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HUMAN RIGHTS AND SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENTS

The balance which should be established between scientific and technological progress and the intellectual, spiritual, cultural and moral advancement of humanity

Report of the Secretary-General

CONTENTS

VII. METHODS ADOPTED OR PROPOSED FOR THE PROTECTION ON THE NATIONAL LEVEL OF HUMAN RIGHTS AGAINST THREATS POSED BY RECENT SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENTS

1. Methods previously described

147. Methods which have been adopted or proposed for the protection on the national level of human rights against threats posed by recent scientific and technological developments have been described in studies of: respect for the privacy of individuals in the light of advances in recording and other techniques; 1/ protection of the human personality and its physical and intellectual integrity in the light of advances in biology, 2/ medicine 3/ and biochemistry; 4/ experiments on human subjects; 5/ uses of electronics which may affect the rights of the person and the limits which should be placed on such uses in a democratic society; 6/ the right to work; 7/ the right to just and favourable conditions of work; 8/ the right to just and favourable remuneration; 9/ the right to form and join trade unions; 10/ the right to rest and leisure; 11/ the right to food; 12/ the right to clothing; 13/ the right to housing; 14/ and the right to education and culture. 15/

1/ E/CN.4/1116, paras. 133-178 and 239-277, E/CN.4/1116/Add.1 and 2, and E/CN.4/1116/Add.4, paras. 4-32.

2/ E/CN.4/1172, especially paras. 31, 42, 43, 49, 50, 59, 67, 75, 84, 85, 88, 91, 92, 100 and 110, and E/CN.4/1172/Add.3, paras. 3-51.

3/ E/CN.4/1172/Add.1, paras. 126, 129, 131, 133-139, 142-148, 151, 152, 154-157, 160, 162, 164, 165, 172, 174-175, 178-182, 188, 190-191, 193-194, 199-201, 205, 212, 234, 236, 239, 244, 252, 254-255, 259-260, 274-275, 280-281, 284-287, 294-296, 299-300, 302, 321, 332-336, 338-340, 343, 345-347, 350-351, 353, 356, 359, 362-365, 367-370, 372-376, 382, 386, 389, 391-392, 394-396, 401, 418, 420-421 and 425; and E/CN.4/1172/Add.3, paras. 52-182.

4/ E/CN.4/1172/Add.2, paras. 459, 461-485, 493-496, 500-512 and 529-534.

5/ E/CN.4/1172/Add.3, paras. 183-308.

6/ E/CN.4/1142, paras. 121-317, E/CN.4/1142/Corr.1-4, E/CN.4/1142/Add.1, paras. 74-92 and 102, and E/CN.4/1142/Add.2, paras. 58-86.

7/ E/CN.4/1115, paras. 47-51.

8/ E/CN.4/1115, paras. 69-73.

9/ E/CN.4/1115, para. 84.

10/ E/CN.4/1115, para. 102.

11/ E/CN.4/1141, para. 22.

12/ E/CN.4/1084, paras. 44-57.

13/ E/CN.4/1084, paras. 80-84.

14/ E/CN.4/1115, paras. 122-124.

15/ E/CN.4/1144, paras. 42 and 57.

148. Under a more general agenda item entitled "National Measures and Policies to Protection and Promote Human Rights in the Light of Recent Scientific and Technological Developments and to Ensure that Scientific Discoveries and Their Technological Applications are Utilized in the Interest of Society as a Whole", the above-mentioned seminar held in Vienna, Austria, in 1972 discussed: (i) general principles of national policy in the field of science; (ii) legislation and regulations, including appropriate governmental machinery; 16/ (iii) specific sets of standards (codes of ethics, guidelines, etc.), and court decisions. 17/

149. The methods on the national level referred to in the last two paragraphs have included, as appropriate: legislation; administrative regulations, licensing of devices; official guidelines; special governmental machinery; codes of ethics; science policies including suitable policies governing the introduction of new technologies; economic policies; the proper use of employment services; suitable training programmes; safety inspection services; safety testing of new equipment, and housing planning. To some extent constitutional provisions have been found applicable. There have also been a number of judicial decisions on the protection of human rights against threats posed by recent scientific and technological developments. In some instances, threats posed to rights by certain devices may be countered by appropriate technical procedures or by other technological devices; this applies in particular to the abuse of surveillance devices and of the computer.

2. The need for further controls and problems arising therefrom

150. There is however a widespread feeling that the explosion of scientific knowledge and of its technological application which has taken place in recent decades has not been accompanied by an appropriately urgent, profound and continuous consideration of the implications thereof for human rights. It has been asserted that such a consideration has become the more urgent since new scientific discoveries now pass more rapidly than ever into practical application, and their implications for human rights are often unforeseen.

151. Mention should be made at this point of the development of studies coming under the general title of "futurology" which are being carried on by, in particular, institutes in various parts of the world. On the international level, reference should be made to the Project on the Future of the United Nations Training and Research Institute (UNITAR). 18/ These endeavours inevitably include considerations of the future impact of science and technology on human rights. The United Nations Research Institute for Social Development has issued a description and discussion of "social prognosis" and of a number of published works on prognosis, on the methodology of social prognosis and on futurology. 19/ Prognosis and the elaboration of "alternative futures" have been greatly facilitated by the development of the computer.

16/ ST/TAO/HR/45, paras. 62-80.

17/ Ibid, paras. 81-92.

18/ See documents A/9614, paras. 13-30 and A/10014, paras. 94-101.

19/ United Nations Research Institute for Social Development, Social Prognosis, Report No. 70.19, Geneva, 1970.

152. Much thought is being given to the need for continuous technology assessment and the form which it should take, either on the national level, the international level, or both.

153. One writer has observed that: "science and technology are not governed by what man holds to be good, moral or humane; the only law applicable to them is the law of possibilities. If it is possible to discover or construct something, science and technology will certainly attempt it, regardless of whether it is useful or harmful to mankind. And governments tolerate and favour these trends. Everything happens as though man refused to take in hand his destiny and that of the planet." 20/ It has been urged that the position has been reached where scientists may have to decide that, while a certain line of research is possible, it may be immoral to follow it up. It has been maintained that: "We will undoubtedly have to decide on occasion not to do something we know perfectly well how to do. It has seemed to some of the critics of unrestrained technology that there is an inevitability about it: whatever can be done will be." 21/

154. Some conception of the complexity of the issue of whether a "moratorium" should, or could, be placed on specific aspects of scientific research is provided by the following extract from an account of the 1971 General Meeting of the Institute of Society, Ethics and the Life Sciences (The Hastings Center), Hastings-on-Hudson, USA:

> "The discussions clustered around certain issues, to which the conference kept returning. They included:
>
> "Whether any scientific research or technological application should ever be stopped or even slowed. A few felt that the burden of proof for further research in some areas should be shifted to the proponents, rather than remaining on those who would hold back. The long-sought technique for predetermination of sex was suggested as one case where this new approach might be applied; the SST [supersonic transport] as a case where it already has been applied. Others strongly opposed any such suggestion, questioning the credentials of laymen in government for passing on such questions. Even if research could be stopped - with all the difficulties involved in international regulation - they argued that the history of attempts at limiting science shows this a greater danger than any results of research would be". 22/

20/ Rudolf Bystricky, advocating the adoption of a Universal Declaration on Science and Technology, in working paper No. 9 prepared for the Colloquium of 30-31 October 1970, held in Geneva and entitled "The United Nations in a Changing World," p.6.

21/ J. Edward Carothers, Margaret Mead, Daniel D. McCracken and Roger L. Shinn (Eds.), To Love or to Perish. The Technological Crisis and the Churches, New York, 1972, p.64.

22/ The Hastings Center Report, No. 2, September 1971, p.3.

Nevertheless, a call was made by the United States Academy of Sciences for a voluntary monatorium on certain types of genetic experiments on micro-organisms; the hazards to human health were described as grave and unpredictable. 23/

155. There was considerable discussion of these questions in the meetings of the Group. The matter of the limitations which might be placed upon scientific and technological innovations was linked with Article 29 of the Universal Declaration, which reads:

> "1. Everyone has duties to the community in which alone the free and full development of his personality is possible.
>
> "2. In the exercise of his rights and freedoms, everyone shall be subject only to such limitations as are determined by law solely for the purpose of securing due recognition and respect for the rights and freedoms of others and of meeting the just requirements of morality, public order and the general welfare in a democratic society.
>
> "3. These rights and freedoms may in no case be exercised contrary to the purposes and principles of the United Nations".

Attention was also drawn to Article 30 of the Declaration:

> "Nothing in this Declaration may be interpreted as implying for any State, group or person any right to engage in any activity or to perform any act aimed at the destruction of any of the rights and freedoms set forth herein".

156. It was stressed in the Group that there cannot be rights without duties. Man being a social being, it was important to find the proper balance between the interests of individuals and between those of individuals and those of society. The reference in Article 29 to "duties to the community" was referred to frequently. It was pointed out that duties were owed to the community, not to the State as such. Did this not imply a global commitment? More than that, it was said, man's duties were surely also towards future generations. Another opinion expressed was that duties were held primarily to the local or national community and in this connexion reference was made to the "brain-drain". If an individual owed special duties to his local or national community, should he not be obliged to give his skills and services where they were most needed at home?

157. It was also pointed out in the Group that the limitations on rights which were permitted by Article 29.2 of the Universal Declaration had to be "determined by law".

158. Another point made in the Group's discussions was that, to make a man happier, it was necessary to improve not only him but also the society in which he lives. The latter was much easier and much more certain of securing the result aimed at.

23/ British Medical Journal, 1974, no. 3, pp. 483-484, cited by WHO in document E/CN.4/1173, p. 28.

159. References were made to the neutrality of science. It was man who must decide the ends to which science and technology should be put. It was maintained also that it was necessary to make such decisions afresh in the course of time, since the evolution of man, especially in its intellectual, spiritual and moral aspects, is a perpetual process of invention.

160. It was pointed out that there may be unanticipated repercussions of certain avenues of research. Researchers set out to achieve certain results, but unexpected side effects may manifest themselves. It was difficult to know exactly what the full implications of any research were going to be. There was in virtually every research some minimum to maximum degree of hazard, which should be accepted if knowledge was to be pursued in order to improve the human condition and human development.

161. Moreover, technological developments often have both good and bad aspects, or may have had initial harmful effects yet good later results. For example, missiles could carry atomic bombs, but their development promoted that of satellites. Again, satellites could be effective spying instruments, yet such spying instruments could facilitate the conclusion of an international disarmament agreement, because inspection is one of the problems arising in that connexion. Satellites also provided the possibility of forecasting the weather, which was a positive thing. Prisoners had been used during the Second World War to find how much acceleration a human being could tolerate. The results of this nefarious practice had proved useful later in connexion with sending man into space. Technological progress was a mixture of contradictions. Each problem had to be studied on its own merits and given expert and careful consideration.

162. Questions of choice in genetic research received some particular attention from the Group. In the past, biologists had merely studied the way in which living things had evolved; but the situation now was very different. Man was acquiring the power to control and to develop that evolution. If man was going to control the direction of evolution however, who should decide what that direction is to be, and how was it to be determined? What should be the objectives? Should the scientist determine these, or the politician, or the Government, or the bureaucrat? If geneticists are hoping to improve the human species, it was important first to know what their ideas of "improvement" are. In a general way, all ought to be more intelligent than they were; but it would be undesirable simply to make all human beings more intelligent, if they are not at the same time endowed with a higher level of moral and ethical thinking. More and more intelligent criminals were not needed.

163. The conclusions of one of the expert contributors include the following:

> "2. The application of science and technology creates social and economic problems which require political solutions. Evil effects which may result from certain directions of application are not inherent in science and technology but arise basically from inadequacies in the social and political organization of society.

"3. Illustrations of the thesis formulated in paragraph 2 can be provided from the transfer of technology to developing countries, from problems of obsolescence and redundancy in industrialized countries, from problems of the role of science in the arms race, and from technologically related global problems of environmental insult, prodigal use of raw materials and energy, and the population explosion."

164. Discussions in the meetings of the Group also concerned the duties of scientists to society and the question of the possibility of a moratorium on certain types of research. It was said that, creativity being part of human make-up, it was impossible to halt any line of research. The question was asked whether the scientific community could discipline itself or whether there must be an intervention by the political organs of the community. This raised the question of whether the scientific conscience was a sufficient guide.

165. It was said that there was a danger that medical technology might become an interest that an experimentalist pursues to satisfy his own ego. It was exciting to experiment with germs and microbes, to see whether one can produce something quite out of the ordinary. Hence, the exponential growth of medical knowledge could become increasingly devoid of social sensitivity, social conscience and social obligation.

166. Another view was that many scientists have a well-developed sense of social responsibility and one member of the Group maintained that biologists were forming an avant-garde on the moral front. Genes could be transferred from one micro-organism to another type of micro-organism. This transfer was a very exciting discovery and opened up the possibility that the genetic nature of any species could be radically changed. At the present time it was only possible with micro-organisms; but conceivably, through the use of cell cultures, it could be applied to higher organisms as well. It was recognized by the scientists engaged in this type of research that certain precautions must be exercised to make sure that harmless organisms are not converted into those that would cause plagues of epidemic proportions. Most biologists thought that it was important to pursue this kind of research, but only with great care and under particular constraints that would eliminate the possibility of producing the kind of organisms which might be parasitic on man or the higher animals and be immune to drugs. It was pointed out that this was a situation in which scientific research itself posed a danger, and not the commercial, or industrial or other applications of the resulting technological knowledge. Fear had been expressed, calling for a moratorium on such research. Applying by analogy a principle taken from certain legal systems, a member of the Group suggested that one test to be applied to the question whether research should continue was the doctrine of "clear and present danger". If it was evident to a group of knowledgeable scientists working in the field that there was a clear and present danger from a research pursuit, even though it might promise great benefits also, it would have to be prohibited or in some way controlled.

167. One expert contributor provides details concerning the "development at the present time ... in the field [of] gene manipulation of the introduction of foreign animal DNA into bacterial cells which then reproduce themselves in generation after generation of the bacteria":

"From the point of view of basic research this technique opens up exciting possibilities. It also raises the possibility of very important constructive applications. For example bacterial cells might be constructed that could be grown easily and inexpensively to synthesise antibiotics and hormones, or enzymes able to convert solar radiation directly into food substances or usable energy.

On the other hand the possibility of this new kind of genetical engineering could lead to gene combinations that have grave implications, constituting a biological hazard. Eventually, largely on the initiative of Paul Berg, a meeting of more than 100 investigators in this field came together at Pacific Grove, California in February 1975 together with non-scientists interested in legal and ethical questions to discuss the issues involved. It was agreed that while in general work in this field could continue with proper safeguards, some experiments are too hazardous to be carried out at present. Future research may show that some of the potential hazards are less dangerous than at present suspected but in the meantime the research workers concerned agreed to exercise voluntary restraint."

His conclusions include the following:

"4. Scientists have a social responsibility for the way science and technology are applied that may often transcend that of the common responsibility of all citizens in a democratic society. A value-free attitude of unconcern adopted by some scientists in relation to the consequences of their work has tended to debase the public image of scientists and to raise suspicions about the role of science. Many scientists have however adopted a highly responsible attitude to ethical problems raised by their work."

He raises, however, two problems as regards the application of a scientist's duties:

"If scientists wish to influence or change the policy of their governments, can they do so most effectively by working inside the establishment, with the consequent restriction in their public activities, or outside the establishment, thus retaining their full rights of public statements and criticism? ... Difficult ethical problems arise in relation to the involvement of scientists in advising their governments in a situation where the scientists themselves have little say in the way the advice will be used. Assuming that governments express the will of the majority of the people of a country, the refusal of scientists to tender advice on problems affecting the community would be interpreted as a socially irresponsible act, tending to alienate them from the community".

168. Professor B.V.A. Röling, of Groningen University, the Netherlands, writes:

"A long-standing tradition exists in which the scholar does his research, makes his discoveries, and leaves the consequences to society, to the blind forces of society. This tradition might have been reasonable, in the past, when relatively small discoveries were made, and then only

adopted by society after many years. During this long process adaptation could gradually be realized. In our time the scientific discoveries are startling, and are adopted by society at once. The scientist has especially in our time a deep responsibility for the future." 24/

169. Professor Jean Coulomb, President of the International Council of Scientific Unions, in his report to the 15th General Assembly of the Council, held in Istanbul, 23-26 September 1974, drew attention, however, to the need for research workers to be allowed to follow their interests without having to consider continually the possible practical applications of their discoveries. 25/

3. Assessment and control machinery

170. The Statement of the Group, quoted in paragraph 4 above, declares in its paragraph 4 that:

"Not every change or development that science and technology make feasible needs to become an actuality. Governments and societies must determine by appropriate mechanisms for technological assessment - including the assessment of possible side-effects and long-range effects - whether the time is right for particular innovations and whether their advantages outweigh for the society the discernible disadvantages. International machinery should be entrusted with such a technological assessment for mankind as a whole. It is a basic human right to have a voice in such decisions. Decisions in such matters must be made on the basis of the considered opinion of bodies of experts and laymen who represent the interests of all the people as well as of future generations".

171. At a stage in its discussions earlier than the adoption of its statement, the Group agreed that the United Nations Secretariat should study the question of national assessment machinery and that the United Nations should encourage the establishment of such machinery where it did not exist (which signified most countries of the world).

172. The opinion was expressed by one member of the Group that such national mechanisms as those described in the Statement are "more than desirable, they are necessary in ... the development of national governments". It was suggested by members of the Group that such national bodies be interdisciplinary, and not composed only of government officials or of persons directly concerned with promotion of enterprises in an area under consideration. On the basis of the

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24/ Report of the First World Conference on the Role of the University in the Quest for Peace, University of Vienna, 25-29 August 1969, State University of New York, 1970, p. 34.

25/ ICSU Bulletin, No. 34-35, September-December 1974, furnished by the International Council of Scientific Unions on 29 April 1975, pp. 5 and 22-24.

experience of certain existing or past advisory bodies, it was urged by one member of the Group that national bodies must be limited in their areas of concern, because too broad a purview resulted in an inability to deal effectively with highly technical problems in specific areas. There was a trend of opinion in the Group that, since types of problems vary among societies, it should be left to the national bodies each to determine its areas of concern.

173. References were made in the discussions of the Group to mechanisms for technological assessment existing in certain countries where scientific research is to some degree dependent on financial support from the State. The important role played in this connexion in the Union of Soviet Socialist Republics by the Academy of Sciences in co-operation with the relevant governmental agencies was mentioned. In the United States, there had been various controlling or advisory bodies. For example, the Environmental Protection Agency was making recommendations on particular kinds of pollution and was prompting Government regulation over the manufacture of specific chemicals. In the area of the control of radiation research, a committee of the National Academy of Sciences had been set up to study the biological effects of high energy radiations and had reported in 1956. Congress had adopted the United States Technology Act of 1972. 26/

26/ The following are quotations from the Act:

"Sec.2. The Congress hereby finds and declares that:

(a) As technology continues to change and expand rapidly, its applications are-

(1) large and growing in scale; and

(2) increasingly extensive, pervasive, and critical in their impact, beneficial and adverse, on the natural and social environment.

(b) Therefore, it is essential that, to the fullest extent possible, the consequences of technological applications be anticipated, understood, and considered in determination of public policy on existing and emerging national problems.

...

"Sec.3. (a) In accordance with the findings and declaration of purpose in section 2, there is hereby created the Office of Technology Assessment (hereinafter referred to as the 'Office') which shall be within and responsible to the legislative branch of the Government.

(c) The basic function of the Office shall be to provide early indications of the probable beneficial and adverse impacts of the applications of technology and to develop other coordinate information which may assist the Congress..."

174. Contributing experts also discussed national procedures for technology assessment. One such expert makes proposals relating to both national and international machinery 27/:

"Areas in which informed political decisions on scientific and technical issues are required include technology assessment - the arguments in favour of the introduction of particular new technologies and their likely side-effects; the risk involved in a large variety of technical processes and its acceptability, bearing in mind human, social and economic factors; the early identification of large scale effects that could arise from technological progress in general; the area of science and technology that should be singled out for special development. In practice decisions on matters of this kind are of course taken by Ministers on the advice of technical experts. As we have seen however, while the background to the decisions are technical, the decisions themselves are basically political. The widest possible participation of the public to the extent of understanding the issues involved is necessary.

... Each specific problem involving the application of a new technology, or even the application of an old technology under new conditions must be examined anew in an attempt to judge whether the social benefits ensuing to the whole people or to particular countries or to particular groups of people in the one country outweigh the disadvantages that will ensue in the way of side-effects which usually weigh most heavily on groups of people different from those who benefit. Judgements of this kind need to be made in relation to the assessment of new technology, the transfer of technology to new countries, and to the risk involved in relation to projects involving the use of technology, old or new in special situations. Problems of this kind have always been present. The acuteness of the issues raised today are due to the fact that the increasing scale and complexity of modern machinery, transport, agriculture, construction, communication networks, energy distribution, drug usage, greatly increase the consequences of failures or other secondary effects. Economic factors in modern production processes involving new advanced technology weigh heavily on manufacturers in deciding to place them on the market before they have been adequately tested, leading to disastrous consequences like the failure of the first subsonic jets thalidomide, Torrey Canyon and so on.

A need is apparent for the existence of machinery in each country to assess such risks and implications. Since risks and implications of a particular development often involve several countries there is need also, for an international body to work along those lines. ... in discussing the work of such bodies one has to distinguish between two aspects - the assessment of the consequences and risks involved in any application and the judgement of their acceptability. The assessment of risks and consequences is a task for scientists and engineers. The judgement of their acceptability is a task for social scientists, humanitarian thinkers and certainly representatives of grass-roots organizations of the people - trade unions, co-operatives, religious and social communities and so on.

27/ As regards international machinery, see paras. 213-230 below.

Judgements as important as those required of the committee will achieve popular acceptance only if a far larger proportion of the general population than at present are able to understand the implications of the decisions taken. This requires, as has already been stressed, a higher level of general understanding of the scientific and technical problems involved which in turn implies changes in the estimation of the importance of science in the educational system at all stages. It also requires confidence of the people that the government of their country is genuinely interested not only in ensuring the widest possible application of science and technology for the benefit of the people but also in ensuring in each case that really adequate safeguards are provided even at the expense of offending the more powerful vested interests. The problems cannot be separated from their social and political context."

175. The following passage written by another expert contributor serves to show that technology assessment need not be divorced from the more general science policy of a government, which includes the positive application of science and technology to meet the needs of the country in question. 28/

"63. The problem is therefore that of making possible the coexistence of a climate of innovation and the mastery of technical progress. Machinery should therefore be established (1) which would make it possible:

- to foresee the possible effects of technology on society and the natural environment;

- to explore the new possibilities of satisfying economic and social needs which technical progress affords;

- to observe the evolution of these needs so that the objectives of society can be redefined in the light of newly acquired knowledge.

These are the functions of what is known as 'technology assessment'.

"64. The general aim of technology assessment is to evaluate the social costs of existing civilian and military technologies in the form of pollution, social disruptions, infrastructure costs, etc., to anticipate the probable detrimental effects of new technologies, to devise methods of minimizing these costs, and to evaluate the possible benefits of new or alternative technologies in connexion with existing or neglected social needs." (2)

28/ Regarding this topic, see the following chapter of the present report.

(1) It seems to us that the introduction of this machinery necessarily presupposes that economists, sociologists and ecologists will join the teams of engineers, chemists, physicists and biologists carrying out the research. It is recommended that the responsible authorities should take steps in that direction.

(2) Science, Growth and Society (OECD, Paris, 1971), p. 82.

"Thus, even in its mission of assessment, 'science policy is ... merely an instrument at the service of the broader political, economic and social functions. It cannot lead to the collective regulation of progress unless national and international leaders are firmly determined to make use of it for that purpose'".(3)

176. Certain authorities have made specific proposals for the assessment of prenatal genetic diagnosis and counselling. 29/ Many others have argued in favour of technology assessment on the national level, and the extracts from some which appear below add details to what has already been said in the present report, as regards either the justification or the possible functions, structure or mechanics of such assessment.

177. Professor Hanslowe and Professor Oberer of Cornell University, United States, have written 30/

"...[T]oday's technological developments are so rapid, complex and insidiously productive of unanticipated consequences as to threaten irreparable harm during traditional reaction time.

"In any effort to tame technology and harness it for less-adulterated social good, the law, as the ultimate instrument of social control, is called into play.

...

"While the need for the old-style regulation continues under the new technology, two fundamental adaptations must be made. First, means for assessing technology before its application must be developed. Second, means for factoring non-economic criteria into the assessment must be devised...

...

"... An obvious starting point for technology assessment is the assessment of governmentally-supported technology. Before public funds are invested in, or public approval otherwise given to, the promoting of a new technology (e.g., nuclear fusion reactors, supersonic transports, microwave generators), its implications, direct and indirect, for the natural and social environments should be made the subject of predictive scrutiny. And since most technological change of consequence is dependent, at one point or another, upon the support of public funds or the withholding of governmental disapprobation, this apparently modest scope of technology assessment might, in practice, prove immodestly adequate.

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(3) Idem, p. 88.

29/ Document E/CN.4/1172/Add.3, paras. 140-145.

30/ Kurt L. Hanslowe and Walter E. Oberer, "Science, Technology, Law: the Good Life", Journal of Legal Education, Vol. 26, No.1, 1973, pp. 32-43.

"... In establishing standards to be applied, the conflicting interests of many divergent groups must be taken into account; similarly in applying these standards. The assessors should, therefore, be broadly representative of the conflicting interests; if they are, instead, elitist, their decisions will be extremely difficult to enforce, considering the breadth of discretion the assessors must have. That breadth of discretion is the by-product of the necessarily broadly-stated standards and of the unlikelihood of consensus as to the meaning of those standards when applied to particular cases. The assessors, then, need not themselves be experts, but must, of course, have ready access to experts.

"As for the procedures to be followed in facilitating technology assessment, summarily stated, they should be such as to bring adequate information, technical and otherwise, to the attention of the assessors and to afford all interest groups adequate opportunity to argue competing points of view to the assessors.

"The primary sanction, at least at the outset, would be the denial of governmental support, by way of funds or license, to those technological innovations which fail to satisfy the assessment process.

"A natural culmination of the foregoing analysis is a scheme of technology assessment centered in the legislature itself ..."

The writers then comment favourably upon the Technology Assessment Act of 1972 of the United States. 31/

178. Mr. Alvin Toffler has written that "we desperately need a movement for responsible technology".32/ He continues:

"...Faced for the first time with technological overchoice, the society must now select its machines, processes, techniques and systems in groups and clusters, instead of one at a time. It must choose the way an individual chooses his life style. It must make super-decisions about its future. 33/

...

"To capture control of technology, and through it gain some influence over the accelerative thrust in general, we must, therefore, begin to submit new technology to a set of demanding tests before we unleash it in our midst. We must ask a whole series of unaccustomed questions about any innovation before giving it a clean bill of sale.

"First, bitter experience should have taught us by now to look far more carefully at the potential physical side-effects of any new technology ...

31/ See para. 173, foot-note 26 above.

32/ Alvin Toffler, Future Shock, Toronto, New York and London, 1971, p. 431.

33/ Ibid., p. 433.

"Second, and much more complex, we must question the long-term impact of a technical innovation on the social, cultural and psychological environment... 34/

...

"Third, an even more difficult and pointed question: Apart from actual changes in the social structure, how will a proposed new technology affect the value system of the society?...

...

"Fourth and finally, we must pose a question that until now has almost never been investigated, and which is, nevertheless, absolutely crucial if we are to prevent widespread future shock. For each major technological innovation we must ask: What are its accelerative implications? 35/

...

"The challenge, however, is not solely intellectual; it is political as well. In addition to designing new research tools - new ways to understand our environment - we must also design creative new political institutions for guaranteeing that these questions are, in fact, investigated; and for promoting or discouraging (perhaps even banning) certain proposed technologies. We need, in effect, a machinery for screening machines.

"A key political task of the next decade will be to create this machinery. We must stop being afraid to exert systematic social control over technology. Responsibility for doing so must be shared by public agencies and the corporation and laboratories in which technological innovations are hatched. 36/

...

"...We must create an environmental screen to protect ourselves against dangerous intrusions as well as a system of public incentives to encourage technology that is both safe and socially desirable. This means governmental and private machinery for reviewing major technological advances before they are launched upon the public.

34/ Ibid., p. 437.

35/ Ibid., p. 439. By "future shock" is meant "the shattering stress and disorientation that we induce in individuals by subjecting them to too much change in too short a time" (Ibid., p. 2).

36/ Ibid., p. 440.

...

"Where self-regulation fails, ..., as it often does, public intervention may well be necessary, and we should not evade the responsibility... 37/

...

"The society might also set certain general principles for technological advance. Where the introduction of an innovation entails undue risk, for example, it might require that funds be set aside by the responsible agency for correction of adverse effects should they materialize. We might also create a 'technological insurance pool' to which innovation-diffusing agencies might pay premiums.

"Certain large-scale ecological interventions might be delayed or prohibited altogether - perhaps in line with the principle that if an incursion on nature is too big and sudden for its effects to be monitored and possibly corrected, it should not take place... 38/

"At the level of social consequences, a new technology might be submitted for clearance to panels of behavioral scientists - psychologists, sociologists, economists, political scientists - who would determine, to the best of their ability, the probable strength of its social impact at different points in time. Where an innovation appears likely to entail seriously disruptive consequences, or to generate unrestrained accelerative pressures, these facts need to be weighed in a social cost-benefit accounting procedure. In the case of some high-impact innovations, the technological appraisal agency might be empowered to seek restraining legislation, or to obtain an injunction forcing delay until full public discussion and study is completed. In other cases, such innovations might still be released for diffusion - provided ample steps were taken in advance to offset their negative consequences. In this way, the society would not need to wait for disaster before dealing with its technology-induced problems. 39/

179. A statement issued at the conclusion of the Conference on Technology, Man and Nature, held in 1970 at Aspen, Colorado, United States, under the joint sponsorship of the Aspen Institute for Humanistic Studies and the International Association for Cultural Freedom included the following passage:

"The pace of technological development, faster than ever before, compels increasing vigilance in anticipating the consequences of technological development. The objectives should be to predict as fully as possible the social, economic, and even political consequences of new

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37/ Ibid., p. 443.

38/ Ibid., pp. 443-444.

39/ Ibid., p. 444.

developments and to provide governments and their electorates with an opportunity for making informed assessments of potential benefits and social costs. In many countries, new institutions will be needed for this work". 40/

180. The passages on technology assessment just quoted seem to have in mind assessment on the national level. Other authorities have envisaged such assessment at both the national and the international levels.

181. The Congress of the International Union of Lawyers, Vienna 1967, considered the growing dangers in the daily life of people due to scientific and technological developments. Its conclusions included the following:

"Up to now we have examined the technical remedies, the social remedies and the more typically legal remedies. However, the new dimensions of the problems and the fact that they are no longer local, the gaps, the excesses and disparities disclosed, the defects in legislative and administrative techniques, as against the merits of certain local solutions which ought to be extended to other countries, should impel us to submit a request for the setting up of standing interdisciplinary committees, at both the local and the international levels, which are not answerable to governments. These committees could provide a constructive and practical means, in present circumstances, of securing preventive vigilance and subsequent supervision of scientific research and the exploitation of new technical methods and so bring about a more positive observance of the articles of the Universal Declaration of Human Rights which relate or will relate to the acquired and fundamental rights of man himself when confronted with the growing development of science and technology." 41/

182. Professor Charles Malik has written:

"In the past the new knowledge produced by fundamental or applied research has been converted into technology with no concern over whether, in the long run, the detrimental effects on human life of these technological applications outweigh the beneficial ones. I feel that this indifferent state of affairs cannot continue, particularly in view of the great power for change inherent in new scientific knowledge.

"I feel that it is highly desirable - indeed, necessary - to establish standing commissions to study the possible beneficial or harmful consequences of new scientific developments before they are incorporated into technology.

...

40/ Text furnished by the International Association for Cultural Freedom, p. 4.

41/ Congress of the International Union of Lawyers, Vienna 1967. Law and Technology. General report, pp. 165-166. Furnished by the International Association of Lawyers on 5 March 1971. [Translation by the United Nations Secretariat].

"Of whom are these commissions going to be composed and to whom will they be responsible? If the commissions are national, they will be responsible to the governments concerned; if international, they will presumably report to the appropriate organ of the United Nations. In either case, their views cannot be self-enforcing; the standing commissions can only set forth consequences and alternatives, which is in itself a most necessary function without which the policy-makers cannot come to a rational decision.

"But need these commissions be dominated by scientists? It would be a mistake if they were. They certainly should have leading scientists among their members, but they should principally have poets, artists, philosophers, statesmen, businessmen, humble peasants who judge by their instincts, and men of God. And when I say 'statesmen', I do not mean 'elder statesmen' only; I mean men actually shouldering national or international responsibility". 42/

183. Having defined "developmental science" as the exploration of "the implications of the breakthroughs made by first-magnitude geniuses", one authority has pointed out: "One distinctive feature of developmental science is its rapid technological transformation. In fact, the pace of technological application is such that developmental science these days is almost immediately converted into technology". He made proposals for the "constitutionalization" of science, including the following: "A public corporation for developmental science can be chartered and given its constitution. Civilian control can be installed and charged with the responsibility for several functions that are now not being performed at all. Most obvious is the need for an ombudsman to process public complaints as well as complaints from scientists inside the Establishment. The ombudsman should have positive, as well as negative, or corrective, functions. That is, in addition to investigating alleged evils he should also see that the scientific enterprise achieves its publicly approved goals. This would require a special court system of adjudication, complete with appeal procedures." He added that "it is apparent that there is an international, or transnational, aspect to the problem of constitutionalizing science". 43/

184. Other authorities have advocated in general terms technology assessment in connexion with the impact of science a d technology upon human rights, without indicating whether national or international procedures are envisaged.

42/ Charles Habib Malik, "The limitations of natural science", Impact of Science on Society (UNESCO), Vol. XIX, No. 4, October-December 1969, pp. 385-386.

43/ Harvey Wheeler, "Bringing Science Under Law", The Centre Magazine, Vol. II, No. 2, March 1969, pp. 59, 65 and 67.

185. After reviewing various threats posed to human rights by recent scientific and technological developments, Professor René Cassin concludes that "it is highly desirable that preventive measures be undertaken in good time whenever the existence or the fundamental freedoms of man are endangered by the application of science or of scientific discoveries. Such measures could be the establishment of a permanent high-level organization, or the holding of ad hoc consultations with a small group of scientists and lawyers. 44/

186. The Chairman of the Science Council of Canada made the following recommendations:

> "Society must so organize itself that a proportion of the very ablest and most imaginative of scientists are continually concerned with trying to foresee the long-term effects of new technology. Our present method of depending on the alertness of individuals to foresee danger and to form pressure groups that try to correct mistakes will not do for the future. A rational institutional framework that will assign a formal responsibility for this critical task to a well-selected, well-organized, and well-financed group of scientists is urgently needed. Clearly, this agency must also have strong representation from the social sciences, including law, and close links with political leaders and with 'the man in the street'. Its task is too important to be left to scientists alone, but scientists must supply the leadership". 45/

187. An "early warning system" has been advocated:

> "...In certain limited fields, the risks of change have caught the popular imagination, and efforts are being made to translate the fears aroused into political action. We are worried, for instance, about the impact of electronics on our privacy; about the effects of industrial waste on our environment; about the genetic hazards of radiation; about certain long-term effects of the unrestrained industrialization of agriculture. But in each case public concern has intervened very late in the day, long after scientific development has been translated into common practice, and long after the evils are already manifest - and after powerful vested economic interests have already grown up to resist supervision and control. We are constantly trying to catch up on the ignorance and apathy of the past. We lack an early-warning system to alert us in good time to the social consequences of work when it is still at the laboratory stage". 46/

44/ René Cassin, "Science and Human Rights", Impact of Science on Society (UNESCO), Vol. XXII, No. 4, 1972, p. 338.

45/ O.M. Salandt, "The Control of Technology", Science, 1 August 1969, Vol. 165, No. 3892.

46/ Paul Johnson, "A Morality for a Dynamic Society", New Scientist, 4 December 1969, p. 507.

188. Nigel Calder writes, as regards technological developments:

"... [W]e must be much more alert to unlooked-for side-effects of innovations; there must be better anticipation of side-effects; also more and earlier discussion of them. A great need for humility and a readiness to admit to ignorance, are essential when research workers and technologists are called upon to advise about innovations. A couple of tons of high explosive cannot cause an earthquake, but it turns out that building dams to store water can do so.

...

"... [N]o country, however rich and determined, can afford any longer to pursue all the technological opportunities open to it. There are simply too many of them, and in any case they multiply faster than they can be followed up. Even if men do not modify their general nationalistic and materialistic ambitions, governments and technologists are still going to have to make arbitrary choices and determine priorities. To suppose that opinionated politicians, eager innovators and independent researchers are all mere puppets in the hands of fate as they help to make those choices calls for reserves of pessimism that few can possess.

"Regulation of the uses of science and technology is certainly possible. Many are preferentially encouraged by governments with research grants and development contracts. A decision not to support a particular project is in itself a measure of choice and control, and that decision may be wise or negligent...". 47/

47/ Nigel Calder, Technopolis - Social Control of the Uses of Science, London, 1965, pp. 16 and 94-95.

VIII. THE USES TO WHICH MODERN SCIENCE AND TECHNOLOGY MAY BE PUT IN THE INTERESTS OF THE PROMOTION OF HUMAN RIGHTS

189. The documents mentioned previously in the present report have related essentially to the impact of recent scientific and technological developments on human rights. To establish the uses to which modern science and technology may be put in the interests of the promotion of human rights requires a different type of enquiry. It may be said that, insofar as the developments in question have mainly beneficial results, then the promotion of human rights depends upon the more intensive and widespread use of those developments. The matter is more complex than this, however, and a considerable literature has developed both within and without the United Nations on an important aspect thereof, namely, the application of science and technology to development.

190. Much that has been written on this subject has the needs of developing countries particularly in mind, but many of the lessons to be learned could benefit persons in all countries. Much relevant work has been done by the Advisory Committee on the Application of Technology to Development, 1/ and includes the preparation of the World Plan of Action for the Application of Science and Technology to Development, 2/ which discusses, inter alia, the use of science and technology to promote the rights to food, housing and health. An expert contributor writes:

> "The World Plan of Action for the Application of Science and Technology to Development, prepared by ACAST, seems to be the most versatile concept of scientific and technological aid to the developing countries.
>
> "Its basic premises seem to be as follows:
>
> (a) regarding science and technology as factors accelerating the all-round development of a country,
>
> (b) adaptation of scientific and technological achievements to the conditions of particular States' activities and to the requirements posed by modern technology,
>
> (c) accepting the fact that the difference in living standards of the developed and developing countries results from the growing 'technological gap' between them; more equal distribution of wealth in the world requires not only a new international economic order but also a wide channel of technology transfer to the developing countries,
>
> (d) obstacles in the technology transfer to the developing countries (high costs, lack of selection criteria for transfer of appropriate technologies, inadequate patent policies of the developed countries),
>
> (e) insufficient number of qualified workers in the developing countries both to operate the new machinery and to do research on the adaptation of new technologies to the countries' needs.

1/ The Committee's reports to the Economic and Social Council, to date, are contained in docs. E/3866, E/4026, E/4178, E/4300, E/4461, E/4611, E/4780, E/4970, E/5131 and E/C.8/24.

2/ United Nations Publication. Sales No. 71.II.A.18.

"A great advantage of the plan is that, beside presenting conditions, directions and mechanism of technology transfer from the developed to the developing countries, it points to the fields of human knowledge which must be further developed and utilized to speed up the social and economic development of the Third World countries. Food, agriculture, soil preservation and utilization, some production problems, natural calamities and some problems in the field of health protection and birth regulation are research priorities.

"As the authors of the World Plan of Action rightly point out, the accomplishment of the Plan will depend not only on the scope and conditions of aid provided by the developed countries but also on the developing countries' scientific-technological infrastructure build-up and rational science policy:

> 'Accordingly, this Plan stresses the importance of building up indigenous science and technology structures in developing countries. This emphasis arises partly from the need for those countries to economize on their scarce resources and to make more intensive use of their potential. They need to develop their ability to identify their human and natural resources and the uses to which these might be put, to select those areas where science can make its greatest developmental contribution, to choose the most suitable technology, and to concentrate their resources in a coherent science policy that is reflected in education and training as well as in research.'" 3/

191. Mention should also be made of the report entitled "The role of modern science and technology in the development of nations and the need to strengthen economic and technico-scientific co-operation among States", 4/ this touches upon, inter alia, the right to food and the right to health.

192. Among the topics discussed at the above-mentioned seminar held in Vienna, Austria, in 1972 was "international programmes and action, including technical co-operation, to ensure that scientific and technological developments are used to promote human rights with due respect to the legitimate interests of other nations and peoples". Many proposals were made in this connexion. 5/

193. The development within countries of appropriate science policies (national policies in the field of science) was discussed at the same seminar 6/ and in some of the papers prepared for the seminar. 7/

194. The Commission on Human Rights, in paragraph 2 of resolution 2 (XXX) of 12 February 1974, requested the Secretary-General to bring to the attention of Governments, for preliminary study and possible comments, the studies already prepared in accordance with General Assembly resolution 2450 (XXIII) and Commission resolution 10 (XXVII) and those studies to be completed. In its paragraph 3, the resolution requested the Secretary-General to seek the views and observations of Governments and the specialized agencies concerned on the use to which science and technology can be put: (a) to strengthen international peace and

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3/ World Plan of Action ... p. 46.

4/ Doc. E/5238/Add.1.

5/ See doc. ST/TAO/HR/45, paras. 114-121.

6/ See especially, ibid, paras. 63-73.

7/ See for instance the Background Paper prepared by Professor Grigore Geamănu (BP/B), paras. 15-20.

security and the fundamental rights of peoples; (b) to promote and ensure general respect for the human rights proclaimed in the Universal Declaration of Human Rights and in the International Covenants on Human Rights; (c) through raising their standard of living, to facilitate and protect the enjoyment by all peoples of their right to employment, education, food, health and economic, social and cultural well-being. Paragraph 4 of the resolution requested the Secretary-General to submit to the Commission an analysis of the views and observations received under paragraphs 2 and 3 of the resolution, in order to enable it to consider possible guidelines on standards which could be included in appropriate international instruments. The analysis is contained in document E/CN.4/1194.

195. There is virtual unanimity that the positive uses of modern science and technology for the promotion of human rights are potentially vast. The Government of the Federal Republic of Germany has written, in its contribution to the present study:

> "The Federal Government is anxious that scientific and technological advances in all spheres of life should at the same time contribute to an improvement of the social and economic situation of all sections of the population. It endeavours by means of its legislation in the fields of social welfare and the economy to contribute to the attainment of this goal at the national level...
>
> "The Federal Government considers it a matter of urgency that social rights should be secured especially in the less developed countries..." 8/

The contribution of the Government of the Union of Soviet Socialist Republics includes the following:

> "The nature of the impact of scientific and technological progress on man depends essentially on the social circumstances in which it occurs. Science and technology do not exist or operate by themselves. They are created by people and the possibility of directing their development to serve human interests and welfare depends on people, on their social organization and on the nature of their activities". 9/

196. In 1973, the Director-General of UNESCO made the following observation on the effect of culture on the uses of science:

> "7. The question of use is especially important with regard to technology, in which the tremendous power over nature that science confers on man is reflected. And when we consider this question - apart from the fact that it does not involve science itself, or even technology, since they are, in this instance, merely the instruments for carrying out decisions made elsewhere - what do we find at the fountainhead of the long and complex chain of those decisions, but the determining factor of culture? When all is said and done, the choices made by politicians, economists, and technicians - without forgetting scientists, whose participation is always necessary and who consequently, as men and citizens, can never disclaim all responsibility - between several possible

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8/ Information furnished by the Government of the Federal Republic of Germany on 13 July 1975.

9/ Information forwarded by the Government of the USSR on 29 August 1975.

lines of action, representing so many different ways of using the same item of scientific knowledge or the same technological power, are in fact accounted for and, in case of need, allegedly justified by more or less conscious and explicit reference to values accepted by or imposed upon the decision-makers. So that the use made of science and technology, like pure science itself, is a matter of culture. In this sense, it can be said that a society has the science and the technology, and the manner of using both of them, which its culture has chosen." 10/

197. One expert contributor writes:

"There is another sense also in which the interconnection between scientific and human values is clearly demonstrated. Few would deny the material progress made possible by modern science and technology. They are of course accompanied by aspects less desirable... But we must not forget that applications of science and technology have transformed the quality of life of hundreds of millions of people. This in itself does not ensure the growth of an appreciation of human values. Nevertheless it does help to provide an essential prerequisite for such a growth. The image of the artist or writer, starving in a garret, producing a great work of inspiration and genius is a romantic fiction. Creativity is difficult in an atmosphere of insecurity and on an empty stomach. One task of science and technology, as I see it, is to provide the material basis on which a full life for all peoples in all countries could be built. The task of ensuring such a full life is of course the task of society. Science and technology can only provide the basis for it."

Another expert contributor states:

"Bearing in mind the significant influence of economic development on the realization of the basic human rights, we cannot fail to notice the tremendous role of science and technology in economic growth. While talking about the need to establish a balance between scientific and technological progress and economic growth, however, we must keep in mind the determining role of the former.

...

Scientific-technological development plays an inspiring role and has a direct influence on acceleration of economic growth and improvement of the living standard of society. Economic growth, in turn, influences intellectual and moral life of both the individual and society since it creates conditions for the development of culture and enrichment of social rights of man."

10/ Document A/9227, Part A, para. 7.

IX. POSSIBLE INTERNATIONAL ACTION

1. Declaration on Human Rights and Scientific and Technological Developments

198. Considerations may be given to the adoption of a Declaration on Human Rights and Scientific and Technological Developments. There are many international texts covering aspects of the question of human rights and scientific and technological developments; these provide both precedents for the adoption of international standards in the area and elements which could be taken into account in the drafting of a general Declaration.

199. In particular, the General Assembly, in resolution 3384 (XXX) of 10 November 1975, solemnly proclaimed a Declaration on the Use of Scientific and Technological Progress in the Interests of Peace and for the Benefit of Mankind.

200. As has been seen above, many articles of the Universal Declaration of Human Rights adopted by the General Assembly in 1948 are of primary importance in this area, although their provisions may be general. The same applies to the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights, both adopted by the General Assembly in 1966.

201. A relevant text of great importance adopted within the aegis of the United Nations is the Declaration of the United Nations Conference on the Human Environment of 16 June 1972. 1/ In relation to drug consumption, mention should be made of the Single Convention on Narcotic Drugs, 1961, the Convention on Psychotropic Substances, 1971, and the Protocol (of 1972) Amending the Single Convention on Narcotic Drugs, 1961. 2/

202. Material forwarded by the International Atomic Energy Agency on 21 June 1971 in connexion with the Secretary-General's study of human rights and scientific and technological developments includes the following:

> "... The treaty on the Non-Proliferation of Nuclear Weapons [annexed to General Assembly resolution 2373 (XXII) of 12 June 1968], which came into force last year, is designed to help ensure over a large part of the world that that vast potential of nuclear energy is used for constructive purposes only. It has been pointed out that it would be particularly unfortunate if the scarce scientific resources and investment capital of the developing countries were to be diverted to the nuclear arms race. The Treaty gives the IAEA special responsibility for applying safeguards against the diversion of nuclear materials to the manufacture of nuclear weapons, and article IV of the Treaty also gives specific impetus to the further development of nuclear energy for peaceful purposes with due consideration for the needs of the developing areas of the world". 3/

1/ Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972, A/CONF.48/14/Rev.1, Chapter I.

2/ See document E/CN.4/1172/Add.2, paras. 468, 486 and 500.

3/ E/CN.4/1083, Annex.

203. Relevant texts emanating from specialized agencies include the resolution on labour and social implications of automation and other technological developments, adopted by the International Labour Conference in 1972 4/ and the declaration of guiding principles on the use of satellite broadcasting for the free flow of information, the spread of education and greater cultural exchange, adopted by the General Conference of UNESCO in 1972. 5/ Scientific groups of the World Health Organization have formulated sets of principles for the testing and evaluation of drugs. 6/

204. The Statement of the Group, quoted in paragraph 4 above, affirmed in its paragraph 1 that: "Certain specific scientific and technological advances such as those listed in paragraph 5 below do pose risks to individual human rights, the welfare of society or the global condition of mankind". In paragraph 5 of the Statement, the Group recommended that consideration be given to the possibility of drafting a Declaration on human rights and scientific and technological developments. Among the topics which would be covered by the Declaration, the Group recommended especially the following:

> Population planning (quantitative and qualitative) in relation to the right to found a family; protection against the hazards of the use of atomic energy; human experimentation; implications of new biological and medical discoveries (e.g. (a) tissue and organ transplantation and the use of artificial organs, (b) genetic manipulation of microbes, and (c) potential modifications of human genome); modification of mental processes by medical means; the social and ethical implications of the extension of life and of new definitions of and attitudes to death, and social and ethical choices in relation to equality in the provision of health protection and medical care.

205. The many international agreements referred to in the Secretary-General's report on protection of broad sectors of the population against social and material inequalities, as well as other harmful effects which might arise from the use of scientific and technological developments, should also be recalled here. 7/ Some of those aimed at the prohibition of weapons of mass destruction have already been enumerated in paragraphs 137-140 above.

206. Other texts, adopted by non-governmental organizations, have been referred to in various documents forming parts of the study of human rights and scientific and technological developments. These include the following texts relevant to the question of experiments on human subjects: the Declaration of Geneva, the International Code of Medical Ethics and the Declaration of Helsinki, all adopted by the World Medical Association in September 1948, October 1949 and June 1964, respectively. 8/ A statement on the determination of the time of death is contained in the Declaration of Sydney adopted by the twenty-second World Medical Assembly in August 1968. 9/ The

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4/ Excerpts appear in documents E/CN.4/1115, paras. 48, 70 and 84, and E/CN.4/1142/Add.1, para.101.

5/ See document E/CN.4/1116/Add.3, Annex.

6/ See document E/CN.4/1172/Add.2, paras. 441 and 459.

7/ See document A/10146, paras. 124-179.

8/ See document E/CN.4/1172/Add.3, paras. 183-233.

9/ See document E/CN.4/1172/Add.1, paras. 218 and 234.

Nordic Conference on the Right to Privacy, organized by the Swedish section of the International Commission of Jurists in collaboration with the secretariat of that Commission and held in Stockholm in May 1967, adopted Conclusions which dealt with the protection of the right to privacy in the light of, inter alia, certain modern surveillance devices. 10/

207. During the debate at the above-mentioned human rights seminar held in Vienna, Austria in June-July 1972, it was maintained that the following ethical standards should be formulated at the international level: (i) the advancement of science and technology was crucial for the welfare of people everywhere; (ii) freedom of scientific research must not be impaired; (iii) a distinction must be made between research and experiments, not all experiments being acceptable; (iv) a distinction must be made between scientific research and technological application; not every new invention should necessarily be applied in practice; as a general rule, new inventions that were liable to be used mostly for the infringement of human rights must be regarded as illegitimate; (v) where practical technological application was legitimate, it was essential that it be subject to regulation and control in accordance with ethical standards; abuse of new inventions must be prevented; (vi) man was the measure of all things; science and technology must only be applied for the welfare of human beings everywhere. 11/

208. Six Working Papers prepared by participants at the seminar held in Vienna in 1972 referred to earlier contain material suitable for consideration in drafting a declaration on human rights and scientific and technological developments. These were submitted by Mr. D.B.H. Martin and Mr. J.L. Steinfeld, United States of America (WP/9), Mr. V.M. Chkhikvadze, USSR (WP/10), Mr. I.G. Torres, Philippines (WP/11), Mr. P. Juvigny (WP/12), Mr. K. Atsumi, Japan (WP/13), Mr. A. A. Mohammed, Nigeria (WP/14), and Mrs. Q. Ahmed and Mr. A.S. Mani, India (WP/15). These papers contained proposals of conclusions for adoption by the seminar but were not voted upon. 12/

209. Many of the resolutions governing the Secretary-General's study of human rights and scientific and technological developments have envisaged the drafting of international standards. The preamble to General Assembly resolution 2450 (XXIII) stated that the envisaged studies of human rights and scientific and technological developments "may serve as a basis for drawing up appropriate standards to protect human rights and fundamental freedoms"; resolution 10 (XXVII) of the Commission on Human Rights requested the Secretary-General to submit to the Commission one or more reports, in fields where sufficient documentation and studies are available, "which could be used as a basis for exploring the possibility of preparing international instruments designed to strengthen the protection of the human rights proclaimed in the Universal Declaration of Human Rights"; Commission resolution 2 (XXX) requested the Secretary-General to submit to the Commission the analysis of certain

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10/ See document E/CN.4/1116, paras.45-46 and 151.

11/ ST/TAO/HR/45, para.89.

12/ ST/TAO/HR/45, para.120.

observations and views which were requested of governments and specialized agencies, in order to enable the Commission "to consider possible guidelines on standards which could be included in appropriate international instruments" and General Assembly resolution 3268 (XXIX) requested the Commission "to draw up a programme of work, ... with a view to undertaking in particular the formulation of standards in the areas which would appear to be sufficiently analysed. It should therefore be recalled that points for possible inclusion in draft international standards have been suggested in the following paragraphs of the documents indicated: (i) on respect for the privacy of the individual in the light of modern recording and other devices and techniques: E/CN.4/1116, paragraphs 177 and 277; (ii) on the protection of the rights of the individual against threats arising from the use of computerized personal data systems: E/CN.4/1142, paragraph 320, and E/CN.4/1142/Corr.1 (English only); (iii) on the use of the computer in policy-making and management processes: E/CN.4/1142/Add.1, paragraph 92. These points could also be taken into account in the drafting of a general Declaration on Human Rights and Scientific and Technological Developments.

210. In addition all of the Secretary-General's reports produced under General Assembly resolution 2450 (XXIII), except the preliminary report which appeared as document E/CN.4/1028 and Addenda 1-6 and Addendum 3/Corr.1-2, include accounts of measures, taken or suggested, to solve the problems created for human rights by modern scientific and technological developments. These accounts of measures, taken or suggested, cross-reference to which is made in the footnotes to paragraphs 147-149 above, were intended, in the words of Commission resolution 10 (XXVII), to "be used as a basis for exploring the possibility of preparing international instruments designed to strengthen the protection of the human rights proclaimed in the Universal Declaration of Human Rights".

211. Other possible elements for inclusion in a draft Declaration could be derived from the preambular or operative paragraphs of the resolutions governing the Secretary-General's study of human rights and scientific and technological developments: General Assembly resolutions 2450 (XXIII), 3026B (XXVII) and 3150 (XXVIII) and Commission resolutions 10 (XXVII) and 2 (XXX).

212. Certain authorities have made relevant suggestions. The late C. Wilfred Jenks, former Director-General of the ILO, urged the adoption by the General Assembly of a Declaration of General Principles Dedicating Science and Technology to the Service of Man, and suggested some of the contents of such an instrument. "At a later stage", he continued, the Declaration "could serve as the basis for the negotiation of a World Science Treaty defining comprehensively the fundamentals of the mutual obligations among States arising from the impact of science upon society". 13/ Rudolf Bystricky suggested the possible draft of a Declaration on Science, Technology and Scientists and discussed such a possible draft, which would touch upon some of the problems mentioned in the present document, including the need to avoid the development of a scientific caste separated from the rest of the community. 14/

13/ C.W. Jenks, "The New Science and the Law of Nations", International and Comparative Law Quarterly, Vol.17, April 1968, pp.339-341. See further para.226 below.

14/ Rudolf Bystricky, "Réflexions à propos d'une Declaration sur la science, la technologie et les scientifiques", Revue des droits de l'homme (Human Rights Journal), Vol.V, Nos.2-3, 1972, pp.315-331.

2. Assessment and control machinery

213. As has been seen in paragraphs 180-183 above, a number of authorities have envisaged the establishment, on the national and international levels, of machinery to assess new technologies, to give warning of possible dangers to human rights which they may present and possibly even to control new developments if threats to human rights seem likely. In addition, several authorities have advocated the establishment of such machinery specifically on the international level.

214. The contribution of FAO to the present report ends with the following paragraph, which is not limited to the right to food:

> "It is thus increasingly apparent that scientific research should be rigorously applied beyond the laboratory and beyond the demonstration of benefits derived from simple techniques by particular individuals and firms in the short run. Only interdisciplinary applied research involving both physical and social sciences coupled with adequate systems to monitor effects over considerable periods of time, can ensure the rights to minimum benefits to all or most of mankind as envisioned in the United Nations Covenant on Economic [Social] and Cultural Rights. Social objectives must be kept in view and progress analysed. Scientific observations, insights, and modern technology can be used to monitor, predict, and even control in desired ways, the various outcomes of the application of science and technology to agricultural production, transportation and other economic processes. Early warning systems on undesirable trends and tendencies can be used for planning changes in man-made systems before irreparable or even serious harm to his environment or himself have occurred. What man has created man can control if he decides in time to do so".

The contribution of UNESCO to the present study includes the Final Report on the Meeting of Experts on the Ethical Problems Posed by Recent Progress in Biology, Varna, Bulgaria, 24-27 June 1975, the Recommendations of which include the suggestion that the Director-General of UNESCO: "(c) establish in close collaboration with WHO and the CIOMS a standing committee of scientists and philosophers to monitor the applications of biological discoveries". 15/

215. The Statement of the Group, which is quoted in paragraph 4 above, recommends in its paragraph 4 that international machinery should be entrusted with technological assessment for mankind as a whole; this assessment would include the assessment of possible side effects and long-range effects of particular innovations and would aim at determining whether the time is right for such innovations and whether their advantages outweigh the discernible disadvantage. In relation to both the national and the international machinery for technological assessment which were recommended, the Statement added that it was a basic human right to have a voice in such decisions and that these decisions must be made on the basis of the considered opinion of bodies of experts and laymen who represent the interests of all the people as well as of future generations.

15/ UNESCO document SHC-75/CONF.605/21, Annex I.

216. At a point in its proceedings earlier than the adoption of the Statement, a majority of the Group made a more detailed proposal for technological assessment on the international level. According to this proposal, governments which had organized at the national level procedures for carrying out continuous technological assessment would arrange for the national organs concerned to report regularly to an international body composed of representatives of the United Nations 16/ and of the interested specialized agencies, including ILO, UNESCO, WHO, FAO and the International Atomic Energy Agency. This international body would report to the United Nations General Assembly. A second body, consisting of perhaps ten to twelve high-level experts coming from all areas of the world, would informally and confidentially advise the inter-agency body, without necessarily adopting reports, and help it to develop a global strategy which would substitute the separate policies followed at present by the various international organs.

217. It was felt in the Group that pending the establishment of inter-agency machinery the United Nations Secretariat, particularly the Division of Human Rights, should initiate this monitoring function.

218. In the discussions of the Group, it was suggested that a function of international machinery would be to call the attention of governments which had no national machinery to the need for it, to assist governments in establishing appropriate machinery, and to provide the international structure to support it. The international body would co-ordinate developments in the field of science and technology and call to the attention of governments those areas which are of most concern. It was pointed out by certain members that, in an area in which new problems develop with great rapidity, it is imperative that action be taken before a situation becomes critical. In addition to predicting future dangers, it was necessary to draw attention to situations which were becoming irreversible. The suggestion was made by some members of the Group that the international body could establish minimum guidelines to be followed by all countries, as well as higher, "desirable" levels which all nations should aspire to attain. Attention was drawn in the discussion to the factor of national sovereignty in connexion with international machinery. Persuasion was important in the absence of powers of compulsion.

219. During the discussions of the Group, attention was drawn to some international organs which had already exercised certain monitoring functions. The United Nations Scientific Committee on the Effects of Atomic Radiation had exercised an influence in bringing about higher standards of safety in atomic energy establishments. The International Atomic Energy Agency had powers which it exercised on an international scale. As a result of the Stockholm Conference of 1972, the United Nations Environment Programme had a permanent secretariat in Nairobi.

220. An expert contributor stresses that: "A need is apparent for the existence of machinery in each country to assess such risks and implications [as "the failure of the first subsonic jets, thalidomide, Torrey Canyon"]. Since risks and implications of a particular development often involve several countries, there is need also for an international body to work along those lines. Such a body should

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16/ Specifically the Division of Human Rights was mentioned in this connexion.

be set up through the United Nations or one of its Agencies". He distinguishes between two aspects of the problem: "The assessment of risks and consequences is a task for scientists and engineers. The judgement of their acceptability is a task for social scientists, humanitarian thinkers and certainly representatives of grass-roots organizations of the people, trade unions, co-operatives, religious and social communities, and so on".

221. Some other authorities have argued in favour of technology assessment on the international level, and the extracts from their pronouncements which appear below may add details to what has been said in the present report, as regards either the justification or the possible functions, structure or mechanisms of such assessment.

222. The Government of Iraq has described the need on the international level for examination of the problems posed by advances in science and technology:

> "There is also a need for an ad hoc scientific committee to study the effects of scientific progress, where these may be harmful, and to safeguard, on a continuous and constructive basis, the human rights of all mankind, and to make its findings in these two areas available to States." 17/

223. A proposal somewhat similar to that which received wide support in the Group, 18/ but linked more exclusively to the beneficial uses of new scientific and technological developments, was made at the Vienna Seminar of 1972 by Mr. A.A. Mohammed, the participant from Nigeria, as discussion leader for the agenda item entitled "International programmes and action, including technical co-operation, to ensure that scientific and technological developments are used to promote human rights with due respect to the legitimate interests of other nations and peoples". Mr. Mohammed said that international organizations should be entrusted with supervision over technological developments. An attempt must be made to make all inventions known, so that they could be used for the benefit of all. The United Nations must gather together, as a committee of consultants, the best experts in the field, to scrutinize and record new inventions, so that nations could borrow new knowledge in an atmosphere free of jealousy. The above-mentioned committee must be interdisciplinary and permanent, since the need was permanent. Nations should undertake to report on any new inventions, so that the experts would have the material necessary for their work. The United Nations must have a standing committee which would receive reports from the committee of experts, to transmit them to higher bodies for appropriate action, including the drawing up of an international instrument for the control of scientific and technological developments in a manner beneficial to humanity. 19/

17/ Information furnished by the Government of Iraq on 27 September 1974 for the analysis of views and observations called for by resolution 2 (XXX) of the Commission on Human Rights.

18/ See para. 216 above.

19/ Document ST/TAO/HR/45, paras. 13 and 115.

224. Three of the above-mentioned working papers submitted at the Vienna Seminar in 1972 include relevant proposals for assessment on the international level:

"1. No doubt modern sciences and technologies developed therefrom have benefitted mankind in tremendous ways; but on the other hand their harmful influences have recently started to be observed. Therefore, it will be necessary to make assessments of the positive main effects and negative side effects of any new science and technology research or application before undertaking it, based upon the most careful and accurate estimation and analysis of those effects.

...

PROPOSAL

An Advisory International Committee should be organized for concentrated studies of the following six problems:

...

3. Exchange of information concerning science and technology internationally;

4. Accurate perspectives of future developments of science and technologies;

5. Assessment of the positive main effects and negative side effects of any new sciences and technologies;

6. Establishment of counter-measures - systems, laws and techniques - with priority over the progress of sciences and technologies." 20/

"The [Seminar] recommends:

1. The establishment of a permanent consultant group or interdisciplinary group of experts based on equitable, geographical distribution in the field to study, on a continuous basis, the innovations in scientific and technological developments in order to recommend the establishment of a balance between scientific and technological progress and the protection of Human Rights." 21/

"4. As rapid strides are made every moment by Science and Technology, which are bound to affect human development all over the world, the United Nations system should constantly be on the watch by adopting what is known as the early warning system so as to bring to the attention of the General Assembly and its principal organs all possible effects from the point of view of the implementation of the Universal Declaration of Human Rights and the International strategies for the Second Development Decade." 22/

20/ WP/13, pp.1-2.

21/ WP/14, p.1.

22/ WP/15, p.1.

225. Speaking of the global problems that arise from the relationships between man and nature, including environmental pollution, Academician Peter Kapitza of the Academy of Sciences of the USSR, wrote that "in the nearest future, an international organization will have to be set up to control global problems on an international scale". 23/

226. C. Wilfred Jenks wrote the following concerning one of the principles which should be included in the Declaration of General Principles Dedicating Science and Technology to the Service of Mankind, the adoption of which by the General Assembly he urged:

> "The Declaration should formulate the fundamental principle that the common interest of mankind in ensuring that scientific and technological innovation and continuing ultra-hazardous activities do not destroy, disrupt, disintegrate or pollute the natural environment on which human life and welfare depend or release forces having such a tendency which are liable to escape from human control is a matter of public policy of general, profound and continuing international importance. From this principle the Declaration should deduce two major obligations. The first would be an obligation for every State to co-operate in preventive measures for the avoidance of known and foreseeable hazards in accordance with appropriate international procedures and regulations: the fulfilment of this obligation would be secured primarily through the provisions of special treaties such as have already been envisaged. The second would be an obligation for every State to participate in procedures of consultation and enquiry for the avoidance of unforeseen hazards before authorising within its jurisdiction or under its authority scientific or technological innovations or continuing ultra-hazardous activities which may have a substantial influence on natural environment to the detriment of the world community or of other States or their nationals ...". 24/

227. Professor Eugene B. Skolnikoff of the Massachusetts Institute of Technology, United States of America, has written:

> "The question of the control of technology, or its direction into 'more useful' channels, necessarily arises. In particular, one can ask whether some kind of internationalization of science and technology is possible that will help to control and to direct technology more wisely.
>
> "Science and technology have been characterized in this century not by their internationalism, but by their use for the achievement of national objectives. This national orientation will undoubtedly continue as a major focus of technological development. However, even on the national scene there is a growing attempt to anticipate the side effects of technology, and to include those anticipated effects as part of the original decision-making for new technology. This movement is in its infancy, and has a long way to go before there are appreciable discernible results.

23/ P. Kapitza, "Three aspects of the global problem of relations between man and nature", Scientific World, World Federation of Scientific Workers, Vol.XVII, No.2 of 1973, p.20.

24/ C.W. Jenks, op.cit., p.340.

"There are also good arguments, however, for attempting to put some portion of the scientific and technological enterprise under international auspices. There have been proposals, for example, for an international science foundation. One argument for it is that it is the only way to get adequate research and development on subjects set by international needs rather than by national objectives. That argument would be particularly relevant to less developed countries (for example, to meet the need for an economic DDT substitute, or to develop health systems based on $100 per capita incomes), but also would be relevant to the development of global technologies that can serve to ameliorate the undesirable effects of technology.

"Another argument for international-sponsored research and development is that such programs can help to keep 'dangerous' subjects in the open, international domain, thereby making their ultimate appropriation for purely national purposes less likely and the prospects for their international control correspondingly more likely. The development of genetic technology, with potential dangerous as well as beneficial applications, is a case in point.

"Lastly, internationally sponsored research and development may also be of great importance in developing 'international' expertise likely to be essential for the operation of the international machinery which is necessary to cope with the effects and regulation of technology. Looking ahead, one can see the importance of developing some international institutions as the arbiters and controllers of technology that are, and are seen to be, impartial. Expertise will be required, and international research and development may be one way to develop such capability". 25/

228. Professor Dennis Livingston has presented an unusually detailed case for, and description of the function of, an international system for technology assessment; the following are extracts therefrom:

"Technology assessment has been defined most succinctly by the United States National Academy of Engineering to comprise 'the sociotechnical research that discloses the benefits and risks to society emanating from alternative courses in the development of scientific and technological opportunities' ... . Assessment may focus on technology and its implications for society and the environment, or on social problems - race relations, urban affairs, individual privacy, and the like - and how they are influenced by the array of available technologies ... . Pervading these considerations is an explicit world-view that only continual oversight of technological diffusion can attempt in advance to cope with the far-reaching second-order consequences that may be loosed by technology on a fragile, interdependent world.

...

"I believe a case can be made for considering the establishment of a formal assessment body affiliated with the United Nations. It is based on the fact that there are consequences deriving from technology, and problems relevant to it, whose unified consideration would be beyond the scope of purely national technology assessment agencies.

25/ Eugene B. Skolnikoff, "Science and Technology: The Implications for International Institutions in the 1970's and Beyond", mimeographed article contributed by the author on 28 June 1971, pp.23-24.

"...[M] any of the secondary and tertiary consequences of technology are international, and so beyond the capacity of any one state to deal with effectively ...

"If it be granted that there is a place for technology assessment at the international level, the remaining issue is the organization and functioning of an entity that would carry out this task. For heuristic purposes, let me suggest the establishment of an agency called the International Technology Assessment Board (INTAB).

"Of the cluster of functions INTAB could perform, its primary task would be to act as the major international clearinghouse for monitoring developments in technological progress and their consequences. It would fulfil the tasks previously described as being lost in the welter of individual, and sometimes conflicting, assessments presently being made by a great variety of international organizations pursuant to their individual missions. More particularly, INTAB might engage in the following activities:

(1) Contracting out specific technology assessment studies ...

(2) Liaison and co-operative with national technology assessment bodies ...

(3) Issuance of an annual report on the use of science and technology for mankind ...

(4) Provision of fact-finding and mediation services ...". 26/

229. At a CIOMS Round Table conference held in 1972, Professor Amitai Etzioni expressed the hope that "countries and the international community will move towards setting up a permanent commission comprised of people who know the field, of representatives of science and the practising professions as well as humanists and theologians to worry about [the social and moral consequences of new break-throughs in biological and medical research]". 27/

230. The report of a panel appointed at a seminar, held in Aspen, Colorado, United States of America, in 1970 by the International Association for Cultural Freedom in conjunction with the Aspen Institute for Humanistic Studies, included the following passages. 28/

26/ Dennis Livingston, "International technology assessment and the United Nations system", American Journal of International Law, Vol.64, No.4, September 1970, pp.164 and 166-170.

27/ Recent Progress in Biology and Medicine - Its Social and Ethical Implications, 7th CIOMS Round Table Conference, CIOMS, 1972, p.29.

28/ Information furnished by the International Association for Cultural Freedom on 17 November 1970.

"Preamble

...

"E. The panel feels that there are three essential needs:

1. More research to provide the knowledge and insight without which the assessment and control of the impact of technology cannot be made. Without a strong effort in both directed and undirected research, the extent of potential hazards cannot be understood and the possible alternative choices of both policy and technology cannot be illuminated.

2. A national and international network of assessment of the economic, social, cultural and individual consequences of new technologies and of alternative technological paths, and of alternative social policies for accommodating and supporting the deployment of new technology.

3. Techniques of intervention in technological development and deployment by control, regulation or the provision of positive or negative incentives in a manner sufficiently flexible so as not to inhibit or discourage beneficial innovation.

Other points:

...

"V. Technological assessment is not a one shot affair. It is something which has to be constantly repeated in the light of new knowledge, new scales of application and evolving experience in regulation.

Control mechanisms require sufficient flexibility so that they can be gradually modified in the light of these repeated assessments.

VI. In each instance, much greater attention needs to be given to the proper balance between progress and uncertainty, and more vigorous efforts to reduce uncertainty before commitment to a new technological direction has created a vested interest.

VII. Technological assessment is a fruitful field for international collaboration, with division of labour among national assessment institutions, and intercomparisons of national experience and data".

X. SUMMARY OF CONCLUSIONS

231. The main conclusions that can safely be drawn from the many authorities, documents and resolutions quoted from or otherwise referred to in the present document seem to be the following:

(i) Science being itself a part of culture, the essential problem facing mankind in relation to scientific and technological progress on the one hand and the intellectual, spiritual, cultural and moral advancement of humanity on the other is to decide on the appropriate two-way relationship which should exist between them. This relationship is not the same for all times or all places. (See Chapter I);

(ii) An investigation of this relationship includes an examination of the impact, both beneficial and harmful of recent scientific and technological developments upon the rights laid down in the Universal Declaration of Human Rights (see paragraphs 14-17). Such impact affects many such rights, either individually (see Chapters II, III, IV and V) or in combination (see Chapter VI);

(iii) The application of policies and measures appropriate to the circumstances is an aspect of achieving the correct relationship between scientific and technological progress and the intellectual, spiritual, cultural and moral advancement of humanity;

(iv) Educational policies should aim at a better understanding of science on the part of the general public and a better understanding of the humanities and the needs of society on the part of scientists;

(v) Measures taken on the national level for the protection of human rights against threats posed by recent scientific and technological developments have been many and varied. Nevertheless, there is a growing conviction that there is need for continuing technology assessment on the national level, in order to assess possible side effects and long-range effects of new innovations and to establish whether their advantages outweigh the discernible disadvantages, and for control over innovations with harmful potentialities. Many proposals have been made from various quarters, including the Group of Experts which met in Geneva on 15-19 September 1975 (see paragraphs 170-188 above), as regards the possible functions, structure or mechanics of such assessment machinery. (See Chapter VII);

(vi) The positive uses of modern science and technology for the promotion of human rights are potentially vast, but their exploitation depends upon the laying down of appropriate science policies on the national level and the creation of

machinery to carry out those policies. Such machinery need not be separate from that set up for technology assessment as envisaged in paragraph (v) above. (See paragraph 175 above and Chapter VIII.);

(vii) On the international level, in addition to the possibility of setting international standards relating to specific aspects of human rights and scientific and technological developments, there have been proposals, particularly on the part of the above-mentioned Group of Experts, for a general Declaration on Human Rights and Scientific and Technological Developments. There are many existing texts which could be taken into account in drafting such a Declaration. (See Chapter IX, paragraphs 198-212);

(viii) There have also been a number of proposals, including one made by the above-mentioned Group of Experts, for technology assessment on the international level. The reasons given for the establishment of machinery for such assessment have been essentially the same as those given in relation to assessment on the national level, except that greater stress has been placed on problems of an international nature, including the prevention of threats to human rights on an international scale and the use of science and technology for the benefit of mankind. (See Chapter IX, paragraphs 213-230).

232. If it should be decided to investigate further the feasibility of setting up the above-mentioned national technology assessment machinery (to the extent that it does not already exist) and international technology assessment machinery, attention should be drawn to paragraphs 25-29 above (particularly paragraphs 28-29) where certain relevant topics are mentioned which have not previously been dealt with by the Secretary-General as part of his study of Human Rights and Scientific and Technological Developments.