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NATIONAL AND TRANSREGIONAL STANDARDIZATION ACTIVITIES AND THE PRESENT WORLD MARKET

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On the occasion of the "Electronica 1978", an exhibition of electronic components and modules held in Munich in November 1978, a technical session took place entitled "Aspects of the International Standardization of Components". One of the four lectures on standardization reviewed current standardization activities in general. An English version of this lecture is given below.

After describing the development of standardization at national, regional and international levels, the author identifies the various organisations involved and explains how they cooperate. International standards are in the future to be accorded priority in the interest of the international market. Some aspects of electronic materials are discussed and new trends in standardization work indicated. In conclusion statistics covering the volume of work on standardization and the cost factors involved are presented.

Some of these statistics, which are based on investigations conducted in Germany, may stimulate similar investigations in other countries.

1. INTRODUCTION

First and foremost it is appropriate to ask: Why standardization? Technical standards are assuming importance as the result of progressive economic integration. There is hardly any technical activity today which is conceivable without adherence to standards, for these alone make a rational division of labour possible not only within national economies but also transregionally on a worldwide basis while at the same time assuring an optimum degree of understanding between engineers through, for instance, unified definitions. Technical standards define, as it were, the state of the art and the prevailing technical level with due account taken of the latest refinements and innovations. Standards are solid foundations on which the active engineer is able to build. They also represent a kind of yardstick according to which a product can be technically assessed, and further assure the interworking of products within a system. They provide the framework within which the modern technical world is able to live and are a decisive factor for the rationalization of world economy.

2. THE DEVELOPMENT OF STANDARDS

Historically speaking, standards first evolved as in-house specifications of firms about to switch from individual manufacture to quantity production with repetition parts. The rationalization of national economies very soon generated the demand, in connection with the increasing division of labour, for mutual arrangements between manufacturers and users. All companies were interested in working out standards for their products in consultation with the users, i.e. customers, in the same way as they were interested in being able to procure standard parts and standard materials from their outside suppliers. This phenomenon of mutuality makes for extraordinarily smooth functioning and well-balanced decisions, and essentially remains a determining factor still to this day.

There is such compelling logic inherent in this system that the industrial countries, first each individually, very soon worked out an extensive set of standards. These bodies of standards covering materials, molds, fits, surfaces, components, modules, subsystems and systems also specify formats, symbols

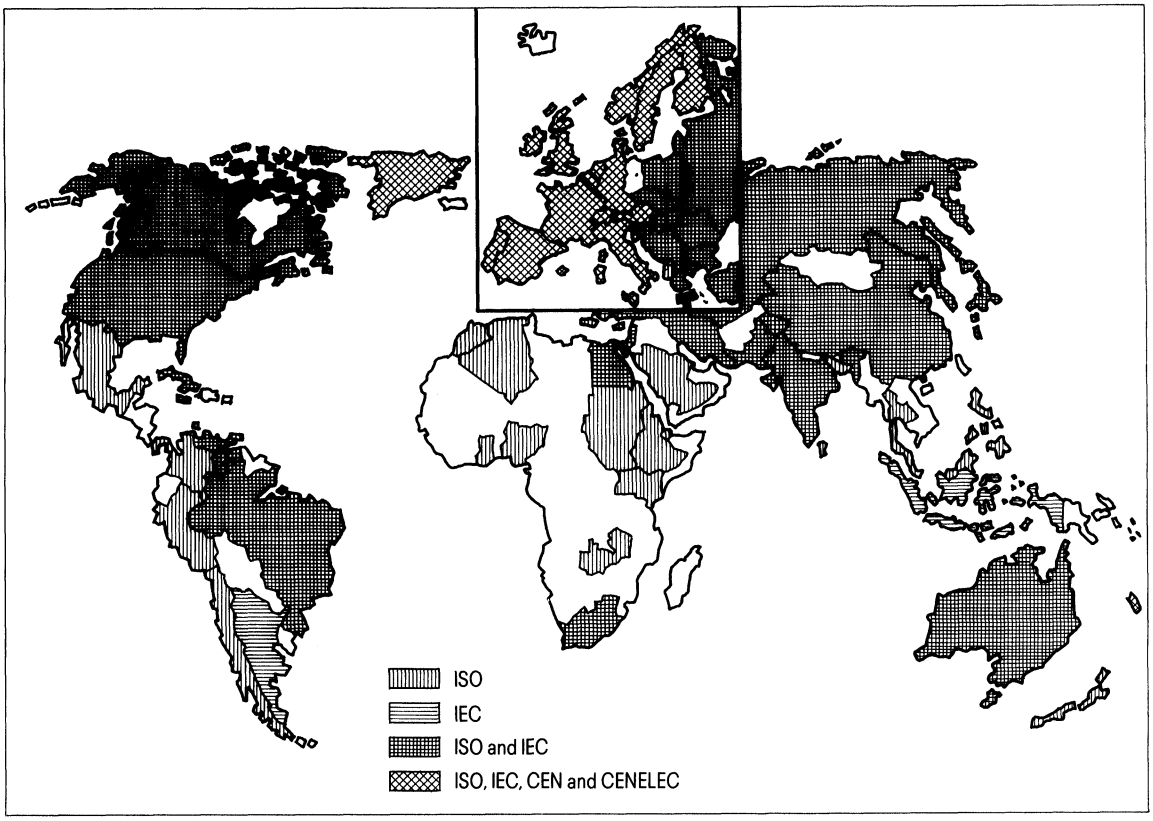


FIGURE 1 Member countries of CEN, CENELEC, ISO and IEC

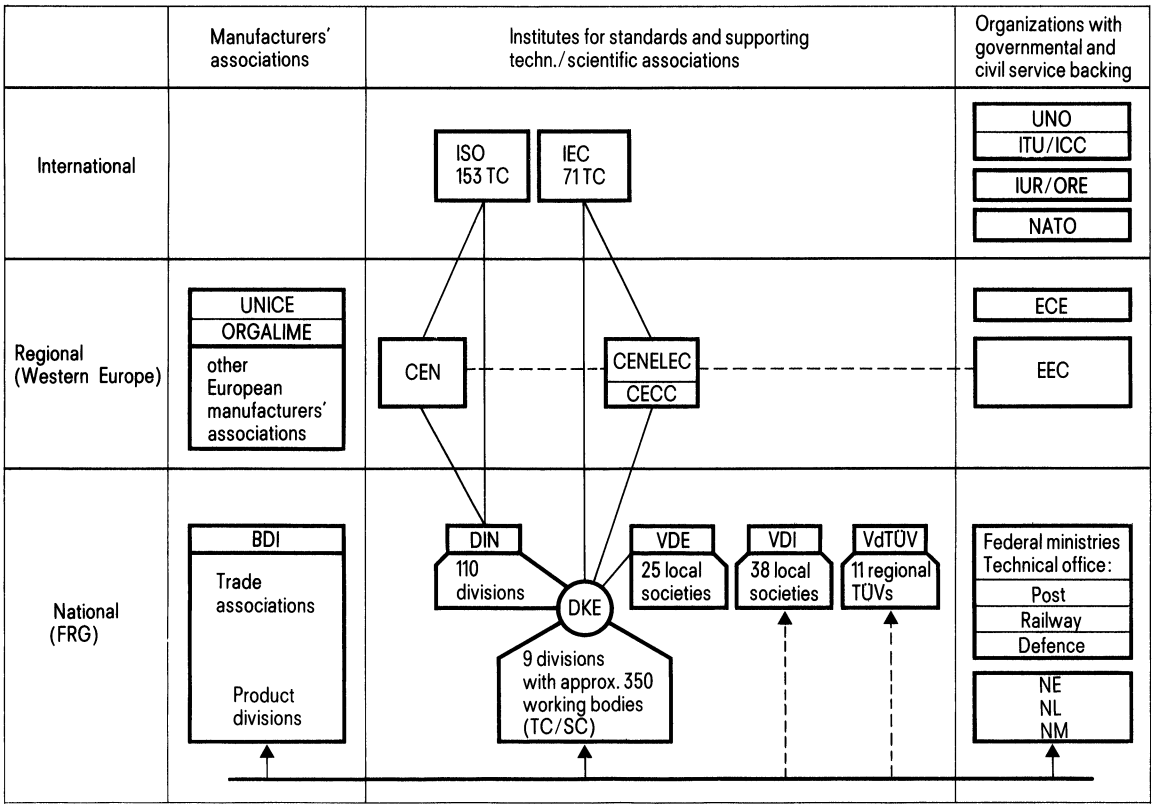
physical and technical units, formulas and safety regulations. Some seventy years ago the International Electrotechnical Commission (IEC) was inaugurated, while some 15 years later the predecessor organization of the present International Organization for Standardization (ISO) for non-electrical engineering began its activities on an international basis. It should be added that the ISO is loosely associated with the UNO. The two international organizations with their seat in Geneva are ultimately expected to introduce a body of standards which will allow the use of unified specifications throughout the world. Figure 1 shows the present worldwide participation in these activities.

In this connection it must be stated however that these extensive international efforts are not always able to keep pace with all the technical and economic requirements of the present. Thus regional standards organizations have sprung up from a large variety of motives. Some regions are in this way able to overcome language barriers in connection with international standardization and to obtain a platform for the discussion of their common interests. A typical example is the ASMO (Arab Organization for Standardization and Metrology). Similar climatic conditions and similar or identical political and/or economic structures and levels of development likewise make for a community of interests. Typical examples are COPANT (Comisión Panamericana de Normas Técnicas), ARSO (African Regional Standards Organization) and ASAC (Asian Standards Advisory Committee).

Similarly related interests are to be found in the Eastern European countries, where within COMECON (Council for Mutual Economic Aid) there is rigorous standardization of increasing depth as well as a division of labour between member nations.

All regional efforts towards standardization are based on existing international standards, which they naturally cross-fertilize and influence by their common efforts whenever it is essential to obtain international recognition for certain regional anomalies.

Regional activities are also pursued in Western Europe, specifically by CEN (Comité Européen de



ISO	International Organization for Standardization
IEC	International Electrotechnical Commission
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CECC	CENELEC Electronic Components Committee
DIN	German Institute for Standardization
VDE	German Association of Electrical Engineers
VDI	German Association of Engineers
VdTÜV	Association of Supervisory Bodies
DKE	German Electrotechnical Commission
UNICE	Union des Industries de la CommunautéEconomique Européenne
ORGALIME	Organisme de Liaison des Industries Métalliques Européennes
BDI	Federation of German Industry
ITU	International Telecommunication Union
IUR	International Union of Railways
ICC	International Conference of Communication
ORE	Office de Recherches et d'Essais
ECE	Economic Commission for Europe
EEC	European Economic Community
NE	Organization for Electrical Defence Standards
NL	Organization for Aviation Standards
NM	Organization for Marine Standards

FIGURE 2 Organizations establishing and influencing standards

Normalisation) and, in electrical engineering, by CENELEC (Comité Européen de Normalisation Electrotechnique). Based on the provisions of the Treaty of Rome it was decided during the inauguration of the European Common Market that restrictions to trade which are not due to tariff policy should also be removed. This, in the final analysis, means that deviating technical standards should be harmonized. Whereas the acceptance of international standards is voluntary throughout the world, in Europe there exists an indirect obligation to harmonize deviating standards. The two European standards organizations operate primarily with close reference to international decisions and only become active themselves in creating standards in cases where no international regulations exist. In Europe's old-established industrial nations there is therefore an extensive process going on with regard to the harmonization of standards. Those nations in Western and Southern Europe which are not members of the Common Market participate in this process on a voluntary basis as a matter of economic interest.

Thus it may be said that standardization is currently taking place on three levels, viz. nationally, to a limited extent regionally, and internationally (Figure 2). The extension of activities from the national domain via the regional to the international scene, as the principal point of interest, is a dynamic process. The inhouse standardization of individual manufacturers, which was the starting point of standardization as a whole, is the function of the rationalization of individual companies within the framework of national and international standardization.

It should be added at this point that manufacturers' and trade associations also have a certain national and regional influence on standardization. Companies that are members of these associations delegate their specialists on an honorary basis for practice-oriented standardization activities and devote particular attention to evaluating whether the proposed arrangements merit standardization; they further determine the depth and volume of standardization that are deemed necessary.

A further point is that the postal as well as railroad authorities of all countries maintain a standards organization of their own in which international proposals, primarily of a technical nature, are developed for the interoperation of transport and communications systems. There is the ITU (International Telecommunication Union) in Geneva and the IUR (International Union of Railways in Paris.

3. SAFETY STANDARDS

In describing the work on standards as our topic we must also make special mention of the safety regulations which today likewise appear in the form of standards. These are voluntarily developed by experts on their own responsibility. I feel that this practice functions so smoothly because manufacturers, users, scientists, officials and supervisory associations are all adequately represented on the working committees.

Due to the enormous expansion of the consumer goods market for customers without any kind of technical training, the desire has been expressed for third-party certification of appliances which meet the specified safety standards. In recent years consumer associations and ministries have made known their requirements in this respect, some of which have sparked off political controversy, which however need not be gone into here. Suffice it to say that the growing concern of public opinion and of the authorities has resulted in a distinctly new trend. The influence of the authorities in the various countries differs according to their political structure.

4. VOLUME OF STANDARDS

The collections of standards (Figure 3) have increased substantially in recent years. Between 1966 and 1975 the number of pages of ISO Standards increased by 550%, while that of IEC Standards increased by over 300%; in Germany the number of pages increased by 250%. Numerous factors have been responsible for this rise.

Internationally the sharp increase in mainly due to the expansion of international trade, which has been necessarily accompanied by the abandonment of nonuniform in favour of unified standards. Whereas hitherto only certain branches of industry were covered by general standards, standards are nowadays broader in scope and greater in depth in all parts of the world. Such development will be unavoidable whenever a single international set of standards is introduced in place of the many national sets of standards. The developing countries often regard standardization as a welcome opportunity for the transfer of technology. The increasing incorporation of know-how into standards is likewise resulting in the expansion of the aggregate international collection of standards.

Within the national domain the increase in standards is indeed substantial, but somewhat less than in the international area where there was from

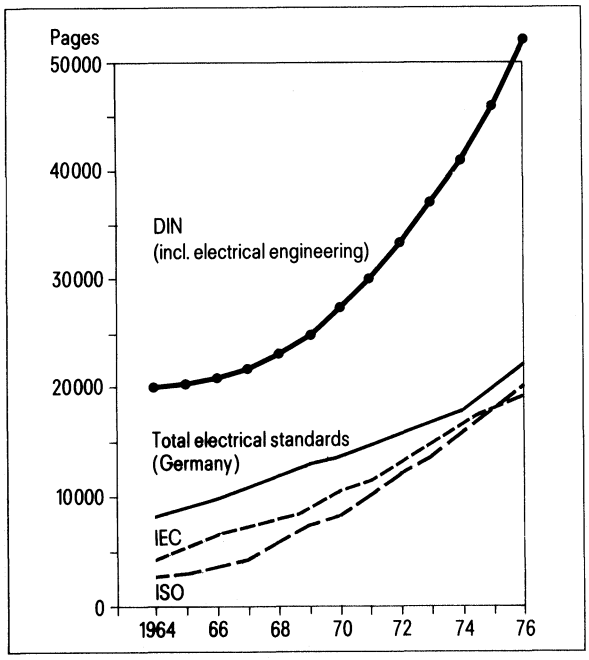


FIGURE 3 Growth of volume of standards (printed A4 pages)

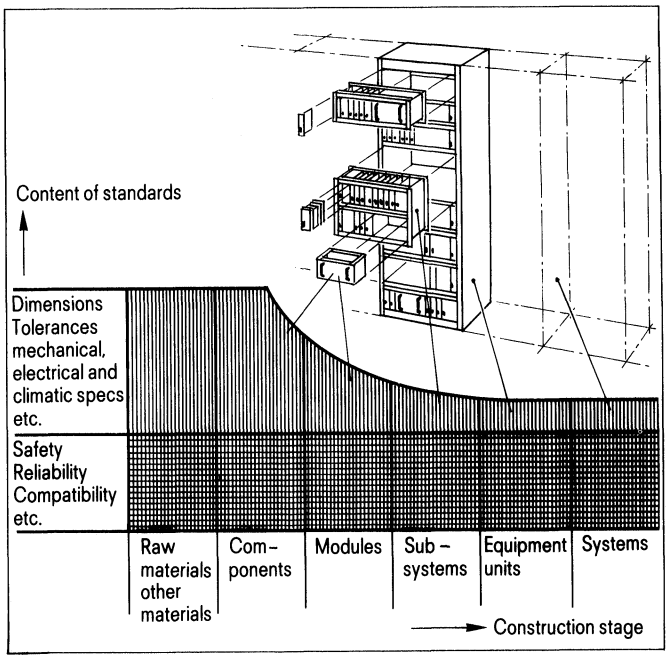


FIGURE 4 Content of standards in relation to construction stage

the outset a far larger collection of standards already on hand. Due to the need to take account of new technical advances, as well as the increasing acceptance of international standards in the interest of unification, 25% of German standards have to be updated annually.

5. VOLUME OF STANDARDS IN RELATION TO CONSTRUCTION STAGE

Cooperation in working out standards rests upon the pillars of specialized knowledge, economic thinking, a spirit of compromise and immense patience. The range of interest extends from the simplest component part in an ordinary appliance through industrial machines and equipment to transport systems, civil engineering projects, communications systems and even power stations. The standards cover dimensioning, mechanical and electrical data, a variety of technical requirements, performance, reliability, safety regulations, test specifications and compatibility. Standardization does not however in any way constitute a rigid all-embracing structure. What it implies I should like to illustrate with reference to some of the products on display at the Electronica.

Captioned "Content of Standards in Relation to Construction Stage", Figure 4 shows that as construction proceeds there is a relative decrease in the sum of normative specifications. This means that technical and scientific further development retains its essential freedom. The general consensus is that it should be possible to build any desired system and to solve any given problem with the aid of standardized components and elements. In so doing the general standards relating to safety, reliability and compatibility must be fully observed, starting with primary materials and ending with the complete system.

One area with a relatively large volume of standards is that of electronic devices. Standards have already been introduced covering device dimensions, mating dimensions, voltage, resistance and capacitance ranges, and the properties of insulation material. Furthermore, in order to assure that devices satisfy the increasing professional demands, certain test specifications have been based on a CECC (CENELEC Electronic Component Committee) quality assessment system.

In the case of microprocessors, which are finding increasingly wide acceptance on account of the growing number of functions and the introduction of sophisticated technologies, there have however as yet

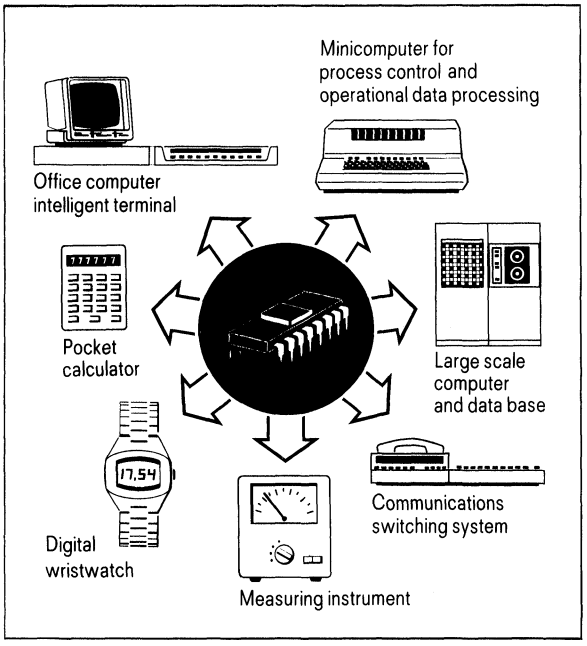


FIGURE 5 Microprocessor applications

been few opportunities for standardization. In this case standardization must therefore be confined to mechanical, electrical data and interface data. The microprocessor's programmability makes it a highly versatile standard device, so opening the way to rational fabrication methods (Figure 5).

The national and international standardization of microprocessors – beyond the existing arrangements with reference to definitions and testing methods – must on the one hand leave sufficient leeway for further technical development and on the other provide the required framework provisions for both manufacturers and users.

The problem of jobkilling which began in the equipment-building industry with the transition from electromechanical components to electronic devices is sufficiently well known. It would however be entirely wrong to regard the microprocessor as another jobkiller. Its development, as also will further development work in this area, serves rather to preserve competitive capability and hence jobs. The past history of science and technology shows that such epoch-making discoveries deserve, in the last analysis, the positive appreciation of society. The railways, for instance, were not exactly welcomed with enthusiasm by the many carriers that were in business a hundred years ago. Yet the competition between road and rail has in recent years acquired a new dimension.

Every innovation poses new problems. Since however they have a positive influence on our living standards, the general public should be better informed and psychologically prepared for scientific and technical changes, especially when social and environmental aspects need to be taken into account.

Standardization, which takes place in public, offers impressive insight into the modern world of technology through its quantitative statistics, which should help to neutralize the frequently emotional element in discussions.

6. COST OF STANDARDIZATION

All scientific technical and technico-economic problems require the appropriate analysis of cost and effort. In the Federal Republic of Germany and West Berlin this standardization work lies within the sphere of responsibility of the Deutsche Institut für Normung, more generally known under its initials DIN. DIN has many direct links with scientific/technical associations, ministries and international technical associations. The running of such an organization with its many referents absorbs considerable funds. A far larger investment of effort – some ten to fifteen times the amount of work done on an honorary basis – is provided for the most part by industry and trade. In the Federal Republic and West Berlin alone there are already some 45,000 specialists working on standards. An investigation has shown that industry currently allocates almost 800 million DM per annum, representing about 1‰ of its earnings from sales, to these activities.

7. SUMMARY

In sum, standardizing activities must be considered to have a certain regularizing function in international trade. Incentives are received from the following quarters:

Within the national domain the incentives are sociopolitical and technical. Sociopolitical aspects such as environmental protection, consumer protection, health protection and the humanization of work have to be taken into due account in standards within the framework of official regulations. As the result of recent discussions on product liability, standards are now being given closer consideration as liability criteria. Technical incentives derive from the growing intricacy of devices and the high innovation rates.

Incentives for the expansion of international standardizing activities derive from the expansion of international trade, the international transfer of production plants and the progressive industrialization of the developing countries. Incentives also come from international agreements such as GATT,† ECE and ECM providing for the removal of non-tariff restrictions to trade. It is essential that international acceptance should be found for sociopolitically inspired national standards so that all member nations always remain able to compete on equal terms.

The high cost of standardizing activities and the new problems which standardization is likely to encounter in the coming years demands the scrupulous observance of the criteria for assessing what merits standardization, and the rationalization of standardization procedures. In recent years some organizations have been merged or reorganized, thereby avoiding much duplication of effort. For the international and national division of labour I have already described the current trends in detail. The ultimate goal of realizing a single set of standards will be the special concern of the CECC because after a certain time it may integrate with the IEC. With this call for the rationalization of international standardizing activities I should like to end my report and to urge my readers, as also my colleagues on the Technical Committees, to rally to the cause in the sense that I have outlined.

†General Agreement on Tariffs and Trade