Solid Foundations and some secondary assumptions in the design of bibliographic metadata: toward a typology of complementary uses of metadata

Abstract
Traditionally, studies on the functions of the catalog have focused on the tasks performed by the users of catalog to access bibliographic information with the ultimate goal to access the content of the resources represented by the bibliographic data. This paper examines the uses of bibliographic metadata by a variety of user types and presents findings on the purpose, functions, and use of bibliographic data to include additional uses by institutions or individuals.

Introduction
Historically catalogs of library resources have taken different forms, the bibliographic data included in a library catalog entry has increasingly been enhanced, and the way users interact with the catalogs and its bibliographic data has also changed, especially since the end of the last century. Bibliographic data include information that describes and represents a resource. Throughout their history, library catalogs have served a variety of purposes. The majority of the literature on the purposes of the catalog focuses on the finding and selecting functions. Cutter, in his Rules for a Dictionary Catalog, identifies three catalog objectives: to find a resource, to show (collocate) what resources a library has, and to assist in the choice of a resource (Cutter 1876). Theories of bibliographic control identify five main catalog functions: find, collocate, identify, select, and obtain, with the additional function of navigation included in fewer works (Svenonius 2000). More recently, the IFLA Library Reference Model (IFLA LRM), a consolidation of the three models, defined the find, identify, select, obtain, and explore user tasks when interacting with the information accessible through a library catalog (IFLA 2017).

Although these have been widely-discussed functions, they seem to only address the uses of the catalog by library patrons and intermediaries who assist them with these user tasks. Often, users of the bibliographic data included in a catalog or other bibliographic data sets are the institutional users, such as staff and administration of a library who use bibliographic data for purposes related to their areas of responsibility. These responsibilities may include cataloging and metadata creation, acquisitions and collection development and management, resource sharing, reference, and various assessment efforts, including institutional accreditation. Most often, these functions of a catalog are referred to as the inventory and management functions of bibliographic data.
This paper examines the uses of bibliographic metadata by a variety of user types. More specifically, this paper presents findings on the purpose, functions, and use of bibliographic data.

To undertake this task we analyzed the literature, focusing on the functions of the catalog, types of metadata to fulfill these functions, and user tasks related to both catalog function and bibliographic metadata. The focus is on identifying bibliographic metadata that supports institutional purposes like collection building, collection quality assessment, marketing, outreach, and educational purposes.

We take a comparative approach to this examination, asking what is particular to user-focused tasks versus institutional uses or requirements. Further, the universe of metadata is larger than traditional bibliographic data, and this fact influences how we conceptualize the universe possible of functions. To that end, we examine metadata standards that support similar information systems, but have a different remit than library catalogs.

**Functions, purposes, or objectives of the catalog**

Others have tried to identify purposes and functions of a catalog taking a different or broader approach. The first to write about the functions of a library catalog was Cutter (1876), who identified the objects of the catalog. Wallace (1984) provides a historical account of the purpose of the catalog. Svenonius, in her 1992 work “Bibliographic Entities and their Uses,” discusses the “functions supported by a library’s file, i.e., catalogue” (p. 10). Lee and Lan (2009) make a distinction between the purpose of the catalog and the bibliographic objectives of the catalog, stating that “bibliographic objectives establish an operational framework for a library catalog” and that “bibliographic objectives are dependent on the catalog’s purpose or purposes” (p. 221).

Tennis (2006), uses a framework analysis to examine the purposes and function of information organization, many of which relate to functions of the bibliographic data included in an information system such as a library catalog. Clarke (2014) presents her study of the functions, goals, and objectives, which she uses interchangeably to mean the ends that library catalogs are or are expected to be designed to meet.

The literature identifies the following purposes of a catalog: to serve as a tool to locate resources, to organize knowledge, to serve as a guide to literature or a particular collection, to establish authority or canonize, to serve as a reference tool, to provide a historic record, to arrange information, and to provide a knowledge base.

Though purpose and function are often used synonymously in the literature, we treat them differently. Purpose, by our lights, is the reason or motivation for why some information system is created. Functions are the actions taken to fulfill the purpose (Tennis 2006). Using this lens, we inventory both the stated purposes and functions in
the literature, build out a comparative typology, and link this to bibliographic metadata used in institutional work like conducting inventories, collection management and assessment.

**Using bibliographic metadata**

Many works focus on the identification of the functions of the catalog but there are other works in the literature that validate functions identified in previous studies or identify additional uses of bibliographic data in an effort to assess institutional research, services, or collections. In addition, the literature offers examples of works whose main goals are not the identification of catalog functions but assessing information systems or designing systems that facilitate user tasks and user needs. A distinction is made here between use of bibliographic metadata and interface functionality of a retrieval system, which sometimes is also referred to as a function of a catalog (e.g., downloading results). Fewer works on the functions of the catalog define the users or base their identification of the functions on user studies, including user information seeking behavior. Cossham (2013) suggests that looking into information seeking behavior (ISB) and catalog use may lead to an expanded identification of functions based on how users use it.

In our analysis of functions, we identified two main types: primary and auxiliary functions or uses of bibliographic data. We define primary functions the actions taken or uses the bibliographic were designed to support. These may often be described as “traditional” functions. Auxiliary functions or uses are other ways the data used to support institutional or individual needs but these are not figured in the design of bibliographic data. In addition, categories of functionality are defined. Table 1 offers an overview of the resulting analysis, including categorization, terms used in the literature for each function, and a definition. Following the Table is a brief discussion of the categories and functions.

Beyond the identification of primary and auxiliary functions, our analysis shows that functions facilitate actions that can be characterized as:

- **access**: actions facilitating access to entities and the content of resources
- **discovery**: actions facilitating the exploration and discovery such as relationships, overview of collections or domains
- **education**: actions that facilitate user instruction on how to search or use the bibliographic data
- **management**: actions that facilitate the management of collections or resources
- **support**: actions that facilitate the use of bibliographic data in support of institutional or individual curatorial, assessment, or other necessities.

In our approach, when necessary as determined by the definition of the function, we have grouped together some sub-functions or functions discussed either as one or as
two separate ones in the literature.

Table 1: Functions and uses of bibliographic data

<table>
<thead>
<tr>
<th>Type</th>
<th>Category</th>
<th>Function</th>
<th>Terms</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>primary</td>
<td>access</td>
<td>finding</td>
<td>find, finding aid, finding, locate, collocate, search, retrieve</td>
<td>to find or locate entities based on certain criteria</td>
</tr>
<tr>
<td>primary</td>
<td>access</td>
<td>identification</td>
<td>identify, differentiate, verify, evaluate, distinguish, make relevance decision</td>
<td>to confirm the nature of a found entity and distinguish it between other, similar entities</td>
</tr>
<tr>
<td>primary</td>
<td>access</td>
<td>selection</td>
<td>select, choice, assist in the choice, narrowing, limiting</td>
<td>to determine the suitability of entities and chose specific entities among them</td>
</tr>
<tr>
<td>primary</td>
<td>access</td>
<td>obtaining</td>
<td>acquire, obtain, delivery</td>
<td>to access the content of an information resource</td>
</tr>
<tr>
<td>primary</td>
<td>discovery</td>
<td>navigation</td>
<td>navigate, discover, explore, browse</td>
<td>to explore related entities, resources, domains, and the relationships among them</td>
</tr>
<tr>
<td>primary</td>
<td>discovery</td>
<td>recommendation</td>
<td>recommend, suggest, connect, reading advisory</td>
<td>to relate and suggest entities based on a particular shared attribute</td>
</tr>
<tr>
<td>primary</td>
<td>discovery</td>
<td>linking</td>
<td>linking data, linked data, linking information</td>
<td>to link to additional entity information, external to a particular metadata storage and retrieval system</td>
</tr>
<tr>
<td>primary</td>
<td>discovery</td>
<td>visualization</td>
<td>visualize, display, cluster</td>
<td>to visualize collections, entities or subsets based on certain attributes</td>
</tr>
<tr>
<td>auxiliary</td>
<td>education</td>
<td>education</td>
<td>educate, instruct</td>
<td>to educate users on how to use the catalog, how to interact with the bibliographic data, and educate users about topical domains</td>
</tr>
<tr>
<td>auxiliary</td>
<td>management</td>
<td>collection management</td>
<td>inventory, control, collection development, collection assessment</td>
<td>to list or register property, to assess collections, identify gaps, acquire, purchase, share, and plan the resources of a particular collection</td>
</tr>
<tr>
<td>auxiliary</td>
<td>management</td>
<td>sharing</td>
<td>share, exchange, interoperability, consistency</td>
<td>to provide consistency of data and facilitate the exchange of data or resources</td>
</tr>
<tr>
<td>auxiliary</td>
<td>management</td>
<td>tool assessment</td>
<td>discovery tool assessment</td>
<td>to facilitate the assessment of discovery tools and inform interface design</td>
</tr>
<tr>
<td>auxiliary</td>
<td>management</td>
<td>advocating</td>
<td>marketing, expression</td>
<td>to market library collections, express the value, reliability and authority of libraries</td>
</tr>
<tr>
<td>auxiliary</td>
<td>management</td>
<td>preservation</td>
<td>preserve, archive</td>
<td>to facilitate the long-term preservation and future usage of information</td>
</tr>
<tr>
<td>auxiliary</td>
<td>support</td>
<td>research assessment</td>
<td>institutional research assessment, reputation management</td>
<td>to provide measures and supporting evidence for research assessment of an institution or individuals within</td>
</tr>
</tbody>
</table>
The primary functions of bibliographic data fall under the categories of access and discovery of information. These are the main purposes bibliographic data and catalogs are designed to support. Among those are the finding, collocating, and choice objectives originally identified by Cutter (1876). More often we see that collocation is discussed as part of the finding function. Svenonius (2000) asserts that “the traditional finding objective specifies that what is to be found in a particular known document, while the traditional collocating objective specifies that what is to be found is a set of documents, defined by criteria such as author, work, and subject”. The IFLA FRBR model and later the LRM model integrate the two traditional concepts of finding and collocating into the one find user task (IFLA 1998, 2017). IFLA LRM defines find as “to bring together information about one or more resources of interest by searching on any relevant criteria” (IFLA 2017, p. 15). In this paper, our definition of “find” includes both finding a single or a set of entities and resources that meet certain criteria and therefore incorporate the collocation function in the finding function.

The identification function is described in the literature using definitions ranging from the traditional object which is to confirm an entity to be what it says it is based on certain criteria (IFLA 1998, Hider, 2017), to the expanded definitions of distinguishing one entity from another similar one (IFLA 2011; Svenonius 1992), and to understand the nature of resources found (IFLA 2017). Users need to first perform the finding function in order for the identification function to take place. According to Liu (2007) “metadata provides information that allows the user to identify appropriate resources without exploring the resources themselves. Metadata allows the user to evaluate an information resource's relative value or lack thereof” (p.12), which implies an evaluation component for the identification function.

Cutter’s “assist in the choice” maps to the selection function, a term used by the majority of the literature on the topic. Here again we see that the function of selection is only possible after the finding and identification functions are performed. This is also discussed by Harej and Zumer (2013) who indicate that "selection can be done only

| auxiliary support | curriculum support | instructional assessment, curriculum support, instructional use, curriculum integration | to support instructional assessment, link to education standards, and support curriculum and accreditation efforts |
| auxiliary support | social interaction | social connection, social interaction | to connect with other users, to enable communication among users about resources, to enable community building |
| auxiliary support | curation | personal curation, institutional curation | to curate personal or institutional data for citation managers, reading lists, or other purposes |
after identification: proper selection can be done only after we have gained sufficient information about the entities on which we will be performing selection" (p.752-753). The selection function allows users to only chose the entities or resources that are most relevant, accessible, or usable based on factors like availability, format, and equipment required to access content. Svenonius (1992) states, “[t]oday the choice or selection of a bibliographic entity is conditioned by a more complicated set of factors. For instance, an important attribute of non-book materials is the equipment needed to experience the materials. What computer system does one need to process a computer data file? What viewing equipment does one need to use a film?” (p. 12).

The obtaining function may often be the ultimate access goal of users, who are looking to acquire or gain access to the content of an entity or resource. This function is more easily facilitated by systems that link together the bibliographic data and the resources themselves, especially in a digital content collection (full-text, digital image, digital music content). In more traditional cases of library catalogs, when the bibliographic data are not directly linked to the content of the resource represented, the data need to offer adequate information for the user to gain access through physical means, request for loan, or purchase.

The navigation function has not always been discussed in the earlier literature as one of the functions of a catalog, although browsing or exploration of bibliographic data was possible even in a book or card catalog. Harej and Zumer (2013) differentiate finding from navigation by asserting that “[w]hile find corresponds to searching, explore represents browsing, which users often use to locate resources when they want to avoid formulating a search statement” (p. 744).

The access functions of bibliographic data that have not been extensively discussed, as such, in the literature include the recommendation, visualization, and linking functions. Relationships between entities, shared characteristics or a combination of them with other data (such as viewing or circulation) function as recommendations for similar entities and can facilitate ratings, rankings, and reader’s advisory services (Dali 2015; Dempsey 2012). Bibliographic data, such as class numbers of subject terms, can be used to visually represent (visualization) a collection or subset of a collection or domain. This function can also support the navigation function. In more recent years, we see extensive discussion of linking internal or local bibliographic data to external data that provide additional information about entities or facilitate navigation outside a particular system. As more linked data or data enhancement efforts make connections to external information, the linking function of the bibliographic data will become more prevalent.

One notable management function of the catalog discussed early on is its use as an inventory for collections. This inventory is used for collection management, including its assessment, development, aiding the acquisition of new resources, or removal
(weeding) of existing resources. Other auxiliary uses of bibliographic data that have been identified in the literature include functions such as educating the user of the catalog in the use of the bibliographic data included in them, sharing bibliographic data or resources, and preservation of resources and their content to ensure future access and use. Other uses of bibliographic data support external purposes. For example, the bibliographic data can be used to assess information retrieval systems, search engines, or other technologies (tool assessment), to provide evidence in support of the marketing of libraries, their value in society, and advocacy efforts (advocating). They are used to support assessment and curation needs of institutions or individuals, including research-related or curriculum-related activities (research assessment, curation, curriculum support). In addition, data like tags, reviews, or ratings serve as a means to facilitate user social interaction.

Conclusion

Our inventory of the complementary uses of metadata lay bare the multiple uses beyond Cutter’s objects. When we consider the value of metadata we are often concerned solely with user interaction. However, as we can see, there are many other ways in which metadata supports knowledge organization work – professionals’ work. A full understanding of these purposes and functions allows us to broaden our conceptualization of the work we do, and therefore, broaden the conversation about the value of the work of knowledge organization.

References


**Additional sources used in the analysis**


