Designing TALARIA: a New Software to Support Resource Sharing of International Communities

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Abstract

In 2020, the COVID-19 situation forced academic libraries to move exclusively to the Web. To respond to the COVID emergency, in April 2020 a group of librarians under the aegis of IFLA created "Resource Sharing during COVID-19" (RSCVD): the first experiment in free digital resource sharing worldwide.

RSCVD is based on the voluntary contribution of hundreds of librarians around the world, who worked with the tools available at that moment in order to share documents held in their libraries with the world academic community. After the success of this initiative in the face of the COVID emergency, the Erasmus Plus Programme, through the HERMES project, gives us the opportunity to design a new Resource Sharing software platform for the RSCVD international community.

TALARIA software is being designed to support library communities in their resource sharing (RS) management. We aim to build a flexible platform to support different needs and policies of a RS community. Librarians will have access to the RSCVD international community when they have to locate very difficult resources, those RS requests that they are not able to find in their usual

collaboration network. For this reason, TALARIA supports the management of difficult requests, allowing users to send a request to all libraries in the community, as well as to a specific library. The software will also support interoperability with other RS management systems, based on the ISO 18626 protocol, in order to connect existing national resource sharing networks. TALARIA will be released as Open Source software, and it will use free Open Source third party software and external services as much as possible.

In this paper we present the state of the art of the project and the new concepts introduced in TALARIA that may contribute to shaping a different and more effective way of resource sharing among libraries world-wide.

Keywords: Interlibrary loan, Document delivery, Resource sharing management systems, RSCVD, Library cooperation

1. RSCVD Background

In 2020, the COVID-19 situation forced academic libraries to move exclusively to the Web and to face old and new weaknesses. The lock-down led to key issues for the scientific community: the unavailability of physical collections, the lack of digitalisation of paper assets, the inadequacy of catalogues, the absence of information on the availability of e-books and electronic resources, problems of delivering digital documents to users, and a general lack of competencies in searching for and retrieving digital documents. To respond to the COVID emergency in the library field, in April 2020 a group of librarians under the aegis of IFLA created "Resource Sharing during COVID-19" (RSCVD): the first experiment in free digital resource sharing worldwide.

RSCVD is based on the voluntary contribution of hundreds of librarians around the world, who worked with the tools available at that moment in order to share documents held in their libraries with the world academic community[1]. RSCVD deals with requests for any textual materials that can be delivered electronically. As many libraries were physically closed, the volunteer lending libraries found available electronic resources and supplied them as far as their usage licences allow.
A basic "Google form" was prepared to request a paper or a book chapter, containing bibliographic information and information about the requestor's identity: Library Name, Institutional email address, Full name. The request form is powered by Instant ILL[2], a free, open source tool developed by OA Works (formerly OA Button), which is able to complete a bibliographic citation from a title or a DOI, and to retrieve an open access version of a paper, if one exists.
The system back-office is made up of a Google sheet file, where all the requests are collected, and is available to all volunteering librarians. Volunteers check the requests file even several times a day, to check if they are able to fulfil new incoming requests. The OCLC Article Exchange Service is used to send the requested documents. This is a free service for those who request materials, but only registered libraries may use it to fulfil the requests. When the item is ready, an email with a link to the PDF file and a password to access it is sent. The file can be downloaded three times and will be on the server for 30 days. Volunteer librarians who do not have access to the OCLC Article Exchange may use similar working systems to send large size files available in their countries or institutions.

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[1] RSCVD Website: https://rscvd.org
[2] Instant ILL Website: https://instantill.org/

Only librarians who are affiliated with academic, public, school, or special libraries at not-for-profit institutions can make a request, as is explained in the RSCVD FAQs [3]. For this reason, a management check has been organised to verify the new institutional email addresses and to validate them also for future requests.

2. HERMES Project

In May 2021, during the pandemic, the project "HERMES - Strengthening digital resource sharing during COVID and beyond" started. HERMES is funded under the Erasmus Plus Program of the European Union, sub-Programme "Partnerships for Digital Education Readiness" and it lasts until April 2023, for a total duration of 24 months.
The project is challenging and it involves an international partnership composed of five organisations: CNR Dario Nobili Library (Bologna, Italy) as the lead partner/project coordinator, three higher educational institutions in the Mediterranean area, namely the University of Balamand (Balamand, Lebanon), University of Cantabria (Santander, Spain), and MEF University (Istanbul, Turkey), and the worldwide organisation IFLA – the International Federation of Library Associations and Institutions (The Hague, Netherlands). Alongside this partnership there is the collaboration of the Scientific Committee, formed by IFLA Document Delivery and Resource Sharing (DDRS) Standing Committee members and professional experts from the United States, United Kingdom and Qatar, and from the partner countries.

The HERMES project was conceived to reinforce the RSCVD initiative, ensuring its sustainability and long-lasting impact. It will provide an opportunity to facilitate the work of librarians around the world by addressing the challenges COVID has created or intensified.
The HERMES group is working with the dual objective of improving the resource sharing management software that libraries already use in Italy and around the world, and facilitating their use in an international, wider community. As a complement to this, HERMES will educate professionals on issues around wider access to knowledge. In the training courses, in addition to knowing the technicalities of the operation of the software for librarians, crucial topics will be addressed, such as finding high quality scientific documentation, how to orient users with respect to the open sciences, and what ethical and legal implications should be taken into account when using and sharing scientific documentation.
HERMES will produce a new open source software, open educational materials and free training courses for librarians, university students and researchers in order to provide high quality, fast and free access to knowledge through the development of specific skills on the topic of digital resource sharing.

3. TALARIA software main features

One of the objectives of the HERMES project is to develop and release TALARIA[4], a new management software for resource sharing, which can be freely used by both the RSCVD international library community and other library communities whose common purpose is to ensure high quality and free access to knowledge. TALARIA will enhance the existing RSCVD system by increasing its robustness, reliability, scalability, usability and independence from commercial platforms.

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[3] RSCVD FAQs: https://rscvd.org/faq
[4] The Talaria of Mercury (Latin: tālāria or The Winged Sandals of Hermes Ancient Greek: πτηνοπέδῑλος, ptēnopédilos or πτερόεντα πέδιλα, pteróenta pédila) are winged sandals, a symbol of the Greek messenger god Hermes. Source: https://en.wikipedia.org/wiki/Talaria

During the development process, the exchange with RSCVD volunteers and librarians is fundamental because they will be involved in testing the software to collect feedback, make improvements and detect and correct bugs in order to build reliable, user-oriented software. Additionally, along with the release of TALARIA 1.0, distance training activities will be organised and software guidelines will be published to support volunteers and librarians in their workflow.

TALARIA is being designed as a modular and customisable system: more modules will be added in the future releases of the software. TALARIA's first release contains the "core" resource sharing modules, which are described in the following section 5, while additional modules will be added in the future to meet the needs of more complex and sophisticated resource sharing communities.

Software technology

The new TALARIA software architecture is built with free and open-source technologies as much as possible. The web server used is Nginx to ensure high performance. The front-end was implemented in HTML, CSS and ES6 JavaScript using the ReactJS framework for a dynamic experience.

The backend was developed in PHP using the open-source Laravel framework and uses a MySQL DBMS. All business logic is made available to the front-end through APIs.

Multilingual support

TALARIA provides multilingual support. The software has been developed in English and will be initially translated into Spanish and Italian, to demonstrate that any other language not yet present can be added. The goal is to incorporate as many languages as possible to facilitate the inclusion of librarians worldwide.

User interface

Technology has become an integrated part of our daily lives and access to scientific information must be ensured at any time with good performance, even through portable devices. For this reason, the resource sharing system TALARIA has been developed as a Progressive Web App (PWA): to ensure a responsive, fast, secure web browsing experience on different platforms. PWA technology combines the possibilities offered by web pages with the advantages of mobile use, offering the same user experience as native apps on mobile devices.

The user interface is user-friendly and based on visual communication. It is designed to be compact and it synthesises actions and information into minimum work environments through icons. These icons allow the recognition and the immediate use of the corresponding action and allow the total control of the operations.

Customisable configuration

TALARIA is designed to be a flexible platform to respond to the needs and policies of different library resource sharing (RS) communities. For this reason, it enables different levels of customisation. Each RS community can decide what features can be activated or not in the initial TALARIA setup. The main customisable features are:

- Graphical identity, such as logo and colour palette, to reflect the visual identity of individual communities;

- Authentication systems. Three different authentication systems that can be enabled will be offered: first, the traditional authentication with the e-mail address and the password chosen during sign-up; second, the federated authentication based on SAML language: in Italy, for example, it has been planned to join the IDEM[5] national federation for universities and research institutions for authentication and authorisation and SPID, the national authentication infrastructure for citizens to access all the public services. Of course, TALARIA will offer the possibility to add different federated systems depending on the requests of the library communities. Finally, TALARIA will allow authentication via social network accounts, such as Facebook or Google;

- Resource sharing (RS) profiles. TALARIA gives the possibility to build peer-to-peer communities where each library is a borrower and lender at the same time, or communities where libraries may have different RS profiles: "Basic" for a borrower only, or "Full" where a library can be a borrower and lender (see section 5);

- Community policies on recovering the ILL costs: the document exchange among libraries can be set up to be totally free of charge (as in the RSCVD community as it was started), free of charge with an imbalance threshold (as in the Italian NILDE community[6]), or with a fixed unit cost, for example using IFLA vouchers;

- End-users management: each library community can decide to enable Patron requests or not;

- The connection of different union catalogues to search for library holdings.

New reference creation and Open Access integration

In order to minimise errors during the manual input of the bibliographic metadata of a bibliographic reference, TALARIA offers the possibility to look for a reference using one of its unique identifiers (DOI, PMID or ISBN) and, if it is found, automatically import all the bibliographic metadata. Another option is to import a new reference through the OpenURL protocol, using bibliographic databases or publishers' websites as the OpenURL sources. Finally, the possibility of entering all bibliographic metadata manually using the "New Reference" form is always available.

The open access integration is one of the most relevant features of TALARIA. This is made possible by integration with the OA button API (https://openaccessbutton.org/) developed by OA.Works. The OA button can check if a resource is available in open access and if there exists an archived version in a public repository. If the resource is available, the link/PDF resource is directly accessible at the TALARIA user interface.

User roles

TALARIA introduces the user roles that allow different levels of control over actions.

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[5] Italian IDEM federation website https://www.idem.garr.it/en/

[6] In the NILDE RS community, each library commits itself "to send documents free of charge, unless there is a strong imbalance between the number of documents requested and supplied, compensations can be obtained at the end of the year" Source: NILDE Rules and Regulations, https://nildeworld.bo.cnr.it/en/content/rules_and_regulations#sotto1.1

Library Operators manage the resource sharing workflow and they can be authorised for multiple roles at the same time, in the same or in multiple libraries, depending on their tasks. The Library Operators' roles are:

1. The Library Manager. This role is acquired after user registration if the user decides to register a new library in the system (i.e. in the RS community). When a user registers a new library, his/her account is created or associated with that library with the role of Library Manager. The Library Manager has control of all operations and is the one who manages his/her library inside the community. He/she can invite, activate, deactivate and remove all the other library operators (including another Library Manager);

2. The Borrowing Operator. The Borrowing Operator only manages the submissions and management of requests to other libraries;

3. The Lending Operator. The Lending Operator only handles the supply of materials requested by other libraries.

If in the TALARIA initial setup the End-users management has been enabled, it means that the community decides to manage Patron requests, then two more Library Operators roles and the Patron User role are available:

4. The User Management Operator. The User Management Operator is the one who administers the library's Patron registration requests;

5. The Delivery Operator. The Delivery Operator is in charge of the management of the Pick-up Desks, printing and delivering requested documents that cannot be digitally delivered to the library's patrons.

6. The Patron User. To become a Patron User, the user must be associated with a library already present in the community. As we will explain in detail in section 4, Patron Users can manage their bibliography and request references, manage and edit their personal information, and they can associate with, meaning that they may belong to, one or more libraries.

4. TALARIA for end-users

TALARIA for the Patron profile will be available only if End-users management has been enabled in the initial software setup. The Patron's user interface is structured into three working environments: Bibliography, which contains the list of all bibliographic references belonging to the Patron; Requests, which displays a list of all references requested by the Patron from one of the libraries with which the Patron is associated; My Libraries, where he/she can manage all the libraries he/she belongs to.

Reference manager
TALARIA, as a reference manager, allows the organisation and management of the bibliography, as well as requests to a library for documents.
In the Bibliography environment, new references can be either imported automatically by title, via identifiers (DOI, PMID or ISBN), via OpenURL protocol to create links from major online bibliographic databases and publisher web sites, or entered manually via the "New Reference" form.

Bibliographic references can be saved, edited, printed, exported or deleted. The edit icon is used to modify the bibliographic metadata, but if the reference is associated with a current or archived request, the Patron cannot modify it any more. The delete operation removes a reference from the bibliography. References can also be organised into groups and tags. The Patron can check at any time whether there exists an open access version of the reference.

My Libraries

In order to request documents, the Patron must be associated with a library. In the My Libraries environment, the patron may ask a library to register, check the status of its registration and, potentially, ask for its removal. In addition, he/she can give each library a short alias of up to six characters, at the Patron's discretion, to be displayed instead of the library's full name in the Requests environment.

Request manager

The Patron must interact with the Request button in the Bibliography environment to request a reference. It is possible to choose the library to request from; select the preferred Pick-up Desk at that library for picking up the document if direct digital delivery is not allowed; select the cost policy in the case of any additional costs; and enter notes for the librarians. If the user tries to request again a reference he/she has previously requested and that has been processed by the library, a warning will appear. An unfulfilled request can be resubmitted to another library.

In the Requests environment, all requests are displayed in a list. The Patron can consult all the requested references with their processing status, ask for a cancellation and accept or reject any additional cost offered by the library for retrieving the document. Finally, the completed requests can be archived as fulfilled/unfilled and will be visible in the Archive.

5. TALARIA for librarians

TALARIA for librarians presents several environments: at present only three have been implemented and these will constitute the core environments of TALARIA 1.0: My Library, Borrowing and Lending.

My Library

In the My Library environment the Library Manager can customise different aspects of the library profile. It is possible to manage the general and administrative information such as the library name, address, the library disciplinary areas, and the ILL services information, such as Pick-up Desks and the ILL supply conditions, such as the imbalance threshold and the ILL costs. In this environment, the Library Manager will create and invite the other library operators to join.

Borrowing

TALARIA's Borrowing environment is divided into New Request, Pending requests and Archive.
To create a new request in the Borrowing environment, there is the "New Request" function, but in this case, unlike the requests made by Patrons, there is no end-user associated with that request. The process is the same for entering a "New Reference" as a Patron (see section 4); that is, a new reference can be either searched for and automatically imported by title or identifier (DOI, PMID or ISBN), or imported via OpenURL protocol from major online bibliographic databases, or entered manually.

On each "new" request listed in the "Pending requests", the actions allowed are to edit the bibliographic reference, check for an open access version, check if the reference belongs to the library's own holdings and, of course, to request the item from another library.

Request management is the core of the borrowing process: finding the "right" library to request the item from may require great professional expertise for very difficult documents, which are not listed in the most popular national or international catalogues. Even when items are present in the library catalogues, the temporary unavailability of the physical copies, as the pandemic has demonstrated, may make it a very difficult task to retrieve them. The RSCVD resource sharing model, where an item request is visible to all the libraries in the community (the volunteers), and the first one that is able to provide the item will deal with the request and fulfil it, has been demonstrated to be very successful in a truly cooperative and mutual-help environment. Before the pandemic, this same mutual-help lifesaver was accomplished through document delivery professional mailing lists (such as docdel-l@iflalists.org).

For these reasons, one distinctive element that has been introduced in TALARIA is the possibility to submit the request to all libraries in the community, as well as to a specific library. The "All libraries" option will be useful if the search within the catalogues has not produced results, or when external conditions mean that the catalogues search is not reliable. In the Lending environment, these requests are called "Orphaned requests".

In the "Pending requests" list, a request may be cancelled or, in the case of unfulfilment, it can be repeated and sent again to another library or to All.

If End-users management has been enabled in the initial TALARIA configuration, the Patron's requests will appear in the "Pending requests" and will be managed until their work-flow has been completed, which means until the request is either unfulfilled or digitally fulfilled (i.e. a digital document is received and may be delivered to the Patron) or the received document has to be sent to the Pick-up desk chosen by the Patron to be delivered in print.

The Archive environment allows the storage of the concluded borrowing requests.

Lending

The Lending environment is a list of requests received and taken over by the library, divided into three menus: Pending requests, Orphaned requests and Archive.

Requests in Pending requests are from borrower libraries. It is mandatory to accept a request to be able to manage it. This step applies both when the library is the only provider chosen by the borrower library, and when the request has been sent to All libraries. If the request has been rejected, this will be directly unfulfilled for the borrower library. There is always the option to unfulfil the request after having accepted it.

The Orphaned request menu is a "community board" that lists those requests that are visible to all libraries. As for normal requests, it is necessary to accept a request to supply it. After accepting the Orphaned request, the other libraries will no longer be able to see it or fulfil it. At this point, the request will be visible in the own Lending Pending Requests and it will be possible to manage it.

In the same way as the Borrowing Archive, the Lending Archive allows the storage of the concluded requests.

Embedded secure electronic delivery

TALARIA, like the Italian web-based interlibrary loan and document delivery software NILDE, will support secure electronic delivery (SED), which will be embedded into the system[7]. This method is recognised and accepted by many scientific publishers.

For PDF documents, the SED module allows the file to be uploaded to the system server, then it converts the document's pages into images, losing all the textual properties and reducing the quality of the document itself; all the images are then merged together to create a new PDF that is a "rasterized version" of the original one. When the document is downloaded at the receiving library, the file is finally removed.

6. Conclusions and further developments

The RSCVD experiment of free digital resource sharing worldwide has created a community of more than a hundred volunteer libraries from about 20 countries, which has been able to help a great number of requesting libraries in many countries.

The backbone of the RSCVD community are the volunteer libraries, which are willing to request as well as to provide documents. These libraries are often part of very well-functioning national resource sharing networks, which are based on different software systems, either commercial or not. But those networks are siloed, and making a connection between the national networks is the challenge that has been undertaken by RSCVD and the HERMES project.

The "dream" of any ILL librarian is to use only one management software, that is, to be able to make a request, or to supply a requested item, to any library in the world without leaving their current management software.

The ISO 18626 Information and documentation - Interlibrary Loan Transactions - standard is the modern communication protocol for ILL systems interoperability. ISO 18626 is well suited to the modern, Web-based technological environment, which is based on XML and Web services. The protocol was initially conceived to support peer-to-peer communication between libraries. Some systems have implemented it as a peer-to-peer connection with other libraries, that is, each library that wants to use the protocol has to set up its own ISO connections/relationships with other libraries outside.

In the conception that we are developing within the HERMES project, the RSCVD software will play the role of a central hub between different networks: when a library cannot fulfil a request in its own RS community, and finds that an outside library can apparently fulfil the item, if that library is found in RSCVD, it should be possible to send the request from the library's local system to the supplier library through RSCVD. The connection between RSCVD's software and the other systems will be based on the ISO 18626 protocol. In our plans, this will be implemented in 2023.

The RSCVD service started as a pilot project run by and dependent upon volunteers, based on the great digitisation work carried out over the years by American libraries. The intention was to continue this service at least for as long as access to library collections was restricted in any part of the world. However, we have come to the creation of a shared tool that can be easily used to connect libraries around the world and fill gaps left by existing resource sharing systems.

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[7] Mangiaracina S., NILDE technical description: Secure Electronic Document Delivery and Digital Hard-Copy, 2013 : https://nildeworld.bo.cnr.it/sites/default/files/NILDE_Technical_Description.pdf

In this paper we have presented the state of the art of TALARIA, the software that is being developed in the framework of the HERMES project, and the new concepts that may contribute to shaping a different and more effective way of resource sharing among libraries world-wide.

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