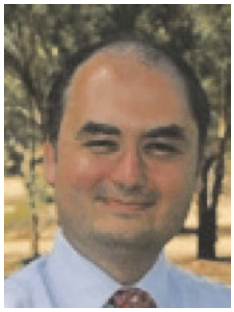
Towards a Sociology of KOS and More Basic KO Research

Philip Hider

Charles Sturt University, School of Information Studies,
Boorooma Street, Wagga Wagga, NSW 2678, Australia,
<phider@csu.edu.au>

Philip Hider is Professor of library and information management at Charles Sturt University (CSU) in Australia. He has been Head of its School of Information Studies since 2008, and is presently also Associate Dean Research of its Faculty of Arts and Education. He holds an honours degree in social anthropology from the London School of Economics, a masters of librarianship from the University of Wales, Aberystwyth, and a PhD in information science from City University, London. Dr Hider worked as a cataloguer at the British Library from 1995-1997 and taught and consulted in Singapore from 1997-2003 before joining CSU.



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Abstract: It is suggested that the knowledge organization (KO) field places greater emphasis on basic research that examines the sociology of KO systems (KOS) and the broader, environmental reasons for the development of both formal and informal KOS. This approach is contrasted with applied KO, which focuses on the practical construction or improvement of specific KOS. The preponderance of applied research in the field of KO is confirmed, at least within the document-centric strand more closely aligned with library and information science, through a survey of articles in the *Knowledge Organization* journal published between 2009 and 2018. The survey utilized the *Frascati Manual* definitions for basic and applied research, and referenced Tennis's classification of KO research (2008). There is considerable potential for building on the critical tradition of KO, with various areas ripe for further sociological investigation. A sociology of KOS could also be accommodated in the popular KO approach of domain analysis.

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1.0 Introduction

It is suggested in this article that the knowledge organization (KO) field places greater emphasis on basic research that examines the sociology of KO systems (KOS) and the broader, environmental reasons for the development of both formal and informal KOS. Recently, I posited that the future of the field of information/knowledge organization (KO) might shift towards looking at how information resources, or "documents," can be described for the purposes of selection as much as for the purposes of finding, in the IFLA-LRM sense of these terms (Riva et al. 2017), and that in this way KO may end up more closely associated with bibliography, or more specifically enumerative bibliography, than it has been for many decades (Hider 2018b). However, while metadata-based information retrieval still allows people, and computers to find resources that content-based information retrieval does not, it is clear, at least to this author, that traditional KO tools such as library catalogues and bibliographic classification schemes are not as central to information access as they once were. In contrast, content-based retrieval, based primarily on computer algorithms and, increasingly, artificial intelligence, mostly developed outside of the KO community, already underpins a large slice of everyday information access, and this slice is likely to only get bigger. The reality is that KO's contribution to the practicalities of finding resources is, thus, more likely to diminish than it is to increase. I argued that KO might instead profitably shift its attention to document selection, in which the description of documents (i.e., metadata) is probably still going to be playing an important role for some time to come. The KO community will surely be able to claim ongoing expertise in the description of documents.

However, while I, therefore, see considerable opportunity for KO to continue to make significant scientific contributions by studying how various domains evaluate (and thus select/de-select) information resources, the historical narrative that I outlined in my article (Hider 2018b) suggests that this new emphasis could also end up being overtaken by technological developments. Just as the field of bibliographic classification diminished in importance (at least to those outside the field) with the advent of computerised catalogues, and the field of library cataloguing is now less central even to libraries due to the rise of Google et al., it seems likely that technology based more on the analysis of content than on domain will at some stage provide the primary means of selecting resources, as well as finding them. Indeed, it could be argued, given the prevalence of relevance ranking, for instance, that this is already the case in many areas of information provision.

Of course, change is inevitable, and academic fields cannot, and should not, be insulated from it. On the other hand, there is no harm in considering other ways in which KO might make contributions to the advancement of knowledge that are less time sensitive. It is suggested in this article that the "critical" strand of KO, exemplified by the work of authors such as Hope Olson, could become part of a broader sociology of KO systems (KOS), which would complement research into the design and evaluation of KOS. The latter has been the focus of most of KO research concerned with documents and recorded knowledge, as confirmed by a high-level analysis of the content of *Knowledge Organization,* from volume 36 (2009) to 45 (2018), reported later.

Sociologically oriented studies of KOS that are more basic, and less applied, in nature examine how KOS relate to society and technology in order to explain their construction, rather than inform it. As such, they are less time sensitive. While specific KOS may become obsolete, aspects of the environments in which they were developed may well continue to be of interest, even after the environments themselves have likewise changed or disappeared. In this article, a case is put forward for more basic research of this nature, given its potential for longer-term utility and for the building of theory. It is also argued that a sociology of KOS could be framed as a branch of domain analysis, while examples of relevant earlier work and promising areas for further investigation are identified.

2.0 Basic and applied research

The categories of basic and applied research are well established, and still frequently used to report research and set policy, even if they have also been criticised for not reflecting the reality of research as typically a mix of both (Gulbrandsen and Kyvik 2010). According to Schauz (2014), however, a century ago the term "basic" research was introduced to indicate research that had less immediate practical applications, rather than none: it was sold to governments as research needed to underpin the applied research that was delivering the technological advances of the period. After the Second World War, growing concerns around the political nature of science funding led to the meaning of "basic" shifting to that of "disinterested," or "pure" in the older, nineteenth-century sense (Schauz 2014). Despite the increasing amounts of government and private investment in applied research, basic research still carries with it a certain cache, at least in university circles, with which it is most closely associated; applied research is also conducted in universities, of course, but is more of a focus for government agencies and laboratories, while "development" tends to be the domain of industry (Gulbrandsen and Kyvik 2010). Widely applied definitions of basic and applied research are published in the *Frascati Manual 2002* (30):

> Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application in view.
>
> Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.

Even though many research projects can consist of both basic and applied elements, with both basic and applied research aims, Gulbrandsen and Kyvik (2010) note that most researchers are able to classify each of their activities as belonging to one category or the other. With the proportions of funding for basic and applied research varying across disciplines, the proportions of basic and applied research undertaken likewise vary. It follows that the proportions of basic and applied research in KO may depend on one's view of what constitutes "KO research."

3.0 KO research

Fields of study, and disciplines, tend to be defined in a combination of ways, including ontologically (their subjects), epistemologically (their methodologies), and socially (their groupings) (Hider and Coe 2020). As with most fields of study, KO's name is indicative of its subject matter. According to Hjørland (2016, 475), KO "is about describing, representing, filing and organizing documents and document representations as well as subjects and concepts both by humans and by computer programs," which could be summed up as "organizing knowledge." However, in the KO litera-

ture, there are divergent views of what this "knowledge" is. Sometimes it is defined very broadly, as all knowledge (Gnoli 2016), yet the study of how all (shared) knowledge is organized is, in my view, the domain of cultural anthropology, while epistemology covers the theory of knowledge at a more generalized level. Other times, knowledge is defined more in the spirit of Hjørland's definition, where the focus is on documents, or "recorded knowledge."

There is no right or wrong answer, of course, but I would suggest that the latter, narrower definition is preferable, as it is in this space that KO can hold its own. The larger part of the KO literature is concerned with the organization, description and retrieval of documents, while most of KOS's institutional base is linked to the document-centric field of library and information science, or "information" as it is now sometimes called. The KO "tribe," to use the well-known metaphor of Becher (1989), may be strong enough to hold onto part of the overlapping "document" and "information" territories but cannot realistically compete, in my view, with anthropology and philosophy for all of the territory of "culture" or "thought." This is not to say, however, that KO cannot make some inroads into the "culture" territory; indeed, a "sociology of KOS" would be positioned to do exactly that.

The history of the KO tradition that centres on documents takes in the "documentation movement," involving precursors of the International Society for Knowledge Organisation (ISKO), such as the Classification Research Group, and pioneers such as Otlet and La Fontaine, and, prior to this movement, the pioneers of early modern cataloguing, such as Cutter and Panizzi (Hider 2018a; Smiraglia 2014).

Throughout, we see an emphasis on addressing practical issues of document access. The tradition's earlier scholarship has been characterised as rationalist and was very much focused on the practice of library cataloguing and classification (Smiraglia 2002). As such it was part of a broader field of study represented by the new professional courses in "library economy" of the late nineteenth and early twentieth centuries (Hider 2018b).

Later, in the second half of the last century, document-centric KO research became more empiricist, but was still predominantly about improving particular tools and vocabularies used by libraries to provide access to documents (Smiraglia 2002). The documentation movement was, after all, primarily a response to the very practical need to control the explosion of scientific publications that was occurring (Hider 2018a). Methodological paradigms that emerged from this movement, such as that of "social epistemology," were based on the view of documentation, and KO, as very much an applied discipline. The "goal of engaging in social epistemology," therefore, "is to lay the foundation for intelligent social action, by making it possible for systems of bibliographic services to be planned and implemented at the national level, so that individual components are coordinated and integrated rather than separated among distinct groups of users" (Furner 2004, after Egan and Shera 1952, 134).

This emphasis on the applied continued after the formation of ISKO in 1989, with its charter and preamble (ISKO 1989) starting off with:

> It is the declared purpose of the International Society for Knowledge Organization to provide personal contacts and opportunities for cooperation to the worldwide community of colleagues who devote themselves to the creation, expansions, revision, and application of tools for the organization of knowledge according to conceptual points of view.

In more recent times, the document-centric strand of KO has, like other KO strands, moved into other epistemological paradigms, including critical theory. Instances of "critical KO" include work applying genre and activity theory (e.g., Andersen 2015), queer theory (e.g., Drabinski 2013), and feminist analysis (e.g., Olson 2008). This paradigm in particular has supported more basic research, examining the ways in which existing KOS both reflect and support various socio-political structures.

Notwithstanding this trend, document-centric KO has continued to produce many applied studies, based on both old and new methodological approaches. Of the latter, perhaps most notable has been "domain analysis" (Hjørland 2017). The majority of KO studies that have analysed domains, however, have done so for applied reasons, that is, to devise or improve KOS in those domains. The extent to which document-centric KO continues to be dominated by applied research is considered in the next section.

4.0 Basic KO research

To gauge the extent to which KO research, in the document access sense, is applied in nature, we might look for more basic studies reported in those venues with a greater emphasis on the theoretical, such as the journal, *Knowledge Organization,* in comparison with those with more obvious practical and professional leanings, such as *Cataloging & Classification Quarterly.* If there is a preponderance of applied research even here, then we may conclude that document-centric KO research is more applied than basic. Accordingly, an analysis was carried out on articles published originally in volumes 36 (2009) to 45 (2018) of *Knowledge Organization* that were concerned directly with any aspect of document description and access. The survey was intended to be indicative of recent KO research, rather than either exhaustive or definitive.

Those articles that dealt with knowledge beyond recorded knowledge were excluded from analysis, as were those

that were deemed metatheoretical or reflexive in nature. Metatheoretical articles could be operationally defined as those that would be coded (if only one code could be used) as 01 (epistemology), 02 (theory) or 03 (methodology) according to Tennis's classification (2008) of KO research. Reflexive articles were those that were focused on an aspect of the field itself, such as KO history, KO education, the work of a member of KO, and so on. Book reviews were also discounted. The three parts of the field, according to Tennis (2008), are: design (04), study (05) and critique (06). He summarises them in terms of three questions:

> How do I build KO systems? [Design]
> What is going on in the process of building and using these structures? [Study]
> What do such structures and processes mean? [Critique]

Tennis (108) himself notes that "much of KO research concerns itself with the design of indexing catalogues, and other descriptive apparatus." Although Tennis (2008) does not relate the three codes to the basic/applied classification, clearly much of what would be classified as "design" would be regarded as applied research. The relationship between research that would be classified as "study" and the basic/applied classification is not so straightforward. Tennis's comments (109) suggest that the research he has in mind is largely connected to the specific, practical objectives of design, aiming "to inform and understand [its] ramifications or shortcomings." However, some of the examples of "study" that Tennis cites, such as those that examine social tagging behaviour, are more wide-ranging in outlook and do not indicate how what is learnt about the use of a KOS, for instance, will inform specific design issues. It would seem that there is plenty of scope for instances of "study" to fall into either basic or applied categories. Finally, Tennis's gloss on "critique," as well as the question above, would strongly suggest that much of this research is basic in nature; it is aiming to understand the implications of KOS, their "meaning," more than about doing something specific to them (which is not to say that a result of this understanding could not be to do something in a broader way, such as challenge their use). Many of the examples given of "critique" would generally be classified as basic research (e.g., Olson (2002), Beghtol (2002); Bowker and Star (1999); Day (2001)).

The remaining 190 articles from the ten volumes of *Knowledge Organization* were classified as either basic or applied, using the *Frascati Manual* definitions, based on indications of the research objectives. These objectives were more discernible in some cases than in others, but in most cases, the author was confident that an acceptable classification was recoded. The results are summarised in Table 1, while those articles that were classed as basic research are listed, by year, in Appendix A.

Year	Basic	Applied
2009	1	13
2010	3	13
2011	4	16
2012	12	13
2013	2	11
2014	5	14
2015	4	15
2016	3	21
2017	3	19
2018	2	16
Total	**39**	**151**

Table 1. Basic and applied research articles in *Knowledge Organization*.

The numbers indicate that even in perhaps the most theory-heavy of KO journals, a large majority of studies of document description and access are applied in nature, or at least more so than they are basic. This corroborates the findings and views of earlier commentators. For example, López-Huertas (2008, 120) identified the main topics covered in the KO literature in the first decade of this century: mostly they were of the "how to" form, although the question of whether "minority and marginalized social sectors [are] taken into account in general systems" did also feature. Similarly, the ten long-term research questions proposed by Gnoli (2008) were mostly "how" questions looking for "solutions," albeit quite general ones. Previously, McIlwaine (2003) framed her review of trends in KO mostly around tools and practical matters, although she did also identify significant interest in the "bias" exhibited in some of the tools.

It should be pointed out that a weighting firmly toward the applied aligns with that of many other fields, especially fields closely connected with the professions. Nevertheless, the research of Bentley et al. (2015) suggests that about a third of university research in professionally oriented fields is, when considered in terms of a binary classification, basic (see Appendix B). Yet the evidence suggests that the proportion in KO is significantly less, overall, notwithstanding the fact that some of the research reported in *Knowledge Organization* and other KO venues is located outside of universities.

In light of this, we should reflect carefully on the nature of document-centric KO research. It does not presuppose specific, practical objectives. If the subject of KO is represented by its name, then more literally the field is about how knowledge is organized rather than about how to organize knowledge. Research for the construction of KOS, i.e., the study of potential KO systems, is only part of KO. The field also includes the study of existing KOS. While such study may in some cases have their improvement as its aim, it may

in other cases be aiming to understand the way existing KOS function, and the relationship between them and their respective environments. This latter form of KO research could well be basic in nature, "undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application in view" (*Frascati Manual 2002,* 30). KOS can thus be studied for their own sake. This does not preclude the possibility that this form of study could in time lead to practical applications, including the improvement of particular KOS or the development of new ones, but it does not start off with this as its main objective.

If applied KO research typically aims to answer questions about what kind of KOS should be developed to provide access to particular document collections, basic KO research questions generally omit the "should" (though in the critical tradition a stance is taken in relation to what should be asked). Instead, basic KO research asks why existing KOS are as they are. While such a question could be answered in terms of the specific details of the system's construction, basic KO research attempts to identify the more general factors, relating to culture, technology, and historical trends. Such research explains and theorises, more than simply describes. It allows for deconstruction, instead of construction. That is, it can break things down so that they can be better understood. As these things include many that relate to the social, this type of study is often sociological, and as a shorthand I, therefore, call it the "sociology of KOS."

5.0 Basic domain analysis

The propensity of domain analysis to support applied research is illustrated in the way it has tended to be framed. For example, Smiraglia (2012, 114), one of its leading advocates, considers that "A domain is best understood as a unit of analysis for the construction of a KO [system]." Domains are, therefore, investigated and analysed in order to construct systems and tools that will help them organize and access their documents more effectively.

Does this mean that if KO research is not analysing domains in order to construct or improve a KOS, it is not domain analysis? I would argue that it could, in fact, still be considered a form of domain analysis. After all, Hjørland (2017, 452) himself has pointed out, in a recent discussion of domain analysis, that "to be considered a research-based field of study, information science and KO must provide explanations of information use as well as criteria of relevance and optimal information infrastructures."

In his introduction to domain analysis, Smiraglia (2015, 2) defines the approach as "the study of the knowledge bases of specific, definable contexts" (In fact, the "domain" is referred to, by Smiraglia (2015), as both the knowledge base and the group sharing the knowledge base, much the same way as cultures, such as national or tribal cultures, are sometimes defined in terms of the people who share them as well as their shared knowledge, since cultures and knowledge bases are both ultimately dependent upon people). As such, a domain is a "unit of analysis for the construction of a KOS" that could represent, at some level, a shared knowledge base (114). Yet it could also be an analytic unit in which KOS have already been constructed. Either way, what is being analysed is the relationship between a domain and a KOS. In the case of applied domain analysis, the relationship is between a domain and a potential KOS or a potentially improved KOS. In the case of "basic" domain analysis, on the other hand, the relationship is between a domain and an existing KO system, or more specifically between a domain and an existing system's development. Basic domain analysis aims to identify the various factors in a KOS's development attributable to the domain.

The contextual factors that result in a given KOS are likely to be wide-ranging: a KOS is the product not only of the work of particular individuals, but also of broader social, political, and economic aspects of its domain, as well as of the material world in which it is situated. A pragmatic approach to domain analysis could readily encompass all such factors, and does not preclude basic research, even though such research has, by definition, no specific practical objective; instead it has a general aim of providing a greater understanding of the world around us, which could be viewed as "practical," at least by some (If such an aim could not be regarded as practical, then this would undermine philosophical pragmatism's own propositions, which are made with similar aims).

If we consider the eleven approaches to domain analysis originally identified by Hjørland (2002), five (i.e., literature guides, special classifications and thesauri, indexing and retrieving specialties, empirical user studies, and professional cognition and artificial intelligence providing mental models for expert systems) tend to be employed in applied KO, but the other six (i.e., bibliometric studies, historical studies, document and genre studies, epistemological and critical studies, terminological studies, and studies of structures in scientific communication) could readily be adopted in basic KO research, and have been. Indeed, many of these approaches, as well as others, could be taken up to research some of the topics I suggest, in the next section, which could bear considerable fruit for the sociology of KOS.

6.0 Past and future basic KO research

As noted above, the "critical" strand of KO has already made significant inroads in the sociology of KOS, revealing how particular KOS are both symptomatic and reinforce certain social, economic, and political structures. Many of the articles listed in Appendix A, classified as "basic KO" in

the survey, could be considered part of this strand and would generally be coded as "critique" in Tennis's classification (2008). Although not all critiques of KO practice focus on an individual KOS, many have exposed the systemic biases of standard cataloguing and indexing tools used in library practice. For example, there has been a long tradition of studies highlighting particular twentieth-century American viewpoints reflected in the *Library of Congress Subject Headings* (Berman 1971; Olson 2001; Roberto 2008; Adler 2017) and the *Dewey Decimal Classification* (Olson 1998; Olson 2001; Fox 2016; Higgins 2016). Various critical theories have been employed in these critiques, but there are no doubt other lenses yet to be applied, and various vocabularies and schemas of the library world that have yet to be fully critiqued in this way.

Another strand of basic KO has examined the business of knowledge organisation in a more positivist way, focusing on the more general characteristics of indexing and resource description, especially in "folk" settings, where large datasets more readily allow for statistical treatments than do professionally produced databases. Folksonomies created by social cataloguing sites and on other social tagging platforms have generated a fair number of studies over the past decade or so, examining a range of variables, such as their exhaustiveness (the extent to which they cover subject matter and so forth), synonymity (the extent to which they cover the same concepts with multiple terms), and their overlap with formal, controlled vocabularies (Adler 2009; Rorissa 2010; Yoon 2012; Rafferty 2018; Johansson and Golub 2019). As sites supporting social tagging continue to expand, and diversify, there will surely be all the more opportunity to conduct this kind of basic KO.

These studies, on the nature of these relatively new forms of information resource description, can also look to ask why their nature is as it is, just as the critical strand has done with respect to the more "authoritative" vocabularies. Because there are so many potential factors that might be at play, it helps to answer the "why" question by comparing and contrasting multiple KOS with certain points of commonality, such as the documents they describe or the environment in which they are situated. Comparison is, of course, a common analytical technique, employed in many disciplines, including those that tend to conduct basic research, such as the humanities. In comparative KO, it may be found that one classification emphasises certain subjects, for example, while another emphasises certain other subjects, because of differences in the worldviews of the users of those classifications. Comparison of different iterations of the same KOS may likewise point to particular changes in the KOS's environment. Instances of comparative KO can be found in Appendix A; earlier ones can be found in the work of Feinberg (2005) and Tennis (2009). Theories of certain KOS, whether these KOS are professional or folk, can be critical or positivist; either way, they can contribute to our understanding of why documents are described and classified in the ways that they are.

While information technology may be challenging KO practice in many ways, it is also providing new opportunities for KO research. As well supporting platforms for folksonomies, it is being used to create massive amounts of document description more broadly, on the part of individuals and groups, much of which can, at least in theory, be readily collated and analysed. This description includes, for example, informal reviews written in blogs and online forums, the menus of websites that point to documentary content, and document-related comments to be found on social media. In the aggregate, this description is likely to represent a far wider range of elements than that of professional description, for reasons of scale and diversity. Elements identified as having been inadequately addressed in professional KO practice may well be much more extant in the new datasets available to KO researchers, enabling them to be studied in much more depth. Examples of such elements include "genre," "perspective," "experience," "audience," and "discipline." These kinds of concept feature in many everyday descriptions of a wide range of works but have been only partially covered in conventional library cataloguing and the like due to practical limitations as well as to the reluctance of information professionals to move beyond the modernist paradigm (Mai 2011). Yet such concepts can tell us a great deal about how particular resources fit into, and in turn help fashion, a given culture, perhaps more so than some of the elements that do occur prominently in professional description.

We should not be all that surprised that the description of some of these aspects of documents has in fact been studied outside of KO, in fields such as sociology and history. The sociology of art and art classification, for instance, has generated a number of significant studies over the past two or three decades focusing on the concept of genre (DiMaggio 1987; Lena 2015). Meanwhile, various strands of intellectual history and cultural studies have examined the role of various kinds of document and their description in cultural and socioeconomic change (e.g., Marien 1997; Duff 2009). There is no reason, in my view, why KO cannot also make valuable contributions in these areas.

Basic KO research is not without its challenges. Theories of document description need to take into account its function, which can vary. Description outside of professional KO practice does not always aim to provide document access. Nevertheless, it can still be profitably compared with description that does, as long as the different functions form part of the explanation. In reality, most KOS, including most constructed by information professionals, are based, at least in part, on document description with different and multiple functions.

Likewise, basic KO research will often need to distinguish between differences in the documents themselves as opposed to differences in their description. For example, a new "genre" may emerge primarily because a new kind of document emerges, or because an existing kind of document is viewed differently. As descriptions and their objects become intimately related over time, their disentanglement is rarely a straightforward task.

Notwithstanding such challenges, basic KO research has already made important scientific contributions and holds much promise for the making of many more. Its explanatory power has the potential to increase the interest the wider academy takes in KO, particularly if its theories cover the everyday classifications and descriptions with which the wider academy, and public, are more concerned. If KO is about the multitude of both formal and informal KOS that now exist in the online world, it is also about the domains in which those KOS operate.

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Appendix A. Articles classified as basic research

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2010

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2011

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2012

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Keilty, Patrick. "Tagging and Sexual Boundaries."
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Zhang, Jane. "Archival Context, Digital Content, and the Ethics of Digital Archival Representation."
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Adler, Melissa A. "Disciplining Knowledge at the Library of Congress."
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2013
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De Santis, Rodrigo and Rosali Fernandez de Souza. "Classifying Popular Songs: Possibilities and Challenges.
Antonio García Gutiérrez and Daniel Martínez-Ávila. "Critical Organization of Knowledge in Mass Media Information Systems."
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2015
Beaudoin, Joan and Elaine Ménard. "Objects of Human Desire: The Organization of Pornographic Videos on Free Websites."
Hider, Philip. "A Survey of the Coverage and Methodologies of Schemas and Vocabularies Used to Describe Information Resources."
Kipp, Margaret E. I., Jihee Beak and Ann M. Graf. "Tagging of Banned and Challenged Books."
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2016
Fox, Melodie J. "Subjects in Doubt: The Ontogeny of Intersex in the Dewey Decimal Classification."
Lee, Wan-Chen. "An Exploratory Study of the Subject Ontogeny of Eugenics in the New Classification Scheme for Chinese Libraries and the Nippon Decimal Classification."
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2017
Keilty, Patrick. "Carnal Indexing."
Hajibayova Lala and Kiersten F. Latham. "Exploring Museum Crowdsourcing Projects through Bourdieu's Lens."
Allen, Adrian Van. "Bird Skin to Biorepository: Making Materials Matter in the Afterlives of Natural History Collections."

2018
Brandt, Mariana Baptista. "Ethical Aspects in the Organization of Legislative Information."
Lacey, Eve. "Aliens in the Library: The Classification of Migration."

Appendix B.
Table from Bentley, Gulbrandsen and Kyvik (2015)

Basic and applied research orientation classifications, percentages within discipline of current academic unit

	Pure basic	**Lean. towards basic**	**Equally basic and applied**	**Lean. towards applied**	**Pure applied**	**Total**	***n***
Teacher training and education	7	12	32	29	19	100	677
Humanities	28	21	26	16	9	100	1,347
Social/behavioural sciences	19	19	24	23	16	100	1,127
Business and economics	8	15	31	28	18	100	980
Law	18	20	34	18	10	100	301
Life sciences	22	26	23	17	12	100	694
Physical sciences, mathematics, computer sciences	18	24	29	19	10	100	1,809
Engineering, architecture	3	13	32	32	21	100	1,667
Agriculture	4	8	23	31	35	100	305
Medical and health sciences	9	16	18	27	30	100	1,322
Other	8	15	33	24	20	100	334
Total	14	18	27	24	17	100	10,563