

they provide multiple indicators of output in ways that can contribute to the concerns of bureaucratized organizations for accounting for the effectiveness of specialized segments within the organization and, at the same time, are in accord with the value system and objectives of professionalized scientists. They represent one way to accommodate bureaucratic and professional objectives.

Another problem area is the degree to which research activities can be organized along the same lines as development activities, and can therefore perhaps be combined with development activities in complex organizations of government and industry. Our research findings imply that such combination is undesirable because the organizational requirements for research differ so markedly from the organizational requirements for development. Not only are different kinds of people required in research activities, and people who have different attitudes toward their work and toward their employing organization, but there is evidence that significant decisions regarding the initiation, conduct, and technical evaluation of research must be made at a different level than for development. Whereas development projects can be planned and programmed from a relatively high level of management and can be controlled by PERT systems and similar indicators of progress and accomplishment, only those scientists at the working level can decide on the appropriateness of alternative lines of investigation open to them at any given point in a research project, and frequently such decisions about the conduct of a project cannot be made until the scientists have accomplished a previous step in the research. Some of the most important research findings have come from "serendipity," that is, unexpected discoveries made during the course of some research oriented in another direction. This is why such highly professionalized persons with internalized standards of discipline must be employed in successful basic research activities; external control procedures are as insufficient here as they would be in the case of a surgeon in the operating room of a hospital.

This does not mean, of course, that research programs cannot be planned in a general sense. General scientific areas can be selected for sponsorship in terms of mission requirements of the sponsoring agency, but with regard to most of the day-to-day conduct of research within these general scientific areas, there must be a special accommodation between bureaucratic requirements and professional modes of operation, as there is in universities and in hospitals.

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