

Archival Science and Knowledge Organization: Mapping Methodological Relationships

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Abstract: We discuss the aspects and points of contact between knowledge organization and archival science, based on the texts published in the scope of the International Society of Knowledge Organization, especially concerning classification and description, building a theoretical-conceptual parallel about their points of contact. The aim is to systematize the relations between knowledge organization and archival science within the scope of classification and description. Bibliographic research in ISKO literature and archival literature was performed. Through systematization, it was possible to understand how the relationship between these fields is carried out and how it can be strengthened. The field of knowledge organization makes a pivotal contribution to the development of methodologies to access information. A series of developments in languages, structures and classifications, that is, knowledge organization systems (KOSs), is presented. On the other hand, archival science has been developing simultaneously, but in many moments seeking interlocutions, although superficial or even unintentional with the field of knowledge organization. The approximation of these fields is essential for the development of archival classification and description, aiming for the construction of ontologies, taxonomies and controlled vocabularies among others. These recent approximations must have occurred due to the changes that have happened in the last twenty years in relation to records management and the way people build knowledge and seek information. Also, it is possible to apply KOSs in the administrative digital environment for better archival representation instruments.

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1.0 Introduction

Knowledge organization (KO) is a field that contributes fundamentally to the development of methodologies for representing a given domain; KO methodologies help give a better understanding of knowledge itself reflecting in ways to access information. In this regard, a series of develop-

ments has been presented for the construction of languages, structures, classifications, that is, systems of knowledge organization. On the other hand, archival science has developed in parallel, but, in many moments, seeking interlocutions although superficial or even unintentional with the field of knowledge organization, as is the case with the development of some requirements of archival description

standards, ontologies, taxonomies and controlled vocabularies among others. However, they contribute punctually and, in many cases, peripherally to the mainstream of world archival thinking which, in many cases, is related to national recordkeeping practices.

These approximations, which were often not so bright, originated due to the fact that in the last twenty years, there were changes in how administrative management produces, transmits and accesses information and along the way, how people construct knowledge and seek information. On the other hand, as Navarro (1995) points out, the field of knowledge organization itself has for a long time relegated the issue of archival records organization to a secondary role as a domain apart from KO itself. From 1980, in the field of archival science, there has been an intensification of work dedicated to the subjects that we can relate to KO, such as classification schemes and conceptions of organization systems, but with minimal relation to the KO literature, which, in our opinion and within this paper and this particular issue, we think that there is an excellent potential for both fields.

On the other hand, in the current context, the production of archival records has a hybrid situation in which paper documents are produced concomitantly with digital records and vice versa, in most countries (Barros 2016, 34). Regarding this, the processes of representation and organization of knowledge in archival contexts are studied in archival science in a compartmentalized way dissociated from a systemic view, to the construction as a whole. The advent of knowledge organization systems as part of a representation process of information contained in archival records is hardly noticeable in the theoretical-methodological context of archival science, and its use often occurs in an “improvised” way.

Systems of knowledge organization are basically, as Dahlberg (1993, 211) postulates, “based on knowledge units—which are nothing else but concepts. Concepts consist of concept elements, also called concept characteristics, and exactly these are the factors by which concept systems—and classification systems are such concept systems—can be constructed.”

As a scientific field, knowledge organization can be based on several axes of study, especially those according to Hjørland (2016): 1) practical and intuitive approaches; 2) consensus-based approaches; 3) approaches based on facet analysis; 4) cognitive and user-based approaches; and, 5) domain analysis and epistemological approaches.

Thus, its scientific field can be and is related to archival science and records management, precisely when one thinks about the possibilities of approaches concerning the systems of organization. Because records management, classification, access, and control systems are just that—conceptual systems based on characteristics of record-producing

institutions—and we lack objectivity in the development of our organizational schemes, archival science consensus-based approaches, facet analysis, user and domain analysis can have a significant impact on organizations that depend on records to work.

In this sense, in this article we seek to draw a theoretical overview of the possible points of connection between KO and archival science in a theoretical and methodological way. As highlighted by Hjørland (2016, 100):

Knowledge organization of archives should, however, also be considered part of KO ... Archives may contain official records, business records, images, letters, diplomas, etc. The most important principle of organization for this domain is the principle of provenance.

Thus, it is essential to emphasize that archival knowledge organization, compared to other fields related to KO is, above all, an intersection with distinctive characteristics. Therefore, it is a theoretical reflection in the first instance, as it studies the systems of knowledge organization in the universe of archives and their relations and points of contact, but there is also a methodological study as it seeks to systematize these points with regard to classification and archival description—its application in the reality of the archives—from this correlation. Barros and Tognoli (2015, 95) point out that, “It is believed that it is possible to understand the work of archival representation as a form of organization of knowledge, that is, the Archival Science as an interdisciplinary area with the organization of knowledge.” In this context, several papers have discussed the relations between KO and archival science, such as Barros and Tognoli (2015), Barros (2016), Barros and Gomes (2018), and Sousa and Araújo Jr. (2013 and 2017). We can also add several ISKO conferences, in which archival science researchers publish and present papers correlating aspects of KO with archival science.

First, foundations of the organization and representation of knowledge are discussed, seeking to demarcate its field of action. Next, KO is correlated with archival theory in relation to classification and description. Finally, a parallel is established between them. The aim is proposing a possible approach between these areas.

2.0 Archival science and knowledge organization: first approaches

Knowledge organization as a field represents a specialization for information science, that is, a socially and scientifically institutionalized study stage within the area of information science, to discuss theories and methodologies related to the various processes of representation and organization. As Mazzocchi (2018, 55) postulates: “knowledge or-

ganization ... as a distinct field, [is] considered today as sub-field (or as linked to library and information science).” It is, therefore, a field that will seek to study aspects of the construction of thesauri, controlled vocabularies, taxonomies, and ontologies, that is, a range of instruments-processes that seek the search and appropriation of knowledge, traditionally linked to library and information science.

Thus, processes traditionally linked to knowledge organization and representation are linked to library and information science. In this regard, the methods of reading, analysis, and construction of specialized languages are mostly related to this universe, but according to the trajectory of knowledge organization and representation, the main concern is the content and its representation of a given domain. Even though, in the case of archives, the context is the essential element of this organization through records provenance and its organic relation, we can improve the classification context with complementary tools based on KOSs. There is a very present need to discuss and apply content-based strategies representing a given administrative domain to its organization as a complementary tool for records management, classification, and description. As pointed out, it is not a shift from traditional archival science views; it's an interrelation between fields.

The process of construction of this field can be based on the authors pointed out by Mazzocchi (2018, 55): “Cutter (1837–1903), Richardson (1860–1939), Sayers (1881–1960) and, of course, Bliss (1870–1955), who used the term KO in two seminal books, *The Organization of Knowledge and the System of the Sciences* (1929), and *The Organization of Knowledge in Libraries and the Subject-Approach to Books* (1933).” Dahlberg is also a key author responsible for coining the concepts of KO currently approached in papers from the late 1970s and 1980s, correlating the conceptual issues of the organization of human knowledge.

According to Hjørland (2008), two large groups of tools-processes can characterize KO, namely: 1) knowledge organization and representation processes: indexing, cataloging, subject analysis, classification; and, 2) knowledge organization and representation systems generated from/to these processes. The latter being primordial for the effective organization.

According to Mazzocchi (2018) and Hjørland (2008), a knowledge organization system (KOS) makes it possible to understand that the systems and organizational conceptions are fundamental for retrieval, but their biggest problem is the rapid change that occurs on how society accesses and relates to knowledge and seeks information, how knowledge specializes itself. This difficult task common to KOSs also pervades the reality of archives. Such a movement can be seen in archives since the nineteenth century with the reordering of the French National Archives, aiming at the intellectual rearrangement of its fonds, until the

development of systems of description in a web environment. There are different ways in which we can apply KOSs; however, we can improve archival organization tools based on their application.

Knowledge organization systems can include, according to Hodge (2000), classification schemes that organize materials at a general level, subject headings that provide more detailed access, and authority files that control variant versions of key information. They also include less-traditional schemes, such as semantic networks and ontologies; each of them having a distinct function and technological foundation and used in a variety of social groupings. The ultimate goal of knowledge organization systems is to fulfill KO's mission: to facilitate management and access.

Therefore, an integrative KOS is believed to aim at contributing beyond its field of action, aiming to assist in the construction of better knowledge organization systems within the archives. Hodge (2000, 1) endorses this perspective:

Knowledge organization systems also include highly structured vocabularies, such as thesauri, and less traditional schemes, such as semantic networks and ontologies. Because knowledge organization systems are mechanisms for organizing information, they are at the heart of every library, museum, and archive.

Thus, KOSs are mechanisms, though they are not named as such, at the core of each system of archival organization, in the processes of classification and description. Souza et al. (2012) establish an interesting scheme to reflect the various systems, their relationships, and developments, as shown in Figure 1.

From Figure 1, it is possible to notice the complex representation process involved in the systems of representation of knowledge, depending on its structure, its semantic freedom, and the way in which the concepts/terms are formulated.

The sizable spectrum and its possibilities are clear here. Thus, in relation to archives, we are mostly talking about KOSs, structured, complex, and with a semantic construction. Such a perception is possible by the very form with which archival instruments are formulated, building a relationship between context and content based on principles that are comprehensive and adaptable to each administrative body but citing what Duranti will call archival bond (1997), that is, the relationship that links each record, incrementally, to the previous and subsequent records and to all records included in the same activity.

Based on Souza et al., scheme, concept, and relationship structures are the ones that mostly apply to archival context, because of the characteristics specified in Table 1.

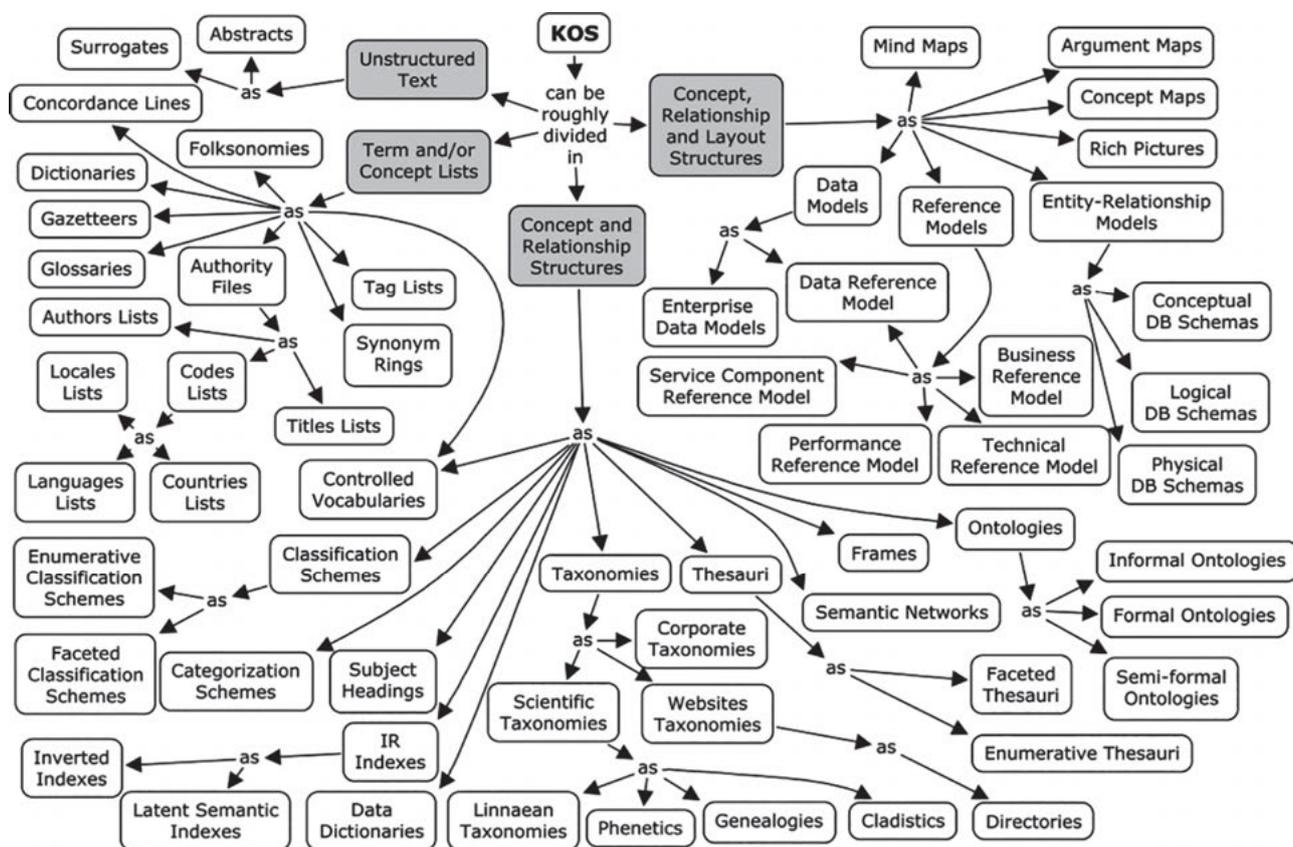


Figure 1. A tentative set of types of KOS (Souza et al. 2012).

Authors	Concepts
Almeida, Souza, and Fonseca 2011	Representational power, semantic expressiveness, intelligibility (for humans), formalization (machine-oriented)
Bergman 2007	Semantic strength, time/money
Guarino 2006	Ontological precision
Hodge 2000	Structure and complexity, relationship between terms, historical function
Lassila and McGuinness 2001	Ontology level (formality of semantic relationships), logical reasoning
Obrst 2004; Daconta et al. 2005	Semantic strength
Smith and Welty 2001	Complexity, logical reasoning
Soergel 2001a and 2001b	Purpose, coverage of concepts and terms, sources, quality of usage analysis, conceptual analysis and conceptual structure, terminological analysis, use of precombination in the index language, access, and display, format of presentation of the vocabulary, updating
Tudhope 2004	Entities (types, coordination, size, depth), relationships (types, expressiveness, formality), typical application to objects in domain of interest (purpose), relationship applying concepts to objects in domain
Wright 2006 and 2008	Communities of practice, systematic resources, non-systematic resources, technology orientation, degrees of indeterminacy, language and knowledge-oriented standards, standards bodies
Zeng 2008	Structure, semantic relationships/functions

Table 1. Adapted from Souza et al.'s (2012) KOS dimensions proposed in the literature.

Based on the table above, it is possible to conclude that a KOS has the following characteristics: 1) representative power (all KOSs have different levels of representative power); 2) formalization (different levels of formalization); 3) semantic aspects (they have terminological and conceptual relations); 4) normalization (there is a format in how we construct types of KOSs); and, 5) interrelationship (one KOS can complement another as a thesaurus can have relationships with an ontology).

These are five things that most archival representation systems lack, especially semantic aspects and interrelationships. We have standards for classification and archival descriptions; however, these systems lack consideration of semantic aspects or interrelationships from one standard to another, from one country to another. That is a main issue and concern for these institutions, because users have a very particular interest when researching in archives. However, semantic aspects of KOSs can help to make our systems more favorable. A KOS serves as a bridge between the user's information needs and the material in the collection.

Therefore, it is possible to conclude that in general, all these aspects are related to the construction of systems, and it is believed that we can find them in the context of archival knowledge organization systems (AKOS). In the next section, we will argue more about these relationships.

3.0 Knowledge organization in archival science

The representation and organization of information contained in records indicate the existence of an administrative action. The organizational structure of a producer body is the foundation for the development and construction of AKOSs. The ontologies, classification schemes, descriptions, and indexes created from this process will have a fundamental relationship with this aspect, but they are not subordinated only to them.

Information science and archival science rely on the synthesis and summary resources of information to organize and represent them (Barros and Martins 2015). Therefore, although the process foundation is different from that traditionally worked in the context of KO, in essence, they are close. The goals are the same, even if the path is different.

Classification is traditionally defended as a fundamental function of archival science (Sousa 2003, 254 authors' translation)—“to delineate the process of management, organization, and representation and in the context of the archives, that is, the classification must have a very strong representative power.” Besides the fact that it is a system of organization deeply formalized and hierarchical by nature, it also has semantic aspects in its structuring, standardization possibilities, and is part of an interchanged process, but archival science hardly acknowledged that in its history.

Eastwood (1994) and Duranti (1997) argue that only records together are archival records and evidence of the activities carried out by an institution, i.e., any document that is not organized by its function/activities, establishing a relationship with its origin (provenance) and its original order cannot be understood as an archival document, since the archival document only exists and makes sense in its relation to others. As RAD (Rules for Archival Description 2008, xxiii) dilates “the principle of provenance means that the records created, accumulated and/or maintained by an individual or organization must be represented together, distinguishable from the records of any other creator.” It is believed that this perception is fundamental and is the basis for the system of organization and representation in the context of the archives, but this is not the only premise. The system in relation to its design is incomplete; there is room to work with ontologies or thesauri, which will help to improve its design as a system.

The basic methodology for archival management and classification—the functional analysis—began in the 1940s with Brooks (1940), Posner (1964), and it was systematized in a more “complete” way in Schellenberg (1956 [2003]). It consists of the basic conceptual elements and the premise of the system. It is precisely through this analysis that AKOSs are built, and they can and should be complemented by taxonomies, ontologies, indexes, and other structured and related forms of KOS.

In relation to the process, Foscarini (2006, 41) established that we could define it as a preliminary investigation, followed by top-down functional analysis and analysis of combined bottom-up processes.

Functional classification is due to administrative standardization and the development of bureaucracy since the end of World War II, leading to rationalization and, at the same time, an exponential increase in the complexity of production and use of legal-administrative documents. This change gives us the foundation to go beyond and think about the possible contributions of KO to archival science.

According to Sabourin (2001, 144), a function is:

any high level purpose, responsibility, task, or activity which is assigned to the accountability agenda of an institution by legislation, policy or mandate; (2) typically common administrative or operational functions of policy development and program and/or delivery of goods or services; (3) a set or series of activities (broadly speaking, a business process) which, when carried out according to a prescribed sequence, will result in an institution or individual producing the expected results in goods or services that it is mandated or delegated to provide.

Having the function as a premise of the system and functional analysis as a constituent element of the representation system leaves room for it to go beyond the strictly contextual and allows a deepening toward the content and the decrease of subjectivity, as we see in Sousa and Araújo Jr. (2013 and 2017), when they approach the taxonomies, and in Barros and Gomes (2018) when approaching the ontologies.

A key factor that makes it possible to apply a KOS in the context of public archives is that most organizational activities are repetitive in nature; they are instances of processes that run frequently.

Some authors point out the problem that occurs in relation not only to classification but to a recurrent problem in archival science that can be aided by a KOS: the naming of classes in research tools and classification schemes. Orr (2005, 111) established that “There is no common rule-based classification model, either in the number of elements or in the levels or in the naming of the classes.” Another recurring problem is the lack of deepening theories in relation to methodologies of the field; according to Hurley (1993, 11) “The science and methodology of functional analysis has not yet been written.” Since the mid-1980s, studies have focused on conceptual questions but with few fundamentally methodological reflections. Shepherd and Yeo (2003, 73) write that “Classification schemes are based on an analysis of functions, processes, and activities” ISO 15489-1 (2001, 14), which is a records management standard, states: “Classification systems reflect the business of the organization from which they derive and are normally based on an analysis of the organization’s business activities,” and that has been the major concern in archival theory over time. But when we look to classification system itself as stated by Foscarini (2006, 191) “the number of classification systems that claim to be function-based, at a deeper glance turns out to be just a mirror of the agency’s internal structure” not reflecting the business functions.

However, with that critique, there are principals and fundamentals-based on functional analyses, but it is not the only classification answer possible. We have developed, as Sabourin (2001) or Bak (2010) dictated, a lot of case studies of functional analyses and the development of classification schemes but thinking only of classification’s functional basis even when the developed systems are not that functional.

On the other hand, the archival description activity of recent conceptualization (since the 1980s) but of traditional practice can be defined according to the Canadian Working Group on Archival Descriptive Standards (1985, 65) as:

The description is an essential function in the processing of archival material, and the products of this function are finding aids of various kinds that give

the administrator control over their funds and allow users and archivists to find the information they need.

The description began to develop during the nineteenth century, but it was only in the 1930s in Europe that description began to be seen as the means of making the user independent of the archivist’s specialized knowledge, and aimed at compiling research tools for the user, not the archivist. The activity of describing acquired a non-evaluative character seen as a consequence of the recognition of its products: to be useful for all kinds of research, it had to serve everyone and no one in particular.

In general, the archival institution seeks to preserve the unique identity of records, aiming at maintaining them in a way that shows the relationships between the records and the institution that produced them, these common practices are a basis for the descriptive work and a main concern since the very beginning.

Archival description seeks relevant information to understand the relationships between the identity of the documents and their integrity as evidence of activity, seeking to build systems of archival representation.

In this context, archival description was the function that went through the greater process of normalization, in a sense presented in the definitions of the framework of Souza (2012). Weber (1989, 505) explains: “What are norms? In a broad sense, they are pre-established guides for action or approved by a committee ... In other words, they are the way individuals compare and judge ... They are a means to a specific end.” We can, according to Table 2, visualize some of the various rules of archival description:

National Instruments of Archival Description	Counties
Manual Archival Description (MAD)	United Kingdom
Rules for Archival Description (RAD)	Canada
General International Standard Archival Description (ISAD G)	International
Describing Archives: a Content Standard (DACS)	USA
Norma Española de Descripción Archivística (NEDA)	Spain
Norma Brasileira de Descrição Arquivística (NOBRADE)	Brazil
Orientações para a descrição arquivística (ODA)	Portugal
Norma Uruguaya de Descripción Archivística (NUDA)	Uruguay

Table 2. National Instruments of Archival Description (NIAD) (Linden, Barros, and Brascher 2017).

Based on the table above, it is possible to visualize that the normalization in the context of the archives occurred as part of an international project and secondarily of national projects. Thus, AKOS reflects national contexts and realities, and this difference is fundamental to be highlighted. When we speak of systems of organization of archival knowledge, we are mainly talking about systems with distinct regional characteristics that must be taken into account in the elaboration of systems.

Archival description has been differently developed from one country to another, due to their different administrative cultures. With that in mind, the same goes for the development of classification schemes, but records are the products of activities developed by a person or entity in the execution of a function.

Based on Tognoli and Guimarães (2019), to understand this process means to comprehend the network of relations between objects, agents (creators—individuals or institutions) and functions (the actions necessary to the accomplishment of attribution within the scope of an administrative structure) as determinative elements to recognize the archival bond. That is why a record can never be conceived as an isolated element, especially because the recognition of the provenance of a record allows it to be used as evidence of activities.

Based on the literature and the text constructed in this section, we created Figure 2:

Based on this figure, it is possible to notice that the processes of representation in the archival context can be improved with reflections and methodologies extracted from the context of KO specifically when thinking about KOSs.

The development of ontologies and taxonomies-based studies herein has major applications in archival classification for the development of better systems. When we talk about archival description, we can see major applications of folksonomies and controlled vocabularies in a relation of context and content. Almost all archival representation systems lack all that KO does best: domain analyses and KOS construction. As we pointed out, we need to work with these methodologies, even more important in the current status of digital records management and production.

4.0 Conclusions

The organization and representation of knowledge is a field that contributes fundamentally to the development of methodologies for accessing information. In this regard, a series of developments have been presented for the development of languages, structures, classifications, that is, systems of knowledge organization. On the other hand, archival science has developed in parallel, but in many moments seeking interlocutions although superficial or even unintentional with the field of knowledge organization, as is the case with the development of some requirements of archival description standards, ontologies, taxonomies, controlled vocabularies, among others.

The representation and organization of information contained in a record indicate the possibility of the existence of an administrative action. The organizational structure of a production entity is the basis for the elaboration and construction of the archival description and classification systems, i.e., the ontologies, classification schemes, de-

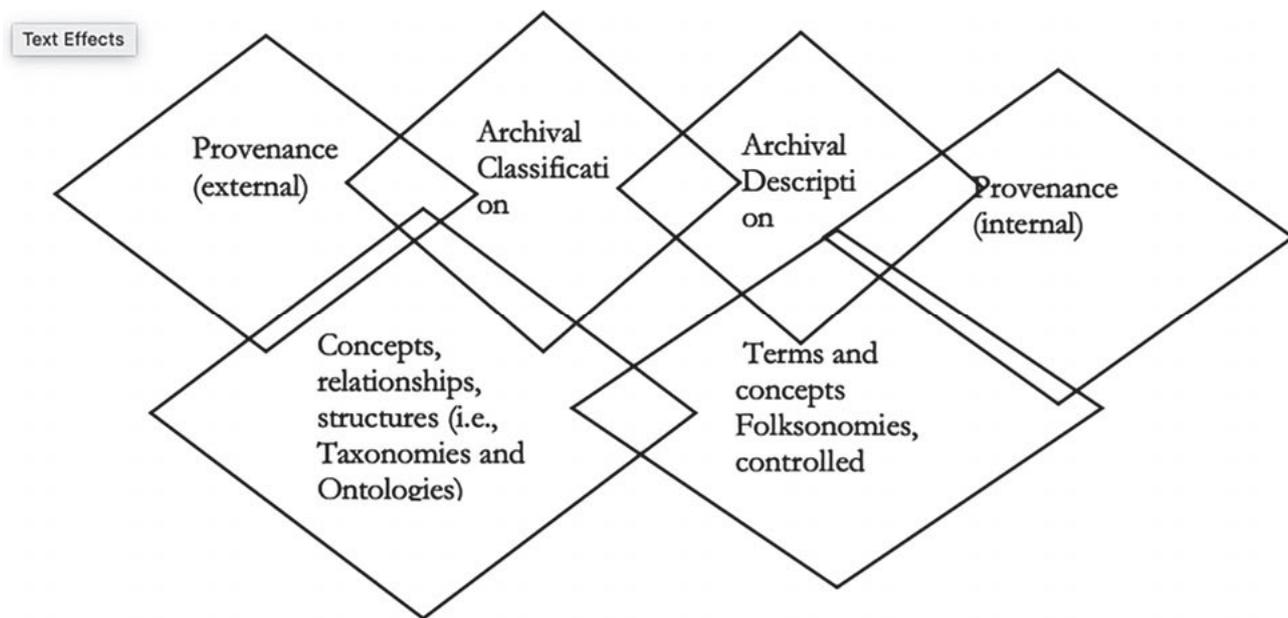


Figure 2. Process of representation and organization of archival knowledge.

scriptions, controlled vocabularies, and indexes created from this process will have a fundamental relationship with this aspect but are not subsidized only to them. As Yakel (2003, 2) points out, representation refers to the two processes of classification (respecting or disrespecting the order) and description, as well as the creation of research instruments (guides, inventories, catalogs) and systems (catalogs, bibliographic databases, and archival databases) resulting from these activities. It is clear how the creation of substitutes relates to representation.

Archival science has a recent theoretical development regarding its conceptual bases and its methodological development. The aim was to present integrative processes of archival science theory, capable of relations with knowledge organization, aiming at an appropriation by both fields. Since the archives become a space of application of knowledge organization methodologies and archival science has a new space for discussion of its historical-conceptual precepts, it is horizontal, that is, two fields with a possibility of intersection. Knowledge organization is a space for improving the organization processes typically linked to scientific information and its developments, and it is organized internationally as such. However, it presents methodologies, approaches, and foundations that are very important for the organization in the archival science environment. Although with their methodologies and objects, no field is isolated; it is in a relationship with each other that we can improve our treatment methodologies.

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