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KNOWLEDGE ORGANIZATION IN LAMS

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Introduction

To be useful and retrievable, collections of publications, documents, artifacts, and specimens in libraries, archives, and museums (LAMs) need to be feasibly organized and presented. This is done in a variety of ways. Books in libraries are sorted on shelves in repositories and described in, and accessible through, catalogues and indexes; documents in archives are organized and retrievable through a variety of search protocols and tools; objects in museums are organized in storerooms and described and displayed in catalogues and various exhibitions. These doings go by the name *knowledge organization (KO)*. Due to different commissions, traditions, and material conditions, LAM institutions have developed diverse routines, techniques, and tools to work with KO.

LAM institutions' tradition of organizing collections is long, but in recent decades, tools for KO have changed enormously due to technological developments; the resources to be included in the collections – including the tools for organizing them – are increasingly digital; and their retrieval is affected by these digital technologies. Today, an unprecedented number of resources are available through a quick search online and a majority of people in Scandinavia have technological devices that offer instant access to these Internet resources.

Many of the constraints of the physical world are solved when ordering digital resources (Weinberger 2007). Even so, it is important to bear in mind that KO practices have developed out of the ordering of physical collections, hence principles from physical tools remain influential. Understanding KO tools today includes considering their historical roots.

In this text, we will trace some historical roots and some challenges and opportunities that new technologies and societal situations bring to the KO work of LAM institutions. We will follow two trajectories of development that we find

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crucial to address, one being regulation, standardization, and rationalization and the other diversification, inclusiveness, and democratization.

When talking about LAM institutions' KO practices, we will use KO as an inclusive term, embracing, for example, information organization (Joudrey, Taylor, and Miller 2015, 3), bibliographical practice (Hansson 2012, 106), and collection management (Matassa 2011). When talking about the materials that are organized, for the most part, we use *records* within archives, *publications* within libraries, and *objects* within museums. Furthermore, the acronym LAM not only represents three different institutions but also, within them, a variety of institutional types. Libraries, for instance, can be public, private, academic, school, or special libraries. Each of these institutional types can, in different ways, affect how KO is done, but here we seek to identify general KO aspects applicable to all types of LAMs.

It is primarily within the library domain that KO has been defined and the term is closely connected to practices of classification and cataloguing. The KO concept was launched by classification researchers at the International Society for Knowledge Organization (ISKO) in the 1980s.[1] In academia, the concept has mainly been discussed within the field of library and information science (LIS). Here, Hjørland identifies two meanings of KO. The first is as something quite narrow, connected to "document description, indexing, and classification performed in libraries, bibliographical databases, archives, and other kinds of 'memory institutions'" (2008, 86). Importantly, even in this narrow definition, archives and museums can also be included as "memory institutions." Hjørland's second definition is broader and relates to how knowledge is organized in society in general, including not only how knowledge is socially organized but also how reality is organized (2008, 86). This broader view is also present in Bowker and Star's writings. In *Sorting Things Out* (1999), they show how our society is permeated by KO tools and practices in the form of categorizations, classification schemes, standards, etc. that steer our conceptions and behaviors. These tools are often so familiarized that we fail to see the advantages and power they give to some viewpoints, while neglecting others.

In this text, both the narrower and the broader view of KO will be addressed; we will look into how KO in LAMs is practiced in a concrete way, but also – in line with Bowker and Star – refer to a more broad and theoretical discussion on the consequences and power aspects of KO, not least in connection with opportunities and constraints new technology brings.

Libraries and KO

As previously mentioned, the main purpose of KO in libraries has been to provide access to publications and their knowledge content by cataloguing and classifying them, i.e., by adding bibliographical data or metadata. Even though this KO practice has a long tradition, it was the nineteenth and twentieth centuries that brought most changes to the field. Now more consistent and standardized

tools were launched, both regarding descriptive cataloguing, e.g., using systems like the joint *Anglo-American Cataloguing Rules*, and the organization of content, e.g., with classification systems such as the *Dewey Decimal Classification (DDC)* (Gnoli 2020, 17–18; Joudrey, Taylor, and Miller 2015, Chapter 2). These systems – together with the settlements of the International Federation of Library Associations (IFLA) and institutions like the Library of Congress, which took on the role of central cataloguing services – were ground pillars and parts of a general trend; sharing and standardizing bibliographical data made it possible to produce worldwide catalogues of resources in the library domain. A precondition for this sharing was, of course, that libraries organized books and serials that were published in multiple copies, but it was also facilitated by the advent of the computerized catalogue and the new ideas of standardization and "universal bibliographic control" – in a joint library domain, it is essential that libraries catalogue books in a consistent and similar way and share KO tools like cataloguing rules, metadata formats, authority control, classification schemes, etc.

Standardized KO practices enabling libraries to share resources were, as mentioned, prompted by the digital technology, but also, on a more societal level, they were closely tied to ideas and practices of modernity and rationalization (Bowker and Star 1999, 13–16). The tendency to standardize objects and routines has been influential in many sectors of the modern society (e.g., see the work of the International Organization for Standardization [ISO]), and the information domain in particular has been targeted. As we will see later on, these standardization efforts – driven by the development of digital technology and ideas of rationalization – led to similar developments in the spheres of archives and museums.

Sharing and standardization of bibliographical practices have taken different routes in Scandinavia (Hansson 2012, 121ff.) If, for example, we look at the introduction of the *DDC*, Denmark developed a national *DK* (*DecimalKlassifikation*) as early as 1915 (Statens Bogsamlingskomité 1915), while in Sweden, the local *SAB* (*Klassifikationssystem för svenska bibliotek*), first published in 1921, started to be replaced by the *DDC* as late as 2011 (Kungl. biblioteket 2020).

Digital technique affected KO in libraries in other ways too. Since the new technology offered users the opportunity to search, from among huge databases, any favorable keywords, professional KO tools were occasionally deemed redundant. However, it soon became obvious that to obtain more accurate and precise search results, the old tools of metadata, controlled vocabularies, and thesauri were also needed in the digital environment. This need became even more obvious with the advent of network opportunities and interoperability between systems. The use of both joint metadata elements – the production of the *Dublin Core Metadata Initiative* must be seen in this context – and controlled vocabularies, especially when providing the subject element of metadata descriptions, seemed indispensable (Dextre Clarke 2008, 432–434).

This brief historical overview of KO in libraries shows that there has been a long tradition in the domain of finding economy and rationality in collaboration

and sharing KO systems, records, and standardized KO tools. It is easy to describe this development as natural, driven in a given direction by technology, rationality, and economic incentives, producing KO systems that in an objective and neutral way mediate information to the users. In recent years, however, LIS scholars have challenged this viewpoint, stating that no KO system is neutral or nontheoretical (e.g., Hjørland 2016). KO systems and tools need to be seen as culturally constructed products that reflect certain ideologies, and they need to be deconstructed and their theoretical assumptions revealed (Gnoli 2020, 24). So, it is important to recognize that when LAM institutions describe their collections and make them searchable in a standardized and systematic way, this KO work will always include a decision-making process pointing out the most pertinent aspects of the collections, i.e., this work always includes decisions about relevant sets of data.

Also, a recurrent critique is how our "universal" subject representation systems, like the *DDC*, for example, are biased by power perspectives. An important contribution to this discussion is Olson's well-cited book *The Power to Name*, where the author shows how a universal language system "marginalizes and excludes *Others* – concepts outside of a white, male, Eurocentric, Christocentric, heterosexual, able-bodied, bourgeois mainstream" (2002, 142; see also Doyle and Metoyer 2015). With a similar agenda, Beghtol criticizes the rigid standardization of bibliographical control in present global KO systems for not responding to different cultural needs. She uses the concept of *cultural warrant*[2] to stress the need to protect cultural and information diversity by "creating ethically based, globally accessible, and culturally acceptable knowledge representation and organization systems" (2002, 507), and with the concept of *cultural hospitality with user choice option*, she invites initiatives that can reframe our systems to be more inclusive and open to cultural diversity (2002, 526). This way to invite different user perspectives into the KO process foresees the possibilities to come with Web 2.0 some years later, when the users can contribute with terms they feel more comfortable with by using folksonomies, tagging, or wiki procedures. With these, more "bottom-up" processes, the positions of experts and participants are altered (Spiteri 2006, 76). In Chapter 12 (this volume), Huvila describes how, for example, Oslo's Biblo Tøyen youth-only library invited a class at a local school to develop a classification system for organizing the collection, resulting in highly unconventional subject groupings. Apart from the possibilities this brings to the indexing process in terms of democratization and inclusiveness, the disadvantages of inconsistency, including the loss of precision and control, which tend to lead to excessively high recall and "noise," have also been noted (Porter 2011, 251).

Archives and KO

The most common way to organize documents/records[3] in archives is via *the principle of provenance*, a combination of two regulating principles. The first, *respect*

des fonds, strives, as stated by the International Council on Archives (ICA), to "maintain information about the creator of the archives in order to preserve the context and ensure survival of meaningful content within the archive." The second, the principle of original order, aims to "keep the records in the arrangement which they were put by the creating body so as to retain relationships between records and thus provide evidence about how the creator carried out their activities." The archivist must therefore keep the original context and order unaltered and unmediated, as evidence would otherwise be tainted (Cook 2013, 106).

These principles occurred in the nineteenth century. During previous centuries, archives – inspired by libraries – had handled records as separate information carriers and organized them according to subject, i.e., pertinence. This practice resulted in a loss of the records' original context (Douglas 2017, 26–29), but with the nineteenth-century historical interest in archival institutions, the context of origin became appreciated as the main source for securing evidence of records.[4]

Archival collections are not only organized but also described, and the descriptions are also regulated by the principle of provenance and shall document both the context of the archive's creation and the original order; a document gets its meaning in relation to other documents in the archive and in relation to the archive as a whole with its original function, purpose, and context. Descriptions are also affected by the fact that archival documents are unique, frequently come in more than one form or medium, are usually unpublished and not available elsewhere, and are often numerous: In modern times, archives can hold millions of documents. In contrast to libraries and museums, which represent publications and objects on the edition and item level, respectively, archives need to describe collections on a higher level, i.e., the fonds level (Cook 2013, 108). This description practice involves a detailed, hierarchical analysis of the whole and its subcomponents, where all documents are included, not always targeted as items but as parts of hierarchically organized subgroups, or series. In recent decades, a shift toward a stronger focus on the record creator's structures, processes, and activities (or functions), implying a top-down rather than a bottom-up perspective, has been visible (Chaudron 2008). An example is the Swedish National Archives' instructions for public authorities to use a process-based description model instead of the traditional so-called "General archives scheme" (Riksarkivet 2012).

Even though archives handle unique material and work with organizing principles guarding the specific creating circumstances of each collection (and are restricted by national legislations), the domain has, in the past few decades, made efforts to standardize rules and codes for descriptions of archival material. (The same far-reaching standardization practice of libraries, however, has not been launched.) The possibilities, not least, that digitization might bring has triggered the development of rules, codes, and standards for descriptions of archival material, with the most renowned being *ISAD(G): General International Standard Archival Description*, *Rules for Archival Description (RAD)*, and *Encoded Archival Description (EAD)*. According to Yeo, these standards are viewed as tools

that "have facilitated systems development, data sharing, remote access, and the construction of some remarkably successful cross-institutional online services" (2017, 170). They have also met criticism, e.g., that they tend to confuse original groupings of documents, break existent narratives, and simplify a complex reality into formalized square data elements (Nesmith 2002, 36).

Descriptions mediate and contextualize records; they both steer and aid the act of interpreting the records (Yeo 2017, 164). This interpretative intervention has challenged the ideas of the neutral archivist; instead, the impact of archival intervention and power through processes of interpretation and representation (and appraisal) has been stressed: The function of archives in society is not only to secure evidence but also to create its memory (Nesmith 2002, 35). Scholars making these reflections (often from a poststructuralist perspective) notice how the constructing power of archivists is disguised behind a seemingly objective and rational practice, and they also stress the importance of archivists recognizing this act of creativity and revealing their biases (Cook and Schwartz 2002, 181–182).

In line with this too is the observation that the principles tend to preserve one *physical* order, based on *one* original creator, a practice obscuring the fact that records can have a complex history, often with several creators (Cook 2013, 109–113). To respect a complex provenance, Barr (1987–1988) suggests a more abstract way of seeing the principles, where records should be kept physically in accession units and linked to various creators through cross-references capturing the sum of relations between documents, creators, and functions. This ambition to broaden the concept of provenance has also been stressed by scholars who argue that when analyzing the provenance of an archive, societal circumstances surrounding the creation and organization of an archive, e.g., ethnicity and community belonging, must also be respected as part of the context (Douglas 2017, 35–36; Nesmith 2002, 35). People documented in the records should also be seen as part of the provenance, especially records of colonial governments where indigenous peoples are documented. In Australia and North America, there is, for example, an ongoing discussion on how to include indigenous communities as co-creators of archival descriptions (Gilliland 2012, 341). Another example is the Swedish handbook *Arkivism*, which aims to include more material about women in Swedish archives. Recognition of the power that lies in being included in an archive is shown in an analysis of a collection in the Norwegian National Archive, in particular how the choice of words to describe the material can have political implications (Qvortrup 2020).

During the past decade, scholars have argued that new digital techniques can make the KO practices of archives more inclusive and democratic; for example, digitization per se can contribute to a more inclusive treatment of provenance since the place of privilege and traditional hierarchical description of the fonds is not prompted by the new technique (Cook 2013, 110–111), and with the technologies of Web 2.0 and crowdsourcing, users themselves can contribute to descriptions by tagging the resources (Huvila 2015).

Museums and KO

KO in museums overlaps KO in libraries and archives, but also has a number of peculiarities. A brief explanation of the latter could go like this: Museums hold an abundance of unique objects, each of which is described on the item level. The wide breadth of objects within heterogeneous museums has necessitated complex and specialized KO systems growing over time. Even within one museum, different systems can be in use synchronously due to the variability of objects (Gill 2017). In comparison, this type of KO is more resource-demanding than libraries holding multiple copies of publications that can be recorded in the same way across collections, and archives holding unique documents that are recorded at the level of *fonds*.

Undoubtedly, this diversification has the strongest impact on the manifold practices of documentation in museums. However, other aspects should also be considered, whether the resource description is entered into the ledger, the card files, or the database. For example, information is rarely found on objects themselves. Unlike materials in libraries and archives, museum information requires outlying documentation sources: "knowledge creation practices are based on attribution rather than transcription" (Gill 2017; see also Bearman 2008). In addition, information usually changes over time. Updated information about, for example, location and storage, provenance, conservation analyses, loan contracts, and exhibitions and literature is added to existing records.

Today, countless computer systems are available, but no all-embracing consensus exists. An exception is the Danish Museum Act, which commands the approximately 100 state-subsidized museums to upload collection information to a common publicly managed online KO system in order to enable cross-collection searches and make all data accessible. Such an enforced compliance, seldom found in other places, is not without its issues. Interoperability is gradually being refined, but each museum has to retain its distinctive system features developed over time to document its specific kinds of objects; otherwise, this information and the collection context might be lost (Robinson 2019). Even seemingly similar KO systems can have subtle differences that challenge attempts to share information across collections.

Although comprehensive standardization has its limits within the museum domain, this does not mean that KO is not regulated, or rationalized. Early examples of efforts to standardize metadata and other information by way of structured vocabularies, thesauri, etc. include *Iconclass* (1973), *Nomenclature* (1978), the Getty's *Art and Architecture Thesaurus* (1990), and *VRA Core* (1996). Each of these and many other tools help museums in their KO practices.

Notably, online collection databases were launched from the mid-1990s onwards, as public access to museum information became an issue, both as a democratic obligation and with the purpose of employing the collections in new imaginative ways. However, nonspecialists rarely appreciated this online access. Databases were difficult to use as they often only included rudimentary

information without images or with only one low-resolution image (Bearman and Trant 2009). Traditionally, the main purpose of KO in museums has not been to provide the public access to catalogued information about objects. In-house KO systems, now becoming publicly accessible, had primarily supported professionals in their work (Gill 2017).

Today, access to information is more multifaceted. Representing information resources in museums "means not just accurately describing what one owns, but also supporting interpretive analyses and active scholarship over the long term" (Marty 2008). Thus, documentation practices run along a scale of raw, refined, and mediated information (Orna and Pettitt, 1998). This scale is reflected in traditional museum practice as both catalogues and exhibitions are ways of organizing knowledge. However, the museum's present-day exhibition does not necessarily mirror the collection catalogue. Put simply, the museum storage contains many more objects, which are identifiable by way of information in the collection catalogue. In the exhibition, objects are interpreted and put into narrative structures, often supported by technological mediation and an exhibition catalogue. In addition to all the other differences, museums' KO thus works on at least two levels: Objects are organized in collection catalogues and they are organized in exhibitions.

Historically speaking, museums have had an authoritative voice in creating records for their objects and in disseminating knowledge about their collections. The multiple systems, also assisted by the abovementioned specialist tools such as structured vocabularies, etc., support this notion. However, due to the resource-demanding practices of providing descriptive metadata, the development of digital technologies, and diverse political demands, many museums have been experimenting with not just tagging and crowdsourcing, but also gamification and machine learning.

Tagging and crowdsourcing, also addressed above, have been hailed for inviting people to engage in generating metadata in an inclusive language, e.g., keywords representing relevant minorities or communities. Such an approach might "democratize" metadata creation (Murphy and Rafferty, 2015). However, crowdsourcing is not per se inclusive. It depends, not least, on who is taking part: The tools of "participatory metadata production" are only inclusive if they are used by a variety of people (Dahlgren and Hansson 2020).

Another way of nudging people to help in the creation of metadata is gamification. Although not as widespread as crowdsourcing within the museum domain, the German ARTigo has developed a number of social games since 2008 to motivate players to provide descriptive metadata (Bry and Schefels 2016). Once more, critical questions must be raised. Players – and taggers – are, among other things, unpaid workforce, and the risk of addictiveness might create concerns (Jafarinaimi 2012). However, if varied groups of people engage in the gaming, the notion of museum professionals as the authoritative source for collection information is democratized, at least to a certain extent.

Yet another way to enrich descriptive metadata is machine learning. Because of increasingly advanced algorithms, computer vision is gradually being trained to analyze, describe, and present museum collections. Thus, computers can potentially generate data from digital images of collection objects at a very fast pace compared to the speed of producing these data manually. Moreover, through refined color and composition analysis, as well as object recognition, computer vision can find similarities and connections across digital images of collection objects (Villaespesa and Murphy 2021), possibly facilitating image retrieval for nonspecialists and opening for the information *flaneur* who does not seek precision and reliability in retrieval but has an exploratory approach (Rafferty 2019). Currently, these technologies are at an experimental level, but their potential raises pertinent questions related to KO, for example, about ethics regarding diversity and biased metadata.

Although descriptive metadata are an important way of making collections accessible, KO in museums is not limited to this. As previously mentioned, each museum has often developed its own distinctive system of documentation over time, including pertinent contextual information (and hidden ideologies), which cannot be replaced by automated processes, and, not least, *mediated* information, performed by the authoritative voice of the museum, is still the main route for making objects accessible to the public.

Conclusion

In this brief description of KO in LAMs, two lines of development have been explored: *Regulation, standardization, and rationalization* and *diversification, inclusiveness, and democratization*. Both are in many ways prompted by new digital techniques, but where the former can be seen as resulting from internal KO technological and practical rationales (connected to our narrower definition of KO, presented in the introduction), the latter is more motivated by political and societal demands (connected to power aspects and our broader definition of KO). In this last section, we will discuss these themes a bit further, but also connect them to ideas of using KO to link LAM collections.

Although we recognize a striving for more standardized KO practices in all LAM institutions, the library domain has been most affected. Libraries have long found economy and rationality in sharing and standardizing KO systems, records, and tools. This can partly be explained by the fact that many copies of books exist. Museums and archives, conversely, handle more multifaceted and unique material – even though paper or digital records/documents of archives do not show the same range of variation as objects from the museum domain – and have, accordingly, fewer opportunities to standardize their KO tools and practices.

Not only material conditions but also institutional commissions and restrictions affect standardizing practices. Since libraries' mission generally is to offer access to knowledge resources independently of where they are placed, and a

standardized global catalogue working as a surrogate to these resources seems rational. Archives, in contrast, are not only restricted by national legislation but also by the provenance principle, which states the need to be sensitive to each archive's original context and structure. Consequently, an extensive global standardization is difficult to implement. Put simply, KO work in museums is executed on two levels: First objects are organized in collections in storages and recorded in dynamic catalogues (traditionally, as an aid to professionals in the specific museum, not to provide public access), then they are organized in narratives in exhibitions. Neither of these functions encourages standardization.

Attempts to standardize and share KO tools and systems have not been limited to these institutions per se but to the LAM field as a whole. With, for example, joint metadata, crosswalks, and shared digital platforms/portals, "unified routes into their deep collective resources" have been envisioned (Dempsey 2000). These ideas have been nurtured by arguments stating that LAM collections, on some basic KO level, could be described by the same types of metadata and the notion that users do not care about institutional barriers (if objects are placed in a museum, a library, or an archive). And digital platforms and web resources connecting digital resources from different collections and domains *have* been launched; one prominent example is Europeana.eu. By using a metadata standard, the *Europeana Data Model (EDM)*, a variety of collections has been mapped and integrated into one platform.

This trend has also met criticism. Some researchers have identified problems with linking metadata of different levels – the high-level descriptions of archives, and the item and edition level of museums and libraries (e.g. Yeo 2017, 182–183) – and Robinson warns that the striving for universal access to digital collections and the standardization procedure this invites put at risk the unique perspectives each institutional type brings. Instead, states that "an organic heterogeneous array of collecting institutions – rather than hybrid mega-repositories – could be vital to maintaining the richness and diversity of cultural knowledge" (2019, 38).

Lately, often from poststructuralist perspectives, the three domains have addressed the constructing and mediating power aspects of KO tools and systems: How, for instance, classification systems and vocabularies favor some viewpoints and neglect others.

Importantly, this bias is not limited to traditional KO tools but is also present in algorithms producing indexing and search opportunities in digital tools (Noble 2018). To address this problem, existing systems and tools have been sensitized to the needs and perspectives of different user groups by, for example, stretching standards, adding more options/codes, or changing the orders of existing systems. This work strives for the inclusion and empowerment of groups that are not normally in power to co-construct existing dominant KO tools (e.g., due to colonialism, racism, or misogyny). To produce terminologies that are more pluralistic and inclusive, digital technologies inviting users have also been seen as promising: For instance, wikis, tagging, and folksonomies. But warnings have been raised that these practices make some users more comfortable

about contributing than others (some groups will still be privileged) and that the reliability of records and the precision and control of the KO process might be jeopardized (Jansson 2020). In particular, this latter position is integrated in the powerful master narrative of information professionals, although serendipitous and exploratory information seeking might be more relevant in many cases (Dörk, Carpendale, and Williamson 2011).

Finally, the sharing and converging of KO practices bring benefits and drawbacks: It can be a great service to users by offering joint access to LAM materials regardless of the institutional placement of objects, and it can serve rational and economic interests. But if this converging KO practice is based on far-reaching standardization, where metadata sets and attributes are uniform and thereby reduced, the necessary diversity and polyphony that different KO practices bring might be lost and replaced by a homogenic perspective.

Notes

1 Inspired by Henry Evelyn Bliss, *The Organization of Knowledge in Libraries and the Subject-approach to Books* 1933 (Dahlberg 2008, 84).
2 The warrant concept is based on the idea that "the basis for classification is to be found in the actual published literature rather than abstract philosophical ideas or 'concepts in the universe of knowledge'" (Chan, Richmond, and Svenonius 1985, 48). But *how* the published literature shall be represented has been under debate and different warrant concepts have been proposed: user warrant, cultural warrant, gender warrant, etc. (Barité 2018).
3 A record is generally perceived as narrower than the concept of a document, and emphasizes the function of evidence.
4 The evidence approach was not new, but if earlier archives and documents were preserved to attest to rights, privileges, and obligations in juridical, economic, and political domains, now the assistance to historical disciplines became just as important (Eastwood 2017, 6).

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