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An essay on the origin
and organization of national
science policies

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with the collaboration of
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Unesco Paris 1971

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Preface

A major objective of the Unesco science policy programme is to promote more active intellectual co-operation among decision-makers and specialists concerned with the symbiosis science-government, for what hangs upon this symbiosis, in the world of today, is not merely social and economic progress, but indeed the very security of nations. This Unesco programme also seeks to help Member States, at their request, to set in motion and to promote throughout the national economy a process of endogenous development, innovative in character, based on the application of modern science and technology.

In this essay—written by a team of specialists under the direction of Jacques Spaey, Secretary General of the Prime Minister's Department for the programming of science policy in Belgium—the authors analyse the currents of thought and action which characterize national science policies among the European States, and outline many of the pressing problems currently facing those responsible for governmental development policies based on science. The essay was published in its original French version in 1969.

The opinions expressed by the authors commit no one but themselves. Unesco feels that the world-wide dimension which the authors have given to their argument, and the positive form in which they advance it, will earn them attentive readers among all those working for the cause of co-operation between the nations.

Dr. Jacques Spaey, leader of the team of authors responsible for the present publication, died shortly before the appearance of this English edition.

Throughout the international community, Dr. Spaey was held in high esteem for the skill and imagination with which he sought to harness science and technology to man's well-being, and for his constant efforts to further the principles of co-operation between the nations.

The Secretariat of Unesco pays tribute to his memory.

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Contents

	Introduction	11
Part one	The role and dynamics of science in contemporary society	15
	1 Science, a means of development	17
	<i>Introduction</i>	17
	Science and progress	17
	Control of the natural environment	18
	The scientific study of man and of human society	19
	The choice of the collective 'civilization blueprint'	20
	<i>Science in society</i>	21
	<i>The factors of economic growth</i>	23
	Extensive growth	24
	Growth by means of capital accumulation without technological change	24
	Growth by means of advances in the organization of production, at constant technology and capital outlay	24
	Growth resulting from technological innovation and its propagation in the national economy	25
	Growth by original technological innovation	27
	Conclusion on the forms of growth	27
	<i>Scientific humanism—the contribution made by science to the quality of life and society</i>	30
	The quality of life	31
	The quality of society	32
	The liberty of the individual and the limits of scientific action	35
	2 Science and technology as factors of social mutation	37
	<i>Science for application</i>	37
	Introduction: science and power	37
	The unity of science and technology: the research project	37
	The scientific approach	38
	The effectiveness of the scientific approach	41
	The scientific approach to science	44

	<i>The choice of objectives and the problem of the norms</i>	45
	Introduction: the question of the goals of rational conduct	45
	Problem of the rational choice of objectives	46
	Hypothesis of an empirical choice of ultimate goals	47
	Hypothesis of science as a producer of its own goals	47
	Hypothesis of biological or 'natural' goals	48
	The deciding of goals <i>a priori</i>	50
	Creation of the norms during action	50
	Justification of the norms	53
	<i>The idea of science policy: efficiency and responsibility</i>	54
Part two	The facts	57
3	The social, cultural and economic data for a science policy	59
	<i>The world plan and the national plan</i>	59
	<i>The economic context</i>	60
	The United States of America	61
	Other industrialized countries	65
	Countries in the first phase of industrialization	68
	The stage which precedes industrialization	70
	<i>The constraints which spring from the economic and social context</i>	71
4	The resources devoted to scientific research and experimental development in the world	75
	<i>World distribution of scientific resources</i>	76
	<i>Concentration of the resources earmarked for research and experimental development in highly developed countries</i>	78
	<i>The evolution in time of resources devoted to research and experimental development</i>	79
	<i>Evolution over a long period</i>	83
	<i>Comments and conclusions</i>	84
5	Historical survey of the promotion of research and of government structures for science policy	86
	<i>Patronage</i>	86
	<i>Academies and learned societies</i>	86
	<i>Institutions for the promotion of research</i>	89
	<i>Characteristics which the academies and foundations have in common: the criterion of merit</i>	90
	<i>The governments enter the field</i>	90
	Scientific institutions of the government	90
	The financing of university research out of public funds	91
	Government organizations for the promotion of research	91
	Government contracts for research and experimental development	94
	<i>The appearance of government structures for science policy</i>	95
	United Kingdom	95
	France	97
	United States of America	99
	Federal Republic of Germany	101
	Belgium	102

Part three	A policy of development based on science	105
6	Science policy as part of the general policy of the nation	107
	<i>Introduction</i>	107
	<i>The state of affairs at the present day: several science policies being conducted simultaneously in the same country</i>	109
	<i>Science policy as part of the general policy of the government</i>	111
	Science policy and educational policy	112
	Science policy and economic policy	114
	A clear appreciation of the point of departure and the stages in view	115
	Science policy and foreign policy	116
	<i>Conclusion</i>	118
7	The functions of a science policy	119
	<i>Introduction</i>	119
	<i>First function: planning</i>	120
	Choice of objectives	120
	Survey of a country's actual situation	138
	Forecasting	142
	Budgetary analysis and preparation of the budget	147
	Consultation and concerted action	152
	<i>Second function: co-ordination between ministries</i>	157
	Ministerial function	157
	Machinery for the administration of science	160
	The controlling organ of science policy	161
	Co-ordination and standardization of the administration	162
	<i>Third function: promotion of research and its financing</i>	163
	General stimuli	163
	The most important of the special stimuli: subventions and contracts	171
	Other special stimuli: scientific prizes and research fellowships	184
	Organizations for the financing of research	185
	<i>Fourth function: carrying out research</i>	188
	Three sectors	188
	Particular needs of each sector for carrying out research and experimental development	189
	Choice of sector by the planner	190
8	International co-operation in science	192
	<i>Historical survey</i>	192
	Co-operation between scientists	193
	Co-operation between governments for scientific ends	194
	Co-operation between governments in the present phase	196
	<i>Forms of co-operation in existence today</i>	196
	Classification according to function fulfilled	197
	Classification according to the legal status of the organization	198
	Classification according to the geographical area in which co-operation takes place	199

<i>Current balance sheet for international scientific co-operation</i>	201
Extent of co-operation	201
Motives for co-operation	201
Orientations of co-operation today	202
Problems of co-operation today	203
<i>The future of co-operation</i>	210
Certain principles of international scientific co-operation	210
Factors governing the effectiveness of co-operation	211
Forms of co-operation	213
The political will towards co-operation	214
Conclusion	214
Conclusions	216
Bibliography	219

Introduction

This essay is, in the full sense of the word, the work of a team. It was conceived and carried out by a group of which the authors are the spokesmen but not the only artisans. Each member of the team has, on his own account, devised, nurtured and sustained the flow of ideas which has led the team to a common approach.

Together they have overcome the obstacles which their activity encountered, for every effort towards progress necessarily entails change or new orientations of existing institutions or accepted ideas. Participation in the shaping of the authors' views has extended to different circles interested in the promotion of science and technology. Their advice and their criticism have given scope for a confrontation of current ideas with the realities of today and tomorrow.

Furthermore, the studies which lie at the basis of this essay have been debated on the international plane. The exchange of views carried out in international organizations, more particularly in Unesco and OECD, on the science policy of governments, has made it possible to apprehend many ways in which science and technology contribute to the development of human society. Such confrontations of experience and ideas, originating in different countries, have made it possible to generalize some of the conclusions and to identify methods applicable in a large number of countries.

A firm hope of progress, and the will to overcome the present constraints on development, have inspired our activity as much as our thinking. Thus our initial assumption was that science, while drawing its inspiration from men's curiosity, has become at the same time an essential factor in development and progress.

In countries where the promotion of science remains but marginal to economic and social development policies, the rhythm and quality of progress suffers, just as its dissemination does, from serious delays. Conversely, in the highly developed nations, it is the systematic application of scientific knowledge which has spurred on technological innovation, with its far-reaching consequences for economic and social progress. The fact that the systematic use of science has often been concentrated on military or political objectives

should not lead us to underestimate its potentialities for application to peaceful ends.

A number of observations highlighted in this essay suggest that the incursion of science and technology into all human activities imparts new dimensions and higher rates of occurrence to the problems raised by the development of societies. It will soon be possible to test this hypothesis, since many countries are embarking on a process of systematic organization of their scientific and technological activities. Experience thus gained will allow for adjustments to be made in the interpretations and approaches which are proposed in this essay.

Our purpose has been to stress the above-mentioned observations and, if one prefers to look at it in another way, to support the underlying working hypothesis. In the final reckoning the essay deals with a theory of *development based on science*, whose conditions and limits we shall delineate as they appear today.

Thus we hope to make a contribution to some essential aspects of 'science policy' and to provide those who assume the responsibility for it in their respective countries with arguments and methods for undertaking vigorous action in this field, where the progress of each nation depends on the comparison of experiences and the co-operation of all.

As we have said, this essay is the work of a team; it is therefore difficult to give a name to each individual contribution. However, it must be emphasized that Professor J. Ladrière has brought us an original contribution on the meaning of scientific and technological change in the thought and organization of contemporary society. Mr. J. Defay has devoted himself more particularly to defining the place of scientific activities in the economic and social context and, at the same time, to the part played by science in development. Mr. A. Stenmans has applied himself to the definition of the functions of scientific policy on the political and administrative plane. Mr. J. Wautrequin has described the birth and evolution of the organized planning of science policy in different countries, the machinery for promoting research, and the problems of scientific co-operation in the international field.

Finally our thanks go to those who, without having shared directly in the drafting of the different chapters of this work, have contributed to it in various ways. Mr. J. De Meulder and Mr. J. Sommereyns have made a summary of the survey techniques and budgetary analysis which are at the basis of a science policy. Miss G. Dehoux, who is in control of administration, has co-ordinated the groundwork which made this publication possible.

The plan of this essay has been conceived in such a way as to give to the reader an alternation between concrete and theoretical information, which allows him to become progressively familiar with a somewhat abstruse subject.

First part. The first chapter summarizes the objectives that are usually associated with a national policy of economic and social development. It enlarges a little on economic growth, which clearly occupies a central place in the objectives of such a policy. However, it gives these concerns their proper place among the more general purposes which form the aims of

civilization. The second chapter deals with scientific and technological change, and the demands of rationality and logic which are its distinguishing features. It describes the scientific mutation of societies as a voluntary action of a new kind, in which man sets the final goals of his activities.

Second part. The third chapter describes the actual state of affairs which constitutes the given data and therefore defines the point of departure of government action. National situations are infinitely variable. An attempt at classification has therefore been made with the object of identifying them according to the state of development already reached by the nation at the moment when the programme of development based on science is conceived, decided upon and put into operation.

We are fully conscious of the arbitrary nature of any kind of classification, and our only aim in this chapter has been to propose a method of analysis of a country's situation. The results of such an analysis allow the identification and subsequent choice of certain objectives of national development.

In the fourth chapter we come into contact with certain realities of scale. By enabling us to appreciate the extent of the size and scope of the scientific revolution in the world of today, they reveal the imbalances which must be faced if the world's evolution is not to take a disruptive course. At the same time they show the range of the key parameters and variables of which the specialist in scientific programming must take account and avail himself.

The fifth chapter summarizes the methods and organizations of the past for the promotion of research, and shows how today's science policies have gradually taken shape and substance. This historical survey ends the examination of the essential facts which must be taken account of in the formulation of a development policy based on science.

Third part. The sixth chapter gives science policy its place as part of governmental policy, while the seventh chapter attempts a definition of its functions and machinery.

Lastly, the eighth chapter deals with scientific and technical co-operation between the nations.

Jacques Spaey

Part one

The role and dynamics of science in contemporary society

