THE FEASIBILITY OF
INTERDISCIPLINARY TEAMS

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CHAPTER 1   INTRODUCTION

I.  The Rise and Fall of Interdisciplinary Research

"What is a cynic? A man who knows the price of everythong and the value of nothing."

Oscar Wilde.

Not only cynics are being accused of imbalances today but whole planning institutions. Planners are now required to serve more than the economic interest and they are finding that new creative solutions are necessary to cope with this situation.

Suggestions about how to arrive at novel solutions to these and other complex problems faced by society today have not been lacking. The suggestion which frequents the environmental literature involves the application of interdisciplinary teams to these problems. And many planning institutions have responded to the suggestion with alacrity. Ecologists, economists, engineers, planners, sociologists and psychologists have been placed together to explore the real costs of development on the environment and to attempt creative solutions.

Not only in planning is this development in evidence. A small but growing group of behavioural scientists have taken the seemingly radical position that the knowledge of the traditional disciplines as they now exist is relatively useless in the effort to find answers to the complex problems of crime and delinquency, senseless violence, drug addiction and so forth. They too are encouraging the growth of interdisciplinary teams to tackle these problems.

Of course the interdisciplinary team has been around for some time in fields such as engineering psychology. But their rapid and ambitious expression in many decision-making and problem-solving institutions in society is a recent development.
The few recorded accounts of the progress of these recent team endeavours indicates that they are finding the establishment and development of interdisciplinary research is not as simple as it would appear on paper. An international seminar at the Organization for Economic and Co-operative Development (O.E.C.D.) Development Centre spent considerable time discussing the dissatisfaction with the sociologists' ability to translate his data into practical terms (Philip, 1969). And an interdisciplinary venture on a large scale, the Inter-Institutional Policy Simulator Project (I.I.P.S.) in Vancouver, reported at the end of its third year of activities that co-ordination had been non-existent between the various sub-groups. The committee management, comprised of members with a range of professional competence and project interests, was criticised because there was 'too little long-range planning, too much firefighting, too much major management concern directed toward survival rather than the purposes for which the project was initiated (Kelly, 1973, p.7)'. To achieve effective co-ordination, a major administrative reconstruction was affected and a full-time co-ordinator appointed. These two reports give some indication of the potential extent of co-operational and integrational problems in an interdisciplinary team.

The concept of interdisciplinarity and its advantages and disadvantages are extremely well developed theoretically in an Organization for Economic and Co-operative Development publication on the subject (Apostel et al., 1972). The concern of the present essay is with the number of times interdisciplinarity has been suggested as a panacea to environmental ills recently without documentation of the problems it presents and the complexities of its application. It is felt that before the status quo in this type of research management (i.e. multidisciplinarity) is rejected, any distinctive problems which may be associated with interdisciplinarity should be researched carefully and explained to the managers of interdisciplinary research ventures along with suggestions concerning management of these problems.
II. Scope and Aims of Study

Apostel (1972) has studied spontaneous development in science and consequently argues forcefully against leaving the reorganization of research necessary to facilitate interdisciplinarity to occur by chance. Gaining impetus from his argument, this essay aims firstly to establish the organization approaches that should be taken in interdisciplinary research, and secondly, it aims to develop a feasibility model for interdisciplinary teams today. It is hoped that such a development will enable the research manager to make an informed decision about the most appropriate style of organization for his research.

Apostel argues that if interdisciplinary research is to be valued correctly and the manager's decision made fairly, quantitative operations research which would optimize not only input and output but communication and integration functions also, should be applied. This recommendation is endorsed wholeheartedly by this reader. However due to the required scope and style of this essay and the resources available to the applied psychologist, a much more limited operations research is anticipated. Once the organizational approaches which interdisciplinary teams should take to reduce unproductive forces are established through a study of the theory relating to analogous situations, semi-structured interviews with a number of interdisciplinary teams will be conducted to arrive at an impressionistic feasibility model for interdisciplinary teams today. These interviews will attempt to assess the following:

1. The degree of managerial recourse to organizational theory in setting up interdisciplinary teams. This will give an impression of the degree of insight today into the seriousness of the social problems of interdisciplinary teams and the likelihood that planned approaches will be taken spontaneously to overcome these problems.
2. The degree and type of constraints that are weighing against the implementation of theoretical approaches today. This will give some idea of the ease with which the approaches may be implemented.

3. Effectiveness of teams in relation to the specific theoretical approaches they have implemented. This will give an impression of the specific approaches which are most generally associated with effectiveness today and should refine the feasibility model.

This endeavour will be placed in perspective by a final assessment of its information value in relation to the potential offered by the theoretical and quantitative operations research approaches.

In the remaining sections of this initial chapter the distinctive features of interdisciplinary teams will be discussed.

III. Interdisciplinarity

Because of the lack of a clear definition, interdisciplinarity and multidisciplinarity have had a history of interchangeable application. For instance, because of a misunderstanding in the use of terminology, Auerswald (1969) debated 'Interdisciplinary Versus Ecological Approach', when by the definitions to be established below they are the same concept. Based on a similar misunderstanding the whole series of seminars mentioned previously, held at the O.E.C.D. Development Centre, were concerned with the multidisciplinary aspects of regional development when they really meant the interdisciplinary aspects. Because there was no attempt to clarify the terms used in either of these two cases, the incorrect use of terms appears to result from lack of insight into the general confusion surrounding their use. However by failing to clearly define they add to this confusion.
The definitions to be used here are extracted from the report on 'Interdisciplinarity' by O.E.C.D. mentioned earlier. The report attempts a careful definition of interdisciplinarity and related concepts through the seminar proceedings and reflections of a group of distinguished authors on the subject. The consensus* of opinion was as follows:

Multidisciplinarity is the juxtaposition of two or more disciplines, not interrelated, which may permit the borrowing of theoretical concepts, eg. the university. A highly multidisciplinary research endeavour would contain a number of disciplinary representatives who were independently researching a problem which had been allocated to them by an integrator.

Interdisciplinarity essentially relates to research only. It demands the pooling of a number of axioms, concepts, or methods, and the processing of them with creative imagination. It is hoped the production of unexpected and creative solutions to complex problems will be consequent. Anticipation of solutions with these qualities is what is most likely to make a manager value interdisciplinarity more than multidisciplinarity. The ideal interdisciplinary team works together throughout a problem, not just before and after. However Michaud (1972) does point out in the conclusion to this report that interdisciplinarity is largely an ideal so far.

One of the contributors to the report, Marcel Boiset (1972), presents a continuum of interdisciplinary variations which have been observed in practice. They range from full multidisciplinarity to full interdisciplinarity in ascending order of methodological interaction. The two most complete forms of interdisciplinarity which are frequently observed today are what Boiset calls Unified and Composite Interdisciplinarity. Unified Interdisciplinarity occurs in research where the area of interaction develops its own concepts, procedures, methods and language, eg. Environmental

* Advocates of interdisciplinarity value consensus conditionally. It is only valued by them if each participant feels that he has gained something from the encounter. His point of view may not have been given priority.
Psychology, Ergonomics. Composite Interdisciplinarity is the form most likely to be found in decision-making bodies in society and is the form this essay is most concerned about. It occurs wherever the interaction is determined by a problem, topic or theme, and all the disciplines capable of contributing, recognize the need for communication and consensus in increasing knowledge and understanding throughout the problem, topic, or theme. The Apollo Space project has been the most famous example of an effective interdisciplinary project.

IV. Interdisciplinary Difficulties

This section will deal with the problems of interdisciplinary teams which may undermine their value and which the planning manuals and environmental literature have neglected to mention. These problems exist in most team endeavours. The distinctive features of interdisciplinary teams merely exaggerate them.

The most obvious source of difficulty is that the team is composed of a range of disciplinary representatives. More communication blocks are involved than mere lack of familiarity with disciplinary content. An intensive training within a disciplinary framework means differences between individuals in level of analysis, style of formulating concepts and problems, and empirical procedures. Furthermore, because of all these differences, each discipline has developed a distinctive vocabulary to explain the supposedly unique phenomena it explores. If any one member felt threatened by another this distinctive vocabulary could, in gobbledygook fashion, prove an invincible weapon of defence. Difficulties of translation and comprehension are likely to multiply alarmingly once the interdisciplinary focus extends beyond the boundaries of either the natural or social sciences.

Team members must be able to work within a high degree of conflict. Interdisciplinary teams are a novel form of organized work which should not by definition, make use of the bureaucratic impersonal mechanisms that have
been shown to reduce threat and secure stability (eg. a leader). Interdisciplinarity can only be achieved when conflicting views are expressed. Team members must also be able to work with a high degree of uncertainty in the work situation, firstly with regard to role specifications, secondly with regard to data retrieval, methodology, and end-points. As yet there is no general plan for interdisciplinary studies and no large body of experience about them in analysed form for teams to draw upon.

Finally, not only must interdisciplinary team members understand and accept one another's point of view, they must be willing to come to a consensus of opinion. Most professionals in Western society have been accustomed since childhood to rewards associated with creative, individualistic behaviour. Guy Michaud suggests it is only practise that will produce a mental outlook '....which combines curiosity with open-mindedness....the desire for self enrichment through new approaches' (Michaud, 1972, p. 285). Most team members are bound to experience insecurity and threat while they are developing the mental outlook that will respond to a consensus situation rather than a 'win or lose' situation.

For those managers who do value interdisciplinarity, the next chapter will outline the organizational approaches that theory would suggest as a means of reducing unproductive forces and introducing feasibility.
CHAPTER 2  THEORETICAL ORGANIZATIONAL APPROACHES TO INTER-DISCIPLINARY TEAMS

To present the organizational approaches most suited to the interdisciplinary situation, an eclectic search was made of the organizational literature. This was necessary because as Silverman (1971) points out, most theories so far have only been partial because different social scientists have concentrated on the factors of most interest to them. They have ranged from concern for the satisfaction of the work group in order to obtain managerial goals (human relations orientation) to the nature of the decision-making approach in relation to the stability of the organization (decision-making orientation). An interdisciplinary team as a total system presents more problems than any one of these theories can handle.

I. Structural Approaches

Because of the necessity for all points of view to be heard, and the high degree of uncertainty in the situation, Burns and Stalker's (1961) 'organic' structure is essential. In their research Burns and Stalker found that systems with little attention paid to formal rules, more decisions reached at lower levels, and communication more common among lateral rather than vertical positions were most effective in dynamic technologies. Gailbraith (1969) has argued similarly with respect to task uncertainty. An organic structure is generally found in professional associations but in an interdisciplinary team, equality in representation is essential.

Interdisciplinary research is being attempted not only on the small team level but the corporation level also. In many social planning organizations complex problems filter right through to the policy-making level. In outlining the most appropriate interdisciplinary structure, it would seem foresighted to appreciate research on both scales.

Emery and Trist (1965) have appreciated most closely the need for a structure which will facilitate rapid communication flow in a large scale
planning enterprise. With the same concern for appropriateness in structure as Burns and Stalker (though influenced by Von Bertelanffy's general systems concepts drawn from the natural sciences) they advocate an Open Systems model which considers four increasingly complex types of environment. Of most concern here is their prescription for the most complex of their environments, the 'turbulent' environment. In these environments where the complex value structures themselves are changing, organizations must adopt non-bureaucratic 'matrix' structures in an attempt to develop a consensus of opinion about their forms of relationship to the environment. The idea of this structure is to delimit communication flow on possibly inappropriate value criteria. The crux of the author's argument is that in this sort of environment, hierarchy should not necessarily be associated with large scale operation.

Accepting their argument rather than their 'matrix' structure which they do not adequately explain, the following procedure is recommended for interdisciplinary research on a large scale. Organization functions should be defined according to turbulence and each function (from policy making to particular problem solving) be referred to the appropriate treatment at the appropriate level.

To facilitate participation from all members, interdisciplinary teams should be limited in size or take steps to ensure high rates of communication. It is a consistent finding that organization size leads to lower member participation rates. However Indik (1965) found support for the hypothesis that organizational size influences member participation indirectly. He studied three different types of organizations under a variety of conditions (notably the nature of the motivational forces binding the members to the organization and the degree of authority) and found that only one explanation that he suggested was supported by all three organizations. The influence chain proposed by this explanation was; larger organization → more potential and necessary communication linkages among members, therefore less adequate
communications overall which + reduced level of interpersonal attraction among members, which + decline in member participation rates. Indik points out in his report that the potential effects of large size do not therefore seem to be inherent in large size. They would be avoidable through attempts to ensure high rates of internal communication.

With the high degree of uncertainty involved in interdisciplinary research, as much unnecessary uncertainty as possible should be eliminated. The scope and duration of the task at hand, the policy of the organization, the work flow expected over time, the expected problems facing an interdisciplinary team in particular and criteria of group effectiveness should be made clear to the group through initial discussions. Adequate provisions should be made for any further queries. It must be stressed however, that discussion of guidelines which are handed down to the group is essential. Pelz and Andrews' (1966) extensive research on the influence of management orientation on research scientists clearly indicates that effective professionals do value some freedom in outlining their goals.

Besides facilitating communication flow through organizational structure, spatial distribution of the group should be considered. Comparative studies of open plan and regular offices shows one consistent finding; that an open plan design does lead to increased communication amongst the members (Brooks and Kaplan, 1972). This would appear at first sight to be the physical situation most compatible with interdisciplinary research however it is now recognized that not all individuals can work effectively in this situation. For those individuals requiring some privacy, compartmentalized facilities offsetting the open room should ideally be provided.

II. Membership Approaches

Whether an interdisciplinary team works effectively on an organizational task is likely to depend in part on the group composition. Schein suggests that for any effective work to occur in a team there must be a
'consensus of basic values' (Schein, 1970, p.88). The research of Pelz and Andrews (1966) confirmed this suggestion. They demonstrated quite clearly the effect of the degree of emotional security in a group through commonality of values on group effectiveness.

Previous differences in status may also prevent communication and consequently impede work effectiveness. It is possible that a low ranking member in one discipline may lack confidence in expressing his point of view in the presence of a member of superior rank from another discipline. Furthermore, status differences may mean that some points of view are more competently researched than others. If possible, all members of an interdisciplinary team should be highly competent in their own discipline.

The high degree of uncertainty in the interdisciplinary situation requires individuals with a tolerance of this uncertainty. One can be reasonably confident that if prospective members fully understand the degree of uncertainty involved, self-selection of members with a tolerance for that environmental quality will take place. This assertion is based on Budner's (1962) research which showed that intolerance of ambiguity was related to career choices among medical students, the acceptance of the role of social and psychological factors in medical treatment and the evaluation of one's preferred field of practice in terms of structure/lack of structure. However self-selection should not be relied upon and active selection methods should be used to check whether individuals are endowed with enough of this quality to demonstrate active willingness to overcome language and conceptual problems in order to understand other disciplinary points of view. Without a high tolerance of ambiguity in the group, tension and unproductive defensive reactions such as 'hiding one's head in the sand' or the scientific snob reaction of belittling the other disciplinary point of view, are likely to occur (Kahn et al., 1966).
Given that selection in terms of values, status and tolerance of uncertainty can't be 100% effective, communication problems are bound to occur. When this happens it is essential that the group recognize the break in communication and confront the problem. This requirement plus the great body of research concerned with emergent leader behaviour in leaderless groups suggests the need for a co-ordinator to direct attention to communication breakdowns and keep ideas in balance.

Studies of creative scientists by Roe (1953), Cattell and Drevdahl (1953), Eiduson (1962), and Chambers (1964), suggests that physical scientists are much less sensitive to social relations than social scientists. Co-ordination in groups with a high component of natural scientists is likely to be quite important.

III. Organization Development Approaches

As well as analysing structured elements which must be considered in the setting up of an interdisciplinary group, it is important to recognize the changing and changeable nature of groups.

Because of this, the co-ordinator of the group is placed in a most demanding role in an interdisciplinary team. Group task and maintenance factors have to be balanced throughout the life of the group for optimum task performance. This means that he must have:

1) Good liaison with the integrator in order to understand the system of planned work flow plus any divergences. (Throughout this essay integrator is taken to mean administrator and data collator; co-ordinator to mean social facilitator.)

2) Some clear idea of the psychological phases that such a group is likely to experience.

3) A great deal of sensitivity to the group situation at any moment so that if uncertainty in the group is dangerously high, he can direct the attention of the group to reducing it.
4) The skills to facilitate communication and discussion and to balance ideas. For instance the synectics techniques reported by Nolan (1972) are particularly appropriate to interdisciplinary problem solving meetings.

The potential to change a group also means that instead of taking environmental factors as fixed and accepting any limitations which may exist in the adequacy of these factors, one can organize training and experiences which can change the ability of the group to work together. 'Laboratory' training is the most common method today and it aims through 'here and now' experience to sensitize group members to various kinds of problems which typically occur in the life of groups. In particular, it attempts to direct the group's attention to the emotional problems which are likely to occur early in the life of the groups when the individuals own needs for identity, status, security and attention are most high. This is most advisable for interdisciplinary groups because in these early stages, the inherent uncertainty in the situation would be very high, and morale could fall dangerously low. However it must be quite clear that in setting up a training exercise, great care should be taken to ensure that the values and assumptions of the training exercise are compatible with the values and assumptions of the team members. Otherwise it will not be taken seriously.