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Federally sponsored research activities have grown substantially in the past few years: they have gone from seven billion dollars in 1960 to about sixteen billion in 1968. (Lederman, 1969, Ch. 1) Can this research sector meet new demands likely to be placed on it? I want to discuss problems that will have to be faced in doing so in this paper.

We are facing these problems because several new substantial problem-sets, requiring solutions and not just study, have come to the fore. They include "urban problems," both physical and social, poverty questions, and a new interest in the environment. The latter has become especially significant in the past six months or so. We see both a concern for the limits of the natural environment, reminiscent of previous worries about the depletion of natural resources, and limitations in the social environment, reminiscent of the concern with urban problems and poverty during the 60's. The solutions we need are policy oriented and require a special kind of mission-oriented research.

We also see a flattening of spending in military and space activities, especially in research and development. We have been left with a large problem-oriented problem-solving (scientific) capability resident in the aerospace firms. These firms claim that their capabilities for doing systematic analyses of defense and space systems, provide them with a special capability for approaching other systems, notably in the

social realm. Hence, enviro-space and urbo-space. These capabilities have been vigorously attacked by Ida Hoos for one. (Hoos, 1968) For better or worse, there exists a large research capability, it is not likely to disappear over night, and its influence is substantial. We must find out how to use this capability most effectively.* What are the likely problems that they will face, especially since they are entering non-military problem sets, involving questions for which value consensus does not exist?

In my discussion I shall leave out much of the current concern for the unscrupulous practices of these firms. (Kalish, 1969; Pahl, 1969; Lang, 1969) Whatever else, they do exist, and they are likely to keep obtaining their contracts even if they are unscrupulous. What we must do, if we are to at least survive their research, is to make sure that we can deal with them in such a way that we get the kind of research we want.

SOME DEFINITIONS

I shall be talking about thinkeries in this paper. A thinkery is a place where people think. Their thinking is supposed to help those who are concerned about public action. It is not likely that thinkeries have to develop new ideas, but they should concern themselves with new approaches or special disseminations of knowledge.** Parts of universities, "think-tanks," and many research institutions could be called thinkeries. The "soft" parts of the aerospace industry, more knowledge based than most industrial sectors, is likely to be a candidate for thinkery material.

* Lederman does not believe that the R&D expenditures will have a reordering in the relative amounts that are spent, though all may change in the same way. If there is even a small leakover of defense level R&D into the social problems area, there would be a substantial flood.

** Machlup (1962) points out how important dissemination activities are.

Almost all of these organizations have dealt with broad, sometimes speculative matters. Frequently they are problem-oriented and problem-solving. And sometimes they are modifying old solutions to fit new problems. Contrary to some myths, thinkers in thinkeries think about the thinkable.

THE PROBLEMS WE BARE

As more research institutions are developed to deal with the new problem-sets that are being articulated in the social sector, certain problems are likely to emerge. I shall deal with some of these problems: the maturation of such institutions, the highly non-consensual nature of the problems they deal with, and the difficulties of developing new kinds of knowledge.

AGING AND ATROPHY

Let me offer a model for the history of the problem-oriented research thinkery. This model is representative of the history of some thinkeries, and not of others.* Its major function is to stress a problem which is common to all of them. (Smith, 1966)

1. The research institute begins with an idea for its existence. The founders, usually very good technically, and emotionally committed to the idea, must get together sufficient funds so they may begin. This may take anywhere from six months to two years. Often the idea for such an institution is generated in conjunction with a client (e.g., Air Force and RAND, HUD and The Urban Institute). The institution is young and open.

* It may represent the history of a "thinkery" part of a larger organization. Also, especially for aerospace firms, we might view this model as being a history of one contract.

2. The next few years can be viewed as being open and beginning. During this time problems are defined, new fields of research are set up, and the organization is still learning enough about the problem so that it could not be said to be fixed in its formulation. The returns to the sponsor may still be very small, if any.
3. The next five or ten years are ones of work and joy. The researchers are exploring the techniques that they have developed in the previous years, they are starting to solve the problems that they have formulated, and they are becoming experts at what they can do. It is likely that during this time that the sponsoring organization is getting a very high output of high quality research relevant to its needs (which needs may have been redefined by the research organization).
4. A period of maturity follows. The best and most creative people of the organization may leave--the excitement of working at the research establishment has decreased. There is developed within the organization a set of experts--but these experts can only solve a particular class of problems. No longer are they so anxious to redefine the problem; they are anxious to exercise their expertise on a suitable problem. There is little infusion of new blood into the organization, and it is likely that the growth of the organization has stopped. Thus upward mobility in the organization is meager. It is likely that we have a staff that is aging and that is "expert."
5. Several adaptations can be made to this state by the research organization. The organization may decide that it is in a state of crisis and proceed to restructure itself. It may decide to continue to offer the services that it is expert at, and not worry about the fact that it is aging.

Problem 1: Research institutions tend to age, and if they do not change they will stagnate.

What solutions are available to such a problem?* We need to create a multi-generational climate within the research institution. Universities do this by having students pass through and train them to various levels of competence. Unfortunately, if there is a decrease in demand for advanced trainees (e.g., Ph.D.'s), research training may need to decrease. Otherwise there will be an oversupply of trained professionals on the market. Other kinds of thinkeries may be able to avoid this problem by training undergraduate (part-time) and post-doctoral researchers. (Dror, 1969)

The institution has to become self-renewing. (Gardner, 1965)

Some people must either be retired gracefully or spun off into organizations which are going to offer a fairly static service. Similarly, the problem that the institution faces will also have to become self-renewing. Perhaps at a certain level of problem understanding, thinkeries should do no further research but spin off new problem institutions with very different missions. These new institutions need not become stagnant if the task that they face is not the fundamental solutions to some problems, but questions of implementation, adaptation, or use of solutions under different environments than the original one.

The renewal problem assumes a different dimension for the temporary style of aerospace. The organization does not atrophy, but in reforming, its style remains unchanged. They must renew in such a way that new problem sets are studied sensitively--education and bombers have significant differences.

* Moravcik and Duffield, 1970, have suggested similar solutions as some of these for the National Laboratories.

ISSUES AND ETHICS

What kinds of problems have thinkeries traditionally dealt with? They have included defense, health, and space. For most of these problems, value consensus exists. Most military research in the early 50's existed in a climate of cold-war about which there existed substantial consensus. The problems that were of concern were not considered partisan political. Even secrecy or partial disclosure were acceptable.

What of the new problems that thinkeries are being called on to deal with? They include the visible questions of poverty and equity, the environment, and our urban places. There exist substantial value differences concerning these issues. Such differences do not depend on scientific questions, but depend on questions of who should get what, where, when, and how, and what is the most humane way of doing so. Not only is there a conflict of value associated with these problems, but there is an ambiguity of client at the same time. Frequently, the client for research is not the same as the organization on which the research is being done. In the case of military concerns, this was no problem. The enemy was the enemy. We have a somewhat less clear case when the Ford Foundation sponsors research on helping the urban poor. And insofar as clients represent interests, a choice of client, in some very real sense, determines the value orientation of the research that is being done. (Horowitz, 1967)

Some would like to escape this dilemma by assuming that some research may be done under a looser relationship with the client. The client may be able to give you money, but your research can be freely directed. However, a subtle subversion of personality is likely to take place in such circumstances, and there are not many today who are willing to believe that sponsored but non-client oriented research really does exist. (Mandelbaum,

1970) The audience for research may will depend on who can pay. Irving Lewis Horowitz has put it: "...There is a direct relationship between the ability to pay and belief in the utility of the social sciences..." (Horowitz, 1967).

Problem 2: Thinkeries can no longer be value neutral bodies. They need to clarify the relationship between client, problem, organization, and researcher.

The alternatives open to the thinkery are many. I will list several of them.

1. The organization can adopt the point-of-view of the client. There may be some conflict with the values of the researchers in the organization who feel that they cannot adopt the values of the client. Presumably, they can leave and join another organization. Who will do research for the poor then? It may be true that there can be clients who are proxies for the poor, but not many are willing to accept the equivalence of the proxy and the poor nowadays. Some suggest that we initially "adopt" the clients view and then proceed to educate the client so that we may alter his view. The researcher in the thinkery may educate his client; the question we want to ask is how much education does the researcher receive from his client?
2. A research organization may adopt a certain point-of-view and then search for clients who are willing to support that point-of-view. This strikes me as a particularly straightforward and admirable stand and one that is likely to survive. There will be those who are willing to pay for research that will help the poor, without being sure of what are the values of the poor. There is one problem that will be faced by those who adopt this option. Will other researchers believe you if they differ with your

fundamental beliefs? I believe that it is possible, at least, to reach some consensus about the value of another thinkery's research. It is likely that research done by a thinkery that adopts this stand will have to be more explicit in its arguments and more convincing if it wants to convince the unconvinced. Whether the research will be honest depends not on the stand that is taken, or that the thinkery has announced a stand, but on the integrity of its members.

3. The thinkery may adopt the point-of-view that is most popular at the time. The politics of the thinkery can be the politics of the majority of the country. The organization can tow the line of the government, twisting back and forth as that line twists.
4. The thinkery can ignore its source of funds. Its point-of-view can be the point-of-view of its researchers. The organization may not even have some internal consensus, but offer only brilliance and inventiveness as a warranty.

One problem will loom large for such a thinkery. Can it survive? It may be quite difficult for a research organization that does not guaranty a certain point of view to survive, considering how research reports are used. Frequently, their purpose is to corroborate a previously decided upon position and not to determine new facts. Rarely is a report so convincing that it serves to change the mind of those who have commissioned the report. Therefore, it is likely that these organizations will have their report hushed up. Will the iconoclasts who make up this thinkery be satisfied with such a final state for their work?

5. The thinkery may have some free clients. Just as some legal firms now let their younger lawyers get involved with poverty cases, so that they may keep some of them in the firm, some thinkeries may

decide to offer free research to certain organizations which cannot afford to pay. This idea has great merit. As in the case of free legal services, there may be conflict of interest between the paying clients and the non-paying and so this form of research aid to the poor may not be viable.

6. Finally, there is an approach taken by the action-thinkereries. These thinkereries claim to take a specific point of view, are concerned about pushing specific problems, and do not maintain an air of being "scientific." This is not to demean their competence, but to suggest that there are attitudes other than the scientific acceptable in a thinkery. The problems these organizations face are peculiar. Their clients, who may be quite sympathetic with the thinkery's aims, feel that the thinkery is too close to those who are going to be served by their research results. Is it true that they are more in cahoots with the interests of the poor, if they are a black organization, than they are in the interests of certain industrial clients if they are white?

THINKING ABOUT THE THINKABLE

Why do we set up thinkereries to deal with problems?* It is because the state of knowledge concerning these problems tends to be quite poor. There do not exist "ways out" of the problems, and people are not so sure the articulated problems are the sources of their discontent. The standard disciplinary approaches at hand have not worked.

Problem 3: If thinkereries are to go into new problem areas, the initial investments in human capital will be substantial and there may be lengthy delays in receiving the fruits of such investments. If the government does not deal with this problem directly, then the kinds of research we are going to get out of thinkereries will not be most responsive to the new problems. The consequences of this are peculiar.

* "Keeping the intellectuals employed," is a useful but not sufficient explanation.

1. We are going to have to put substantial public funds into thinkeries so that they can become capable of solving problems. The small initial contracts that they receive to do research are not sufficient for them to start up and develop some unique capability to solve problems. HUD's funding of the Urban Institute, or the substantial grants to start the New York City Rand Institute, are cases in point.
2. Thinkeries will need substantial amounts of money for speculation and for some research that is bound to fail. If these organizations do not take substantial risks, informed by their greater capability and knowledge of certain problems, then who will? The case of urban model building which was supposed to solve problems, and in the end resulted in the education of a group of urban specialists, comes to mind. We need to sponsor some research which has a high probability of failure or impracticality. What are suitable levels of risks for such endeavors?* In military research, the amount lost can be awfully large before it is considered too much. Whether military research is the place to look for models of risky research is another question.
3. The investment in thinkeries will be difficult to recover. Much of the investment will go into the development of human capital. This human capital has the habit of migrating easily to other organizations and of being quite impossible to impound. Also, the money invested and the benefits thereof are frequently disbursed, through reports and journals,

* Unfortunately, the problem of knowing when to stop speculative research is very difficult. San Francisco did not fund A.D. Little's simulation efforts forever. The client will have to decide when it cannot afford longer term investments--and the researchers will have to make the future loom larger in the present if they want to continue to work speculatively.

so that the total benefits are spread much more broadly in the society than in a single firm. Such a "public good" justifies public investment. The current problems of the Systems Development Corporation in going private is a case in point. (Dahl, 1969)

4. Thinkeries may have to adopt research strategies that are so structured that some fast payoff results occur. It is likely that some high-payoff, low-cost results can be obtained from a thinkery due to the synergy available when a new problem is approached by traditional disciplines. An example of this is "slippery water," which was invented by a chemist who looked at some of the problems of the Fire Department in New York City, for the New York City Rand Institute.*

CONCLUSIONS

1. Thinkeries will have to develop a capacity for renewal; this may mean that they will have to adopt some of the techniques of the university, suitably modified, so that they can incorporate many generations into their staff.
2. They will have to develop a way of spinning off expertise, problem "fixes", and experts, if they wish to continue to be thinkeries.
3. They will have to learn to develop diversity so that they may deal with many clients, including the poor, and at the same time to be true to their own values.
4. Finally, thinkeries require investment, comparable to the national investment in nuclear energy, whose return can only be measured quite indirectly and only over a longer run than is usually done.

* Ed Blum found that adding polymers to pumped water increased the flow rates in the hoses and let water rise higher.

I have not answered some "how" questions here. If an organization can be renewing, then what is a good technique for doing so? When is the thinkery stagnating, and when is it hibernating?

If a thinkery is about to maintain some value position in an explicit way, what are organizational implications of doing so? Should it be big and multidisciplinary. Should it be temporary, put together for the moment? Should it be a conglomerate, with lots of trading around? And what if someone is about to come out with a "hot report." Congruent values will not necessarily keep clients under the same roof.

What is the best way of paying for the public goods aspect of research. Should we let such profits remain untaxed if research results are publicly reported? How do we disseminate problem solutions in a better way than the written report?

What is needed is an incentive system to make these organizations be responsive to the problems posed here. If their main concern is "self-perpetuation" (as Ida Hoos suggests) then it would be worth the while of those who would use their research to build in "killer effects" for the thinkery most likely to be bad. Can we reward reorganization by paying people to change and retire? Can we actually go out and hire the most political of the thinkeries rather than the value-purest? Can we make them publicly accountable for their suggestions? Can we account publicly for what they do and treat these investments as public goods, while at the same time not let the few benefit disproportionately from governmental expenditures.*

* Current fiscal problems of Lockheed, which uses 80% government owned facilities to build the C 5-A, suggest that we have not learned how even for the "builderies."

The real problem that remains, and the problem for which I have no sure solutions, is how to get thinkeries to do "good" work. In a way, the problems referred to by Kalish and other critics of thinkeries exist in almost all government research and government contract work. The problems that I have referred to in this paper are some of the most crucial problems that these organizations face. If we can make the support and design of thinkeries responsive to these problems, perhaps the thinkeries will behave somewhat better.

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