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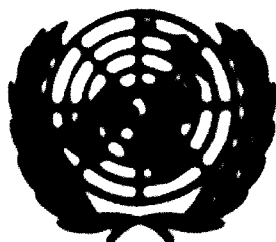
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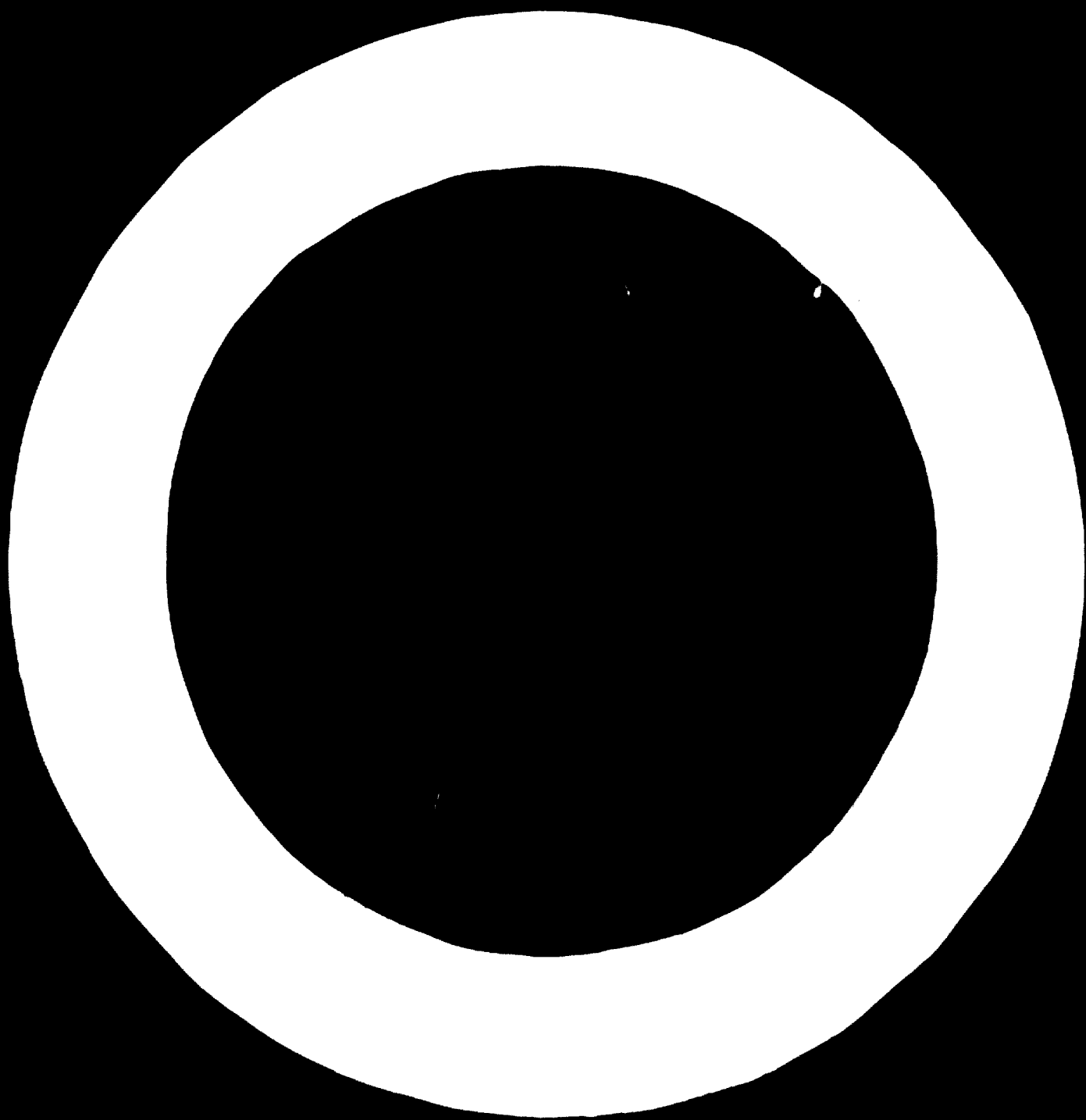


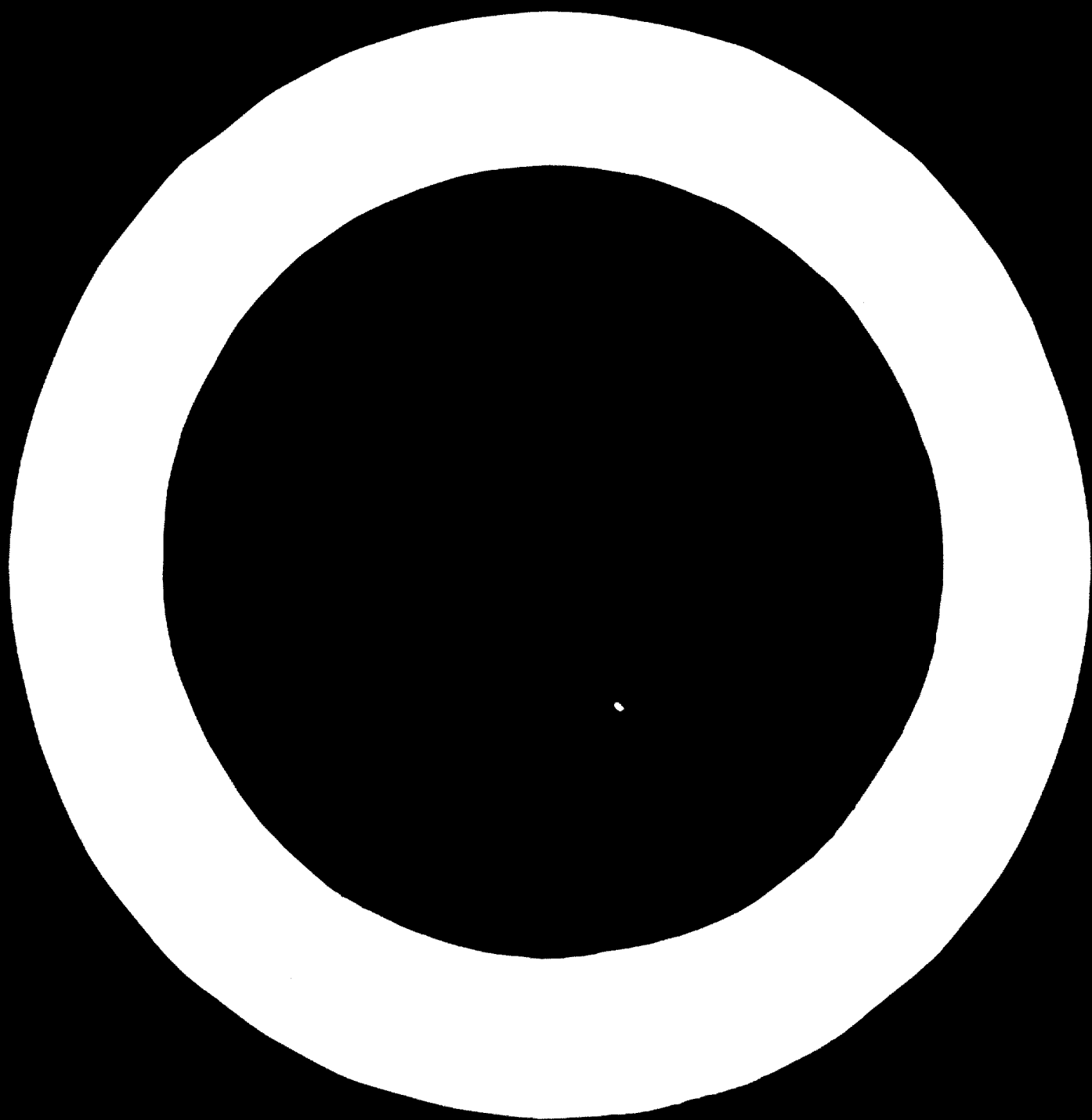
**THE PROMOTION
OF INDUSTRIAL
STANDARDIZATION
IN DEVELOPING
COUNTRIES**

HELSINGØR, DENMARK

4 to 25 October 1968

UNITED NATIONS





**THE PROMOTION
OF INDUSTRIAL
STANDARDIZATION
IN DEVELOPING
COUNTRIES**

**Report of the United Nations
Interregional Seminar**

**RELSINGØR, DENMARK
4 to 25 October 1965**



**UNITED NATIONS
New York, 1966**

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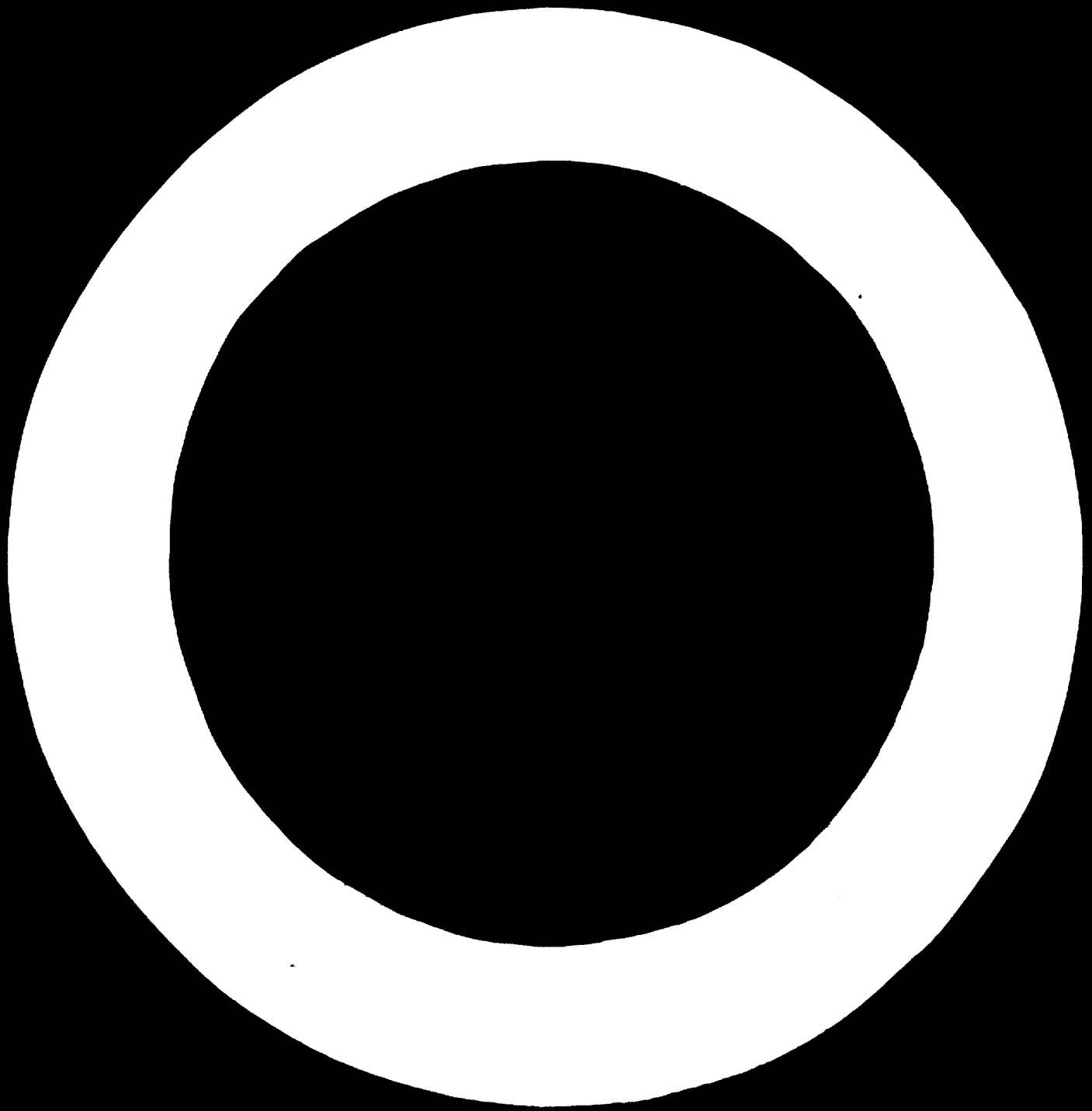
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INTRODUCTION

1. The Interregional Seminar on the Promotion of Industrial Standardization in Developing Countries was held in Helsingør, Denmark, from 4 to 25 October 1965. The Seminar was sponsored by the United Nations in co-operation with the Royal Government of Denmark.

2. The programme of the Seminar was prepared by the Danish Standards Association in consultation with the United Nations and the Development Committee (DEVCO) of the International Organization for Standardization (ISO). The following were the substantive items on the agenda:

- (a) The purpose and importance of standardization
- (b) The role of international organizations in the field of standardization
- (c) National standards organizations and their functions
- (d) Establishment, adoption and application of standards
- (e) Initial activities in the application of standards to industry
- (f) Standardization and the consumer
- (g) Company (in-plant) standardization
- (h) Training of standards engineers.

3. The Seminar was attended by twenty-seven participants and fifteen observers. The geographical distribution of the participants and observers was as follows:

	Participants	Observers
Africa	6	2
Asia	11	4
Europe	3	7
Latin America	7	-
North America	-	2

4. Thirty papers prepared by international experts of recognized eminence in their fields were presented to the Seminar. The presentation of papers was followed by intensive discussions on the relevance and application of the points made by the speakers to the situation in developing countries in general, and to specific conditions in the participants' countries.

5. The complete list of the participants, in the Seminar, who were nominated by their governments, and of the observers and speakers, is given in the annex to this report.

6. The participants had the benefit of visits to the headquarters of the Danish Standards Association and the Government Testing Laboratory in Copenhagen, and to several factories in both Denmark and Sweden.

7. The Seminar was opened, jointly with the United Nations International Seminar on the Application of Cartography for Economic Development, by Mr. H. E. Kastoft, Director of the Secretariat for Technical Co-operation with Developing Countries of the Royal Government of Denmark. Mr. Kastoft explained the organization and financing of the seminars and thanked the United Nations for the confidence it had placed in the Danish Government. He also observed that during the current year no fewer than thirty seminars had been organized in Denmark. The participants were welcomed to the meeting on behalf of the United Nations by Mr. Horacio M. Ureta, Chief of the Cartography Section of the Resources and Transport Division, and by Mr. R. C. Desai, Chief of the Industries Section of the Centre for Industrial Development; and by Professor Einar Andersen, Director of the Danish Geodesic Institute.

8. Greetings were read from Mr. I. H. Abdel-Rahman, United Nations Commissioner for Industrial Development, and Mr. W. R. Leonard, Acting Commissioner for Technical Assistance of the United Nations.
9. Mr. Carl Iversen, Head Master of the University of Copenhagen, addressed the meeting on the subject of the Social and Economic Structure of Denmark.
10. Mr. O. Weincke, the Managing Director of the Danish Standards Association served as Director of the Seminar, and Mr. R. C. Desai of the United Nations as Co-director.
11. The participants elected the following committee to draft its report: Mr. A. K. H. Abd Alla (United Arab Republic), Mr. M. d. J. Crespo (Honduras), Mr. C. Ezeji-Okoye (Nigeria), Mr. M. E. Galea (Malta), Mr. R. E. Racela (Philippines), and Mr. J. Vela Huergo (Argentina). Mr. H. Lal (India) was elected Rapporteur, and Mr. I. D. Radović (United Nations) was made secretary to the Drafting Committee. The Drafting Committee elected Mr. J. Vela Huergo its Chairman. Mr. S. K. Sen (India) was co-opted to serve the Committee as adviser.
12. The participants from Afghanistan, Argentina, Bolivia, Brazil, Ceylon, China, Ecuador, Honduras, India, Kuwait, Malaysia, Malta, Mexico, Philippines, Republic of Korea, Romania, Sudan, Syria, Thailand, Turkey, Uganda, United Arab Republic and United Republic of Tanzania made brief statements on the development of standardization activity in their countries.
13. The Drafting Committee presented its report on 25 October, 1965. With a few amendments, the report was unanimously adopted and the Seminar was concluded.
14. In adopting the report, the participants expressed their gratitude to the United Nations and to the Danish Government for organizing the Seminar. They particularly wished to place on record their deep appreciation of the able direction provided by Mr. O. Weincke and of the co-operative, courteous and efficient manner in which Mr. L. Nørgaard, Miss R. Pedersen and Miss U. Busk provided help in administrative and other matters.

I. THE PURPOSE AND IMPORTANCE OF STANDARDIZATION

15. Three papers were presented on the subject of the importance of national and international standardization: "What is Standardization? Its Aims and Possibilities" by Messrs H. A. R. Binney and H. M. Glass presented by Mr. Glass; "Importance of International Standardization for International Trade" by Mr. A. T. Vrothom presented by Mr. O. Sturen; and "The Role and Significance of Industrial Standardization and Uniformity of Measurements in Ensuring Quality of Output" by the State Committee on Standards, Measures and Measuring Instruments of the Union of Soviet Socialist Republics presented by Mr. L. A. Balyaev.

16. The participants agreed that wherever goods and services were exchanged standards provided a common language and criteria for judging the value of the goods and services and methods by which the goods and services might be put to optimum use. These results are achieved by means of glossaries of terms and definitions, specifications, methods of sampling, methods of gauging and testing, and codes of practice.

17. Standards have functional application at a number of levels:

- (a) Individual standards.
- (b) Company standards.
- (c) Standards of industry associations.
- (d) National standards, and
- (e) International standards.

National Standardization

18. In a highly industrialized country, national standards are usually generated as a result of work already done by individual firms, trade associations and government agencies. In developing countries, in the initial stages, it is frequently necessary for a central standardizing authority to draw up national standards.

19. Whatever sequence or method is employed in the preparation of national standards, it is essential that they should command the confidence of the producer and the user alike.

20. The language used in a standard should be clear and precise, each term having a specific and definite meaning. Standard glossaries of terms are not only useful, but are indispensable in ensuring that all involved in the exchange of goods and services employ and understand the same technical language.

21. Standards as a rule should stipulate the final properties of products. In some exceptional cases, it may only be necessary to spell out a process of manufacture, for example, for wines. If a manufacturing process must be described in detail, the description should appear in an annex or appendix, not in the main body of the specifications.

22. Since it is generally impractical to test every single item, in a series, sampling techniques are usually employed. After a representative sample has been obtained, it is necessary to apply standardized tests to determine the properties that correspond to criteria in the specifications. In principle, a specification should define the methods of testing and analysis. Where choice exists for selection from alternative test methods, consideration should be given to the capital cost and the technical skill required, so that the final choice may be both economical and practical in the context of the industrial capability of the country. The criteria for compliance may be included in the standard to guide acceptance or rejection.

23. Specifications may be broadly divided into two categories - (a) dimensional specifications, and (b) performance or quality specifications. In either case goods or services should be defined by the minimum number of characteristics necessary to fulfil the purpose.
24. Codes of practice are recommended practices for design, installation, maintenance, construction and services. Such codes are generally issued separately.
25. There are several ways of bringing about the implementation of standards. They may fall between two extreme limits. One extreme method is to impose standards by legislation. The other extreme is to rely on persuasion and voluntary adoption.
26. In a free enterprise, highly industrialized economy where manufacturers and users are conditioned to appreciate the value of standardization, the method of voluntary adoption is likely to be successful. In countries at the initial stages of industrial development, a measure of official compulsion may be found beneficial to generate initial momentum. When a standard is enforced by legislation it is desirable that the standard be referred to, not described, in the legislation. It is difficult to amend and keep a legally described standard up to date since the machinery of legislation is not normally attuned to quick action as changes become necessary.
27. Even valuable standards, however, may prevent technological advance if they are not subjected to periodic review. Standards must take experience in their use into account, as well as later innovations in research, techniques in instrumentation, automation and control. A standard should be flexible enough to permit technological improvement, but not too tentative to prevent a manufacturing process from achieving sufficient stability to become economically feasible.
28. There is no precise formula for the frequency with which standards should be reviewed. The frequency of review should be determined by the pace at which a nation's industries progress. In the United Kingdom the period is five years, but only when need exists does a review result in revision. When standards are issued, it is desirable to specify a period for review in the body of the standard, especially of those concerned with safety and health.
29. To relieve purchasers of the need for sampling and testing goods, national standards organizations may act as certifying authorities in checking the conformity of goods with national standards. In several industrialized countries the national standards bodies have set up such systems. Certification is of special value to the ordinary consumer who is not equipped to check whether goods that are offered for sale and stated to meet a specification do so in fact. For foreign trade, the reciprocal recognition of national certifying schemes between countries that exchange goods and services can also be of considerable benefit.

International Standardization

30. The objective of international standardization is to facilitate the international exchange of goods and services. The benefits of standardization are similar at national and international levels for communication between suppliers and consumers, interchangeability of components and equipment, and elimination of unnecessary variety. Developing countries have a substantial stake in international standardization since, as large importers of the products of advanced countries, they would benefit considerably if they could buy their requirements freely from a wide range of suppliers offering equipment on the basis of common international standards.
31. The Seminar participants were informed that there were more than 400 recommendations of the International Organization for Standardization (ISO). Compliance of national standards with ISO recommendations was being attempted by all ISO member countries. There are, however, certain practical difficulties which stand in the way of early achievement of this goal.

32. One of the most important factors inhibiting the effort towards international standardization is the presence of two major systems of measurement - the metric system or *Système International (SI)* and the foot-pound system. In this connexion, the decision of the Government of the United Kingdom to move towards the adoption of the metric system is a significant step in the direction of global unification.

33. Advance towards international standardization is necessarily slow, although in some industries, such as chemicals, rapid progress may be expected. In other industries, such as those producing capital goods, international standardization may take longer than twenty or thirty years. The situation varies from industry to industry and from country to country. In the United Kingdom the compliance of British Standards Institution (BSI) standards with all ISO Recommendations was as follows:

	Per cent
Substantial agreement	45
Partial compatibility	16
Some disagreement	6
In process	16
Not applicable	17

The percentages for several other economically advanced countries were lower than the above percentages for the United Kingdom.

34. The task of adjusting national standards to conform with international recommendations is indeed a complicated one. First, adoption of international standards sometimes implies a large capital outlay for the necessary change-over in equipment, and intensifies the natural reluctance of producers who have built their plants and equipment on the basis of national standards. Second, the advantages of international standardization are found largely in the field of international trade, and the incentive to change is therefore often weak in industries and in countries whose domestic market constitutes the predominant element in total production. In this connexion, however, the Seminar participants were heartened by the statement of the United States Government Observer that, following the 'LaQue Report'), United States authorities were studying problems involved in moving towards international standardization. European countries were also progressing towards the harmonization of their national standards, irrespective of whether they formed part of the European Economic Community ('The Common Market' or 'The Six') or the European Free Trade Association ('The Outer Seven'). The developing countries welcome these moves by the governments of advanced industrial countries as beneficial to the world community.

35. The Seminar participants recognized the important role of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) in the task of promoting international standardization. The task of evolving international recommendations is complex, and it takes a longer time than that needed for promulgating national standards. The estimated period was from two to eight years for ISO to issue a recommendation.

36. The participants noted that many organizations, in addition to ISO and IEC, were involved in the work of international standardization. There was clearly a need for better co-ordination, and steps were being taken to improve it.

¹⁾ United States Department of Commerce, National Bureau of Standards, *Report of the Panel on Engineering and Commodity Standards of the Commerce Technical Advisory Board*, Part A: PB 166811; Part B: PB 166812 (Washington, D. C.).

II. THE ROLE OF INTERNATIONAL ORGANIZATIONS IN THE FIELD OF STANDARDIZATION

37. Five papers on this topic were presented, of which two were concerned with the activities of ISO and IEC, and three with those of the United Nations family. The papers were 'International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). Their Object Organization and Working Procedure' by Mr. H. Saint-Leger, 'Possibilities of Membership in ISO and IEC; Participation in their Technical Work, the Help they might bring to Developing Countries' also by Mr. H. Saint-Leger, 'Interest and Activities of the United Nations in the Field of Industrial Standardization' by the United Nations Centre for Industrial Development, 'National Testing and Standards Centres and UNESCO's Contribution towards their Establishment in Developing Countries' by Mr. K. Billig; and 'Preparations for a Standards Institute in a Developing Country', giving a short outline of the Industrial Testing and Research Centre in Damascus, by Mr. Th. Barlag.

The Role and Activities of the International Organization for Standardization and the International Electrotechnical Commission

38. In the development of standards to facilitate the international exchange of goods and services between nations, the Seminar participants recognized the prime role of ISO and IEC among the international organizations concerned with standardization.

39. The structure of ISO consists of a General Assembly, a Council, various committees of the Council and a General Secretariat. The older organization, IEC, was established to facilitate the co-ordination and unification of national electrotechnical standards; it is now the electrotechnical division of ISO, with functional and financial autonomy. Membership in ISO is open to the most representative national standards organization in a country; the October 1965 membership was fifty-one; Similarly, IEC consists of the most representative national standards organizations in the electrical field, and has a membership of forty. Some national standards organizations, with jurisdiction and activity in electrical and other fields, are members of both these bodies. Both ISO and IEC are financed by contributions from their member bodies.

40. The standardization activity of ISO and IEC is handled in technical committees. The responsibilities of each technical committee is determined by the ISO (and the IEC) Council. The results of the work of the technical committees are published as ISO and IEC Recommendations. Of the other committees of ISO, the one of primary interest to developing countries is the Development Committee (DEVCO) which was set up to deal, among other things, with the standardization problems of developing countries. Recently, at the recommendation of DEVCO, countries without full-fledged standards organizations might become 'ISO correspondent members'. Such members are entitled to receive all documentation from ISO - some of it free and the remainder on payment of a small fee - and to attend meetings of the technical committees in which they are interested, without being required to participate either as members or observers. The annual subscription for correspondent membership is \$ 50.

41. In view of the importance of ISO and IEC as the primary organizations in the field of international standardization, the Seminar participants recognized that it would be in the interest of all developing countries to seek membership in ISO and also in IEC, when appropriate.

42. The Seminar participants recognized the practical difficulties involved in formulating and implementing international standards. Formulating an international recommendation is more complicated than determining a national standard, and the task therefore requires a longer time. The implementation of international recommendations is also more complicated and generally has to be effected through national standards. In view, however, of the great importance of international standardization to their economies,

the developing countries were interested in measures to speed both the formulation and the implementation of international standards. The Seminar participants and the General Secretary of ISO took note of an observation by one participant in the Seminar that an international recommendation for a commodity of which his country was the major world supplier was arrived at without consultation or participation by his country. To avoid such situations, the participants recommended that ISO and IEC and their technical committees should automatically consider inviting participation of non-member countries with significant interest, as buyers or sellers, in a commodity under consideration.

43. In cases in which no national standards had yet been formulated, the participants agreed, in principle, to adopt ISO and IEC recommendations as their national standards. For reasons beyond their control, however, developing countries experienced difficulties in this direction. They were, for example, dependent on economically advanced countries for imports of capital goods. So long as there was no agreement among their principal suppliers on the adoption of international standards, the developing countries had to contend with varying national standards. They could not adopt any one foreign standard, since this would restrict their choice in buying equipment in the world market. For this reason, quickening the process of the adoption of international standards by industrially advanced countries would also speed their adoption by developing countries.

44. Since developing countries were embarking upon industrialization, it was important that standardization should be initiated or accelerated before industrialization gathered momentum. Otherwise, in the absence of standardization, overlapping practices would develop, and vested interests built up, making it more difficult at a later date to disentangle the situation.

45. The need to assist developing countries in their standardization activities was therefore urgent, and should receive the immediate attention of ISO and IEC. The offer of correspondent membership, involving merely the receipt of ISO literature, was not enough. Countries which did not yet have fully developed national standards bodies, nevertheless needed a voice, at least in DEVCO and in the technical committees in whose work they had vital interests. It was realized that ISO would have to find additional financial resources to extend its activities; ISO might take advantage of the United Nations offer at the Sixth General Assembly of the ISO in 1964 to provide resources for technical assistance to developing countries.

46. The Seminar participants recommended that ISO enlarge its operations, considering that (a) the promotion of standardization in newly developing nations cannot wait, and it requires equal attention with the technical activity of formulating standards, and (b) the interests of the developing countries need to be properly safeguarded by a more active part in the ISO committees which primarily affect their interests. On the other hand, developing countries should do their utmost to organize and to take full advantage of the forum that ISO and IEC provide.

The Role and Activities of United Nations agencies

47. The United Nations, as well as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and other specialized agencies - referred to here as the United Nations system - are particularly concerned with technical assistance. Although its resources are limited, the United Nations system is capable of providing substantial financial and technical support for the entire range of needs of developing countries in building up standards.

48. In the United Nations, industrial standards are the concern of the Centre for Industrial Development which was established in 1962 in response to the demand for greater activity by the United Nations in the field of industrial development of developing countries.

49. The United Nations system engages in two relevant areas of action: research and information, and technical assistance. The research and information activity of the organizations include situation surveys and publication of material. Surveys of standards activities were carried out in Asia and Africa by the regional economic commissions of the United Nations. Publications entitled **Industrial Standardization in Developing Countries**¹⁾ and **Report of the Expert Working Group on Standardization, Patents and Marketing (Part I: Standardization)**²⁾ were made available to the participants as background documents. Such surveys and publications provide useful guidance and comparative data to developing countries in their tasks.

50. The technical assistance activities of the United Nations system are financed from contributions by governments to several programmes, namely, the Special Fund, the Expanded Programme of Technical Assistance, and the allocations for technical assistance in the regular budgets of the United Nations, and of UNESCO and other specialized agencies. Available aid with respect to standardization may be classified into four principal methods: establishing standards institutions, conducting technical meetings, assigning experts and providing fellowships and scholarships for training abroad. The participants welcomed the knowledge of available facilities, and the assurances given them of the willingness and ability of the United Nations to allocate increased resources for promoting standardization in developing countries, as part of its general programme to increase the share of its resources allocated to industrial development. The participants noted that the provision of technical assistance by the United Nations in Central America, Paraguay and Turkey had added three member bodies to ISO. The United Nations system also assisted with testing laboratories set up independently or in conjunction with standards institutions and industrial or technological research institutes. On their part, the Seminar participants agreed to recommend increased domestic effort in their own countries to make full use of the extensive facilities available to them from the United Nations system.

51. The Seminar participants also approved the measures taken to achieve greater co-operation between the United Nations and ISO, and endorsed the proposals made by the United Nations for the extension of ISO (and IEC) activities to meet the urgent needs of newly independent countries. They stated that they would welcome any arrangement by ISO and IEC with the United Nations for the specialized help they might give as the leading technical institutions in the field of standardization. The United Nations and ISO and IEC had functions and responsibilities in this regard which were complementary; the two groups together could perform these better than either of the two alone.

52. The most fruitful areas for collaboration between ISO (and IEC) and the United Nations appeared to be the following:

- (a) Furthering the understanding, recognition and acceptance of industrial standardization in developing countries;
- (b) Surveying existing conditions in developing countries and preparing suitable standardization programmes for these countries;
- (c) Promoting regional and sub-regional co-operation in the field of industrial standardization;
- (d) Organizing industrial standardization training programmes for personnel from developing countries;
- (e) Searching for and hiring experts for assignment in developing countries;
- (f) Following up on projects already under way;
- (g) Assuring adequate flow of information between industrialized and developing countries; and
- (h) Providing advisory services and finance for industrial standardization programmes.

¹⁾ United Nations publication, Sales No.: 65.II. B.2.

²⁾ Economic Commission for Asia and the Far East, Asian Conference on Industrialization (I and NR/IND. CONF/S.6; Restricted circulation).

III. NATIONAL STANDARDS ORGANIZATIONS AND THEIR FUNCTIONS

53. Seven papers were given on this subject: 'Organization of the Standards Organization of a Small Country', based on experience in Denmark, by Mr. O. Weincke, 'Building up a New Standards Organization', based on experience in Turkey, by Mr. O. Sturen, 'First Steps in Setting Up a Standards Organization in a Developing Country' by Messrs. H.A.R. Binney and H.M. Glass, presented by Mr. Glass, 'Some Thoughts on the Establishment and Operation of a National Standards Organization in Developing Countries', based on experience in Lebanon, by Mr. A. A. Sharif, 'Administration of a National Standards Body', based on experience in India, by Mr. H. Lal, 'National Standardization in a Highly Industrialized Society - The United States of America' by Mr. R. E. Gay, and 'Standardization in the Union of Soviet Socialist Republics' by the State Committee on Standards, Measures and Measuring Instruments of the Union of Soviet Socialist Republics, presented by Mr. L. A. Balykov.

54. No model pattern exists for establishing a national standards organization. The development of such an organization in a given country must always be determined by its economic and social conditions. A number of valid recommendations may be made, however, for all developing countries in the initial stages of establishing standards organizations.

55. All groups concerned with standards should be brought into the machinery of a national standards organization. These include the government, industry, consumers, professional bodies, trade organizations, research organizations and academic institutions. Only by winning the full co-operation and confidence of all concerned can a national standards organization become effective, and only in this way can national standards respond to the real needs of the country. Though in industrialized countries national standards organizations usually have sufficient authority without government sponsorship, in developing countries these organizations should, at least in the initial stages, be strongly supported by the government.

56. In many developing countries government financing has to be relied upon almost exclusively for the launching and the initial stages of the operation of a national standards body. As the organization develops, financial support from private bodies benefiting from its work may be feasible, and some revenue may also be forthcoming from the sale of publications and other services, such as testing and certification.

57. A national standards organization needs only a small staff in the beginning. At this stage, in order to reduce the time factor in national standardization, as well as to make the best use of available resources, the stress should be on the adoption or suitable adaptation of already existing foreign or international standards. It is of great importance that the staff, however limited, be well qualified. In a developing country there is greater need for the staff of a national standards organization to devote a significant part of its time to the promotion of standardization and the education of all concerned than is the case in industrially advanced countries. Because of limited resources, the establishment of priorities is even more important in the case of the former than in the latter. If the initial projects are selected and dealt with so as to highlight the value of standards, and at the same time to establish the efficiency and impartiality of the standards organization, it will secure both the moral and the material support needed to undertake a much wider programme in the future.

58. One of the important tasks of a new standards organization is to build up a library containing information on domestic and foreign standards and on the recommendations of international standards bodies. All those interested in standards should be encouraged to take advantage of this service.

59. Testing facilities are indispensable for a standards programme. Without them a great number of standards are 'paper standards', and confidence in their quality and reliability, which is one of the main objects of introducing standards, will not be achieved. Compliance with standards must be verifiable. Furthermore, some testing is needed in the course of setting standards.

60. There are no established rules for the organizational structure of a national standards organization. Most existing national standards bodies, however, exhibit notable similarities in structure.
61. Usually, in a developing country, the government establishes the national standards body, stipulates its by-laws and its purpose, and assures the representation of all interested parties.
62. The highest authority of a national standards body is usually a general assembly or council. This is responsible for the policies and the budget of the organization. It generally approves the final national standards.
63. The council usually has a large membership, representing the government, industry, trade, consumers, and research and technical institutions. An executive committee is therefore appointed from the membership of the council to manage current activities concerned with operating policies, finance, administration and similar matters. The adoption of national standards may also be responsibility of the executive committee, unless a special technical board is appointed for this purpose.
64. The work of a national standards body is generally divided among a number of division councils or technical divisions, representing various industries, with membership from all interests. Each technical division is responsible to the executive committee.
65. Such technical divisions set up technical committees, which are the basic fundamental units of the entire standards organization. It is in these committees that standards are formulated. All the interests concerned with a given standard should be represented in the appropriate technical committee. One of the problems in forming a technical committee is the difficulty of finding technically competent representation for consumers; for this reason it is advisable to promote consumer organizations.
66. Much of the technical and administrative work of a national standards body is usually managed by a permanent secretariat. The secretariat is directed by a managing director or general secretary, and is responsible to the executive committee and the council. The secretariat is composed of both technical and clerical staff. The secretariat assures smooth collaboration between various technical committees and technical divisions, maintains contacts with the interests concerned with the work on standards, with other national standards bodies and with international standardization organizations. It distributes draft standards prepared by the technical committees and publishes and sells final national standards. The staff of the secretariat provides all necessary technical and secretarial assistance for the meetings of the technical committees. The technical staff of the secretariat also assists in the education of all concerned with matters of standardization, particularly in developing countries.
67. In the administration of a national standards body, the importance of the training and the motivation of the staff of the permanent secretariat needs to be stressed. There is need for dedicated leadership. A national standards body run by standards engineers should obviously set an example in administration and efficient methods of operation. An office manual containing various procedures for the organization is required.
68. The organizational structure of a national standards body should be sufficiently flexible to allow for the development and expansion of its standardization activities.
69. The functions of a national standards body may be summarized as follows:
- (a) Preparation, publication and implementation of national standards;
 - (b) Centralization of standardization efforts in the country through the collaboration of all interests concerned;
 - (c) Co-operation with national standards bodies of other countries; and
 - (d) Representation of the country in ISO and IEC.

IV. ESTABLISHMENT, ADOPTION AND APPLICATION OF STANDARDS

70. Three papers were presented on this topic: 'Working Procedure of the Technical Work of the Standards Organization of a Small Country', based on experience in Denmark, by Mr. O. Weincke, 'Experience in Standardization Efforts in a Newly Industrialized Country', based on experience in India, by Mr. S.K. Sen, and 'Voluntary or Compulsory Standards' by Mr. Th. Franck.

71. As in the case of organizational structure, the working procedures of established national standards bodies show marked similarities.

72. Essential to the work of a national standards body is a programme to indicate the fields and the scope of activities to be undertaken by the standards organization. This programme must be set up as a co-operative effort of all groups interested in industrial standards. No programme of work should be regarded as final or complete, and provision must be made for its revision or extension in line with relevant technical and economic developments. In establishing a programme, an important rule to observe is that no work should be undertaken unless a definite need exists.

73. As soon as it has been decided to study a new question, a new technical committee should be formed to undertake it, unless it can be referred to an already existing committee. Sometimes a technical committee may establish working groups for the purpose of preparing first drafts. When a technical committee has approved a first draft proposal it becomes a draft standard, and should be circulated for criticism. All those interested in the content of the draft standard should be given an opportunity to examine it, and should be requested to comment on it. All such comments should be presented to the technical committee for consideration and for possible incorporation into the draft standard. Modifications of the draft standard are sometimes so considerable that it has to be recirculated for examination and comment before the technical committee may approve it. The final draft standard, together with relevant information regarding its formulation, should then be transmitted through the secretariat to the executive committee or the division council (whichever has the delegated authority from a council or a general assembly) with the request that it be adopted as a national standard.

74. The procedure described above is necessarily detailed, and it usually requires a long time. This underlines the desirability of adapting or adopting existing national or international standards whenever possible; this may shorten the time considerably. As an example, the Seminar participants were informed that in India the average time for technical processing of a standard is thirty-three months; the average time from the receipt of a proposal to final publication of a new standard is fifty-two months.

75. Draft proposals are sometimes sent to a national standards body from outside organizations with the request that they be adopted and issued as national standards. If such draft proposals have been prepared in collaboration with all interests concerned they may be issued as draft standards for comment. If not, they should first be discussed by the appropriate technical committee, and possibly used by that committee as a first draft proposal.

76. Recommendations of ISO or publications of IEC may also be adopted as draft standards by the technical committees of national standard bodies. This not only results in a considerable saving of time, but facilitates the co-ordination and unification of national standards as well.

77. The 'ISO Guide for the Presentation of ISO Recommendations'¹⁾ distributed to the Seminar participants, may be utilized to advantage in the presentation and editing of draft standards and national standards. A wider application of this Guide might bring about a greater degree of consistency among national standards in various countries and might facilitate both international and national standardization.

¹⁾ International Organization for Standardization (Geneva, July 1965).

78. In addition to work directly related to the issuance of national standards, a national standards body is also responsible for related work of a technical and administrative nature, most of which should be entrusted to the secretariat. Examples of this include preparation of an annual report, issuance of lists of existing national standards and establishment of technical co-operation between technical committees of the national standards body and various technical organizations.

79. In most industrialized countries, the primary purpose of standardization is to co-ordinate and harmonize existing industrial patterns. In a developing country, however, standardization is not only an instrument of co-ordination but of direction as well, with the latter function often the predominant one.

80. The voluntary or mandatory character of national standards is generally determined by the social and economic structure of the country in question. Since a suitable standard represents the consensus of all interests concerned with the subject matter of the standards, it should command ready acceptance without legal or other pressures. In some cases, however, if the safety and health of individuals is concerned, or if the national interest is involved (for example, in certain cases of export), standards may be made mandatory. It should be noted, with respect to legally enforced national standards, that the legislative process is slow to respond to the need for change and modification; this may render a standard obsolete in the light of rapid technical developments and thus act as a brake on technical and economic progress.

81. Another aspect of the implementation of standards is certification marking for goods conforming to accepted standards. A certification mark is a third-party guarantee that goods have been inspected and tested and can be purchased with a reasonable assurance of quality. This is of considerable importance to a purchaser without readily available testing facilities, necessary knowledge or skill for inspection and testing, or where such testing is uneconomical. The organization providing certification marking should be independent, technically competent and without conflicting business interests. In addition to verifying quality control in a plant, this organization must maintain a continuing check on quality by inspecting and testing samples of the product in question.

82. A great deal of promotional work is necessary to secure the widespread implementation of voluntary standards. This may include advertisements in the press, exhibitions, films and slides, press releases and conferences; this procedure is of particular importance for implementing standards in a developing country.

83. Considerable help in implementing voluntary standards may be secured from a government which makes use of national standards in its purchases. In most developing countries, the government constitutes the largest body of organized consumers, and its influence on the adoption of standards by manufacturers is correspondingly great.

V. INITIAL ACTIVITIES IN APPLICATION OF STANDARDS TO INDUSTRY

84. Four papers were presented on this subject: 'International Standardization Concerning Quantities, Units and their Symbols' by Mr. H. Høigaard Jensen and Mrs. V. Simonsgaard, presented by Mr. Høigaard Jensen; 'Basic Standards' by Mr. J.G. Busck, presented by Mr. O. Wejncke, 'Test Methods' by Mr. J.G. Busck, presented by Mrs. Simonsgaard, and 'Testing Facilities for the Development and Application of Standards' by Mr. F. Hadass.

85. To ease communications and promote progress, it is necessary to standardize the symbols used in science and technology, and to institute uniform and generally accepted units of measurements. The Metre Convention, which was established in 1875 and has a current membership of eighty-one governments, has recommended the use of the *Système International (SI)* of weights and measures. The responsibility for using this system in standards rests with national standards bodies. The adoption of SI may be a slow process, particularly in areas where the use of other units of measurement has already been established. Promotion of the use of international units should be directed towards industry and educational institutions. The ISO Technical Committee dealing with quantities and units (TC 12) is preparing a document for use in educational institutions which it proposes to print in large quantities and distribute with UNESCO aid.

86. Basic standards may be described as those used as the basic for the elaboration of other standards. Examples of basic standards of general applicability include sizes for standards, reference numbering, preferred numbers, and codes of drafting and drawing. Basic standards for specific fields include tolerances, limits and fits for mechanical engineering, and modules for the building industry.

87. The English term 'basic standard', because of its use both for the systems of units and measurements (SI standard, foot-pound standard) and for the basic standards described in paragraph 86, leads to some confusion and misunderstanding; it should be examined for the possibility of a convention to establish two different terms, as in French ('*étalon*' for the former and '*norme fondamentale*' for the latter).

88. The value of standardization is greatly reduced when appropriate testing does not ensure that the product fulfils the requirements. The importance of testing and test methods is illustrated by the fact that about a third of ISO recommendations and draft recommendations are concerned with testing.

89. Among existing relevant test methods, the most common groups are the following: measurement of dimensions by a variety of means, such as rules and gauges, testing the quality of materials by chemical analysis, mechanical examination, electrical tests; evaluation of the performance of machines and apparatus by different performance tests measuring output and reliability, and various electrical and mechanical safety tests.

90. Different test methods may give different results for the same characteristic. It is therefore necessary to standardize test methods and rules to be followed in the testing procedure. Since testing involves additional costs for a product, it should first be decided what is the most economical test method that will give satisfactory results.

91. In a given standard, test requirements may be shown immediately after the definition and description of the item. In some cases, however, it is better to give test requirements in a separate standard. In either case, the test method should cover sampling, where applicable, a description of the testing apparatus, performance during the test, and reporting and interpretation of the results.

92. Testing equipment used in industrialized countries is not always available or suitable in developing countries. Test methods for the specific needs and conditions of the latter should be adapted or evolved from the beginning.

93. The need for efficient testing facilities is of particular importance in a developing country to build up its export trade, which usually represents a buyers' market, in which goods, to be competitive must adhere strictly to buyers' specifications and standards. No less important are testing facilities for safeguarding the interests of a developing country in its imports of capital goods and consumer products.

94. Testing facilities are indispensable for the favourable development of local industries and for the formulation of standards and specifications which take full account of a country's needs and of such factors as local conditions of supply, quality of raw materials, availability of labour and equipment, and financial resources.

95. Testing laboratories which are purely functional, and not built for prestige purposes, can be equipped and made operative with comparatively modest means. It is possible in the initial stages, for instance, to have an efficient testing laboratory with 300 to 500 square metres of floor space, and an investment in equipment of \$ 120,000 to \$ 150,000. Financial outlays of this magnitude are within the scope of the United Nations Special Fund, which, in general, provides funds for experts, training fellowships and equipment.

96. In addition to specialized testing laboratories, a national standards body can make effective use of testing facilities available at university and other research laboratories. Since, however, routine testing is of only secondary importance in the work of such laboratories, testing facilities specially built for the needs of a standards body, and operated by it, will eventually be justified in most cases.

VI. STANDARDIZATION AND THE CONSUMER

97. The following four papers were presented: 'Bas. Requirements. Material Specifications, Test Methods' by Mr. J. M. Hillenius. 'Standardization of Components and Utensils' by Mr. B. Otzen. 'Marks Indicating Conformity with Standards' by Mr. B. Brosie, and 'The Relationship of Consumer Organizations to the Work of the Standardization Organizations' by Mr. P. Goldman.

98. Consumers of today, who have a large choice of consumer goods, need guidance not only as a protection against shoddy goods, but also to prevent them from buying goods not really suited to their purposes. There are currently three established procedures for consumer information: comparative testing, quality or certification marking and informative labelling. All three methods provide guidance to the consumer in making a satisfactory choice, and have their advantages and limitations.

99. In comparative testing, the relevant properties of several brands of a product are compared, price information is sometimes given. The results of the tests are published in such a manner that the consumer may make his own choice, though recommendations may at times be made to guide him. The results of comparative testing are greatly influenced by the test methods employed. There is, therefore, a clear need for international co-operation to unify test methods, especially since some brands are sold in many countries, and international trade is constantly expanding. This, however, does not mean that the consumer is 'standardized'. The evaluation of product properties may be different in various countries and for varied groups of consumers. For comparative testing, objective measuring methods should be used so far as possible, but in special cases it may also be necessary to use subjective methods for example, ease of handling, tonal quality, taste. One of the problems of comparative testing is sampling. In the case of inexpensive merchandise, such as incandescent lamps, it is possible to test a reasonably large number of units, but for more expensive items, such as motor cars, this often cannot be done. Another drawback of this method is that the results of testing are generally published too late to provide guidance for all consumers, or the results may be outdated by changes already made by manufacturers.

100. Quality or certification marks indicate that a specific product complies with certain standards. Quality marks are based on published standards issued by national standardization organizations, and are generally the property of these organizations. A manufacturer is given the right to use the quality mark for a specific product on condition that the quality of the product complies with the minimum requirements stated. In order to check this, the product is tested by authorized testing stations. In addition, the organization operating the quality mark occasionally visits the plant where the product is manufactured to ensure that quality is maintained during production, and also to check it against test samples collected from the market.

101. In some countries quality marking is widespread and well established, in others it is used only for articles of certain types. Quality marks are of particular value for articles which absolutely require a certain minimum quality level, or which must meet safety requirements. One of the main objections to this method is that a quality mark does not indicate any quality of a product that is higher than the standard and therefore places the producers of higher quality products at a disadvantage. In addition, quality marks are often wrongly represented and interpreted as guarantees of high quality rather than occurrences that only predetermined minimum requirements have been met.

102. Informative labelling gives factual information on the essential properties of a specific product so that the consumer can decide for himself which product is best suited to his specific needs. This method has been in use for more than a decade in Scandinavian countries, and is now being introduced in the Netherlands and the United Kingdom.

103. A firm using the labelling system furnishes information on the label according to a standardized form, so that a basis for comparison among different brands is available. Labels include only 'objective' data, that is, information that can be determined by standard tests. Measuring methods used are agreed upon by representatives of all concerned --- consumers, manufacturers, trade members and research staffs. Firms prepare their own labels on the basis of tests carried out in their own or in independent laboratories, but an independent body maintains continuing vigilance to ensure that data on the label conform with the tested characteristics of the product.

104. The informative labelling system omits 'subjective' but valuable information to the consumer. Another impediment to the successful application of this method is the high degree of sophistication among consumers needed to make the system work. Consumer education in informative labelling, which has been found useful in Scandinavian countries, may be employed with advantage in developing countries.

105. Effective consumer information and protection call for standard methods of measuring performance. The national standards organizations are best qualified to define relevant product characteristics and to describe standard methods of measuring performance. The participants noted that both ISO and IEC are willing to give assistance in establishing international standard methods of measuring performance. This has been done through their technical committees. IEC TC 59 has done some work in this respect on domestic electrical appliances, and ISO TC 73 is engaged in activities relating to collaboration between consumers and standards organizations.

106. The economic advantages of standardization, reflected in lower prices for the consumer, are considerable. Such advantages, among others, are improved interchangeability of parts, easier service and maintenance, lower inventory costs and larger production lots.

107. The purpose of consumer organizations is to safeguard the interests of the consumer by establishing a better balance of power between the seller and the buyer. The formation of consumer unions has been taking place at an accelerating pace since the Second World War. Today the International Organisation of Consumer Unions (IOCU) has thirty-five members from twenty-two countries. The governing bodies of these unions are composed of organizations which perform comparative tests of consumer goods and publish their results, including information on brand names and prices.

108. The fundamental characteristic of these consumer organizations is that they are non-profit bodies, independent of business support and influence. They do not accept advertisements in their publications or exploit their test results commercially.

109. Tests carried out by consumer unions are designed to give all possible relevant answers to consumers before they buy. If the requirements of a national standard are sufficient to give these answers, consumer unions test to these standards. If not, they rely on standards of other countries, or on methods that they or independent technical experts have devised.

110. One of the main problems consumer unions are currently attempting to solve is the satisfactory representation of consumers in national standards bodies, in terms of both their number and their technical competence, for the purpose of counterbalancing the predominant influence and technical superiority of manufacturers' representatives. It is of the greatest importance that this problem be solved because the only way to establish reliable test methods for consumer goods is with the full co-operation of consumers and manufacturers.

111. The example of consumer unions in developed countries has more future than present relevance for developing countries. In the latter, the protection of consumers calls for governmental action.

VII. COMPANY (IN-PLANT) STANDARDIZATION

112. Three papers on this subject were presented by Mr. B. B. Singh: 'Necessity, Object and Savings', 'Organization of Company Standards Department' and 'Collaboration: Internal and External'.

113. National and international standards cannot cover all the complex, extensive needs for in-plant standards. For this reason, company standards activity is indispensable.

114. The principal objective of company standardization is reduction of costs without impairment in the quality and performance of the product. Lack of company standardization leads to excessive stocks of materials and spare parts, slow inventory turnover, accumulation of in-process inventory, a large number of specially designed items, time-consuming special handling, additional machine set-up time, shorter production runs, long delivery cycles, complex and inefficient production control and similar deficiencies.

115. The benefits of company standardization are both tangible and intangible. Tangible benefits, among others, are the reduction of inventory, reduction in production control and inspection costs, reduced maintenance, saving in design and tooling costs for special components, improvement in control of quality and reliability of products, and reduced obsolescence. Examples of intangible benefits are better service to customers and relations with them, and better co-ordination between the design and production functions.

116. Indispensable for the organization and successful operation of a company standards department is the full backing of management and the complete co-operation of all involved. Depending on the responsibilities of the standards department and on the company, the standards department may be under a general manager, works manager, chief design engineer or other executive of comparable status. The company standardization function cuts across managerial lines, and it is therefore important that it be placed as high as possible on the organization chart as a staff rather than a line function.

117. Company standards are of different types: formal standards and specifications (for example, drafting practices, screw thread dimensions) and codes of practice (for example for welding). Formal company standards are mandatory, but codes of practice are sometimes intended as guide lines.

118. The normal sequence in the preparation of company standards is as follows: collection of data; arrangement of data in logical sequence; elimination of unnecessary varieties, inconsistencies and inadequacies, publication and promotion of the resulting standard. In the preparation of standards all effected departments should be consulted. At times a working committee, or representatives of all functions and departments affected, may be advisable. A proposed standard should always be circulated for suggestions and comments before its final approval and acceptance as an approved standard.

119. It will often be found that a national or foreign standard is suitable for company needs. It may then be adopted without change, thus saving considerable time and effort.

120. Standards cannot remain static in a dynamic company but must be reviewed and revised as often as necessary. In revising a standard, exactly the same procedure in obtaining comments should be followed as if it were a new standard. To facilitate the application of standards for new products, standardization should be applied at the design stage. The application of new standards to existing products is, naturally, often difficult.

121. In industries where companies have strong operating similarities and face like problems, some standards are handled on an industry-wide basis. Standards formulated under such conditions may provide the basis for future national standards.

122. A company standards department needs constant contact with the outside world. In seeking solutions to its problems it needs access to comprehensive sources of national and international standards and other relevant information. The best source of such data is the national standards body, and co-operation with such a body on the part of company standards departments is of great value. Such co-operation also gives the companies an opportunity to play a more active role in the formulation of national standards.

123. In the course of the Seminar, the participants were given the opportunity of studying company standardization at the following industrial concerns engaged in varied industrial activities. The Seminar programme included the presentation of papers on standards activity in these companies, followed by plant tours.

Company	Industry
Volvo, Göteborg	Automobiles
Eriksbergs Mek. Verkstads A/B, Göteborg .	Shipbuilding
Aalborg Værft, Aalborg	Building components
Sabroe, Aarhus	Machine tools, refrigeration, compressors
Paasch & Silkeborg, Silkeborg	Dairy machinery
Angli, Herning	Shirt manufacturing
Tulip Brand, Vejle	Meat packing
Laur. Knudsen, Vejle	Household appliances, electrical equipment
Danfoss, Nordborg	Automatic controls

124. The participants were given descriptions and evaluations of the standards organizations in these companies - - - the standards applied, the methods of formulating standards and the inter-departmental arrangements for their implementation. All the companies expressed their conviction that company standardization had resulted in reduction in costs. They also spoke highly of the value derived from participation in the work of national and international standardization.

VIII. TRAINING OF STANDARDS ENGINEERS

125. A paper entitled 'Training of Standards Engineers' was presented by Mr. S. K. Sen. The term 'Standards engineer' was used in a general sense to include all technical personnel dealing with standardization.

126. Since standardization is a specialized activity, it is usually difficult to find suitable personnel to work as 'standards engineers'. This is particularly the case in developing countries, which are likely to face a general shortage of all types of technical personnel.

127. Training of standards engineers is therefore of utmost importance. It assumes special significance because of the fact that normal training facilities for standards engineers are not available as they are for other engineering and technical professions, since the subject of standardization is not usually taught as a specialized subject in technical education. It is recently that a few technology institutions in the United States and some other countries have initiated courses in this field.

128. Facilities for training in standardization outside educational institutions are limited. In the field of professional training, Mr. John Gaillard conducted a short but intensive course in New York for many years. In France, the Association pour l'Organisation des Stages en France (ASTEF) and the Association Francaise de Normalisation (AFNOR) together have been organizing group training in standardization for developing countries since 1961. The national standards institutes of Denmark, Germany and Sweden have operated training courses from time to time. Among the developing countries, the Indian Standards Institution (ISI) has organized courses for training standards engineers at various functional levels.

129. Standards engineers in national standards bodies should receive different training from those working in companies, though there is much in common in the content of courses for the two groups. The approach to standardization, the presentation of standards and the technical and human problems encountered in national standardization differ from those met with in company standardization to such an extent that specialization in one requires different treatment and training from the other. It is of utmost importance, however, that the interrelationship between the two should be made clear to all standards engineers, irrespective of whether they work in a national standards body or in a company.

130. In training standards engineers for national standards bodies, emphasis should be placed on the techniques of organizing and conducting committee meetings and dealing with the human problems which arise in seeking a balance between the various interests involved in the formulation and implementation of standards. On the other hand, training of company standards engineers needs more emphasis on communication and correlation between different company functions, coding and control of material and inventory, documentation and information, drafting and drawing practices, and the like. It is important that the training of all standards engineers should combine theory and practice to enable trainees to utilize the knowledge gained in their own functions.

131. The training courses for standards engineers for national standardization work should preferably include (a) an orientation phase, (b) a study phase and (c) a practical phase. Lectures for the study phase may include (a) principles of standardization, (b) organization and techniques for national standardization work, (c) implementation of standards and (d) public relations. The course of training for company standards engineers is usually a short and intensive one, and the principal subjects discussed may cover (a) standards functions at national and company levels, (b) scope and organization of company standards activities, (c) tools and techniques for company standardization, (d) material management, (e) documentation and identification systems, (f) coding of stores, (g) drawing control and (h) management support for standardization.

132. In a developing country the acceptance of a company standardization programme by the management is often a slow process requiring an educational or promotional plan. This may take the form of short conferences of company managers, at which experiences with concrete results obtained from standardization may be stressed, with particular reference to current topical problems of the industry.

133. Apart from management conferences, another type of programme which has been found effective in impressing company management is to make a survey of existing company practices to emphasize the need for a planned standards programme and the savings that can be achieved in this way. Experience in India along this line shows that in a brief period of about six months, a number of areas can be located in which standardization would result in substantial benefits, through codification, variety reduction, simplification and so on.

134. There is no doubt that developing countries that wish to establish national standards bodies will find it necessary to train their personnel right from the planning stages. The participants noted that training courses in France and India continue to be available to nominees from developing countries. Several other countries have also offered to accept trainees for individual placements. The United Nations, moreover, is ready to give high priority to fellowship and scholarship awards in this field.

135. The participants nevertheless thought that the establishment of one or more international centres for training in standardization was the need of the hour. The centres could utilize an international teaching staff and evolve courses of study with an international background. The matter should be taken up by ISO, which could plan suitable programmes and devise ways and means to implement them. The participants hoped that liaison would be established between the United Nations and ISO for this purpose, and that it would be possible to find the necessary financial resources.

ANNEX

LIST OF PARTICIPANTS

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COUNTRY	NAME	TITLE
AFGHANISTAN	Mr. Ali Mohamed-Saad Zoi	Director, Directorate of Public Finance, Ministry of Planning
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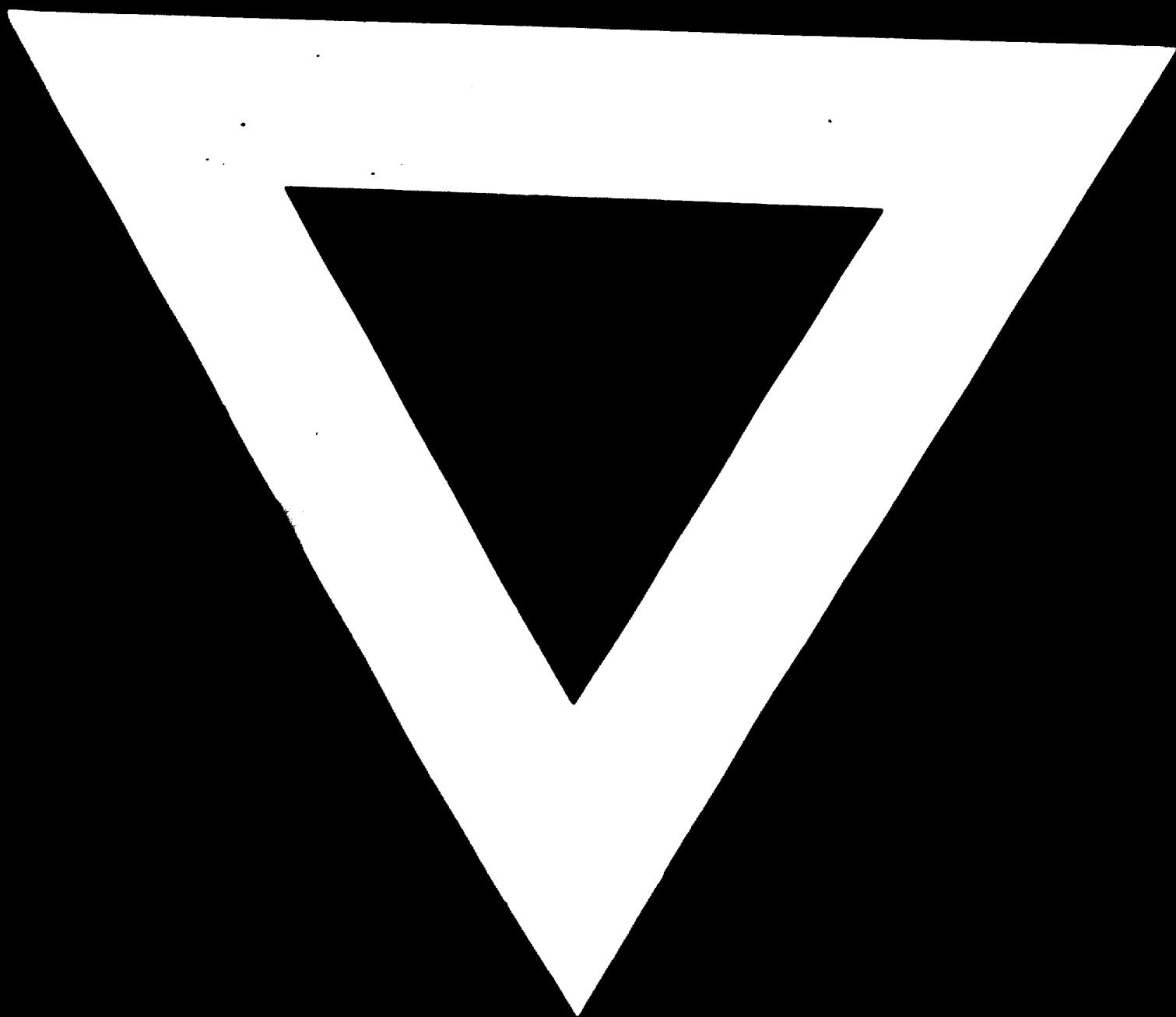
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