universities, especially in both the global and field searches conducted in the RDSs. The OPACs were likewise not completely free of duplicates.

University Tool	UMU		UPV		ULE		MEANS
	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
Automatic indexing	92.85%	100%	100%	----	----	100%	98.21%
Interfaces evaluation	100%	----	76.92%	100%	100%	100%	95.38%
Digital libraries	88%	84%	88%	88%	96%	100%	90.66%
MEANS	93.61%	92%	88.30%	94%	98%	100%	94.75%
Isidoro Gil Leiva	100%	100%	56%	28%	100%	100%	80.66%
José Vicente Rodríguez Muñoz	88%	50%	36%	10%	33.33%	100%	52.88%
MEANS	94%	75%	46%	19%	66.66%	100%	66.77%

Table 5. Relevant results of searches by subject or author fields: First 25

Table 5 shows a higher degree of relevance for results from field searches relative to those from global searches. The results obtained from subject searches approached or exceeded 90 % relevancy and, as with the global searches, the percentage of relevant results was higher than it was for author searches.

The latter show a substantial improvement over the previous results, with those obtained from the University of Murcia's OPAC being more than adequate. The same differences between searches for the two authors chosen can be seen, for the reasons previously given.

The most relevant results once again came from searches performed through the University of León's OPAC. Conversely, the University Politécnica de Valencia is the institution that offered the fewest relevant results from author searches, partially due to the fact that these searches retrieved many works edited by these authors, something which, as I have noted, distorted the results.

University	UMU		UPV		ULE		TOTAL S
	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
BOOKS	37.43%	78.66%	27.02%	83.56%	70%	41.86%	50.95%
ARTICLES/PAPERS	54.74%	0%	65.54%	0%	21.66%	0%	32.45%
BOOK CHAPTERS	0.55%	0%	0%	0%	0%	56.97%	7.34%
ELECTRONIC RESOURCES	1.67%	10.66%	5.40%	16.43%	8.33%	1.16%	6.16%
OTHERS	5.58%	10.66%	2.02%	0%	0%	0%	3.08%

Table 6. Document types within the relevant results retrieved: First 25

Table 6 reveals a predominance of books among the relevant documents retrieved. This predominance was significantly higher in the OPACs searches than in those of the RDSs, in which journal articles predominated. The exception here was the University of León, whose RDS retrieved more books than articles.

None of the OPACs retrieved journal articles. However, the ULE's OPAC retrieved a large number of book chapters, principally as a result of the library regularly entering individual papers from congress proceedings into its catalogue. However, it is clear that it does not produce analytical records of journals.

The percentage of electronic resources is noteworthy in the University of Murcia's and the University Politécnica de Valencia's OPACs and in the University of León's RDS. Finally, the section of "others" primarily includes theses, end-of-degree and end-of-year projects, and Master's dissertations; these are a significant presence in the UMU subject searches. Numerous works of this type were retrieved at UPV, but because the majority of them appeared through the author searches, they have not been classed as relevant.

University	UMU		UPV		ULE		TOTALS
	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
2011–2015	14.36%	17.33%	27.02%	6.94%	5.83%	9.30%	14.51%
2001–2010	52.65%	54.66%	54.72%	69.44%	71.66%	56.97%	58.92%
1991–2000	31.38%	28%	18.24%	23.61%	19.16%	27.90%	24.81%
(...)-1990	1.59%	0%	0%	0%	3.33%	5.81%	1.74%

Table 7. Age of relevant documents retrieved: First 25

Table 7 shows that more than half of the retrieved documents were published during the first decade of the 21st century and, in addition, in the last decade of the 20th century. Documents prior to 1990 were scarce or non-existent.

As for documents from most recent years, they are significant mainly in the RDS of UPV and both of UMU's tools. In the case of UMU's OPAC, the currency of the documents is due to the results appearing in descending date order. In addition, when a subject field search is performed in ULE's RDS, the results are ordered by date that replaces relevance, producing an increase in the currency of the retrieved documents.

As can be seen in Table 8, the majority of the retrieved documents analysed are in Spanish, though English is a significant presence and, in all cases, more numerous in the results obtained from the OPACs, which is due to the higher number of books that are retrieved by these tools, many of which are in English.

Other languages merely make a token appearance and are limited, when they appear, to Portuguese, Catalan and French, in that order. The presence of Portuguese is mainly due to collaborations between the searched-for authors and their Brazilian colleagues.

University	UMU		UPV		ULE		TOTAL S
	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
SPANISH	84.57%	70.66%	68.24%	55.55%	85.83%	77.90%	75.90%
ENGLISH	11.17%	26.66%	27.70%	44.44%	11.66%	22.09%	21.33%
OTHERS	4.25%	2.66%	4.05%	0%	2.5%	0%	2.75%

Table 8. Language of relevant documents retrieved: First 25

### Filter or selection features

A high or low number of results returned may make it necessary to limit or extend the search. The RDSs' single, global search box prioritizes recall over precision, as a result of which the user usually receives too many results rather than too few.

Facets allow the user to limit or extend the search by displaying related concepts, formats, ranges of dates, languages, and so on. As Noe (2012) points out, facets are an unavoidable feature if we want accurate results, but its use ought to be explained in order to push their use (Holman et al., 2012)

In the case of the OPACs, a more precise retrieval of results is achieved through a Boolean combination of concepts in the advanced search and through the use of indexes (Villénm – Rueda, Senso and Moya – Aneón 2007).

In my view, it is necessary to underline the usefulness of author, title and subject indexes, which in general are not available. Hofmann and Yang (2012) consider that the definitive replacement of OPACs with RDSs will come about because RDSs feature a widespread integration of advanced searching and navigation features based on alphabetical author, title and subject indexes.

In the analysis I conducted, I found that advanced searching was widespread and was available for searches in both the OPACs and the RDSs. This was not the case for alphabetical indexes, which were not available in any of the tools tested except for the University of Murcia's OPAC, which allows users to browse indexes by author, subject, place of publication, publisher, catalogue number and Universal Decimal Classification (UDC).

With regard to the possibilities for expanding results, both Murcia and León allow searches to be broadened to include results from outside the library. UPV allows users to extend the search to references without full text and gives information on the number of copies of each resource. I noted that Functional Requirements for Bibliographic Records (FRBR) was implemented, as manifestations of the same work were displayed together – the same document but in different editions, for example. As Metz – Wiseman et al. (2012) points out this is a useful possibility. Chickering and Yang (2014) point out FRBR relationships as one of the features from Primo.

University	UMU		UPV		ULE		TOTAL
	RDS SUMMON	OPAC	RDS PRIMO	OPAC	RDS WC	OPAC	
Electronic resource: directory or database that includes it	---	---	x	---	x	---	2
Type of publication/content	x	x	x	x	x	---	5
Format	---	x	x	x	x	x	5
Subjects/disciplines	x	x	x	x	x	x	6
Authors	x	x	x	x	x	x	6
Journal title	---	x	x	---	---	---	2
Languages	x	x	x	x	x	x	6
Dates	x	x	x	x	x	x	6
Library/collection/location	x	---	x	x	x	x	5
Copies available	---	---	---	---	x	---	1
Full text	---	---	---	---	x	---	1
Provider/Publisher	---	---	---	x	---	x	2
Courses	---	---	x	---	---	---	1
TOTALS	6	7	10	8	10	7	

Table 9. Selection features

In terms of the presentation of the results, all tools offered ordering by relevance by default, except for León, whose RDS presents them by "library and relevance," as was pointed out previously, which means that the user has to specifically choose to sort by relevance. UPV also provides ordering by popularity.

Table 9 presents the 13 selection features encountered in one or more of the tools studied.

In general, it is possible to state that there were numerous and varied selection features, and that there were usually more of them in the RDSs than there were in the OPACs. However, none of the tools offered all of the filtering possibilities listed here. The greatest range of possibilities was found in UPV's and ULE's RDSs.

All the tools allow the user to select by authors, languages, dates and topics, subjects or disciplines. The ability to select by publication type, content and format was very common. With respect to these facilities, it is necessary to point out that in some tools there was a clear differentiation between document types and formats, while others presented both possibilities together. Most of the tools allowed the user to limit his or her search to a specific library or private collection or to a particular location.

At the other end of the spectrum, some features were only found in one tool. These features always corresponded to a particular RDS. In my view, the possibility of performing specific searches of the recommended materials featured in course bibliographies, which is offered by UPV, is highly useful. It is essential for there to be a transparent and effective connection between bibliographies and the implemented RDSs that allows easy access to the resources recommended by lecturers in their syllabi.

### Recommendations of related documents, contributions and user assessments

As different works point out (Rodríguez et al., 2015; Pintos, 2016) the social interaction between users is not a priority for the companies that own the RDSs. However, Breeding (2015) considers that the opinion of experts is very useful to indicate relationships between resources or to add entries. And Race (2012) reckons that RDSs can facilitate the accidental discovery of resources through serendipity if they make more use of social features.

Rodríguez and Travieso (2013) previously noted that Summon shows shortcomings in the implementation of features related to the OPACs social or participatory aspects as it did not make recommendations to users or allow them to make contributions. Primo Central's section on recommendations and/or related materials, meanwhile, allows not only suggestions of related materials but also of related works or similar titles. In terms of rich content, tag clouds were rare. And with regard to user contributions, the most common sort was the ability to add description tags, but some systems such as WorldCat Local allow comments, critiques or reviews.

However, the present analysis revealed significant progress in the use of social and collaborative aspects of the tools studied. It should be noted that UPV's RDS most clearly provides allocations of tags and comments. I did not see ratings, but it was possible to order results by popularity, as previously noted. With regards to the OPACs, that of ULE allows comments to be left.

### Discussion

Librarians should have the goal of helping users discover content in any format that is accessible from the library, without neglecting the emphasis that has traditionally been placed on the librarian's task of representing and organizing information. From the work conducted in this study and other previous ones, I can conclude that there is still certain vagueness when it comes to directing users to new tools and/or the traditional catalogue. Only UMU presents the user with the existing possibilities in a clear and simple manner.

The RDSs represent a considerable advance. The combination of the library catalogue, article indexes and other sources of information in a unified interface is an undoubted improvement. But in spite of this favourable aspect, there are shortcomings that have been indicated by Fagan et al. (2012), such as the difficulty of carrying out specific disciplinary search strategies and the absence of authority control, which negatively affect the precision of information retrieval. As Breitbach (2012) points out metadata are less valuable than before because the borders between disciplines disappear and the same terms are used with different meanings. However, all discovery systems depend on excellent quality metadata for success to achieve effective retrieval (Akeroyd, 2017).

In this study I found that disciplinary searches and the possibility to define the search using indexes are scarce. Only the University of Murcia allows these. For this reason, it was necessary to use advanced searching to filter the results. Filters by subjects and topics at ULE and UPV were inconsistent for selecting the information required.

Searches in the single, global search box or in the field searches returned a significantly higher number of results in the RDSs than they did in the OPACs. The high number of results retrieved by the UMU's RDS stands out. Hoseth (2012) believes that RDSs are efficient in general on interdisciplinary searches. The number of results retrieved varied according to whether searches by subject concepts or author were performed, with concept searches providing more results. In addition, I detected differences based on whether concepts were more or less specific and whether authors had more or less common names or ones comprising greater or fewer parts.

The relevance of the results obtained was higher in the OPACs and in field searches, which represent an effective filter for results, for both tools. ULE's OPAC stands out for having achieved 100 % relevance in the results of all searches made. It is also worth noting that the subject search results were more relevant than the author searches, partly because in the case of UPV's works edited by the searched-for authors but not authored by them were discarded because they were not considered relevant. I have shown that the integration of the library's own collection – for example, integrating analytical records and dissertations – plays a significant role in the results.

The relevant documents retrieved were primarily books and journal articles. The retrieval of books was more frequent in the OPACs, whereas RDSs returned more articles. The presence of chapters of books, electronic resources and other document types was marginal. It was only with ULE that I saw a predominance of books in the searches in the RDS and a considerable abundance of chapters in the OPAC. The retrieved documents were mainly dated from the first decade of the 21st century and the last decade of the 20th century. Documents prior to 1991 were infrequent, and the presence of publications from the last five years was limited, to some extent due to the decrease in Spanish university libraries' purchases and subscriptions. In terms of the predominant languages found, it is worth noting that the analysed relevant documents were written mainly in Spanish or English. The latter language was most frequent in the case of books. The presence of other languages was marginal.

With regard to the selection or filter features, in general the RDSs provided a wider range of possibilities than did the OPACs. All the tools allowed the user to select by authors, languages, dates or subjects and disciplines. The ability to select by type of publication, content and format was also very common. It is worth highlighting the option to limit the search to the recommended bibliographies for various degrees' subjects that was offered by UPV's RDS.

In relation to the collaborative aspects of analysed tools, I consider the option to include contributions of users themselves to be positive, as it encourages them to view these tools as something more immediate and participatory. The option of suggesting related searches or similar documents was also a positive feature. However, I noted a limited use of these social features. Libraries need to raise awareness of these in order to encourage user participation.

Finally, it would be advisable to expand the rich content offering with each record. At present, it is limited mainly to the inclusion of the covers; providing summaries, critical reviews and so on would enable a more informed — and therefore effective — selection. In this regard, I would point out the joint presentation of the manifestations of the same work that the UPV catalogue offers.

## Conclusion

Libraries will have to consider customers when it comes to placing the different instruments for accessing content on their web sites, and ask themselves the following questions: When should a user be directed to the catalogue? When should a user be directed to a RDS? What items should the library continue including in its catalogue? Or: Has the time to abandon the catalogue come? And, fundamentally: Are users capable of finding the best resources to meet their needs?

It should be noted that the number of explored locations has been short. For the above reasons, I believe that it is necessary to continue with this line of work and carry out a more exhaustive evaluation and exploration that allows us to discover the impact that the different tools implemented and/or developments, settings, and customizations carried out by libraries themselves have on the amount and relevance of the results found.

Search technology has evolved far beyond federated searching and bring almost Google-like power to library searching, the challenge now is to adapt and refine the tool to meet the objectives of the library and to test it to prove that the library is taking advantage of it in a more intensive and extensive use of library contents. As Spezi, Creaser and Conyers (2015) point out, RDSs are an important investment at universities so they cannot be considered only as an adding value tool but ought to prove their value with evidences. Their utility should be proved in information searching but also in librarian resources' management and in the use of academic contents.

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