International Society for Knowledge Organization

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Participants at the Ninth International ISKO Conference in Vienna, Austria , July 5-7, 2006 spent a very busy three days listening to an impressive range of papers covering many aspects of knowledge organization. The theme of the conference was "Knowledge Organization for a Global Learning Society," and it encompassed a variety of subcategories related to the main theme, including such topics as theories of knowledge and knowledge organization, design and implementation of information systems, concepts, multilingual problems of information retrieval, representation of knowledge, users and uses of knowledge organization, ontologies, nonprint media and linguistic and cultural approaches to knowledge organization. The published proceedings (Budin, Gerhard, Christian Swertz and Konstantin Mitgutsch, eds. 2006. *Knowledge organization for a global learning society: Proceedings of the Ninth International ISKO Conference, 4-7 July 2006. Vienna, Austria.* Würzburg: ERGON Verlag) are set out under 9 categories containing a total of 51 papers. A few of the authors were unable to attend the conference. Hence their papers were published but not presented. By the same token, there were some papers presented that have not been included in the proceedings. Thus the proceedings do not match the programme exactly. Moreover, some of the presentations were given in concurrent sessions, such that it was not possible to hear every presentation. With apologies, to those participants whose papers are not covered here, in this analysis, it was deemed best to cover those papers in the published proceedings since they are the ones that are available for perusal from the printed text. Insofar as possible the categories used in the proceedings have been followed. However, for purposes of discussion, within a large category the order of papers has been rearranged to bring subcategories of papers together. Because there is no index to the volume some cross-indexing has been done.

1. Information systems and learning in a global society: concepts, design and implementation

This is the largest and most amorphous of the categories and there is some overlapping. For discussion purposes, some attempt has been made to order the 12 papers according to the subtopics "concepts," "design," and "implementation." The first 6 papers deal primarily with various types of concepts. The next 3 papers appear to be related to the design of system. Two of these deal with metadata. Finally the third group are related to process and retrieval in the implementation of systems.

With respect to concepts, Claudio Gnoli's (Italy) paper "The meaning of facets in non-disciplinary classification," addresses the problem of the constraint of disciplines on classification schemes. In doing so, he tests a freely faceted classification by applying it to "little bibliographic samples stored in a MySQL database" and then develops web search interfaces (in PHP language) to demonstrate possible uses of the techniques described. He takes the work of the CRG (Classification Research Group) – and the work of the ILC (Integrative Level Classification) research project as starting places and poses the question "what is, then, the meaning of facets when they refer no more to discipline classes, but to phenomenon classes?"

"Integration of international standards in the domain of manufacturing enterprise," by Aaron Loehrlein, Richard Martin and Edward L. Robertson (USA) describes research into the commonalities and differences in terminology and definition in the texts of 21 international standards of the ISO using a specific subject domain. Focus is on the practical ramifications of inconsistencies in meaning between standards and the steps being taken by ISO working groups and other interested parties … to bring those standards into alignment." Specifically among such issues are "definitions, concepts, terminologies, frameworks, models and basic principles." Each stan-

dard tends to have its own terminology and its own interpretations of that terminology. Differences range from variations among editions of one standard to variations across standards.

Another paper on concepts, "A Common sense approach to defining data, information and metadata," by Dimitris Dervos (Greece), and Anita Coleman (USA) focused on the problem of "the lack of a clear consensus in the way reference is made to the corresponding fundamental concepts" data, information, metadata and knowledge. This problem is intensified across disciplines with competing definitions in such areas as traditional computer science, database technology, data mining and, library-and-information science. The authors have developed a methodology based on two preconditions and two assumptions. The assumptions prioritize the terms such that "information is at a higher level than data; and "knowledge is at a higher level than information." On this premise, the definitions are developed and stated in the hope that this will lead to "interdisciplinary work … leading to growth of the information sciences and information systems" and the promotion of the usage of common vocabulary in many disciplines.

Dealing with geographic terms, Olha Buchel (Canada) describes "Uncovering hidden clues about geographic visualization in LCC." This paper "examines the nature of georeferenced information in academic library catalogs organized according to the Library of Congress *Classification*." The goal was to obtain an understanding of the implications for geovisualization of library collections. The author takes the view that geovisualization and geographic retrieval have the potential to "to transform information systems into highly interactive tools for learners and information seekers." It has been ascertained that library catalogues are rich in geographic references that can be represented cartographically. These georeferences may come in the form of subject headings or parts of subject headings and in classification notations as found in LCC call numbers in the 050 and 090 MARC fields. The idea of georeferences can be broadened if one includes languages, literatures, religions and ethnic groups. A literature review was carried out in which it was found that "despite their virtues" representations are not without limitations. Specifically, different kinds of users require different kinds of maps (e.g. political maps, historical maps, linguistic maps etc.). LCC was chosen as the basis for analysis because of its grouping of georeferences by category as opposed to scattering by alphabetical location in *LCSH*. The analysis considered three factors – time, scale (as in hemisphere, continent, country, etc.) and type of georeferenced data (e.g. museums, laboratories, etc. As a result, the paper presents some interesting and varied possibilities. There is a lengthy discussion of observations and the author concludes that "each domain of knowledge in LCC may have different geographic representations." Advantages of this kind of representation are numerous. Multiple representations can act as filters according to the topic, time, scale and document type and permit "meaningful summaries of collections and knowledge discovery."

"Global unity: Otto Neurath and the International Encyclopedia of Unified Science," by Mikel Breitenstein (USA) describes the contribution of Neurath to "modern global information organization." His proposed encyclopedia was "a grand project to bring together scientific philosophies from a variety of disciplines, embodied in essays in a series of printed volumes." It would not cover all knowledge but would bring together the "premises and perspectives" of leading thinkers in modern science. The intent was to organize this huge discipline so as to: a) define by classification and explication the fields of modern science; b) establish a documented body of unified topics; and c) affirm an interdisciplinary network that would bring together scientists from various disciplines to enable them to solve problems. He promoted visual education and used a system designed by him called "The Vienna Method of Picture Statistics" to develop further an international language called ISOTYPE (the International System of Typographic Picture Education). This was a system of simplified pictures which he developed for the representation of statistical data. His plan for organizing modern science had considerable potential. However, only two of the planned 26 volumes were ever published. This paper is a descriptive discussion of Neurath's life and work.

In their paper on systems design, Kerstin Zimmermann (Austria), Julika Mimkes and Hans-Ulrich Kamke (Germany) describe a proposed design for "an ontology framework for e-learning in the knowledge society." The system is intended to provide access to resource materials for e-learning. The authors begin with brief descriptions of existing schemes of organization – Metadata schemes including MARC21, BibTex, an open source document preparation system used in academic communities, the Dublin Core; and existing ontologies FOAF (Friend of a Friend), (SWP) Semantic Web Portal and MarcOnt. With this

background they constructed the top level of a new ontology containing 9 categories, which is illustrated in the paper. Further discussion focuses on the requirements for two different approaches – course-centered and user-centered approaches. This is obviously a work in progress. "Framework" is the operative word and a full ontology needs to be worked out. Plans are to test the framework on two examples – a free collection of online materials for physics and library science materials. Both of these systems are currently course-centered. While it is not clear, it could be assumed that the tests will take a user centered approach.

"Metadata assistance of the Functional Requirements for Bibliographic Records: Four User Tasks," by Shawne Miksa, William Moen, et al (USA), is a report on the MARC Content Designation Utilization (MCDU) Project. The project has analyzed some 56 million records in MARC 21 format for purposes of determining the actual use of the content designators available in the records. In doing so, it uses concepts from FRBR (the Functional Requirements for Bibliographic Records) to examine and critically assess the way in which end users make use of bibliographic data in four retrieval tasks – finding, identifying selecting and obtaining relevant information resources. The paper describes the methodology used and discusses partial results of the analysis. The research is seen by the authors as an important contribution to discussion about the future of MARC and the work on Resource Description and Access (RDA), previously referred to as AACR3. Several questions are raised which require further study. This is the first of two papers involving FRBR. A related paper by Athena Salaba and Marcia Zeng (USA), and Maja Zumer (Slovenia), deals with the "Functional Requirements for Subject Authority Records." It is a descriptive report on the terms of reference and initial activities and the subject authority issues discussed in the IFLA Working Group on FRSAR. As such, it is a report not a research paper.

Using another approach to subject retrieval, Jeff Gabel (USA) experimented with "Improving information retrieval of subjects through citation-analysis." This research responds to the now well known, but not surprising fact, that responses to subject retrieval from OPACS tend to be low in recall, and the performance of web-based catalogues is disappointing. The study focused on the use of citation-chasing as a methodology for generating, ranking and clustering alternative subjects for the potential enhancement of subject searching. Using the subject area "language and languages – origin" and its subdivisions, titles were retrieved from the OCLC database. The cited references in the retrieved titles were then used to retrieve subjects from their records. The result was a method of retrieval that went more deeply into the contents of the items than retrieval by catalogue record alone could attain. Some of the subjects retrieved had not been uncovered using the records for the source documents.

In a paper on "Annotation and its application to information research in economic intelligence" Charles Abiodun Robert and Amos David (France) describe the theory and concept in the implementation of the process of annotation in information research. Annotation is understood in the context of three parameters – 1) different documents require different annotations; 2) two or more users may not make the same type of annotation for the same type of annotation for the same document; and 3) a specific user may not annotate the same document the same way at different times. Economic intelligence was defined by the authors as the use of information in strategic decision making.

In "Knowledge-oriented educational processes: from knowledge transfer to collective knowledge creation and innovation", Markus Peschl examines components of the field of knowledge management. His goal is to develop an understanding of the process of teaching and learning. In doing so he reinterprets the process in the light of individual and collective *knowledge construction* and *knowledge creation.* As a starting point, the author points out that students have deficiencies in a number of skills, such as "reading, mathematics, problem solving, etc." and asks the question "what are the reasons and causes behind such deficiencies?" He begins with an examination of the underlying cognitive operations which are responsible for knowledge processes on five levels. From these he identifies five areas of the intellectual problems/deficiencies. He states that all have at their root a common cause – "a lack in the capacity to deeply understand and to intellectually penetrate in the meaning of a phenomenon or reality." This finding leads to a closer look at the processes of "*knowledge construction* and *knowledge creation.*" and to an analysis of knowledge sharing as the foundation of the educational process." The result is the identification of three modes of knowledge sharing and learning/teaching – learning as knowledge transfer (in the conventional sense) and downloading (in the technical sense), learning as knowledge construction modeling and learning as dialogue/conversation

in context. In a further step the author takes a closer look at these three modes in a table that identifies three domains – level of knowledge, the cognitive activities necessary to construct and explore, and the characterization of knowledge which is the result of the construction processes. In the final analysis he presents four solutions to the question "How can we achieve a height level of these intellectual capacities of understanding and reflection?"

Ricardo Brun's (Spain) paper on the "Retrieval effectiveness in software repositories: from faceted classifications to software visualization techniques," discusses different knowledge techniques for organizing software repositories such that the software components and documentation that they can be retrieved and reused at different phases of a particular project or for different projects. A software repository is described and an information system "where users can access the software components and their related information using a retrieval subsystem. Thus it is likened to information retrieval used in document and bibliographic systems. Five fundamental approaches are examined – keywords and controlled vocabularies, natural language and faceted classification faceted classification and domain analysis combined, and formal methods (methods based on mathematical representation). The various methods were tested, somewhat in the manner of the Cranfield project. The conclusion was that there were no significant differences in retrieval effectiveness among the techniques/subsystems. However, it did conclude that "systems should provide different complementary retrieval methods and techniques." In the final analysis, the author offers "areas of improvement: visualization and comprehension." He recognizes the importance of linkage between documentation and components. Documents didn't provide a "clear understanding of how a specific functionality had been implemented, as they are not related to each other or to real implementation." The use of diagrams based on standard modeling languages is suggested. The models contain different aggregation levels used to expand searches based on free text comments. It should be noted that the author states that his evaluation process "offered some similarities with the *Cranfield* project" and he identifies with the "library community." However, perusal of the brief bibliography reveals that all sources come from the computer science and engineering fields with no citations from the library and information science field, so it is impossible to determine how terms such as "facet" are being defined.

Metadata is currently a very important topic in the area of knowledge organization. Three papers in this category are devoted to this topic. However, throughout the conference there was frequent reference to this topic in other contexts. Such papers can be found in sections 3 (Menard), 4 (Jacob, Hudon), and section 7 (Smiraglia).

2. Global society and learning in theories of knowledge and knowledge organization

This section contains seven papers posing various theories related to knowledge organization. In "Social change, modernity and bibliography," Jack Andersen (Denmark) examines the role of bibliography in the global learning society in the context of today's environment. In doing so, he defines bibliography as a document that performs a communicative activity with a particular purpose and as a genre that concerns itself with how to use bibliography and how to recognize bibliographical activity as a form of knowledge organization. He concludes that "knowledge organization theory can make an important contribution to the understanding" of many bibliographical activities in the global learning society. Judith Simon (Austria) presented a paper on "Interdisciplinary knowledge creation – using wikis in science." In it she explores "how new knowledge is created in interdisciplinary discourses and investigated and how the process might be mediated and promoted by the use of wiki technologies." She concludes that certain features of wikis have potential but that "full benefit can only be obtained if it is embedded into a broader communication situation."

Two papers in this group focus on mapping. In the first presentation, Alon Friedman (USA), in a paper entitled "Concept mapping as measurable sign," studied the various forms of concept mapping presented in papers given at ISKO Conferences in 2000 and 2004. An assumption was made "that if a relationship between the concept 'sign' and concept mapping could be discovered, this relationship then could be examined in terms of frame and semantic theory." Such a 'relationship' could not be found between styles and procedures of mapping as found in the earlier ISKO proceedings but the author recognizes this as a first attempt at this kind of analysis and, recommends the extensive analysis of cognitive strategies in future conference proceedings. In the second paper on mapping, "Knowledge map of information sciences," Chaim Zins (Israel) took a broader approach. Considering general issues, principles and impli-

cations, he explored the theoretical foundations of information science by identifying and formulating definitions for "data," "information," "knowledge," "message," and "information science," using them to analyze 28 classification schemes that had been compiled by leading scholars. From the analysis the author mapped conceptual approaches documenting what he describes as a "systematic and scientifically based knowledge map of the field, grounded on a theoretical basis." The map consists of three broad categories – foundations, resources and users, with resources being divided into seven subcategories. The purpose of the mapping was to provide readers with a better understanding of the issues and considerations involved in the foundations of information science.

Rebecca Green (USA) focuses on "Semantic types, classes, and instantiation." In doing so she carried out a preliminary investigation on semantic types and their levels of abstraction. Data taken from WordNet and FrameNet were used to examine the relationships between hierarchical levels and semantic types that name frame elements (a.k.a. slots). Four patterns were discovered and the issue at hand was to identify, locate and characterize the kinds of classes that could best serve as semantic types. "Largely this became an issue of identifying the appropriate hierarchies among candidates." Several scenarios for hierarchical levels were identified and reviewed. Then an analysis was carried out using the data from WordNet and FrameNet. A best option supported by the data was identified together with the characteristics of the levels. The relationships between the hierarchical levels and the semantic types were found to be complex. The author describes the research as preliminary and indicates that more extensive examination is needed.

In the final paper in the group devoted to theory, Clare Beghtol (Canada) addressed "The global learning society and the iterative relationship between theory and practice in knowledge organization systems." This paper builds on the assumption "that one way of achieving understanding between different cultures and from different vantage points within the same cultures is to study the relationship between theory and practice." The author examines a model derived from the work of John L. Keddy entitled "The interaction of theory with practice" and applies his approach to examples of knowledge organization systems, specifically library classification systems such as *DDC*, *UDC* and the faceted systems, and investigates how ideas "mitigate into practice and back into theory and how "best practices" emerge and come into being. Her conclusion is that such an examination can provide clues about theories and practices "that can enhance the contributions that knowledge systems make to the global learning society."

Also in this category, Agnes Hajdu Barât (Hungary) examines "Usability and the user interfaces of classical information retrieval languages." It focuses on some traditional methods of searching and their role in Hungarian OPACS. In doing so, she looks at three types of search tools – *UDC*, thesauri and subject headings – in the light of challenges to users and the techniques they employ. The key question to which she is seeking answers is "whether a universal system or local solutions is the best approach for searching in the digital environment." Her conclusion recognizes the difficulties users have with classification and raises possibility of combining classification codes with other methods of retrieval. This paper is more on uses and users than on theories and is closely related to papers in section 5 below.

3. Multilingual problems of information retrieval

Four papers were presented on various aspects of multilingual problems in the context of the global learning society. The first two focus on retrieval in multilingual settings, while the other two deal with terminology. Elaine Ménard's (Canada) paper on "Image retrieval in multilingual environments: research issues" brings together two problem areas – multilingual environments systems and image databases. As entities these topics have been given a fair amount of attention, but as the author indicates, when taken together, research is scarce. She presents a description of the two aspects and identifies the problems that exist when these factors are put together in a retrieval environment. Image retrieval is described as to its utility, user requirements and retrieval approaches and the problems that provide challenges when applied to images are identified. The products of the investigation are a number of areas that need to be subjected to further research, including the characteristics of metadata schemes for image databases, user needs and user behaviour.

Graciela Rosemblat and Laurel Graham (USA) designed a "Cross-language search in a monolingual health information system" at the National Library of Medicine. The system responds to the challenges of making an English language only health information system accessible to non-English language users. This

particular prototype responds to Spanish language users and takes advantage of English language system enhancements. The original system and the improvements are described. A failure analysis was carried out and a usability study conducted. Problems were identified and further enhancements planned. Susanna Keränen (Finland) delivered a paper on "Equivalence and focus of translation in multicultural thesaurus construction." This is a report on an ongoing Ph.D. study on problems related to multicultural social science thesaurus construction, with concentration specifically on information science. In doing so, it "deals with translation problems and indexing practices in creating multilingual and multicultural thesauri." The study is both qualitative and quantitative and perspectives are both linguistic and sociological. The aim of the study is two-fold: a) to identify different discourses and vocabularies existing in a particular domain and to see how they are considered in the multilingual environment; and b) to operationalize the concept of equivalence in multicultural thesaurus construction. The paper is descriptive of the study, setting out the theoretical framework, the research questions and findings to date. A number of arrow-graphs are included showing word associations. The final paper in this section, "Alexandria, a multilingual dictionary for knowledge management purposes" by Marianne Dabbadie and Jean-Marc Blancherie (France) describes "the only multilingual dictionary for websites and PCs" and its application to mobile devices. This is ongoing research and an application is under development. A future experiment is planned using the field of e-tourism.

4. Representations of educational and didactical knowledge

The nine papers included under this topic are somewhat disparate in nature. They deal with such topics as metadata schemes, subject access to the Internet, creation of a taxonomy, indexing, navigating hierarchies, etc. If one concept can be used to encompass the topics it would be "structure in information systems." Under this umbrella, it is possible to locate three sub-themes. These are: evaluation of schemes or systems (Jacob, et al, Williamson, Lee, Hudon, and Peńa); creation and adaptation of structures (Kwaśnik et al, Loehrlein et al, and Afolabi and Thiery); existing systems vs. the development of new structures (Pena); semantic indexing (Biagetti).

Elin Jacob, Nicholas George (USA) and Hanne Albrechtsen (Denmark) presented a paper entitled "Empirical analysis and evaluation of a metadata scheme for representing pedagogical resources in a digital library," that introduces and describes the nature of the resources that make up a particular digital library for "just-in-time teaching" (JiTT), a project which is part of a programme initiated by the National Science Foundation. The goal of the system is "to promote the development of innovative educational resources and to pioneer original methods for delivery of instruction in science, technology, engineering and mathematics (STEM)." The system is described is an analytical framework provided by cognitive work analysis (CWA). It is proposed as an innovative approach to the evaluation of the effectiveness of the JiTT metadata scheme. This is still a work in progress. However, the authors indicate that CWA is promising and they cite it for its comprehensive approach to understanding the scope and complexity of the system. Related papers on metadata can be found in section 5 (Dervos and Coleman; Zimmermann et al; Miksa et. al).

Nancy Williamson's (Canada) "Knowledge structures and the Internet" builds on previous research on the development of knowledge structures to provide aid for users searching the Internet. Specific focus is given to the structure of data in web directories, thesauri and gateways and portals as search tools. Cognizance is given to the two basic approaches to information searching – direct access and browsing – with emphasis given to the browsing aspect. The research reveals some improvement over the past seven years but there is still much to be done, for example, improvements in online thesaurus display such as to make them more effective in searching and browsing.

Hur-Li Lee (USA) explored two fundamental approaches to information seeking in "Navigating hierarchies vs. searching by keyword." Participants from two different cultures were used – American and Taiwanese students. The findings reveal differences related to familiarity with the English language but found little differentiation in their search behaviours or search preferences. This is preliminary research and suggestions for future work are included. In the area of creation and adaptation, Barbara Kwaśnik et al (USA) addressed the "Challenges in creating a taxonomy of genres for digital documents." Such a taxonomy was created for use in the experimental phase of an ongoing study "to learn about the usefulness of providing genre information to support information-seeking tasks." Challenges revealed include difficulties in identifying and naming genres, and the

problems of linking the genre identification with clues to genre attributes and purposes. Aaron Loehrlein, Elin Jacob et al (USA) described work in progress on the "Development of heuristics in a hybrid approach to faceted classification." The purpose of the research was to "identify automated methods to complement and streamline the intellectual process in the generation of faceted schemes." It describes the development of word pair, suffix and WordNet heuristics and outlines a way in which heuristics can be integrated with a manual intellectual analysis to develop a faceted vocabulary for an "initial organization of terms" from which a faceted vocabulary could then be constructed. Further it was found that a "hybrid semi-automatic approach to faceted scheme creation can combine the intelligence, context awareness and evaluative judgment of the human with the speed of processing, unlimited memory and consistency in repetition of the machine." In other words, it results in the process being more efficient and time saving.

Michele Hudon and Sabine Mas (Canada) focused on "Structure, logic, and semantics for web-based collections in education." Using home grown classification structures they analysed three dimensions – structure (number of main categories, number of levels, etc.) logic (principle of division and type of hierarchical relations) and semantics (concepts and their representation in the form of terms). They concluded that "the data gathered would allow them to add to the body of literature on the organization of web-based knowledge and to increase the understanding of how web-based resources in education are organized and could be accessed." Further research is needed to provide reliable data on conceptual coverage, terminological consistency and structural interoperability. Working in the same subject discipline as Hudon, Catalina Naumis Peña carried out an "evaluation of educational thesauri." The purpose of the research was to evaluate existing thesauri in order to decide whether to construct a new one or to adapt one already in existence. Existing thesauri and standards for data exchange were analyzed and a methodology for evaluation was proposed and compared with a virtual education platform. A basic structure for setting up the information was recommended. Not surprisingly, the authors found it difficult to locate a ready made thesaurus created with its own objectives and environment that could be used satisfactorily in another context. They concluded that their own thesaurus was needed and proposed one using three kinds of metadata to serve various purposes. This paper has some affinity with papers by Beall and Vizine-Goetz.

Babajide Afolabi and Odile Thiery (France) take a different approach in "Using users' expectations to adapt business intelligence systems." Emphasis is on the role of the user and the authors propose two models for adapting their system and describe the domain on which they are testing the models. This is a work in progress and the next phase will be to construct a metadata structure from the models which will serve as a tool in the reconstruction of an existing database. Maria Teresa Biagetti's (Italy) paper, "Indexing and scientific research needs" examines the principal problems of semantics as related to the needs of scientific research, particularly in the social sciences. The author examines four theoretical approaches – aboutness, multi-modal, request-oriented and pragmatic approaches. The conclusion was that "semantic indexing of the same books by different libraries, each one considering different views and scientific approaches, would provide a rich epistemological resource" when handled in a union catalogue. While this may have merit in a specialized field, it is a somewhat idealistic approach in the world-at-large where, mainly for economic reasons, libraries accept without change catalogue copy available from other institutions.

5. Theoretical basis of knowledge organization: universal vs. local solutions

The title of this category is somewhat of a misnomer. It contains six papers that divide neatly into two categories. Three of the presentations examine existing methods of organization and propose improvements and enhancements with specific examples (Beall and Vizine-Goetz: McIlwaine and Mitchell; and Pajarillo). The other three posit theoretical alternatives to knowledge organization in general (Tennis; Thellefsen; Qin et al). In the first group, Julianne Beall and Diane Vizine-Goetz (USA) discuss "Finding fiction: Facilitating access to works of the imagination by form and format." In doing so, the authors address "ways to assist users who are primarily interested in finding a good story." More specifically, the problem addressed is the scatter in the *Dewey Decimal Classification* (*DDC*) created by the location of literary fiction by genre in the 800 class while stories found in comic books, operas, etc are located in the 700 class by virtue of their type and form of presentation. In their search for a solution to improved retrieval, the authors combine the use of two prototype

retrieval systems, FictionFinder and the Dewey-Browser, in order to enhance retrieval. Using two universally accepted systems, in their research, Ia McIlwaine (UK) and Joan Mitchell (USA) addressed "The New ecumenism: Exploration of a *DDC/UDC* view of religion, in which they examined the potential use of the recently revised *UDC* as a basis for the future revision of the 200 class in *DDC*. As an example, the Buddhist religion was analyzed in detail. In the third paper, "A qualitative research on the use of knowledge organization in nursing information behavior," Edmund Pajarillo (USA) likens the process of home nursing care to the processes of knowledge organization. The other three papers in this group are somewhat more broadly based. Not tied to any specific system, they offer theoretical suggestions for alternative approaches to knowledge organization in general. Joseph Tennis (Canada) compares "Function, purpose, predication, and context of information organization frameworks" using a wide range of processes including bibliographical control, information retrieval, resource discovery, etc. Information frameworks are exemplified as classification schemes, ontologies, bibliographic descriptions, etc. theoretically based the paper presents, the first part of an "evaluative rubric" that represents the "first step in identifying an analytical tool for evaluating information organization frameworks." Future research will apply the rubric to different frameworks." In this same category, Martin Thellefsen (Denmark) in his theoretical paper "The dynamics of information representation and knowledge mediation" takes an "alternative approach to knowledge organization based on semiotic reasoning." In doing so, he addresses the distance between domain specific terminology and knowledge organization systems (KOS). The mediation process is set out in detail, with the goal to improve retrieval by reducing the distance between domain terminology and the knowledge system. In the final paper, Jian Qin et al (USA) on "Adaptive modeling of workforce domain knowledge" describes the building of a semantic base using an adaptive modeling approach. Emphasis is on how designers should extract and model concepts and consider what methodologies are useful in developing ontologies.

6. Users and uses of knowledge organization

Again the title of the category requires some explanation. The six papers contained in this group are not about users per se but rather about the *development of improved systems* to meet the *"needs of users."* Two of them are domain specific; three investigate types of systems, and one focuses on education for knowledge organization. Maria Lôpez-Heurtas describes a "Thematic map of interdisciplinary domains based on their terminological representation." Here, she addresses the difficult domain of gender studies – a discipline fraught with problems in many information systems. The data was based on six hundred documents on gender studies in the Spanish language. The documents were retrieved from the Internet, a national library catalogue and a large university catalogue using the terms *feminism*, *women*, *woman* and *gender.* Free key words were assigned following examination of the documents. Description and terminology extracted was added to a database and the terminology was examined for its characteristics and its relationship to other disciplines observed. Edmund Pajarillo's (USA) paper "A Classification scheme to determine medical necessity" deals with classification for home nursing care scenarios and is closely related to the author's paper in section 5 above. It is the application of classification to the subject of home care nursing with an attempt to address the question "Can home care nurses use a classification scheme to determine medical necessity of home care services for their clients?" The research is explorative and designed to pilot a classification scheme for nursing. The paper displays a three level concept map of the classification. In keeping with the general theme of the conference, the scheme is put forward as an example of "how knowledge organization concepts" may be viewed as global learning applications" in a domain specific discipline such as nursing.

Kathryn La Barre's (USA) "A multi-faceted view," focuses a two-fold investigation on the "use of facet analysis in the practice of website organization and access." This ongoing research investigates the use of the FAST system of subject representation in website design. Two methods are used to collect data – the examination of 200 websites and unstructured interviews of eighteen practitioners on their understanding of the FAST system and its use. The ultimate goal will be a set out guidelines for the system's use in the development of websites. Xia Lin et al (USA) take a somewhat different approach in their paper on "Dynamic concept representation through a visual concept explorer." The authors begin with the assumption that ultimately systems must be able to organize the data automatically and that the displays will allow bibliography, museum and users to be interactive. For purposes of the research they have con-

structed a prototype system that generates concept maps in response to users' requests in an interface between users and the literature. An illustration of a concept maps is included. In a completely different type of research Victoria Francu (Romania) addresses "Subjects in FRBR and poly-hierarchical thesauri as possible knowledge organizing tools." Her research is responding to an identified need for a more extensive treatment of the subject authority requirements in a revised version of the FRBR (Functional Requirements of Bibliographic Records) and the FRAR (Functional Requirements of Authority Records) with respect to subjects. Specifically, work is needed with regard to the entity-relationship model particularly semantic and syntactic relationships. She investigates a conceptual model of poly-hierarchical thesauri as a possible structure for the purpose. In her analysis she used UDC as well as thesauri. This paper is related to the presentation by Salaba et. al and Miksa et al in section 1 above.

Finally in this category, a paper by Steven Miller et al (USA) entitled "Great expectations: Professionals' perceptions and knowledge organization curricula" uses library and information science education to analyze the age-old problem of the gap between librarians' expectations of skills in knowledge organization and what is taught in accredited masters programmes across North America. This paper shows evidence of extensive research and is the only paper on this topic in the proceedings. Is there a mismatch? The author's answer is "a partial 'yes' and a partial 'no'." and includes an explanation of this conclusion.

7. Ontologies

Strange as it may seem in a time when "ontologies" is an extremely popular topic only two papers on that subject are wholly dedicated to the topic, although the topic is mentioned in other papers. Richard Smiraglia (USA) in "Empiricism as the basis for metadata categorization" expands the case for instantiation to archival documents. Instantiation is defined as a work existing "whenever it is manifest in physical form (in a book for example)." As described by the author, in this paper "a sequence of research projects is summarized to demonstrate the value of empirical observation in the creation of metadata for ordering collocated instantiations." Three research studies have been carried out using data from: bibliographical works taken from the OCLC and RLIN databases; a set of unique Etruscan artifacts from the University of Pennsylvania Museum of Archeology and Anthropology; and the personal papers of a midshipman from the library of the U.S. Merchant Marine Academy. Background material includes a discussion of the history of empirical research methods in knowledge organization and empirical research and instantiation are linked. The products of the analyses are three ontologies illustrated in a comparative table. "In all three cases instantiation enriches the resource base. The author concludes that "these results demonstrate the importance of the phenomenon of instantiation for the design and implementation of information systems." In addressing metadata this paper has an affinity with papers in section 1 by Miksa et al and Dervos and Coleman, and Jacob et al in section 4.

In the second paper on ontologies, "Hierarchical relationships used in mapping between knowledge structures" Carol Bean (USA) analyzed user-designated Broader-Narrower term pairs in order to characterize the nature and structure of the relationship between pair members. Semantic analysis revealed two types of relationships – *kind-of* (72%) and *part-whole* (28%). A generous list of both types of relationships is included. Findings "clearly indicate that humans use a variety of different mechanisms to determine close conceptual relations." Further, from her findings, the author warns that this has implications for automated mapping of terminologies and the aligning of ontologies such that in their design and construction a variety of types of conceptual relationships should be accommodated. This group of papers illustrates the broad approach to categorization in these proceedings. Smiraglia is dealing with categories of implementation whereas Bean is categorizing words.

8. KO for non print multimedia

The two papers in this category reveal how far the issues related to multimedia have come since their first introduction into bibliographic control in the 1960s when the primary concern was bibliographical description. Francisco Javier Garcia Marco (Spain) addressed the problem of "Understanding the categories and dynamics of multimedia information." In doing so, he proposes a model for analysing multimedia information. The context for his study is the theory of communication and he begins with a complex map of communication science. Multimedia messages are analyzed based on the model dealing "with communications channels and tools: still images, movies, sounds, texts, texts with illustrati-

ons, audiovisuals and interactive multimedia with an emphasis on non-textual documents." The global properties of the multimedia message are addressed. The author points out that the "multimedia environment has great potential to promote a wider theory of knowledge organization bringing closer distant fields like scientific and fictional indexing or verbal and image indexing." In the second paper "Flickr and democratic indexing: Disciplining desire lines" Rob Hidderley and Pauline Rafferty (UK) consider three models for subject indexing and compare and contrast two indexing approaches – the democratic indexing project and Flickr, a working system for describing photographs. The systems used were both described.

9. Linguistic and cultural approaches

In this final category there are three papers. One paper deals with linguistic issues, one deals with cultural issues and the third deals with both. Blanca Rodriguez Bravo (Spain) presented research on "The visibility of women in indexing languages." This research is an analysis of how gender matters are handled in indexing languages using examples from the *Library of Congress Subject Headings* (LCSH), the *Unesco Thesaurus* (UT) and the *European Women's Thesaurus* (EWT) and is based on the entries for "*Man/Men*" and "*Woman/Women*" and their subdivisions as well as the related terms contained in these entries. Extensive examples are included. Not surprisingly, a lack of symmetry was found and recommendations are made for upgrading to equal status. This paper is related to another on the discipline of women's studies by Maria Lopez-Huertas in section 6.

In a second paper in this group, Florian Kohlbacher (Japan) researched "Knowledge Organizaton(s) in Japan: Empirical evidence from Japanese and western corporations." He presents some insights from a current project on knowledge transfer, creation and sharing in a cross-cultural context. Data was collected through "qualitative interviews" with company managers and corporate staff over the years 2005 and 2006. Recent critical issues are identified and differences in Japanese and western approaches to knowledge management and creation are analyzed. Factors considered include the knowledge transfer process within multinational corporations and the critical issue of knowledge retention. In the final paper, Ann Doyle (Canada) discussed "Naming and reclaiming indigenous knowledges in public institutions: Intersections of landscapes and experience." It begins with the name if an indigenous people in northern British Columbia, Canada – the *Musqueam* – for which there was no authorized name used in a university library catalogue. It then explores the issues of the classification of indigenous peoples in the context of library classification theory. The goal is "to examine theoretical foundations that may serve to guide the design, development and evaluation of classifications for describing indigenous knowledge in library collections.

Conclusion

A scan of thisvsummary indicates that the conference indeed presented a varied program. Overall perhaps there were fewer papers that were precisely focused than those presented at previous conferences. However, collectively the goals focused on theories, tools and methods for improving existing systems or designing alternative approaches. It is inevitable that some topics, such as metadata, permeate the whole conference and have implications for areas of research. Other topics that constantly appear are related to vocabulary and language – ontologies, classification, semantics, etc. Always striking are the papers originating in other disciplines such as nursing and business, whose authors are seeking to use the theories and practices of knowledge organization as models for organization and processes in those disciplines. This is a positive sign demonstrating the potential for generalizing theories and methodologies for knowledge organization to other disciplines. There was one "orphan" paper on library and information science education. True, the theme was global learning, but in a different sense. Another unusual inclusion was three papers dealing with FRBR. One was a report of activities the IFLA Working Group and not research per se, but the other two were on subject authority control, which was more germane to the nature of ISKO conferences. It is inevitable that specific topics become scattered. A precise topic can be dealt with from many points of view, placing papers on the same topic in different categories. There is nothing wrong with this but a good index would counter the scatter and aid readers in use of these proceedings. Nevertheless, despite a few shortcomings this volume is a valuable addition to the research agenda of KO.