Classification Research

Knowledge Organization in the 21st Century: Between Historical Patterns and Future Prospects. The 13th International ISKO Conference, Krakow, Poland

Nancy J. Williamson

University of Toronto, Faculty of Information,
140 St. George Street, Toronto Ontario Canada M5S 3G6
<william@fis.utoronto.ca>

The thirteenth international ISKO Conference, Knowledge Organization in the 21st Century: Between Historical Patterns and Future Prospects, was held in Kraków, Poland, May19-22, 2014. Seventy-six papers were presented in 13 categories. The first category, "Current Global Problems in Knowledge Organization" contains 5 papers, the first of which is "Classical Databases and Knowledge Organization: A Case for Boolean Retrieval And Human Decision-making During Research" by Birger Hjørland (Denmark). It is the keynote address and considers databases based on the Boolean retrieval model and challenges those who feel that this is a less than effective approach. It argues for the continued value of Boolean systems and further supports the role of human expertise in searching and the role of knowledge organization in database design. (An abstract only is included in the proceedings. The full paper is to be published in JASIST.) The first of the remaining papers in this section is by Michael Buckland (United States), titled "Knowledge Organization and the Technology of Intellectual Work." This paper looks at past achievements and thoughts for the future. It considers aspects of technology and of time. Briefly it describes the history of document technology, including writing, printing, telecommunications, copying, and digital computing. He also addresses the challenge of knowledge organization and the technology of intellectual work. The case for documentary editors is examined. The possibility for documentary editing being improved by web technology is entertained and the history of technology is projected into the future. Two final sections focus on: 1) knowledge organization, culture and time; and 2) technology, culture and time. Gathering these aspects together in a summary, Hjørland concludes "Knowledge is cultural, alive and changing. Technology is cultural too, but inanimate and stable." Dagobert Soergel (United States) discussed and illustrated "Knowledge Organization for Learning," showing how meaningful or deep learning can be supported through a well-structured presentation of material by giving learners schemas they can use to organize knowledge in their minds and help them to understand knowledge organization principles that they can then use to construct their own schemas. He aims at meaningful presentation that expresses the internal structure of a domain and facilitates the learner's organization of concepts and their relationships. The introduction describes deep learning and identifies the tools for building structures and external representation of structures. Using knowledge structures, the author provides examples—entity-relationship schemas, facets and frames, graphic organizers and concept maps. Finally, there is discussion and examples of meaningful arrangement. Continuing in this section, Bruno Jacobfeuerborn (Germany) and Mieczslaw Muraszkiewicz (Poland) presented a paper on "Big Data and Knowledge Extracting to Automate Innovation: An Outline of a Formal Model." The authors state that "we suffer from the problem that a quick upsurge of data towards what is dubbed big data does not entail a comparable increase in knowledge." As a result they feel we "need methods and tools to discover and/or create more knowledge in a faster manner and then… knowledge-to generate in a semi-automatic way, more innovations." In this paper they are proposing a framework of methodology to achieve this objective. They provide background and definition for the discussion and propose an innovation generator. In conclusion, the au-

thors describe "Big data along with increasing coverage and density of networked social facilities and technological artefacts is one of the greatest challenges we face within the present time and in the future." We cannot predict how knowledge organization will change but we can expect that our understanding of the world will change "so will the organization schemes of our knowledge change accordingly, and the big data approach will play a crucial role in this process." H. Peter Ohly (Germany) spoke on "Sociological Aspects of Knowledge and Knowledge Organization." At the outset, Ohly points out that at this point in time "with the challenge of self-organizing ordering systems by social software a new crisis comes up for knowledge organization. The future might be a combination of logical descriptions, specialized evaluation, and accompanying user-driven principles." In light of this situation, he discusses "several classical sociological positions. Some conclusions are drawn for knowledge and information as well as for science and for knowledge organization and objections and prospects are designated." He begins with the natural representation of knowledge organization—knowledge as nature, knowledge as spatial order and as virtual organization. Then he turns to the philosophy of science, sociology of science and the sociology of information. Ultimately he considers information technology and sociological perspectives. In conclusion, he looks at the views of several well-known philosophers and reaches the conclusion that "knowledge is not intersubjectively self-evident as such. But rather the structure of knowledge can be objectively worked out."

The second group contains 8 papers and is entitled "Knowledge Organization Domain and Epistemology." In the first of these papers, A. Neelameghan and K.S. Raghavan (India) describe the "Science of Consciousness as a Domain: Issues for Knowledge Organization." The authors attempt to map the domain and examine its coverage in knowledge organization systems. Facets for the domain are suggested based on published literature, with the suggestion that these need to be adequately provided for in KO systems. Some research groups are actively involved in research in consciousness science and there are several theories of "consciousness." In order to get an understanding of the nature of the concepts numerous publications and articles in the area were analyzed to get an understanding of the nature of concepts involved. A wide range of subject areas appeared to have a bearing on the domain. A frequency table of all subject headings that occurred was prepared. A list of journals cited was drawn up. The terms "science of consciousness" and "human consciousness" were not found in *LCSH*. So *LCSH* was examined for narrower terms—specifically the terms "consciousness," "spirituality," and "altered states of consciousness." It is obvious that coverage in *LCSH* is limited and does not include many of the concepts found in current literature. Thus the tools do not keep pace with the literature. The authors conclude that "knowledge organization systems need to continuously examine the developments and changes in the universe of subjects and accommodate newly emerging disciplines with substantial literary warrant." Rick Szostak (Canada) examined "Skepticism and Knowledge Organization." The author feels that while skeptical arguments have an important place in the KO field, it would be unfortunate if the field were "to assume the correctness of a skeptical outlook. Rather, the field should essay to combat the sources of skepticism." His paper sets out to outline some strategies for doing so. His starting point for his analysis is the book *The Sociology of Philosophies* by Rand Collins. Here he identified an important source of skepticism and explains the implications of this which he describes as the chaos of disciplines, the abundance of theories and methods as a bewildering set of concepts that contradict definitions by different groups of scholars. In his analysis of the situation he feels that knowledge organization can play a critical role in clarifying terminology and can reduce the level of ambiguity. His intention is to show that skepticism can and should be alleviated. He says that the field of knowledge organization can do much to bring order out of chaos and outlines some strategies. A major suggestion is mapping. In his final analysis, he lists seven ways in which KO can aid in clarifying the situation. He is optimistic that there is a way forward that will be an improvement. Vera Dodebei and Evelyn Goyannes Dill Orrico (Brazil) addressed "Knowledge in Social Memory: Empirical Experiment for a Domain Conceptual-Discursive Mapping." Two perspectives were used as methodological procedures: a conceptual analysis "regarding categorization of author intellectual production selected from a syllabus of the discipline of social memory and institution and discursive fragments from Paul Ricoeur's text "memory and imagination" were used. In the first case data analysis pointed to six main facets that organize memory context, and in the second case data analysis is related to discursive materiality organizing Ricoeur's ideas of memory from some philosophical points of view. The reader is introduced to social memory context, to metaphors as a conceptual model for KO, a conceptual frame for social memory context and a discursive frame for the concept of "fair memory" in Paul Ricoeur. Finally, the author concludes that the analysis has led to a promising path for upcoming studies in knowledge organization. Marek Hetmański and Marie Curie-Sklodowska (Poland) spoke on "The Actual Role of Metaphors in Knowledge Organization." They write that metaphors, despite their wide use in knowledge organization, play an ambiguous role there. The authors argue that "metaphors containing

probability concepts, although not immediately intuitive or comprehensible, are more fruitfully effective in mapping knowledge organization." They discuss spatial mapping of information, what information metaphors hide, and dynamic metaphors of probable knowledge. In conclusion, they make a suggestions as to how metaphors might be handled and state that "metaphors with dynamic and probabilistic connotations guarantee that the … danger is avoided and promotes a more effective and reasonable mapping out of knowledge organization." Michael Kleineberg (Germany) presented a paper on "Integrative Levels of Knowing: An Organizing Principle for the Epistemological Dimension." In this paper, it is argued that under the condition of epistemic pluralism, knowledge organization theory should take the epistemic frameworks adopted by authors or creators of documents. Therefore this paper concentrates on "the concept of integrative levels of knowing as an organizing principle for a classification of viewpoints." To begin with, he explores the "context indexing illusion and examines integrative levels of knowing in ontogenesis, phylogenesis, and historiogenesis." Then he discusses organizing the epistemological dimension. In this section also, Gercina Angela Borem Lima (Brazil) and K.S. Raghavan (India) dealt with "Categories in Knowledge Organization." These authors recognize the work of Ranganathan and its influence. The categorical or facet-analytical approach has become the most predominant approach to knowledge organization in recent times. This paper explores some of the facet-based systems, raises some questions as to their relevance in the digital environment, explains the principles of the facet analytic approach and examines three aspects of these schema: the degree of correspondence between some of the schemes, the impact of culture and language on the schema categories and the contrast between the classical and prototype approaches used. Categorization as a cognitive process is discussed. Models of categorization are described. In their final discussion the authors state that "categories and hierarchies of categories are the best way to organize knowledge for information retrieval and knowledge discovery." However "the classical and prototype models are not entirely satisfactory." There may be categories that are best suited to the traditional model and others to the prototype model. There is need for further research. Rosa San Segundo Manuel (Spain) and Daniel Martínez-Ávila (United States) examined "Digital as a Hegemonic Medium for Epistemology and Knowledge Organization." "The connection between epistemology, knowledge organization and the production/organization/use of knowledge is discussed in the context of the Digital Age and its media." A general introduction is provided. The hegemony of new media in the digital age is discussed as is new epistemology and knowledge organization in the Digital Age. In their conclusion, the authors are predicting that we are entering a new age. In it, constitutive change will shape reality. "The new Age of post-information is being structured and the reality of information shaped …New models of organization and access that are more collaborative and participative with a more open and critical knowledge organization" will be developed. In the final paper in this section, José Augusto Chaves Guimarães and Rodrigo de Sales (Brazil), Daniel Martinez-Ávila (United States) and Maira Fernandes Alenca spoke on "The Conceptual Dimension of Knowledge Organization in the ISKO Proceedings Domain: A Bardinian Content Analysis." This paper focuses on the knowledge organization as presented in the ISKO proceedings, 1990-2012. An analysis was carried out on 71 papers with "knowledge organization" in their titles. They were able to extract 11 definitions that were studied using 5 categories: nature, object, tools, processes, and perspectives/approaches. These categories identified communities of authors who interact in the domain. They found a field of knowledge whose objects are recorded knowledge and conceptual structures and whose main processes are classification, indexing and information retrieval. A historical background is provided. Their methodology is described and findings discussed.

The third group of papers is entitled "Methods of Knowledge Organization" and contains six papers. K.S. Raghavan and I.K. Ravichandra Rao (India) presented a paper on "Facets and Facet Analysis: A Domain Analysis." Facet analysis was treated as a domain and the basic question was "what are the facets of facet analysis?" The intention was to represent the contours of the domain. The objectives and methods used are described and results are set out, including a list of dominant themes. As many as 340 authors were examined in the research front, and single-authored papers emanated from 41 countries. Collaborative works were represented by 51countries. In their conclusions, the authors state that "the focus of the domain still appears to be evolving with some new areas emerging as research fronts." Information architecture, data mining and natural language processing are emerging as dominant themes. Ann M. Graf and Richard P. Smiraglia (United States) addressed "Race & Ethnicity in the Encyclopedia of Milwaukee: A Case Study in the Use of Domain Analysis." This is a descriptive study which analyses resources from a portion of a comprehensive bibliography on the history of metropolitan Milwaukee USA that was designed to serve those who would research and write entries for the *Encyclopedia of Milwaukee*. Analytic techniques are used to explore the intension and extension of the domain as it is developing. The topic is introduced. A literature review is provided. The methodology is described and a detailed analysis is given. Results are

consistent with the authors' earlier work. From this, what we learn "is something about the influence of knowledge structures that serve as substrate for knowledge organization systems." Some questions emerge. D. Grant Campbell (Canada) addressed the topic "The Human Life as Warrant: A Facet Analysis of Protocols for Dealing with Responsive Behaviours in Dementia Patients." The subject area is "classification of responsive behaviour exhibited by persons in long-term care facilities suffering from advanced dementia. The introduction provides a brief description of the subject area. Facet analysis is described and "responsive behaviours" is defined. The two facet analysis systems used were described. In essence, the paper "suggests facet analysis is useful, not because it improves the work of gerontologists and behaviour specialists, but rather because it captures and illustrates in a way that does justice to the complexity and frequent inconsistency of real-life caregiving situations." Claudio Gnoli (Italy) discussed "Boundaries and Overlaps of Disciplines in Bloch's Methodology of Historical Knowledge." The paper draws on the aspects of Marc Bloch's essay "The Historian's Craft" that are relevant to knowledge organization. Four main themes were selected for analysis. The introduction describes the approach to his analysis. Then each theme was discussed in turn: terminology problems of history, principles for the organization of historical knowledge, sources of information, interdisciplinarity and the nature and boundaries of history as a discipline. In his conclusion, Gnoli states "the very delimitation of a discipline like history involves complex problems. All this should encourage experts of knowledge organization to adopt a cross-medial interdisciplinary approach, if they really desire to be of help to researchers." Jihee Beak and Richard P. Smirgalia (United States) presented a paper on "Contours of Knowledge: Core and Granularity in the Evolution of the DCMI Domain." That is, they carried out a domain analysis of the core and granularity on the proceedings of 12 international conferences of the Dublin Core Metadata Initiative (DCMI) from 2001-2012. The methodology is described. 1686 keywords were isolated from the titles of 350 contributed papers. A detailed analysis is included. "It appears the domain is rich with new ideas emerging constantly. The domain is lively and continually evolving. It thus represents a rich structural contribution to the substrate of information science and bears further monitoring." Shu-Jiun Chen (Taiwan) and Hur-Li Lee (United States) presented "Art Images and Mental Associations: A Preliminary Exploration." This paper presents preliminary findings of a study that explores mental associations made by novices viewing art images. Twenty Taiwanese college students responded to the question "What does the picture remind you of?" It solicited information on how non-experts are stimulated by art. The paper reports on the analysis of participant responses to three images and describes a 12-type taxonomy that emerged from the analysis of 9 of the types derived from the *Art & Architecture Thesaurus,* but three new types were located: artistic influence, association, reactive association and prototype association. The methodology is described and each type of association set out. This was an exploratory study and no definite conclusions were drawn. Further study will be undertaken.

The fourth group entitled "Knowledge Organization Systems (KOS)" contained four papers. The first paper was broad and all-encompassing. The other three pointed to specific systems. Thomas M. Dousa (United States) and Fidelia Ibekwe-SanJuan (France) spoke about "Epistemological and Methodological Eclecticism in the Construction of Knowledge Organization Systems (KOSs): The Case of Analytico-Synthetic KOSs." Two cases were examined—Julius Otto Kaiser's method of systematic indexing and Brian Vickery's method of facet analysis for document classification. They showed "that both of these systems combined classical features of rationalism with elements of empiricism and pragmatism and argue that such eclecticism is the norm rather than the exception, for such KOSs in general." The topic is introduced and each of the two systems described. The analysis is only partial and could readily be expanded. Nevertheless, both of the methods "displayed epistemological-methodological eclecticism and did so in similar ways." In their conclusion, the authors express some degree of caution. In another paper, Thomas N. Dousa (United States) discussed "Categories and the Architectonics of System in Julius Otto Kaiser's Method of Systematic Indexing." He works on the fact that categories can shape the overall architectonic framework of a KOS. This paper expands on the traditional account of the function of categories in faceted KOSs by exploring some of the ways it can contribute to general systematicity of a KOS. Aspects of systematic indexing (SI) are explained—including categories, statements, and file organization. His analysis establishes three categories of terms: terms of concretes, terms of countries and terms of processes—as forming the structural foundation of systematic indexing. Rebecca Green (United States) presented a paper on "Facet Detection Using WorldCat andWordNet." In general, procedures for establishing facets tend to be subjective. This paper investigates "whether the facet structure of a subject literature can be discerned automatically on the basis of its own metadata." Nouns found in the titles of works retrieved from the WorldCat bibliographic database based on Dewey numbers are mapped against the nodes of the WordNet noun network. Density measures are computed

for these nodes to identify "nodes best summarizing the title noun data/best corresponding to facets of the subject." The nature of facet analysis is introduced. Green's methodology is described and topics are identified using *DDC* numbers. These are converted to facets. The result is two sets of data to work with. Future work will centre on different thresholds and more targeted means of word sense disambiguation and different measures and pruning of output. In her conclusion, Green states that "work to date has been promising enough to warrant further investigation." Richard Smiraglia (United States) addressed the topic "Classification Interaction Demonstrated Empirically." He states that "deconstructed elements of a knowledge organization system share network relationships that might be used in interaction with the characteristics to provide classification interaction as a means of identifying previously undiscovered relationships." In the light of this, a random sample of UDC call numbers from the online catalog of the Catholic University of Leuven is analyzed to discover interactions among conceptual classification, instantiation, and bibliographic demographic characteristics. He explains classification interaction, describes his methodology and provides preliminary results. This includes a description of the bibliographic population, correlations of bibliographic characteristics, the distribution or population of the UDC and correlations among operators. His concluding discussion includes a comparison with the WorldCat study. "The results…are affirmative to the extent that statiststically-significant associations exist in ways that make sense intuitively." The results are rich because of the synthetic nature of UDC.

The fifth topic, "Knowledge Organization Tools: Thesauri" contains only two papers. Jae-wook Ahn, Dagobert Soergel, et. al. (United States) presented a paper on "Mapping Between ARTstor terms and the Getty Art and Architecture Theasurus." In this paper, "to make better use of knowledge organization systems for query expansion, the authors developed a pattern-based technique for composition ontology mapping in a specific domain." The technique was tested in a two-step mapping. Free-text queries were first mapped to the *Art and Architecture Thesaurus* terms. Then the *ATT*-base was in turn mapped to a search engine's indexing vocabulary (namely ARTstor). The result was an improved mapping success rate from 40% to 70%. The paper then discussed how the technique may be applied to other KOS mapping and how it can be implemented in practical systems. An introduction and definition of mapping with examples is provided. The principles of mapping from the two tools are set out and the mapping procedure described as it is applied in the matching development methods. In further work, they will refine the patterns and improve the matching rate. Sholeh Arastoopoor and Rahmatollah Fattahi (Iran) spoke on "A More Effective Web Search Through Developing a Small Thesaurus on Non-Topical Terms: A Proposed Model to Improve Pertinence and Retrieval Relevance." The title does much to explain the topic. Non-topical terms are terms that would not be used by searchers but which could be effective support in making users better searchers. The authors propose the use of such terms along with queries to help make users' queries closer to natural language. The nature of the terms is described and a literature review and methodology are provided. The findings are presented by answering three major questions: 1) Is it possible to create a small thesaurus based on the non-topical terms?; 2) Is the developed thesaurus effective in refining the search results?, and 3) What are the users' impressions about searching topical terms along with the non-topical terms? Findings suggest that "a thesaurus of non-topical terms could help in web search." This study is the first phase of a broader and more exhaustive project.

The sixth section, "Knowledge Organization Tools: Classification," parallels the fifth section and contains 9 papers. This appears to indicate a continuing use of classification systems in a world that has become predominantly a word-based world. Deborah Lee (United Kingdom) presented a paper on "Webs of "Wirkung": Modelling the Interconnectedness of Classification Schemes." It "explores relationships among different classification schemes. It suggests how these relationships could be considered part of the "reception" of a scheme, in particular as an aspect of its Wirkung." Inter-domain and intra-domain scheme relationships are examined and combined with pre-existing research in intra-scheme relationships. A model is proposed which maps inter-scheme relationships identifying some of the complexities involved. Musical instrument classification (organology) is used as an example. The topic is introduced. The construction is described. Keeping the connection within a domain is described, as is the crossing of domains. Temporal connections are also discussed (i.e. connections across "versions" and "editions"). The latter involves various editions of *DDC*. In her conclusion, the author indicated some insights. "Relationships can be described using a scheme-to-scheme model or a property-to-property model." These models can be complex. This model is the first step in the research. Thomas M. Dousa (United States) spoke on "Classificatory Structure and the Evaluation of Document Classifications: The Case of Constitutive Classification." The paper is a historical case study examining the contrasting evaluations of a single structural form, i.e. the hierarchical structure known as constitutive classification—by two early pioneers of

knowledge organization, Julius Otto Kaiser and James Duff Brown. Both knew of the use of constitutive classification of documents but had different opinions of it. Kaiser, a special librarian, classified documents by documentary form, while Brown, a public librarian, was concerned with subject classification of books. The different opinions are described and constitutive classification is defined. The work of each author is discussed. Both men were familiar with the structural form of constitutive classification but they drew "diametrically opposite conclusions" about the classificatory goodness of constitutive classifications for the physical organization of documents. Lynne C. Howarth and Eva Hourihan Jansen (Canada) looked "Towards a Typology of Warrant for 21st Century Knowledge Organization Systems." The authors' examination "considers that there may be multiple warrants identified among the processes of design and relationships to users of the National Occupational Classification (NOC), the standard occupational classification system published in Canada." They argue that there may be a shift in semantic warrant: "that signals a transition for traditional knowledge organization systems and that warrant continues to be a relevant analytical concept and organizing principle, both within and beyond the domain of bibliographical control." Beginning with the work of Clare Beghtol they provide context for their discussion by revisiting Beghtol's typology of semantic warrant. Canada's National Occupational Classification (NOC) is described. In their conclusion, the authors refer back to Beghtol, who mused "as we have seen the priorities that different classificationists have assigned to various semantic elements dictate the eventual character of the classification systems" and to the work of Bliss and the CRG. Their findings lead the authors "to speculate that…where input from both top and bottom are essential to constructing meaning in an evolving classification system there may be room for contemplating expanded or new semantic warrants for judging the validity and value of NOC" and eventually other KO systems. Joseph T. Tennis presented on "Load Bearing or Levikttown? The Edifice Metaphor in Conceptualizing the Ethos of Classification Work." "This paper introduces the edifice metaphor. This metaphor accounts for the context of time and place, when comparing the similarities and differences that obtain between classification schemes. It is argued that this metaphor helps call into question the contemporary assumption that all classification is a universal constant." The author introduces the Billings Classification Scheme as an example and states the reason for the choice. He then develops a discussion of the edifice metaphor and compares the Billings scheme with the Morgan Library Scheme and Museum Reference Collection Scheme. Melodie J. Fox (United States) described "Medical Discourse's Epistemic Influence on Gender Classification in Three Editions of the Dewey Decimal Classification." The first (1876), second (1885), and seventeenth (1965) editions were used as representing change in the way sex and gender are handled. Melodie is addressing the question: how closely the changes in *DDC* correspond to shifts in medical thought regarding sex and gender classification. Michel Foucault's articles "Truth and Power" and "The Order of Discourse" are a starting point to determine "selection of epistemic considerations including teleology, authority/subjectivity and rhetorical space, and necessary and sufficient conditions. The same criteria are used to examine *DDC*'s discourse, "whether similar epistemic shifts are at play or not and if a detectable influence can be identified." The general situation is introduced and the methodology described. The medical background and climate are defined. Then the epistemic considerations are considered in each of the three editions of *DDC* chosen. A special section on sex and gender in the mid-20th century, a period of major change, precedes the discussion of the eighteenth edition of *DDC*. A table of changes to *DDC*'s gender classification is included. Finally, the author asks the question "where are we now?" and in general finds that change is still taking place. Ana Vukadin (Croatia) and Aida Slavic (Netherlands) addressed "Challenges of Facet Analysis and Concept Placement in Universal Classification: the Example of Architecture in UDC." The authors describe the challenges to the revision of class 72 architecture in UDC. Precisely, they report on the research under taken in preparation for its revision. It consists of an analysis of concept organization in UDC in comparison with the *Art and Architecture Thesaurus* and class W of the *Bliss Bibliographic Classification*. The topic is introduced. Facet analytical theory and UDC are used and they draw on the work of the Classification Research Group (CRG). Architecture as used in UDC is described. The approach to be taken in revision is set down and a comparison of UDC, AAT and BC2 is carried out. Some basic facets were found to be common to all three systems. They found no need to change the nature of the main facet in UDC, but the structuring could be improved. Revision of UDC is a long and complex process. Their "research into AAT and BC2 influenced a decision to take steps toward the integration of physical planning and architecture by establishing a unified class above classes 71 and 72 which could accommodate the facets of the shared concepts presented as special auxiliaries." Agnes Hajdu Barát (Hungary) wrote on "Hungarians in the History of the UDC." She outlines a major segment of the history of the Universal Decimal Classification in Hungary and all related important events and activities. She states that the usage and publications of the UDC in Hungary are significant milestones in the international history of UDC. The position of UDC in various types of Hungarian libraries is described and early participants are named in

a historical introduction. Adaptation and usage of UDC in Hungary is outlined and Hungarian librarians' affiliation in the work of the International Federation for Information and Documentation (FID) is documented. The history of Hungarian Full Editions of UDC and actions of Hungarian librarians and libraries is set out. Some conclusions are drawn. Specifically, "there is a strong and determined relationship between international activities and national diffusion and successfulness." For example, the use of UDC in the Hungarian National Bibliography. This is a somewhat different topic for a conference of this kind but the topic is highly relevant to the subject area. Jill McTavish (Canada) discussed "Everyday Life Classification Processes and Technologies." The usual approach to classifying is to use one of the standard classification systems. This paper suggests an "alternative" approach for LIS scholars—"one that considers the application of LIS theories about classification to the investigation of everyday life 'classification' processes and technologies." Classification in general is defined, followed by a definition of what the author means by "everyday life classification processes and technologies." She applied this to a publication named *Eating Well with Canada's Food Guide*. The domain analysis is described. The author draws on a large research project about perceptions of healthy eating and in the analysis 10 vegans, 10 organic users and 10 foodies were sampled as to their perceptions of food groups in healthy eating. In phase 2 of the research, 18 registered dietitians were asked to define "healthy eating." The analyses of the two groups were compared. The research provided some insights on how non-experts understand a domain and how the domain knowledge is reflected in their everyday life classification practices. It suggests that "unlike expert knowledge…domain knowledge is complex." In the last paper in this section, Ernesto William De Luca and Ingetraut Dahlberg (Germany) addressed "Including Knowledge Domains from the ICC into the Multingual Lexical Linked Data Cloud." The authors note the importance of access to everyone and the presence many local information systems and social networks in data silos that are not semantically related. Data integration, through reengineering or querying is an important task in order to make information available to everyone. The authors cite the need for information about the data itself in the form of a semantic road map. Thus in this paper they present their work "of providing Lexical Linked Data (LLD) through a meta-model that contains all the resources and provides the possibility to retrieve and navigate them from different perspectives." In doing so, they combine existing work done on knowledge domains (based on the Information Coding Classification) and related integrated lexical resources. Knowledge organization and linked data is discussed and the knowledge ICC domain is converted into RDF/OWL EuroWordNet. Then after the conversion they interlinked ICC with RDF/OWL-EuroWordNet. The authors point to two contributions made by this article: 1) The production and publishing of Lexical LOD datasets and 2) The description of a method to produce a common lexical linked data knowledge repository and related enrichment within knowledge domains of ICC. A table showing the mapping between WordNet Domains, *DDC* and ICC codes is included in the paper.

The seventh section of these proceedings, entitled "Knowledge Organization Tools: Taxonomy, Ontologies, Terminology" contains seven papers. Christopher S.G. Khoo et.al. (Singapore) described "Developing a Taxonomy to Support User Browsing and Learning in a Digital Heritage Portal With Crowd-Sourced Content." It deals with the development of a project entitled Singapore Memory Portal, a collection of postings about Singapore's history, culture, society, life/life style and landscape/architecture. The taxonomy is divided into two parts: an upper level taxonomy to support user level browsing of topics and a lower level taxonomy to represent the types of information available on specific topics. Some research was undertaken on other similar projects and the taxonomy was developed on the basis of terms/concepts harvested from existing taxonomies, classification schemes and finding aids from within the institution as well as from external sources. A literature review was conducted and the development of both levels of taxonomies is described. The conclusion identifies four next steps to be carried out in the project: check of the contents coverage, the development of a method of automatic tagging, the development of a browse interface, and the carrying out of user studies. Kavi Mahesh (India) addressed the topic "Highly Expressive Tagging for Knowledge Organization in the 21st Century." Semantic metadata is expensive to generate manually. While recent web technologies enable users to tag documents and other forms thereby generating metadata that could help to organize knowledge. However, adding tags is inadequate to capture "aboutness" of the document in a way to support powerful semantic functions. The author states that "there is a strong need to develop a semantic tagging mechanism with sufficient expressive power to capture the aboutness of each part of a document or dataset or multimedia content in order to enable applications that can benefit from knowledge organization on the Web." This paper uses "snippets as semantic tags that map portions of a document or part of a dataset or segment of a multimedia content to concepts and relations in an ontology of the domain(s) of interest." It is suggested that expressive tagging can be achieved by adapting a subset of the syntax and semantics of the Web Ontology Language (OWL-2). The author assumes that a suitable OWL ontol-

ogy is available and describes a number of possible types of tags. "The tags are not meant to replace content itself. They merely capture the aboutness of insufficiently detailed and expressive representation to enable its use in a variety of semantic applications." Some applications are suggested. Ricardo Eito-Brun (Spain) wrote a paper entitled "Ontologies and the Exchange of Technical information: Building a Knowledge Repository Based on ECSS Standards." This paper describes the development of an OWL-based ontology to manage the different artifacts and information items requested in the European Space Agency. "The proposed ontology provides the basis for building advanced information systems where the information coming from different companies and institutions can be integrated into a coherent set of related data. It also provides a conceptual framework to enable the development of interfaces and gateways between the different tools and information systems used by the different players aerospace projects." The purpose of the ontology is described and the methodology set out. The development of the ontology is explained. The next steps in the project will include the creation of a semantic repository supporting the ontology and the implementation of technical connectors to automatically extract data from a set of representative tools project and ingest them into the semantic repository. Devika P. Madalli, B. Preedip Balaji, and Amit Kumar Sarangi (India) addressed "Music Domain Analysis for Building Faceted Ontological Representation." Their paper discusses the construction of faceted ontologies for domain modeling using the faceted classification approach to do the domain analysis in music. Major approaches of knowledge organization systems (KOS) are discussed, beginning with the classification approach, followed by the subject indexing approach and an ontology approach in general. Then they apply these to music domain analysis as a case study. They conclude that "faceted ontologies provide a power tool for organizing the web base on classificatory principles used in knowledge organization theories and engineering tools." Rodrigo De Santis and Rosali Fernandez de Souza (Brazil) prepared a paper on the topic "Towards a Synthetic Approach for Classifying Popular Songs." The authors discuss the classification of popular songs by studying how six online systems (a service broadcaster, a library, a guide, an encyclopedia, a radio, and an on demand music seller) describe and retrieve this kind of object. Discussions are based on the "That Music" prototype—an ontology-based system built specifically for popular songs. Popular song is defined and described in six on-line systems The ontology-based faceted system is developed. As a result of the study, two concurrent steps and some challenges were revealed. Jadwiga Woźniak-Kasperek (Poland) wrote on "Terminology as a Picture of Knowledge Organization in a Scientific Discipline." The purpose of the paper was to explore the basics of selected present-day terminology theories and approaches and to show their potential for knowledge organization and representation. A descriptive and comparative framework is used. Included in the study are the concept theories formulated by Ingetraut Dahlberg and Birget Hjórland. The author feels that we should forget about devising universalistic systems for everybody and build consistent KOSs instead. He says this suggestion is not new but the tools to accomplish it are new. These tools originate from present day terminology and information technologies. He discusses the role of language and terminology in detail. The triad concepts-terms-semantic is an important tool. In his conclusion, he says "We could try to enrich the ample achievements of information science in KO and KOS with the most recent results of studies on concepts, terms and semantics as well as with solutions developed in the field of information technologies." Gabriela Besler and Jolanta Szule (Poland) presented a paper on "Gottlob Frege's Theory of Definition as Useful Tool for Knowledge Organization, Definition of 'Context'." This paper is a case study on the theory of definition, the aims of definition, kinds of definition, conditions of correct definition and what is definable. They present three kinds of definitions used by Frege: a contextual definition, a stipulative definition and a piecemeal definition. The term "context" is used in different situations and meanings in the field of knowledge organization. The paper is rounded out with a discussion of how Frege's theory of definition can be useful in knowledge organization. They began by looking at the different ranges of knowledge organization, examining the research of such authors as Dahlberg, Hjørland, Joe Tennis, Maria López-Huertas and Claudio Gnoli. Frege on definition followed. Then they addressed the three types chosen for analysis: contextual, stipulative and piecemeal. Next came the condition of a correct definition as formulated by Frege. Finally they addressed the "use" of "context" in knowledge organization. Their findings suggest that Frege's theory can be useful for establishing and clarifying key terms connected with knowledge organization.

In the eighth section, there were 2 papers on "Automatic Classification Systems." In this section Agnaldo Lopes Martins, Renato Rocha Souza and Heliana Ribeiro de Mello (Brazil) presented "The Use Of Noun Phrases in Information Retrieval: Proposing a Mechanism for Automatic Classification." This paper is research on "syntactic structures known as noun phrases (NP) being applied to increase the effectiveness and efficiency of the mechanisms for the document's classification." Their hypothesis is "that noun phrases can be used instead of single words as a semantic aggregator to reduce the number words that will be used for the classification system without los-

ing its semantic coverage, increasing its efficiency." The research is carried out in three phases: 1) NP preprocessing; 2) system training; and, 3) classification experiments. Automatic classification of documents is briefly described. The corpus of documents used in the experiment consisted of 45 items taken from SciELO (Scientific Electronic Library Online) in three areas of knowledge: 18 from engineering, 13 from literature and 14 from history. The corpus was converted to plain text, special characters removed, stop words removed and foreign and special words dealt with. Additionally three steps were applied: removal of quantifiers, removal of some qualifiers and the use of stemming. A number of further steps were applied to arrive with appropriate training data and a performance evaluation was carried out. Sample results are included. Improved performance was only noticed when the noun phrases were converted into their stemmed form. Further research will add new documents belonging to knowledge fields to assess the robustness of the system. Luiz Antônio Lopes Mesquita, Renato Rocha Souza and Renata Maria Abrantes Baracho Porto (Brazil) addressed "Noun Phrases in Automatic Indexing: A Structural Analysis of the Distribution of Relevant Terms in Doctoral Theses." The purpose of this research was to "analyze whether there is a characteristic distribution behaviour of relevant terms over a scientific text that could contribute as a criterion for their process of automatic indexing." The corpus examined consisted of 98 doctoral theses from eight areas of knowledge in the same university. The methodology and analysis are described. The expectation was that they would find a similar behaviour for all text in the corpus. "However there was a marked similarity between all sections of the Social Sciences…as well as among all the Natural Sciences. In turn, between them there was approximately an inverse distribution behaviour." A number of possibilities are being considered for further research including the use of the methodology on samples from other programs.

The ninth group of papers deals with "Knowledge Organization and Representation for IRS." (i.e Information Retrieval Systems). Suellen Oliveria Milani, and José Augusto Chaves Guimarães (Brazil) and Hope A. Olson (United States) described "Bias in Subject Representation: Convergences and Divergences in the International Literature." They state that "terms chosen to represent document subjects, the classification notations assigned to them, the abstracts and indices contained biases in two contexts."—a negative context and a positive context. The paper discusses the characteristics and occurrences of bias in subject representation. "It is exploratory and bibliographic and adopts an inductive method." The aim and scope of the study are set out and the methodology is described. The domain studied was established using eight terms found in the titles, subtitles, abstracts and keywords of articles found in 9 library and information science journals published between 1996 and 2010 and the Proceedings of the ISKO conferences of 2007, 2009 and 2011. 4,912 articles were found. 66 met the criteria. *Cataloging and Classification Quarterly* was found to be the major source of what could be considered biases; these were primarily found in articles on *LCSH*. The authors found "all classifications are biased in some way." The nature of the various types of bias is discussed. The paper concludes that the terms chosen contain biases in two contexts—a negative context and a positive context. The authors advice is "instead of a naïve conception of avoiding or eliminating bias, perhaps it would be possible to think about reliable decisions about how to deal with biases in subject representation." Hanna Batorowska and Barbara Kamińska-Czubala (Poland) prepared a paper on "Information Retrieval Support: Vizualisation of the Information Space of a Document." The aim of this paper "is to present a realistic information-space model of a self-authored full-text document on information culture indexed by the author of this article." The methodology is outlined, and the result of the research is a model of information space visualization of a given document. Pauline Rafferty (United Kingdom) was concerned with "genette," "intertextuality" and knowledge organization. The notion of intertextuality is examined, and its use by knowledge organization researchers is explored. The work of Gerard Genette has been used to map out possibilities by applying the concept of "intertexuality" to the design of information retrieval systems. The paper examines some KO systems that have traces of intertextual poetics in their design, including the FRBR model. Intertextuality is defined and its presence in knowledge organization systems acknowledged. The second entity defined is "expression" and the third "manifestation." In the FRBR model, there is evidence of Genette's influence in the mapped relationships. The author also discusses a system called LibraryThing which shows traces of intertextual poetics that has some interest in relation to FRBR. The author states that some of the ideas she has presented may "take us too far from the authority of bibliographic description." However, there is a starting point for such rumination. Juliana Assis and Maria Aparecida Moura (Brazil) wrote on "Consensus Analysis on the Development of Meta-languages: A Study of the Semantic Domain of Biotechnology." The authors "investigated the dimensions of formation and expression of consensus within Biotechnology in order to analyze the possibilities and limits of Concensus Analysis as a methodological tool applied to knowledge organization." The research explored co-authorship networks and semantic networks. The methodology used a triangulating method and theories of

social network analysis, consensus analysis and a semiotic approach. A freelisting technique was used in the collection and analysis of the concepts. Evidence of consensus in knowledge organization and the origin of the term "consensus" are discussed. The methodology is set out and preliminary analysis is provided with partial results. Sayyed Mahidi Taheri, Zohre Shahrestani and Mohammad Hadi Yagoub Nezhqad (Iran) presented a paper on "Switching Languages and the National Content Consortiums: An Overview on the Challenges of Designing an Iranian Model." The purpose of the research was to address the challenges of creating a switching language for the Iranian National Content Consortium (INCC). They are concerned with mapping between Iranian thesauri, subject heading lists and a general classification scheme. The methodology is described, and the current status of Iranian semantic systems is described. A number of the systems are briefly described, and ten challenges are identified. Bernard Ijesunor Akhighbe, et. al. (Nigeria) addressed "A Baseline Model for Relating Users' Requirements of Web Search Engines." This paper considers the need to relate users' needs as requirements for WeSEs in a dynamic context. User-centred evaluative methodology was used to propose a first-order measurement model (FoMM) with baseline characteristics using factor analysis. A literature review is provided. The Web Search Engine and the changing environment is described. The methodology is set out including the theoretical foundations, the scale development, the data collection and sample profile. All this leads to the data analysis and result followed by the presentation of a proposal for a model. The authors conclude with indications for further work. Olubunmi Akerele and Adenike Osofisan (Nigeria) and Amos David (France) wrote on "Using the Concepts of Case Based Reasoning and Basic Categories for Enhancing Adaptation to the User's Level of Knowledge in Decision Support System." Their hypothesis "is that this approach will enhance the decision support system for solving decisional problems in which information retrieval constitutes the backbone technical problem." The theoretical background is stated. The competitive intelligence and information system is described. The characteristics of five fundamental categories are identified. The proposed framework is presented with a model and methodology. They state that "Users' activities or experiences are important resources that need to be exploited in order to obtain knowledge on the user." Consequently they have "proposed the use of basic categories for representing knowledge on the users." Hajibayova Lala and Elin Jacob (United States) describe "User-Generated Genre Tags Through the Lens of Genre Theories." They start with the premise that "representing the genre of a resource could provide better knowledge representation, organization and retrieval" and they identify a number of authors who have written on this topic. This work suggests application of social network taggers can "better define the nature and constitution of a discourse community while simultaneously shedding light on multifaceted representations of the resource genres." A list of LIS genre studies is produced and communities of genre taggers identified. In their conclusion, the authors "propose the application of social network analysis to detect communities of genre taggers." In a second paper, Lala and Jacob address the question "Investigation of Levels of Abstraction in User-Generated Tagging Vocabularies: A Case of Wild or Tamed Categorization?" This study appears to be a follow up on the previous paper. The authors analyzed approximately 8000 tags generated by 40 subjects, which provided an analysis of 7617 tags assigned to 36 online resources, representing four content categories (TOOL, FRUIT, CLOTHING, VEHICLE) and three resource genres (news article, blog, ecommerce). The methodology is described and the results discussed and tabulated. In their conclusion, they make three statements: 1) User-generated vocabularies can be quite dynamic and multifaceted and generally be comprised of terms at multiple levels of abstraction; 2) This study demonstrates that assignment of tags representing the three levels of conceptual abstraction can be equally useful for taggers when representing the content of resources; and, 3) Future studies should analyze the use of superordinate, subordinate and basic level representations across a wide range of language groups and domains. Katarzyna Materska (Poland) presented a paper on "Faceted Navigation in Search and Discovery Tools." The author points out the increasing importance of that which is variously known as faceted search, faceted browsing or guided navigation and raises seven research questions. To find answers, he applies multiple methods of conceptual analysis. Selected aspects of information seeking and exploratory search were subjected to a critical literature review and a critical analysis of some user studies were carried out. Case studies of several search and discovery tools were used to exemplify concrete solutions. Faceted navigation is described, as is faceted search and user behaviour. Discovery tools are examined and related to user behaviour. It is concluded that "one of the great strengths of faceted search is the way it allows users to explore complex information spaces in an intuitive manner…faceted navigation isn't a magic bullet but it can complement keyword search extremely well…Although faceted search gives us a set of hints it is still not a final answer for many sophisticated needs in science." Sahbi Sidhom (France) discussed "Numerical Training for the Information Retrieval in Medical Imagery: Modeling of the Gabor Filters." The author proposes a "method of medical image indexing and research by exploiting their own digital component." The image data component is repre-

sented by a vector of characteristics. Using Gabor wavelets, each image of the training medical base is indexed and represented by its characteristics (texture). A numerical database is built which permits numerical search for similarity with the request image. The application was tested on a training mammography image base. The context of the experiment is described, as is the methodology used. Results are given with respect to the research phase, illustration and study of performances. In further work, the author plans to develop a search engine based on textual concepts and the numerical signature of the image. The result will be a system combining two approaches. In the final paper in this section, Verônica Silvia Rodriguez Marques (Brazil) spoke on "The Treatment of Theatrical Text Content and the Dissemination of Information." She analyses the contents of theatrical texts searching for a way to facilitate access to the contents of a particular type of text. It uses the document abstract as the tool to recuperate information. It deals with written theatrical text according to its peculiarities which make it different from scientific or literary texts. A proposal for a methodological construction for theatrical text is suggested. The abstract as an information access tool is discussed, as is the standardization of an abstract. Theatrical text is defined and its characteristics identified. Finally, "the paper discusses the theatrical text as a text with different characteristics from other texts."

The tenth section, "Knowledge Organization for Special Domains" contained six papers, each one on a different domain of knowledge. Hemalata Iyer and Mary Guadrón (United States) did a presentation on "Older Adults and eHealth Literacy: Challenges to Knowledge Representation." A Delphi study was conducted on participants including gerontological nurses, nursing faculty, state long-term care ombudsmen and health sciences/medical consumer health librarians. "This study brings together the research in the area as well as practitioners' views and perspectives on the current day challenges to knowledge organization/representation and techniques to enhance ehealth literacy for older adults." The objectives of the study were: 1) to examine knowledge organization and representation issues to support ehealth literacy programs; and 2) to identify design and usability factors appropriate for access to ehealth information. Methodology is described and survey results are outlined. A Delphi study was used to obtain consensus from experts regarding ehealth literacy for older adults. Aspects addressed included knowledge representation and language, categories and categorization, the use of prototypical symbols and images and the use of multimedia. In conclusion, the authors stated "knowledge organization and representation issues are very central to the effective design, development, and implementation of ehealth literacy initiatives for older adults. Further research is needed in this direction to examine issues such as knowledge structures, terminology, image/multimedia representation and text presentation appropriate for diverse older adult groups." Heather Lea Moulaison and Wade Bishop (United States) discussed "Organizing and Representing Geographic Information." The authors focus on the problems of access to maps, specifically place names. "End-users may search via geographic coordinates, but there is a potential for richer transaction if a variety of verbal place-names are accessible. Into the future, as content becomes increasingly digital, personal lexicons of place-names have a potential to be used increasingly, both inside and out of traditional repository settings." For map curators, place access is of primary importance. Based on an earlier assessment, the authors state that "designating geographic places is a first-order classification act subject to human bias." In light of the known biases, this paper attempts to address two fundamental questions: "In what ways might place-name biases affect end users?" and "Under what circumstances is it possible to alleviate some of the bias inherent in providing access to cartographic material through information systems?" The methodology is described. Place-name standardization is discussed, as is the cartographer's bias. Other aspects referred to are the information intermediaries and end-users, and a process referred to as "critical cataloguing," and metadata for maps. The authors indicate that "in future work, as data becomes increasingly digital and as systems are increasingly queried on line, questions of the effect of technology has on place-names can also be explored." Wieslaw Babik (Poland) spoke on "Knowledge Organization for the System of Indexing and Retrieval of Information on the Folk Culture of the Polish Carpathian Region." As the title indicates, this paper indicates that it deals with information as expressed in the form of nested arrangements of terms and assumes that the organization pattern for the domain knowledge will be the starting point for the creation of the system language. A unique knowledge map has been developed. At present, such patterns have been developed for culture, ethos customs (ceremonies) demonology, magic and folk medicine. Thus it was possible to build a number of knowledge organizational patterns in the form of nested arrangements of terms. Keyword languages most often used were generated from those patterns. The new system was applied for the first time in a keyword language of ethnology and cultural anthropology. This new system permits the use of the existing terminological system of a particular field as a support in the process of indexing. The research permitted the proposal of a new procedure of building an indexing and retrieval language. Marek Nahotko (Poland) presented a paper on a "Model of Scientific Publishing as Knowledge Organization Process." This paper explored the possibilities of a knowledge organiza-

tion approach to scientific publishing. Some basic assumptions are set out, and the piece is part of a larger work on innovations and changes in scientific publishing. The first step was creation of a model to decide what to choose for basic entities necessary for the model, "mainly data, information and knowledge and how to define it." Knowledge processes are defined. "Knowledge processes can also be presented from an information/data point of view. There are also three stages: Knowledge → Information (Data) → Knowledge (new)." The objective of this paper was to examine the tools employed in the preparation of text for publication as knowledge organization systems. Pekka Henttonen (Finland) spoke on "Bibliographic Subject Headings as Access Points to Archival Sources." He "examines whether subject headings in a bibliographic description could be used to direct users to relevant archival sources: a publication about a subject is likely to cite archival sources that are related to the subject." There are some problems, such as finding the optimal level the user should be directed to in the archival hierarchy and the lack of information in archival persistent identifier. The relationship between subject headings and archival sources is discussed. To examine whether subject headings could be used as access points to archival sources, the author "analyzed subject headings and sources in studies about a phenomenon known as 'jagars' in Finnish history." Jagars was chosen because there were subject headings available, the subject headings had to include "Jagar movement" and the author had to identify archival sources by scientific citations. Observations were taken from the data and practical application of the approach was discussed. In conclusion, the author states the approach might work in some cases, but more studies are needed and "it is at the moment very far from practical application." Diana Pietruch-Reizes (Poland) presented a paper on "Smart Cities and Knowledge Organization." "Smart City has been defined as a city that uses information and communications technology to make both its critical infrastructure, its components and utilities more interactive, efficient, making citizens more aware of them." The paper discusses the significance of the Technology Industrial and Science Parks (TISPs)— producing, exploiting, transferring and applying knowledge—in the support of intelligent cities development. The author compares different types of TISPs using both descriptive methods and statistical analysis. The concept of intelligent specialization is described in detail, as is intelligent development—knowledge and innovative based economy.

Section eleven is entitled "Knowledge Organization for Libraries" **and** contains 6 papers. In the first paper, Widad Mustafa El Hadi and Laurence Favier (France) discussed "Bridging the Gaps Between Knowledge Organization and Digital Humanities." The paper focuses on the fact that libraries, archives and museums are in the process of digitizing the representations of cultural and historical documents, images and artefacts. The authors are addressing "the fundamental role of Knowledge Organization Systems for the Humanities with a special attention to libraries as one of the actors of Digital Humanities." The interplay between digital libraries and digital humanities is highlighted. It also deals with "new forms of research that were difficult or impossible to undertake before." A context and rationale are provided. There is a brief account of digital libraries and their mission. The nature of digital libraries for the humanities is discussed, as are KOS in digital environments. Building resources and discovering knowledge strategies in heterogeneous data collections as well as building digital repositories are covered. Then they outline some of the inadequacies of online digital resources for digital humanities needs. Included are digital repositories, the drawbacks of accessing digital libraries and repositories, the lack of well-adapted interfaces, the lack of interoperation and the absence of well-adapted semantic technology. Finally, this is followed by some suggestions for improving information access to digital libraries and repositories. They conclude with the question "what will be the best modes for organizing digital libraries in terms of KOS and visual aid for improving information search?" Maria Teresa Biagetti (Italy) presented "Digital Libraries and Semantic Searching." The author's approach was to "highlight the possibility of improving the search functions of documents in digital libraries." In her presentation, she took into consideration semantic web and social networking advanced tools such as bibliographical ontologies and recommended systems. Her proposal also considers "the paradigm founded on the conceptual analysis of documents to improve semantic search functionalities in digital libraries." The nature of digital libraries is described. New strategies for semantic searching in digital libraries are described. Marcia Lei Zeng and Karen F. Gracy (United States) and Maja Žumer (Slovenia) described "Using a Semantic Analysis Tool to Gennerate Subject Access Points: A Study Using Panofsky's Theory and Two Research Samples." The authors are exploring a method for enhancing the subject access to materials that are not included in the usual library subject cataloguing process. Using two research samples they "analyzed the access points supplied by OpenCalais, a semantic analysis tool." They suggest using the three-layer framework applied in image analysis by Erwin Panofsky. The research question is introduced and there is a review of related literature. The research method is described and preliminary findings are presented. Subject access points fall at the "description" and "identification" levels rather than the "interpretation" level. For future work, they suggest analyzing user needs

according to the three layers (or substitute the "interpretation" with "inferencing") and thus understand their nature. They think this knowledge would help us predict the usefulness of existing semantic analysis tools. Athena Salaba and Marcia Zeng (United States) discussed "Extending the 'Explore' User Task Beyond Subject Authority Data into the Linked Data Sphere." "Explore" is a user task introduced in the Functional Requirements for Subject Authority Data (FRSAD) final report. "Through various case scenarios, the authors discuss how structured data, presented based on Linked Data principles and using knowledge organization systems (KOS) as the backbone, extend the *explore* task within and beyond subject authority data." The background for the paper is described. A literature review is provided and "exploring" is defined in different ways: as user behaviour, as exploring through interfaces and through KOS and other metadata. Four different case scenarios are examined including exploration based on mapped subject authority data, exploration via a semantic network, exploration from a taxonomy to references and relationships and through potential using a controlled vocabulary to enable future exploration in LOD. The authors summarized the patterns and "hope to provide examples and clear paths for future projects." The cases used in proving the notion of "explore" are by no means an exhaustive list. They welcome additions and contributions from researchers and practitioners. Agnieszka MIodezka-Stybel (Poland) spoke on "Towards Continuous Improvement of Users' Access to a Library Catalogue." The paper discusses user access to library records by their publication in Google. The records would be a thesaurus as well as abstracts. End users' statistics were monitored and pilot testing covered visibility of library records in Google search results. The research was undertaken at the Central Institute for Labour Protection, National Research Institute, Warsaw, Poland. The nature of the venue was introduced. The tools supporting the indexing and retrieval were identified and described. Improving Google users' access to the library catalogue was discussed, as was the visibility of records. The results were encouraging but the author states that "a full evaluation of the effectiveness of publishing the catalogue and determining priorities for further action requires monitoring processes over a longer period of time." Blanca Rodrígueza Bravo, Críspulo Travieso Rodríguez, M. Graça de M. Simões, and M. Cristina V. de Freitas (Spain) addressed "Evaluating Discovery Tools in Portuguese and Spanish Academmic Libraries." The purpose of the research "was to get to know the degree of implementation of discovery tools in university libraries in the Iberian Peninsula." It also provided for an initial evaluation of the facilities offered by the tools implemented. The situations differed in the two countries. Eight tools were evaluated. The tools were identified and the applications described. They have several strengths. On the other hand there were gaps to be filled. There was "some vagueness when directing users toward new tools or the traditional catalogue…and there was limited use of the functionalities relating to social OPACs…and there is a need to expand the enriched content offered with each record." Further work is needed to achieve more exhaustive exploration and evaluation.

The twelth section on "Knowledge Education" includes 4 papers. Michèle Hudon (Canada) researched "KO and Classification Education in the Light of Benjamin Bloom's Taxanomy of Learning Objectives." "Focusing on knowledge organization and classification education…learning objectives proposed in courses entirely or partially dedicated to these subjects in North American information science programs were categorized with the help of Benjamin Bloom's Taxonomy of cognitive objectives." The author sets the context for the research over the past 30 years. Over a period of time, three projects were set up. The first was an extensive review of relevant literature. The second project used a web-based questionnaire to collect information relating to KO and classification courses offered in programs accredited by ALA. The third was set up with the goal of categorizing specific objectives set in current courses entirely or partially dedicated to KO generally and/or to bibliographic classification more specifically. This paper originated in the third study and "focuses on the fourth dimension of the categorizing process." Course objectives and Bloom's taxonomy are explained. A methodology is described. As to the results, given the size of the corpus used no generalization was possible, but some tendencies were revealed. The results reinforced what has been observed over the past thirty years. In KO and classification education, teaching and learning objectives are very general, often vague and "despite the fact that KO instructors recognize the necessity for students to develop high-level analytic skills," the author sees little explicit reference to such skills in current course objectives. Aneta Kamińska and Irene Pulak (Poland) analyzed "Knowledge Organization in a Digital Learning Environment in the Experiences of Pedagogy Students." "The results of a diagnostic survey showing the way in which the students of pedagogy create and organize their digital personal environment used in the individual learning process" were presented in this paper. It deals with the sources of information used, their methods of storage and the tools used for this purpose. The "personal learning environment" is defined and the methodology used is described and four questions used in the survey are provided. In their conclusion, the authors note "that students of pedagogy increasingly build their learning environment on digital resources,

but in practice they insufficiently use specialist tools to make easier the organization of knowledge." Some changes are needed to remedy the situation. Catalina Naumis-Peña and Angélica M. González-Olvera (Mexico) discussed "Characteristics of Library Science Terminology in the 21st Century." "Characteristics of terms used in library science literature, extracted from two journals in the field in English and two in Spanish were studied and analyzed." Results from the study include: terms that differ from the entry in library science dictionaries but whose meaning in that source coincides with other specialties consulted. "Thematic indexing terms were identified in journals that publish articles on this subtopic and cross checked in library science thesauri and dictionaries in Spanish and English." The methodology is described. This study shows "that library science specialists use terms in their communications without a clear definition of them and assume their meaning is known. Slow updating of traditional thematic normalization tools aggravates the lack of clarity in terminological use." Luciana Corts Mendes and Amanda Pacini de Moura (Brazil) wrote on "Documentation as Knowledge Organization: An Assessment of Paul Otlet's Proposals." This discussion is "anchored in Birger Hjørland's argument that the field of knowledge organization (KO) must be formed by two interdependent views, a broad conception on how knowledge is socially and intellectually produced and organized and a narrow view that deals with the organization of the documents that register knowledge." Paul Otlet's documentation is examined in the light these principles. The narrow and broad views of knowledge organization are introduced, and Otlet's views of how knowledge is produced and organized are discussed. Documentation is described as a historical component of the KO field. It was concluded that "Otlet's endeavor parallels Hjørland's present day views on KO, both in arguments for the improvement of the activities of organization and for the strengthening of the field itself." The authors' analysis makes clear that Otlet fulfilled Hjørland's claim for the KO field. KO needs to acknowledge this fact.

The thirteenth set of papers falls under the heading "Knowledge Organization History and Future" and contains 5 papers. Victoria Frâncu and Tabita Popescu (Romania) presented a historical paper: "Twenty Years After: Scientific Research in the Field of Knowledge Organization in Romania(1993-2012)." The main point that authors want to get across in this study is that "research in the field of knowledge organization in Romania over the last twenty years is unequally and unjustly distributed among different categories." The study has three stages: data collection, data recording and data interpretation. The authors interest is "directed towards analyzing to what extent research and writing for publication have an impact on the evolution of Romanian libraries over this twenty years span." The objectives are stated. It is a longitudinal study and a descriptive-interpretative study. It is also a "retrospective study that looks back in time in order to discover trends and patterns in the Romanian KO research." Definitions of the terms, scope and limitations of the study are spelled out and the methodology is described. In the collection of data, seven variables are used: 1) author; 2) profession (attributes—faculty, librarians and others); 3) type of work (attributes research report, professional work, descriptive work, informative work); 4) type of manifestation (attributes – book, book chapter, doctoral thesis, journal article, conference paper); 5) descriptors; 6) year of publication; and, 7) language of publication (Romanian, English, French and Hungarian). A detailed analysis is carried out on each of the variables. First result of the 70 authors identified only 4 produced more than 10 works. These authors signified a real preoccupation with KO subjects. More than half the authors produced only one KO work, "suggesting writing for publication is somewhat secondary and even accidental to them." 46% are authored by 4 people. In general, the results show that there is "a deficit in the research activity of Romanian LIS faculty…that students attending courses in this university department have little if any chance of a research-oriented education." This has a critical impact on the library field in the long run. The authors suggest some solutions for improving the research environment. Maria J. López-Huertas (Spain) wrote on "Exploring the Boundaries of Knowledge Organization: Towards Future Projects." "The theoretical findings claimed by postmodern thinking (as inter and transdisciplinarity) suggest that a change in the fundamentals of knowledge and in the design and construction of KOSs should be undertaken." Here the author "deals with the role KO in systems that exceed the function of information retrieval in the strict sense, the need for cultural integration in KOSs and the contribution that transdisciplinary and other recent theories can contribute to the foundations of KO and the design and construction of the KOSs." KO beyond the traditional scope is explained and transculturality in KOSs described. Rethinking the KO foundation in the light of post-epistemology and transdisciplinary theories is addressed. As a result of the research, she indicates that new contexts are emerging, and the identification of those new environments and how KO can serve in those settings is a challenge that should be taken. It is a way to contribute to the interdisciplinary character and to progress. Izabela Kijeńska-Dabrowska and Marta Kuźmińska (Poland) produced "Classifications and Interdisciplinarity Within Scientific Disciplines and its Influence on Contemporary e-society in Poland." This research starts with the idea "of an engine search tool that could embrace clas-

sification functions of scientific disciplines with modern trends of interdisciplinarity and specialization convergence within science has been evaluated." The e-browser covers research fields within existing classification schemes and considers implementing tendencies in on-going research. The concept of interdisciplinarity and its influence on the classification of disciplines is described and the e-browser prototype perspectives given. Barbara Sosińska-Kalata (Poland) prepared a paper on "Semantization and Standardization—Cooperative or Conflicting Trends in Knowledge Organization?" This author states that the two most important trends in research on knowledge organization are semantization (i.e. systems used in practice) and standardization. "They determine current approaches to the development of methods and tools for organizing access to the digitally recorded knowledge in information systems and networks." In this paper it is "argued that the standardization of methods and tools for the representation of knowledge resources accessible in digital environment should not and does not have to imply… generalization and simplification of the representation of their semantic content." Knowledge organization is described in general terms. The syntactic and semantic approach in KO is discussed in the context of Hjørland's definition and semantization in KO research is described. There is a "growing interest in semantic technologies followed by the development of new KOS types." Similarly, standardization in KO research is analyzed. Finally, the author states that "it is to be hoped that despite the well-established position of traditional 'classification standards' and simplification tendencies in contemporary organization of access to digital knowledge resources those new solutions will be put into practice and open the way to parallel standardization and semantization of KO tools. In the final paper, Barbara Szczepanowska (Poland) addressed the "Promotion of Knowledge on the International Level—the Example of Occupational Safety." The focus was on knowledge promotion and the importance of acquiring the proper reliable and up to date knowledge and information to aid specialists in their research. OSH, or Occupational Safety and Health, is described as "a very complex multi-subject part of knowledge and practice—accidents at work, occupational hazards, diseases caused by work etc." There is a need for the exchange of up-to-date information on OSH especially on an international level. The author notes the importance of networks and mentions and describes several European networks organized at the global level. She zeros in on the National CIS Centre in Poland and its activities and databases and its facilities for searching in four languages (English, Polish, French, Spanish). In conclusion, the author notes the importance of the use of new technologies.

These Proceedings pick up on established history and principles while bringing forth new systems and tools. It brings forth many suggestions for new applications and further research. The conference was aptly named "Knowledge Organization in the 21st Century: Between Historical Patterns And Future Prospects."