ISKO 16's Bookshelf: Knowledge Organization on the Verge of the Pandemic—An Editorial

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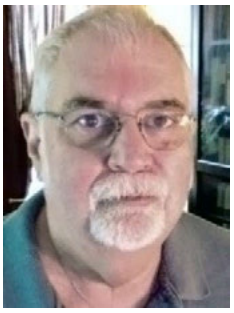

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Abstract: The Sixteenth International Conference on Knowledge Organization was to have been held in Aalborg, Denmark in July 2020. Cancelled due to COVID-19, the proceedings were published online on 4 December 2020 containing 48 full papers, 17 short papers and 14 posters. Informetric analysis of the proceedings reveals the shifting intension and extension of the knowledge organization domain. International participation was extensive as usual. There is a much larger share of empirical and applied technical research, and therefore much less historical or analytical work than before. The shape of the research front continues to revolve around concept theory and domain analysis, but cultural and ethical issues are more prevalent than before, having attained nearly core status. There is new emphasis on concepts around interdisciplinarity and phenomenon-based knowledge organization systems, and facet analytical theory has been extended into new approaches in the linked data environment. There are more journal articles than before. No monographs are highly cited but interdisciplinarity, Wittgenstein, domain analysis and music classification are prominent alongside archival science and ontology construction on the bookshelf for this conference. Among conferences ISKO and its chapters predominate. The discourse represented by the works on ISKO 16's bookshelf seems to be rooted in classical concept theory. There is some concretization of discourse concerning interoperability and the continued distancing from ideas of single or "universal" knowledge organization systems. There is a recurrence of concepts of warrant buttressing the extension of research into issues of culture and identity.

Keywords: ISKO international conference, knowledge organization, citations, references

1.0 The Year 2020

It is safe to say none of us knew. None of us knew when the new year dawned on 1 January 2020 what sort of year we would be living through. None of us who attended ISKO 15 in Porto knew that the 2020 conference planned for Aalborg would not take place. When the first news of COVID-19 came, none of us knew it would be a life-changing entity. And none of us knew how a virus could change the course of our science. Certainly, none of us knew that not only would we not gather in 2020 but that the world would have to wait for a vaccine to find some semblance of order on the lines of what we had known before. But, as we shall see, the science of knowledge organization is robust and evolving. The challenge for the science of knowledge organization is to concretize now, to pull up the drawbridges of distraction, to enhance the core membership, the strengthen the theoretical tenets of the domain, and to do all of this during a pandemic.

The Sixteenth International Conference on Knowledge Organization was to have been held in Aalborg, Denmark in the northern tip of Europe. A call for papers was issued in mid-2019. A local committee insisted that there must be a two-tier peer-review system of abstracts first and papers

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later. The norm for ISKO international conferences for decades has been to elicit new ideas by asking for abstracts, and then having accepted abstracts, to let the authors have free reign to produce papers of value. The method employed on this occasion meant that many authors would refuse to participate, and that many others would drop out as the parameters of inconsistent peer review became apparent.

Following the cancellation of the conference due to COVID-19, ISKO agreed to pay Ergon Verlag to publish the proceedings for online distribution to the membership. The "volume" was published on 4 December 2020 via the Nomos eLibrary (which separates the volume from the collected proceedings in the series *Advances in Knowledge Organization* that are available to ISKO members on the Ergon Verlag microsite (https://www.ergon-verlag.de/isko_ko/). The volume is titled *Knowledge Organization at the Interface: Proceedings of the Sixteenth International ISKO Conference, 2020 Aalborg, Denmark*, ed. Marianne Lykke, Tanja Svarre, Mette Skov and Daniel- Martínez-Ávila. The volume is no. 17 in the series *Advances in Knowledge Organization*. According to the "Introduction" (11) conference topics were:

> Knowledge organization across domains, media and technologies
> Knowledge organization as understanding and communication
> Knowledge organization as driver for development and change.

The volume contains "48 full papers, 17 short papers and 14 posters." Contents are described as (11-12):

> The papers covered a wide range of topics within the conference themes, i.e., knowledge transfer, concepts and conceptualization, fiction genres, ethical aspects, classificatory structures, representation, probabilistic models, social tagging, domain analysis, music classification, legacy data, document types, semantic networks, bibliographic relationships, faceted classification, KOS mapping, warrants, KO education, museum
> 12
> organization, and archival organization. The papers discussed theoretical issues related to knowledge organization and the design, development and implementation of knowledge organizing systems as well as practical considerations and solutions in the application of knowledge organization theory. The papers covered knowledge organization systems ranging from classification systems, thesauri, metadata schemas through to ontologies and taxonomies.

Contents are "organized in full papers, short papers and posters ... alphabetically by first author."
Since 2008 I have analyzed the contents of international ISKO conferences in a series of editorials titled "ISKO's Bookshelf" (Smiraglia 2008, 2011, 2013, 2014, 2016, 2018). Following on the concept of authors as citers over time (White 2001) and a 2015 refinement of the notion of a single scholar's domain (Smiraglia and Beak 2015) my approach has been to discover through informetric analysis of the works cited by the community the following:

> the shifting intension and extension of the domain of knowledge organization (KO),
> the international growth of the domain
> the influential discourses that were motivating ISKO scholars
> signs of concretization of the science of knowledge organization.

Research questions across the series have remained:

- How international is participation in ISKO's international conferences and where are global centers of innovation located?;
- What epistemic stances of ISKO scholars are visible in the citation indicators at each international conference?;
- What is the shape of the research front as represented by each international conference?; and,
- How are the shifting extension and intension of the KO domain reflected in each international conference?

The proceedings volume contain 79 entries, as described above: 48 full papers, 17 short papers and 14 poster. (The volume offered to members by Nomos/Ergon was not actually available on 4 December 2020—logins provided by the publisher to conference contributors were not functional. This analysis was conducted from a draft provided by the series editor.) The number of collaborative papers has increased even since the remarkable 68.6% reported in 2018—fully 75.9% of contributions in 2020 came from collaborative teams ranging in size from two to eight. Half were by two authors, 27% were by three authors, and the remaining 20% were from teams of four to eight authors. This result shows a subtle shift in the domain from its more or less equal division among empirical and humanistic epistemologies toward the characteristics of a more empirical science.

2.0 Pandemic geopolitics

ISKO biennial conferences have always been international. Over time it has been interesting to monitor the growth of the domain in different geopolitical environments. By analyzing the reported institutional affiliations of authors we

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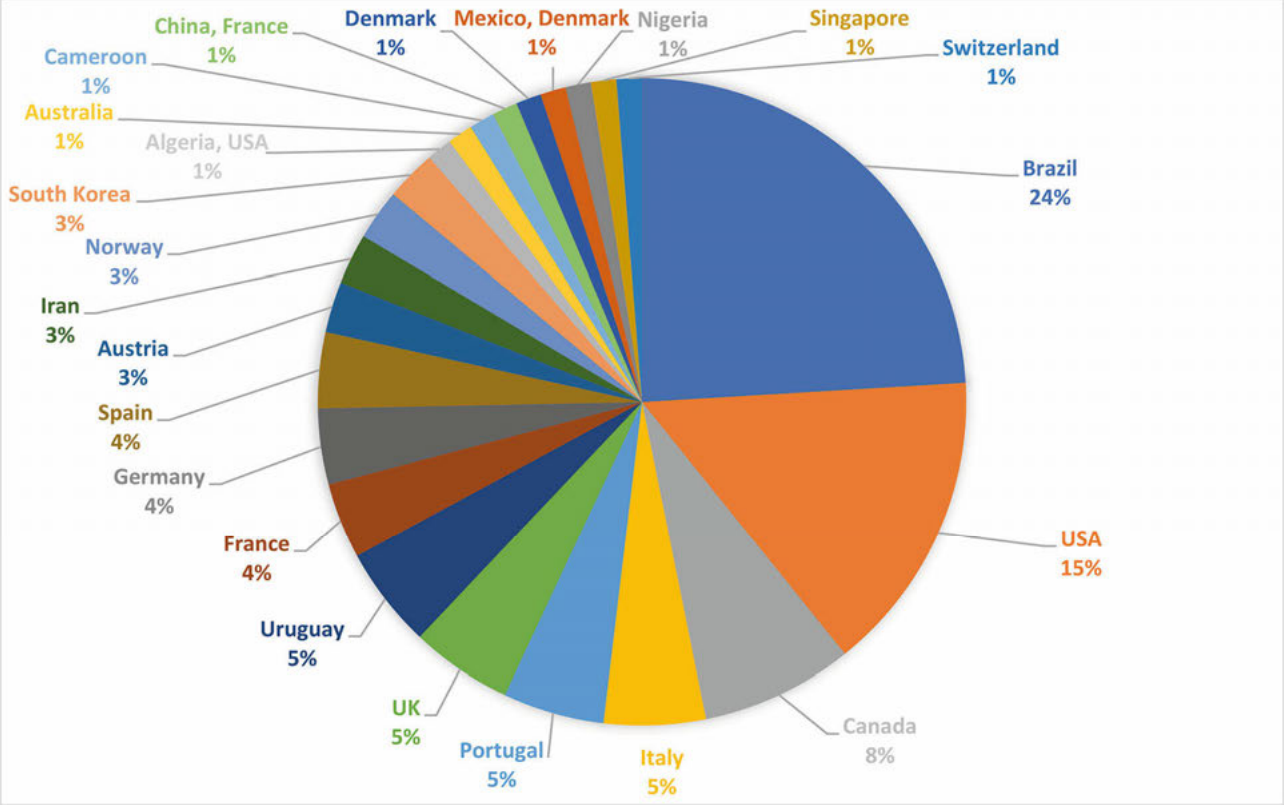

can create a visualization of the geopolitical origins of the contents of the proceedings. This year's visualization appears in Figure 1.

Although the proportions are different from in 2018 (Smiraglia 2018 345) Brazil, the United States and Canada are still the largest contributors; Brazil's contribution is smaller and the US and Canadian contributions are larger than 2018. There are fewer countries of affiliation this time, and there seem to be fewer contributions from Asia. According to the unpublished report to the 2020 ISKO General Assembly (Smiraglia 2020), the majority of manuscript submissions to the journal come from China (18%), Brazil (12%), the United States (10%), Canada (7%) and the United Kingdom (6%). Interestingly, half of the poster submissions (originated in institutiions with Brazilian affiliations. An unanswerable question is to what extent the encroaching pandemic affected submission of abstracts as the pandemic took hold first in China in late 2019 and then spread to Italy and then to North American in early 2020.

Collaborative teams were analyzed by country of affiliation; the results appear in Table 1.

The largest collaborative teams came from South Korea, Austria, Mexico and Canada. Smaller collaborative teams were associated with institutions in Brazil, the USA and Canada—the countries of affiliation contributing the largest proportion of content.

affiliation	collaboration
South Korea	6
Austria	5
Mexico	4
Canada	3.5
China	3
Nigeria	3
Portugal	2.7
UK	2.7
Spain	2.6
Brazil	2.4
Algeria	2
Denmark	2
France	2
Germany	2
Iran	2
Singapore	2
Switzerland	2
Uruguay	2
Italy	1.7
USA	1.5
Australia	1
Cameroon	1
Norway	1

Table 1. Collaborations by Country

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3.0 Citing behavior of ISKO 16 authors

There were 1241 citations to source works cited by the authors of the 79 contributions. The mean number of references per contribution was 15.7. The mean number of references per paper was 17.7 (range 2 to 47), per poster 6.1 (range 1 to 12). The mean age of work cited was 14.8 years (14.7 for papers and 15.1 for posters). These figures are consistent with prior conferences, suggesting the continued social scientific orientation. Age of work cited ranged from 2 to 107. Plotting mean age of work cited by authors from different regions yielded the distribution in Table 2.
Brazil, the USA and Canada again fall into the middle of the distribution suggesting the majority of the papers and posters fall along the mean in terms of age of cited work.

Typically in KO the most cited sources are articles from refereed journals. Conference papers are also an important source of recent science, but monographs, technical reports and chapters from anthologies also constitute a large share of source material. Table 3 shows the distribution of publication venues; the category "monographs, etc." includes technical reports and chapters from anthologies.

This particular conference seems to have a slightly more scientific bent than usual, with a much larger proportion (approximately twice as much) of journal articles and conference papers than other sources.

Fifty-five journals were cited two or more times. A very eclectic list of 200 journals were cited once; these range from the *Wiener Zeitschrift für Die Kunde Südasiens* to *Journal of the History of Sexuality* to *Journal of Information Warfare* to *Chicago Review, Art & The Public Sphere* and *Tourism Geographies*. The mean age of work cited in journal articles is 11.5 years. Table 4 is a list of the 21 journals cited four times or more.

This is a shorter list of journals in the top tier than we have seen in earlier conferences. *Knowledge Organization* is always the journal most cited by ISKO conference authors but the proportionate share of citations to *KO* is much larger than has been seen before.

Specific articles that receive recurring citation point to the discourse informing the conference domain. The list of journal articles cited two or more times appears in Table 5.

affiliation	mean age of work cited
Norway	28.7
Italy	23.7
Austria	22
Algeria, USA	20.7
Uruguay	17.9
Brazil	17
Spain	16.9
Mexico	15.7
Cameroon	14
USA	13.3
UK	13
Canada	12.1
Singapore	11.8
France	10.7
Germany	10.2
Portugal	9.7
Australia	7.7
Denmark	7
China	6.5
Iran	6.2
Nigeria	5.8
South Korea	5.5
Austria	5.2
Switzerland	2.5

Table 2. Mean age of work cited by affiliation

Venue	Freq.
Journal articles	602
Conference papers	198
Monographs etc.	403
Dissertations and theses	17
Web resources	68

Table 3. Publication venues.

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Knowledge Organization	137
Cataloging & Classification Quarterly	33
Data Science Journal	32
Journal of Statistical Software	32
Journal of the Association for Information Science and Technology ; Journal of the American Society for Information Science and Technology	32
Journal of the Korean Society for Information Management	12
Library Trends	10
Novos Estudos	10
Journal of the Amer- ican Society for Information Science & Technology	8
Notes	8
International Journal on Digital Libraries	7
Bulletin of the American Society for Information Science and Technology	6
Journal of Risk Research	6
Library Resources & Technical Services	6
Archives and Museum Informatics	5
Axiomathes	5
Journal of Travel Research	5
American Archivist	4
Information Research	4
International cataloguing and bibliographic control	4

Table 4. Most cited journals.

Hjørland, Birger	2008	"What is Knowledge Organization (KO)?"	10
Hjørland, Biger	2002	"Domain Analysis in Information Science	8
Dahlberg, Ingetraut	1993	"Knowledge Organization: Its Scope and Possibilities	6
Hjørland, Birger	2016	"Knowledge Organization (KO)"	4
Tennis, Joseph T	2012	"The Strange Case of Eugenics: A Subject's Ontogeny in a Long-Lived Classification Scheme and the Question of Collocative Integrity	4
Adler, Melissa	2009	"Transcending Library Catalogs: A Comparative Study of Controlled Terms in LCSH and User-generated Tags in LibraryThing for Transgender Books	3
Barité, Mario	2018	"Literary Warrant	3
Beghtol, Clare	1986	"Semantic Validity: Concepts of Warrant in Bibliographic Classification Systems	3
Beghtol, Clare	2002	"A Proposed Ethical Warrant for Global Knowledge Representation and Organization Systems	3
Giunchiglia, Fausto, Biswanath Dutta, and Vincenzo Maltese	2014	"From Knowledge Organization to Knowledge Representation	3
Gnoli, Claudio	2016	"Classifying Phenomena Part 1: Dimensions	3
Gnoli, Claudio	2017	"Classifying Phenomena Part 2: Types and Levels	3
Hudon, Michèle	1997	"Multilingual Thesaurus Construction-Integrating the Views of Different Cultures in One Gateway to Knowledge and Concepts"	3
Zeng, Lei	2019	"Interoperability	3
Abgaz, Yalemisew, Amelie Dorn, Barbara Piringer, Eveline Wandl-Vogt, and Andy Way	2018	"Semantic Modelling and Publishing of Traditional Data Collection Questionnaires and Answers	2
Alajmi, Bibi and Sajjad Rehman	2016	"Knowledge Organization Trends In Library And Information Education: Assessment And Analysis	2
Barité, Mario	2019	"Towards a General Concept of Warrants: First Notes	2
Bates, Jo and Jennifer Rowley	2011	"Social Reproduction and Exclusion in Subject Indexing: A Comparison of Public Library OPACs and LibraryThing Folksonomy	2
Beghtol, Clare	2005	"Ethical Decision-Making for Knowledge Representation and Organization Systems for Global Use	2
Binding, Ceri and Douglas Tudhope	2016	"Improving Interoperability Using Vocabulary Linked Data	2

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Broughton, Vanda	2006	"The Need for a Faceted Classification as the Basis of All Methods of Information Retrieval	2
Buckland, Michael K	1997	"What is a 'Document'?"	2
Bullard, Julia	2016	"Warrant as a Means to Study Classification System Design	2
Chen, Peter Pin-Shan	1976	"The Entity-Relationship Model---Toward a Unified View of Data	2
Colombo, Stephanie and Mario Barité	2015	"Tres Enfoques de Bias en Organización del Conoci- miento: Bias Neutro, Bias Negativo y Bias Positivo	2
Duranti, Luciana	1997	"The Archival Bond	2
Gnoli, Claudio	2018	"Classifying Phenomena Part 4: Themes and Rhemes	2
Golder, Scott A and Bernardo A Huberman	2006	"Usage Patterns of Collaborative Tagging Systems	2
Hider, Philip	2015	"A Survey of the Coverage and Methodologies of Schemas and Vocabularies Used to Describe Information Resources	2
Hjørland, Birger and Hanne Albrechtsen	1995	"Toward a New Horizon in Information Science: Domain-Analysis	2
Hjørland, Birger	2017	"Domain Analysis	2
Lee, Deborah and Lyn Robinson	2017	"The Heart of Music Classification: Toward a Model of Classifying Musical Medium	2
Lee, Deborah	2017	"Numbers, Instruments and Hands: The Impact of Faceted Analytical Theory on Classifying Music Ensembles	2
Lykke Nielsen, Marianne	2001	"A Framework for Work Task Based Thesaurus Design	2
Mazzocchi, Fulvio	2018	"Knowledge organization system (KOS)	2
Noruzi, Alireza	2012	"FRBR and Tillett's Taxonomy of Bibliographic Relationships	2
Sabourin, Paul	2001	"Constructing a Function-Based Records Classification System: Business Activity Structure Classification System" Archivaria 51: 137-154	2
Tennis, Joseph	2013	"Metaphors of Time and Installed Knowledge Organization Systems: Ouroboros, Architectonics, or Lachesis?	2
Yeo, Geoffrey	2007	"Concepts of Record (1): Evidence, Information, and Persistent Representations	2
Zeng, Marcia Lei and Lois Mai Chan	2004	"Trends and Issues in Establishing Interoperability Among Knowledge Organization Systems	2

Table 5. Most cited journal articles.

Of course, only partial citations are given here; full citations appear in the proceedings. The table is arranged in order of descending frequency of citation. The comparable list from ISKO 15 had 27 authors; there are 40 on this list, suggesting a broader source of discourse. On the other hand, the articles most frequently cited are cited more often than before, suggesting a more concrete reliance on those articles for discourse. As usual, Hjørland and Dahlberg are the most heavily cited, followed by Tennis, Beghtol and Gnoli, but this time newcomers Adler, Barité and Guinchiglia Dutta and Maltese join this center tier together with KO regulars Hudon and Zeng. We also can note that there is some ritual citation here of Hjørland's outdated 2002 article; the cumulative nature of science would suggest there should be higher citation of his 2017 update. In addition to signaling ritual citation (see also the citation to Hjørland and Albrechtsen 1995) this also is a sign of loose refereeing. We see here the core of knowledge organization (concept theory and classification) alongsinde warrant (or meaning) and unsettled factions of applicability ranging from interoperability to conceptual models. Probably the clearest discourse element in this table is the search for a unifying conceptual model.

The category "Monographs, etc." in Table 3 includes monographs, chapters in anthologies and technical reports or government documents. There were 219 citations to

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monographs, 119 to chapters in anthologies, and 68 to technical reports or government documents. Eight technical reports or government documents were cited more than once; these appear in Table 6.

Thirteen monographs were cited more than once. These appear in Table 7.

Four chapters (Green, Khoo, Gnoli and Szostak) were cited more than once; five anthologies were cited more than once. The emergence of the online *ISKO Encyclopedia of Knowledge Organization* is notable, in particular if we consider its relationship in KO to the role of the former *Annual Review* (*ARIST*) in information. Both chapters and anthologies are included in Table 8.

Conference proceedings are almost as important in KO as journal articles. This is a sign of the activity level of a relatively new science, where there is much new work underway based on a slender theoretical core. Conference proceedings most cited appear in Table 9.
ISKO 11 (Rome 2010) was cited 6 times, ISKO Brazil 2019 and UDCC London 2017 each 5 times, ASIST 53 2016 4 times,

3.0 The research front

A usual first step in identifying a domain's research front is identifying the authors whose work is most cited. It is common to see a mixture of ritual citation (e.g., Ranganathan, cited in nearly every paper that concerns "facets") and citation to those whose work has most influenced the authors contributing current research to the conference. 153 au thors were cited twice or more; 28 were cited 5 times or more—these are shown in Table 10.

International Organization for Standardization (ISO). 2011. *ISO 25964 -1: Thesauri for Information Retrieval*. Geneva: International Standard Organization.	11
Riva, Pat, Patrick Le Boeuf, and Maja Žumer. 2017. *IFLA Library Reference Model: A Concep- tual Model for Bibliographic Information*. Netherlands: IFLA. https://www.ifla.org/files/assets/cataloguing/frbr-lrm/ifla-lrm-august-2017_rev201712.pdf	5
IFLA. 1998. *Functional Requirements for Bibliographic Records: Final Report*. München: K.G. Saur.	3
Brazil. 2011. *Ministério da Saúde. Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Departamento de Ciência e Tecnologia. Diretrizes Metodológicas: Elaboração de Pareceres Técnico-Científicos*. 3. ed. Brasília: Ministério da Saúde.	2
National Information Standards Organization. NISO. 2005. *Z39.19-2005 - Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies*. Baltimore, MD: NISO	2

Table 6. Technical or government reports.

Szostak, Rick, Claudio Gnoli, and María José López-Huertas. 2016. *Interdisciplinary Knowledge Organization*. Switzerland: Springer.	3
Wittgenstein, Ludwig. 1953/2009. *Philosophical Investigations*, 4th ed., trans. G.E.M. Anscombe, P.M.S. Hacker, and Joachim Schulte. Malden, MA: Wiley-Blackwell.	3
American Psychological Association. 2010. *Publication Manual of the APA*, 6th ed. Washington: American Psychological Association.	2
Arp, R., B. Smith, and A.D. Spear. 2015. *Building Ontologies with Basic Formal Ontology*. Cambridge, MA: MIT Press eBooks Library.	2
Bowker, Geoffrey C. and Susan Leigh Star. 1999. *Sorting Things Out: Classification and its Con- sequences.* Cambridge, Mass.: Massachusetts Institute of Technology.	2
Cabré, Maria Teresa. 1999. *La Terminología: Representación y Comunicación: Elementos Para una Teoría de Base Comunicativa y Otros Artículos*. Barcelona: Institut Universitari de Lingüística Aplicada.	2
Dickinson, George Sherman. 1938. *Classification of Musical Compositions: A Decimal-Symbol System.* Poughkeepsie, N.Y.: Vassar College.	2
García Gutiérrez, Antonio. 2007. *Desclasificados: Pluralismo Lógico y Violencia de la Clasificación*. Barcelona: Anthropos	2
Olson, Hope A. 2002. *The Power to Name: Locating the Limits of Subject Representation in Li- braries*. Canadá: Springer.	3
Plato. 1963. *Crátilo: Diálogo sobre a Justiça dos Nomes*. Lisboa: Ed. Sá Costa.	2
Schellenberg, Theodore R. 2003. *Modern Archives: Principles and Techniques*. Chicago: Society of American Archivists.	2
Smiraglia, Richard P. 2015. *Domain Analysis for Knowledge Organization: Tools for Ontology Extraction*. Oxford: Chandos Publishing.	2
Svenonius, Elaine. 2000. *The Intellectual Foundation of Information Organization*. MIT, Cam- bridge.	2

Table 7. Most cited monographs.

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Green Rebecca. 2001. "Relationships in the Organization of Knowledge: An Overview." In *Re- lationships in the Organization of Knowledge*, edited by Carol A. Bean and Rebecca Green. Dordrecht etc.: Kluwer Academic Publishers, 3-18.	3
Beghtol, Clare. 2001. "Relationships in Classificatory Structure and Meaning." In *Relationships in the Organization of Knowledge*. edited by Carol A Bean and Rebecca Green. Kluwer, Dordrecht: 99-113.	
Tillett, Barbara B. 2001. "Bibliographic Relationships." In: *Relationships in the Organization of Knodwledge*, edited by Carol A. Bean and Rebecca Green. Dordrecht: Springer, 19-35.	
Day, Ronald E.. 2005. "Poststructuralism and Information Studies." *Annual Review of Information Scicence Social and Technology* 39, no.1: 575-609.	
Downie, J. Stephen. 2003. "Music Information Retrieval." *Annual Review of Information Science and Technology* 37: 295-340.	
Khoo, Christopher S.G. and Jin-Cheon Na. 2006. "Semantic Relations in Information Science." Annual Review of Information Science and Technology 40, no. 1: 157-228.	2
Gnoli, Claudio. 2017b. "Classifying Phenomena, Part 3: Facets." In *Dimensions of Knowledge: Facets for Knowledge Organizatio*n, edited by Richard Smiraglia and Hur-Li Lee. Würzburg: Ergon, 55-67.	2
Szostak, Rick. 2017b. "Facet Analysis Without Facet Indicators." In *Dimensions of Knowledge: Facets for Knowledge Organization*, edited by Richard P. Smiraglia and Hur-Li Lee. Würzburg: Ergon Verlag, 69-85.	
Kleineberg, Michael. 2017. "Integrative Levels." Knowledge Organization 44: 349-379. Also available with an extended appendix in ISKO Encyclopedia of Knowledge Organization, edited by Birger Hjørland and Claudio Gnoli. https://www.isko.org/cyclo/integrative_levels.	
Rafferty, Pauline. 2018. "Tagging." Knowledge Organization 45: 500-516. Also available in ISKO Encyclopedia of Knowledge Organization, ed. Birger Hjørland, coed. Claudio Gnoli. http://www.isko.org/cyclo/tagging	
Szostak, Rick. 2019. "The Basic Concepts Classification." In ISKO Encyclopedia of Knowledge Organization, edited by Birger Hjørland and Claudio Gnoli. https://www.isko.org/cyclo/bcc	2
Orilia, Francesco and Chris Swoyer, 2011. "Properties". In *The Stanford Encyclopedia of Philosophy* (Winter 2011 Edition), edited by Edward N. Zalta.	
Väänänen, Jouko. 2019. "Second-order and Higher-order Logic." In *The Stanford Encyclopedia of Philosophy* (Fall 2019 Edition), edited by Edward N. Zalta.	

Table 8. Anthologies and chapters with multiple citations.

Conference	**Freq.**
ISKO International	43
ISKO Chapters	21
ASIST	9
UDCC	5
Other	27

Table 9. Most cited conferences.

Hjørland	41
Smiraglia	19
Gnoli	17
Szostak	17
Dahlberg	14
Beghtol	13
Guimarães	10
Lee, Deborah	10
Olson	10
Ranganathan	9
Tennis	9
Adler	8

Broughton	8
Barité	7
Duranti	7
Hudon	7
Soergel	7
Zeng	7
Green	6
García Gutiérrez	5
Kleineberg	5
Oliveira	5
Park	5
Riva	5

Table 10. Most cited authors.

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Author co-citation analysis is a technique that helps uncover theoretical poles in a domain's discourse by correlating perceptions among citing authors of relationships among research from key members of the research front. It is important to remember that the visualization represents the perceptions of citing authors, in this case it represents the perceptions of authors who contributed to ISKO 16. Thus the perceptions represented in the visualization reveal epistemological rather than ontological connections—a bit of insight therefore into the discourse governing the generation of the research reported by conference submissions. As before (see for example Smiraglia 2018) there was very little co-citation, which is a sign of little theoretical coherence across the conference. Authors from Tabl 10 were entered into a matrix and co-citations to their work were recorded. Authors with little or no co-citation were then removed, producing a final matrix of 16 authors. A visualization produced using Gephi 0.9.2 (https://gephi.org/) appears in Figure 1.

Again, as in prior conferences, we see the core importance of Dahlberg and Hjørland, and following the thickness of the line we see that they are closely related to Green and Smiraglia. Emanating from Dahlberg is a theoretical region representing aspects of concept theory. Emanating from Hjørland is a theoretical region, including domain analysis. Nodes in that region are represented by Smiraglia and Guimarães A strong association then emerges between this core and the leading edge authors Szostak, Tennis and Zeng. Szostak (through connections with Kleineberg and Gnoli) represents new approaches to phenomenon-based classification. Tennis Adler and Olson anchor a large region representing ethical and cultural considerations. New names emerging from this visualization are Barité, Adler, García Gutiérrez and Kleineberg. Also interesting is the reemergence of Beghtol (cultural warrant, ethics) and Hudon (multi-lingual thesauri), whose earlier work is being revisited.

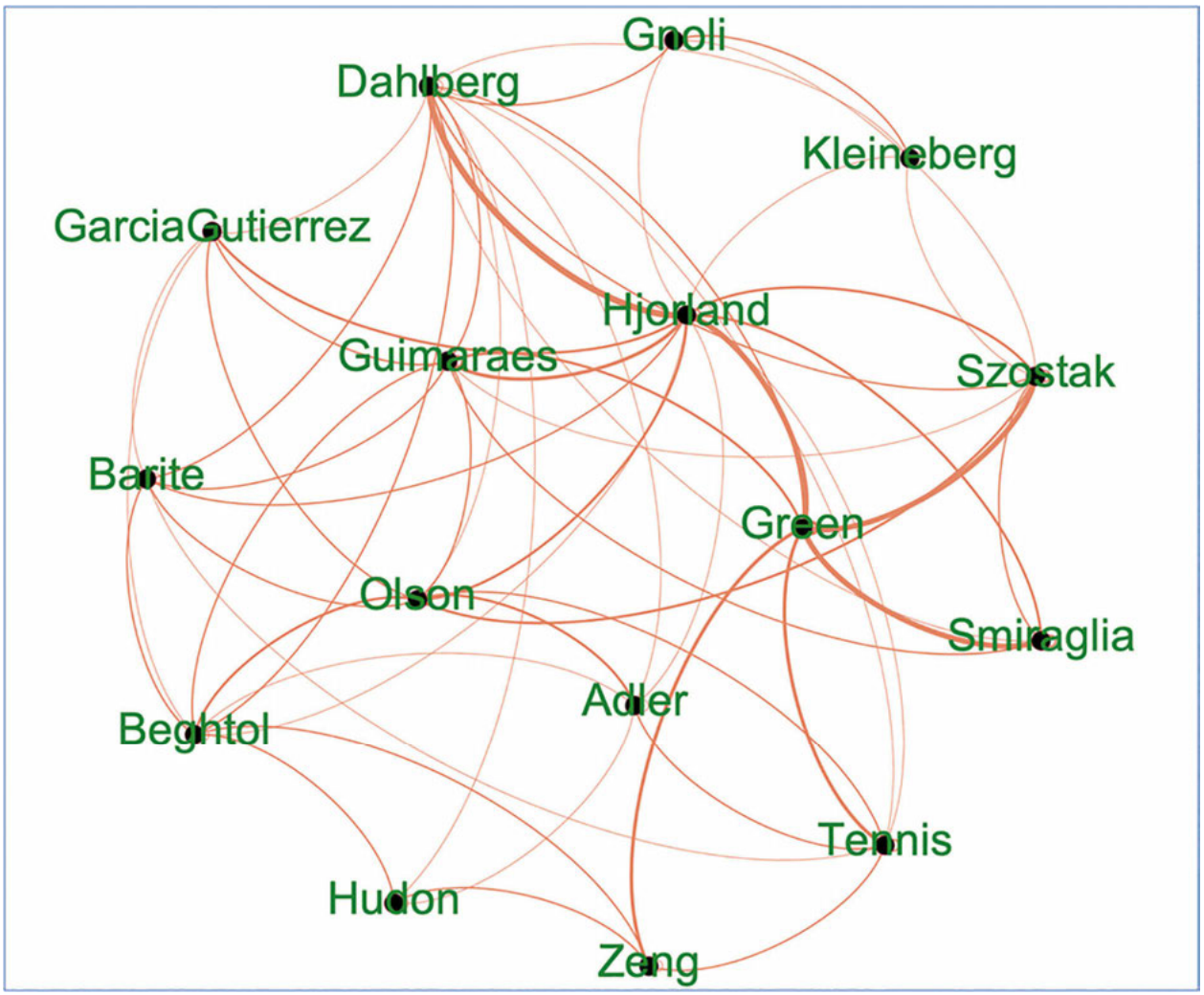

Figure 1. Author co-citation visualization.

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4.0 Explicit themes of ISKO 16

Because the conference was cancelled we have no program to work from—typically these include panel titles that provide broad themes. For the present analysis we turned to the titles and abstracts of conference submissions. These were analyzed using Provalis ProSuite's QDA Miner and WordStat modules (https://provalisresearch.com/products/prosuite-text-analytics-tools/). Among the titles there were 945 words of which 389 were unique; of the 556 recurring terms 19 occurred 3 or more times; these are plotted using WordStat's MDS visualization tool in Figure 2.

We see here pointers to social and cultural issues, to archival and library systems, to core ideas of domain analysis, ontology, knowledge organization systems, and concepts. To better visualize thematic concept we analyzed abstracts as well. The abstracts used 12226 words of which 2434 were unique and thus 9792 words recur. To visualize thematic content we used WordStat's phrase-finder module. 28 phrases of 2 to 5 words occur four times or more; an MDS plot appears in Figure 3.

We see that the recent uptick in emphasis on archival science and knowledge organization constitutes a segment, as does the relationship between faceted classification and information retrieval. Linked data and mapping issues occupy a region that also includes performing arts (not visible is "semantic web"). Finally is the region at the left containing knowledge representation, and semantic relations (behind "extraction of semantic relations" is "semantic relations" alone). We can see from these two visualizations how the core of the domain of knowledge organization is being extended to embrace new linked data and semantic relations technologies.

5.0 ISKO 16's Bookshelf

Before we ask what is on ISKO's bookshelf, we might return to the original research questions. Concerning international participation we see this extended as usual. Submissions from Brazil and the United States continue to dominate but many more countries are represented as well. A continuing anomaly is the low participation of Chinese contributors given the large number of Chinese submissions to the society's *Knowledge Organization* journal. Concerning epistemic stances, we see in this particular conference a much larger share of empirical and applied technical research, and therefore much less historical or analytical work than before.

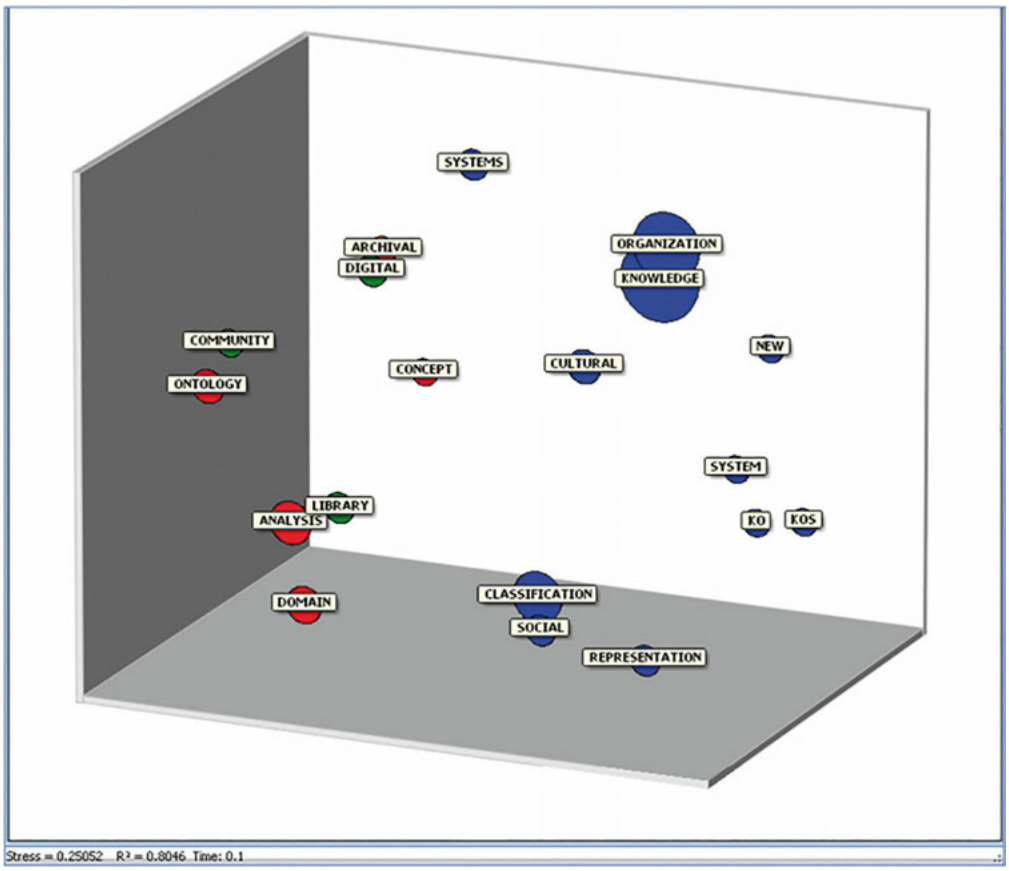

FIgure 2. Plot of most used title keywords.

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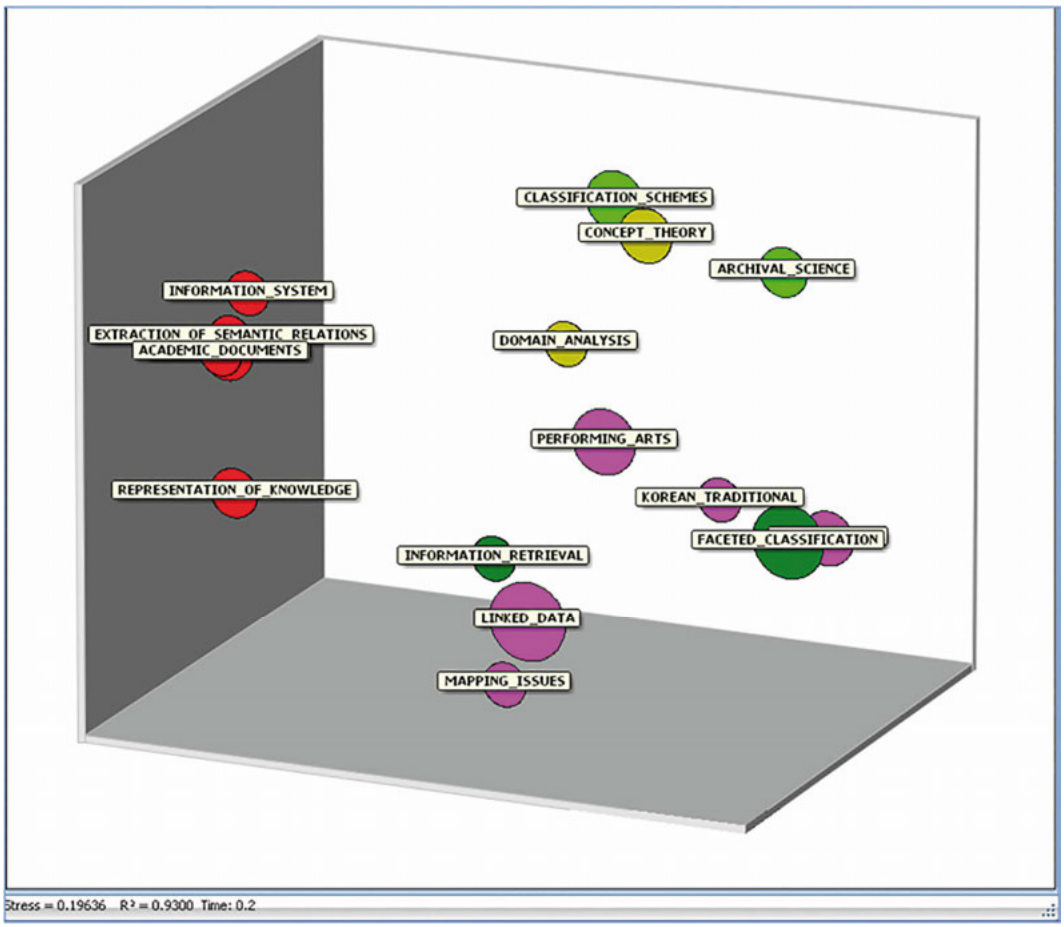

Figure 3. Phrases most commonly occurring in abstracts.

The shape of the research front continues to revolve around concept theory and domain analysis, but we see that cultural and ethical issues are more prevalent than before, having attained nearly core status. We also see new emphasis on concepts around interdisciplinarity and phenomenon-based knowledge organization systems. The utility of facet analytical theory has been extended from its original use in classification into new approaches to knowledge representation in the linked data environment of the semantic web. Thus the extension continues to shift related to the influence of information technology as the intension solidifies around core concepts, which now include cultural and ethical concerns.

What is on ISKO 16's bookshelf? There are more journal articles than before, and a greater proportion of those are from the society's *Knowledge Organization*. But there is an expanding list of contributing journals as well. Thesauri and the new Library Reference Model are prominent. No monographs are highly cited but interdisciplinarity, Wittgenstein, domain analysis and music classification are prominent alongside archival science and ontology construction on the bookshelf for this conference. Among conferences ISKO and its chapters predominate.

The discourse represented by the works on ISKO 16's bookshelf seems to be rooted in classical concept theory, teased into new territory by the notions of interdisciplinarity and freedom from hierarchical constructs represented by phenomenon-based approaches and the extension of facet analytical theory. Domain analysis shows the concretization of discourse concerning interoperability and the continued distancing from ideas of single or "universal" knowledge organization systems. Perhaps the most obvious element of discourse in ISKO 16 is the recurrence of warrant buttressing the extension of research into issues of culture and identity. Thus the discourse remains robust. ISKO is well placed to continue to make a difference in a post-pandemic world.

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