

ANNEX A

DEFINITIONS

Some useful definitions for the various steps in the R and D process were put forward by the Zuckerman Committee¹ in 1961 and again in 1963 by the Committee of Enquiry into the Organization of Civil Science chaired by Sir Burke Trend.² The definitions are as follows:³

"We have taken "research and development" to mean, in general terms, all those activities which are directed towards the acquisition of scientific facts and techniques, or towards their application, to the design of new or improved materials, or equipment, or to the devising of new processes, often involving, in the later stages, the construction of prototype equipment or pilot plant.

We have found it helpful to differentiate between five categories of activity normally included under the port-manteau term, research and development. These are pure basic research, objective basic research, applied (project) research, applied (operational) research, and development. Our definitions of these terms are set out in the following paragraphs. We would, however, emphasize two points. First, there is and can be no clear-cut line of demarcation between one form of research and another; basic research and development are, so to speak, bands at opposite ends of a continuous spectrum. Second, most organisations engaged in research will be concerned to some extent with the whole range of research and development. •

(i) *Pure Basic Research*

Pure basic research is research carried out solely in order to increase scientific knowledge: that is, knowledge of the nature of the material world. Such research is commonly called either "fundamental" or "pure" or "basic". These words, particularly "fundamental", are often connected with the idea of work of high intellectual quality. A fair amount of "pure" scientific research may, however, be of a routine or of a preliminary nature. For example: (i) "filling in", where a main break-through has already been made; (ii) exploratory work in fields where a good deal of semi-empirical experimentation is needed before the real problems can be identified; (iii) descriptive observational work, notably in biology and geology. A line of "pure basic" research is selected by the individual worker to satisfy his own tastes and intellectual curiosity.

Examples of pure basic research are:

A study of the properties of high energy cosmic ray particles. The correlation of the chemical and structural changes that take place in muscle during its contraction and relaxation.

(ii) *Objective Basic Research*

Between "pure" and "applied" research there lies an intermediate category of scientific work to which we have given the name "objective basic". This denotes

¹ Committee chaired by Sir Solly Zuckerman in the United Kingdom, the Committee was formed in May 1958 and reported in July 1961. "Report of the Committee on the Management and Control of Research and Development," Office of the Minister of Science, HMSO, London 1961, 129 p.

² HMSO, London, 1963, Cmnd. 2171.

³ "Report of the Committee on the Management and Control of Research and Development," *op. cit.*, pp. 6-8.