

ISKO 14's Bookshelf: Discourse and Nomenclature— An Editorial†

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1.0 The 14th International ISKO Conference, Rio de Janeiro, Brazil

The 14th International ISKO Conference took place in Rio de Janeiro, Brazil in September 2016 just weeks after a successful Olympiad had focused the world's attention on this thriving metropolis. It was spring in the southern hemisphere, and conference goers were thrilled to enjoy warm sun-filled days and starry nights, not to mention exciting and exotic beaches at Copa Cabana and Ipanema, all under the watchful eye of the famous statue *Cristo Redentor*. The conference was the guest of the Fundação Getulio Vargas, opening at the Oscar Niemeyer Auditorium on the broad avenue known as Praia de Botafogo, and continuing over the next two days at the Management Building in the city's historic Rua da Candelaria. Attendees took part in twenty sessions containing seventy-two research presentations, bringing together the world's knowledge organization research community for the fourteenth time under the auspices of the International Society for Knowledge Organization. The conference kicked off with a keynote address by Maria José López-Huertas on "The Integration of Culture" and a roundtable chaired by D. Grant Campbell concerning "KO for a Sustainable World," emphasizing the major conference themes of sustainability and cultural information sharing.

Since 2008 I have created informetric domain analyses of the contents of international conference proceedings to capture the evolving intension and extension of the knowledge organization (KO) domain. Essential research questions each time are:

- How international is participation in ISKO's international conferences?;
- How do citation indicators describe the scientific approaches represented at ISKO's international conferences?;

- Which authors represent the research front present in the conference?; and,
- What do co-word analysis and author co-citation analysis tell us about the shifting extension and intension of the KO domain as represented by each international conference?

The editorials in this series are titled "ISKO's Bookshelf" to make use of the metaphor of the scholar's knowledge cache. The metaphor of the bookshelf points us toward comprehending the larger discourses that are influencing the constant morphing of the domain.

The proceedings (Guimarães, Milani and Dodebei. 2016) were published in digital form at the conference, and were shipped to participants in print and subsequently made available online at the Ergon-Verlag ISKO Members' portal at http://www.ergon-verlag.de/isko_ko/. There are seventy-one papers in the proceedings, including the keynote; the program contained nineteen research paper sessions plus the opening session. The contents of the published program are the same as those of the proceedings. The original spreadsheet containing the references from all of the papers can be found on my blog at <http://lazykoblog.wordpress.com/>. As before, editing of the proceedings was spotty, particularly with regard to the references that are the raw data for much of this analysis. Basic citations in the form of author names, dates of publication and selection titles seemed reasonably reliable, but other details were not always consistently rendered. Conference proceedings in particular, which constitute a large proportion of ISKO researchers' bookshelves, are variously rendered by different contributors and are not consistent through the volume. For example, here are the references

to the 2014 ISKO International Conference as found in the proceedings (minus duplication):

- *Knowledge organization in the 21st century: between historical patterns and future prospects: proceedings of the 13th international ISKO conference in Kraków, May 19-22, 2014*. Würzburg: Ergon;
- *Knowledge Organization in the 21st Century: Between Historical Patterns and Future Prospects*. Proceedings of the 13th ISKO Conference, Krakow;
- *Knowledge Organization in the 21st Century: Between Historical Patterns and Future Prospects: Proceedings of the Thirteenth International ISKO Conference*, edited by Wiesław Babik. Krakow, Poland, 12-22 May 2014. Würzburg: Ergon Verlag;
- Babik, Wiesław, ed., *Knowledge organization in the 21st century: Between historical patterns and future prospects*. Würzburg: Ergon;
- *Advances in Knowledge Organization*, 14; and,
- *Proceedings of the Thirteenth International ISKO Conference, Kraków, Poland, 9-22 May*.

The appropriate way to cite the conference using the *Chicago Manual of Style* is this:

Babik, Wiesław, ed. 2014. *Knowledge Organization in the 21st Century: Between Historical Patterns and Future Prospects, Proceedings of the 13th International ISKO Conference, Krakow, Poland, May 19-22, 2014*. Advances in knowledge organization v. 14. Würzburg: Ergon-Verlag.

I include these examples to make the point that the inconsistent citation practices in a single volume make it quite difficult to compile data such as that found in the remainder of this editorial. It also makes it quite difficult for any sort of automated indexing service to generate adequate data from the text itself. Given the importance of informetric approaches to domain analysis in the knowledge organization domain, it should be expected that publications from the domain would contain citation data of high quality, consistent in style. Be that as it might, one limitation of the research presented here is that errors in matching might have crept into the data gathering reported here.

2.0 International presence

Rio de Janeiro is a special place, and the research profile of the sponsoring chapter ISKO-Brazil attracted much international attention. National affiliations of first-named authors were tabulated, and the countries of affiliation are visualized in Figure 1. Authors were affiliated with institutions in fifteen countries.

Obviously, the largest sector is occupied by authors affiliated with Brazilian institutions. While it is typical for authors from the host country to contribute heavily—e.g., Poland in 2014 or India in 2012 (Smiraglia 2014, 344; 2013b, 4)—it also has become normative for authors from Brazilian institutions to contribute a substantial portion of the conference's papers—13.8% in 2010, 13% in 2014, 29% in 2012 (Smiraglia 2014, 344; 2013b, 4; 2011, 180). Consequently, we can see both patterns in this conference; that is, Brazilian hosts contributed over and above their usual considerable proportion of the conference's papers. The rest of the distribution is typical for an ISKO International Conference. The contributions from the USA and Canada are slightly lower than usual. Iran, Taiwan and Singapore who were newcomers in 2014 are not present. Switzerland and Uruguay are new this time. Still, ISKO's reach is clearly global.

3.0 Citation analysis

There were 1339 citations in the 71 papers, with a range from 3 to 52 references per paper. The mean number of references per paper was 18.1, the mode was 9 and the median was 17. Only 17 papers had more citations than the mode. This suggests a consistently social scientific orientation among the conference papers. Dates of publication of works cited ranged from 1548 to the present, with a mean age of cited work 16.2 years, a median of 10 years and a mode of 1 year; the majority of the citations were to works published in 2015-2016. This measure of the currency of works cited is consistent with prior ISKO international conferences and represents a social-scientific epistemology. To discover whether there is any difference by country of researcher affiliation in the number or age of cited works, means were compiled for each country of affiliation. The results are shown in Figures 2-3.

With regard to the age of works cited, researchers from Switzerland, Uruguay and Slovenia contributed reference lists much older than the mean, and those from Canada, Poland and France much more recent than the mean. With regard to the numbers of references, researchers from Poland, Portugal, Italy, Brazil and the USA used reference lists near the mean, those from other countries were more distant from the mean in both directions. We know from domain analyses of KO research in the past (Smiraglia 2013a) that there is an epistemological duality that persists, whereby more or less equal parts of the research output are empirical and rational, represented by narratives that are more or less scientific or historical. Empirical research tends to lie near or below the means both in currency and number of works cited, while historical narrative tends to rely on citation of more and older works. The results here

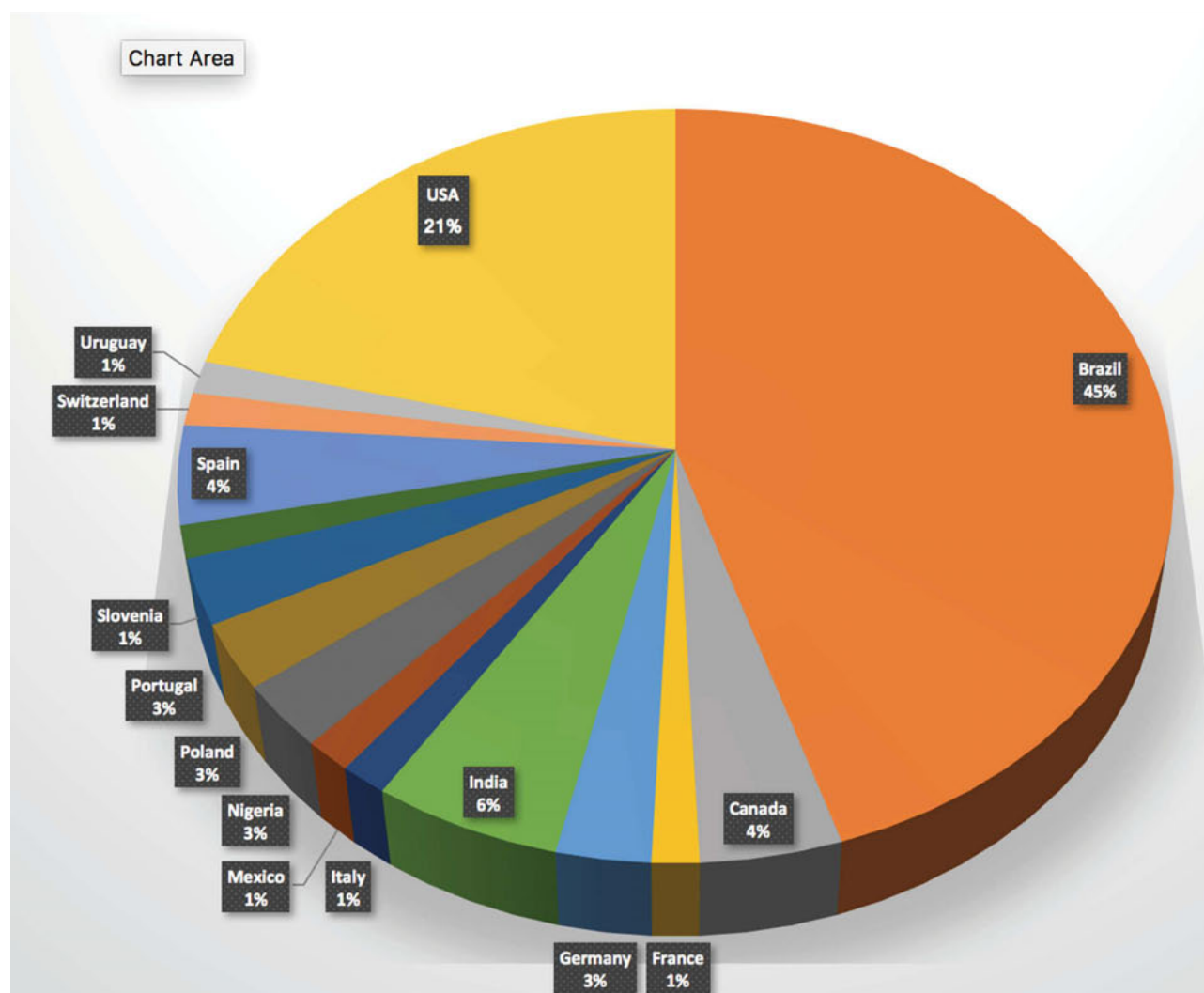


Figure 1. Countries of affiliation

are consistent with that observation. As before, ANOVA was used to test the hypothesis that number of references influenced age of cited work, and vice versa; the test indicated there was no statistically significant influence of either variable on the other. Similarly, χ^2 was used to test the hypothesis that country of affiliation was associated with either numerical variable. No statistical significance was discovered. This tells us that the range in age of cited work and number of works cited is typical of KO at large, which is more evidence of the dichotomous empirical approaches that are common in the domain.

Research in KO usually relies on journal articles, research papers in conference proceedings, monographs and various other (mostly digital) resources. In this conference, 523 citations were to journal articles, 193 were to conference papers, and 491 were to monographs with the remainder pointing to websites or other sources, including 26 theses or dissertations. 225 journals were cited, 53 of which were cited twice or more. Those cited 3 or more

times are shown in Table 1. As is typical of ISKO, roughly half of the sources cited are research reports, representing the empirical epistemological node of KO, and roughly half are in monographs, representing the rationalist or historicist empirical nodes.

126 conference proceedings were cited, of these 20 were cited twice or more, and a small cluster of 8 conferences was cited 3 or more times; these are shown in Table 2.

Obviously, the most-cited conferences are recent biennial ISKO International conferences, but we also see that the 2015 Brazilian ISKO regional conference and the international UDC Consortium symposium also were heavily cited. 102 of the citations, or about half, were to conferences held by a group of relatively closely-related scholarly societies. These are shown in Table 3.

This list shows some of the intellectual discourse surrounding KO as its current research front is represented in the ISKO 2016 proceedings. Information science con-

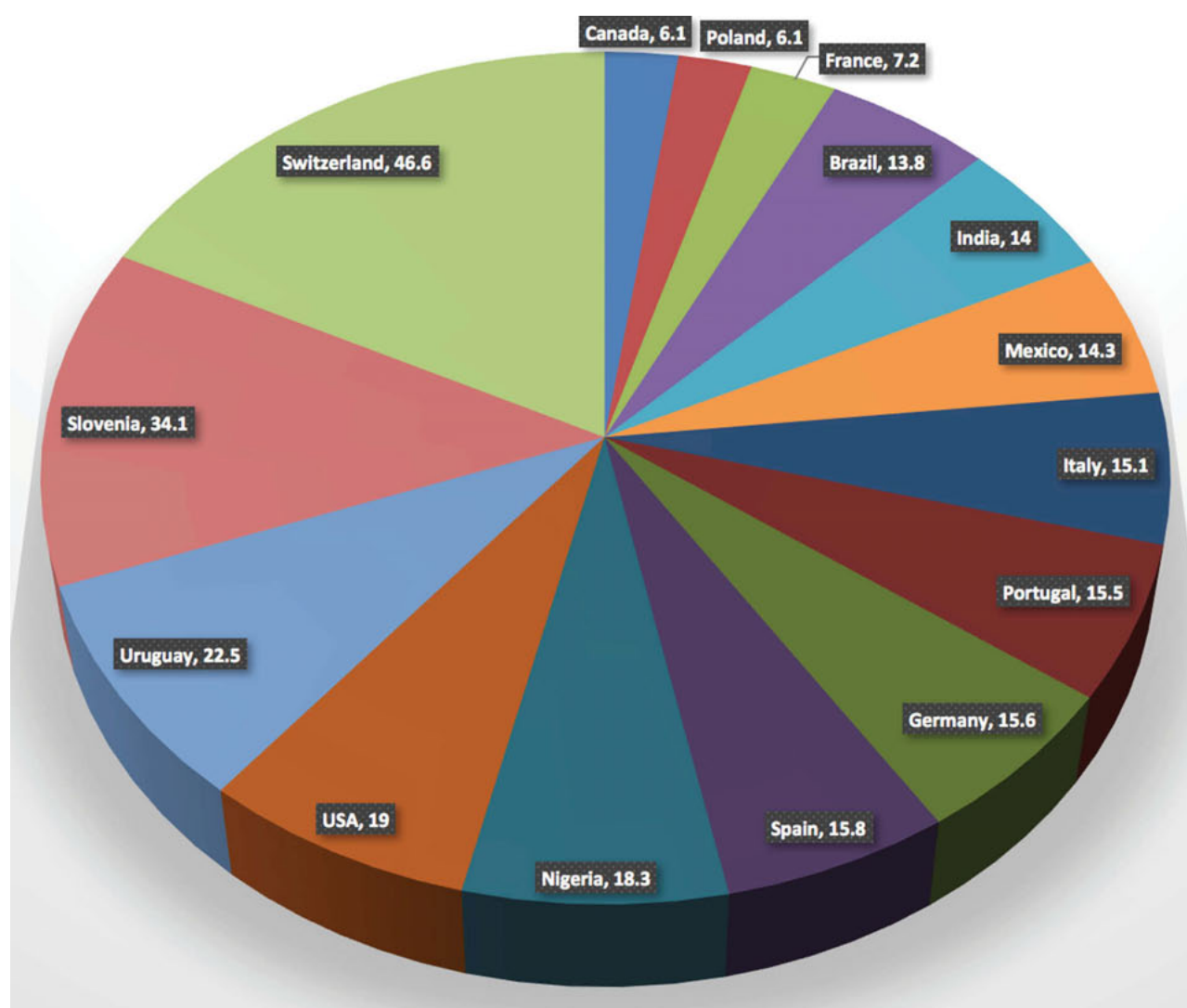


Figure 2. Mean age of cited work by country of affiliation.

ferences (ASIST, CAIS, ENENCIB, iConference) predominate, but semantic web and digital library influences are visible as are international librarianship and music information retrieval, along with the expected ISKO, ISKO chapter, and UDCC conferences. Classification and KOSs, then, are focused within the KO domain, but that domain is itself overlapping with information science, librarianship, semantic web, digital libraries, and even music information retrieval.

Of the large number of monographs cited, only a small group of 8 were cited more than once. These are shown in Table 4.

This remarkable list is yet more evidence of the discourse surrounding the research front of KO as represented by the 2016 conference. Leading the list is Olson's 2002 *The Power to Name*, which together with Bowker and Starr's *Sorting Things Out* and Berman's classic *Prejudices and Antipathies* constitute hallmarks of ethical discourse in KO, particularly as it is expressed in specific KOSs. Fol-

lowing that is an anthology concerning epistemology and culture, which can be seen together with the *Stanford Encyclopedia* and the Ritzer *Metatheorizing* as pointers to epistemological questions undergirding KO as a domain. The rest of the list includes pointers to domain analysis and the construction of specific kinds of KOSs.

3.1 Authors most cited and author co-citation analysis

The 1339 cited works listed 887 authors in first position, of which 137 were cited two or more times. Of these, 35 were cited four or more times; these authors are given in Table 5.

There are no surprises on this list. Szostak is new to the top of the cluster, and the influence of the Brazilian chapter is visible. What is of more interest is the author co-citation plot shown in Figure 4 below. Only thirteen authors were co-cited enough to enable a matrix for ma-

nipulation in IBM-SPSS™; multi-dimensional scaling (MDS) is used to create the visualization in which the proximity of co-cited authors is plotted. The plot as shown here is a two-dimensional rendering of a three-dimensional plot. Goodness of fit—the degree to which the visualization is an appropriate representation of the data—is indicated by low stress (closest to zero) and high R^2 (approaching 1). The plot in Figure 4 represents the data very well.

<i>Knowledge Organization</i>	91
<i>Journal of Documentation</i>	36
<i>Journal of the American Society for Information Science and Technology</i>	36
<i>Cataloging & Classification Quarterly</i>	13
<i>Ciência da Informação</i>	12
<i>Library Trends</i>	10
<i>Information Processing and Management</i>	9
<i>International Classification</i>	7
<i>Library & Information Science Research</i>	6
<i>Library Resources & Technical Services</i>	6
<i>Perspectivas em Ciência da Informação</i>	6
<i>American Archivist</i>	5
<i>DataGramaZero</i>	5
<i>Encontros Bibli</i>	5
<i>Informação & Informação</i>	5
<i>Scientometrics</i>	5
<i>Tabula</i>	5
<i>Transinformação</i>	5
<i>Brazilian Journal of Information Science: Research Trends</i>	4
<i>Information Research</i>	4
<i>Scire</i>	4
<i>Semiotica</i>	4
<i>Aslib proceedings</i>	3
<i>Informação & Sociedade</i>	3
<i>International Journal of Human-Computer Studies</i>	3
<i>Journal of the Society of Archivists</i>	3
<i>Library Review</i>	3
<i>Ponto de Acesso</i>	3

Table 1. Most cited journals.

ISKO Granada 2002	11
ISKO Krakow 2014	11
ISKO Toronto 2000	5
ISKO Brazil 2015	4
ISKO Montréal 2008	4
UDCC Lisbon 2015	4
ISKO London 2004	3
ISKO Rome 2010	3

Table 2. Most cited conferences.

ASIST Annual Meeting	3 1978, 1988, 1997, 1999, 2014
CAIS Annual Meetings	1999, 2011, 2015, 2016
DCMI	2006, 2009
ENANCIB	2003, 2007, 2008, 2014, 2015
European Semantic Web Conference	2006, 2007
iConference	2012, 2015
IFLA	2003, 2009
ISKO Brazil	2012, 2013, 2015
ISKO	1990, 1996, 2000, 2002, 2004, 2006, 2008, 2010, 2014, 2016
ISKO France	2015
ISKO Germany	2013
ISKO Spain	2011, 2012
ISKO UK	2010
ISMIR	2007, 2009, 2012
SIG/CR	1995, 2001, 2002, 2013, 2014, 2015
TPDL	2003, 2004
UDCC	2009, 2011, 2015

Table 3. Core scholarly conferences cited.

Olson, Hope A. 2002. <i>The Power to Name: Locating the Limits of Subject Representation in Libraries</i> . Dordrecht, The Netherlands: Kluwer Academic Publishers.	5
Smiraglia, Richard P. and Hur-Li Lee, eds. 2012. <i>Cultural Frames of Knowledge</i> . Würzburg: Ergon Verlag.	5
Smiraglia, Richard P. 2015. <i>Domain Analysis for Knowledge Organization: Tools for Ontology Extraction</i> . Chandos Information Professional Series. Waltham: Elsevier Chandos.	4
Bowker, Geoffrey C. and Susan L. Star. 2000. <i>Sorting Things Out: Classification and its Consequences</i> . Cambridge: MIT Press.	3
Currás, Emilia. 2010. <i>Ontologias, taxonomias e tesouros</i> . Brasília: Thesaurus.	3
Gil Leiva, Isidoro. 2008. <i>Manual de indexación. Teoría y práctica</i> . Gijón: Trea.	3
<i>Stanford Encyclopedia of Philosophy</i> . Stanford, Calif.: Stanford University. (2011 2014 2016)	3
Staab, Steffen and Rudi Studer, eds. 2004. 2nd ed. 2009. <i>Handbook on Ontologies</i> . Berlin: Springer.	3
Berman, Sanford. 1993. <i>Prejudices and Antipathies: A Tract on the LC Subject Heads Concerning People</i> . Jefferson: McFarland.	2
Langridge, Derek W. 1989. <i>Subject Analysis: Principles and Procedures</i> . London: Bowker-Saur.	2
<i>Information and Documentation – Records Management - Part 1, General</i> . London: British Standards Institution. ISO15489-1.	2
National Information Standards Organization. 2005. <i>Guidelines for the Construction, Format and Management of Monolingual Controlled Vocabularies</i> . Bethesda, Md.: NISO Press. ANSI/NISO Z39.19-2005.	2
Peignot, Gabriel. 1802. <i>Dictionnaire raisonné de bibliologie</i> , tomo I, Paris: Chez Villier.	2
Ritzer, George. 1991. <i>Metatheorizing in Sociology</i> . Lexington: Lexington Books.	2
Roe, Sandy K. and Allen R. Thomas, eds. 2004. <i>The Thesaurus: Review, Renaissance, and Revision</i> . New York: Haworth Press.	2

Table 4. Most cited monographs.

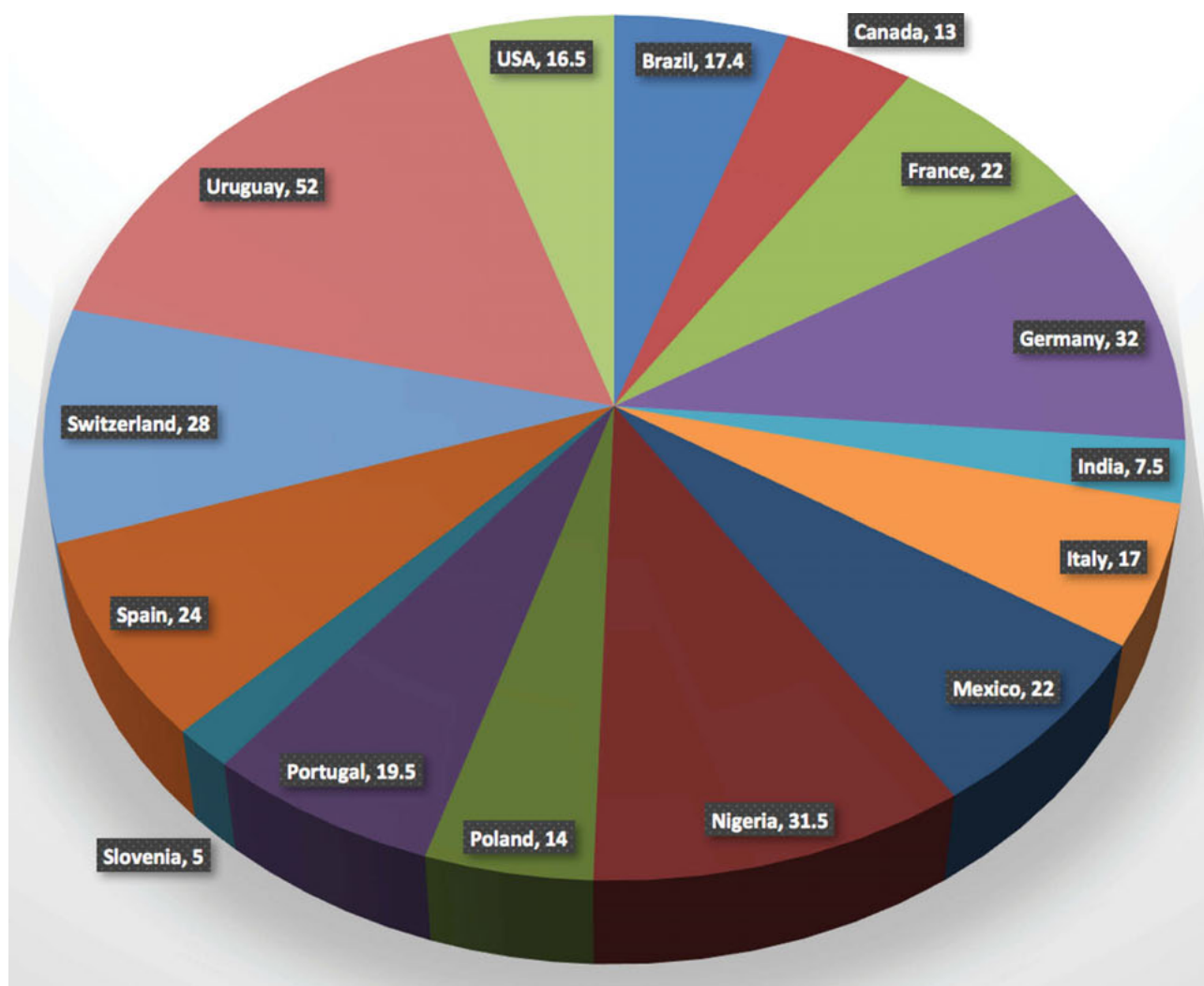


Figure 3. Mean number of works cited by country of affiliation.

It is always important to remember that author co-citation helps to visualize the perceptions of the citing authors, in this case, conference contributors. In other words, the clusters we see tell us how those researchers perceive the intellectual proximity of the work they cite; that is, the visible clusters are evidence of the ontical stances of the research front. Thus the dotted clusters in Figure 4 represent the core, the intension of the conference research front. They represent classical core ideas of concept theory, epistemology, and activity-oriented knowledge organization. There is a classical cluster—Hjørland and Dahlberg—and an active research front cluster, representing domain analysis and classification theory. The dashed clusters are the intension of the domain, the shifting granularity. The new work on interdisciplinarity is clearly influential, and the active research front combines ideas about integrative levels and facets, with reference to ethical concerns. Curiously, or interestingly, Ranganathan is ever present and yet not directly

connected to any specific cluster. This is representative of the increasing emphasis on the flexibility of synthetic and faceted KOSs. Figure 5 is a Gephi-generated network map of the same group of internally co-cited authors. Ranganathan is connected to every other node, core pathways connect Hjørland and Dahlberg (concept theory, epistemology, activity-oriented KOSs), but we also can see how well interlinked is the entire domain. This is a visualization of the tenacity of the constant motion in the intension, which pulls development of specific KOSs through the filters of the classical bases of concept theory and epistemology. The intension is the network that holds the extension in check. KO is a dynamic domain.

3.2 Co-word analysis

Co-word analysis is a technique by which keywords and terms within a corpus of text are analyzed according to

Hjørland, Birger	58
Dahlberg, Ingetraut	31
Smiraglia, Richard P.	31
Szostak, Rick	22
Olson, Hope A.	20
Mai, Jens-Erik	16
Beghtol, Clare	14
Tennis, Joseph	13
Gnoli, Claudio	12
López-Huertas María J.	10
Fujita, Mariângela S. L.	8
Guimarães, José A.C.	8
García Gutiérrez, Antonio	7
Ranganathan, S. R.	7
Frohmann, Bernd	6
Gruber, Thomas	6
Aitchison, Jean	5
Barité, Mario	5
García Marco, Francisco Javier	5
Gil Leiva, Isidoro	5
Lancaster, F. W.	5
Bowker Geoffrey	4
Campbell, D. Grant	4
Campos, Maria Luiza	4
Foscarini, Fiorella	4
Green, Rebecca	4
Heredia Herrera, Antonia	4
Hulme, E. Wyndham	4
Iyer, Hemalata	4
Ohly, H. Peter	4
Ritzer, George	4
Sales, Rodrigo	4
Serrai, Alfredo	4
Vickery, Brian	4
Zeng, Marcia Lei	4

Table 5. Most cited authors.

their relative proximity (or distance), which in turn is a means of visualizing core concepts in a domain in relation. In this case all conference paper titles were entered into Provalis Research's ProSuite™ software. The WordStat feature allows isolation of keywords as well as multi-

word phrases (an approximation to terms) by frequency of occurrence. The most frequently cited can further be isolated and plotted using multi-dimensional scaling. WordStat provides a three-dimensional visualization as though viewed against a corner in a box or room, which helps emphasize the proximity or distance among clusters. Also, specifically associated clusters can be color-coded. Figure 6 is an MDS plot of the most frequently occurring keywords, and Figure 7 is an MDS plot of the most frequently occurring phrases.

2,558 individual keywords were revealed by the analysis, 21 keywords occurred with frequency greater than .4%. These contained linguistic variants of “knowledge,” “information,” “organization,” and “science”; after regularizing these variants the final list was used to create the plot in Figure 6. Goodness of fit is slightly lower than we saw in Figure 4; the only way to improve it is to remove words, which alters the representation of the core domain concepts. Here we see three regions: the blue boxes represent traditional classification theory, with regard to ontology, semantics and indexing methods, in this case the intension of the domain; the red boxes represent the extension of the domain, classical knowledge organization, together with domain analysis seen as closely related to information science and knowledge representation with an important emphasis on bibliographic representation. The lone green box represents the digital emphasis now preoccupying the technological aspects of KO.

One hundred and ninety-nine two to five word phrases occurred, but only nine occurred with high frequency; these included linguistic variants of the terms “knowledge organization” and “information science.” The consolidated list is visualized in Figure 7; this plot is a better fit for the data. Not surprisingly the visualization emphasizes the relationship between classical knowledge organization and information science, especially via the domain analytical model; theory lies in this cluster. The information retrieval cluster also demonstrates applied aspects of thesauri, ontologies, and indexing.

4.0 ISKO 14's Bookshelf

This analysis reveals the contours of the KO domain as the representative members of its research front gathered in Rio de Janeiro to share current work in late 2016. We see a fair amount of continuity with prior ISKO international conferences. The research front is global, but not unexpectedly has large continuing contributions from Western Europe, North America, Brazil and India, and as always with new contributions from other regions. Citation metrics indicate a social-scientific epistemology continues to dominate the domain, and we also see evidence of the continued dichotomies between empirical research

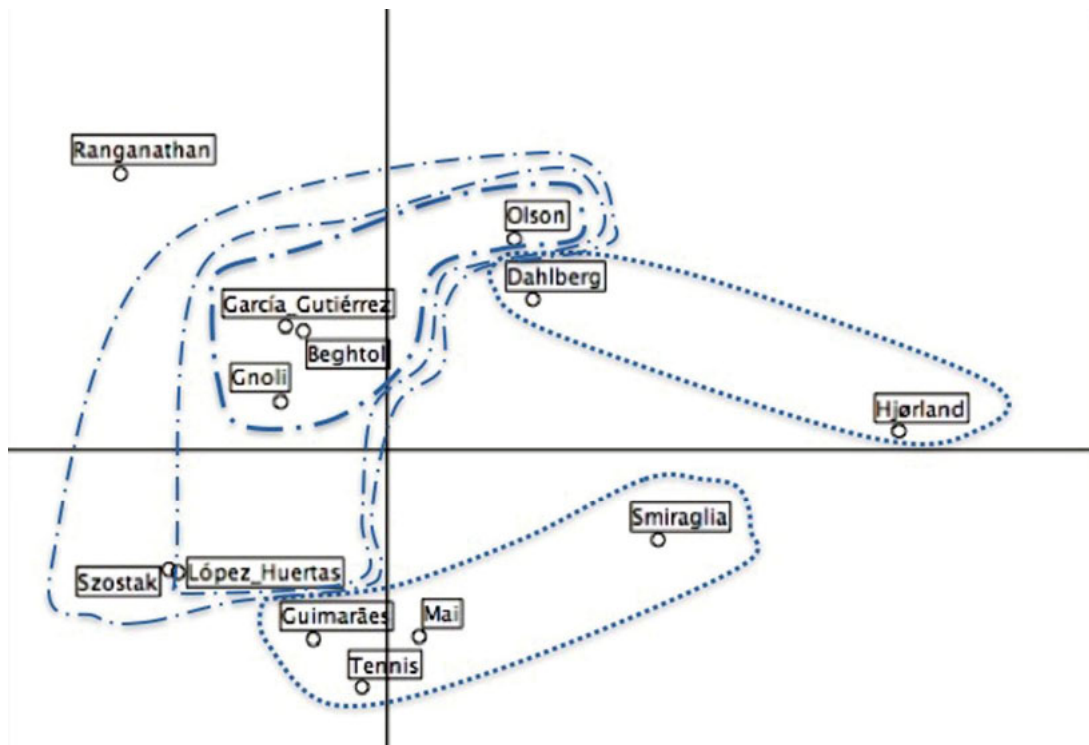


Figure 4. MDS plot of internal conference author co-citation (stress = .07577 R^2 = .97692).

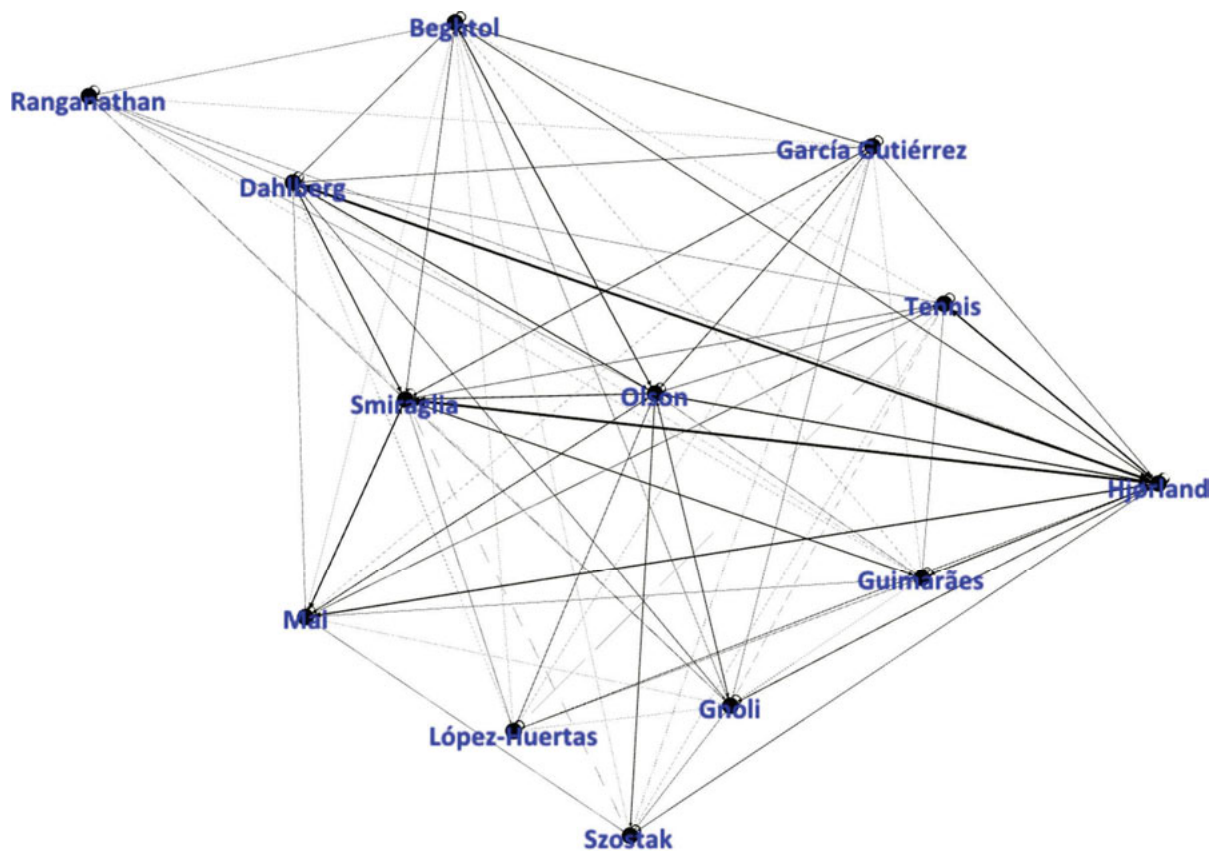


Figure 5. Gephi network plot of internal conference author co-citation.

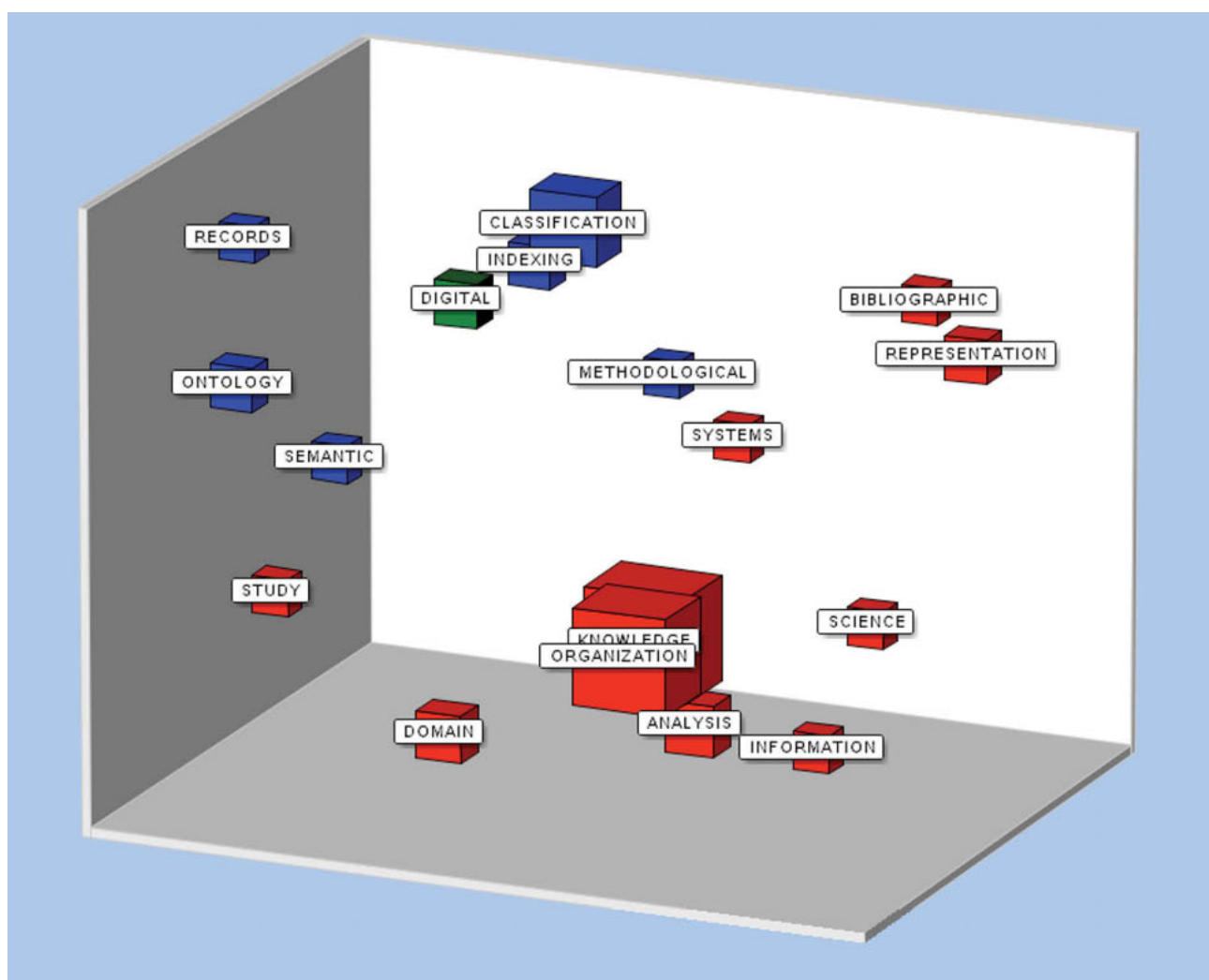


Figure 6. MDS Plot of Title Keywords (stress = 0.17799 $R^2 = 0.8815$).

and historical narrative, on the one hand, and between semantic and ethical considerations and technological advances in building new KOSs, on the other. The lists of journals and conferences cited as well as the list of most-cited authors is also consistent with prior conferences, which is further evidence of the strength, coherence and productivity of KO as a scientific domain.

There are new observations here as well. There is a greater reliance than before on sources from Latin American authors, conferences and publications. This is not only evidence of the high productivity of researchers from the host country of Brazil, it also demonstrates the continued value of holding international ISKO conferences in diverse parts of the world. The whole domain is enriched when its knowledge base is extended by exposure to new resources.

Co-word analysis and author co-citation analysis can be taken together as a form of methodological triangulation. In this case we see the continued strength of the core ex-

tension of KO rooted in concept theory and epistemology, sharing dual empirical and historical/theoretical approaches to common research questions, and a close relationship to information science. We also see the continued evolution of the domain's intension, represented by new approaches to applied KO, especially with regard to ethical concerns and the inclusion of formerly excluded nomenclatures. We see the importance of digital technology, and we also see the elevation of interest in faceted techniques.

New to this analysis is evidence of the discourse taking place around the scholars in KO's research front. Here, ethical and philosophical discourse clearly predominate. It is one of the hallmarks of KO's relationship to information science, similarly a meta-discipline that incorporates aspects of many disciplines. Yet, clearly, apart from mere reliance on other disciplines, KO adds value by the constant evolution of KOSs at a dizzying pace—new geopolitical influences, new social nomenclatures, new and evolving technologies—all are incorporated and moved from

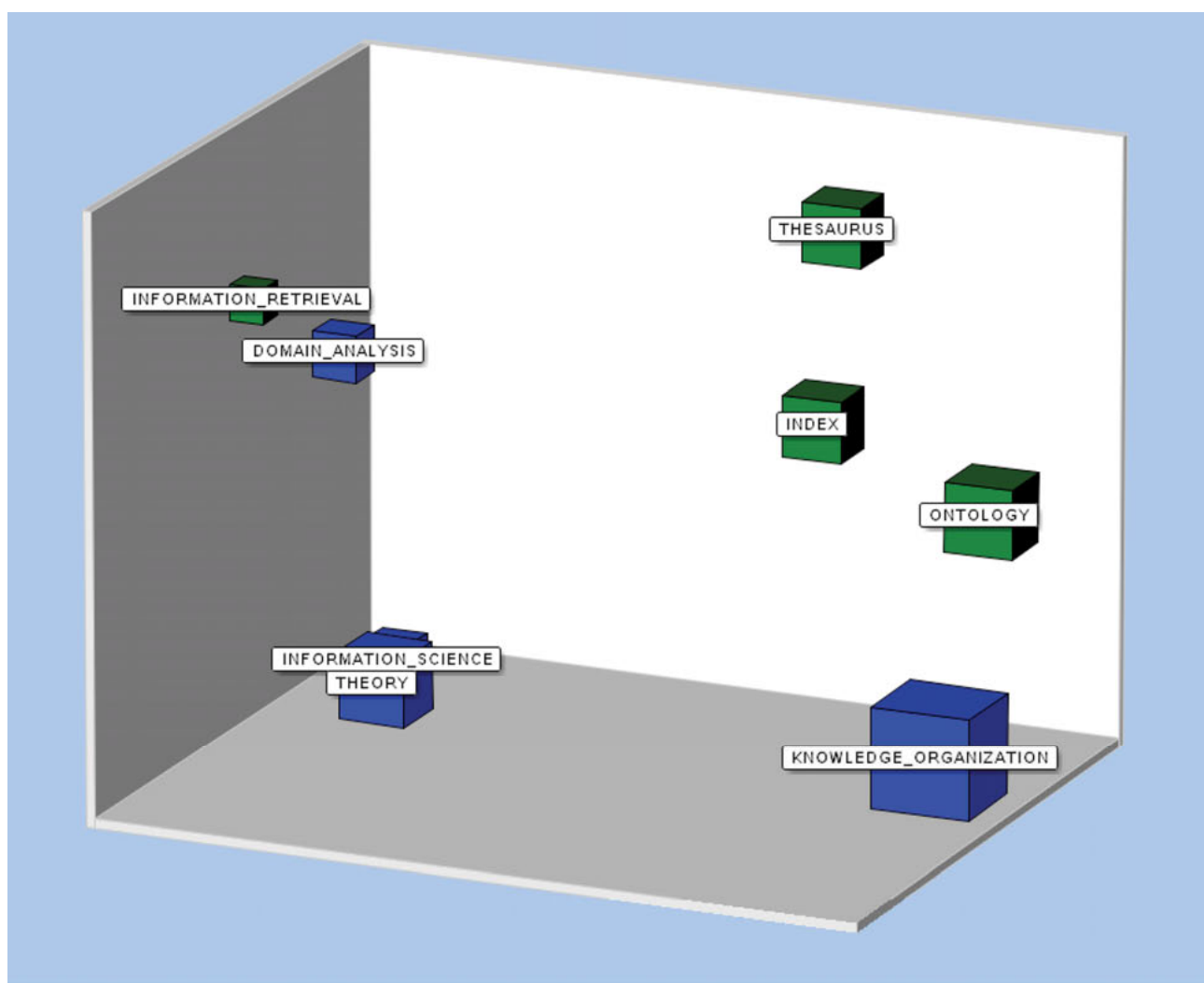


Figure 7. MDS Plot of Title Phrases (stress= 0.19004 $R^2 = 0.9584$).

experimental stage to actual use in the emergent digital intellectual space.

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