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Smiraglia, Richard P. 2015. *Domain analysis for knowledge organization: Tools for ontology extraction*. Chandos Information Professional Series. Waltham: Elsevier Chandos Pub. 105 pp. ISBN 9780081001509. US$78.95.

Domain analysis studies emerged in knowledge organization (KO) with the work of Hjørland and Albrechtsen (1995), who understood domain analysis as a theoretical approach to information science (IS). They believe the best way to understand information in IS is the study of domains through discursive communities (Hjørland and Albrechtsen 1995, 410). In this perspective, domain analysis is related to the socio-cognitive approach to KO, which considers discursive communities part of a domain and involve the relationships between the domain structure and the knowledge of the individual and social levels, as the domain has its own actors, biases, subjective criteria of relevance, particular cognitive styles, languages, etc.

Richard P. Smiraglia, reknowned professor and member of the Knowledge Organization Research Group at University of Wisconsin, Milwaukee, USA and editor-in-chief of the journal *Knowledge Organization*, presents domain analysis as a multi-method paradigm in his book *Domain Analysis for Knowledge Organization*. For Smiraglia, the combination of different theories and methods is common in domain analysis; thus, he shows that an explicit relationship exists between ontological, epistemological, and methodological issues to contextualize domain analysis in KO. This view is closely related to Hjørland's (2002) eleven approaches to domain analysis because, according to Smiraglia, when the approaches are applied in combination, they enrich domain analysis.

Hjørland's (2002) eleven approaches were set out systematically as different ways of analysing a domain. The approaches are: producing literature guides and subject gateways; producing special classifications and thesauri; research on indexing and retrieving specialties; empirical user studies; bibliometrical studies; historical studies; document and genre studies; epistemological and critical studies; terminological studies, languages for special purposes (LSP), discourse studies; studies of structures and institutions in scientific communication; and domain analysis in professional cognition and artificial intelligence. We notice a relationship to Smiraglia's study when Hjørland (2002, 451) explains that "research in information science combining several of the above mentioned approaches will...strengthen the identity of IS and strengthen the relationship between research and practice in IS."

The first chapter of Smiraglia's book contextualizes domain analysis in KO. Its development occurred during the rise of postmodern thought in KO and aimed at discovering different views and techniques to understand context. In addition to characterizing domain analysis as a multimethod paradigm, Smiraglia also explains domain analysis and metatheoretical approaches, as well as other methods that are also used to understand a domain (bibliometrics, critical theory, semiotics, discourse analysis, etc.). Martínez-Ávila, Semidão, and Ferreira (2015, 118) sought to recognize the methodological aspects of critical theories in classification and KO and acknowledged "the influence of critical theories in the epistemological, conceptual, methodological, axiological, or even rhetorical spheres." In this context, the combination of methodological and epistemological issues are presented indirectly as a form of domain analysis, corroborating what is presented in Smiraglia's book. Guimarães's research (2014) also takes this view, as he presents the socio-cognitive perspective of domain analysis in its methodological contribution in KO. He also highlights that domain analysis is an approach to characterize and assess science once domain analysis allows visualizing the construction and socialization of knowledge.

By recognizing domain analysis as a methodological paradigm with two demands—to analyze each domain thoroughly and continuously, and to analyze both a specific domain and a variety of domains together—Smiraglia pre-

sents much research published in ISKO International Conference proceedings, *Knowledge Organization*, and some dissertations, under the specter of Hjørland's eleven approaches (2002) in chapter two. In the book, it is evident that most analytical studies use empirical methods such as bibliometrics; however, discourse, gender, and epistemological analyses are also conducted. A wide variety of applications of the eleven approaches to domain analysis occur in the research under examination. Smiraglia believes in the continued success of the postmodern paradigm of research in domain analysis in KO.

When discussing empirical methods for visualizing domains, Smiraglia devotes the third chapter to explain the typical approaches or standards for domain analysis in KO. Two points are crucial in this chapter: the importance of method and the visualization of a domain. Smiraglia claims (42), "in this book, my focus is specifically on techniques for capturing the knowledge base of a community." The way this capturing is carried out is considered the methodology used to recognize the domain, and the visualization of the results will help the contextualization and understanding of the knowledge base. However, the author warns that a single study is not able to cover the interpretation of a domain in its entirety. Many studies and different methods are needed to understand it and, more than that, to assess its evolution.

By analyzing a domain, its context must always be considered. Contextualization is critical to the analysis of the knowledge base of a community, which has the construction of knowledge organization systems (KOS's) as a goal. Smiraglia states (p. 48), "It is simply important to remember that in any empirical analysis we must define the context precisely and with reference to neighboring contexts." Similarly, Tennis (2003, 194) argued that "what is perceived as an established domain intersects with another domain. The result is a new domain to some, but not to others." This thought can be related to what Bufrem and Freitas (2015) presented under the aegis of information science, i.e. the concept of an interdomain.

Interdomain is conceptualized as (Bufrem and Freitas 2015) "an intersection area or appropriate conjunction of different domains of one or more areas in order to provide a locus for establishing interdisciplinary and collaborative relationships within these domains." Their understanding is that an interdomain appears not only in the choice of objects and themes, but also in the methodology outlined by the authors, and this point can be related to what is studied in Smiraglia's book. Following this thinking, Smiraglia argues that domains that share the same theoretical paradigms also share the same methods. He denominates this as (49) "an epistemological consensus on methodological approaches." He believes that the combination of different methods lead to a "methodological triangulation," which will provide better visualization and understanding of the domain. The findings disclosed by Freitas, Bufrem and Breda (2016, 6) are along the same lines, claiming, "methodological choices or structures for writing scientific papers derive from epistemological and theoretical approaches that accept and validate a scientific domain."

Chapter four presents empirical techniques to visualize a domain. Initially, two multidisciplinary databases are presented as sources for citation analysis: Web of Science and Scopus. Smiraglia discusses how the data obtained in the two databases, especially when combined, can be used to interpret and visualize the extent and intensity of domains. Citation analysis, co-word analysis, author co-citation analysis, social network analysis, and network instantiation are presented as the main techniques for domain analysis; however, I believe the term "method" is the most appropriate. Smiraglia's intention was to demonstrate coherence of the domains and the extraction of the ontological content using these methods.

It is possible to relate this proposition with the proposal by Castanha and Grácio (2014, 173) that domain analysis and meta-theory contribute significantly to bibliometric studies. They consider, like Smiraglia, that domain analysis and meta-theory presupposes the need for qualitative analysis and assist the researcher in the use of different methodological, theoretical, and epistemological approaches, which enables a more consistent analysis of the domain.

Qualitative methods for domain analysis are briefly presented in chapter five. Cognitive work analysis (CWA) is presented as a qualitative analysis technique, considered new to KO. This methodology, according to Smiraglia, highlights the importance of the researcher being part of the domain environment to understand the existing symbolic interactions among the involved entities. The term "symbolic interactions" is also a new concept in KO, considered a social theory based on the notion that human interactions involve the interpretation of symbols.

It is evident that the qualitative approaches are considered essential to have a contextual perspective of domain. Once again, he reinforces the idea that the combination of different methods is needed to improve results and achieve a methodological triangulation to lead to comparison and/or divergence of interpretations. Recognizing the interactions and symbolic cultural knowledge of the discourse community that compose the domain, as well as its context and ontological bases, is considered by Smiraglia as one of the objectives of qualitative methods.

Domain analysis did not emerge specifically in KO, but has evolved over the years within this community, as described in the last chapter of Smiraglia's book. He considers (97) domain analysis as an academic methodological paradigm to understand the ontological bases and analyze

the evolution of academic communities. The goal of strengthening domain analysis in KO is evidenced by the number and depth of studies that have been recently developed. For instance, a 2015 special issue of *Knowledge Organization* was dedicated exclusively to revisit this issue.

Smiraglia understands that the expansion of domain-analytical research is necessary. He establishes an overview of the methods used in research in domain analysis and points out that most of them uses some kind of metric to underpin the analysis. Chapter six points to the need for different research in the same domain to, further, produce meta-analyses of these same domains. Smiraglia concludes by relating his thought to Dahlberg's, and with it his invitation to conduct research that goes beyond what can be observed empirically and to look at KO in a metadisciplinary way. He expects us to seek the contexts, properties, activities, and origins of domains, thus involving ontological, epistemological, and methodological issues.

Domain Analysis for Knowledge Organization reaches the proposed objectives. The book presents a mapping of the tools to recognize context and to analyze and visualize a domain. More than that, the book demonstrates the importance of applying different methods for the recognition of ontological and epistemological foundations of a domain. The book is clear, objective, and was written in such a way to meet different readers, from beginners in the subject to those who are already familiar with domain analysis.

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