

## THE LEVEL OF EXPLOITATION OF UNIVERSAL DECIMAL CLASSIFICATION IN LIBRARY OPACS: A PILOT STUDY

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### *Summary*

The paper reports on a pilot study observing the level to which library classification, Universal Decimal Classification (UDC) specifically, is exploited in searching and browsing library OPACs. The study was conducted in 2004-2005. A selection of 30 Web OPACs using UDC from 22 countries were observed. The OPACs were representative of 5 in-house and 10 vendor library systems. Interface areas examined were: UDC access points, searching, browsing and display. In total, 23 designated interface functionalities were identified. From these observations, it transpires that there is a great discrepancy in the number of functions available, ranging from two to sixteen. The majority (87%) of OPACs have between seven and sixteen UDC related access points and functions enabled. Only four out of thirty catalogues offer top/down systematic browsing (i.e. knowledge area browsing), and only fourteen catalogues have a classification number in the bibliographic description hyperlinked to allow access to other titles in the same class. The study shows that Web OPACs offer different selections and a different number of functions in supporting searching or browsing UDC - even if libraries use the same vendor system. This study is only a pilot and does not analyse the differences between interface options in relation to the 'strength' of library systems and does not rank them according to their importance in IR. However, the study provides an insight into this, usually neglected, segment of library OPACs and establishes a framework for further research. At this stage the research does not include analysis of classification authority data on which the searching and browsing is based. Further research is planned to shed more light on IR specific functions and their relation to authority control and library systems.

*Keywords:* OPAC, classification, UDC, Universal Decimal Classification, IR, information retrieval, subject approach to information, library systems, interface, searching, browsing

### *1. Introduction*

Documentary classifications are the oldest and the most important tool for knowledge organization in libraries and library catalogues seem to be the natural environment to observe the use of classification in information retrieval (IR). Paradoxically, however, library systems and the OPACs built upon them have been notorious for their poor support of subject retrieval and especially the low level of exploitation of classification in providing subject browsing and navigation. This has often been a focus of criticism:

*"End-users of OPACs, an expanding heterogeneous community, have a variety of information-seeking needs and behaviors. Furthermore, the document collections available to them for online searching are multi-disciplinary in coverage and, at present, are poorly structured and indexed. Evidence indicates that the process of searching and discovery is more central to end-user searching objectives and satisfaction than the delivery of any pre-defined product. Most end users are not going after a specific "known item", nor do they have a well-defined output product in mind at the outset of their interaction with the online system. Scholars may wish to branch out into new disciplines or unfamiliar approaches to a problem. Typically, end users wish to discover materials on a topic of interest, and they seldom have or wish to present a precise expression of that interest. Both the expression of the topical*

*interest and the interest itself may change dynamically during the search and browsing activity.*

*...Conventional IR systems and OPACs provide little flexibility in searching or browsing at will in the information databases they contain. Those that do generally exact a large cost in learning time and effort from the user. But as a look back to earlier information systems should suggest, characteristic factors such as structure, organization and other reading or access devices are not the limiting, restricting factors. There are few options available at the conventional computer system search interface because the designers have put few there. Lack of interface flexibility and search options is imposed neither by today's technology nor by highly-structured databases. In fact, organization, structure, pre-established linkages between information entities or nodes and navigational search methods are the means by which system designers can provide retrieval systems that offer users not only a variety of search options but also increased flexibility in the way they may wish to browse and move about the information source. Hypertext is one way of characterizing this increased, "non-linear" flexibility." (Hildreth, 1995a, online)*

More than ten years on, this statement still appears to be relevant for, what seems to be, an enduring problem in library catalogues. This is in spite of the fact that the conditions for visualisation of subject access and better use of classification in IR were created in the early 1990s with wider accessibility and improvement in the GUI and were easier to implement within a Web interface. It seems that it has taken a long time for this to be exploited to any extent in Web OPACs. For instance, the first Web OPACs used to offer only a subset of a modest selection of IR functions that were normally available on the local library system interface. This situation seems to have been improved with the development of Web technology and library systems. A user-friendly Web interface is now the norm for any library catalogue. OPACs that support hypertext-based browsing and navigation have eventually become more open to visualisation of relationships within the information system and in supporting user-system interaction but this is still not fully exploited for a significant proportion of catalogues and especially not in the area of subject access.

This research is an attempt to establish the level to which the advantages of a Web interface are used in providing subject access to information and subject browsing based on the UDC classification. The study may help in providing a more detailed picture about the use of classification in library catalogues and can serve as a starting point in designing user studies or further examinations of subject access infrastructure and OPAC interfaces.

## *2. Related research on subject access and the use of classification in OPACs*

To emphasise the importance of subject access Gödert & Horny (1990: 66) referred to numerous user studies in the USA that confirmed that subject searching represented, on average, 51% of the total searches in OPACs. The authors, then, went on to point out that this was the area where OPACs scored extremely poorly by failing to provide the necessary recall or precision. The authors summarised the IR issues in OPACs as being related either to problems in finding the correct search terms, the problem of increasing recall, or the problem of increasing precision. Later, similar research undertaken by Markey Drabenstott (1996a) also confirmed that subject retrieval in OPACs resulted in either too great a recall, i.e. high posted searches, or too small a recall, i.e. low posted searches.

*The first studies of online catalog use demonstrated that the problem of too many and too few retrievals plagued the earliest online catalog users. Despite fifteen years of system development, implementation and evaluation, these problems still adversely affect the subject searches of today's online catalog databases. (Markey Drabenstott, 1996a: 107)*

The solution for these specific problems, however, appears to be well known and readily available in library systems. Early studies by Wajenberg (1983), Svenonius (1983),

Cochrane & Markey (1985), Markey Drabenstott (1986, 1990) emphasised the advantage of using classification in library OPACs for improving recall and precision. Related research by Hildreth (1991) and later Markey Drabenstott (1996) indicated that classification can be a device to find additional retrieval in low posted searches and can be useful in studying relevance feedback. These findings, however, for some reason, did not lead to a better exploitation of classification, as was made evident from reports in the 1990s by LeBlanc (1995), Marker (1996), Markey Drabenstott (1996a), Markey Drabenstott, Burman & Weller (1996) and Markey Drabenstott & Weller (1996, 1996a).

The reported problems and proposed solution for OPACs made no impact on libraries and library system vendors. Commercial library systems did not support classification as a tool for subject access and this situation remained throughout the 1990s (Marker, 1996; Cochrane & Johnson, 1996; Markey Drabenstott, 1996). Analysis of eight widely used library systems in 1995 by Kniesner & Willman (1995) showed that only two of them were able to support basic requirements such as: shelflist order, enough field length to display the full classmark, display of the main entry, free browsing (forward/backward), and approximate matches. It was repeatedly pointed out by different authors that even shelflist browsing, as introduced in the latest generation of OPACs, especially Web OPACs, was quite restricted for no good reason (Howard, 1990; LeBlanc, 1995; Hildreth, 1991; 1995; 1995a).

When it comes to libraries using UDC, according to published reports, the situation seemed to be a little better - or at least this was the case for a certain number of well-managed libraries. Buxton's (1990) report on a selection of bibliographic databases and in-house library systems using UDC, for instance, illustrated a sophistication in classification use that was not common for library systems in general. The selected libraries developed innovative solutions in order to search and browse UDC. Libraries using vendor systems, however, such as the Cranfield Institute of Technology Library (Libertas), Aberdeen University (Dynix), Edinburgh University (Geac), and King's College London (Libertas) are mentioned as examples of catalogues that had no special features for handling UDC numbers (Buxton, 1990: 200-201).<sup>1</sup>

Other reports on the use of UDC in library OPACs at the time, such as those by Porter & Galpin (1988) on the Muscat system at the Scott Polar Research Institute Library (Cambridge, UK) or on the ETHICS systems in the ETH Library<sup>2</sup> by Hug & Nöthiger (1988), Loth & Funk (1990) and Loth (1996) were success stories. With the exception of these papers, there were no user studies reported in relation to UDC searching and browsing in library OPACs, in the nineties.

From 2004 to 2006 there were again several fine examples of library catalogues exploiting classification to enhance subject access and browsing reported by Schallier (2004, 2004a, 2005), Hajdu Barat (2006) and Papy & Chauvin (2005) who also observed their users attitudes towards browsing UDC. In addition a report by Balikova (2005) illustrated the trend in improving the infrastructure behind subject access by building rich authority data with UDC mapping to other indexing languages that may further enhance the use of classification in library systems.

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<sup>1</sup> The Situation in 2004 is as follows: King's College Library uses Aleph and UDC can be only seen when browsing call numbers; Cranfield Institute of Technology Library (since 1993 Cranfield University) uses the Unicorn Sirsi system and does not provide any access to classification search or browse and UDC can be seen only as call numbers in a record display. Aberdeen University Library uses Aleph and provides classification browse to DDC and no UDC is visible in the catalogue. Edinburgh University uses Voyager and does not provide any access to classification search/browse, only the Main Library seems to be still using UDC for shelf arrangement and this is only visible through record viewing. Imperial College London uses Unicorn and also provides no access to UDC search or browse.

<sup>2</sup> Eidgenössische Technische Hochschule Library in Zürich, Switzerland.

### 3. Objectives and methodology

The purpose of this study was to provide a general overview on how different libraries exploit the existing potential of the UDC system, library systems and a Web Interface. Thirty Web OPACs from different countries were observed with the objective of establishing the number of subject searching/browsing functionalities, based on UDC, that were supported.

At this stage, the aim was to provide information on the general level of libraries' willingness and expertise in making use of UDC in providing subject access, rather than analysing any given library system and indexing practice or real users' needs. From this point of view it was relevant to look into the performance of Web OPACs based on the same library system in different countries and with a different scope of UDC usage.

UDC can be used in libraries in different ways and for different purposes. If it is used for shelf arrangement, a single UDC number will appear in the call number (shelfmark) only. In many European countries in which UDC is the main indexing system, the classification is often used for both shelf arrangement and detailed subject indexing. In this case, a document will have a broader UDC number in the call number (e.g. 612.3 Digestion), but one or more UDC numbers as a detailed subject index (e.g. 612.313 Salivary glands or 611.316+612.313+616.316 Anatomy, physiology and pathology of salivary glands). In many libraries which do not have open access to shelves or have the collection arranged according to some local system, the practice may be to use UDC as a subject index only.

In libraries in which UDC is used as a subject index, classification data is usually managed through classification authority files and is often linked to natural language terms (subject headings or thesauri). The logical assumption is that if UDC plays an important role in subject indexing, this will be reflected in the number of options for searching/browsing UDC in library OPACs.

#### 3.1. Selection of Web OPACs

The international selection of OPACs was based on the type of UDC use in a given country. The majority (23) of OPACs chosen were union catalogues in academic, public or national library networks in 22 countries that could be categorized according to the UDC usage as shown in Table I:

Table I: Selection of OPACs according to type of use of UDC

USAGE CATEGORY		COUNTRIES	COUNTRIES IN CATEGORY	OPACS IN CATEGORY
A	UDC is used in majority of libraries	Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Portugal, Slovenia, Macedonia, Serbia & Monte Negro[1], Spain	11	13
B	UDC is used in certain type of libraries	Australia, Belgium, Finland, Germany, Ireland, Italy, Norway, Switzerland, U.K.	9	14
C	UDC is used seldom	Austria, Israel	2	3
TOTAL			22	30

A larger proportion of OPACs were chosen from countries in groups A and B, where UDC was used in the majority of libraries, and from those countries where it is widely used in academic and special libraries, as these countries are more likely to have a history of implementing the UDC in library networks and more incentive to make full use of the classification (see more on UDC use in the world in: Slavic, 2006). Care was taken that the selected catalogues represented both systems developed in-house and well known commercial products.

The assumption was that in-house library systems impose fewer limitations in developing appropriate tools for classification management and searching. Of all Web OPACs included, 5 were in-house and the remaining 25 were one of the following vendor systems: Aleph (8), Athena, EOS Glas (1), Horizon (2), Innopac (2), Bookmarc Sirius (1), Talis (1), Unicorn Sirsi (3), Voyager (1) and VTLS (2).

Web OPACs were selected based on a combination of an arbitrary search for library OPACs in countries where UDC is known to be widely used<sup>3</sup> and literature research (for instance: Buxton, 1990; Baliková, 2001; Gödert, 2003; Gobytè, 2000; Leščić & Cvitaš, 2003; Hajdu-Barat, 2004, Schallier, 2004, 2004a; Gnoli, Ridi & Visintin, 2004).

While some OPACs were chosen based on the fact that they were more advanced in their use of the UDC, others were selected because they best illustrated the situation in the respective environment.<sup>4</sup> OPACs included in this research (listed alphabetically by country) are given in Appendix 1, with URL address, type of catalogue (single, union, type of library system - I for in-house; V for vendor) and name of the system. Interface language(s) are indicated and each OPAC is assigned a code that is used in data collection.

### *3.2 Selection of interface options to be observed*

The main strength of Web OPACs is the graphical user interface and enhanced hypertext navigation capability. But this does not solve the problems of managing data content, labelling and deciding how these will be grouped, linked, used and presented to the user (Gödert, 1991; Hildreth, 1995, 1995a). Hence, in the preliminary examination of OPACs, the attention was focused on identifying all elements of IR interface functionality that can be found related to accessing, browsing and searching classification data. There were 23 such functionalities found and they were grouped into four categories:

- **General interface and library system functions:** type of access to UDC number (search index/call number, browse index/call number); type of UDC use (call number or subject index), availability of list of UDC numbers or words for term selection, use of UDC alongside another classification systems; use of UDC alongside a subject heading system
- **UDC browsing:** the existence of a subject directory for top/down browsing; possibility to start browsing through searching (i.e. positioning in the UDC hierarchy); availability of free browsing (i.e. forward/backward in the hierarchy), hyperlinking of a UDC number in the bibliographic record; the possibility of expanding the UDC hierarchy in the search result (i.e. to broaden or narrow the search)
- **UDC searching:** automatic right truncation<sup>5</sup> in a search (to improve recall); approximate matching (i.e. 'no zero result' option); availability of a Boolean search of the UDC; searching parts of a UDC complex number; searching a UDC caption; searching/browsing from an authority record choosing any related terms within the record
- **UDC in results display:** classified results display (i.e. collocation of records according to UDC classes); shelflist display (simple list of all items available in the class), correct UDC sorting; UDC caption display (in results or in the record), hierarchical indentation of classes in display

The primary goal of this pilot study was to 'scan' the area and identify issues for further research, hence, the listed interface functionalities were not in any way ranked from the point of view of their importance in IR. The complete data on the presence of UDC IR functions in all 30 OPACs can be seen in Appendix 2.

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<sup>3</sup> In the period from 2000 to 2004 a number of Web OPAC addresses were gradually collected through library checking and correspondence with UDC users and published on the UDC Consortium Web pages (<http://www.udcc.org/opacs.htm>).

<sup>4</sup> Such a case is the choice of three catalogues in Croatia that show a discrepancy in functionalities although they are in-house systems specially designed to meet the needs in the environment in which UDC is used as the only classification for both shelf arrangement and detailed subject indexing. Another example is the choice of four UK OPACs, none of which offers suitable functionality for searching and browsing UDC.

<sup>5</sup> Left truncation was found in one OPAC (HR-KGZ). Since this was an exception among Web OPACs, this function was not included in data collection.

#### 4 Findings and discussion

A certain number of simple searching/browsing functions can be implemented in OPACs based on the presence of the UDC numbers in a bibliographical record (e.g. field **6xx** in MARC formats) where these data appear as a simple text string. Hence the presence of these functions on the Web catalogue interface does not require any special effort. There are, on the other hand, functions that can only be enabled on the search interface if the UDC data are managed and supported through a classification authority file (see Table II).

Table II: Relationships between IR functions and authority control

	FUNCTIONS THAT CAN BE BASED ON UDC DATA BIBLIOGRAPHICAL RECORDS ONLY (TEXT STRINGS)	FUNCTIONS THAT REQUIRE UDC MANAGEMENT AND ACCESS THROUGH AUTHORITY CONTROL
GENERAL	browse/search UDC index or call number use of other classification systems use of subject heading systems	mapping to other classification systems mapping to a subject heading system
BROWSING	search to browse free browsing of UDC index (backward/forward) hyperlink in bib. record display	subject directory/hierarchy browse bt/nt expansion of UDC in search results (irrespective notation) launching related search/browse from authority data
SEARCHING	number search approximate matching (non-zero result)	searching part of complex UDC number (Booleans) searching UDC captions or searching/browsing UDC using words searching UDC using subject heading systems
DISPLAY	approximate classified display approximate shelflist display	correct classified display correct shelflist display UDC caption display hierarchical display

Although all library vendor systems that appear in this study are known to support authority control management it appeared that the functions dependent on authority control are less likely to appear on the catalogue interface.

If examined individually, catalogues differ greatly according to their choice of functions and access points to the UDC. It was clear from the outset of this observation that no catalogue needs all the searching/browsing functions or access points suggested that were checked. It is worth mentioning, however, that the number of functions varies from 2 (HR-NL) to 16 (CH-ETH) with 87% of OPACs having between 7 and 16 UDC related access points and functions enabled.

As shown in Table III, direct access to searching or browsing a UDC index is offered in 90% of the catalogues. It should be noted that the relevant function can be introduced in different ways on the interface: searching/browsing 'UDC' or 'local classification', 'classification' or 'call number'.

Very few (6.7%) of the Web interfaces offer an additional expert search, probably because the Web OPAC is considered to be primarily an end-user tool while an expert search is likely to be provided on the library intranet. It is significant that 50% of catalogues are using UDC alongside a subject heading system without evidence that these are actually mapped to the UDC through a subject authority file. In 36.7% of cases, however, a UDC caption is used for an alphabetical subject search or as a basis for local subject heading systems. These are, for instance, University Library in Leuven, Belgium (BE-UL), the Public Library in Zagreb, Croatia (HR-KGZ) and the Library of Croatian Academy of Science and Arts (HR-HAZU).

Three basic requirements are present in a significant number of catalogues: *search to browse*, *free forward/backward browsing* and *hyperlinking UDC from records* (70%, 56.7 % and 46.7% respectively). The more demanding function of broadening and narrowing search results by expanding the UDC hierarchy, depends upon coding BT/NT links in the classification authority data and is supported in only 23.3 % of the catalogues.

Table III: Summary statistics for presence of IR functions in Web OPACs

UDC IR FUNCTIONS		22 OPACS WITH UDC IN SUBJECT INDEXING	8 OPACS WITH UDC IN CALL NUMBER	30 OPACs (100%)
GENERAL	ACCESS TO BROWSE/SEARCH UDC INDEX	20 (66.7%)	7 (23.3%)	27 (90%)
	NO ACCESS TO SEARCHING /BROWSING UDC	2 (6.7%)	1 (3.3%)	3 <sup>6</sup> (10%)
	EXPERT SEARCH	2 (6.7%)	0 (0%)	2 (6.7%)
	LIST TO SELECT SEARCH TERMS (UDC NUMBERS OR CAPTION)	8 (26.7%)	0 (0%)	8 (26.7%)
	UDC USED ALONGSIDE OTHER CLASSIFICATION	3 (10%)	0 (0%)	3 (10%)
	UDC USED ALONGSIDE SUBJECT HEADING SYSTEMS	13 (43.3%)	2 (6.7%)	15 (50%)
BROWSING	SUBJECT DIRECTORY FOR BROWSING	4 (13.3%)	0 (0%)	4 (13.3%)
	SEARCH TO BROWSE	14 (46.7%)	7 (23.3%)	21 (70%)
	FREE BROWSE UDC [FIELD INDEX]	12 (40%)	5 (16.7%)	17 (56.7%)
	UDC HYPERLINK [IN BIB. RECORD]	10 (33.3%)	4 (13.3%)	14 (46.7%)
	BT/NT BROWSE UDC IN HIT LIST	3 (10%)	0 (0%)	7 (23.3%)
	DEFAULT TRUNCATION	13 (43.3%)	7 (23.3%)	20 (66.7%)
	APPROXIMATE RESULTS (NO ZERO RESULTS)	10 (33.3%)	4 (13.3%)	14 (46.7%)
SEARCHING	BOOLEAN SEARCH OF UDC INDEX	3 (10%)	0 (0%)	3 (10%)
	SEARCHING PARTS OF COMPLEX UDC	7 (23.3%)	0 (0%)	7 (23.3%)
	SEARCHING UDC CAPTION	11 (36.7%)	0 (0%)	11 (36.7%)
	LAUNCH SEARCH FROM AUTHORITY FILE BROWSE	4 (13.3%)	1 (3.3%)	5 (16.7%)
	CLASSIFIED DISPLAY	10 (33.3%)	1 (3.3%)	11 (36.7%)
HIT DISPLAY	SHELFLIST DISPLAY (EACH ITEM WITHIN CLASS)	2 (6.7%)	7 (23.3%)	9 (30%)
	CORRECT SORT OF SUBCLASSES	1 (3.3%)	1 (3.3%)	2 (6.7%)
	UDC CAPTION DISPLAY	4 (13.3%)	0 (0%)	4 (13.3%)
	HIERARCHICAL INDENTATION OF HITS	2 (6.7%)	0 (0%)	2 (6.7%)

Two search functions *default (right) truncation* and *approximate match* that can be implemented without maintaining UDC in the authority file are present in 66.7% and 46.7%. A Boolean search of the UDC index is given in only 10% of the catalogues, most probably because this option makes sense only if *searching parts of a complex UDC number* is supported, which is true for 23% of OPACs.

In order to allow searching parts of the UDC, some catalogues keep the elements of complex numbers (often only the auxiliaries of place) in separate fields but this was not counted as an actual 'complex number search' function. Only two catalogues (CH-ETH and CZ-NL) have their searches based on authority files that seem to provide complete factoring of UDC complex numbers. Five OPACs (16.7%) allow searching of the UDC from an authority file, i.e. the transition from browse to search, in which instance the search expression is embedded in the hyperlink, that is a 'click' of the hyperlink launches the search. The functions of *searching UDC caption*, as well as *launch search from authority file* are related to maintaining classification data in an authority file and these two capabilities are not widely seen within the catalogues examined (36.7% and 16.7% respectively).

<sup>6</sup> In these three OPACs, UDC can be accessed through record viewing only. A search has to be performed through some other access points (title, author, subject).

In the display of results, again, functions that do not directly depend on authority data are more common in the selected catalogues. Hence, *classified display* (showing classes against the number of records) is present in 36% and *shelf-list display* (showing all items that contain that classmark in the call number) in 30% of catalogues. Correct sorting of UDC numbers still remains a problem, as OPACs seem to continue sorting UDC as text (only two, i.e. 6.7%, show correct sorting).

Only one (3.3%) of the OPACs that use complex UDC numbers that include symbols seems to do this correctly, the other OPAC (with UDC notation in call numbers) was found to have the correct sorting but only because the numbers used did not include any symbols that would disturb the order. Similarly, the presence of *UDC caption* (only 13.3%) and *hierarchical indentations of results* (only 6.7%) require the management of UDC in an authority file and it is no surprise that these two functions are not widespread among catalogues.

Depending on whether there is a classification authority control available and on its quality, OPACs by the same vendor (e.g. Aleph) show a very different level of support of UDC. The best Web OPAC according to this observation is from the ETH library (now using Aleph) that allows searching UDC using 'words' in three languages while preserving UDC semantic relationships and allowing search expansion through mapping to a trilingual thesaurus in the subject authority file (Figure 1) that was developed in the library's in-house system during the 1980s and 1990s.

Cross-references - ETH Subjects - LEPTONS (PARTICLE PHYSICS) : eng : 539.12,000.2	
Click on the tag in the left column to jump to this heading in the Browse List. Click on an underlined heading to create a set of records related to it. Click on the browser's <i>back</i> button to return to your place in the Browse List.	
UDC	539.12,000.2
<u>Term</u>	<u>LEPTONEN (TEILCHENPHYSIK)</u>
<u>Term</u>	<u>LEPTONS (PARTICLE PHYSICS)</u>
<u>Term</u>	<u>LEPTONS (PHYSIQUE DES PARTICULES ÉLÉMENTAIRES)</u>
<u>Broader term</u>	<u>ELEMENTARTEILCHENPHYSIK : 539.12</u>
<u>Broader term</u>	<u>PARTICLE PHYSICS : 539.12</u>
<u>Broader term</u>	<u>PHYSIQUE DES PARTICULES ÉLÉMENTAIRES : 539.12</u>
<u>Related term</u>	<u>MYONEN (TEILCHENPHYSIK) : 539.126.33</u>
<u>Related term</u>	<u>MUONS (PARTICLE PHYSICS) : 539.126.33</u>
<u>Related term</u>	<u>MUONS (PHYSIQUE DES PARTICULES ÉLÉMENTAIRES) : 539.126.33</u>
<u>Related term</u>	<u>NEUTRINOS (TEILCHENPHYSIK) : 539.123</u>
<u>Related term</u>	<u>NEUTRINOS (PARTICLE PHYSICS) : 539.123</u>
<u>Related term</u>	<u>NEUTRINOS (PHYSIQUE DES PARTICULES ÉLÉMENTAIRES) : 539.123</u>
<u>Related term</u>	<u>ELEKTRONEN (TEILCHENPHYSIK) : 539.124</u>
<u>Related term</u>	<u>ELECTRONS (PARTICLE PHYSICS) : 539.124</u>
<u>Related term</u>	<u>ÉLECTRONS (PHYSIQUE DES PARTICULES ÉLÉMENTAIRES) : 539.124</u>
System No	000015329

Figure 1: Authority record for UDC class 539.12 *Leptons* in ETH catalogue

Also, the University Library in Leuven (Belgium) whose catalogue showed a very good subject searching/browsing based on UDC, in their Dobis Libis system, announced a migration to Aleph while preserving all functionalities and further developing their authority data (Schallier, 2004, 2004a; 2005). Both Swiss and Belgian catalogues show that the quality of subject searching can be achieved irrespective of the library system.

The expectation that UDC may be well exploited for subject searching, even if it is used in shelf arrangement, does not seem to be confirmed through the observation of eight OPACs using UDC in call numbers, included in this study. In general, these OPACs did not show much affinity to including UDC data in subject access. In the case of British catalogues, this typifies the tradition in Anglo-American libraries of neglecting classification data, mentioned earlier on in the paper in relation to OPAC studies in the 1980s and 1990s.

It was logical to make the assumption that in-house systems, specially designed to meet the needs of a UDC-orientated library environment, would show better functionality in searching and browsing the UDC. This was, anyway, the case in Buxton's research from 1990. This assumption appeared to be unfounded and the poorest OPAC in terms of



functionality proved to be that of the Croatian National Library union catalogue (in-house system) in spite of the fact that all libraries in Croatia are using UDC as the main and often the only indexing language and all the bibliographic data in Croatia contains UDC. Almost as poor was a Slovenian library system that was recently bought by Bosnia & Herzegovina, Macedonia and Serbia & Montenegro library networks. All three countries are using UDC across the library sector as the main and often the only indexing system. Two of the best in the category of in-house systems are the union catalogue from Norway (BIBSYS) supporting twelve functions and the union catalogue of public library network in Zagreb, Croatia with six functions.

The most interesting paradox is that only 13.3% of catalogues offer a subject directory to allow browsing from top-level categories of the classification - although a UDC based knowledge map is something patrons would be used to while visiting library and browsing shelves.



Figure 2: Access to UDC browsing tree (National Library of Switzerland)

The link between searching using natural language while displaying results in a classified way is not sufficiently exploited in library OPACs. If properly implemented this function would allow users to determine a relevant class of hits easily and narrow their choice (viewing subdivision) or expanding their browsing to the whole class of similar document, instead of scrolling through a tediously long accession, alphabetical or chronological list of hits. Hierarchical display of subjects and expansion of searches ought to be supported through proper UDC data management and additional hierarchy coding (cf. Loth, 1996; Slavic, 2006a). Displaying a caption next to hyperlinked UDC numbers in records and in a classified display could help users decide more quickly on relevance or may trigger further exploration, and this is often lacking. All the above options closely depend on the separation of IR functions from simple UDC number processing and require full classification data management.

##### 5. Concluding remarks

This study shows that the success in implementation and use of UDC to a great extent depends on the expertise available in the individual libraries and their policy towards authority control and the use of classification authority files in underpinning searching and browsing of OPACs. It was out of the scope of this research to analyse the reasons why libraries do not develop and support classification authority control (e.g. lack of funding, expertise, needs). This study indicates, however, that there is still a great proportion of libraries that do not make use of UDC data, that already exist in the system, to enhance what is obviously very poor subject access. In their present state of development, it seems that vendor systems offer services and options that are very similar in scope and this also applies

to authority control and the availability of hypertechnology in Web OPACs. Hence, when subject access does not appear as good as is technologically possible the problems seem to be rarely related to the quality of library system in use. The examples of catalogues with a good level of support to UDC in this study, confirm that the classification system itself or Web OPAC technology do not impede the improvement of subject searching and browsing in library catalogues.

Since 1993, UDC has been distributed to libraries as a database file (UDC Master Reference File) with annual updates, and if users wish they can store this file in the database and produce different kinds of exports, printouts and tools. In theory this approach should facilitate the use of UDC in the online environment through the creation of authority files that would underpin subject information retrieval. In practice, however, the use of UDC MRF in building or maintaining a classification authority file requires additional effort: conversion of data to MARC, automation of annual updates, additional data to manage hierarchies, word searching etc. The exchange (sharing) of existing UDC authority files between libraries is still very rare which means that the most benefits would be felt if UDC publishers would provide richer UDC data in more appropriate, ready to use formats.

This study has helped in providing a general framework for the observation of IR functions related to classification. Further research is required on subject authorities and specific library systems to identify the specific problems in authority control and exchange of classification data. Also a study of user behaviour in browsing classifications in more advanced OPACs would be useful in providing a more accurate picture of UDC's role in supporting subject browsing and search expansion.

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*Appendix 1: Selection of Web OPACs providing subject access through UDC*

COUNTRY	UDC USAGE <sup>7</sup>	LIBRARY	CAT. TYPE	URL	SYSTEM <sup>8</sup>		INTERFACE LANGUAGE	CODES <sup>9</sup>
					V/I	NAME		
AUSTRALIA	B	1. National Acoustic Laboratories Library	SINGLE	<a href="http://library.hearing.com.au/athcgi/athweb.pl">http://library.hearing.com.au/athcgi/athweb.pl</a>	V	Athena	English	AU-NAL
AUSTRIA	C	2. Universitätsbibliothek der Technischen Universität Graz	UNION	<a href="http://tubss01.tu-graz.ac.at/ALEPH/DB1HUVVSJXKBD6V83RRK4KHA6IQRAEMUQVDKXCXQ58PEVPYRMLG-00982/file/start-0">http://tubss01.tu-graz.ac.at/ALEPH/DB1HUVVSJXKBD6V83RRK4KHA6IQRAEMUQVDKXCXQ58PEVPYRMLG-00982/file/start-0</a>	V	Aleph	German	AT-UT
AUSTRIA	C	3. Bibliothekskatalog der Universität Linz	UNION	<a href="http://aleph.edvz.uni-linz.ac.at/ALEPH/VUKXLJ2ND7R8RBKHH1XNFCGUKK14LFY82EDTISBT8MSKCR1MIR-00993/file/start-0">http://aleph.edvz.uni-linz.ac.at/ALEPH/VUKXLJ2ND7R8RBKHH1XNFCGUKK14LFY82EDTISBT8MSKCR1MIR-00993/file/start-0</a>	V	Aleph	German	AT-UL
BELGIUM	B	4. Universiteitsbibliotheek K.U.Leuven	UNION	<a href="http://bibserv.libis.kuleuven.ac.be/ipacbin/LibriVision/search_form.html?SESSION_ID=1100140389_7701&amp;lv_action=LV_Search_Form&amp;DB_ID=1&amp;LDB_NAME=G&amp;HTML_SEARCH_TYPE=ADVANCED&amp;L_SUBJECTS=0">http://bibserv.libis.kuleuven.ac.be/ipacbin/LibriVision/search_form.html?SESSION_ID=1100140389_7701&amp;lv_action=LV_Search_Form&amp;DB_ID=1&amp;LDB_NAME=G&amp;HTML_SEARCH_TYPE=ADVANCED&amp;L_SUBJECTS=0</a>	V	DOBIS-LIBIS	Dutch, French	BE-UL
CROATIA	A	5. Croatian National and University Library	UNION	<a href="http://www.nks.hr/">http://www.nks.hr/</a>	I	CroList	Croatian	HR-NL
CROATIA	A	6. Zagreb City Library	UNION	<a href="http://www.kgz.hr/#">http://www.kgz.hr/#</a>	I	Zaki	Croatian	HR-KGZ
CROATIA	A	7. Croatian Academy of Sciences and Arts Library	SINGLE	<a href="http://161.53.55.45/web/start01.htm">http://161.53.55.45/web/start01.htm</a>	I	ISIS	Cro., En.	HR-HA
CZECH R.	A	8. The National Library of the Czech Republic	UNION	<a href="http://sigma.nkp.cz/F/?func=file&amp;file_name=find-b&amp;local_base=skc&amp;CON_LNG=ENG">http://sigma.nkp.cz/F/?func=file&amp;file_name=find-b&amp;local_base=skc&amp;CON_LNG=ENG</a>	V	Aleph	Czech, English	CZ-NL
ESTONIA	A	9. ESTER - Estonian Library Catalogues	UNION	<a href="http://helios.nlib.ee/search/">http://helios.nlib.ee/search/</a>	V	Innopac	Est., Ru., En.	EE-ES
FINLAND	B	10. Tampere University of Technology Library	UNION	<a href="http://tutcat.linneanet.fi/cgi-bin/Pwebrecon.cgi?LANGUAGE=English&amp;DB=local&amp;PAGE=First">http://tutcat.linneanet.fi/cgi-bin/Pwebrecon.cgi?LANGUAGE=English&amp;DB=local&amp;PAGE=First</a>	V	Voyager	Finnish	FI-TUT
GERMANY	B	11. University Library of the Freiberg University of Mining and Technology	UNION	<a href="http://webopac.ub.tu-freiberg.de/">http://webopac.ub.tu-freiberg.de/</a>	V	LiberO	German	DE-FU
HUNGARY	A	12. Miskolci Egyetem katalógusa	UNION	<a href="http://kvt20.lib.uni-miskolc.hu/webpac-bin/wgbroker.exe?2004111512344703502176+-access+top.Miskolcang">http://kvt20.lib.uni-miskolc.hu/webpac-bin/wgbroker.exe?2004111512344703502176+-access+top.Miskolcang</a>	V	Horizon	Hun., En.	HU-MIS
IRELAND	B	13. Irish Management Institute	UNION	<a href="http://glas.imi.ie/GLASOPAC/index.asp">http://glas.imi.ie/GLASOPAC/index.asp</a>	V	EOS -Glas		IE-IRI
ISRAEL	C	14. Technion Library	UNION	<a href="http://lib.technion.ac.il:4500/ALEPH/ENG/TEC/TEC/TEC/SCAN">http://lib.technion.ac.il:4500/ALEPH/ENG/TEC/TEC/TEC/SCAN</a>	V	Aleph	Heb., En.	IL-TEC

<sup>7</sup> A - UDC is used in majority of libraries; B - UDC is used in certain type of libraries; C - UDC is very rarely used, in few libraries only.

<sup>8</sup> 'V' indicates vendor library system, 'I' indicates in-house library system.

<sup>9</sup> This code is assigned to each Web OPAC and is used in the presentation of research results.

COUNTRY	UDC USAGE <sup>7</sup>	LIBRARY	CAT. TYPE	URL	SYSTEM <sup>8</sup>		INTERFACE LANGUAGE	CODES <sup>9</sup>
					V/I	NAME		
ITALY	B	15. Politecnico di Torino	UNION	<a href="http://opacbiblio.polito.it/ALEPH/-/start/libw">http://opacbiblio.polito.it/ALEPH/-/start/libw</a>	V	Aleph	It.	IT-POL
ITALY	B	16. Università di Genova	UNION	<a href="http://catalogo.sbi.genova.it/ALEPH/">http://catalogo.sbi.genova.it/ALEPH/</a>	V	Aleph	It.	IT-UG
LATVIA	A	17. Latvian National Library	UNION	<a href="http://195.13.129.13:8080/ALEPH/ESBYKPEE3U8DT8QYQDFMY2QDGIRLM6X2UGAYSFC5CVUJEF2RYU-00224/file/start-0">http://195.13.129.13:8080/ALEPH/ESBYKPEE3U8DT8QYQDFMY2QDGIRLM6X2UGAYSFC5CVUJEF2RYU-00224/file/start-0</a>	V	Aleph	Latv., En.	LV-LNL
LITHUANIA	A	18. Lithuanian National Library	SINGLE	<a href="http://www.libis.lt:8080/en/welcome.html">http://www.libis.lt:8080/en/welcome.html</a>	V	Dobis Libis	Lith., En.	LT-LNL
NORWAY	B	19. Bibsys Library Data Centre	UNION	<a href="http://wgate.bibsys.no/search/pub?lang=N">http://wgate.bibsys.no/search/pub?lang=N</a>	I	Bibsys	No., En.	NO-BIB
PORTUGAL	A	20. National Bibliographic Database - PORBASE	UNION	<a href="http://sirius.bn.pt/sirius/sirius.exe">http://sirius.bn.pt/sirius/sirius.exe</a>	V	Sirius	Pt.	PT-POR
PORTUGAL	A	21. Fundação Calouste Gulbenkian, Biblioteca de Arte	SINGLE	<a href="http://www1.gulbenkian.pt/ipac-cgi/ipac.exe">http://www1.gulbenkian.pt/ipac-cgi/ipac.exe</a>	V	Horizon	Pt.	PT-GUL
SLOVENIA; MACEDONIA, SERBIA & M.N.	A,A,A	22. Slovenian Union Cat.; Macedonian Union Cat.; Serbian Union Cat.; Monte Negro Union Cat.	UNION	<a href="http://www.cobiss.si">http://www.cobiss.si</a> ; <a href="http://www.nubsk.edu.mk/cobiss/">http://www.nubsk.edu.mk/cobiss/</a> ; <a href="http://vbs.nbs.bg.ac.yu/cobiss/">http://vbs.nbs.bg.ac.yu/cobiss/</a> ; <a href="http://cnbct.cnb.cg.ac.yu/cobiss/">http://cnbct.cnb.cg.ac.yu/cobiss/</a>	I	"COBISS"	Slov., Mac., Serb.	COBIS
SPAIN	A	23. Catàleg Col·lectiu de les Universitats de Catalunya	UNION	<a href="http://www.cbuc.es/ccuc/">http://www.cbuc.es/ccuc/</a>	V	VTLS	Sp.; Cat.	ES-UNI
SPAIN	A	24. Biblioteca de la Universidad Carlos III de Madrid	UNION	<a href="http://biblioteca.uc3m.es/uhtbin/cgisirsi/8t4cB3wD8c/90520072/61/1592/X">http://biblioteca.uc3m.es/uhtbin/cgisirsi/8t4cB3wD8c/90520072/61/1592/X</a>	V	Unicorn	Sp.	ES-BUC
SWITZERLAND	B	25. Bibliothèque nationale suisse	UNION	<a href="http://www.coris.ch/newbns/Francais/saisie.asp">http://www.coris.ch/newbns/Francais/saisie.asp</a>	V	VTLS	Fr., Ger.	CH-BNS
SWITZERLAND	B	26. Eidgenössische Technische Hochschule (ETH)	UNION	<a href="http://opac.nebis.ch/ALEPH/39TKJTMJAYHRCS7G2139V1I7LK731PB637XS13LN8DKAHUICJG-13604/file/start-ids">http://opac.nebis.ch/ALEPH/39TKJTMJAYHRCS7G2139V1I7LK731PB637XS13LN8DKAHUICJG-13604/file/start-ids</a>	V	Aleph	Fr.; Ger., En.	CH-ETH
U.K	B	27. RIBA British Architectural Library	SINGLE	<a href="http://195.171.22.30/uhtbin/cgisirsi.exe/W2etq4E4dq/0/49">http://195.171.22.30/uhtbin/cgisirsi.exe/W2etq4E4dq/0/49</a>	V	Unicorn	En.	UK-RIB
U.K.	B	28. School of Pharmacy Library	SINGLE	<a href="http://unicorn.ulsop.ac.uk/uhtbin/cgisirsi/Sat+Jun+26+16:26:32+BST+2004/0/49">http://unicorn.ulsop.ac.uk/uhtbin/cgisirsi/Sat+Jun+26+16:26:32+BST+2004/0/49</a>	V	Unicorn	En.	UK-SPL
U.K.	B	29. University of Surrey Library	UNION	<a href="http://opac.lib.surrey.ac.uk/www-bin/www_talis32">http://opac.lib.surrey.ac.uk/www-bin/www_talis32</a>	V	Talis	En.	UK-US
U.K.	B	30. University of Bath Library	UNION	<a href="http://www.bath.ac.uk/library/webcat/">http://www.bath.ac.uk/library/webcat/</a>	V	Unicorn	En.	UK-UB

Appendix 2: Presence of IR functions in Web OPACs<sup>10</sup>

LIBRARY SYSTEM	IN-HOUSE SYSTEMS					VENDOR SYSTEMS																								
	bibsys	CroList	COBSS	ISIS	Zaki	Aleph										Athena	EOS	Horizon		Innopac	LiberO	Dobis Libris	Sirius	Talis	Unicorn Sirsi			Voyager	Vtls	
OPAC CODES	NO-BIB	HR-NL	COBIS	HR-HA	HR-KGZ	AT-UT	AT-UL	CH-ETH	CZ-NL	IL-TEC	IT-POL	LV-LNL	IT-UG	AU-NAL	IE-IRI	HU-MIS	PT-GUL	EE-EST	DE-FU	BE-UL	LT-LNL	PT-POR	UK-US	ES-BUC	UK-RIB	UK-SPL	UK-UB	FI-TUT	CH-BNS	ES-UNI
1. ACCESS TO UDC <sup>11</sup>			• Si		• Si	• Si	• Si	• Bi	• Bi	• Bi	• Si	• Bi	• Bi	• Bc	• Bc	• Si	• Si	• Si	• Si	• Si	• Si	• Si	• Bi	• Si		• Bc	• Bc	• Bi	• Si	• Sc
2. EXPERT SEARCH <sup>12</sup>			•					•																						
3. UDC IN CALL NUMBER					•									•	•				•				•	•	•	•	•	•		•
4. UDC AS AN INDEX TERM	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•						•	•	
5. LIST TO SELECT SEARCH TERMS	•					•	•	•								•	•											•	•	
6. UDC USED ALONGSIDE OTHER CLASSIFICATION	•												•							•										
7. UDC USED ALONGSIDE SUBJECT HEADINGS	•			•	•	•	•	•	•	•				•		•	•	•		•	•			•						

<sup>10</sup> Columns showing catalogues using UDC in the call number only are shaded in grey.

<sup>11</sup> Access to UDC: separate screen A-advanced search; Si - Search Index; Bi - Browse Index; Bc - Browse call number; Sc - Search call number.

<sup>12</sup> Search using field codes and search syntax.





LIBRARY SYSTEM	IN-HOUSE SYSTEMS					VENDOR SYSTEMS																									
	bibsys	Crolist	COBSS	ISIS	Zaki	Aleph								Athena	EOS	Horizon		Innopac	Liber	Dobis Libis	Sirius	Talis	Unicom Sisi				Voyager	VTLS			
OPAC CODES	NO-BIB	HR-NL	COBIS	HR-HA	HR-KGZ	AT-UT	AT-UL	CH-ETH	CZ-NL	IL-TEC	IT-POL	LV-LNL	IT-JG	AU-NAL	IE-IRI	HU-MIS	PT-GUL	EE-EST	DE-FU	BE-UL	LT-LNL	PT-POR	UK-US	ES-BUC	UK-RIB	UK-SPL	UK-UB	FI-TUT	CH-BNS	ES-UNI	
17. SEARCHING PARTS OF UDC <sup>14</sup>	•							•	•		•	*	*			•	*			•	•	*							*		
18. SEARCHING UDC CAPTION	•			•	•	•	•	•	•			•				•		•		•											
19. CLASSIFIED RESULT DISPLAY	•						•		•			•	•					•	•	•					•			•	•		
20. SHEFLIST ITEM DISPLAY							•	•						•	•								•	•		•	•			•	
21. CORRECT SORT OF UDC									•														•								
22. UDC CAPTION DISPLAY				•	•			•																					•		
23. HIERARCHICAL INDENTATION OF HITS																				•									•		
TOTAL NO. OF FUNCTIONS	12 53%	2 7%	4 17%	6 26%	8 35%	10 43%	11 48%	16 69%	11 48%	7 30%	6 26%	7 30%	9 39%	8 35%	7 30%	7 30%	6 26%	9 39%	8 35%	12 53%	5 22%	3 13%	8 35%	8 35%	3 13%	8 35%	6 26%	9 39%	12 53%	6 26%	

<sup>14</sup> In order to perform search on parts of complex numbers, the main auxiliaries are entered in a separate field. This situation is marked as "\*".