From Bibliographic Records to Data

Changes in the Library Environment with the Application of Linked Open Data Technologies

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ABSTRACT

The change that has taken place in the library environment with the application of linked open data technologies is analyzed. Thus, the main objective of this paper is twofold. First, the authors intend to describe this new environment from the perspective of the institutions called GLAM (galleries, libraries, archives and museum); and, second and more precisely, they analyze the change from traditional library records to the particular case of linked open bibliographic data. To attain the first part of this goal, they systematized the information found in the official sources that define the different concepts under study. To address the second part of that objective the authors examined the publication of two key documents: Library Linked Data Incubator Group: Use Cases, in particular the section referring to the bibliographic data cluster, and Linked Open Data-Enabled Bibliographical Data (LODE-BD). It is concluded that the main result of the conversion of bibliographic data to open linked data is that the data will be more visible and integrated with other services and therefore more likely to be reused by them.

Keywords: *Bibliographic Data, GLAM Institutions, Library Linked Data Incubator Group: Use Cases, Linked Open Data (LOD), Linked Open Data-Enabled Bibliographical Data (LODE-BD), Paradigm Shift*

INTRODUCTION

The World Wide Web Consortium (W3C) is an international community that develops open standards to ensure the long-term growth of the Web. Among its goals is to develop and promote the concept of the Semantic Web. According to this institution (2014) "The term *Semantic Web* refers to W3C's vision of the Web of linked data"

DOI: 10.4018/irmj.2014070103

Within this context, therefore, the term "Linked Data" refers to the method by which data can be displayed, published, linked and exchanged using Uniform Resource Identifier (URIs) and Resource Description Framework (RDF). Linked Data (LD) technologies make it possible to connect and enrich metadata, so that different representations of the same content can be searched and linked, thus relating resources that come from different sources and domains.

For the library environment it is very much of interest to be able to connect our data not only with the institutions of our own environment, be they libraries, archives or museums, but also with other very diverse agencies, the main result being that these institutions tend to increase their visibility on the web. However, for this idea to become a reality, cultural institutions must adapt their traditional environment to this new context.

Starting from this premise, the overall objective of this paper is twofold. First, we intend to describe this new environment from the perspective of the galleries, libraries, archives and museum institutions (GLAM); and, secondly and more precisely, we attempt to analyze the change from traditional library records to the particular case of open and linked bibliographic data.

In line with this main objective, throughout the article we also intend to meet the following specific objectives:

1. To define each of the concepts involved in the Web of Linked Data: data, open, linked.
2. To describe the following initiatives associated with these concepts, fundamentally Open Data, Linked Data and the sum of the two: Linked Open Data (LOD).
3. To identify the advantages and disadvantages of the application of this movement in the case of the institutions under study.
4. To study the case of bibliographic data in reference to this context.

The method used in our research is the study of documentary sources. To attain the first part of our overall goal, we proceeded to systematize the information found in the official sources that define the different concepts under study. These definitions have been completed with other scientific documents which specify and extend the information provided by these sources. Moreover, to reach the second part of our goal we examined the publication of two key documents: *Library Linked Data Incubator Group: Use Cases*, in particular the section that refers to the bibliographic data cluster, and *Linked Open Data-Enabled Bibliographical Data (LODE-BD)*, consultation of which can assist data providers when selecting the appropriate encoding strategies for producing LOD-enabled bibliographical data

According to the dual objective proposed, the article is divided into two parts: the first, theoretical, in which the current library environment is analyzed in relation to the application of LOD, and a second part, more applied nature, in which the development of LOD in the case of bibliographic data is detailed more specifically.

LIBRARIES IN THE LINKED OPEN DATA ENVIRONMENT

For over 20 years, in the environment of memory organizations or entities also known by the acronym LAM or GLAM (galleries, libraries, archives and museum) a series of changes has been taking place, often at a dizzying rate, that has led to a complete rethinking of the modes of management and operation of such institutions. Often referred to lately as a "paradigm shift" or "shift in perception," this transition is becoming a reality especially in academic libraries (Bueno de la Fuente, 2012, p. 3).

Libraries were massively automated in the late 80s and early 90s. The end of the century brought the emergence of new conceptual models such as *Functional Requirements for Bibliographic Records* (FRBR), and the materialization of the term "metadata" to refer specifically to the description of digital documents. In the new millennium new concepts have appeared associated with this new documental typology, such as the digital library, virtual library or the

most "novel and substantial" term, which is "repository." Following this quick review, we arrive at the start of the new decade talking about open and linked data.

DATA, OPEN, LINKED

Below we define these three terms –data, open and linked– grouped under the acronym LOD.

If library automation entailed the importing of bibliographic records, in this new scenario what is going to be shared are data. Lately, the word "data" appears frequently in scientific and popular articles, usually accompanied by another term that defines its meaning, such as "Open Data," which we shall address shortly, "Data Mining," and more recently, "Big Data." And under this concept a series of highly diverse data is grouped. Hernández (2013) notes that because of information technologies we are able to gather all different kinds of data: personal data, for example, our buying habits and personal and / or professional relations; data about the context in which we live, such as the pollution level, data objects and products such as the history of a particular monument through a photo taken on mobile phone and data about processes that allow us to know the near real-time route of a commercial plane. Increasing numbers of individuals and organizations are contributing to this "data deluge" by choosing to share their data with others (Heath & Bizer, 2011). As examples we can cite Web-native companies such as Amazon, media like the BBC or the New York Times, public bodies such as the U.S. government and research initiatives within various scientific disciplines.

Also included in this mass of data are library data, whose mission focuses on library data exchange and on the potential for creating globally interlinked library data; exchanging and jointly using data with non-library institutions; growing trust in the growing semantic web; and maintaining a global cultural graph of information that is both reliable and persistent (Bauer & Kaltenböck, 2012). As representative examples of this type of data we can mention the presence of libraries such as the Library of Congress and initiatives such as Europeana and the more recent case of the Digital Public Library of America (DPLA).

The adjective "open" associated with other terms has given rise to the so-called "open movement." This movement has garnered attention from the library community in recent years, mainly because of the many reported benefits it offers in the face of this high growth of information.

The open concept is included in a broader term, "Open Knowledge." According to the *Open Definition Advisory Council* (2014) this term refers both to "content such as music, films, books; data be it scientific, historical, geographic or otherwise; and government and other administrative information." This same body states the distribution conditions to be met for a work to be considered open. In particular, it lists the following 11 guidelines: access, redistribution, reuse, absence of technological restriction, attribution, integrity, no discrimination against persons or groups, no discrimination against fields of endeavor, distribution of license, license must not be specific to a package and license must not restrict the distribution of other works.

The list of expressions that includes the term "open" is becoming ever broader, although it must be said that the first one was "Open Source," which emerged at the end of the 90s. Open Source does not just mean access to the source code (Open Source Iniciative, 2014). The distribution terms of Open Source software must comply with the following criteria:

1. Free redistribution.
2. Source code.
3. Derived works.
4. Integrity of the author's source code.
5. No discrimination against persons or groups.
6. No discrimination against fields of endeavor.
7. Distribution of license.
8. License must not be specific to a product.
9. License must not restrict other software.

10. License must be technology-neutral.

Many cultural institutions benefit from Open Source, since the initial and maintenance costs are low, and the figure of technology providers is avoided, allowing greater flexibility. In addition, this type of software gives professionals greater control over their systems, allowing them to obtain a better understanding of the interests and expectations of their users.

In this context we can also highlight "Open Access", defined as the free availability of literature on the Internet that allows any user to read, download, copy, print, distribute, search and link information without financial, legal or technical barriers. (Budapest open access initiative, 2002). In this sense we can say that Open Access facilitates free access to information and knowledge through the Internet without economic barriers and restrictions deriving from copyright (Ferreras, 2011). In this context, it is the authors themselves who define the rights granted to their works; this is usually done through creative commons licenses (Martín; Angelozzi, 2013). In this environment we also find the term Open Data, which we define below.

Finally, the last of the terms in this field is not defined by itself but is joined primarily to the expression data, and secondly, to the sum of open and data.

OPEN DATA, LINKED DATA LINKED OPEN AND DATA INITIATIVES

The Open Data initiative is closely related and linked to the conception of open government, with its "philosophy of open access to certain data without copyright restrictions" (Ferrer ; Peset; Benavent, 2011, p. 162). In this sense we can define Open Data as "a movement that promotes the release of data, usually in reusable and non-textual formats such as CSV (comma separated values) from organizations" (Peset; Ferrer; Subirats, 2011).

It is necessary to clarify that the term Open Data does not refer to the mere availability of data on the network, i.e., Internet publication in such a way that data can be read and downloaded. Hernández and García (2013, p. 260) claim that "to be truly open the data must be available online, preferably for download, but they must also have some sort of legal license so that they can be used, reused and redistributed, even mixed with other data, at the minimum subject to "attribution" (recognition of authorship, the person who created it), or "share alike "(the norm that any exploitation made of such data, including derivative works, should maintain the same license to be disclosed)."

The guidelines to follow for the publication of these data were established by the W3C in the document entitled Publishing Open Government Data (Bennett & Harvey, 2009). These recommendations can be summarized in the following points:

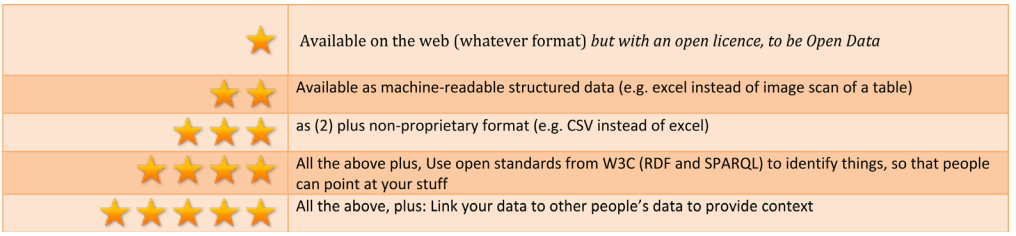
1. Publication of the raw data in a format that allows automated use (xml, rdf and csv).
2. Creation of an online catalog of the raw data (complete with documentation) so that people can know what has been posted.
3. The data should be both human- and machine-readable.

In 2010, Berners-Lee developed a 5-star classification system "in order to encourage people -- especially government data owners -- along the road to good linked data."

Linked Data (LD) is the form the Semantic Web uses to link the various data that are distributed on the Web, so that the data are linked in the same way as on Websites. The basic idea of Linked Data is to apply the general architecture of the World Wide Web to the task of sharing structured data on a global scale (Jacobs; Walsh, 2004).

The *Guía breve de Linked Data* (2014) specifies that "the Semantic Web is not just about publishing data on the Web, but about doing it in such a way that they can be linked to others, so that people and machines can explore the web of data, and be able to reach related information referred from other initial data. "

Figure 1. 5-star classification system. (Adapted from Bernes-Lee, T. Linked Data – Design Issues, 2009)



On the other hand, if we want a more precise definition of the term we can go to the official website "Linked Data" (2014) where this concept is defined as "the use of the Web to connect related data that were not previously linked, or the use of the web to lower barriers to the linking of data currently linked through other methods."

The term Linked Data (LD) thus refers to a set of best practices for publishing and interlinking structured data on the Web. In the case of LD, data should be published "in accordance with the principles designed to facilitate linkages among datasets, element sets, and value vocabularies" (Berners-Lee, 2011). These best practices were introduced in 2006 by Tim Berners-Lee in his Web architecture note Linked Data and they have become known as the Linked Data principles. These principles are the following:

1. Use URIs as names for things.
2. Use HTTP URIs, so that people can look up those names.
3. When someone looks up a URI, provide useful information, using the standards (RDF, SPARQL).
4. Include links to other URIs, so that people can discover more things.

That is, this set of best practices or recommendations included under this concept will allow sets of data, information, and knowledge to be exhibited, shared, and connected on the Semantic Web using URIs and RDF."

The goal of the Linked Open Data (LOD) project is to build a common knowledge base by publishing databases in RDF on the web and by setting up RDF links between data from different sources (Ríos; Martín; Ferreras, 2012).

Linked Open Data is a way of publishing structured data that allows metadata to be connected and enriched, so that different representations of the same content can be found, and links made between related resources (Linked Open Data - data.europeana.eu, 2014).

According to Mitchell (2013, p. 12), "LOD is comprised of two distinct concepts, the first being that data published on the Web should connect readily with related information ("linked") and that in doing so should be as accessible to computers as it is to humans ("data"). The second concept central to LOD is that in order for data to be linked and reused, it must be open and free from legal and copyright restrictions ("open")."

Although in some contexts Linked Data is often assimilated to Linked Open Data, not all linked data are open data - and they do not have to be. They are only open if they are released on license agreements permitting free reuse. Thus, "Linked Data" refers to the technical interoperability of data, whereas "Open Data" refers to its legal interoperability.

In this sense, the words of Zeinstra and Keller (2012) are quite appropriate when they declare that "data can be open but not linked. Data can be linked but not open. The Semantic Web can only function with data which is both open and linked."

THE ROLE OF LINKED DATA IN LIBRARIES

This overview of Open Data and Linked Data is not limited to a particular area or discipline; rather, we can speak of the movement in the scientific, governmental or media context, to give just some examples.

Turning now to the application of this technology in the particular case of LAM institutions, we can say that the first organization to carry out a specific study was the W3C, which in May 2010 constituted the Library Linked Data Group Incubator (LLD-XG). The aim of the group was to "explore how existing building blocks of librarianship, such as metadata models, metadata schemas, standards and protocols for building interoperability and library systems and networked environments, encourage libraries to bring their content, and generally re-orient their approaches to data interoperability towards the Web, also reaching to other communities" (*Library Linked Data Incubator Group Charter*, 2010).

To carry out such an undertaking the group identified the following activities that would need to be developed for the drafting of the final report:

- Gathering use cases and case studies demonstrating successful implementation of Semantic Web technologies in libraries and related sectors.
- Fostering collaboration among actors (libraries, museums, archives, publishers) interested in porting cultural assets to the Linked Data Web.
- Identifying relevant data models, vocabularies and ontologies and ways to build or improve interoperability among them.
- Identifying the need for the elaboration of new standards, guidelines and best practices.
- Identifying the areas of (Semantic) Web technology that could benefit from the expertise of the communities represented in the Group.
- Proposing a relevant scope and organization for the work that will follow the initial effort carried out by the Group (*Library Linked Data Incubator Group Charter*, 2010).

The result of the work carried out by the LLD-XG was presented in October 2011 under the title "Library Linked Data Incubator Group Final Report." This final report includes two complementary documents that were published independently: Use Cases (USECASE) and Datasets, Value Vocabularies, and Metadata Element Sets (VOCABDATASET). According Saorín (2011), this document "is relevant to our understanding of the opportunities now open to libraries to do better, achieve a greater digital impact and commit to complementary forms of indirect social utility."

The final report asserts that "in Linked Data, data is expressed using standards such as RDF (which specify the relationships between objects, and Uniform Resource Identifiers (URIs, or "Web addresses")." This final report examines how Semantic Web standards and Linked Data principles can be used to make the valuable information assets that libraries create and curate — resources such as bibliographic data, authorities, and concept schemes — more visible and re-usable outside of their original library context on the wider Web.

The body of the document is divided into the following sections: scope of the report, benefits of the linked data approach, current situation, and recommendations.

It is important, at this point, to highlight the advantages and benefits that the library community can obtain from the application of this approach and which the report includes both generally and specifically. Summing up these general advantages we can state the following:

- Linked Data and especially Linked Open Data is sharable, extensible, and easily re-usable.
- It supports multilingual functionality for data and user services, such as the labeling

of concepts identified by language-agnostic URIs.
- Resources can be described in collaboration with other libraries and linked to data contributed by other communities or even by individuals. Through rich linkages with complementary data from trusted sources, libraries can increase the value of their own data beyond the sum of their sources taken individually.
- By using globally unique identifiers to designate works, places, people, events, subjects, and other objects or concepts of interest, libraries will allow resources to be cited across a broad range of data sources and thus make their metadata descriptions more richly accessible.
- The reuse of these unique identifiers allows data providers to contribute portions of their data as statements.
- Library authority data for names and subjects will help reduce redundancy of bibliographic descriptions on the Web by clearly identifying key entities that are shared across Linked Data. This will also aid in the reduction of redundancy of metadata from library holdings.

The report also details a number of specific advantages in terms of the following groups:

- Researchers, students, and patrons.
- Organizations.
- Librarians, archivists, and curators.
- Developers and vendors.

However, the report itself also indicates a number of drawbacks and limitations that current library data have in relation to the application of LD, which are cited below:

1. Library data is not integrated with Web resources.
2. Library standards are designed only for the library community.
3. Library data is expressed primarily in a natural-language text.
4. The library community and Semantic Web community have different terminology for similar metadata concepts.
5. Library technology changes depend on the development of vendor systems.

BIBLIOGRAPHIC DATA CLUSTER

In this section, we focus on the analysis of the USECASE document, and more specifically on the "bibliographic data cluster," since they are directly related to the purpose of our study. The document describes selected use cases and case studies from the library community and related sectors. These were gathered and analyzed by the W3C Library Linked Data Incubator Group, based on submissions from different organizations and individuals. Cases have been grouped into eight topical clusters, which are described below. Also, selected use cases from each cluster have been summarized. In order to provide more detailed information to the interested reader, cluster sections and case summaries are linked to the wiki pages the Incubator Group has used to gather and curate the original information (*Library Linked Data Incubator Group: Use Cases, 2011)*.

The collected set of use cases, case studies, initiatives, and ideas is organized into eight clusters:

1. Bibliographic data.
2. Authority data.
3. Vocabulary alignment.
4. Archives and heterogeneous data.
5. Citations.
6. Digital objects.
7. Collections.
8. Social and new uses.

After collecting and reviewing the submitted cases for each cluster, group members extracted general conclusions from these cases. "The motivation behind these extracted use scenarios is to summarize and capture the main ideas from the set of original cases. The extracted

Table 1. Summary of individual cases of the bibliographic data cluster. (Adapted from Library Linked Data Incubator Group: Use Cases, 2011)

Case name	Main contribution to the application of LD
Bibliographic Network	LD techniques would allow bibliographic records to be described as an information graph
AGRIS	LD allows the semantic richness of the data to be exploited
Community Information Service	LD allows data to be provided with an open license and using open standards which enable its re-use
Data BnF	LD allows data from several sources to be brought together with a scalable and interoperable data model
Identification and Deduplication of Library Records	LD allows the development of algorithms for automatic detection of duplicate records
Linked Data and Legacy Library Applications	LD will be a challenge for systems architects
Migrating Library Legacy Data	LD can benefit from the systems and services that may emerge in the Semantic Web environment
Open Library Data	LD can easily reference the manifestations of this database
Regional Catalog	LD allows a German Central Catalog to be created more easily
Pode	LD enables library data to be converted to RDF, converting them to FRBRized library data, and linking data to individual instances in other Linked Open Data datasets
Polymath Virtual Library	LD enables the process of obtaining links from different sources to be improved
Talis Prism 3	This is a hosted Linked Data service which offers both SPARQL querying and powerful full text search capabilities

use cases presented in this document cover the majority of topics and situations related to each cluster" (*Library Linked Data Incubator Group: Use Cases, 2011*).

BIBLIOGRAPHIC DATA CLUSTER ANALYSIS

Bibliographic data cluster analysis is the first which is analyzed in the above document. This cluster presents use cases related to bibliographic records. This document defines bibliographic record "as a set of data elements describing the content and characteristics of an information object produced for human consumption" (*Library Linked Data Incubator Group: Use Cases, 2011*).

Use cases analyzed under the bibliographic data cluster technique are listed in Table 1. The goal of the Group, just as for the other cluster, was to gather use cases and case studies demonstrating successful implementation of Semantic Web technologies in libraries and related sectors.

After a detailed analysis of each of the selected use cases, the Group presents the general conclusions set out below which refer to the advantages of the application of Semantic Web technologies in the particular case of the Bibliographic data cluster:

- Semantic standardization of bibliographic elements.
- Elimination of duplicates and unification of records.

- Fusion of duplicated records from a single resource into a master record.
- Tagging Web resources with standardized bibliographic terms.
- Integrated metadata search interfaces across several providers.
- Information aggregation.
- Bibliographic records annotation.

It is of interest to note here the work of Hernández (2012), which examines in depth each of the use cases defined above. This author concludes that "there are a number of schemes and metadata models that evolve to the Web, standards and protocols for the construction of interoperability, both within and outside libraries. A lot of structured data are already available in library systems and may be published as LD. However, there are still some limitations to be overcome, such as the lack of coordination" (Hernández, 2012, p. 62).

LODE-BD RECOMMENDATIONS 2.0

The main purpose of the Linked Open Data-Enabled Bibliographical Data (LODE-BD) is "to assist data providers in selecting appropriate encoding strategies for producing LOD-enabled bibliographical data (directly or indirectly)." In order to enhance the quality of the interoperability and the effectiveness of information exchange, the LODE-BD Recommendations are built on five key principles (Subirats & Zeng, 2013):

1. To promote the use of well-established metadata standards and the emerging LOD-enabled vocabularies proposed in the Linked Data community;
2. To encourage the use of authority data, controlled vocabularies, and syntax encoding standards in metadata statements whenever possible;
3. To encourage the use of resource URIs as data values when they are available;
4. To facilitate the decision-making process regarding data encoding for the purpose of exchange and reuse;
5. To provide a reference support that is open for suggestions of new properties and metadata terms according to the needs of the Linked Data community.

LODE-BD recommendations "are presented as a whole package, encompassing the important components that a data provider may encounter when deciding to produce sharable LOD-ready structured data describing bibliographic resources (such as articles, monographs, theses, conference papers, presentation material, research reports, learning objects, etc. – in print or electronic format) from a local database. In the future the recommendations may be extended to accommodate other kinds of information resources" (Subirats & Zeng, 2013). It is expected that in the future recommendations will be expanded to accommodate other types of information resources.

The structure of the report is specified in the same document in the following table, which indicates the roadmap forward for consultation on the recommendations. After an introductory chapter which defines the purpose of the report, the second chapter refers to the general recommendations and is divided into two parts: the first which includes the fundamental questions that any data provider who decides to publish their bibliographic data as LD must ask themselves; the second refers to general questions about the metadata. The third section includes decision trees. Consultation of these trees will be of help when deciding on the selection of recommended properties according to local needs. The recommendations are completed with the last two chapters, which contain references and appendices.

It is important to address the three fundamental questions that arise in the second chapter and which we shall reproduce and analyze below.

Table 2. The roadmap of the LODE-BD. (Adapted from LODE-BD Recommendations 2.0)

Part	Focus
1	**About**
2	**General Recommendations**
2.1	Questions addressed
2.2	Metadata terms overview
3	**Decision Trees**
4	**References**
5	**Appendixes**

1. What kinds of entities and relationships are involved in describing and accessing bibliographic resources?

After referring to the importance of the use of a conceptual model in the context of the bibliographic descriptions, the report defines a simple conceptual model based on three entities: resource, agent and theme (Figure 2). For a greater understanding of this point of the report we refer to the document entitled *Meaningful Bibliographic Metadata* (M2B) (Subirats & Zeng, 2012).

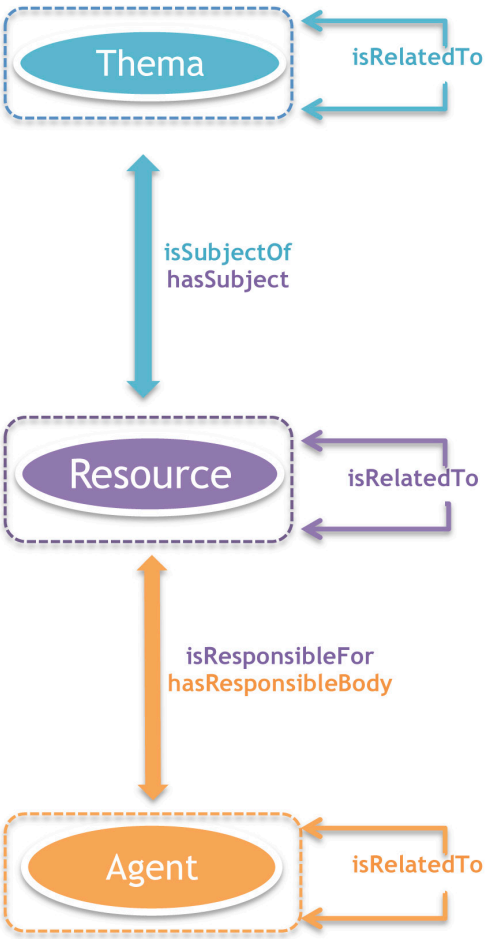
2. What properties should be considered for publishing meaningful/useful LOD-ready bibliographic data?

LODE-BD has built its recommendations on nine groups of common properties for describing bibliographic resources defined in document M2B and which we shall list below. They include specific best practice recommendations for about two-dozen properties used for describing a bibliographic resource as well as an additional two sets of properties for describing relations between bibliographic resources or between agents (Table 3).

Table 3. Properties for describing bibliographic resources in the M2B. (Adapted from Meaningful Bibliographic Metadata (M2B))

Group	Properties
1. Title Information.	Title, alternative title-(handling parallel title(s), translated title(s), transliterated title(s), etc.
2. Responsible Body.	Creator, contributor, and publisher or issuer of a resource.
3. Physical Characteristics.	Date, identifier, language, format, and edition/version.
4. Location	Location and availability
5. Subject	Subject term, classification/category, freely assigned keyword and geographic term.
6. Description of Content.	a)any representative description of the content, usually in the form of abstract, summary, note, and table of contents b) type or genre of the resource.
7. Intellectual Property	Rights, terms of use and access conditions
8. Usage	Audience, literary indication, and education level.
9. Relation	See Table 1 of M2B

Figure 2. The LODE-BD general concept model. (Adapted from Subirats ; Zeng, Meaningful Bibliographic Metadata, 2012)



3. What metadata terms are appropriate in any given property when producing LOD-ready bibliographic data from a local database?

LODE-BD has selected a number of well-accepted and widely used metadata/vocabularies and has used their metadata terms in the recommendations. All metadata terms used in the Recommendations are included in a crosswalk table (refer to Section 2.2 of recommendations). Flowcharts are used to present individualized decision trees, which provide an adjustable decision-making process for data providers and for their situations when selecting metadata terms and which are laid down in Chapter 3 of the report. This chapter provides the decision trees for the properties included in each of the nine groups that are presented in Table 3. Starting from the property that describes a resource instance, each flowchart presents decision points and gives a step-by-step solution to a given problem of metadata encoding. At the end of each flowchart, there are alternative sets of metadata terms for selection. A data provider can highlight the decision path and mark the metadata terms to be used at the end.

Consulting both metadata and vocabularies as well as the decision trees and understanding their components, along with the full range of options presented by LODE-BD, "will enable data providers to make their choices according to their development stages, internal data structures, and the reality of their practices" (Subirats & Zeng, 2013).

To summarize this section we reproduce what Agenjo (2013) had to say about this document, highlighting the usefulness of these recommendations. "The eminently didactic and practical character of the document is unquestionable and makes it extremely useful for anyone who, without a very deep knowledge of the subject, is confronted with a project aimed at publishing data in Linked Open Data."

CONCLUSION

As we stated at the beginning of our discussion, memory institutions are in the midst of a paradigm or perception shift. Fulfilling the first of the objectives set we defined the meaning of LD and LOD initiatives, in general, and then focused on the particular case of libraries. Once the theoretical framework was posed we described a practical application using the specific case of bibliographic data.

After the report by the LLD-XG in which the LOD possibilities for the library environment are addressed, it is now time to start implementing initiatives to corroborate the practical application of such movements. This is the case of the document "Recommendations LODE-BD 2.0" described above.

As a final conclusion we can say that GLAM institutions are content providers with great potential, mainly due to bibliographic information which "is generated by consolidated standards that ensure its quality, ability to be shared and sustainability" (Peset, Ferrer & Subirats, 2011). Within their standards what stands out is the use of vocabularies and authority files that allow the enrichment of other non-library data, and therefore, collaboration with other organizations outside the library environment. "The main outcome of the conversion of bibliographic data into linked open data will be that the data will begin to be more visible, integrated and reused by other services" (Martín & Angelozzi, 2013, p. 10), thus escaping from the "invisible web" in which they currently reside.

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