Current Trends in Knowledge Organization (1)

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0.1. Resumen

Estado de la cuestión sobre los avances y tendencias recientes de la investigación en Organización del Conocimiento. En primer lugar, se traza una introducción histórica, en la que se consideran los antecedentes de la situación actual: la investigación sobre tesauros, el impacto de las ideas de Ranganathan y el nacimiento de ISKO (International Society for Knowledge Organization) en 1989. Seguidamente, se define el concepto de Organización del Conocimiento, y sus conceptos fundamentales. De cara a conocer la situación actual, se analiza la producción científica reseñada en el 'Knowledge Organization Literature', suplemento de la revista *Knowledge Organization*. Los resultados muestran la creciente importancia de los temas de representación y organización automatizada del conocimiento, incluidos los sistemas de clasificación, la necesidad de un tesauro universal, la búsqueda de nuevas estructuras para la organización del conocimiento y la preocupación sobre la calidad en indización y catalogación temática. Se recomienda una colaboración más estrecha con los terminólogos dentro de los criterios del análisis facetado, considerado el principal patrimonio de la disciplina.

Palabras clave: Organización del Conocimiento. Análisis bibliométrico. Historia de las Ciencias de la Documentación. Teoría de la Clasificación. Tesauros. Automatización de centros de información.

0.2. Abstract

State of the art about the recent advances and trends in Knowledge Organization research. Firstly, a historical introduction is traced, where the backgrounds of the current situation are considered: the thesaurus period, the impact of Ranganathan's ideas and ISKO foundation. Thereafter, Knowlege Organization is defined, toguether with its basic conceptual frame. In order to reach an understanding of the current situation, it is offered an analysis of the scientific production reviewed in the supplement 'Knowlege Literature', published in the journal *Knowlege Organization*. Results show the increasing impor-

tance of knowlege organisation automation research —including automating universal classification schemes—, the cry for a universal thesaurus, the pursue for new conceptual structures for knowlege organization, and concern on the quality of indexing and subject cataloguing procedures. Finally, a close cooperation among terminologists and knowlege-organization researchers is recommended, in the frame of facet analysis, which is considered the main achivement of this discipline.

Keywords: Knowledge Organization. Bibliometrics. History of Information Science. Classification Theory. Thesauri. Information centers automation.

1. Historical Introduction

1.1. The Thesaurus Period

Before we can go into the details of our topic, we should first explore a little bit of the history of our present situation starting some 30 years ago.

When in the very early sixties the first thesauri were created in USA, e.g. the ASTIA and the EJC Thesaurus, it so happened that during the FID Congress in Washington, 1965, a few German information science leaders and specialists decided to establish within the German Documentation Society a Committee for Thesaurus Research. Back home this idea was realized and the committee's work began with the establishment of guidelines, on how a thesaurus should be defined (Dahlbeg, 1966), constructed, maintained, and used. This led to the production of numerous thesauri and numerous books on thesauri (2) in a number of languages in many countries as well as to the corresponding standards, national and international ones (Soergel, 1969; DIN 1463, 1972). Actually, what I would like to call "the Thesaurus Period of Knowledge Organization" has not ended yet but its life-time seems now to get into fairly old age.

My work as secretary of the German Thesaurus Committee ended after 12 years in 1977 when it became obvious that we had failed already for many years to recognize the necessity of reconsidering what had been given up when turning entirely to the natural language approach —as against the former notation-oriented approach characterized by the use of the well-known classification systems, the UDC, DDC, LCC, etc.

We had missed indeed in Germany to note what had been going on in England as far back as 1968 when Jean Aitchison produced her first faceted thesaurus (Aitchison, 1969), her Thesaurofacet for the English Electric Company in which she applied the theories of Ranganathan's Colon Classification and into which she incorporated also the experiences gathered by the British Classification Research Group. This Group had in the early sixties received a grant from NATO

in order to establish a new universal classification system on the basis of general categories. The research started in 1963 but failed after some years (Foskett, 1970) of explorations with the conclusion that it did not seem possible to use this theory for the construction of a new general system. Jean Aitchison therefore stated expressly (3) (Vickery, 1966) that one needed to consider the disciplines as main classes of departure in this attempt, and since the thesaurus of the English Electric Company would cover a number of disciplines —as did her later work for the UNESCO Thesaurus— we find this disciplinary approach from the former "outworn" classification systems appearing again in these new thesaurus creatures. In other words, the inductive approach of thesaurus making, starting from terms and building up on this basis the concept sets with their broader and narrower and related terms, as well as their language equivalents in the form of synonyms and near-synonyms, was complemented with the deductive approach with disciplines as starting points and their possible conceptual framework.

1.2. Classification Reconsidered

In order to further explore these ideas and apparent necessities we left the Thesaurus Committee to the German Documentation Society and founded in 1977 the Society for Classification meant to comprise all those concerned with the study and application of all approaches to classification —be it by its inverted sense in thesauri, or in their faceted way as presented in the British thesauri mentioned —and even by the taxonomic approach for the ordering of objects, like in botany or zoology, etc. and the approaches of numerical taxonomy (Sneath/Sokal) using the formal, mathematical methods for the recognition of classes of objects according to their characteristics.

Another twelve years of annual conferences, with a lot of proceedings volumes (*Studien zur Klassifikation*), 17 altogether, and some working group activities followed. However, this work did not lead us to a common consensus; rather —to make a long history short —it unfortunately ended in a splitting-up of our different approaches: the mathematicians in this German Classification Society became dominant, "conquered" so-to-speak the majority of the seats in the Council of the Society and expected that under their guidance our concept-oriented approach could prosper equally.

You can imagine what happened? We decided to leave the Society for Classification to the mathematicians and statisticians with their cluster and data analysis methods and founded a new society, this time under the broader heading of knowledge organization, indicating that the concept of 'classification' was rather to be interpreted as a method of classifying, that is grouping together what belongs together, whereas 'knowledge organization' would more comprehensively include the entire frame of how knowledge can be understood, organized,

described, and represented in such a way that it can be properly accessed and made available for anyone seeking it. Thus, the International Society for Knowledge Organization was founded in 1989 (Dahlberg, 1989) with the purpose of reaching out to our interested colleagues in other countries as well.

1.3. Knowledge Organization on its Way

Actually, the term 'knowledge organization' in its other form 'organization of knowledge' was framed long ago already in the thirties in Evelyn Bliss's work "The Organization of Knowledge in Libraries" (Bliss, 1933) and has since then continued to be used here and there. Dagobert Soergel's dissertation (in German) of 1971 was thematized in a similar way by "Organization of Knowledge and Documentation" (Soergel), 1971, as was my dissertation of 1973, published under the title "Foundations of Universal Organization of Knowledge" (Dahlberg, 1974).

Our journal, which was started in 1974 under the title "INTERNATIONAL CLASSIFICATION", became the organ of the new Society and as of this year, 1993, changed its name into KNOWLEDGE ORGANIZATION to comply with this broader heading and the intentions behind it (Dahlberg, 1993).

2. What is Knowledge Organization?

2.1. What is Knowledge?

There are many attempts in these times to define what is to be understood by 'Knowledge'. None of the definitions has been satisfying for me, except the following one of which I do not have the source available anymore, saying

"Knowledge is the subjectively and objectively conclusive certainty (Gewißheit) of the existence of a fact or of a state of a case. Knowledge is not transferable. It can only be acquired by somebody through his or her own re-thinking".

Indeed, we cannot grasp this "certainty" of something but we can form —and have done so always in history— socalled 'knowledge units' of something and such units can be handled, very effectively indeed.

2.2. How will Knowledge Units come into Being?

Let me explain to you very briefly what has been published already here and there (Dahlberg, 1978a) as the socalled "Referent-oriented, Analytical Concept Theory". From this title you see already that we are dealing with concepts when speaking about knowledge units. Indeed, by referring mentally to any item of reality or also irreality and by making statements, predications about this item of reference, we are showing what we know about this item and are generating by this demonstration the elements of the concept we are forming through such sta-
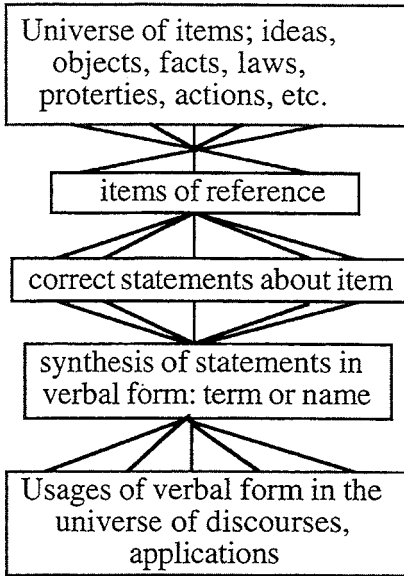
Fig. 1. Model for concept construction

tements. The number of necessary and true statements about one item of reference are then the number of knowledge elements, also called characteristics of our knowledge unit, the concept. Thus "referent-oriented" implies that there must always exist something in the real world or in our mind to be predicated; and "analytical" implies that by the different statements on the item of reference we are determining already the single characteristics which our concept in question is possessing. What remains to be done is to determine the essential characteristics and to summarize these into a fixed designation. This we will not explore here further.

As a model of this generation or construction of a new concept I am using Figures 1 and 2. The reconstruction of a concept already "in use" can follow the same lines, it needs, however, an extension by using a matrix for the statements and the occurences of the statements in different sources, see also (Sartori, 1984).

Conclusion: Knowledge Units come into being by true and essential statements about any referent and their synthesis into the form of a designation (a code, a term, a word, or a name).
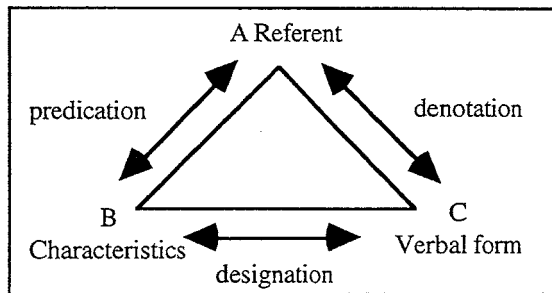

Fig. 2. Concept triangle, the formal representation of a knowledge unit

2.3. How can Knowledge Units be organized

There is a sort of self-organization inherent in concepts if their characteristics can be made explicit and related to each other —we are speaking here of the analytical judgments/statements of Immanuel Kant, for example:

The concept of 'conference' can be explicated by making the following statements:

A conference

— is a gathering of people

— in a certain subject field

— for a certain purpose

— at a certain place

— at a certain point in time

From these statements we can derive the following characteristics:

— gathering of people

— subject field

— purpose

— place

— time

and correspondingly socalled generic or abstractive concept systems of "conferences" can be generated according to

— kinds of people

— kinds of subject fields

— kinds of purposes

— geographic locations

— time periods (years, months, and days)

And we can also derive other kinds of concept systems from 'conference', viz. according to the components or parts of a conference which are then called 'partitive concepts systems'. Thus we can state that a conference exists of

— a number of persons with different responsibilities

— having a special location (e.g. university, research center)

— having a secretariat

— having certain facilities (rooms, furniture, equipment),

— etc.

In such a way a *general concept*, like 'conference' can be organized into general and specific concept systems. However, if we are dealing with an item of reference that can be stated to be real and actually existing in space and time, then we have to add to the general predications and their characteristics also the statements about the actual location and the actual dates, that is, the individualizing characteristics to create the *individual concept* in question.

Thus you see what is involved in establishing concept systems and what should be involved in creating classification systems which truly correspond to our knowledge of the items of our reality.

We can go on from here and say that these two types of systems, which were indeed already anticipated in the "Logic of Port Royal" of 1662, when Antoine Arnauld (1964) distinguished between division and partition (chapt. 5 and 6) and which we now call hierarchical systems, can be fruitfully applied to the establishment of concept systems of knowledge fields such as disciplines or subject areas if we consider such a field or area as wholes characterized by their parts. Thus, philosophy of science recommends to analyse such a field by determining its object or objects of concern as well as its range of activities exerted upon these objects. Here we see how well-founded Ranganathan's ideas were to analyze his 31 main classes (being disciplines) into groups of concepts —he called them facets —which relate to these kinds of categories, named 'Personality' and 'Energy' by him (Ranganathan, 1967). These are practically the representatives of the subject and the predicate of a sentence. And since every subject field contains of course always more concepts than just those of objects and activities according to the different kinds of propositions which can possibly but also specifically be made in each field, one needs to extend the two facets of objects and activities accordingly by all those facets of concepts demanded by the inherent characteristics of such objects and activities. Ranganathan called these his "rounds and levels" and established his facet formulae for each one of his main classes (Ranganathanm, 1933). We tried to find a general formula for the partition of a subject group and called it "Systematifier" (Dahlberg, 1978b, p. 42). It needs probably also an extension for use in the deeper structures of the more specific fields of a subject group.

The concept systems thus to be generated are based on the partition relationship, however, the sequence of the parts obey what we called the "Functional Relationship", just as any syntagmatic structure contains a function of its logical subject and logical predicate as well as also the complements of its predicate (Dahlberg, 1981).

As an example let us take the field of Librarianship. Here you have:

books, documents	objects	
cataloguing	activity	necessary,
rules	tools	general
for retrieval	purpose	concepts
in special libraries	environment	
		facultative,
in Spain	location	individualizing
1993	time	concepts

This is only a very rough and easy example. But it can show the relationship to the Colon Classification of Ranganathan and should help us to envision how the concept systems of the future should be established in order to comply with the possible propositions —and consequently with the possible new knowledge, that is information, contained in documents. We have to consider this in order to counter-act the prevalent laisser-faire attitude of the computer-industry which offers free-text systems en masse without considering the fact that we can never find the needle in the haystack if we search for expressions of concepts without knowing how authors might have disguised them in their terms and if —in addition— we have no access to the syntagmatic context of the concepts in question (Fugmann, 1992).

3. Current Trends in Knowledge Organization

3.1. Some Statistics from Knowledge Organization Literature

Most of you probably know the current bibliography in our journal which is now called *Knowledge Organization Literature* and which presents in almost each issue some 400 to 500 references, sometimes even with abstracts, of our pertinent literature in a systematic order.

In order to acquire some idea of what may be current trends from the point of view of literary production I counted the references included in the issues of 1991, 1992 and of 1993 according to this outline (leaving out the group 0 which are documents according to form) (see the next page) and made some interesting detections.

By explaining this I will also show you that with the subdivision of the 9 groups this outline follows the Systematifier principle mentioned above for the subdivision of a knowledge field, which are the following here:

1	Theoretical Foundations and General Problems	430
2	Classification Systems and Thesauri Structure and Construction 468	
3	Classing and Indexing (Methodology)	655
	Subtotal	1553
4	On Universal Classification Systems and Thesauri	227
5	On Special Objects Classification Systems (Taxonomies)	20
6	On Special Subjects Classification Systems and Thesauri	209
	Subtotal	456
7	Knowledge Representation by Language & Terminology	874
8	Applied Classing and Indexing	311
9	Knowledge Organization Environment	208
	Subtotal	1393

The majority of references (1553) occur in the first three subdivisions, these are the foundational facets in our field with a tendency to increase from theory and general aspects via the objects of concern and the activities. The second three —the application of the knowledge units of the first three to universal or special object and subject field systems make up only a fraction of the first three facets with 456 items altogether and reveal that the compiler of this bibliography may not have had access to the sources informing on mere object oriented systems, taxonomies, since only 20 of them are listed. The latter three facets show that problems of language and terminology including here also the formerly socalled "Question-answering systems" —now the online procedures— as well as expert systems, etc. are by far ahead of our current literature production, numbering 874 references. The groups 8 and 9 contain 311 and 208 references respectively. Altogether the last three groups were represented by 1393 items.

The following subfacets are having more than 50 references: 12, 14, 15, 21, 22, 23, 24, 25, 31, 32, 33, 34, 357, 38, 387, 39, 42, 43, 44+448, 48, 65, 72, 75 (751, 756, 757). 76, 77, 78, 81, 88, 92.

The facets with over 70 references are: 25, 31, 34, 39, 48, 72, 75, 77, 78, 81, 92.

What cannot, however, be shown by the outline are such cases where we had to make a further breakdown because of a sudden occurrence of new literature — and this may be indicative indeed of "current trends" in our field. These are the following, the amounts of occurrences are contained in their two-digit numbers:

| 124 | Knowledge Acquisition |
| 247 | Relational Databases |

Knowledge Organization Literature

Statistics of references occurring in Nos.91-1/4, 92-1/4 and 93-1/4
of the current bibliography in the journal KNOWLEDGE ORGANIZATION

0 Form Divisions
01 Bibliographies
02 Literature Reviews
03 Dictionaries, Terminologies
04 Classification Systems & Thesauri
05 Periodicals and Serials
06 Conference Reports, Proceedings
07 Textbooks (whole field)
08 Other monographs
09 Standards, guidelines

1 Theoretical Foundations and General Problems
11 Order and Knowledge Organization (KO)   74
12 Conceptology in KO   62
13 Mathematics in KO   48
14 Systems Theory and KO   62
15 Psychology and KO   65
16 Science and Knowledge Organization   32
17 Problems in KO   44
18 Classification Research (CR)   26
19 History of KO   17

2 Classification Systems and Thesauri (CS&T).
Structure and Construction
23 Construction of CS & T   64
24 Relationships

5 On Special Objects CS (Taxonomies)*   20
51 On Taxonomies in Area 1 (ICC)
52 On Taxonomies in Area 2
53 On Taxonomies in Area 3
54 On Taxonomies in Area 4
55 On Taxonomies in Area 5
56 On Taxonomies in Area 6
57 On Taxonomies in Area 7
58 On Taxonomies in Area 8
59 On Taxonomies in Area 9

6 On Special Subjects CS & T*
61 On CS & T in Area 1 (ICC)   4
62 On CS & T in Area 2   7
63 On CS & T in Area 3   7
64 On CS & T in Area 4   27
65 On CS & T in Area 5   50
66 On CS & T in Area 6   24
67 On CS & T in Area 7   15
68 On CS & T in Area 8   28
69 On CS & T in Area 9   47

7 Knowledge Representation by Language and Terminology
74 Grammar Problems   17
75 Online Retrieval Systems & Technol   329

25 Numerical Taxonomy · · ·
26 Notation. Codes 34
27 Maintenance, Updatg.& Storage, CS & T 23
28 Compatib. & Concord. betw Index.Langg. 9
29 Evaluation of CS & T 16

3 Classing and Indexing (C & I) (Meth.)
31 Theory of Classing and Indexing 79
32 Subject Analysis 52
33 Classing and Indexing Techniques 59
34 Automatic Classing and Indexing 133
35 Manual and Automatic Ordering 108
36 Coding 19
37 Reclassification 8
38 Index Generation and Programs 113
39 Evaluation of Classing and Indexing 74

4 On Universal Classif. Systems and Thesauri
41 On Universal Systems in General 11
42 On the Universal Decimal Classification 58
43 On the Dewey Decimal Classificationq 54
44 On the Library of Congress Classif. and the Library of Congress Subject Headings 61
45 On the Bliss Bibliographic Classification 4
46 On the Colon Classification 9
47 On the Library Bibliograph. Classification 12
48 On Other Universal CS and T 88
49 free

75 Online Retrieval Systems & · · · 100
76 Lexicon/Dictionary problems 52
77 Problems of Terminology 230
78 Subject-oriented Terminology Work (TW)* 74
79 Probl. of Multilingual Syst. & Transl. 13

8 Applied Classing and Indexing (C & I)***
81 Gen. Probl., Catal., Guidelines, Rules 85
82 Data Classing and Indexing* 14
83 Title Classing and Indexing 13
84 Primary Literature C & I (except 85) 40
85 (Back of the) Book C & I 26
86 Secondary Literature C & I 23
87 C & I of Non-book Materials 47
88 C & I in Subjects Fields* 113
89 C & I in Certain Languages 63

9 Knowledge Organization Environment
91 Professional and Organizational Problems in General and in Institutions 9
92 Persons and Institutions in KO 81
93 Organization of C & I on a Nat. and Internat. level 29
94 free
95 Education and Training in KO 21
96 Legal Questions -
97 Economic Aspects in KO 11
98 User Studies 38
99 Standardization in KO work 19

* Subdivisions of 048-, 5, 6, 78, 82, and 88 according to the Information Coding Classification (ICC) described and displayed in Int.Classif.9(1982)No.2, p.87-93 and in the Int. Classif. & Indexing Bibliography, Vol.1, 1982. A further division of the above scheme was published in Int.Classif.12(1985)No.3, p.147-151. It has been amended in the meantime and published in the Annex to an article in Knowl.Org. 93-4.

** CS & T stands for Classification Systems and Thesauri; *** C & I stands for Classing and Indexing

343   Automatic Classing and Indexing Techniques

356   Hypermedia, Hypertext

357   Document Structuring (SGML), etc.

715   Artificial Intelligence

725   Semantic Networks

753   Online Activities, Query Optimization

756   Classification Systems and Thesauri in Online Systems

757   Expert Systems

814   Rules, Codes for Subject Cataloguing

I guess that you will not be surprised about these latter results. These subjects should be well-known to all of us and we would only wonder if they would not result in a respective number of documents.

3.2. CD-ROM, the Big Chance also for Universal Systems

When in 1984 a project toward computerized retrieval of the DDC notations was undertaken at the OCLC, a new era began for the old classification systems (Markey and Demeyer, 1986), finding its present realization in the fact that DDC-20, now 120 years after its introduction, is available on CD-ROM and can be used as such. Forest Press sells it under the name *Electronic Dewey* and I would like to cite from the advertisement:

Electronic Dewey features advanced online search and windowing techniques, full-text indexing, a personal notepad, LC subject headings linked to DDC numbers, and a database that includes all the latest DDC changes. Users can view and browse headings displayed in the context of the DDC hierarchy and see a sample cataloging record for the most frequently occurring subject heading associated with a classification number.

Along with the compact disc and system software, the *Electronic Dewey* package contains a user guide, which explains and illustrates the use of the software in the context of Dewey. A set of hands-on exercises teaches three basic approaches to using ELECTRONIC DEWEY. Also included are a setup guide, which provides information on installation and setup, and a quick reference guide. For libraries which do not have the necessary equipment, an *Electronic Dewey* workstation will be available at a special price of $2,450. The workstation includes E*Electronic Dewey* plus a stand-alone Wyse 386sx/25 personal computer, an internal Hitachi CD-ROM drive, and a color monitor."

The respective development of the new UDC medium edition, now administered by the new UDC Consortium, will surely follow this development as it has recently been brought into a machine-readable version (March 1993). A socalled Master Reference File (MRF) has been created with some 60.000 class numbers in all subject fields in the English language. But what is really unbelievable are

the prices for which this is to be sold: One has to pay more than $3.000 for this version if one does not subscribe to the updating versions. It seems to me to be prohibitive for any further use, especially as compared with the DDC offer which *includes* an entire 386 PC + monitor and many more attractive items with it.

But these are questions of the market and will consolidate —hopefully— after some time of experience. In this case again the user will profit from the competition of the systems. This holds also for the other existing universal schemes, such as the Library of Congress Classification (LCC), the Russian Library Bibliographical Classification (LBC), the Colon Classification and the new edition of the Bliss Classification. For the LCC and the LBC their unusual size might create the greatest problems whereas the latter two will have to struggle still with the necessary ongoing revision and completion work.

3.3. The Cry for the Superthesaurus

What would be the preconditions for a Universal Source Thesaurus, that is a machine-held version of all the existing thesauri? This idea had been outlined in D.Soergel's book of 1974 (Soergel, 1974), but only some three years ago a project of the European Communities was to tackle this problem in a pilot study (Stern and Rischette, 1991), unfortunately so far without further result. Nevertheless, librarians —and other people as well— need something better than their existing subject-heading lists and wonder, how these can be transferred into such systems as in use in the documentation centers. On the other hand, information scientists realize that their tools of a controlled language are getting more and more obsolete if they are not constantly updated; but exactly this constant updating brings with it a constant growth so that these thesauri might experience one day the same kind of death as those animals in prehistory: dinosaurs are said to have had to die because the structure of their bodies would not comply with their growth. A week ago, on Oct. 26, 1993, we had a workshop in Germany on a new kind of thesaurus, viz. one that is not related to a certain store of documents but conceived in a universal way just like the dictionaries of linguists (4), that is, in alphabetical order. I have my doubts about the success of this idea, if it will not be based on a faceted structure. The bigger something grows the more structure is necessary to hold it in good balance.

Another thing are at present the attempts to coordinate the existing thesauri and classification systems in one major field, such as in medicine the UMLS, the Universal Medical Language System, and a similar undertaking in agriculture. Also for the fields of the environmental sciences a metathesaurus is being constructed in Austria (*Expert Meeting "Environmental Data Catalogue"*, 1993). It looks as if this development, already anticipated in the recommendations of 1971 for the UNISIST Programme, to establish compatibility between the existing the-

sauri of one subject area, will finally find its solutions (UNISIST Report, 1971).

3.4. How to Find Better Structures?

The question arises where and how to find better structures for thesauri and classification systems? One of the most exciting papers given at the 5th FID/CR Conference in Toronto, June 1991, was the one by Rebecca Green on the development of a frame-based structure for thesauri (Green, 1992), exemplified —by the way— by some statements of the New Testament. The search for the structures of knowledge can also be traced in some papers of the recent 4th ASIS/SIG/CR Workshop in Columbus, Ohio (Smith, Beghtol, Fidel y Kwasnik, 1993). At the 3rd German ISKO Conference last week Josef Zelger showed that even fantasies, dream-like stories can be analyzed and interpreted with regard to their structures (Zelger, 1993). Of course, anything emanating from human beings must show a sort of a structure, as we are structured ourselves. Any sentence we are producing shows structure and it seems that this is dependent on the inner state of somebody, on the harmony with the infinite. Imagine only the sentences somebody utters when being in the state of utmost excitement! In 1980 we organized within the Society for Classification a conference in Salzburg, entirely devoted to Knowledge Structures and Order Models (Dahlberg, 1980) with wonderful papers showing also structures in nature and art. Here I could go on speaking of a conference once organized by R. Wille on Symmetry and also on an article by György Doczi of 1986 (Doczi, 1986). But back to our speciality: It seems for me that the categories and their relationships which were explored already so early in our recent history by Eric de Grolier (1962), Perreault (1967, 1969) and others should be reexamined in order to be applied in constructing better future faceted classification systems.

3.5. New Programming Techniques

As I am not a programmer, any of my statements on these developments must necessarily be read with caution. But the developments are obvious. The fashion word here is "Object-oriented programming" and much has already been written on Object-oriented Data Base Management and the like (Thompson, 1991). The idea is to have well-structured material for possible reuse. Thus, the possibility to reuse parts of existing programs has found quite some expression in the literature and resulted even in a dissertation which established a faceted classification system for such a reuse (Albrechtsen, 1992). We were happy that at our First International ISKO Conference in Darmstadt, 1990, one of our main speakers who happens to be the organizer of our Third International ISKO Conference in Copenhagen, 1994, gave a paper on the findings of her dissertation in this field (Albrechtsen, 1990).

3.6. What about Improved Quality in Indexing and Subject Cataloguing?

Some years ago much good work was devoted to string indexing, to name the investigations of Elaine Svenonius and her former student and now professor T. C. Craven in London, Canada. It seemed to have been motivated by the work on the British PRECIS system (PREserved Context Index System) (Austin, 1984). Although this latter is still in use, no literature has been produced on it any more in recent years. Instead a workshop at the Library of Congress explored the possibility of reinventing precoordination of subject headings *(The future of ...,* 1991) and a Working Group of the IFLA Section on Classification and Indexing is attempting to finalize principles for an adequate form and use of subject headings. Many of the papers presented at the recent conference of this group at Lisbon were meant to reflect these ideas which were summarized on the last day by Julianne Beall with regard to their actual pertinence (5).

Improved indexing quality has also been the aim of the recent book by Robert Fugmann on "Subject Analysis and Indexing", his socalled "Bloomington Lectures" (Fugmann, 1993). We hope to hear more about the concept of Quality concerning all aspects of our profession next year at ISKO Conference in Copenhagen (6).

3.7.. Indexes and Electronic Publishing

A book review of our first two volumes *Advances in Knowlege Organization* by P. A. Cochrane (7) claimed that although we had published the Navigational Index to our proceedings on diskette we should have made available the entire volumes also on this medium in order that one can make use of the Index together with the text in the same medium. Now, here we are well in futureland. Our journal exists already in machine-readable form although not as yet offered as such, the book series may follow if there is demand. So far we must state that our colleagues do not seem to be too much interested in reading the books; will they find the time to read them on a screen?

Let us wait and see, we are prepared to help in any respect to shape a better access to our knowledge.

4. Perspectives

After this promenade along features of recent developments let me add some hopes for the creation of future developments in our field.

There has been much interest shown recently from the part of terminologists to get acquainted with the practices of classification for an improvement of terminological systems. A paper presented by Lynne Bowker at the Conference on Terminology and Knowledge Engineering (TKE'93) in Cologne this August is

an example for what one could call the "reinvention of the wheel" as she used faceted classification principles unaware of their existence and naming and spoke of "Handling Multidimensionality in a New Generation of Term Banks" (Bowker and Meyer, 1993). The work by Fred Riggs should also be mentioned in the context of a possible collaboration with the improvement of glossaries (Riggs, 1982, 1991). He pleads for a better understanding of the need for descriptive terminology in the social sciences where every scientist wants to use his own terminology. The remedy to this apparent desaster is the socalled anasemantic glossary which does not start with terms to be defined but with definitions to which the terms used to express the respective concept have to be added. One needs of course a well-designed classification system to place the definitions of concepts in a consistent order.

In both cases, knowledge organizers are demanded to help in choosing the adequate methodology. But, are they prepared? At least we should be prepared to cooperate, not only in our groups but more so nationally and internationally.

In my opinion a big step forward could be accomplished if we would be ready to develop faceted concept systems in collaboration with the terminologists in their respective subject fields. This would surely help them but would also help us to create more adequate and more up-to-date tools for the representation of existing knowledge units. Thus, readiness for cooperation and of course information on possible cooperative ventures is needed today.

As this is also the reason for the existence of ISKO we do hope that our members will develop the necessary open-mindedness and look for such possibilities. There will be a positive feedback, in any regard, I am sure!

5. Notes

(1)   Paper presented at the First Conference on Knowledge Organization and Documentary Systems, Madrid, Nov.4-5, 1993.

(2)   I abstain from listing all of them here, it would become a bibliography of itself. In Dahlberg (1966), Soergel (1969) y DIN 1463 just the first three German publications are given.

(3)   She stated: "It was a mistake entirely to disregard the traditional academic subject divisions in favor of the 'fundamental' categories" (Vickery, 1966).

(4)   The workshop was named: "Thesauri as terminological lexicons. Concept, definition and requirements on software", Weilburg, Oct. 26, 1993.

(5)   IFLA Satellite Meeting on Subject Indexing. Principles and Practice. Lisbon, 17-18 Aug.1993.

(6)   Call for Papers: Knowledge Organization and Quality Management. Third International ISKO Conference, Copenhagen, Denmark, June 21-24, 1994.

(7)   To be published in *Knowl. Org.* 20 : 4 (1993).

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