

basic research in fields of recognised potential technological importance. It is well known that the pursuit of defined technological objectives, for example the development of a supersonic aircraft, sometimes exposes an area in which existing scientific knowledge is seriously insufficient. It then becomes necessary to try to organise an increase in this knowledge before a further technological advance can be made. Research of this type may be as intellectually exacting as what we have called "pure basic" research. The difference between "pure basic" and "objective basic" research derives mainly from the fact that the latter is stimulated primarily by technological needs. It therefore calls for a planned approach even when the satisfaction of these needs is remote. This characteristic of "relevance" to a definable technological objective is a practical criterion which differentiates "objective" basic research from "pure" basic research.

Examples of objective basic research are:

The study of the fundamentals of plasma physics, which may provide data likely to be of value to work on thermo-nuclear fusion directed to the harnessing of new sources of energy. A study of the growth of virus in living cells, which may provide information of value in combating virus infections of man.

(iii) & (iv) *Applied (Project or Operational) Research*

As indicated above, applied research has as its object the attaining of a practical goal, which can be fairly precisely defined, such as a new process or piece of equipment. We believe that this type of work is best described as *project research* to distinguish it from applied research directed to improving the use of an existing process or piece of equipment. The latter may be called *operational research*.

Examples of applied research are:

Project. To provide design data for a nuclear-powered submarine. To determine the cause of the specific failure of a particular crop and to derive a remedy to prevent its recurrence.

Operational. To improve the working performance of an existing type of graphite-moderated carbon dioxide-cooled nuclear reactor. To provide the data for improving the design and layout of farm buildings by a study of their purpose and day-to-day use.

(v) *Development*

Development bridges the gap between research and production. It may be defined as the work necessary to take, for example, a new process or piece of equipment to the production stage. It will often include the erection and operation of pilot plants or the construction of prototypes.

Examples of development are:

The work required to determine the best production techniques for the manufacture of solid fuel elements for a nuclear reactor, research having determined the necessary composition of the fuel elements and the material for the containers. The work required to determine the appropriate process for manufacturing penicillin on a large scale, research having established its antibiotic properties, and small-scale trials its clinical usefulness."