
Standardization as a Tool of Scientific Management

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IN THE LIBRARY world the word standardization is not always considered with sympathy. Even in a standardization-minded country like the United States the tendency to uniformity and to elimination of individual variety is not liked by those whose task is to promote intellectual initiative and development and to encourage personal study and investigation. Yet one of the basic principles of scientific management is the application of standardization, and it is worth while to inquire in which cases standardization is justified and whether it can ever hamper progress.

Years ago the writer assisted at a meeting in the International Institute of Intellectual Cooperation (the predecessor of Unesco) on standardizing formats of books and papers. In the course of a spirited discussion an elderly librarian pleaded that it would be a shame if an almanac he displayed (perhaps it was the *Almanach de Gotha*) should be published henceforward in an industrial standard size. At this point Marie Curie spoke up to explain the value and the limits of standardization, with arguments that won at least one hearer to the idea of standardization.

The old definition of standardization is to eliminate useless and disadvantageous diversity and variety. The more positive one is to bring production to a higher level, to guide and plan judiciously the necessary diversity in order to promote harmony in variety, and to assure that human labor will be used in a worthy way. By eliminating waste of energy and by expelling gradually the inferior varieties in production, standardization should make its contribution to progress.

An industrial standard can be described¹ as a concise statement defining: (1) the form, size composition, quality, performance, or other

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characteristic of a material or a manufactured product; or (2) methods of testing, applying, or otherwise manipulating such a material or product; or (3) a relationship between characteristics of different products. Standardization in the field of librarianship and bibliography is not much different in principle, although the products and materials are intellectual, and not so easily definable in mathematical and quantitative ways.

The value in defining a term is arbitrary. In reality there are notions associated consciously or unconsciously with any phrase which are not covered by the formula of a definition. The word "standard" is connected with what is permanent and of high level. Since translation of terms in the international field into Latin or Germanic languages is based on the word "norm" (normalisation, Normung), there is an association with something that is normal and belongs to the average level of the mass. Such relations are dangerous, for it would be a wrong interpretation of standardization to connect it with permanence and with mediocrity. On the contrary, if it is to fulfill its purpose it should be dynamic and display a tendency to follow or, still better, to stimulate progress.

The major and direct aims of standardization are:

1. Interchangeability. In the material field there may be interchangeability in elements of building, or apparatus, or tools—e.g., in a library the interchangeability of bookshelves or their supports, or of catalog cards, or of bibliographic cards. This may concern objects of about the same size but of different qualities, such as catalog cards having dimensions of 75 x 125 mm. but of unlike color or material. It also may be directed to quick replacement of some part of an apparatus in the event of a breakdown; for instance, it may involve the fitting, voltage, wattage, intensity, or size of an incandescent lamp serving as the light source for a microcopying outfit. The direct economic consequence of free interchangeability of materials, entailing lower inventory because fewer sizes are required, is to decrease reserve stocks. Also, quantity buying of fewer sizes may follow, with lower prices.

Important as the above may be, interchangeability in the immaterial field is even more so. The economic gains possible from it are not so easily calculated, but they are not less real. The waste of time caused by widely different systems of subject headings, of methods of alphabetical arrangement (especially in non-English languages), and of classification and coding, result in the practical inaccessibility of vast amounts of information, which is lost so far as the general public is

concerned. Not seldom a librarian develops his own system of cataloging or of classification; and while such initiative may be appreciated, readers are handicapped when they have to make searches and to trace information in a way to which they are not accustomed. Since it is so difficult for users to adjust to varying conditions, efficient use of bibliographic data, abstracts, and other information can be achieved only if the material arriving from several sources can be filed together more or less automatically.

2. Facilitated inspection and control. Insofar as some departments of a library or of an information service may be considered as small industrial workshops, standardization is an important means for inspecting the output so that gradually the best methods and processes may be chosen. Unless units of performance or elements of processes are standardized to some extent, it is impossible to make comparisons within one's own institution or with others. Again, if in a photocopying department nonstandard methods of producing copies and nonstandardized materials are employed, it is not feasible to make reliable precalculations and to fix rates in such a way as to serve the public well and at the same time avoid dangerous losses for the institution.

Insufficient study and attention to work standards, either in the case of material production or of intellectual labor, have only too often caused miscalculation, with subsequent losses, arrears, and other shortcomings in the performance of scientific institutions. Neglect of standardization means a deficiency in scientific management which not only brings harm to business enterprises but also to noncommercial agencies.

3. Facilitated training. Every employee entering a new job loses time in learning the routines. It is obvious that one changing his position will be trained in his new work more quickly if he has not to learn new techniques. In librarianship the turnover of the personnel is high, hence there is repeated loss of production in the periods of introduction. By standardization of methods and processes such loss can be reduced considerably. Also, training in colleges will be more efficient when acquired techniques can be applied without substantial modifications after the entry into practical service.

If results such as those suggested above can be obtained in a substantial degree they almost automatically tend to further improvement and make standardization fulfill its real purpose—the raising of quality and production. Yet it must be remembered that standardization is not

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an end in itself. If it amounts to a fad and renders no real service, it may kill initiative, freeze an existing situation, and retard progress.

Standardization can be achieved at various levels, i.e., (1) within one's own enterprise, (2) nationally, and (3) internationally. Of course the last—if it is realized—is the most effective, but it is the most difficult to attain.

Experience shows that standardization starting from the top and proceeding downward is seldom successful. Inasmuch as it should be based on actual practice, it should begin in the individual enterprise or institution, extend gradually to the national level, and finally to the international field. It should take into account the widest diversity of interests and should be the result of collective study and consideration.

Where standardization is a tool for economic management, the producers, the distributors, and the consumers should be considered as interested parties. This principle applies also in the noncommercial, intellectual field. In the world of documentation the producers are the authors, the editors, and the printers; the distribution is commercially in the hands of publishers and booksellers but noncommercially in those of librarians; and the final consumer is the reader, the student, or the intellectual worker. These three groups must be considered and consulted if a valuable standard is to be established, even when an individual institution is preparing a standard for its own use.

If a national standard is to be developed, the national standardization institution, such as the American Standards Association (ASA) in the United States, may provide for representation of all interested parties on the committee in charge. Finally, the representatives of the national standardization bodies may work together in a technical committee of the International Standards Organization (ISO) in order to arrive at an international recommendation and if possible an international standard. In the ISO the secretariats of the international technical committees are entrusted to various national standardization bodies. For documentation in the strict sense of the word (including librarianship) the secretariat is, for the time being, in the hands of the Netherlands Standards Organization (Hoofdcommissie voor de Normalisatie in Nederland). The secretariat is designated as "ISO Technical Committee 46—Documentation."

There are, however, other ISO technical committees of interest to librarians, viz.: ISO/TC 37—Terminology (assigned to the Oesterreichischer Normenausschuss in Austria) and ISO/TC 6—Paper (as-

signed to the Afnor in France). A special subcommittee of ISO/TC 46 deals with document reproduction. The French standardization body, Afnor, is in charge of the subcommittee.

Meanwhile standardization is not a monopoly of national and international agencies. Older standards have been established more or less through tradition and have been accepted to a large extent, an example being those for printing types in the graphic industry. Gradually the preparation of standards has developed a technique, and it now is considered desirable to leave the organization of this work to competent bodies.

Although in principle the standardization agencies in the various nations work along similar lines, the procedure varies from country to country. In the United States the setting up of a norm ordinarily is undertaken if one or more competent and authoritative specialized bodies take responsibility for the preparatory work. In the field of librarianship the American Library Association acts as sponsor for the drafting of standards.

In some countries standardization is considered a government affair and standards assume the character of government orders. There is danger in such compulsory standards, however, in that they do not meet the requirements of practical life and that their character is insufficiently dynamic to enable them to follow the evolving of the equipment, methods, and processes for which they are meant. Moreover, there may be special circumstances in which it is desirable, if not necessary, to deviate; and official compulsion prevents the standard from serving executive needs at such a point, and hence may become a handicap. To forestall such a result, a standard specification should have the character of a recommendation.

Standards in librarianship and in the broader field of documentation concern the following general subjects:

A. Material of documents

1. Sizes of paper and like objects (such as forms, drawings, books, pamphlets, periodicals, bibliographic cards and slips, photographic material)
2. Quality and tests of material for documents (applying to paper, ink, binding materials, and photographic material, etc.)

B. Layout of documents

1. Forms for writing paper
2. Accountancy forms

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3. Drawings
4. Books and pamphlets
5. Periodicals
6. Bibliographic cards and slips
7. Various forms (e.g., library lending forms, etc.)
- C. Elements of the contents of documents
 1. Graphic characters (handwriting characters for drawing, printing, and typing)
 2. Transliteration and transcription
 3. Symbols and abbreviations (for pure and applied sciences, for technical drawing, for titles of periodicals, etc.)
 4. Terminology
- D. Editing the contents of documents
 1. Title references and bibliographical notices
 2. Abstracts, summaries, book reviews, and the like
 3. Periodical articles
- E. Arrangement of documents
 1. Alphabetic arrangement
 2. Systematic arrangement
- F. Filing and storage of documents
 1. Filing material
 2. Filing cabinets, indexing and other equipment
- G. Various apparatus (mechanical devices)

With some exceptions standards are available for the above, having been established by existing national bodies, or by other institutions, or by tradition. The International Standards Organization is only beginning its task. Some international recommendations have been formulated provisionally, however, and before the war the International Standards Association (ISA) published a few proposals (in the form of "bulletins") in this field.

Below are given a few examples of standards, especially in the domain of librarianship *strictu sensu*:

A. Material of Documents

1. *Sizes of paper and like objects.* Here standardization through tradition plays an important role. In old books the official folio sizes often show the proportion of the golden section $\frac{1}{2}(\sqrt{5} - 1)$, or approximately $\frac{5}{8}$. The international library card of 75 x 125 mm. (3 x 5 inches) retains the measurements of the first international post card,

from which they were taken. A French law of November 4, 1798, prescribed metric sizes for paper derived from a basic rectangular surface of a square meter of which the sides show a proportion $1 : \sqrt{2}$, the only proportion which after repeated dividing into halves remains constant for the parts obtained.

At the suggestion of Wilhelm Ostwald, German standardization followed this principle (DIN 476; ISA Bulletin 7—1934).^{*} The Deutsche industrie normal (DIN) standard starts with the surface called A0, being 841 x 1189 mm.; A1, the half size, is 594 x 841 mm., and so on. The sizes A4 (210 x 297 mm.) and A5 (148 x 210 mm.) are those recommended for usual books and periodicals. Derived from this so-called A series are the B and C series, showing similar proportions and a metric base (B1 = 1000 x 1414 mm.). Some sixteen continental European countries have adopted the so-called A series. The French paper standardization (Afnor Q1, Q1-1/Q1-4) is based on three sizes: Carré (45 x 56 cm.), Raisin (50 x 64 cm.), Jésus (56 x 72 cm.). The Carré is the preferred one and includes the size (21 x 27 cm.) nearest to the A4.

The French sizes follow one another in a Renard series (ISA Bulletin 11—1935) of preferred numbers, in which the ratio is $\sqrt[5]{10}$ and lower powers. The measurements in the Anglo-Saxon countries are nonmetric. A much-used American size for letter paper is 8½ x 11 inches. Near to it comes the English 8 x 11 inches, which is one of the preferred dimensions according to the series of British Standard Sizes for Paper (BSI 730—1937). The foolscap size which was and is much used in English official documents measures 14 x 17 inches—half size, 14 x 8½ inches, being about the proportion of the golden section. The tolerances for reduction, e.g., after binding, are important. In most countries they are 6 to 10 mm. for writing paper (DIN 198).

The standardized measurements of cards and slips have found the largest application all over the world. The 75 x 125-mm. card is used in almost every country, the size 3 x 5 inches, approaching it very nearly. The DIN A7 size, 74 x 105 mm., gives practically the same height of card, so that if necessary the DIN A7 cards may be mixed with the 75 x 125-mm. cards.

Sizes of letter covers (DIN 680, 678), file covers (DIN 821), and note pads (DIN 4999) are standardized in most countries in connection with the dimensions of letter paper. For post cards the Inter-

^{*} Full titles of standardization agencies are listed at the end of this article.

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national Postal Union has adopted the A6 (105 x 148 mm.) as the maximum (DIN 679). Sizes for accountancy forms often are set more or less by the machines used for office accounting and tabulating. In Europe there has been effort to make them conform to letter-paper sizes (N 1026). Drawing sizes have been standardized in most countries.

The sizes for books, pamphlets, and periodicals should follow the letter-paper standardization, and, in fact, most countries offer recommendations in this direction. However, the fact remains that there is a wide variety on the market. Most scientific books show formats of which the width varies between 12 and 18 cm. and the height between 19 and 25 cm., proving the weakness of theoretically developed standards. The consumer requires comfortable reading, and the publishers adopt what they think will best suit the buyers.

Sizes for various items have been standardized, e.g., for posters (DIN 683), name plates (DIN 825), folders for tourists (DIN 5000), and menus (DIN 5002). More important to the librarian, however, are the dimensions of photographic material, and here arises a typical difficulty. In the beginning, when document reproduction was not yet a regular library practice, the photographic industry fixed its own standards. Glass plates of 9 x 12 cm. and 13 x 18 cm. were usual. Then came the reduced camera film of 6 x 9 cm. and 6 x 6 cm., and the cinematographic film with widths of 35 mm., 16 mm., and 8 mm.

The librarians were only small consumers, and they were more or less compelled to accept the commercial sizes in photography. Today document reproduction has grown to such an extent that there is warrant for it to make its own conditions. Contact copying should follow the measurements of existing documents, and the present draft recommendations of ISO Technical Committee 46 Subcommittee Document Reproduction mentions the sizes A4 (210 x 297 mm.) and A5 (210 x 148 mm.) (cf., DIN 4520; NBS R 165-36). It is doubtful whether the suggested standard will be satisfactory. The majority of documents to be copied are a stage larger than A5 and substantially smaller than A4, so that keeping to the proposed standard would cause a considerable loss of sensitive material. A new international size, therefore, seems desirable. One of approximately 26 x 17 cm. would cover a considerable number of cases.

For copies made with the aid of projection (camera copies either macroscopic or microscopic), the proportion of the sides of the copying frame should correspond approximately with the average propor-

tions of the sides of the documents. The usual microfilm frames (18 x 24 mm. and 24 x 36 mm.) deviate about 6 per cent from the DIN proportion $1 : \sqrt{2}$; but the average proportion in books is narrower, so that there is a loss of material in the width of the frames. H. H. Fussler suggested standardization of only one dimension of the frames (perpendicular to the direction of the microfilm), and adjustment of the other dimensions from case to case, so that the available surface of the frames can be fully used. Today the most usual widths of the rolls for full-sized or slightly reduced-sized photocopies are 21, 25, 30, and 33 cm. It would be desirable to standardize the width for ordinary photocopies to 21 and 30 cm. For the time being it seems desirable to keep the width of cinematographic films for document microreproduction, using the distance between the perforations (cf., ASA Z38.7.8/9/12—1944; BS 677—1942, 865—1939, 1153—1944, 1166—1944; DIN 4520). Microcards and microsheets at present follow the standard sizes for bibliographic cards, which mainly are 75 x 125 mm. and 74 x 105 mm., but also 9 x 12 cm.

2. *Quality and tests of material for documents.* Practically all materials for documentary purposes have been standardized. It is curious that the preferences among those to be standardized are largely different from country to country.

Most standards for paper concern strength, moisture content, degree of opacity, lignin content, and sizing. The general tendency is to consider paper made from rags as of first quality. However, pure cellulose paper in many cases shows equal durability. Following are some examples of standards which have been established in various countries: Argentina, IRAM 3008-P; Germany, DIN 827; the Netherlands, N 176-1763; New Zealand, NZSS 362 (schoolpaper, stationery); Poland, PN P-02001; Rumania, Stas 570, 1568 (drawing paper); Russia, GOST 4665-49 (lightproof paper).

Ferric tannate inks (in Germany, Normaltinte), for which diverse countries have standard recipes, are considered permanent. The Bureau of Standards gives various formulas (NBS C 196, 301, 400). Inks containing carbon black (Chinese ink) are equally durable. Most inks containing aniline dyes are not lightproof. Colors of printing inks are standardized in some countries (N 903). Also, for carbon ribbon and paper the materials containing carbon black are most durable. In Germany the Reichsausschus für Lieferbedingungen gives valuable formulas (DIN RAL 976 A).

Standards set for the quality of binding materials, such as linen,

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leather, cardboard, thread, and glue, are of special importance to librarians (NBS CS 39-34, CS 57-36; BS 1544—1949). The standard pencil is the graphite copying pencil (GOST 444.7-48; DIN RAL 931/2).

For ordinary photographic purposes the sensitivity and grading of sensitized papers and films have been standardized (DIN 4566). Gradually also the special requirements for documentary reproduction justify standardization (ASA Z38.7.8—1947). Norms for durability, fineness of grain, and fireproof and moistproof properties of microcopies and photocopies are needed especially. The American Standards Association has now set up a special committee dealing with document reproduction, although this committee probably will give first attention to equipment for such reproduction.

B. Layout of Documents

1. *Layout of forms for writing paper.* Here an undesirable variety in standards has grown up, and is an aggravation. In the United States and Germany the address commonly is put on the left-hand side of a letter, with the same margin as that of the text. In France, on the contrary, the address is put at the right-hand side. In the United Kingdom there is no uniformity. (DIN 676-679; N 1026; NS 395-396; UNE 4002; UNI 925-931)

2. *Layout of accountancy forms.* These go their own way. They are strongly influenced by the construction of accounting devices, and a traditional standardization of checks and the like is affected by modern American office machines (DIN 684, 5003; SIS 732821; Afnor Q1-4, Q1-5; NBS R 37-38).

3. *Layout of drawings.* Standards in this field are to be found in almost every country possessing a standardization institution. Not only drawings for ordinary engineering work, but for special fields of engineering such as architecture, building, central heating, garden architecture, and naval engineering have been standardized (ASA Z14.1; BSI 308; CNM 41-43, 1303-1305; DIN 28, 34, 823, 824, 1919, 30084; GOST 4444-48; N 13, 36-41, 44, 45, 135, 453; PN B131-133, N94001x/94004; SIS 732, 821; SMS 672; Stas. 612, 687/8, 700, 734/6, 788, 869, 1-49, 2-49, 74-49; UNE 1032/1036; UNI 938-940).

4. *Layout of books and pamphlets.* At this point tradition is still the most important factor, and official standards are rare. Title page, colophon or impression, table of contents and indexes, and the place of indexes and tables of contents in books still vary widely. Even the data necessary for preparing a catalog card not infrequently are in-

complete and inadequate. International standardization for technical and scientific books and pamphlets might be useful. Some improvement may be achieved by the so-called "publishers card," which should contain the necessary bibliographical data concerning a published book. Before the war the International Standards Association developed a standard (ISA Bulletin 22) which was accepted in various countries (DIN 1504; NBN 261; UNE 1001).

5. *Layout of periodicals.* Here international standardization has advanced although an ISO recommendation has not yet been established definitively. The first standard for the layout of periodicals was worked out in the United States under the title "American Recommended Practice for Reference Data for Periodicals" (ASA Z291—1935; cf., BSI 1629—1950; DIN 1503, 826; NBN 245; NS 22-23; UNE 1066). Before the war an international ISA recommendation dealt with the contents strips sometimes used to provide short summaries of the contents of periodicals. These could be cut into slips and pasted on cards, and thus offer abstracts of the articles in convenient form (ISA Bulletin 22; DIN 1504; NBN 261; UNE 1001). By many continental European periodicals the title is given at the bottom of the cover page of each number, with abbreviated title, volume, year, number, pages, date, and place of issue (ISA Bulletin 21; DIN 1501, DS 147-148; N 783).

6. *Layout of bibliographic cards and slips.* International standardization is badly needed for the exchange of bibliographic cards, and the prewar ISA recommendation (ISA Bulletin 22) was a step in the right direction (cf., DIN 1504; UNE 1056). However, while such a standard can be established in detail only when there is international agreement about bibliographic references, in practice many bibliographic services already make use of the 75 x 125-mm. card; and the prewar ISA recommendation for bibliographic titles combined with the Universal Decimal Classification number, the Library of Congress number, or the Dewey number as indicating the classification.

7. *Layout of various forms.* The Germans have standardized various forms for library administration, such as slips for lending (DIN 1500, 1506). Commercial forms have been standardized in the United Kingdom (BS 108—1951), application forms for employment in France (NF Z-45-004), and forms for registration of commodities in Germany (DIN 681). This list of examples might be extended.

C. *Elements of the Contents of Documents*

1. *Graphic characters.* In the expression of thought in graphic sym-

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bols the aesthetic value should not be underestimated, and therefore it is advisable to avoid overstandardization. Nevertheless, in order to promote legibility of texts for practical purposes, and also with a view to document reproduction, some uniform proposals are desirable.

For handwritten catalogs various recommendations have been established in library schools. The general one is to keep the letter form as simple as possible and to have the letters composed of parts of circles and straight lines. As height for the body, 2, 3, and 4 mm. have been recommended, with 5 mm. for capitals, most letters being developed from quadrangles of about 2 mm. square. Spacing between the separate letters varies from 1 to $\frac{1}{3}$ mm., and between the lines from 5 to 10 mm. Drawn letters are standardized in numerous drawing standards (e.g., CNM 50 f1-f3; DIN 16-17; N 27-28).

Long before standardization institutions existed printing types showed a certain amount of uniformity. Systems of points were developed. The body is substantially the distance between the upper limit of a capital and the lower limit of the letter "j." The unit, the 7 metric point, was conceived by Fourrier and mathematically fixed by François Ambroise Didot, and later on perfected by Berthold. It is now 0.376065 mm. at 20° C., corresponding with about $\frac{1}{72}$ inch. In the United States, twelve points (about 4.5 mm.) make a German Cicero, or one pica.

Average proportions between height and width of printed lines have been calculated. The Germans distinguish narrow script, middle script, and wide script. (The average proportions between width and length of the characters are respectively 0.5-0.53, 0.75-0.8, and 1-1.07.) The product, i.e., body \times number of types \times average proportion, then gives the length of a text. Thus, from a given line length, the number of lines of a text may be calculated. In fat types the width of the drawn lines is about one-fourth of the height of the type. Standards for the dimension of the composition and for correcting proofs are available in various countries (DIN NAGRA 11, DIN 1451, 2107; UNE 1034, 1-2).

Conventional typewriters show standard width of the spacing (pica 10 pitch, elite 12 pitch, microelite 16 pitch, etc.). The body corresponds approximately with 9-point and 7-point printing type. Modern machines with variable and adjustable spacing will cause the establishment of new standards sooner or later.

2. *Transliteration and transcription.* Here the library world is greatly interested in standardizing Cyrillic and other non-Latin scripts.

The Library of Congress and the British Museum have developed their own standards for Russian script. In the international field a recommendation has been evolved by the ISO, based on the ISA proposal No. 7 of 1939. It is still difficult to get complete agreement on the point involved (cf., OST/VKS 8483). Also standards for transliteration of the Greek alphabet (DIN 1453) have been worked out.

3. *Symbols and abbreviations.* The standards for symbols in scientific and technical work still show confusion in the international field. Usually they are included in those for definitions and terminology. Although the main symbols for physical data are internationally accepted, the specialized sciences show many deviations from country to country. It would be desirable to have an international code. Chemists have international symbols for chemicals in the Table Annuelle des Poids atomiques of the Union Internationale de Chimie Pure et Appliquée.

The old Committee for Intellectual Cooperation of the League of Nations started a code of title abbreviations, based mainly on the principles applied by *Chemical Abstracts*. ISA Bulletin 23 improved this so that it became more or less an international standard. In various countries (Belgium, Germany, Holland, Switzerland) standard abbreviations of periodical titles have been issued. The ISO in 1953 accepted ISO recommendation No. 4 as general recommendation for them (cf., DIN 1502; N 782; NF Z-44-002; NS 386/387; SNV 90.100/90.101).

4. *Terminology.* Standardization in the field of terminology is spread over the technical committees of the national standardization organizations as well as of ISO. In a great number of specifications it appeared necessary to give definitions of the basic scientific and technical terms used. To bring some unification in the technique of terminology, ISO has established a special committee, ISO 37, which in principle has a coordinating activity only. In Unesco a special section is dealing with the problems of technical terminology and vocabularies, and collecting bibliographical and other data in the field of linguistics which is of interest from the point of view of documentation. In the special field of terminology concerning documentation itself the former International Institute of Intellectual Cooperation drafted a list of definitions.²

Before World War II the late Henri Lemaître, with the help of many other librarians, started the compilation of an English-French-German vocabulary of librarianship. The International Institute of Intellectual Cooperation declared itself ready in principle to publish

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the work, but the war intervened. Subsequently Unesco accepted the responsibility for completion and publication of the vocabulary, and various experts gave their help to accomplish it. At the end of 1949 Anthony Thompson took over the task and brought it to a satisfactory end. The *Vocabularium bibliothecarii* was published in 1953.³

D. Editing the Contents of Documents

1. *Title references and bibliographical notices.* Although 90 per cent of all scientific libraries possess an international collection of books, in which at least three languages are well represented, we still are far from international standardization in this field. The librarians of the United States and the United Kingdom have come to agreement through the Anglo-American code, although it is not generally applied. The survey of J. C. M. Hanson, *A Comparative Study of Cataloguing Rules Based on the Anglo-American Code of 1908*, gives a splendid base for developing international rules, but little has been done since World War I.

ISO Technical Committee 46—Documentation has now come to the development of rules for title references, based on ISA project No. 3 of 1939 (cf., DIN 1505). Presumably in the near future an ISO recommendation for an international standard will result. At least it is to be hoped that rules for short-title references will be established. These will have great value in the mutual ordering of copies of periodical articles by reproduction services in the civilized countries, and for international lending and exchange of books. It is doubtful whether more detailed rules for cataloging will be accepted soon (cf., BSI CJ [OC] 4918; DIN 1505; N 917; SNV 90.103).

2. *Abstracts, summaries, book reviews, and the like.* There has been much discussion about this subject in Unesco and its Committee on Bibliography. For the time being the recommendations of *Chemical Abstracts* for preparing abstracts are widely applied.⁴ ISO Technical Committee 46—Documentation is taking the subject in hand in consultation with Unesco.

3. *Periodical articles.* Before the last war the Office International de Chimie tried to establish a standard, specified as la Rédaction, la Présentation, et la Publication des Mémoires dans les Périodiques. There is need for general rules to be followed in preparing a scientific article in order to obviate useless repetition of known material, to avoid insufficient reference to previous publications, and to promote the use of a clear introduction, summary, and conclusion concerning

the scientific results obtained.⁵ The discussion of this subject in various committees of Unesco has not led yet to concrete results.

E. *Arrangement of Documents*

1. *Alphabetical arrangement.* Alphabetical rules, sometimes called ABC rules, are to be found in various American handbooks on cataloging and librarianship. Outside the U.S.A., codes for alphabetical arrangement have been established in France, Germany, and Holland (cf., DS 377).⁶⁻⁸ Since words and names in all languages of the world have to be inserted in the alphabetical files of libraries and scientific institutions, it would be desirable to come gradually to international rules. So far no such ambitious project has been undertaken.

Of a more specific national character are the lists of subject headings. In this field the U.S.A. is ahead. The lists of subject headings prepared by the Library of Congress and other institutions are important tools for simplifying search, and show the advantages of standardization. The three-figure alphabetic order table of Cutter may also be considered as a simplification standard for alphabetic arrangement of authors' names.

2. *Systematic arrangement.* A certain number of widespread classifications have achieved the character of standards. The Library of Congress Classification and the Dewey Decimal Classification may be mentioned first, but the classification of Ranganathan and those of Bliss, Brown, and Cutter also possess value. In Europe the Universal Decimal Classification is the direct concern of the British Standards Institution and the Deutscher Normenausschuss for the English and German editions respectively, so that in the United Kingdom and Germany the U.D.C. is an official standard. The International Federation for Documentation is responsible for all international U.D.C. editions and the U.D.C. is the only classification kept up to date by international cooperation. The procedure for its establishment is about the same as for the engineering standards set by ISO and by national standardization bodies.

F. *Filing of Documents and Other Accessories*

1. *Files and covers.* Standardization here affects libraries especially insofar as vertical files are concerned. It should follow closely the standards for sizes of periodicals, pamphlets, commercial catalogs, and the like (cf., BS 1467—1948; DIN 821; N 690; SFS Z VIII 1/2).

2. *Furniture for filing.* Such furniture has been standardized in con-

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nection with the sizes of catalog cards, bibliographic cards, and filing covers (cf., DIN 4544, 4545; SNV 10.142). Also the shelving in libraries has become more or less uniform through tradition—the height of stacks about 2.25 m. and the width of shelves beginning at 20 cm. and increasing 5 cm. for each larger size.

G. Various Apparatus

The standardizing of equipment for document reproduction is felt to be necessary more and more. The American Standards Association has issued the following norms:

Z38.7.4—1944 R 1948	Projectors for Opaque Materials for Use in Small Auditoriums, Specifications for
Z38.7.5—1948	Printing and Projection Equipment, Methods of Testing
Z38.7.6—1950	Photographic Enlargers, Methods for Testing
Z38.7.8—1947	Microfilms, Practice for
Z38.7.9—1946	Microfilm Readers, Specifications for
Z38.7.10—1944 R 1948	Contact Printers, Specifications for
Z38.7.11—1944 R 1948	Printing Frames, Specifications for
Z38.7.16—1947	Resolving Powers of Lenses for 35-Millimeter Slidefilm and 2 x 2-Inch Slides, Method for Determining
Z38.7.17—1946	Reels for Processed Microfilm

The resolving power of lenses and other optical characteristics for cameras and enlargers has been made uniform in various countries (BS 161—1949; Afnor S 28-002; DIN 53383; PN M 54500; UNE 1030). Reels for microfilm were standardized in France under NF Z43-002.

In 1950 ISO appointed a subcommittee for document reproduction, forming part of ISO Technical Committee 46—Documentation. Draft recommendations were already available for the terminology of document reproduction, and for the sizes of photocopies and microcopies. Their intent is to standardize reading apparatus, although it is doubtful whether the time is ripe for that. Since the American production of microfilming equipment leads the way, it is to be hoped that the ASA committee for document reproduction will start formulating standards in close cooperation with ISO. It is hardly possible to realize international standardization as long as the country most representative in

dealing with the subject does not partake intensively in the international work.

From the above random examples it appears that extensive standardization has been accomplished in librarianship and documentation, but that still much has to be done. International standardization is still in its infancy and needs energetic promotion. It cannot be stressed enough that, particularly for librarians and documentalists, standardization loses half its value if it is not done on a world-wide base. There is much good will in this respect, but international cooperation always moves slowly and much misunderstanding and ignorance is still to be surmounted.

The more the general idea of scientific management is understood and accepted in the library world, the more librarians will become standardization-minded. If we patiently try to stimulate that development, the work should be crowned by success. This may redound to the benefit of international understanding and cooperation, and thus do its share toward vanquishing the forces of destruction that threaten the peace and progress of mankind.

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KEY TO STANDARDS

- ASA—American Standards Association
 Afnor—Association française de normalisation
 BSI—British Standards Institution
 BS—British Standard (issued by BSI)

Standardization as a Tool of Scientific Management

- CNM—Comité de normalisation Mécanique
- DIN—Deutsche Industrie Norm (issued by Deutscher Normenausschuss)
 - NAGRA—Normenausschuss für das graphische Gewerbe
 - RAL—Reichsausschuss für Lieferbedingungen
 - DS—Dansk Standard
- GOST—Gosudarstvennig Opshayusnig Standardov (USSR State Official Standard)
- IRAM—Instituto Argentino de Razionalizacion de Materialas
- ISA—International Standards Association
- ISO—International Organization for Standardization
- NBN—Norme Belge nationale (issued by Institut Belge de Normalisation)
- NBS—National Bureau of Standards
 - CS—Commercial Standard
 - C—Circular
 - R—Reissue
- N—Netherlands Standards (issued by Hoofdcommissie voor de Normalisatie in Nederland, HCNN)
- NF—Norme française (issued by Afnor)
- NS—Norsk Standard
- NZSS—New Zealand Standard Specification
- OST—Opshayusnig Standardov (USSR Official Standard)
- PN—Polskich Norm (issued by Polski comitet normalizacyjny)
 - B—Budonictwo
 - N—Nauka
- SFS—Finnish Standard (issued by Finland Standardiseringskommission)
- SIS—Sveriges Standardiseringskommission
- SMS—Sveriges maskinindustri-forenings standardkommitte
- SNV—Schweizerische Normenvereinigung
- Stas—Standard de stat (issued by Rumania Comisium de standardizone)
- UNE—Una norma Española
- UNI—Unificazione Italiano
- VSM—Verein Schweizerischer Maschinindustrieller