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TECHNICAL COOPERATION AND SCIENTIFIC AND TECHNOLOGICAL  
DEVELOPMENT IN HEALTH IN LATIN AMERICA

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## I. INTRODUCTION

The end of this century is marked by an accelerated transformation of the productive structures of societies based on the introduction of new technologies, raw materials, and forms of organization of production. These changes have a universal effect, creating new paradigms for integration of the countries and regions into the international division of work and production.

The traditional comparative advantages that made the industrialization of the Latin American countries possible, such as an abundance of natural resources and inexpensive labor, are losing meaning to the extent that the new industrial processes tend to reduce their importance. The new dynamics of accumulation endanger the viability of the traditional industries in Latin America. Their survival will depend on the capacity to change, the development and selective absorption of technologies, restructuring processes, realization of investments, and other factors.

At the same time that the phenomena of structural changes in the bases of production at the world level are observed, the countries of Latin America suffer the greatest economic crisis in their history. Although of quite complex origin, by all indications it does not involve a situational phenomenon, surmountable with some adjustments. Reinitiation of growth will be possible only with difficulty if utilization of outmoded forms of production and exchange is continued.

The search for ways out of this crisis situation and for a new type of integration into the international context depends on the review of development models, in which a significant role should be granted to scientific and technical development, including the mastery of new technologies. Decisions on how to obtain them, develop them, and utilize them are fundamental to promotion of the development of a technological base in the countries of the Region that will allow them to increase their fields of action as sovereign nations, both now and in the future.

In the document "Desarrollo Integral y Democracia en América Latina y el Caribe (ideas y agenda para la acción)," prepared in September 1987 by a group of experts headed by Aldo Ferrer in compliance with a resolution of the General Assembly of the Organization of American States, similar positions, presented below, are proposed:

The Region should find effective responses to those changes. This requires incorporation of advanced technologies in the traditional sectors and those at the vanguard and strengthening of the existing capacity to innovate in the scientific and technical areas of each

country. It also means assimilation of knowledge in ways compatible with the provision of resources and the demands of Latin American societies.

Integration of the Region into the world order depends on the massive general incorporation of the technological revolution into the economic and social systems.

The field of health and the scientific disciplines related to it offer a series of opportunities for inspiring scientific and technical development of the countries of the Region. Concerted action by the principal actors in the development of science and technology in this field, such as the scientific community, the producers of health services and basic supplies for these services, and the state, could promote the development and consolidation of areas such as biotechnology and research on and production of drugs, immunobiologicals, and medical equipment.

In addition to being a basic requirement for the reduction of dependency and consolidation of strategic productive sectors from the economic point of view, scientific and technical development in health is fundamental to the search for new ways to overcome the serious problems that exist. Here we refer both to the scientific and technical infrastructure related to the basic biomedical and social disciplines that provide scientific support to health care practices, and to the applied and operational research dedicated to supporting the reorganization of the health systems and services, the technological research that generates innovations to be transferred to the production of inputs, and the organizational entities charged with the definition of policies for science and technology and health that respond to social demands.

## II. THE FIELD OF SCIENCE AND TECHNOLOGY IN HEALTH

The field of science and technology in health covers a series of rather heterogeneous processes with respect to its purposes, agents, instruments, and products and the loci where there are developed. The delimitation proposed here, although necessarily arbitrary, seeks to include those nuclear processes that articulate different social practices and can thus form a particular field in the organization and division of work at the society level.

The first component process of the field of science and technology in health would correspond to the production of knowledge. It involves a process of work that is developed in research units (institutionally located in universities or research institutes or in the health services), through which specific agents (investigators or health professionals), utilizing specific work instruments (subject-matter related or logical or cognitive), act on a specific object (a piece of data or already existing knowledge) and produce a specific product (new knowledge or a new procedure or technological innovation). The research project is the basic unit of work that articulates the various components of the process.

With respect to the utilization of knowledge, one can identify two basic processes: the production of health services and the production of material inputs for these services (especially equipment and drugs). Each of those processes is developed in a specific institutional locus, involving direct and indirect agents of production, as well as specific instruments, objectives, and products.

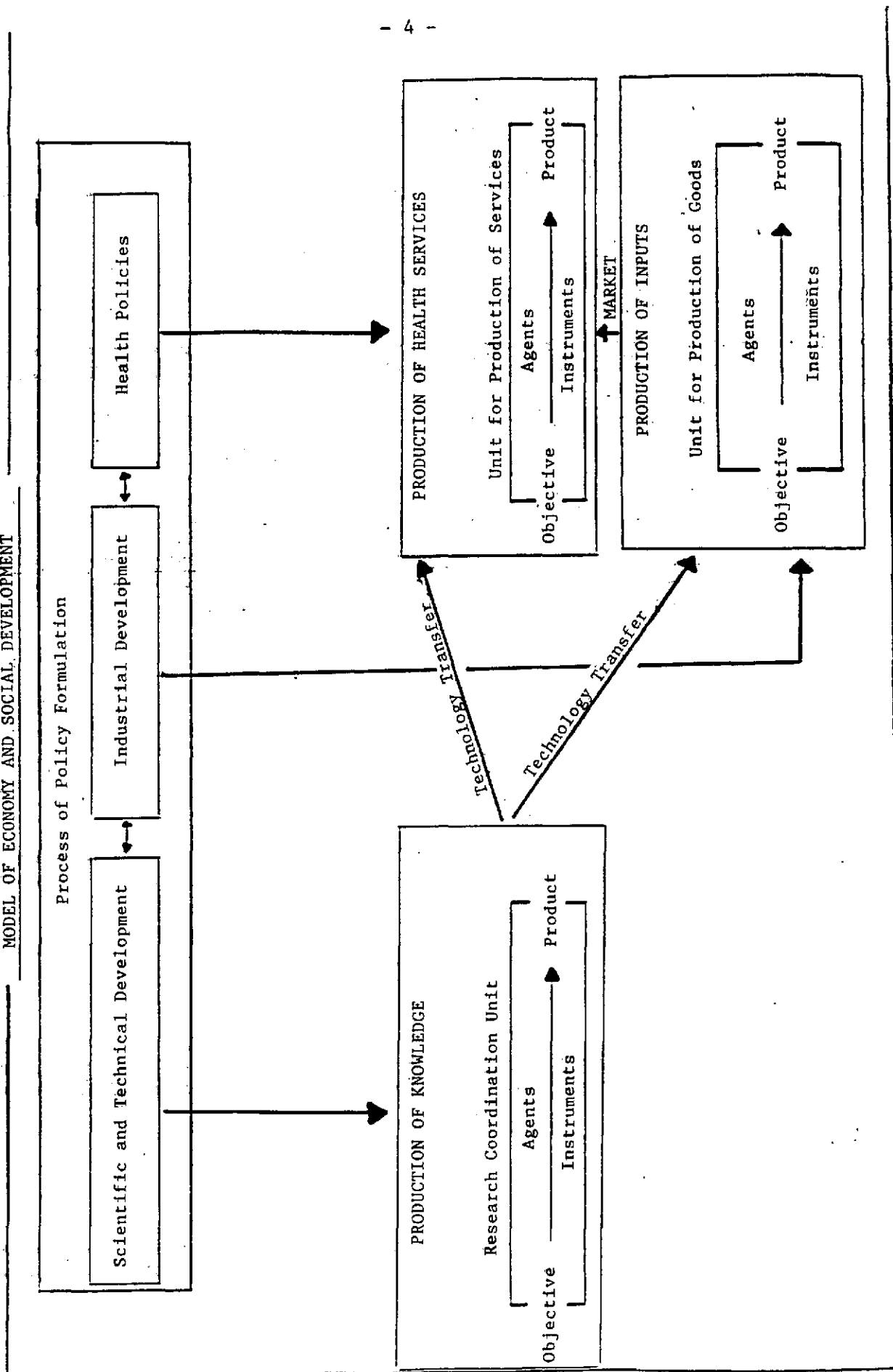
Finally, at the highest level, but also with its own characteristics with respect to loci, agents, instruments, etc., there is the process of the formulation of policies on scientific and technical development in health, which is closely related to the processes of the definition of health policies and industrial development and, at a macro level, with the actual socioeconomic development model itself.

In addition to those fundamental processes, a series of others related to their articulation, such as the transfer of technology and the marketing of inputs and services, can be identified. It is important to emphasize that the individualization of each process does not mean that they cannot all exist in a single institutional space, with common agents, simultaneously. By way of example, (although technological innovation depends increasingly on an approximation between science and technology, between the world of science and that of production) the process of the production of goods and services itself can go on generating innovations - new procedures and tools - through a mechanism of learning by doing; stated another way, the very process of production creates, in addition to its products, its own development.

The components of the field of science and technology in health could thus be described schematically - with all the limitations inherent in such a scheme - as follows:

# THE FIELD OF SCIENCE AND TECHNOLOGY IN HEALTH

## MODEL OF ECONOMY AND SOCIAL DEVELOPMENT



### III. PROBLEMS OF SCIENCE AND TECHNOLOGY IN HEALTH IN LATIN AMERICA

It is not easy to identify the principal problems in science and technology in health in Latin America. Without attempting to make an exhaustive list, one can identify specific problems related more directly to each of the processes mentioned and general problems, particularly those having to do with the lack of organization of that field, both internally, among its components, and in its relationships with the social environment, the fruit of historical conditioning, and the contradictions of the models of development adopted.

With regard to specific problems in the production of knowledge, one could point out:

- The problems derived from a less-developed stage of the institutionalization and collectivization of scientific work in health. There still predominate in many fields of knowledge isolated investigators that react to attempts to orient research according to priorities, as if this were a threat to their creativity and the autonomy of science. This phenomenon, associated with poor understanding of planning and scientific administration, as well as the scarcity of managerial cadres specialized in that area, has as a consequence the absence of institutional research objectives and policies articulated with national policies for health and the development of science and technology, in addition to problems in the administration of research institutions, in the preparation and management of projects, in negotiations with financing agencies or with companies for the transfer of technology, etc.
- A brief list should also include the problems related to the training of human resources in research and its utilization - most notably inadequate remuneration, absence of career plans in most of the countries, and inadequate working conditions. In regard to the dissemination of scientific results, the economic crisis is hitting the already precarious tools of dissemination that the Region has, and the high cost of subscriptions to foreign journals makes access to a basic element of the work of the investigator - the updating of knowledge - difficult.

With regard to the problems of science and technology at the level of the health services, note should be made of those related to the accelerated incorporation of new technologies and the resulting increase in the cost of care, as well as those derived from the need for reorganization of systems and services in a context of pressures to increase access, equity, and efficiency. In particular, there is a need for enhancement of the decision-making processes for selection and incorporation of technologies; for organization of integrated systems of high technological complexity in order to achieve more equitable distribution of access at acceptable costs; for expanding knowledge of technological evaluation; for strengthening the standardization and modelling of procedures; for improvement of relations with

national and international suppliers, with better utilization of purchasing power; for linking the production of knowledge to the detection of technological gaps in the practical aspects of health that generate demands and orient the definition of research priorities; and for improvement of the administration of supplies and creation of systems for equipment maintenance.

Concerning the sector for production of inputs, there exist a series of problems related to the recent formation of the sector in Latin America, such as low capitalization and difficulties in the generation of technologies and access to them.

With regard to the formulation of national policies for scientific and technical development, one can mention deficiencies in knowledge of the methods and tools of scientific and technological planning, as well as of the disciplines that seek to understand the structure and laws that govern the dynamics of the development of scientific activity in health.

The knowledge of these laws, jointly with mastery of the planning tools appropriate to science and technology, is basic to the organization and promotion of research related to attention to social demands.

Another fundamental element for the definition of policies on scientific and technical development, particularly in this time of scarcity of resources, is the availability of reliable information that would make it possible to nourish the process of decision-making and its evaluation. Information is needed to improve the criteria for identification of priorities in order to carry out an analysis of the trends in scientific production; to evaluate the capacity for response by the scientific infrastructure to the demands made on it; and to establish strategies for expansion and development of that infrastructure according to current and future demands. In addition, we need to formulate and improve indicators that make it possible to evaluate the effects of actions in the field of scientific and technological production - in particular, indicators of utilization of the results of scientific research.

The weaknesses in this field are also very marked. Very few Latin American countries have a regular system for scientific and technical information; most of them obtain it by means of surveys with irregular periodicity and relatively unsatisfactory coverage.

In the institutional plan, it is undeniable that most countries are making an undeniable effort to create structures that make it possible to carry out the functions of promotion, coordination, and support for scientific research. This is expressed, for example, in the creation of institutions specifically devoted to this objective, such as councils on science and technology and, in the field of health, the units of science and technology in the Ministries of Health. However, there is still a long way to go before effective coordination between the institutions and the definition of policies for research, health, education, and production can be created across the system.

We refer, finally, to the general problems that have to do with the lack of organization within the field of science and technology in health and in its relations with the prevailing models of socioeconomic development.

The entities charged with the definition of policies for scientific and technical development, industrial development, and health do not generally possess the necessary coherence of objectives and are not organically articulated, and there is no regular flow of information among them. The multiplicity of decision-making centers, uncoordinated among themselves, leads to the establishment of frequently contradictory policies or to overlapping or parallel actions, which accentuates the low productivity of the limited resources available.

These contradictions have their roots in the models of socioeconomic development adopted by the countries of the Region and the problems caused by the economic crisis that they face. Historically, the conditions of underdevelopment relegated science to a secondary role, with the universities devoted almost exclusively to training in the liberal professions. A partial exception to this was health research, which achieved the prestige of public power, particularly when urbanization required effective action to control urban epidemics. In the 1960s and 1970s, several countries defined policies for scientific and technical development which succeeded in expanding the infrastructure and scientific production of the Region. However, these policies, which gave concessions to the importation of industries and technologies generated abroad, expanding the gap among the still small scientific communities of those countries and their structures for production of goods and services, were not accompanied by coherent policies in the production of goods and services. The policies of reducing public spending, a readjustment measure adopted in the face of the fiscal crisis and the external debt, threaten the possibilities of survival of the universities and public research institutes which still depend almost totally on state financing; this is jeopardizing the possibilities for innovation and the scientific capacity of a large number of the countries.

#### IV. TECHNICAL COOPERATION FOR THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY IN HEALTH IN LATIN AMERICA

It has already been mentioned that several of the countries of the Region, notwithstanding the restrictions of the economic crisis and in part in an attempt to confront it, are adopting a series of measures to promote scientific and technical development in health. As a result of the growing demand caused by the reorganization of the services, the increase in the cost of health care, and other factors, there is an awareness of the importance of the development of science and technology for economic and social development, in particular for the improvement of health conditions and health care. In addition to the creation of institutions devoted to the formulation and implementation of policies for science and technology in health already mentioned, those measures include the training of human resources through the expansion of graduate courses, the strengthening of the technical and material



bases of research institutions, and the establishment of regulatory measures for incorporation and utilization of technologies.

The general basic objective of technical cooperation in this field should be the reinforcement of those efforts through the utilization of the fundamental strategies defined by the current administration of PAHO, which are the administration of knowledge, promotion of TCDC, and mobilization of national resources.

In such a broad, diversified field as conceived in Section II, the lines of cooperation that are presented below are strategic in nature, and may be supplemented by others that are more specific. Not all the processes mentioned are covered, given the purpose and limitations of an organization for sectoral cooperation such as PAHO; there is, for example, a secondary plan, which refers to the production of inputs.

a) Promotion and support for research

The concession of subsidies is utilized in an attempt to develop research that responds to relevant problems and that is still not sufficiently supported with national or international resources. The operation of a subsidy program that seeks to integrate production, dissemination, and utilization of knowledge should also serve as a demonstration model of the organization of a program to support research committed to attention to specific social demands.

In particular, in order to respond to the problems mentioned in Section III, research on the structure and development of scientific production in health and on the process of technological development in health should deserve support, with a view to supporting the definition of policies and the planning of scientific and technical development in health.

b) Training of human resources in aspects related to the development of science and technology in health

The clientele for this type of activity - the agents of the different processes mentioned in Chapter II - is rather diversified. It includes the makers of plans and policies for scientific and technical development in health that act at the level of institutions for research coordination and institutions for formulation of health policies; investigators in the biomedical area and in overall health, whose training usually does not involve topics related to the problem of scientific and technical development; administrators of research institutions; and, finally, personnel at both the managerial and health care levels of the health sector, who also do not receive regular training in such areas as technological management, criteria for selection and incorporation of technologies, and evaluation of health technologies.

c) Strengthening the scientific and technical units of the Ministries of Health and the health departments of the counsels of science and technology

This line of cooperation has as its objective supporting creation and strengthening of these coordinating units, in either general or specific aspects of their organization, as for example, the constitution of their scientific and technical information systems. Included as support mechanisms to these units are direct advisory services; granting fellowships for training their human resources in aspects of planning and administration of science and technology or for visits to more developed centers; promotion of meetings or workshops for exchange of experiences and discussion of topics of interest; and collection, analysis, and dissemination of pertinent bibliographies.

d) Preparation and implementation of regional programs for the development of areas of strategic interest, both for the development of science and technology and for the solution of health problems

These programs should seek the promotion of the articulation between research and the production of goods and health services as well as the establishment of networks of cooperation among institutions of several of the countries. The regional program for the development of biotechnology in health is an example of this line of cooperation.

V. THE RESEARCH COORDINATION UNIT OF PAHO

Current situation

The Research Coordination Unit of PAHO (DRC), in accordance with its title and institutional placement, has as its principal responsibility at present the coordination and evaluation of the research activities developed by the various technical areas of the Organization.

Another axis of work is constituted by administrative and secretariat-type activities involving: the Advisory Committee on Health Research (ACHR), the Internal Advisory Committee on Health Research, the Ethics Committee, the ACHR Subcommittee on Biotechnology, the Internal Advisory Committee on Biotechnology, and administration of the Research Grants Program, the WHO Collaborating Centers, the Research Training Grants, and the Regional Program on Biotechnology.

The work of technical cooperation aimed at supporting the strengthening of the scientific and technical infrastructure and the definition of policies in the field of science and technology in health, developed by means of consultations and meetings with professionals of the research units of the ministries and science and technology counsels, has been gathering strength recently (especially since 1983), given the dynamism in this area at the country level.

With regard to each of these three principal axes of work and the profile of activities as a whole, one can identify a series of problems:

In the first place, if we take into account the definition of the field of science and technology in health, the difficulties that it faces, and the lines of cooperation that can be contributed to overcome them (Sections II, III, and IV), it is easy to see that the current lines of action of DRC are very limited. There is no clear definition of scientific and technical development in health as the principal axis of work to which the rest is subordinated. Neither is there programming coordination with other areas that act in the field of science and technology in health, particularly the area of the health technology.

The actions of cooperation developed by DRC for the purpose of supporting the organization of scientific and technical activity in health at the country level are limited and sporadic and there are few possibilities to implement effectively the recommendations that are made at meetings on the topic. There are limitations on human and financial resources - for direct execution of actions of cooperation and for mobilization of national resources. There is no regular information system integrated with existing data banks in the countries that can provide information and analyses on projects, investigators, research institutions, producers of inputs, products, incorporated technologies, regulatory policy, etc.; that information is essential to orient the definition of national policies and the technical cooperation of the Organization in this field.

The absence of a clear nuclear axis represented by a policy of cooperation for technical scientific development in health, already mentioned, is prejudicial to the coordination and evaluation of the research component of the technical programs. To coordinate - for what, and to evaluate - in relation to what? This component of internal planning in DRC, as the coordinating unit for the efforts of the various technical programs, would be fundamental for increasing the possibilities for and the impact of activities related to research, but it suffers from the absence of a clear orientation. That lack of orientation strengthens the historical institutional limitations that make interprogram coordination difficult.

The Grants Program is being affirmed as a clear instrument of cooperation and internal coordination, with policies, priorities, and clearly defined administrative mechanisms, but its area of influence on the overall activities in that field is limited. The Regional Program on Biotechnology is an example of the effort for interprogram coordination and also of cooperation based on a defined policy with broad political and scientific support together with investigators and authorities in the countries.

The structuring of a regular internal system of information on research activities supported or developed by the technical programs - a basic requirement for the coordination - has not been established because of a series of technical problems and the lack of a common will to establish it. In the end, information for what?

In regard to the secretariat-type activities of the Advisory Committee on Health Research (ACHR), at its last meeting (in August 1987 in Rio de Janeiro) the weaknesses of the ties between ACHR, DRC, and PAHO as a whole were made explicitly clear. Without follow-up, without more effective daily participation of its members in life of the Organization, and without the implementation of its recommendations, the meetings of ACHR assume a ritualistic character. It is clear and the past shows us that ACHR can contribute a great deal, either technically or politically to the execution of a program for scientific and technical development in health, after its inception. The case of the Subcommittee on Biotechnology articulated around concrete lines of work is a good example of that possibility.

The Unit (DRC) is also developing a series of administrative activities that consume a considerable amount of time and work, but that are of debatable impact with regard to technical cooperation of the Organization, as in the case of the Collaborating Centers of the World Health Organization, for example. These are an important instrument in the mobilization of national resources, since they are integrated effectively into the programs for technical cooperation. Currently, the Collaborating Centers are usually limited to sporadic activities of cooperation with the Organization. Their designation has been transformed, from an instrument for the legitimization of institutions of excellence to one for the mobilization of resources.

#### Proposal for reformulation

The proposal for reformulation mentioned below has as its objective overcoming the problems mentioned and enabling the Unit (DRC) to develop or coordinate the development of the lines of cooperation mentioned in Section IV.

The fields of action of the Unit in this new stage could be schematically considered as "internal planning" and "external planning," both articulated in relation to a fundamental axis of work which is the promotion of scientific and technical development in health.

With respect to the activities of "internal planning," DRC should seek coordination of the efforts which the various technical areas develop to promote scientific activity in health. In this area the following lines of action can be identified:

- Formation, in PAHO, of a "Program for Technical Cooperation for the Development of Scientific Activity in Health." Of course, it is not a matter of creating a new vertical program with this objective. The "Program" should consist of the articulation of the different existing research components at the levels of the programs for cooperation in technical areas and the country programs. So that the "Program" is not an artificial aggregate of dissimilar parts, preparation for it should have as its point of departure the basic documents of policies and priorities of the Organization, from which the terms of reference for the programming of activities of cooperation in the field of research should be derived. Based on those terms of reference, each technical area will program the set

of activities that will integrate the corresponding component of research.

- Once a "Program" of action in the field of science and technology in health in which all the sectors of the Organization participate is structured conceptually and programmatically, DRC should establish the methodology and procedures for the follow-up and evaluation of the activities of cooperation of the "Program." It is clear that this methodology should be coherent with whatever is utilized for the evaluation of technical cooperation in other fields.
- Another significant component of this "internal planning" of the Unit, refers to the structuring of information systems that permit follow-up and monitoring of the research components of the various technical programs.

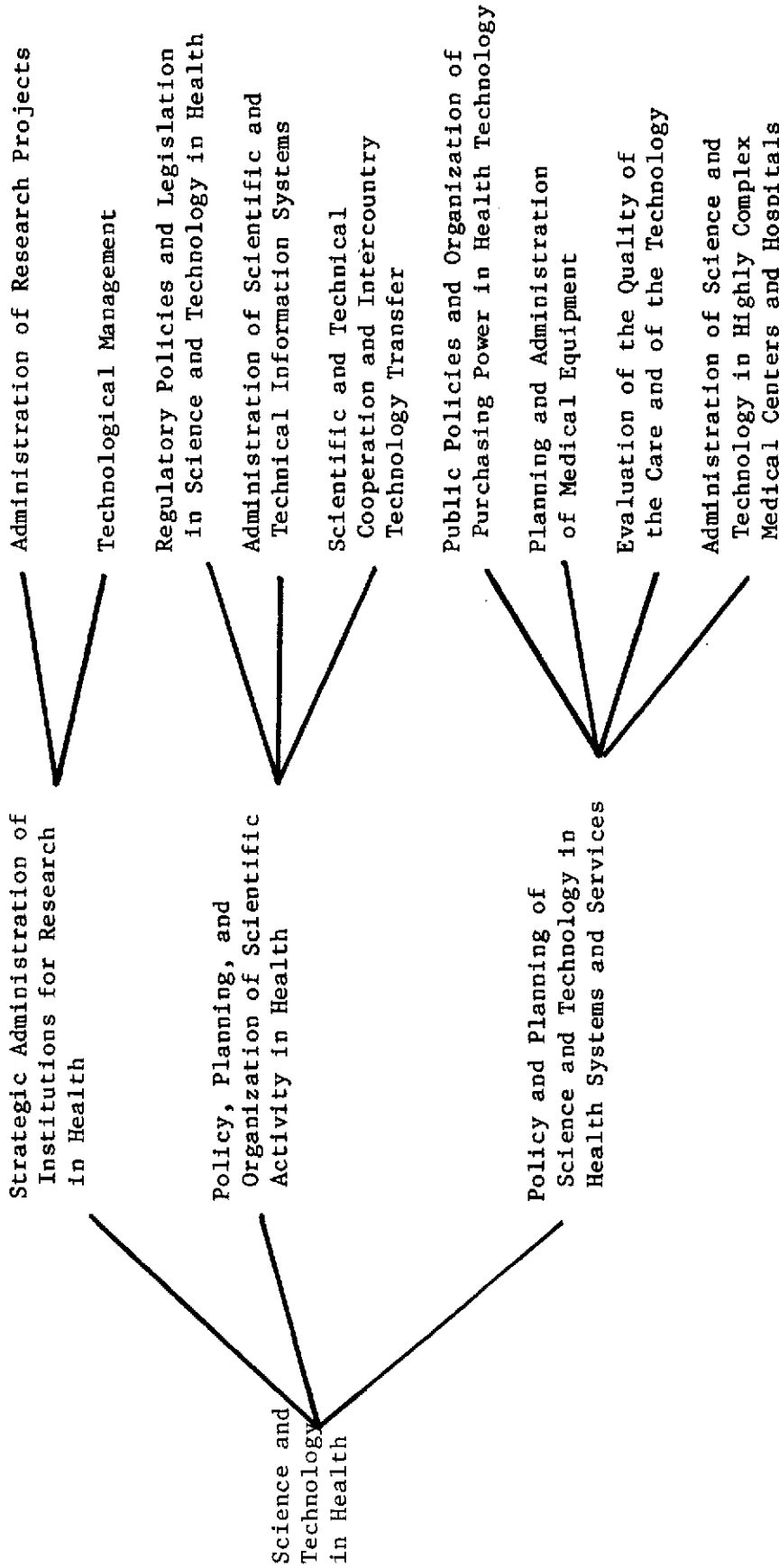
With respect to the activities of "external planning," these can be subdivided in turn into activities of cooperation geared toward the strengthening of the entities for coordination of scientific activity and those aimed at strengthening the scientific and technical infrastructure.

With regard to the former, the principal lines of cooperation already were mentioned at the beginning of Section V and refer to support for the units of science and technology in health in the training of their human resources, in the establishment of scientific and technical information systems, and in other ways. This line also includes the development of methods and techniques for planning and administering science and technology in health and also research on the situation of research in health in the Region.

Concerning the strengthening of the scientific and technical infrastructure, the Unit should coordinate the development of special regional programs that articulate activities of various technical areas of the Organization in the two large fields of knowledge in health - the medical-biological and the socio-epidemiological. With respect to the former, a "Regional Program for the Development of the Biotechnology Applied to Health in Latin America" is already in the implementation stage. With respect to the latter, in accordance with the recommendations from ACHR, a program aimed at strengthening the infrastructure and scientific production in the area of research on systems and health services should be prepared.

Strategically, the Unit should be linked more closely to the scientific community and the planners of science and technology in the Region, for the definition of the policies of technical cooperation in this field and for their implementation. The already existing committees and subcommittees, and those to be created, should be more closely linked to the Unit. In the internal plan the existing mechanisms of coordination should be strengthened, particularly the Internal Advisory Committee on Health Research and the Grants Program.

# TOPICS FOR EDUCATION IN THE FIELD OF SCIENCE AND TECHNOLOGY IN HEALTH



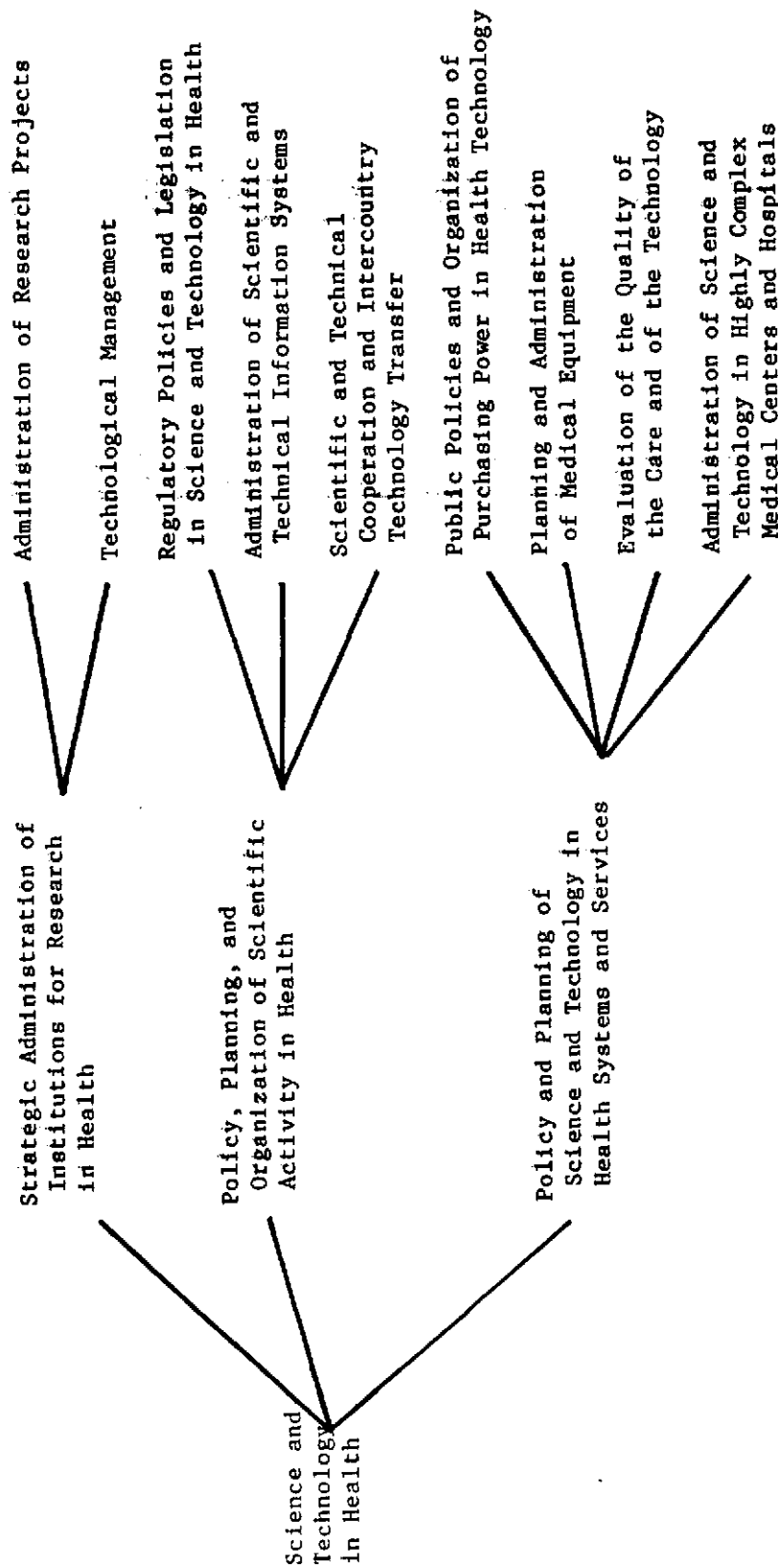
Breadth of the Topic: NATIONAL

Objective: EDUCATION

Contents: PARTICULAR

Clientele: SPECIFIC

# TOPICS FOR EDUCATION IN THE FIELD OF SCIENCE AND TECHNOLOGY IN HEALTH



Breadth of the Topic: INTERNATIONAL NATIONAL

Objective: SENSITIZATION EDUCATION

Contents: GENERAL PARTICULAR

Clientele: MIXED SPECIFIC