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STANDARDIZED BIBLIOGRAPHIC PROCESSING

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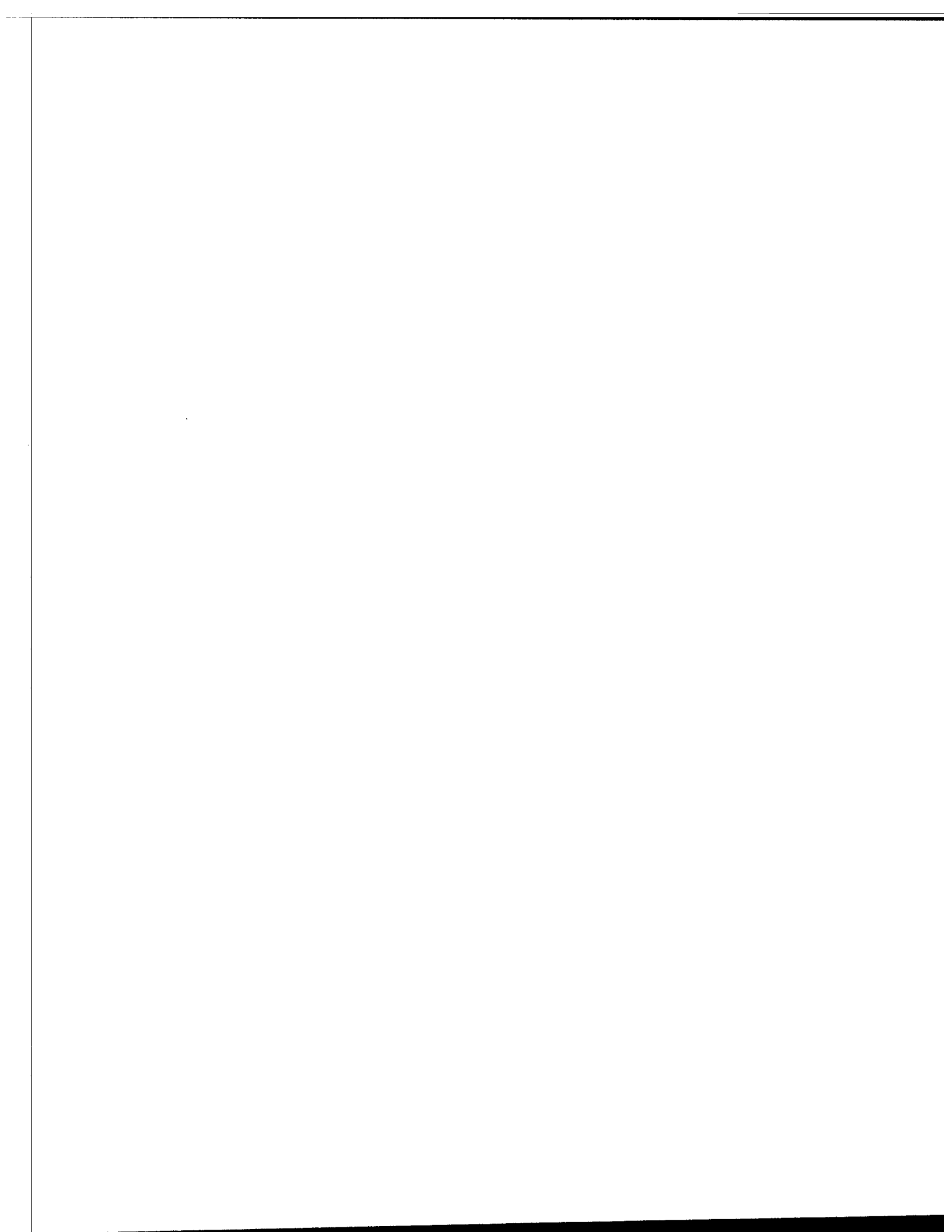
**Patron Number:**

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**Notes:**

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## STANDARDIZED BIBLIOGRAPHIC PROCESSING

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## ABSTRACT

Because of an ever growing number of publications, and ever dwindling economic resources, those who work in the information community have always seen the need to share resources through standardization. Since the 1960's new computer technologies have made the sharing and exchange of bibliographic records feasible. Throughout this period, standards for descriptive cataloguing have been refined so that the records being exchanged will be compatible. Based on these standard machine readable records, both libraries and the abstracting/indexing communities have developed various formal exchange formats. This paper presents an overview of the development of standardized bibliographic processing from the first cataloguing rules through to computer exchange formats. The use of these standards by the Defence and Aerospace community is examined with particular emphasis on the treatment of technical reports.

## INTRODUCTION

The requirement for standards dealing with information handling is generally obvious to members of the information community. This paper will offer a brief history of and some of the rationale for the development of standards within our industry. We will attempt to clarify the unwieldy situation which presently exists in the exchange of bibliographic material both internationally and nationally.

In recent years rapid technological change and the ensuing proliferation of new products and services has led to widespread demand for benchmarks of quality. Standardization has become a fact of life. We are witnessing an increase in the number of standards and standard controlling agencies with a corresponding number of confusing acronyms and initialisms. For example, in Canada the National Standards System (NSS) consists of a coordinating agency, the Standards Council of Canada (SCC) and five standards writing organizations (the Canadian Gas Association - CGSA, the Canadian General Standards Board - CGSB, the Canadian Standards Association - CSA, the Underwriters' Laboratories of Canada - ULC, and the Bureau de normalisation du Québec - BNQ). Also under the umbrella of the SCC are five certification organizations, thirty-four testing organizations and many others "concerned" with national standardization (Standards Council of Canada, 1987).

It has never seemed appropriate to question the value of standards. We all know that standards are designed for our common good. Technical standards save us from the frustrating and the expensive. As Sandra Paul illustrated with a poster published by the American National Standards Institute (ANSI), no one wants to have to purchase 6 different lightbulbs to find the one that fits their lamp socket. (Figure 1, Paul, 1984). Not only do standards save us time and money, many of them also protect us and ensure our safety. An example of a protective standard in Canada is one that details acceptable levels of air pollutants such as asbestos.



Figure 1. American National Standards Institute Poster

### General Categories of Standards

Taking a look at technical standards, we find that they fall loosely into three categories: those that are developed because they lead to financial benefit; those that have safety or consumer protection implications; and finally those that set out a quality to be achieved which is valued and culturally appropriate. Of course the standards that have been most successful in the commercial world are in the first category, while standards providing protection seem to be successful usually only when coupled with government intervention (Paul, 1982). The third category of standards, and those with which most of us are familiar in the information industry, are qualitative in nature. These have the least chance of being universally and consistently implemented as they carry little concrete incentive other than the achievement of a common goal of quality service.

### Standards in the Information Industry

It could be well argued that the information industry standards are more than qualitative in nature, but that is not at issue here. What we must recognize is the fact that we have been involved in standardization for many years, whether the incentive has been material or altruistic. In fact, the American National Standards Committee Z39 dealing with library, information science and related publishing areas has existed since 1939 and lists at present approximately 40 standards related to information processing of one type or another (Rush, 1982).

In twenty years the information industry has witnessed an "information explosion" and along with it an increased demand for higher quality service. Dian Cohen a prominent Canadian economist has stated that we are moving from a product oriented economy to an information oriented economy (Cohen, 1988). Librarians are faced with the dilemma of trying to provide greater service with static resources. They view standards as one means to achieving high quality useful service while minimizing costly repetition and inconsistency. This recent move to standardization is evident when we consider that most of the 40 standards produced by the American Z39 Committee have been produced since 1970 (Wood, 1982). Further, at present there are at least 20 information standards under development (Rush, 1982). Figure 2 illustrates this trend towards increased standardization clearly.

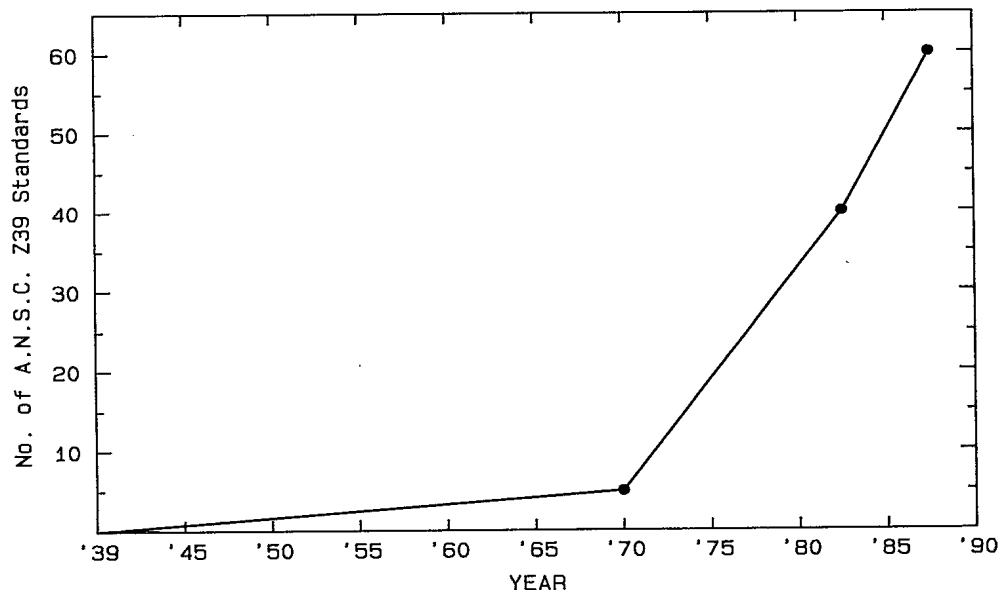


Figure 2. American Standards Relating to Information

### UNIVERSAL BIBLIOGRAPHIC DESCRIPTION

Although the full effect of meeting the increased demand for information with static or often diminishing resources has only been seriously felt in the last two decades, libraries have long realized the benefit of a standard universal bibliographic description. Bibliographic description is the standardized description of an item in a collection providing accurate information about the physical and intellectual properties of the item. Not only does the bibliographic description or cataloguing distinguish the item from all others, it also notes where the item may be found in the collection. This objective of Universal Bibliographic Control (UBC) was set out by the International Federation of Library Associations (IFLA) in the early 1970's. The basic tenet of UBC is that any item published in any nation should be catalogued once according to an internationally accepted standard by the appropriate national agency such as a national library. All other nations and their libraries would copy this one original description.

Why has so much attention been paid to this exercise of consistently describing and indexing items in library collections? A major factor is that this enterprise has always been one of the most costly in libraries. In 1980 the cost of originally cataloguing a book was over \$17 (McQueen, 1985). Averaging the inflation rate over the past eight years an approximate cost to libraries in 1988 would be close to \$30. These high costs have caused librarians to attempt to limit the amount of original cataloguing that must be performed in-house, turning to standardized cataloguing which can easily be shared (McQueen, 1985).

In addition to immediate financial savings, high quality, internationally consistent cataloguing yields other benefits. A library's file of bibliographic records will last years while cards, catalogues, software, hardware and yes, even librarians come and go. The file is an investment that must be lasting and flexible for future technological developments. Even if new formats are required in the future, with standardized records we can easily take advantage of common conversion programs. It seems evident that cataloguing standards are essential in libraries for both short term savings and long term investment.

### Cataloguing Rules

To understand our current status in the area of cataloguing standards, a brief historical summary is necessary. The development of cataloguing rules began over 140 years ago when Panizzi of the British Museum wrote the first major statement of cataloguing principles - Rules for the Compiling of the Catalogue. Then, in the 1900's the Library of Congress of the U.S. began selling copies of its catalogue cards for use in other libraries. This sharing of records caused a demand for cataloguing rules that would enable libraries to devise compatible cards locally. In the next forty years the Library of Congress, the British Library, the American Library Association and the British Library Association all published different editions of cataloguing rules. Finally, in 1961 fifty-three countries participated in the International Conference on Cataloguing Principles in Paris. The international bibliographic standard produced at this meeting has come to be known as the Paris Principles. Based on these principles we have witnessed the publishing of two editions of the Anglo American Cataloguing Rules by the national libraries and library associations of Canada, United States and United Kingdom (Wynar, 1980). The second edition of this work, known as AACR II, has been published in many different languages and has been widely accepted as an international standard (Delsey, 1987).

Integrated into AACR II is a true international standard known as ISBD - International Standard Bibliographic Description. This format, devised in the early 1970's under the auspices of IFLA, specifies the essential elements of bibliographic description; the order of the elements; the form of the elements; and certain standard punctuations. Figure 3 shows a catalogue card created with AACR II rules (Library of Congress, 1972).

AACR II's rules tells us for example to use "Unesco" as an entry, not "United Nations Educational, Scientific, and Cultural Organization"; or "University of British Columbia", not "British Columbia. University". Such examples may seem to be common sense, but in any room of people there will be as many different common sense approaches as there are people. If all cataloguers made decisions without the assistance of detailed rules such as AACR II, library users would never find the information they seek. Would the publications of this panel, for example, be found under Advisory Group for Aerospace Research & Development, or AGARD, or TIP, or Technical Information Panel? Or would they be listed only under title?

These rules have been interpreted and revised to accommodate language and cultural differences. They are also continually subject to differences of "practice" in local catalogues. Despite the many variations, a good deal of progress has been made in the past 20 years in the sharing and exchange of bibliographic records. As we have discussed, much of the standardization of bibliographic records has occurred to facilitate sharing of cataloguing in order to save money. This process has also been greatly influenced by advances in technology (Delsey, 1987). Computerization of library catalogues and the creation of standardized machine readable records has brought us one step closer to the international goal of universal bibliographic control.

### Bibliographic Exchange Formats

In order to exchange bibliographic records by computers, a second level of standardization above cataloguing rules is required. Standardized formats and guidelines for coding data to machine readable form are needed to translate the information catalogued. One of the most widely used coding systems, (Machine Readable Cataloguing) was initiated by the Library of Congress (LC) in the 1960's. The system was designed to enable LC to exchange records with other libraries on magnetic computer tape rather than on cards. It was not developed in isolation, but in consultation with the British National Bibliography so that exchange of records on computer tapes could take place. Since that time we have observed the development of many different national MARC formats: Canadian MARC, UK MARC, French INTERMARC, and German MARC to name a few. For an example of an LC MARC record, see Figure 4.

To better understand exchange formats, let us look at the elements of which they are composed. It is widely accepted that any bibliographic exchange format consists of three parts: the structure of the record; the content identifiers or tags; and the

contents or data themselves (Hopkinson, 1986). The structure refers to the arrangement of the data on the particular computer medium, most often magnetic tape. The universally accepted structure for exchange on magnetic tape is set out in an International Organization for Standardization Standard, ISO 2709, Documentation: Format for Bibliographic Information Interchange on Magnetic Tape which has been implemented as several national standards, such as ANSI Z39.2, American National Standard Format for Bibliographic Information Interchange on Magnetic Tape. ISO 2709 states for example that each separate piece of information must be first identified by a tag consisting of three characters. On a tape of MARC records, such fields as the title will always be preceded by its tag of 245 while the author field will be tagged with 100. This tagging means that any computer system can search for the particular tag to provide access to that field.

Although ISO 2709 specifies that there will be tags, it does not stipulate exactly what the tags will be. Therefore, at the second element of an exchange format we begin to see variation and several different systems of tagging or of designating data. MARC, a library associated tagging system, was designed to accommodate the complicated cataloguing rules described above. The Reference Manual for Machine Readable Bibliographic Descriptions published by UNESCO was created to facilitate the exchange of records in the abstracting and indexing community. The third major set of content designators is detailed in the Unesco Common Communication Format (CCF). This format was the result of a Unesco symposium in 1978 held in Taormina, Sicily, wherein a compromise was reached between the library and the abstracting & indexing communities. The Common Communication Format was intended to bridge the gap between the Reference Manual and MARC. However, its success is still to be realized. To the detriment of the international exchange process, there now appear to be three standard exchange formats where once there were only two. Computer programs have been written to allow exchange of records across these formats, but implementation of these conversion programs is expensive and complicated. In actual practice very little exchange occurs except between information organizations using the same format (Hopkinson, 1983).

The final element of any exchange format is the actual content of the record. This element is dependent on the cataloguing rules in use; on their application for the particular purpose at hand; and on the method that the exchange format uses to divide up the information. An example of these rules in the library community, AACR II has been discussed at length above. The abstracting and indexing community also uses sets of cataloguing-type rules to determine the contents of their records. These rules, however, seem to be even more varied than those used by the library community. Because abstracting services deal in specific subject areas, and because there is little public demand for exchange of records between these services, compatibility of content descriptions rarely exists (Wood, 1982).

<b>Knuth, Donald E.</b>		
The TeXbook / Donald E. Knuth ; illustrations by Duane Bibby. — Reading, Mass. : Addison-Wesley Pub. Co., c1984.		
ix, 483 p. : ill. ; 24 cm.		
Includes bibliographical references.		
Includes index.		
ISBN 0-201-13448-9 : \$15.95		
1. TeX (Computer system) 2. Computerized typesetting. 3. Mathematics printing. I. Tide.		
Z253.4.T47K58	1984	686.2'2544—dc19 83-830
		AACR 2 MARC
Library of Congress		

Figure 3. Library Catalogue Card in AACR II Form

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RSN   PTC   OPN   DFC   DCR   DCH   TCH   LNG
18624712 updt LC : 84Feb22 83Feb16 86Mar09 19:42
                01:830216 02:      s 03: 1984 05:   mau 06:  a
                09:  b   13:      1 14:      1 17:   eng 19:   d
                30:      m 31:      a 32:      0 33:      a   --
010   ..... 2001 $a 83000830 //r86
020   ..... 2001 $a0201134489 (soft) :$c[$115.95
039   0..... 2001 $a2$b3$c3$d3$e3
040   ..... 2001 $aDLC$cDLC
050   00..... 2001 $aZ253.4.T47$bK58 1984
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100   10..... 2001 $aKnuth, Donald Ervin,$d1938-
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                Duane Bibby. --
260   0..... 2001 $aReading, Mass. :$bAddison-Wesley Pub. Co.,$cci984.
300   ..... 2001 $aix, 483 p. :$bill. ;$c24 cm.
500   ..... 2001 $aIncludes index.
504   ..... 2001 $aIncludes bibliographical references.
650   .0..... 2001 $aTeX (Computer system)
650   .0..... 2002 $aComputerized typesetting.
Continue? (Y=yes or N=no)
y
650   .0..... 2003 $aMathematics printing.

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Figure 4. Library of Congress MARC Record

## BIBLIOGRAPHIC STANDARDIZATION IN DEFENCE AND AEROSPACE

We have emphasized the importance of technical standards both generally and in the information industry, and indicated that international standards for descriptive cataloguing are of particular importance. With these standards in place libraries can save money by sharing resources and by creating files that will serve as long term investments despite changes in technology. The present degree of computerization has created a need for a second level of standards in the form of exchange formats. To what degree has this standardization process affected our information services in Defence and Aerospace?

It seems that defence information services have somehow managed to remain out of the turmoil of other library communities. Perhaps, however, we have not reaped some of the benefits resulting from the turmoil. In defence we are often trying to prevent people from finding our information, while other information services are striving to provide universal access. For this reason the need for a large shared catalogue has not been great. Further, defence library users normally need technical and applied information. The publications that are collected to meet this need for the most part are not esoteric and difficult to catalogue. Our information facilities contain straight forward, relatively easy to catalogue texts, manuals, journals, and technical reports. Therefore, the impetus to participate in standardized bibliographic processing with a view to sharing cataloguing has not been present. The question we must ask is whether it is now effective and appropriate for us to become involved in these international networks so rigidly controlled by complex standards. Would it be to our advantage to participate in sharing of bibliographic records, and if so how might we proceed to bring our procedures in line with the international standards that exist?

Books and Periodicals

It appears to be both appropriate and advantageous to participate in a system of universal bibliographic control for defence oriented collections of books and periodicals. As many authors point out we will save time and money by copying cataloguing from large shared cataloguing systems (Delsey, 1987; Hopkinson, 1984; McQueen, 1985; & Paul, 1982). We will also create a database of standardized bibliographic records which can then be easily manipulated by most library automation software packages. When there are new technological developments, our standardized records will be ready to be included in any conversion programs required. There is no longer a need to develop costly and short-lived in-house systems to provide access to our book and periodical collections. If we are willing to contribute effort at the "front end" the result will be a profitable long term investment. The money and time saved as a result of shared cataloguing can be invested in providing a higher quality of service to our clients.

Technical Reports

The standardization of bibliographic records for technical reports, however, is not as easy to implement as standardization for books and periodicals. Reports are referred to by many as "grey literature" in reference to the difficulties encountered in

identifying and obtaining them. They are produced quickly to present vital technical information in a published format, but this process means that they often are not subject to the rigors of other types of publications. They are often soft bound with little accurate identifying information. For example, the title may be different on the cover, the title page and the document control sheet! Reports frequently don't present a complete picture of ongoing research, as they cover only one phase of development (Burruss, 1985). They are not indexed in valid abstracting and indexing systems and many libraries do not even provide subject access to them. For these reasons technical reports have not been of primary importance to most libraries and information centres, and hence, they have not been thoroughly considered in the information handling standardization processes.

#### Technical Reports - Cataloguing Rules

In North America those of us whose clients depend on technical reports create bibliographic descriptions of our reports according to the American Committee on Scientific and Technical Information (COSATI) Standard entitled Guidelines for Descriptive Cataloging of Reports. Defense Technical Information Center (DTIC) in the U.S. and Defence Scientific Information Service (DSIS) in Canada have both published their own applications of the COSATI rules for use in defence information centres at the national level. However, it appears that there has been no formal discussion of possible compromises which could lead to complete compatibility between the two sets of rules. Both the COSATI guidelines (1978 version) and the DTIC rules (1984 version) were consulted by DSIS when the last revision of the DSIS rules was produced in 1985. Unfortunately, because of existing and historical procedures at DSIS, this Canadian version could not be 100% compatible with the American version. Similarly, within the Department of National Defence in Canada the report cataloguing institutions seem to use the DSIS standard only when it conforms to existing local practices. This standardization problem has been addressed nationally in the United States by the Commerce, Energy, NASA, Defense Information (CENDI) Cataloging Committee who published in 1985 Guidelines for Descriptive Cataloging of Reports. This new revision of the 1978 COSATI guidelines presents rules that "govern the form of the essential cataloguing elements for reports processed by the major federal information processing agencies: U.S. Department of Commerce, U.S. Department of Energy, National Aeronautics and Space Administration, and U.S. Department of Defense" (Guidelines, 1985). Its publication is a welcome addition to American report cataloguing standardization and the experience gained by the CENDI Cataloging Committee in producing this standard could serve as a starting point for future international cooperation.

#### Technical Reports - Exchange Formats

Not only is there a problem with lack of standardization of cataloguing rules for technical reports, but we encounter another problem at the exchange format level. Standardized international tagging systems such as MARC do not exist for the exchange of technical report records. In the U.S. the defence agencies belong to a shared cataloguing network, but this network is mainly limited to the defence community and in 1985 it was stated that the system's design did not readily permit downloading of records to create local catalogues (Burruss, 1985). However, one of the six main objectives of the revised COSATI guidelines of 1985 was to standardize tags for the exchange of machine readable data. This indicates that machine readable report cataloguing is indeed being shared to some extent in the U.S. In Canada there is no vehicle for sharing cataloguing of technical reports nationally, but computerized exchange of records is being considered. For the time being each information centre produces all its cataloguing originally. DSIS has access to the American cataloguing network, but in a "read only" capacity for database searching. DSIS also receives copies of the American and British magnetic tapes of report records, but these are standardized only with respect to the structure (using ISO 2709) while the tagging systems and cataloguing rules are incompatible (both with the Canadian systems and with each other!).

#### Technical Reports - Recommendations

Based on comments above concerning the advantage of standardized bibliographic processing, it appears that technical report users, and the information community as a whole could benefit greatly from internationally standardized cataloguing rules and exchange formats for technical reports. The steps towards this standardization would be lengthy, difficult and costly to initiate. Further, as Henderson suggests, long term commitments and binding obligations would have to be undertaken by the national agencies precluding many unilateral decisions (1980).

However, the advantages far out weigh the disadvantages. Defence information centres would enjoy considerable cost saving through large international standardized catalogue sharing systems, and our catalogues created in this fashion would be standardized to survive as a long term investment. In cooperating we could share experience and expertise within the report community and the information community as a whole. To quote an appropriate cliché, we would not find ourselves "reinventing the wheel". It has also been suggested that as a large unified international network we would carry more influence in political decisions affecting the information industry (Henderson, 1980). Finally, and most importantly, as processing costs are cut and access to records is improved, we will be able to provide superior quality information service to our technical report users.



## CONCLUSION

In conclusion, we have discussed the rise in importance of standards in the information handling business. With our economy turning from a product basis to an information basis, librarians and information managers are being pressured to provide increased and better service with static or often diminishing resources. Standardization has helped us keep costs down and allowed us to optimize our use of technological advances. Standards for the creation of bibliographic records are no longer esoteric doctrines for high quality control, they are fast becoming practical and necessary tools for improved service. The Defence and Aerospace information communities have historically been out of the main stream of bibliographic standardization. However, like all other information centres, our services can benefit greatly from cooperative standardization, and we should whenever possible take advantage of the systems in existence for books and periodicals. Further, we have an important contribution to make to the information industry in the area of technical report processing standardization. Report bibliographic description and record exchange have not yet been seriously considered for international cooperative standardization. Since the processing of technical reports is our area of expertise and interest, we should promote national and international actions to standardize in this area. Standardized bibliographic processing of reports would benefit us and the rest of the information community financially, technically and politically. Most importantly, standardization in this area would benefit our clients.

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