Appendix B Exploration of existing webscale discovery services: Primo, ED, Summon, WorldCat Local and Google Scholar

Content

1. Introduction

In this part of the study, the options of the various existing discovery systems for realising a national discovery system for France were explored:

- One case report – RERO in Switzerland - is described in chapter 2 as an example of such a (regional) discovery system using an existing web scale discovery service.
- In the chapters 2 to 5, the results of this study into the possibilities of Primo, Summon, WorldCat Local, EBSCO discovery service and Google Scholar are described.
- In chapter 6, the results of the exploration of the scenario using one of the web scale discovery systems as offered by the library system providers and the results of the exploration of the scenario using Google Scholar are discussed.

The providers of web scale discovery systems have been contacted with regard to this study and sent a document with 20 questions. All providers participated in this study and put in considerable effort to answer these questions. The method of participating in this study varied for each provider: after teleconferences in order to discuss the questions and their context, OCLC, Ex Libris and EBSCO have sent in a document with written answers to the questions, Serial Solutions organised two extensive teleconferences in order to answer the questions, while Google Scholar one telephone interview war held. Pleiade Management and Consultancy wrote and/or edited the responses and has returned the results for each provider for a last review and check. However, it is important to emphasise that the exact text in this report is the sole responsibility of Pleiade Management and Consultancy.

2. Case report : RERO

2.1 Introduction

RERO – the acronym for REseau ROmand - refers to a network of libraries in Western Switzerland. The network includes most academic, public, heritage and specialized libraries of the cantons of Geneva, Fribourg, Jura, Neuchâtel, Valais and Vaud, as well as the Courts of the Confederation: combined approximately 260 libraries serving 60,000 students of 5 universities and 295,000 registered patrons.

The network is organised in 6 subdivisions of libraries, each with a coordinator and with their own LMS administration for some local functions (acquisitions, items, circulation matrix etc.)..

The main services of RERO consist of:

- A shared LMS system (Virtua Consortium): one single system with one database,
    - to share global data like: bibliographic and authority records, patrons records
    - allowing specific set-up by each subdivision for local data.
- Harmonized OPACs: 1 global OPAC for the union catalogue, and 6 local OPACs (1 filtered view per subdivision)
- A meta search (MetaLib) with a shared knowledge base and 4 link resolver instances (SFX)
- A shared Digital Library (rero doc)

2.2 Selection and implementation of a discovery tool

The strategic plan of RERO gave a high priority to enhance services to end-users by the implementation of one discovery portal for the printed collection, the digital collection and the online resources (electronic resources, databases,etc.). The main purpose of the discovery service is to provide users with one entry point to both the digital and print collections of the RERO network. As such, the new discovery service will offer online requests and is seen to replace the various OPACS within the network.

With regard to the selection an important consideration was that the selected discovery service should interoperate with the LMS through APIs and fit in the trend towards the cloud for library systems (for instance with regard to the library management systems). In addition, it was not seen as feasible to build an own solution with open source software because of the human resources that this would take.

In the period May to July 2011, a tender was called for the discovery tool. This resulted in the selection of Primo Central by ExLibris[1], which was finalised at the end of March 2012. The implementation phase was started soon after. A working group was setup with 6 representatives from the network and a project team with 7 members (no full-time involvement for these

[1] Version 4.0, adapted for consortia.

participants) plus a coordinator for 0.7 FTE. It is foreseen that the discovery service will be available mid December 2012.

2.3 Architecture

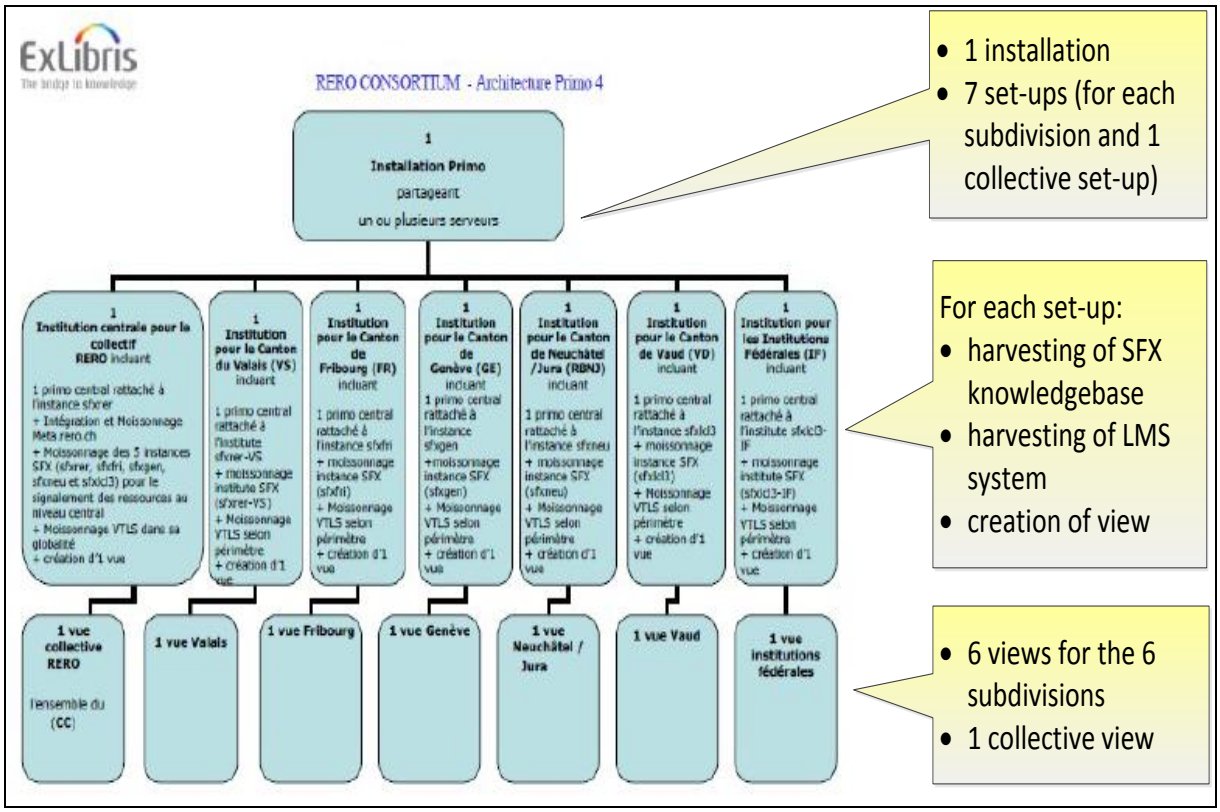

Figure 1 Architecture RERO

In the figure above the architecture of the Primo implementation is sketched:

- The installation is made of 7 Primo institutions: 1 for RERO collective, 6 local (1 per subdivision).
- The LMS system is harvested once, for the RERO collective, and each local primo institution is accessing to its own rebuilt data.
- There are 7 set-ups: for each subdivision of the RERO network a separate set up plus a collective one.
- For each set-up, the SFX knowledge base is harvested for that particular subdivision.
- This architecture follows the set-up of the LMS system that RERO uses.
- All parameters within the system will be the same for the entire network. In other words, the only differences between the subdivisions are the resources.
- For the first implementation in December 2012, the IP address range will be used for authentication. In a later release, Shibboleth authentication will be implemented. Shibboleth is already implemented at the universities within the network, but not yet at the other libraries.

2.4 Lessons learned

- The administration tool of Primo has different levels (such as consortium level, individual library level). However, in practice, the administration tool is rather complex, and there are not enough restrictions in access control, for example to avoid overwriting of parameters or simultaneous access. Therefore, clear and strict procedures have to be developed.
- The effort for the initial administrative setup (entering all the data) consumed quite a lot of manpower.

2.5 Maintenance, desired effects and business model

- After implementation, it is estimated that the administrative effort from the side of the RERO network will take 0,5 to 1,0 FTE.
- The desired effects of the discovery tools are a better usability of the library resources for the end-users, resulting in an increase in usage for the e-resources and the print resources. In the longer term, it is foreseen that the discovery tool will replace the OPAC catalogues of the subdivisions.
- The central organisation of the RERO network finances the discovery tool in its entirety. The central organisation is financed for approximately 50% by the cantons and another 50% by annual fees from the member libraries.

3 Ex Libris: Primo, Primo Central Index and SFX

3.1 Architecture with multiple (meta)data platforms

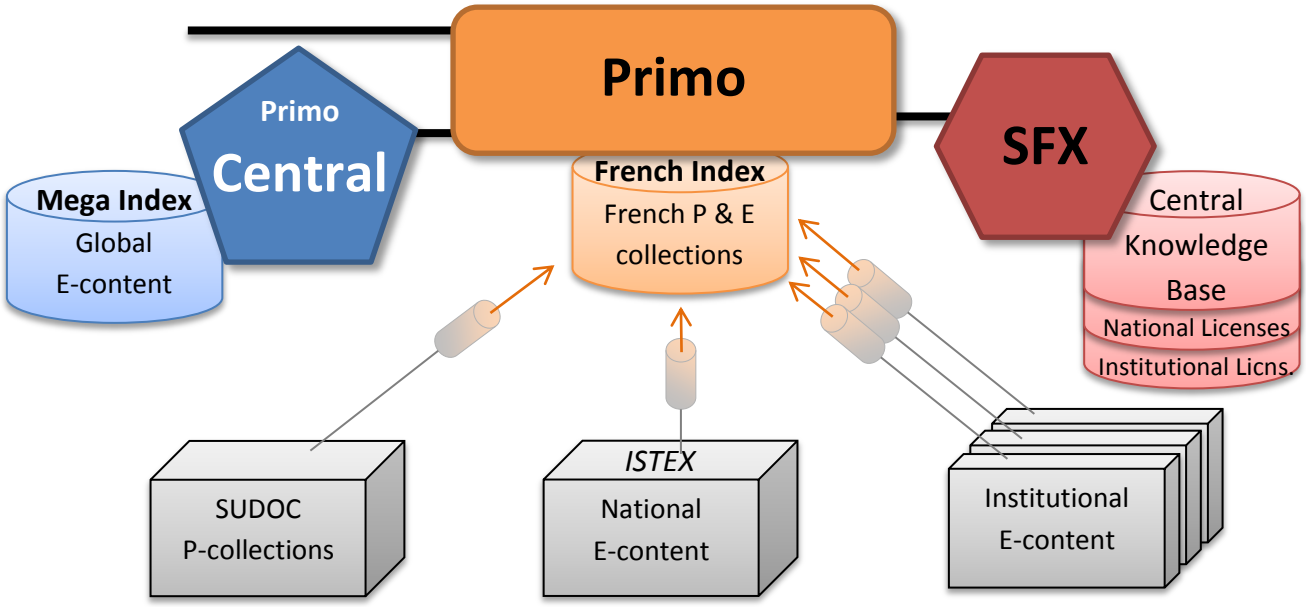

Figure 2 Architecture with Primo

The Ex Libris staff provided a schematic representation for a possible architecture for the French national discovery tool, which includes a French Index (see figure 2).

- **Ex Libris provides three functional units:**
  1. **Primo** – a discovery solution to harvest all relevant French sources, building a French Index and display the user interface for discovery and delivery
  2. **Primo Central** – a mega Index of global e-resources on article level
  3. **SFX** - link resolver based on a Central Knowledge Base and augmented by national and institutional licenses
- **The proposed architecture is based on the following data service principles:**
  - Ex Libris with its data service team cooperates with publishers worldwide maintaining:
    - Mega index of metadata describing global e-content for e-journals and e-books including article level and chapter-level when available
    - Central Knowledge Base with global e-resource information about the supplier (target), the package (sub target) and what such a package contains (object portfolios)
  - ABES will be the main contact to the publisher regarding French national licenses. ABES uses a tool of their choice to maintain all relevant data.
  - Individual HE institutions will continue to license additional e-content, maintaining them with a tool of their choice
- **Purpose and Interaction of components:**
  - The Primo Central index provides search results of global e-content on article level during discovery via an open API; These results will be blended to a single result set by the actual discovery component, e.g. Primo.

- The Primo software provides two purposes: (a) harvesting and bringing together various French metadata sources (SUDOC, ISTEX, institutional holdings) for building a central French Index; (b) providing a user interface for entering a search, carrying out the search in its own search index (the French Index in this case) and external indexes (the Primo Central mega index in this case), merging the results and provide this to the end user including delivery options. In addition, Primo can connect to any Solr Index via a so-called Deep Search connection.
- The SFX software provides Open URL link resolution to support the discovery component in its attempt to deliver electronic resources. This is based on the central knowledgebase of e-journal and e-book services and the information about national and institutional licenses. Depending on the tools used by ABES and the institutions, this may be provided e.g. via holdings files or similar.

- **Primo Central metadata quality**: Primo Central is an index that covers hundreds of millions of scholarly materials, aggregated from numerous information providers. Approx. 90% of the records in Primo Central contain full metadata including subject headings or topics; a similar percentage includes the complete full text or abstract indexed in addition to the metadata.
  Link with Metadata Hub: The metadata indexed in the Primo Central Index is not owned by Ex Libris, but rather licensed by it for the purpose of indexing and displaying in our service. All intellectual property rights embedded in the metadata are reserved by the applicable contributing providers and such providers remain the sole and exclusive owners of the metadata. Therefore, for enrichment and redistribution by the Metadata Hub, ABES will have to ask permission of copyright. The metadata index in a French Index will be completely controlled by ABES and ABES would define any license/ownership of this data.

3.2 Locator services

- **Three possible setups:** The Ex Libris staff mentions three options for the set-up of the national discovery service in France (see table below). The first two options (A and B) would service all French libraries, the last option (C) only those libraries with a link resolver implemented[2].

Options	Central discovery	Link resolver	My Account functionality	Patron authentication
A. Central discovery provides full resource coverage and full linking and My Account functionality	SUDOC loaded into the French index	central consortial SFX: loading local holdings files into central KB	provided as OPAC via link or OPAC via Primo API (see below for description)	authentication relayed to Shibboleth, SAML2, CAS, LDAP, ALEPH user account and others
B. Central discovery provides full resource coverage and full linking	SUDOC loaded into the French index	central consortial SFX: loading local holdings files into central KB	needs to link back to local OPAC	happens in local OPAC
C. Central discovery provides full resource coverage	SUDOC loaded into the French index	local link resolver needs to include nationally licensed e-content	needs to link back to local OPAC	happens in local OPAC

Table 1Three options compared

[2] Option A versus option B: option A probably requires more coordination with the 150 HE institutes (with 1400 libraries) that fully participate in SUDOC and 2000 libraries that participate in SUDOC for journals only.

- **Integration Primo and link resolvers:**
  - Primo integrates seamlessly with the link resolver SFX via OpenURL. In addition Primo Central makes use of holdings files to filter e-content for search results per institution. This interaction/compatibility is based on:
    - The creation of an export file called “Google Scholar institutional holdings file” in xml format from SFX containing all active resources list of the institution’s collection
    - The export from SFX to Primo of the “Google Scholar” holdings file is used to indicate in Primo Central index the availability of the Institution’s collection
    - The creation of an SFX Pipe in Primo to harvest the journal titles in the local Primo Index
    - The setup of the SFX Base-URL in the Primo Back office in order to generate the correct link for OpenURL from Primo to SFX.
  - Primo can interact with any other link resolver which support the OpenURL standard (1.0 or 0.1) and which can export its resource list in a Google Scholar institutional holdings file in xml format (http://scholar.google.com/intl/en/scholar/institutional_holdings.xml) that will be harvested by Primo Central.
  - For an overview of the interaction between the Primo Central Index, the Primo views per library and the link resolver, see the figure below from Ex Libris:

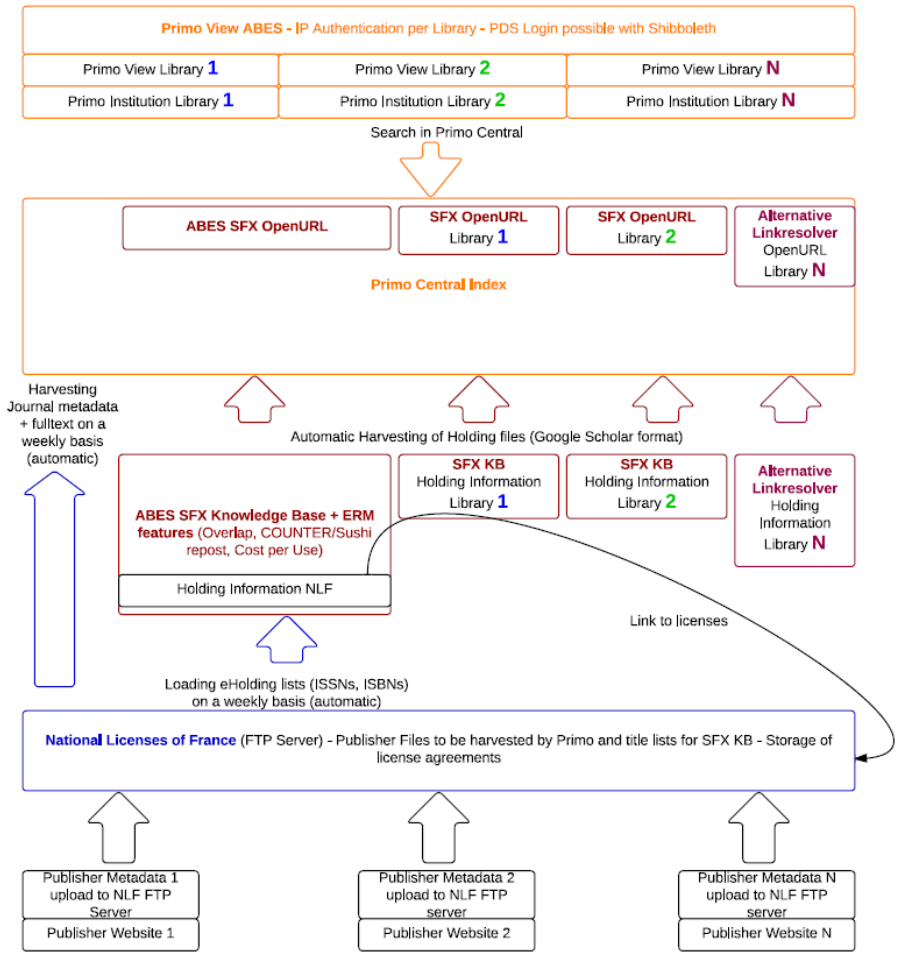

Figure 3 Dataflow in systems with Primo

- **National license information integration and international standards:**
  - Knowledge Base data from the ISTEX service can be loaded into SFX using files of various formats.
  - It is possible that ABES will create their own SFX targets for the national e-content licenses in their own SFX instance as an extensions to the SFX central knowledge base
  - In addition, Ex Libris will continue to improve the existing process of including the French national e-content licenses into the global knowledge base with an upload to Ex Libris Data Service team taking place on a regular basis.
  - There are national initiatives to manage licenses to e-content centrally. Examples are EZB in Germany and KB+ in the UK. Ex Libris is active in both. In each case the goal is to add national specific content to knowledge base in order to ensure that individual libraries do not have to maintain entries which are the same for all libraries in a country. The KBART format is already used to exchange files between Ex Libris and French publishers. It is on the development roadmap to make this directly available from SFX (Ex Libris is a partner in the KBART project in the UK). There are discussions to also include ONYX-PL into the list of supported formats.

3.3 Connectors

- **Integration of local holdings:** In order to cover local holdings of a library, the metadata have to be harvested by Primo. This can be either done directly from the ILS of the library, or from SUDOC, if the metadata is fully managed there. It is also possible to mix the two approaches: load everything available from SUDOC and only harvest the local additions from the local ILS. This is common practice e.g. in the Austrian Library (Österreichische Bibliothekenverbund und Service Gmbh). The process by which the source data is converted to PNX (the normalized metadata scheme of Primo) is called a Primo pipe. Running a pipe allows harvesting records from a particular data source, normalizing and enriching them for discovery purposes. Such pipes exist for harvesting data of the following formats: Dublin core XML, MARC Exchange (ISO2709), MARC XML, WARC and for major library data sources[3]. New pipes can easily be configured by librarians through Primo's back office user interface without any need for programming. If the library maintains their e-content in SUDOC, it should be possible to extract the necessary data from there and load it directly into the central SFX. This depends on the actual data attributes managed in SUDOC whether all necessary fields are available.
- **OPAC:**
  - **OPAC via link:** Exposing the OPAC screen in an IFrame within Primo's user interface or providing a link to the native ILS OPAC to let the user place a hold request etc.
  - **OPAC via Primo:** The OPAC functionality is fully integrated inside Primo's UI. ALEPH Version 18, 20.1 and higher, and Voyager Version 7.2 and higher include APIs that enable

[3] Ex Libris Aleph; Ex Libris Voyager; Ex Libris Alma; III Millennium ; SirsiDynix Horizon ; SirsiDynix Unicorn ; SirsiDynix Symphony ; VTLS Virtua; Geac Advance; Ex Libris DigiTool; OCLC contentDM; Dspace; Fedora; Luna Insight; BePress Digital Commons; PTFS ArchivalWare

Primo to provide an interface for this. Any other ILS can work with this functionality if the ILS provides the right APIs to do so. OPAC via Primo makes a seamless integration of core OPAC functionality possible. This integration ensures that users can remain within one interface to perform most library tasks, from finding to requesting. It is important to note that the OPAC in Aleph and Voyager still exists and contains all its traditional functionality; Primo simply exposes it in a different form. The business logic itself, however, remains in the ILS.

- **Authentication**: authentication of the individual user is needed to access the following services: My Account functionality; RSS feeds & alerts; Tags and Reviews; Permanent E-shelf; Access to specific E-resources for which it is necessary to authenticate (restricted access). To enable a variety of user authentication methods, Primo is installed with the Patron Directory Services (PDS) module. PDS can be setup to relay authentication to Shibboleth, SAML2; CAS; LDAP; ALEPH user account and some others.

3.4 Portal

- **Primo view:** Primo allows using the IP range of the web browser to assign the session to one of the configured Primo institutions. The Primo institution controls several things during the session (allowing a central discovery to provide a consortial service to all HE institutions in France with tailored result display per institution):
  - The display of the availability of resources in general for a member of this institution in the search result. This is true for print and electronic resources and will be displayed as "available" or "not available" or any other visualization.
  - The link resolver server, which provides the actual link to the full text service (and any other service) for this resource as defined by this institution.
  - UI customization—local branding for each institution.

- **French language support:**

  - **Language detection:** In order to offer language-based services, Primo must first detect the language of the indexed text and the query. Primo can detect English, French, Italian, German and a variety of other languages. Primo includes further linguistic analysis capabilities including for French: stop words identification for different handling in ranking, stemming algorithm and more.
  - **Character conversion**: Primo provides automatic character conversion for French.
  - **Multilingual thesaurus support:** Support for multilingual thesauri can be enabled in Primo. In a multilingual environment a controlled term can be shown in English in the English interface and in French in the French interface, for example, if the controlled term is available in the data and defined in normalization. The multilingual thesaurus functionality can be used in the full record display as well as in the facets.
  - **Limit on language:** Facets are created on the fly, based on the library definitions and the specific result. If all items fall under the same value, the facet will not be displayed (for example, if all items on a list are of the same language, the language facet will not be displayed).

- **Spelling suggestions:** If a search term returns fewer results than a library-defined number, Primo offers alternatives ("Did you mean…?"). The algorithm takes into account phrases and errors that were entered by users in the past and so improves over time. Alternative spellings are also accommodated, by defining such words and their alternatives in the synonym list. The list of commonly misspelled words per language is stored on the Primo server (see also figure 4).

Figure 4 Did you mean function in French

3.5 Other information

- **SaaS or locally hosted:** the consortium environment can be deployed in a data centre by ABES or as a SaaS solution provided by Ex Libris. It is also possible to distribute administration rights to each individual institution over its user interface and solution.
- **Present coverage of French publishers by Primo:**
  - Brepols Periodica Online
  - Bureau International des Poids et Mesures
  - Cairn
  - Revues.org
  - Erudit
  - HAL
  - INED (Institut national d'Etudes démographiques)
  - Lavoisier SAS
  - Persée
  - PoPuPs (Portail de Publication de Périodiques Scientifiques)
  - Calenda
  - Hypothèses.org
  - L'année philologique
  - With another 15 French publishers, negotiations are on-going
- **Alma:** Primo is fully and seamlessly integrated with Ex Libris next-generation library management system Alma (in the cloud).
- **User statistics:** via UStat (part of SFX) and via the SFX and Primo reporting modules.

3.6 Information sources

- Teleconference with Axel Kaschte, Frédéric Lefevre, Maud Arnaud, December 10, 2012

- Document provided by Axel Kaschte, answering 20 questions with regard to the French national discovery tool dd. 2012-12-18
- Primo Datasheet
- bX flyer
- Primo Central Index Collection List - direct coverage (November 2012)
- Primo Central Index Collection List - alternative coverage analysis (November 2012)
- Primo Central Index Collection List – Open Access
- SFX V4 Overview

4. Serial Solutions: the Summon™ Web-Scale Discovery service

4.1 (Meta)dataplatform

- **Large index**: To cover the scholarly literature which requires an enormous operational effort. At this moment, the Summon index has over 1.3 billion documents indexed, 80% of which are fulltext indexed. Serials Solutions made a heavy investment in the last five years in order to achieve this. The Summon index has a unique match and merge technology, including metadata from the publishers and meta data from A&I databases. These data are matched and merged into a virtual single record in the index. Similarly, the metadata from a French open metadata platform could be matched and merged in the Summon index.
- **ISTEX:** the platform for national licences in France would pose no problem. The platform would be indexed in the Summon index and the link resolver should ensure that the content of these national licences is linked to the ISTEX platform.
- **E-books:** Over 12 million e-book titles are now included in the Summon index. The larger publishers also deliver metadata for the chapter titles. Over 10 million of the e-books are also indexed full text in the Summon index. A unique feature is a match of the full text of the e-book version with the printed version in the holding of the library, even if the library does not hold the electronic version.
- **Multiple platforms:** the respondents emphasize that one of the core concepts behind the summon discovery tool is its large unified index. According to them, examples of libraries using the VuFind portal and multiple platforms with indexes show that to generate a unified result set with adequate relevancy ranking from different index platforms is extremely hard if not impossible.

4.2 Locator services

- **Knowledgebase:** the knowledgebase of serial solutions is interoperable with other knowledge bases. Thus, importing data from French libraries that use other knowledge bases is feasible. However, the challenge is to get a 100% match. The respondents from Serial Solutions estimate that approximately 30% won't match. However, for scholarly journal titles this percentage might be lowered by using artificial intelligence to approximately 10%. 'It is feasible but not optimal'.
- **Indexing SUDOC:** SUDOC can be indexed and included in the Summon index in order to provide data on the print holdings of the French libraries. Norway can be seen as an example, where the union catalogue Bibsys is indexed by the Summon discovery service.
- **A national link resolver:** the respondents mention that a local link resolver can easily be integrated in the Summon discovery system: for libraries with a local link resolver a 'national link resolver' does not appear to have little added value in their view.

4.3 Connectors

- **OPAC connector**: The OPAC of a participating library will be harvested in the index of summon with hard links to the various items[4]. When the end-user clicks on this link, the information with regard to the availability of that particular item will be delivered by the OPAC via a XML or JSON web service within the Summon environment. If the end-user wants to reserve the item, the user has to log-in to the OPAC[5]. However, in the case SUDOC will be indexed for the information on the print holdings instead of the OPACS of all French libraries, this mechanism will not work. Another possible solution lies in encoding the link to the OPAC. This will work if the OPAC as a unique identifier and the records within that OPAC have unique identifiers.

4.4 Portal

- Web-based open API, with both XML and JSON options.
- Summon is provided as a Software as a Service (SaaS) model . The user interface is designed through open source software (Ruby on Rails.) The API allows libraries to design and locally host their own interface for the service.
- No authentication is required for searching or seeing results.

4.5 Other information

- Summon has a new release every three weeks, thus constantly improving the service and expanding the coverage.
- The Summon service is now used by over 500 libraries in 40 countries, including by over 33% of ARL member libraries, and also includes the following French libraries:
    - PRES Toulouse, France
    - Université Paris VII – Diderot
    - Université D'Evry
    - Université de Rennes 2
    - Ecole Centrale de Paris
    - SciencePo – Paris, France

4.6 Information sources

- Teleconference with John Law and Florin Craciun, December 12, 2012

[4] Summon presently supports the following OPACs amongst many more: EOS. Evergreen, ExLibris Aleph, ExLibris Voyager, SirsiDynix Symphony, SirsiDynix Horizon, Innovative Interfaces Millennium, OCLC PICA, Talis. The data structure for an OPAC to be harvested should be MARC21 or MARCXML/MAB/CMARC/CNMARC and have UTF-8/MARC-8 encoding. EZ Proxy, IIWAM are supported. In addition, the OPAC should provide real time availability.

[5] A few libraries have succeeded in integrating this also in the Summon environment.

- Teleconference with John Law and Ben McLeish, December 21, 2012
- Documention from Serial Solutions:
    - 360 Consortium Edition Consortium Models
    - 360 Link Getting Started
    - 360 Resource Manager Getting Started
    - 360 Sales Workbook
    - Data optimization checklist
    - Sales checklist for client catalogues and data
    - Serials Solutions for Consortia
    - Summon Getting Started
    - Summon Quick Guide

5. OCLC WorldCat Local and WorldCat Group catalogue

5.1 Dataplatform and architecture

- **Two options**: OCLC offers two principal discovery solutions: (1) WorldCat Local: a discovery solution for individual libraries (2) WorldCat Group Catalogue: a discovery solution for the resources shared by a group of libraries. This may be thought of as a union catalogue of both physical and electronic resources.
- **WorldCatGroup Catalogue:** A WorldCat Group Catalogue would provide a single solution with a single service URL. However, this would provide access only to nationally licensed/shared resources. This solution would not be able to offer different institutional resources to users who authenticate to different institutions. It would also not provide the deep interoperation with the individual library management systems of each institution in order to display item location/availability information in the OCLC user interface. Instead it would provide a link to pass users to the native interface of each library management system.
- **WorldCat Local**: WorldCat Local would be able to offer users of each individual institution access to both resources of that institution and national/shared resources. However, a separate instance of WorldCat Local would be required for each institution. While each could be configured with the same national branding, each would have a separate URL. Each instance of WorldCat Local would have its own configuration of resources available in the central index and its own WorldCat knowledge base configuration for linking to resources and would be associated with a separate instance of EZProxy for authentication. Each library would need to separately configure its own WorldCat Local. No group-level administrative configuration options would be available. In order to meet the majority of the requirements outlined in the ABES vision, OCLC would propose setting up WorldCat local for each library. To facilitate discovery from a single search box, OCLC would suggest ABES create a service to map the IP of the user to the appropriate instance of WorldCat Local based on the IP or prompt the user to choose their affiliation if the user is outside of an identified IP range.
- **Data platform:**
    - **Journals:** Content from more than 91,495 journals is accessible through the WorldCat Local/Group Catalogue service.
    - **Books:** The WorldCat Local central index includes metadata for more than 14.4 million e-books from major aggregators (including NetLibrary, ebrary, Ingram and Overdrive), mass digitization projects (including Google Books, Hathi Trust and Project Gutenberg) and individual publishers (including Springer, Wiley, Elsevier and Taylor & Francis). OCLC can provide a specific analysis of the national e-book collection to determine coverage if a list of ISBNs is provided.
    - **Open access:** WorldCat Local / Group Catalogue includes unique scholarly collections from institutional repositories including more than 23 million records representing digital resources from more than 1,100 contributors to the OAIster aggregated catalogue, harvested from open access collections worldwide.

- **Full text:** Full text from a number of collections is indexed in WorldCat Local, including Berkeley Electronic Press, BioOne, Emerald, IEEE Publications Database, InfoSci Books, InfoSci Journals, M.E. Sharpe eBooks, M.E. Sharpe Journals, SA ePublications Journal Collection. OCLC also have signed agreements to index full text for more than 80 further collections including collections from Elsevier, Brepols, and Alexander Street Press.
- **Ownership data:** Ownership and reuse of WorldCat metadata is governed by the WorldCat Rights and Responsibilities for the OCLC Cooperative [6]. According to these guidelines OCLC member responsibilities include (1) Not engaging in mass downloading from WorldCat without OCLC's prior written consent and (2) Not engaging in mass distribution of data directly from WorldCat to non-members without OCLC's prior consent. Ownership/copyright of metadata in the WorldCat Local central index is governed by agreements between OCLC and data providers. These do not allow for redistribution of metadata beyond the WorldCat platform. Depending on the platform used by ABES for Metadata Hub it may be possible for this to be synchronized with the WorldCat platform in a manner similar to that is used for union catalogues (via SRU record update).

5.2 Locator services

The WorldCat knowledge base and link resolution (see figure below) are fully integrated into WorldCat Local and provide seamless operation with the user interface to provide:

- Outbound link resolution via 'View Now' links in the WorldCat Local user interface to licensed and open access electronic resources.
- The ability for users to limit or refine their searches to include only records for articles that have full text available via a library's e-collections
- A-Z e-journal/e-book browse and search page
- Inbound link resolution from third party discovery interfaces (e.g. Google Scholar or any other discovery service) to e-resources as defined in the WorldCat knowledge base.
- Management of the WorldCat knowledge base allows for both import and export of KBART-formatted files.

[6] http://www.oclc.org/fr/fr/worldcat/recorduse/policy/default.htm

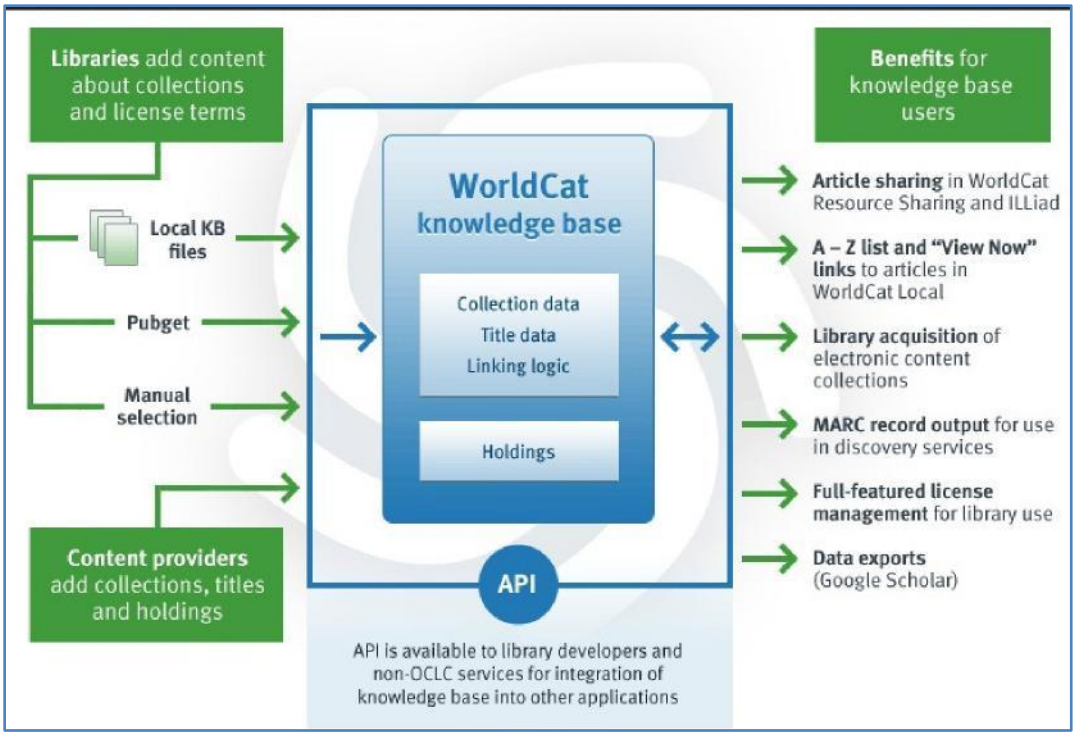

Figure 5 WorldCat Knowledgebase

5.3 Connectors

OCLC has completed integration of WorldCat Local with several integrated library systems, and continues to work on interoperability with other systems. WorldCat Local is currently active at libraries with the following systems:

- Innovative Interfaces: Millennium, INNOPAC, INN-Reach
- SirsiDynix: Horizon, Symphony, Unicorn
- ExLibris: Voyager, Aleph
- Axiell: OpenGalaxy Plus
- Talis: Alto
- OCLC: LBS-OLIB

Expanded access to other ILSs will be added according to market need.

WorldCat Local retrieves item location and availability/circulation status information from the target ILS and displays it in real time in the WorldCat Local user interface. In addition, users are passed from the WorldCat Local user interface directly to the item in the local ILS in order to place holds/reservations on items.

5.4. Portal

A discovery service may be said to consist of the following four major components:

1. User interface
2. Central index of aggregated metadata/full text

3. Knowledge base / link resolver for linking to e-resources
4. Interoperation with a library management system (e.g. circulation) to display item location/availability and for patron place hold/reservation functions

Currently the WorldCat Local/Group catalogue user interface does not interoperate with the central index of another provider. This would depend on:

- An API being available for connecting to the provider's central index; e.g. Primo Central
- Development by OCLC to enable WorldCat Local to use the API
- License terms between publishers and the central index provider allowing redistribution of content through another provider's (OCLC's) user interface

Similarly, the user interfaces of other discovery service providers do not currently interact with the WorldCat Local central index. This would depend on:

- An OCLC API being available for connecting to the WorldCat Local central index
- Development by other providers to enable their discovery services to use the API
- License terms between publishers and OCLC allowing redistribution of centrally indexed content through another providers' user interfaces

OCLC is currently developing a WorldCat discovery API. Even if other discovery service providers implement this API, the license terms between OCLC and content providers do not allow for all centrally indexed content to be searched/redistributed to another user interface.

French language support:

- Interface: WorldCat Local / Group Catalogue includes a French language interface as well as interfaces in ten other languages.
- Search term translation: Search term translation is not offered by WorldCat Local / Group Catalogue, nor is it on OCLC's roadmap for future development.
- Limit/sort on language: WorldCat Local / Group Catalogue does not currently offer an explicit language sort option, it examines the language setting of the user's browser and elevates items in that language in search results. It also includes a language search filter that may be applied prior to searching or after searching via a language facet to limit search results only to items in a particular language.
- Spelling suggestions: WorldCat Local / Group Catalogue provides 'Did you mean' search suggestions when a search statement returns zero results. The terms suggested are not language-specific.

- **Recommender function:** WorldCat Local / Group Catalogue does not currently include a recommender function based on user activity. OCLC Research and the Information School, University of Sheffield (UK) are currently engaged in a joint research project to investigate the development of recommender systems [7]. OCLC has been working with BibTip

[7] http://www.oclc.org/research/activities/recommender.html

(http://www.bibtip.com/en) to collect and analyse search patterns through all worldcat.org interface, including WorldCat Local, Group Catalogues and worldcat.org. OCLC has collected sufficient data to provide reliable recommendations and will be evaluating the integration over the next year.

5.5 Other information

Content already signed from French publishers includes OECD and Société internationale de bibliographie classique (SIBC). Other French publishers on our target list or with whom we are in negotiations include:

- Editis
- Eyrolles
- INIST CNRS
- Lavoisier
- Lefebvre Sarrut
- Presses de Sciences Po
- Presses Universitaires de France (PUF)

5.6 Information sources

- Teleconference at January 10 2013 with Christian Négrel, Catherine Furet and Mindy Pozenel
- Document with answers by OCLC received January 11, 2013

6 EBSCO: the EBSCO Discovery service (EDS)

6.1 Data platform and architecture

- **Data platform:** The EBSCO Discovery Service (EDS) Base Index represents content from approximately 20,000 providers (and growing), which accounts for more than 350,000 publications from the world's top publishers and information providers representing nearly 140 countries. EDS is focused on scholarly, peer-reviewed content. The complete index to materials for any given customer may be expanded with the inclusion of custom catalogues, repositories and other resources for a given institution. A few characteristics:
    - Full text: EDS provides extensive full-text searching
    - Metadata: it can be expected that in the end most discovery services will have access to primary publisher metadata. However EBSCO will have very robust metadata available for the majority of sources (quality subject headings, abstracts, and keywords for applicable titles). EBSCO has established a unique process called "platform blending" which allows to bring in content from important subject indexes, bringing in the value of the very detailed controlled vocabularies/indexing. Customers who subscribe to these indexes on EBSCO*host* (e.g. Francis, Pascal, PsycINFO, etc.) will have these become part of the discovery experience.

- **French content:** the chart below demonstrates French language results from EDS as of 17 December 2012 in order to illustrate the extent of French content presently available.

Source Type	# of French Articles / Results in EDS as of 17 December 2012
Academic Journals	877,332
Reviews	209,765
General Interest Magazines	170,230
Trade Publications	15,618
Books	9,861
Reports	8,413
Primary Source Documents	1,375
Dissertations / Theses	98

Table 2 Nr. French articles in ED

- **Ownership metadata:** EBSCO licenses content from publishers, so these publishers retain ownership of all content. Users may use the content (download, print, copy, etc.) according to copyright law and in accordance with varying publisher restrictions. The base index of EDS is a proprietary index and cannot be used/enriched or redistributed by third parties.

6.2 Locator services

EBSCO offers a vendor-neutral OpenURL link resolver called LinkSource. LinkSource provides better access to full text via SmartLinks technology and metadata enhancers, a dynamic combination that increases the likely match between the citation and the full-text source. EBSCO's proprietary SmartLinks technology provides immediate access to full text in a library's EBSCO e-journals and EBSCO*host* databases. And metadata enhancers, which use citation details from EBSCO's Integrated Knowledge Base to supplement (or enhance) the data on the OpenURL, ensure that users encounter fewer dead links. EBSCO also provides CustomLinks, which allows libraries to create and manage multiple customized links to relevant web-based resources. However, the integration of the proprietary solution (LinkSource) is not a obligatory option. EBSCO Discovery Service is also compliant with the large majority of Link resolvers available in the market.

6.3 Connectors

- **Union catalogue**: EDS handles many union catalogues in consortia setups. EBSCOadmin is designed to accommodate union catalogues. Below an example in Italy, creating a widget in the result list or at the citation level, to indicate where a journal or book is available: (Chi possiede questo titolo/articolo in Italia?)

Figure 6 Chi possiede questo titolo/articolo in Italia?

- **Connecting with the institutional OPAC**: EDS provides the loading of an institution's complete catalogue so that it can be searched together with EDS content as part of the unified search experience. As part of this functionality, EDS supports Real-Time Availability Checking. Real-time availability advises the user of Status (Available, In Library Use, On Hold, Checked Out, Missing, Lost) and Location.

6.4 Portal

EBSCO Discovery Service is available in both French and English. Also, if enabled by the library administrator, users can change the interface text of EBSCO Discovery Service from English into one of 26 languages. The administrator can also set the sorting option for language at the French language. At the moment there is no recommender function in EDS.

6.5 Other information

Examples of French publishers that are indexed in *EBSCO Discovery Service* include Caracolivres, Fileos, EDP Sciences, L'Harmattan Edition Diffusion, and Organisation for Economic Cooperation & Development.

6.6 Information sources

- Teleconference with Mr. Mathieu Ponthenier, November 28 2012
- Document with written answers, January 4, 2013

7. Exploration of a collaboration with Google Scholar

7.1 Data platform

Google Scholar indexes to a large extent the content of all scholarly publishers worldwide: the commercial publishers, scholarly societies, many academic departments and repositories are included. Google Scholar focuses on the scholarly literature only – this is a rather strict scope. Patents are included as well (the users can exclude that if they wish). Google Scholar receives the data from the publishers for free, while others pay for it. For this reason, Google Scholar is not allowed to redistribute the metadata within the index. Google Scholar indexes the full text of the journals and books whenever it is available online. If fulltext is not available online, it indexes the most complete form available online - abstract or metadata.

There are approx. 5 FTE involved in the maintenance and development of Google Scholar. However, this cannot be seen as an appropriate measure of the effort to build such a service. Google Scholar has been built over the last 9 years while making use of the infrastructure of Google and is designed to be as automated as possible. Therefore, it is possible to support the service with such limited manpower. The staff is for a large part involved in improving the algorithms that underlie the service. Because of this and because of the fact that Google Scholar receives the data for free from the publishers, it is possible to keep it the service without any charge to its users.

As mentioned above, Google Scholar receives the data from publishers for free under the condition that it will not redistribute those data. Therefore, redistribution via the Metadata Hub of ABES cannot be allowed. However, an index of French literature with metadata enriched by the Metadata Hub could be easily included in Google Scholar and thus supporting the retrieval of those items.

With regard to the idea of a platform with metadata of relevant literature for France, enriched by the Metadata Hub, the respondent states that this could be crawled by Google Scholar and incorporated in their index. Actually, Google Scholar has already a similar arrangement with the PASCAL database from INIST where the enriched metadata from Pascal are incorporated in Google Scholar. Similar arrangements exist with PubMed and other A&I services.

In conclusion, Google Scholar more or less covers the entire electronically available scholarly literature worldwide. With regard to digitized books, Google Scholar covers all books covered by Google Books that are within the definition of scholarly literature. The respondent emphasises that quite a lot of books within academic libraries do not fall within this category. Again, Google Scholar maintains a strict policy of covering scholarly literature only.

7.2 Locator services and connectors

- Google Scholar is compatible with all link resolvers.
- With regard to including library catalogues, the respondent states that the problem is that libraries often have literature in the catalogues that does not fall into the category scholarly literature. However, Google Scholar is integrated with a number of library services:

- The union catalogue WorldCat as well as the French union catalogue SUDOC is integrated with Google Scholar in the following way: this can be demonstrated when a search result has (apart from cited by, related articles, all [number] versions) the option library search under the label 'More'. If that is the case, a click brings the user in (for example) the WorldCat environment and the libraries in the neighbourhood of the user that have the particular item are shown. WorldCat and SUDOC have connectors to the OPAC's of many participating libraries and – if this collection is available - the user can enter the OPAC with one click. Again, it has to be noted that not all books in the union catalogue are covered: only those books that are in Google Scholar and are considered by Google Scholar as scholarly books. Google Scholar produces its index with the strict scope of scholarly literature and then uses intersections with other indexes for adding this kind of services. Currently, Google Scholar is working with 24 national and regional union catalogs in this fashion.
- A document delivery service is another example of integration with library service. BL Direct is a document delivery service of the British library. When BL Direct is shown right under the search result, a click brings the user to the British Library Direct environment where this document (mostly journal articles) can be ordered.

- With regard to an eventual national knowledge base and link resolver, the respondent states that this could be integrated in Google Scholar like other link resolvers. However, the respondent mentions that Google Scholar is now working on an approach to receive the data on holdings of all libraries from the publishers. They approach the library consortia so that they include such delivery of holding data to Google Scholar in their subscription agreements with the publishers. This will mean that there will be a sort of global knowledgebase included in Google Scholar that will provide licensed content (via a direct link at the left side of the result page) for users that are entitled to this content via the licenses of their libraries. An example can be found via the search action 'site:jbc.org' in Google Scholar. Already a number of publishers deliver this information to Google Scholar and others are in the process of making these data available. For France, it would be important that the consortium COUPERIN would enable the delivery by the publishers of its licences of these data. The aim is to support the smaller libraries that have not and in many cases will not have a link resolver of their own.
- The ISTEX platform will pose no problem for Google Scholar. They will have to crawl the full text (and if there is an index with metadata this will also be crawled) and this will be added to the index of Google Scholar. Actually, the ISTEX platform would be treated by Google Scholar as a publisher's site. Google Scholar would also need to know which institutes are entitled to this content.
- Authentication and authorisation is not relevant for Google Scholar. This will happen at the institutional level (for instance to get access to the OPAC for reserving an item) and at the publisher's sites if it relates to licensed content.
- With regard to the future ILS in the cloud, at a moment it is difficult to say anything definite about a system that does not yet exist. However, generally speaking it is always easier to connect to 1 system instead of over 80 different systems. Also, the ILS system in the cloud will not change the situation with regard to the union catalogue (there will be still one union catalogue) and no particular changes regard to the link resolver/knowledgebase in relation to Google Scholar.

7.3 Portal

Google Scholar has already a French language interface, spelling suggestions in French and the possibility to make selections with regard to the language of the search results. A search term translation service seems possible; however the respondent from Google Scholar wonders how often such a translation service would be used by the end-users. In his view, if someone commands the English language, he or she will also be able to think up adequate search terms. However, if someone does not command the English language, it is not clear how this person can read the English language scholarly literature. While it may be doable to build a translation service for search terms, it is not feasible to build a function within Google Scholar to translate the scholarly articles, because these are at the publisher sites.

7.4 Other information

The respondent form Google Scholar is positive about collaboration, and estimates that most aspects that have been discussed are feasible and could be realised with limited effort and costs. Most things are already there – the collection of the ISTEX data is for example an additional effort, and maybe other content that has to be covered for French purposes. Although it has to be emphasised that with regard to scholarly journals most are already covered by Google Scholar. In principle, the respondent sees collaboration with ABES to set-up a discovery service with special features for France as possible and feasible.

7.5 information sources

- interview with Mr. Anurag Acharya, Google Scholar, January 14, 2013

8. Discussion

In this chapter, the results of the study into the options of the webscale discovery tools by the library system providers and of Google Scholar will be discussed together below. More detailed findings are also listed in table 3 for the library system providers and in table 4for Google Scholar.

- **(Meta-)dataplatform:**
    - **Coverage:** All providers claim to cover the worldwide scholarly literature extensively and tool index the full text of it for a large part of it. Google Scholar even states that they cover the full text for the large majority and only in exceptional cases solely the metadata. In this respect , Google Scholar also seems to have a more strict definition of scholarly literature than the other providers. This comes especially to the fore when Google Scholar indexes union catalogues and/or link to Google Books: this is only done for scholarly books and not for other publications that are often included in collections of academic libraries. With regard to the coverage of scholarly journal literature, there is reason to believe that in the long term existing differences in coverage between the various discovery tools will vanish as publishers will increasingly distribute their data to other discovery systems as well. With regard to the metadata quality, all discovery systems have mechanisms in place to use metadata from A&I databases to enrich the metadata delivered by the primary publishers via match & merge mechanisms.
    - **Other platforms:** Ex Libris is the sole provider with a policy to connect their centralised index to other Solr platforms with the so-called deep search connection. All other providers prefer to receive the data to include it in their centralised index.
    - **Enrichment:** Enrichment of metadata from a centralised index by Metadata Hub and redistribution to other parties is generally prohibited by the license conditions by the primary publishers. Enriched metadata from an open platform would be included in the centralised indexes of the discovery tools via match & merge mechanisms.
- **Locator services:**
    - **Interoperability:** Interoperability between link resolvers of other providers and the studied discovery services pose no problem. Google Scholar can integrate all link resolvers as well.
    - **Knowledgebase:**
        - All library system providers participate in development of the KBART standards for knowledgebase data. Therefore, it can be expected that the exchange of knowledgebase data will be facilitated in the near future by using this standard. However, the experiences presently show that an important percentage of sources will not match (10 to 30%, see also paragraph 4.4.2).
        - Google Scholar is creating a sort of knowledge base of its own by asking publishers to provide the holding data of the libraries that are their customers. Google Scholar approaches the consortia to ask if they will include such a delivery to Google Scholar in their licence conditions.
    - **Location of print sources:**

    - The German webservice JOP (see Appendix A 5.3 for a full description) that indicates the availability of a journal article in the printed version of a journal appears to be unique.
    - All providers – including Google Scholar – have many examples of integrating/connecting to union catalogues.
- **Connectors:**
    - One of the strongest points of the discovery services by the library system providers appear to be the connectors to the OPACs of many different library management systems. These connectors bring the end-user to functionality such as reserving of print items, oftenn within the environment of the discovery tool. This could enable libraries to replace their OPAC with the discovery service. Each connector to the OPAC has to be established separately, the effort to create these connectors for over 150 institutional systems however is considered to be rather limited (in terms of person months).
    - Google Scholar connects to OPACs of individual institutes via WordCat or Sudoc.
- **Portal:**
    - All provide a limit option on the language (via facet mostly).
    - Google Scholar, Primo and Summon have spelling suggestions for the French language available. Summon has automatic pluralisation and treatment of compound words in French language (and other languages). In addition, Primo offers multilingual thesaurus support.
    - None provide search term translation functionality. Google Scholar indicated that this was possible to built (using Google Translator), however there was doubt if this would fulfil a need.
    - With regard to the other requirements, the interfaces are more or less comparable. See Appendix C.

Clearly, a national discovery tool for France realised by an adaption of one of the existing web scale discovery tools will need the following tailor-made components:

- **Open French metadata platform:** A separate open platform for metadata of the national licences and selections of the scholarly literature that are especially important for the French scholarly community has to be created. From this study, it becomes clear that the centralised indexes of to describe discovery tools are not open to others because of the licenses they have with the primary publishers. This means that the requirement that the envisaged Metadata Hub by ABES can enrich metadata by its authority files and that those enriched metadata can be redistributed to other parties can only be realised by a separate open platform.
- **A national locator service:** A national locator service has to be developed separately. Such a national locator service will have to insist of a link resolver and a webservice indicating availability for printed sources. A national link resolver has to be based on national knowledgebase. Using a knowledgebase of one of the library system providers might encounter the following problem areas:
    - Presently, there appears to be limited matching of the KB data from other providers

- A national knowledgebase data collection has to be open in nature and neutral in character with regard to commercial providers in order to meet the necessary consensus and support by all French HE libraries. Therefore, such a national knowledgebase data collection would only succeed when is completely open and on a neutral platform.
- A web service indicating in printed journals has to be developed anyway.

No.	**Overview of the results of the scenario study into discovery tools by library system providers with regard to the requirements for the national discovery tool**	
1	Sharing (parts of) the index or metadata with other discovery services	Ex Libris can create a so-called deep search link with other Solr platform is. The other providers would take the data from an open platform and include these in their own centralised index. The present discovery services are not interoperable with each other as such. Sharing and/or redistributing data from their own centralised indexes is generally excluded by the licenses with the primary publishers.
2	Interoperability with local link resolvers/knowledge bases	a. Interoperability between link resolvers of other providers and the web scale discovery services pose no problem in general. b. All providers are anticipating in developing the KBART standards for knowledge base data. Therefore, it can be expected that the exchange of knowledge base data will be facilitated in the near future by using this standard. However, present experiences showed that an important percentage of sources will not match (10 to 30%, see also paragraph 5.3.2) c. The webservice JOP that indicates the availability of a journal article in the printed version of a journal appears to be unique.
3	Interoperability with union catalogue in order to give availability information	All providers have examples of inclusion of union catalogues in their discovery services.
4	Integration/interoperability with local OPACs and ILL service	One of the strongest points of the discovery services by the library system providers appear to be the connectors to the OPACs of many different library management systems. These connectors bring the end-user to functionality such as reserving of print items, oftenn within the environment of the discovery tool. This could enable libraries to replace their OPAC with the discovery service. Each connector has to be established separately, the effort to create these connectors for over 150 institutional systems however is considered to be rather limited (in terms of person months).
5	Interoperability with the knowledgebase of the future shared library management system	As all providers will adhere to the KBART standard, interoperability with the knowledge base of the future shared LMS in the cloud appears to be guaranteed.
6	Interoperability with a platform with nationally licensed content	Ex Libris is the sole provider with a policy to connect their centralised index to other Solr platforms with the so-called deep search connection. All other providers prefer to receive the data to include it in their centralised index.
7	Options to deduplicate, enrich and redistribute metadata	Enrichment of meta data from a centralised index by Metadata Hub followed by redistribution to other parties is generally prohibited by the license conditions by the primary publishers. Enriched metadata from an open platform would be included in the centralised indexes of the discovery tools via match &merge mechanisms
8	Requirements with regard to the metadata and/or full text indexed	All providers claim to cover the worldwide scholarly literature extensively and to index the full text of it for a large part of it. There is reason to believe that in the long term existing differences in coverage between the various discovery tools will vanish as publishers will increasingly distributed their data to other discovery systems. With regard to the metadata quality, all discovery systems have mechanisms in place to use metadata from A&I databases to enrich the meta data delivered by the primary publishers via match & merge mechanisms.
9	Requirements with regard to the coverage of the scholarly content and the option to add 'private' content to the index	
10	Search options	No important differences, see appendix C
11	Non-English language support (as part of search options)	Primo and Summon have spelling suggestions for the French language available. Summon has automatic pluralisation and treatment of compound words in French language (and other languages).

		All provide a limit option on the language (via facet mostly). In addition, Primo offers multilingual thesaurus support. None provide search term translation functionality.
12	Recommender options	Ex Libris is the only provider with a recommender service for articles in place. OCLC and Serial Solutions are developing such services. Serial Solutions have recommender service for A&I databases. See also appendix C
13	Presentation of the results	No important differences, see appendix C.
14	Export options	See appendix C.
15	Sorting options	No important differences, see appendix C.
16	User accounts	All provide a save results option, some also provide a save search statement option. See also appendix C
17	Social features	OCLC and Ex Libris provides user tagging options in contrast with the other two providers, see appendix C
18	Open API platform; opening-up mechanism metadata for internet search engines	All providers have or are working on API's to open up their discovery tools. See also appendix C
19	User statistics	All provide user statistics. See also appendix C

Table 3 Overview requirements met by discovery tools of the library system providers

No.	**Overview of the results of the scenario study into Google Scholar with regard to the requirements for the national discovery tool**	
1	Sharing (parts of) the index or metadata with other discovery services	Ex Libris can create a so-called deep search link with other Solr platform is. The other providers would take the data from an open platform and include these in their own centralised index. The present discovery services are not interoperable with each other as such. Sharing and/or redistributing data from their own centralised indexes is generally excluded by the licenses with the primary publishers.
2	Interoperability with local link resolvers/knowledge bases	d. Interoperability between link resolvers of other providers and the web scale discovery services pose no problem in general. e. All providers are anticipating in developing the KBART standards for knowledge base data. Therefore, it can be expected that the exchange of knowledge base data will be facilitated in the near future by using this standard. However, present experiences showed that an important percentage of sources will not match (10 to 30%, see also paragraph 5.3.2) f. The webservice JOP that indicates the availability of a journal article in the printed version of a journal appears to be unique.
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5	Interoperability with the knowledgebase of the future shared library management system	As all providers will adhere to the KBART standard, interoperability with the knowledge base of the future shared LMS in the cloud appears to be guaranteed.
6	Interoperability with a platform with nationally licensed content	Ex Libris is the sole provider with a policy to connect their centralised index to other Solr platforms with the so-called deep search connection. All other providers prefer to receive the data to include it in their centralised index.
7	Options to deduplicate, enrich and redistribute metadata	Enrichment of meta data from a centralised index by Metadata Hub followed by redistribution to other parties is generally prohibited by the license conditions by the primary publishers. Enriched metadata from an open platform would be included in the centralised indexes of the discovery tools via match &merge mechanisms
8	Requirements with regard to the metadata and/or full text indexed	All providers claim to cover the worldwide scholarly literature extensively and to index the full text of it for a large part of it. There is reason to believe that in the long term existing differences in coverage between the various discovery tools will vanish as publishers will increasingly distributed their data to other discovery systems. With regard to the metadata quality, all discovery systems have mechanisms in place to use metadata from A&I databases to enrich the meta data delivered by the primary publishers via match & merge mechanisms.
9	Requirements with regard to the coverage of the scholarly content and the option to add 'private' content to the index	
10	Search options	No important differences, see appendix C
11	Non-English language support (as part of search options)	Primo and Summon have spelling suggestions for the French language available. Summon has automatic pluralisation and treatment of compound words in French language (and other languages).

		All provide a limit option on the language (via facet mostly). In addition, Primo offers multilingual thesaurus support. None provide search term translation functionality.
12	Recommender options	Ex Libris is the only provider with a recommender service for articles in place. OCLC and Serial Solutions are developing such services. Serial Solutions have recommender service for A&I databases. See also appendix C
13	Presentation of the results	No important differences, see appendix C.
14	Export options	OCLC is the exception without any export options, see appendix C.
15	Sorting options	No important differences, see appendix C.
16	User accounts	All provide a save results option, some also provide a save search statement option. See also appendix C
17	Social features	OCLC and Ex Libris provides user tagging options in contrast with the other two providers, see appendix C
18	Open API platform; opening-up mechanism metadata for internet search engines	All providers have or are working on API's to open up their discovery tools. See also appendix C
19	User statistics	All provide user statistics. See also appendix C

Table 4 Overview requirements met by Google Scholar