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DISSEMINATION AND TRANSLATION ROLES IN EDUCATION AND OTHER FIELDS, A COMPARATIVE ANALYSIS.

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LINKING ROLES IN THE DISSEMINATION AND UTILIZATION OF KNOWLEDGE ARE INVESTIGATED. THE VARIOUS TYPES OF AGENTS LINKING RESEARCH AND PRACTICE INCLUDE--(1) THE CONVEYOR, (2) THE CONSULTANT, (3) THE LEADER, (4) KNOWLEDGE BUILDERS, (5) THE DEFENDER, (6) THE INNOVATOR, (7) PRACTITIONERS, AND (8) THE USER. THREE ISSUES CONCERNING THE INSTITUTIONAL CONTEXT OF THE LINKING ROLE ARE EXAMINED--(1) INSTITUTIONAL BARRIERS WHICH AFFECT KNOWLEDGE DISSEMINATION AND UTILIZATION, (2) INSTITUTION TYPES WHICH MOST EFFECTIVELY SUPPORT AND CONTROL LINKING ROLES, AND (3) INSTITUTION TYPES WHICH SERVE AS LINKERS. ENDEMIC PROBLEMS IN LINKING ROLES ARE SUMMARIZED IN TERMS OF OVERLOAD AND MARGINALITY. PLANNING AND ADMINISTRATION REQUIRE FOUR ACTIONS TO BUILD A FUNCTIONING SYSTEM OF KNOWLEDGE LINKERS--(1) BUILD AN INSTITUTION WHICH INCLUDES AND SUPPORTS THE REQUIRED ROLES, (2) RECRUIT CANDIDATES TO SERVE IN THESE ROLES, (3) TRAIN THESE RECRUITS TO FILL THE ROLES, AND (4) SUPPLY THEM WITH THE EQUIPMENT NECESSARY TO HELP THEM DO A GOOD JOB. THIS PAPER WAS PRESENTED AT THE UCEA CAREER DEVELOPMENT SEMINAR, CO-SPONSORED BY THE UNIVERSITY COUNCIL FOR EDUCATIONAL ADMINISTRATION AND THE UNIVERSITY OF OREGON (17TH, PORTLAND, OREGON, OCTOBER 22-25, 1967). (HW)

DISSEMINATION AND TRANSLATION ROLES IN EDUCATION AND OTHER FIELDS

A Comparative Analysis

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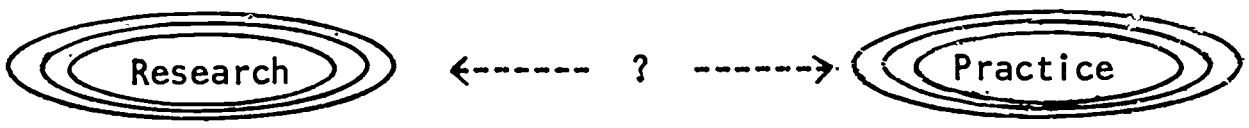
Any detailed consideration of the dissemination and utilization of knowledge must sooner or later focus on the question of linking roles. Who sees to it that knowledge gets to the user? Who is charged with the responsibility of retrieving basic or applied knowledge, deriving practical implications from it, and distributing it to people who need it and can use it?

A natural starting point for a discussion of linking roles is a birds-eye view of what is often termed "the knowledge gap": the situation for which linkage is required. Figure 1 depicts this gap: the two enclosures represent

Figure 1



two social systems each defined and identified by its own set of rules, values, languages, and communication patterns. Those norms which are shared within each system also define their separateness from each other. There is an inadequacy of shared values, common perceptions, and inter-system communication patterns.

The linking role argument is that this gap can be bridged effectively if additional persons or groups are interposed between the two systems as in Figure 2, these additional intermediaries being specialists in the process of linking itself.

Figure 2

The question which really should be asked first is this: are linking roles necessary? Is it not better for knowledge builders to pass their findings directly to potential users? Do we really need someone in between to translate (and possibly distort) the researcher's knowledge? Isn't this the simplest, most efficient, solution we could possibly come to for the linkage problem? There is no easy answer to this question, but in the presentation which follows we will try to address ourselves to it. We will try to show what all the components of the linking function are and with that understanding we will return to ask this question again.

This paper will begin with a review of the various roles which do seem to serve the primary function of knowledge linking. Following this review, these same roles will be cast in their institutional context with consideration given to the institutional barriers to knowledge flow both on the knowledge builder and knowledge user sides, and to the institutional arrangements which facilitate the linker's activities. The presentation will conclude with a summary analysis of what appear to be the endemic problems in the linker concept and some thoughts about how it ought to be developed in education. We will endeavor to be practical, indicating what types of linking roles seem to be most suitable and effective for what linking tasks, what characteristics and skills need to be considered in recruiting and training linkers, and what kind of institutions need to be created to secure these roles and to make knowledge linkage an embedded feature of our national educational system.

A. A TYPOLOGY OF LINKING ROLES:

One of the first facts we should be aware of when we discuss linking roles is that there are a great variety of roles which could be said to be linking in one way or another. Indeed, connected to every phase, every aspect, and every

problem in the dissemination and utilization process, one could conceptualize a specific role: someone responsible for retrieving knowledge from basic research for the developer, someone responsible for identifying new innovations in practice for other practitioners, someone responsible for writing handbooks and producing packaged knowledge for potential clients of various sorts and so forth. The range of such roles is suggested by some recent attempts to classify them. A well-known typology current in education is that developed by Clark, Guba, and Hopkins in a number of recent articles (e.g., 3586*). They have posited a sequence of interrelated roles which correspond to various stages in a research, development, and diffusion sequence. Under "development" they include roles for "inventing," "packaging," and "evaluating," while under "diffusion" they list "informing," "demonstrating," "training" and "servicing" or "nurturing." Another educator (Hencley, 6032) offers a "taxonomy" of research and development roles which includes "quality controllers," "social bookkeepers," "design engineers" and "researchers who concentrate on diffusion." One could go on to other theorists and taxonomists in education and other fields to find similar lists. Each list has its own special logic and its own special elegance. It is, therefore, with considerable trepidation that we set out to compile our own typology, piecing together from diverse sources those concepts pertaining to linking roles which seem to be non-redundant and conceptually additive or integrative.

A cautionary note may be in order before we proceed, however. As in any classification, the "types" offered here are all somewhat fictional, something on the order of "ideal types." When we look at linker *in vivo* we find that he is a mixture, playing several linking roles in sequence and simultaneously and indeed sometimes not playing the linker at all.

Here, then, in table one is a typology of linking agents drawn from a wide spectrum of sources across many fields of knowledge, and grouped under major headings which suggest their most salient functions or the assumptions about the transfer process which each set seems to imply.

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* These numbers used to identify each citation refer to the Bibliography on Knowledge Dissemination and Utilization being compiled by the author for the U.S. Office of Education.

(Insert Table 1 Here)

1. The Conveyor:

The most rudimentary and simplistic linker concept is the "conveyor" (3041) or "carrier" (6029), one who takes knowledge from expert sources and passes it on to non-expert potential users. The "knowledge," of course, could be in the form of research data, information derived from research, "packaged" knowledge derived generally from scientific knowledge in the form of curricula, printed materials, and training programs, or it could be supplies, products, services, or practices founded on or derived from scientific knowledge in one way or another. The pure conveyor concept suggests that such knowledge is passed on pretty much in the form that it is received. It seems doubtful, however, that anyone in a linking role performs in such a limited capacity. Perhaps the salesman comes as near to this pure linking role as anyone, taking from the producer a fully developed, fully packaged, and fully usable product and placing it in the hands of the user. There is very little question that salesmen in all fields play important knowledge linking functions (6062, 3886, 2340, 5385, 1447). Even the salesman, however, may be helping the user in a more complex manner than is usually conceived. The drug detail man may give the doctor samples and literature of various sorts and he may, in addition, tell him what drugs Dr. X in the next town is ordering (Bauer, 2340). The grain elevator operator (1447) may pick up items from agriculture experiment station bulletins so he can pass on useful bits to farmers and thereby develop firmer ties of friendship and respect.

Another role which may come close to the pure conveyor type is the extension subject matter specialist in agriculture. A full time agent of the Agriculture Extension Service (AES), he is based in the university and is responsible for keeping the county agents informed and up-to-date on new developments in his special area. There is some research evidence that these extension specialists do indeed see their role primarily as that of one-way communicators of university research to the counties (Brown, 2866). Nevertheless, the linking task of this specialist is a sophisticated one. He must take research findings in raw form and package them into pamphlets, programs, projects, lectures, training courses and other forms which are

readily digestible by the county agent and his farmer clients. Such a variety of tasks would in industry involve such varied roles as research retrieval, engineering, production, packaging, advertising and marketing.

A similar linking role is played by the science reporter (e.g., Wood 3897), who retrieves and interprets knowledge from a wide range of scientific sources, even if he specializes in one field, and draws forth items which appear to be of interest to the general public.

Mention should also be made of the teacher, particularly the traditional role of one-way knowledge communicator in the classroom. For the most part in this discourse, we are paying little head to this conventional, ubiquitous, and obvious pattern of knowledge linking. Let us pay homage to this role, however, as perhaps the parent of the many less obvious and more sophisticated linkers which are the primary focus here.

Of all conveyor types, the one most frequently cited and viewed as a classic is the county agent of the AES, who is most frequently viewed as a one-way communicator of new technical information from the state university to the farmer. Various studies of the "image" of the county agent indicate the prevalence of this limited conception (3052, 3516). This view is not shared by the county agent, himself, however, and is not confirmed by researchers who have studied the role in depth (e.g., 1129, 5385). In fact, the county agent serves as communicator, teacher, consultant, demonstrator, helper, and community leader, culling information from a variety of sources and disseminating it in a variety of ways.

When planners and policy makers in education discuss the need for more disseminator and diffusor roles in education (e.g., 3586) they should be sensitive to this distinction between "conveyor" and a more complex conception of linker. There is, nevertheless, a distinct logic to the simple concept and a distinct utility if it could be made to work in practice. The trouble with the concept may be in large part one of "image." The fact is that terms like "disseminator" or "conveyor" sound to most people like "errand boy," and "runner." Znaniecki, for example, describes the disseminator function thusly: "while important socially (to develop support

for scholars), it is scientifically unproductive" (6033, page 150). Halpin (0641) puts the matter bluntly: "I can only writhe as I watch the fatuous and condescending attitude of both the scientist and educational practitioner toward prospective middlemen. Even the advocates of the middleman plan imply that the middleman should serve as a type of editorial assistant, at a status level only slightly above that of the average secreatary and certainly below that of the research technician." (page 198).

Such comments may well be valid in the main. There are some conveyor-type linkers, however, who escape stigma altogether. In particular we can cite the by now well-established role of scientific expert or advisor. Perhaps beginning with the mobilization of brainpower in the Second World War, there has been increasing interest at the highest levels of government for advice and presumably expert information from distinguished scientists. In repeatedly answering this call, some of our most renowned scientists have, in effect, turned themselves into knowledge linkers of the conveyor type. Unfortunately, there have been no quantitative and thorough empirical studies of this role of scientific expert, although much has been written in a journalistic vein. Most writers focus on the question of the legitimate or proper role of the scientist in the policy-making and decision-making process. Many warn of the dangers of too much reliance on experts. For example, Moulin (3382) notes that experts are replacing public opinion as guiding forces in political decisions (hence possibly subverting democracy). Schilling (3402) and Michael (6190) warn that scientists may disguise personal values and partisan viewpoints in the form of "expert advice," while Penders (6042) cautions us that expertese at the top, while indispensible, should only be used in conjunction with heavy local responsibility. On the other hand, some writers deplore the relative powerlessness of the scientist-expert. Sponsler (3422), for example, contrasts the influence of scientists in the Soviet Union and the United States: there they are "on top," in significant policy roles, but here only "on tap," and therefore functioning in a marginal and less-than-optimum capacity. On the other side of this argument, Leiserson (1146) says that as we move from "technical" to "policy" advice, the scientist's role becomes less vital and this is as it should be to protect and maintain his status as an objective knowledge source.

Another successful, if less exalted, linking role is found in some sectors of industrial R & D in the title of "systems engineer." As this role is depicted operating in the Bell Telephone Laboratories (Morton, 6184, Havelock and Benne, 3872) it allows basic researchers and development engineers to pursue their separate special interests without "interference" from management. The systems engineer looks over their shoulders, pulling out ideas and popping them in when it seems appropriate, but not disrupting their ongoing creative efforts. One might assume that such a person would be subjected to second class status as depicted by Halpin. In fact, however, he survives and prospers to the point where upper management looks to this group for future leadership positions.

To sum up, the conveyor concept of linkage is a very limited one but has wide-spread currency; it is what people usually think of when they think about special roles to disseminate knowledge. Very low valuation, by researchers and practitioners alike, suggest that it is a problem role under most circumstances. There are instances, however, where conveyor-type linkers are accorded high prestige and are able to operate with high effectiveness.

2. The Consultant:

In its purest form the consultant role is not necessarily a knowledge linking role at all. The consultant is, rather, a facilitator, helper, objective observer, and specialist in how to diagnose needs, how to identify resources, and how to retrieve from expert sources. He tells "how" in contrast to the conveyor, who tells "what" (3041, 6029). The underlying rationale for consultation is that only the client, himself (the user), can determine what is really useful for him. Therefore, when others come to his aid they should do so as collaborators (3692) or encouragers (motivation builders, 1319). It is up to the consultee to take initiative (3550) and when information is given, he is in a position to take it or leave it. Bidman (1335) notes that five characteristics distinquish consultation from education (the conveyor role): first, the consultee initiates; second, the relationship is temporary and specific; third, the consultant is from a different professional discipline than the consultee; fourth, he is advisory only, having no responsibility for implementation; and fifth, he has no administrative relationship to the consultee.

Consultation is often depicted as a second best procedure, a very passive, impotent, almost bystander role (6012, 2993), but two relatively recent developments have added considerable depth to the concept. One of these has been "mental health consultation,"[1] first advanced by Coleman and later refined by Gerald Caplan (2079). From the psychiatric interview came the insight that "help" really starts with "help me to understand myself" and "help me to define for myself why I need help and what help I need." This concept has been generalized from the mental health professions to all forms of helping and applies equally to knowledge linking. When someone comes to someone else for "advice," what they need first and foremost is an understanding of what their problem is and how they are reacting to it. The consultant, therefore, should allow the consultee to tell his story, not so the consultant may be informed, but so he himself may be informed. This type of relationship calls for restraint and a non-directive stance by the consultant and a withholding of advice, expert information, and a minimum of programming for the consultee.

A somewhat different concept of consultation has been developed over the last twenty years by the staff of the National Training Laboratory under the label of "change agent" (Lippitt, et.al., 1343). The "change agent" consultant, like the mental health consultant, emphasizes the need for client self-diagnosis and problem definition, but the change agent is flexible in what he gives. He may assist in the diagnosis by showing the client how to conduct a self-survey (Selltiz and Wormser, 6181), or by conducting a self-survey for the client (5219, 5221, 3913). He may provide the client with skills in problem formulation and problem solving and he may make the client aware of various change strategies. The change-agent consultant is, therefore, an active participant and collaborator and a conveyor of knowledge about the process of change itself.

Both of these developments in consultation have come a long way in their twenty year history, each developing as a distinct profession with its own

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[1] This should not be confused with psychotherapy, psychotherapeutic counselling or other varieties of treatment for mental illness in spite of some similarities in historical origin and assumptions.

rules and institutions. Most recently, however, there are signs of a merging of, or at least a mutual learning between, the two movements, the change agent group becoming more clinically sophisticated and the mental health consultation group more concerned with active helping and collaborating with the client (Chin and Benne, 6113).

While such refinements in the concept of consultation are now widely understood and accepted, the reader should be cautioned that the actual term "consultant" is still used very loosely to describe any type of advice-giver or expert, including the "conveyor" type discussed earlier.[2] Many writers use the term to describe someone who is peripheral to the mainstream of decision-making, either because his expertise is not recognized or valued,[3] or because he needs to retain the onlooker's objectivity.[4] The term is used by Schein and Bennis (6077) merely to distinguish the outside change agent (the "consultant model") from various other change agent roles which operate within the client system.

We may be able to gain some perspective on the concepts of "conveyor" and "consultant," as used here, by a comparison of some of their attributes. We do not wish to stress the value of the consultant over the conveyor as

(Insert Table 2 Here)

this table may imply. The emphasis should be placed on the unique contribution which each type of role may play in a total program of knowledge dissemination and utilization. The two roles may be and can be used effectively in a coordinated development program, with the consultant type preparing the client or client system, building a readiness to change and an openness to outside expert knowledge and an understanding of how and when to use such knowledge. Glaser, for example, (6097), in a carefully controlled field experiment, found that psychological consultation developed greater client receptivity to "research, demonstration and innovations developed by others."

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2 Fairweather; 6189, "Social Action Consultant."

3 Early use of mathematicians in industry, 2993.

4 Peter summarizes the viewpoint of social scientists about their action role: "observe and do research but remain essentially aloof from action programs" (6057).

On the other hand, the conveyor is needed to provide crucial technical information at the time when the client is ready for it. Wilkening (5385) found that the county agent was relatively ineffective as an introducer of new ideas, but when it came to translating innovations into practice and adapting to personal use, he was crucial. As we have mentioned previously, detailed studies of the effective county agent show him taking a variety of roles at different stages in the adoption process (Stone 1129, Penders 6042), sometimes encouraging and assisting the client with self diagnosis, sometimes providing new information, sometimes training or retraining, sometimes providing encouragement and reinforcement.

There are a number of other roles which are akin to the "consultant" in that they are not directly providing knowledge but rather facilitating the process. Reiff and Riessman (3218) discuss the role of "expeditor" as an ideal role for the indigenous non-professional. The expeditor is one who "sees to it that service is given" to the user. Such a person would be able to identity with client needs and concerns and yet be influential and knowledgeable about the resources of the serving system. Where this type of role deviates from the consultant concept is in the idea that partisanship (on behalf of the client) is a useful and in most cases necessary stance for the linker. We will return to this question later in discussing the role of "defender."

At the opposite extreme is the "mediator," one who is officially and legitimately objective. This notion of linkage is throughly legal. It assumes that knowledge producers, conveyors, and clients are all basically partisans and potential adversaries. Thus, relations between doctors and patients, seller and buyers, writers and readers, and teachers and students are regulated by specific norms and rules which are codified in our legal system. This system, in turn, is administered by an officially "objective" group: the judiciary. Probably the role of the judiciary has been most prominant in the field of psychiatry (Tershakovec, 3251). The marginal status of psychiatry as a medical science leads to considerable conflict and confusion between psychiatry and the public on such critical questions as "what is mental illness?", "what is the proper treatment for mental illness?", and "what is the difference between mental illness and criminality?". Decisions on these questions are not made by the "experts" but by the judges after

listening to experts and reflecting on the needs of society. The utility and appropriateness of this sort of middleman may be disputed in specific cases, but it is probably an indispensible last resort when problems of linkage have turned into conflicts.[5]

3. The Leader:

Both the conveyor and the consultant are typically outsiders as far as the receiver-user is concerned. They are not likely to be linked to him in a formal organizational sense, nor are they likely to be related in a reference group sense of being "one of us." There are, on the other hand, a great number of roles which create effective linkage through power or influence within the receiver's own group. We discuss these various role types under the designation "leader."

To begin with, there is good evidence that formally constituted leaders (administrators, supervisors, directors, presidents) do have a major effect on utilization of new ideas. Carlson has shown this with respect to school system superintendents (1174), as has Richland (3698). Just how the administrator brings about utilization, and what sort of role he plays in the process, is more problematic, however. Some authors (e.g., Ashby, 1279) seem to suggest that he is sort of a funnel through which all information comes to the users. Others[6] indicate that administrators function as "facilitators" or "supporters" of the user's efforts to retrieve and utilize new ideas.

A concept related to formal leadership, but used more typically in the area of planned change and diffusion, is that of "gatekeeper." This term was first introduced by Lewin (2640, 1342) in describing housewives as the focal persons through which influence on household eating habits had to be channeled. Many receiver systems may be so organized that there

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5 Many readers may see this inclusion of judicial and legal roles within the linking role concept as rather muddy. It must be agreed that they are not primarily knowledge linkers, but only serve this role on occasion.

6 Chesler, 2607, on the role of the school principal, and Carey, 3602, on the role of the University president in the development of evening colleges.

is a distinct "gate" (specific set of rules, norms, etc.) which must be passed to get free access to a group of receivers. In bureaucratic organizations this "gate" may be controlled by the "boss," the formally designated leader, or it may be controlled by some other officially designated person (e.g., editor).

The "gatekeeper" concept is significant in that it reminds us to note the channels and barriers which represent the client-user system and the access routes to it. The gatekeeper is the one who holds the strategic position. The gatekeeper can be the leader, but organizational charts and official power may be misleading. In most parts of the world, for example, the oldest male is the head of the household and is accorded the highest prestige. Nevertheless, it may be the female who controls access to those critical areas of personal life which are of most concern to the development worker, for example, dissemination of birth control information, sanitation procedures, food preparations, etc. Cama (6044), for example, notes the great potential of utilizing women in development programs for these reasons.

The formal leader and the gatekeeper (strategic role holder) are both to be distinquished from the opinion leader (0295). There is a large body of literature supporting the view that the vast majority of those who eventually adopt new ideas do so because they are influenced by some other member of their own group. When this pattern of imitation is focussed on one particular person and is stable over time and across a number of innovations, we can speak of "opinion leadership."[7]

That judgments and attitudes are influenced by the social environment is a well established fact in social psychology. People do have a tendency to conform to the opinions and behaviors of those around them, not only in unstructured situations,[8] but even where there is direct sensory

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[7] Actually, this definition is not universally accepted and there is a need for clarification. See Rogers' discussion, 1824, especially pages 209 to 214.

[8]

evidence which contradicts those opinions and behaviors.[9] This phenomenon of conformity in itself may be responsible for many kinds of adoption behavior, but there is considerably more which should be understood to appreciate the opinion leadership concept. For one thing, conformity is not typically blind acceptance of what anybody who happens to be present is doing or saying: there are spheres of conformity, specific kinds of groups, often called "reference groups," within which there is likely to be high conformity on certain issues. In other words, people are distinctly selective in their acceptance of the opinions of others, and their selectivity is based largely on prior experience and background. For example, most farmers have most of their discussions and exchanges about farming with other farmers. Therefore, naturally, "other farmers" are their reference group for new ideas on farming. Some farmers, however, have had many successful encounters with the extension service. In these cases the conveyor and opinion leader functions can be fused. Thus Beal and Rogers find that the agricultural scientist is a significant referent for the most innovative farmers (1351).

The county agent example is offered to make a point: reference group members can be on a rational as well as non-rational basis. There are certain people I trust for new information and there are certain people I don't trust, but this may have little to do with personal friendship or liking. There is no doubt that friends and neighbors seem to be critical influences in the adoption process (e.g., 2690, 3886, 2535). Yet the influence they exert may not be based solely on "good fellowship" as this may imply. Indeed, if experience has told us that our friends are not reliable sources of information, we will often ignore their advice. What counts is our perception of others as exemplars. It is not so much "being like me" as "being what I aspire to be" or "being what I would be if I could." Thus both Blackmore (2492) and Wilkening (1923), in different settings, found that test demonstrators who were effective were seen primarily as "good farmers."

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9 Asch experiments asking subjects to compare lines of various lengths.

Discussions of opinion leadership have typically focussed on what is known as the "two step flow of communication" hypothesis, first introduced by Lazarsfeld and others in an analysis of voting patterns in 1940 (6182). According to this hypothesis, mass media of communication, which are presumably beamed at the public as a whole, are actually only influential with a small portion of externally oriented, media-oriented, people. It is these people who in turn influence the remainder of the public through their opinion leadership.

The theory has proved to be problematic in many ways (see Katz, 0295, and Rogers, 1824), particularly in implying: (a) that there are only two steps; (b) that there is only one channel through which a given individual may be influenced; and (c) that those who are influenced by media are in fact the most influential people, i.e., that media-oriented people are opinion leaders. Extensive literature surveys of the diffusion process (e.g., Rogers, 1824) emphatically contradict all three of those assumptions.

The point which sould be made here is the need to know how the opinion leadership is constituted and organized. We should recognize above all that opinion leadership is something which is present in every social system and every reference group, but we should not assume that such leadership, when found, will be progressive, i.e., that it will encourage the adoption of new ideas. Hoffer (1852) notes that "high quality and quantity of well-recognized extension-oriented leadership were all found to be positively related to success of the extension program." In other words, the extension service depends for its success on a core of progressive leadership in the client system. This same point is made by many who have discussed the problem of national development. For example, Hull (1768) states that there must be an elite of powerful modernization proponents before technical assistance will "take." Otherwise, advise will be ineffectual. Interestingly enough, the same point has been made about introducing change in our own urban communities in the United States. There needs to be a stratum of informal (as distinct from purely political) leadership in the community which is not only effectively oriented toward new ideas from outside but which is also effectively linked to the "followers"

within their own community. This has been demonstrated in survey studies of the social integration of American cities (Angell, 6193).

The importance of opinion leadership, in contrast to formal leadership, probably relates to the degree of formal coordination of the user social system. Presumably, the more loosely structured the system the more important is the role of opinion leadership. Thus in farming (individual land holdings), medicine (individual physicians working out of their own offices), and academic settings (individual scholars working on independent self-determined research projects) colleague influence may play a determining role. It is less clear what constitutes opinion leadership within bureaucratic structures, i.e., among organizational scientists, hospital staffs, government departments, corporation employees, and school system personnel. It might be argued that opinion leadership is an important concept for these groups also, but only among the leaders of more or less autonomous units (e.g., among directors of laboratories, hospital administrators, corporation executives or executive boards, and school system superintendents).

Before leaving the concept of "opinion leader" we should also see how it relates functionally to the "conveyor" and "consultant" described above. Katz (0295) suggests that the opinion leader serves three purposes for the receiver-users: he provides (1) information (conveyor), (2) a standard to follow (conformity to reference group norms), and (3) social support for adoption decisions. In other words, he seems to serve similar or overlapping functions to those of conveyor and consultant. It would appear, however, that the distinctive aspect of the opinion leader is his insideness. The opinion leader is above all a legitimator of new ideas and practices.

Anyone contemplating a program of diffusion should consider the implications of opinion leadership and legitimation. In a stable client system with identifiable and strong indigenous opinion leadership, it may be a wise strategy to take the opinion leaders as primary communication targets. But when this leadership is not strong, the attempt to make them inside change agents may alienate them from the rest of the client

system and disrupt whatever community coordination may have existed previously. At the same time, to select members of the client system who are marginal in status and isolated from other members is equally fatal to a change program, unless some means are found for legitimating these insiders to their colleagues.

4. The Innovator:

The last point leads us directly to a consideration of another type of role easily confused with the opinion leader but clearly distinct both conceptually and empirically, the "innovator," the first person or persons to take up a new idea. The "innovator" may or may not be original in an absolute sense (inventor). As used here the concept means the earliest to adopt a new idea within a particular social system.[10]

At this junction the reader might ask why we have included the "innovator" as a "linking role." Does he really link to anyone, or is he simply an accidental by-product of the diffusion of knowledge? We feel that the innovator may be a linker in several ways. First, he may be a latent opinion leader, perhaps through the success and the prosperity which may result from being an innovator. This may be the way in which Blackmore's (2492) and Wilkening's (1923) test demonstrators came to be known as "good farmers."

A second way in which innovators serve as linkers is as demonstrators and quasi-opinion leaders for the real opinion leader. The opinion leader may be reluctant to stake his reputation on an untested product or practice. If he is able to see how someone else (the innovator) fares before he starts, he is in a safer position. This type of flow pattern depends, of course, on adequate linkage between innovators and opinion leaders. If it is true that innovators are isolates, viewed as cranks and oddballs by the rest of the social system,[11] then there is little hope

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10 This definition is very close to Rogers, 1824, page 193.

11 As Barnett would have us believe, 0620.

for this type of linkage. Under these conditions opinion leaders would avoid innovators. Such may well be the case, particularly in very conservative social systems.

The relationship between opinion leaders and innovators still needs clarification. Menzel and Katz (3404) found an inverse correlation between early adoption of a new drug (innovation) and opinion leadership among doctors. They use this finding to suggest that the innovator acts as an "advance scout" for the opinion leader in much the same way as we have suggested here, but the linkage between the two (the innovator and the opinion leader) is left unexplained. They note that rural sociologists have found similarly inconsistent relationships between opinion leadership and innovativeness. To this knot, another loop is added by noting that those contacted directly and those influenced indirectly may be in the same group. Innumerable studies have shown[12] that such factors as higher education, higher social class, larger farms, larger income and cosmopolitan orientation, characterize the farmers who have more contact with the extension system. If these correlations represent a cluster of attributes which define a very special subgroup, one implication might be that linkage between this group, loaded as it is with potential opinion leaders, and the larger group of low education, low income, small farm, localite farmers, may be a real problem. Research clearly is still needed to untangle this problem, to discover if and how the chain of innovator-opinion leader-follower works.

A third way in which the innovator may become an effective linker is through the active advocacy of the innovation. The innovation advocate may be a particularly useful role <u>within</u> large bureaucratic structures where porfit does not depend exclusively on self-initiative but more on one's reputation in the system and one's contribution to the success of the group.[13] Schon has given us some illuminating case examples of how "product champions" operate in industry (3025, 6094). It is sometimes the case that the inventor, himself, champions his own product, becoming sort of a missionary

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12 1534 and many others cited by Rogers, 1824.

13 A situation which does not hold in agriculture or in private medical practice.

on his own behalf. To some extent, Skinner has played this role for teaching machines (although his inventor status might be questioned by some). Schon finds, however, that at least two and possibly three roles are involved in adoption of innovations in an industy. First, there is the inventor; second, there is the champion, a man who sees the value of the invention, comes to believe in it, and decides to devote all his energies to selling it to top management; and finally, there may be a third role of backer or "patron," someone in high power and high monetary position who is persuaded by the champion and allows him to become an entrepreneur by giving him risk capital.[14]

Although Schon to a great extent is bemoaning the inadequacy of the utilization of new ideas in industry, particuarly when they are from "outside," the "champion" concept may provide an important key to effective utilization in many fields, especially education. The big factor here is motivation, the total involvement and investment of self in the innovation. This is what separates the champion from the bureaucratic errand boy concept of the conveyor.

5. The Defender:

As discussed up to this point, the linking role has always been viewed positively: facilitating, speeding, easing, expanding the flow of knowledge. There is another side to the coin, however. We know that not all change is good, and not all resistance is misguided and perverse. On the contrary, it may be that all new ideas and changes bring with them some problems and some reasons why adoption is not advisable. It is a fair wind indeed which blows no ill. It is partly for this reason that sophisticated knowledge - linking systems require barriers, checks and balances.

Previously, mention has been made of the "gatekeeper," one who stands guard over the entry points to the client system. Now we would like to put

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[14] Columbus must be rated as the classic case of this type.

forth a somewhat more active concept of guardian, the defender, one who champions the client against innovations.[15] It has been traditional to think of individuals filling such roles primarily in a negative way, as blockers, unwanted nuisances and hinderances in the path to progress. Some authors (e.g., Klein, 3691) take a more positive view, however. The fact is that some clients and some client systems are too open to change and adoption of new ideas, too unaware of the pitfalls of innovations, too vulnerable to the dangers. The defender is always on watch for these dangers, always ready to sound the trumpet to awaken the public. In so doing he may, of course, merely compound the linkage problem by making the client more defensive, more suspicious, and hostile to anything new. On the other hand, he may be playing a more creative role in: (a) sensitizing the consumer to important value concerns;[16] (b) re-examination and re-diagnosis of needs;[17] (c) mobilizing public opinion to demand more adequate products and services;[18] and (d) developing a greater public sophistication and selectivity in evaluating the quality, value, relevance, and feasibility of innovations.[19] Large scale attempts to institutionalize "defender"-like roles in the urban ghettoes using indigeneous recruits have been noted by Kahn, et.al. (0020) and Reiff and Riessman (3218).

One of the most vital tasks in the utilization of knowledge is the communication of negative information. To forestall and especially to reverse an adoption process once begun may be a more important and yet more difficult task than bringing about the acceptance of innovations. The history of smoking would appear to be the classic case of this. The first part of

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15 Contrast Schon's "product champion," 3025.

16 Fluoridation: the involuntary medication issue. Even groups sometimes seen as lunatic fringe may be functional in this way on some issues.

17 Upton Sinclair, on need for pure food and drug legislation.

18 Nader on automobile safety.

19 The role that the Consumers Union is able to perform on a limited scale.

the twentieth century witnessed one of the most effective diffusion campaigns of all time. Hundreds of millions of men and women of all classes in many countries adopted cigarette smoking. Now in the 1960's we are struggling to utilize scientific knowledge on the hazards of smoking, with very little effect. The defender tries to prevent these situations from happening by forestalling change until such irreversible risks are thoroughly examined. Francis and Rogers (1409, 1410) have noted that this is one important function of the county agent. Tracing adoption behavior for a non-recommended innovation which was on the market (the "grass incubator"), they found that non-adoption was correlated with agent contact.

Although the imagery is legal, the implicit assumption behind the "defender" concept is thoroughly scientific: i.e., the critical and objective evaluation of all practices, products, and ideas, regardless of the claims of their champions. This concept has a kinship with such scientific roles as the evaluation researcher (e.g., the role of social scientists in community development projects, 6045), Hencley's "quality controller," (6032), and the "development" role of "testing and evaluating solutions and programs" included in the Clark-Hopkins paragidm of R & D roles in education (3586).

The case for the defender as a useful linker may have been somewhat overdrawn in this presentation. The defender may well be committed to resistance to the point that he is still resisting and preventing diffusion long after the value, relevance, and safety of an innovation have been clearly demonstrated. Even the most perverse manifestations of their role may still be functional, however, is serving as markers of latent resistance in the client system. The skilful change strategist can steer a course around these markers, avoiding what might be icebergs of latent hostility and anti-change sentiment.

6. Knowledge Builders as Linkers:

In discussing the "defender" role above, it was noted that the scientist plays a key defense role by evaluating and critiquing new knowledge. We should now like to turn to a more detailed consideration of the part

played by scientists, scholars, engineers, and other knowledge builders in the processes of dissemination and utilization. To the extent that such people operate as linkers to the world of practice or to the consumer, they may do so half-consciously (and sometimes, we fear, half-heartedly) because they see their primary functions as builders, not transmitters.

But do these builders, in spite of themselves and their own self-images, assist in the knowledge linking process? Some good evidence suggests that they do or they don't depending on how they are positioned in the social system and how they are used by others.

a. The Basic Scientist and the Scholar as Linkers:

> We discussed at an early point how the basic scientist who is a star, among the most respected in his field, comes to be known as an "expert" and is called upon by government policy makers and others in the world of practice. The importance of these distinguished leaders of science goes beyond this, however. The high ranking basic scientist is in a real sense the gatekeeper to the work of science. He defines what is scientific and what is not, and he is responsible for the maintenance of the standards of science and empirical "truth" (6033).

At the very least, it must be said that such a role of defender and champion of basic knowledge is indispensable. Without it, we would have no scientific knowledge at all.

Another equally important role for the basic scholar is that of supreme generalist and general educator. Partly because he is removed from the hustle and bustle of everyday dealings with everyday problems, the scholar can consider the basic implications of new knowledge and can integrate disparate findings into theories that make sense out of the whole and show us where we are going. These sweeping overviews of knowledge are disseminated to the next generation through classroom teaching and textbooks in the university indirectly and through curricula in the schools.

Yet another way in which some scholars, particularly philosophers and some social scientists, may influence the utilization of knowledge is in being the definers of basic human values and directions. These are the people who help us answer questions such as: "Knowledge for what?"; "What is progress?"; "What is well-being?". There is, to be sure, some dispute about who ought to be the definers of such fundamental questions. Ayn Rand would have us leave it to the philosophers. Traditionally, it may have resided in theologians, mystics, and prophets (6033). Perhaps there should be no final arbiters on such questions. Nevertheless, it would seem that someone should be helping us to think through these weightiest of all knowledge utilization questions.

Finally, there is the semi-scholarly role of "future planner" or "futurist." Knowledge utilization systems must not consider only the short run in terms of months and years. There must be some individuals devoting a large amount of their time to a more long range future a decade or a generation beyond the present. Very recent developments in education indicate a growing recognition of this planner role. Recently the Office of Research in the U.S. Office of Education commissioned a number of scholars in various institutions to prepare descriptions of society and societal needs in the 1980's. Even at the local level there may be a role for futurists, however. Kurland (3447) believes that State Departments of Education are the ideal locus for future planners, and some California experiments now underway may show us that even at school district level long-range planners can be functional (Miller, 6191). Thus the planner concept is now definitely with us. Where the role belongs in the structure of Education and what its focus and range of concern are to be; these are issues yet to be resolved.

b. Applied Researchers, Developers, and Engineers:

When we move from basic to applied research the implicit linkage assumption becomes inescapable. An applied researcher

is inevitably someone with a dual orientation, looking toward "research" on the one hand and "application" (making something practical, something useful) on the other. The necessity of facing simultaneously in two directions may make life difficult for the applied researcher but it does allow him to fulfill a linking role. The importance of applied researchers as linkers is related in part to the inadequacy of the conveyor concept. The fact is that few, if any, linkers are capable of retrieving knowledge from basic research, screening, and packaging it, and at the same time transmitting it to the user. There is a great need for a division of labor between the processing and the transmitting aspects of this job. Earlier we saw this in the division of labor between the county agent and the extension subject matter specialist. Even the specialist, however, by his own admission, does not feel competent to interpret research findings as such to practitioners and county agents (2866).

The types of activity listed by Clark and Hopkins (3586) under development give a good idea of the range of activities in which applied research and development people are engaged: "inventing solutions to operating problems," "engineering packages and programs for educational use," and "testing and evaluating solutions and programs." In short, the R & D man translates research into usable services and products.

Most of the literature on these applied research and development roles comes from industry (e.g., 1163, 6062, 6184), perhaps because the concept of the R & D center really originated here.[20] What the literature emphasizes is the constant struggle to develop and administer scientific projects which benefit the company; to educate the researcher to organizational goals. The fact is that industry still does not really know how to utilize science effectively. Much of the problem may be traced to the socialization and the self-image of the scientist. The organization expects

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20 However, with the growth of the regional laboratories and educational R & D center which have U.S. Office of Education support, we can expect this picture to change.

effective dissemination and linkage to them, not to the scientific fraternity. The scientist, on the other hand, is reluctant to move over to the viewpoint that practical concerns are paramount or co-equal to scientific ones. Nevertheless, we want to emphasize that the scientist who is successful in industry is a true linker; he is creating a bridge from scientific knowledge to use.

The linking function of R & D is most fully realized in the role of R & D manager, the man who must attract and hold high calibre scientific talent and at the same time justify the work of the laboratory in terms of improved product quality and new marketable products. His job depends on the lab being useful to the company. To fill the role it is not enough for him to simply have background and training in management. He also needs to have an understanding of scientific values and methods (2573, 6192).

Within education the concept of R & D management is still underdeveloped, but the review of Sieber, of the organization of educational research, highlights the importance of the role of "director" of educational research bureaus and "research coordinator" with the school of education, role designations which have only emerged within the last decade (6187).

The power of the applied research and applied research management roles, in contrast to the pure conveyor discussed earlier, resides in the potential for genuine two-way flow. That is, the person in this position is capable not only of translating research into practice, but also of translating practice needs and concerns into researchable problems. He provides the vital stimulation which the research world needs from the everyday world. In this connection the consistent findings by Pelz & Andrews are worth noting: that scientists and engineers who participate in management and dissemination activities are more effective and more productive as scientists, judged by criteria of publications and ratings of scientific excellence and overall usefulness (6067). These

findings are in sharp contrast to the popular view that scientists are most effective only in cloistered and strongly protected environments.

The advantages of diversity may not apply to all types of non-research activity, however. In his research, Sieber (6187) found that educational research directors who were assigned the role of providing services in addition to research were less productive than those who could spend full time on the research mission.

Hardly distinct from other applied research and development roles is that of the "engineer," a term which has an increasingly hazy meaning within the industrial world.[21] The engineer is someone who has a broad scientific and technical training and who can be used by industry in a great variety of roles, e.g., as applied researcher, developer, conveyor, and consultant. Largely, what an engineer has in the way of specific skills he learns on the job. It is not clear, therefore, what some educators mean when they say we must have "educational engineers" (1059). In fact, we probably have them already in the form of "curriculum leaders" (0212), curriculum developers (e.g., PSSC, 1172), curriculum coordinators, school psychologists,[22] and many other existing roles in the educational establishment.

Emerging roles in educational engineering are too numerous and as yet too recently conceived to be listed here in detail. The newly established regional laboratories, ERIC centers and "Title III"

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21 As noted by J.W. Forrester of M.I.T. in a recent address to the National Academy of Engineering.

22 Especially as envisaged in the Chicago plan of COPED, The Cooperative Project for Educational Development.

Centers[23] and IDEA Centers[24] have spawned numerous role-types which fit within "engineering" or "development" or "linking" designations. John E. Hopkins and others at Indiana University have tried to bring together a number of these in the working paper: "Exemplars of Emerging Roles" (6188).

7. Practitioners as Linkers:

As we have used the linking concept in this paper, we have typically been referring to linkage to the practitioner (e.g., the physician, or the teacher). Yet we realize that the practitioner is not the user in any ultimate sense. We only wish to help the practitioner to become more effective in serving his clients, the general public, the consuming public, students, patients, the needy, or whatever. It is appropriate, therefore, to view the practitioner, himself, as a linker of knowledge to the ultimate consumers. In the "conveyor" discussion we listed the teacher in this role, but it is equally true that anyone who provides specialized services, whether he be a plumber, a manufacturer, a physician, or a mechanic, is imparting to the public some elements from our vast collective cultural knowledge bank. To the extent that such services reflect new and scientific knowledge these practitioners are serving as linkers.

It may be important for us to look at the practitioner from this angle in assessing some of his deficiencies. There can be an overemphasis on professionalism and specialization in some occupations, which may weaken the linkage to the consumer (e.g., by making it more difficult for him to know where to go to be served for particular needs). In medicine, where these trends are particularly marked, some have advocated the revitalization of the general practitioner role, someone who would be able to interpret the needs of the patient as a whole to the various specialists, (1973).

An alternate solution would be to develop a special kind of linking agent for the consumer, a role already existing in Britain's Citizens

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23 All of these sponsored by the U.S. Office of Education.

24 Sponsored by the Kettering Foundation.

Advice Bureaus (CAB's) (0020), and in the early stages of development in recent federal programs for the poor. To be effective, these generalists must be equipped not only to provide information but also to provide emotional help, referral, feedback, and, at times, to undertake advocay of the client's interests.[25]

Actually, these most generalized consumer-linker functions have been part of the AES county agent role repertoire for many years. Not only does the county agent provide information on specific agricultural pratices, but he also serves as a youth worker, home economics expert and advisor, and organizer and coordinator of multitudinous community events.[26]

8. The User as Linker:

With the brief analysis of the generalized linkers just presented, we have now come full circle to the question with which we began. Are linkers necessary? Can the user serve as his own linker? Reviewing the various functions which seem to have been necessary to bring knowledge to the user, translating basic knowledge into useful products and practices, retrieving and transmitting, screening, adapting, testing, and so forth, one might say that the task of the user doing his own linking would be overwhelming. But there is one important thing going for this point of view: the user is the only locus of primary need. It is for him and only for him that the knowledge is useful. Basically he needs three things: knowledge of resources, access to resources, and diagnosis of his own need. It is possible to give people knowledge of resources through training, a good "general education" as it were. It is also possible, in a technologically advanced society, to provide many people with ready access to these resources, and it is possible for sensitive, self-aware, self-critical, and secure people to make pretty good diagnoses of their own needs. But it is very rarely, if ever, that we find people fully equipped in all these respects. Moreover, when we speak of "underdevelopment," at home or abroad, in the ghettoes, in the countryside, in hospitals, industries, or schools, we mean that there is a serious deficit in all three of these areas.

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25 See again the section on the "defender" role in this connection.

26 See, for example, Stone's analysis, 1129.

It is true that as a system does develop with the help of various linking mechanims, the need for intermediary roles declines. Thus we find that the most sophisticated farmer, with long experience with the extension service, and training at the agricultural college, does not rely on the county agents quite as much as some other farmers. If he wants something new, he knows that he can pick it up from the university and from the research literature long before the county agent is likely to come around with is (1549, 3041). But U.S. agriculture is a very advanced system indeed, at least in terms of the utilization of agricultural research. Other groups of practitioners in the U.S., in medicine and social welfare and education, are not nearly so well served.

Summary of Discussion on Linking Role Types

In offering this typology of linking roles we have tried to cover all the important functions which, together, are needed to establish and maintain linkage between knowledge sources and resources on the one hand, and users, consumers, and clients on the other. We say "together" because we believe that they should be seen together, forming among themselves an interlocking chian. Figure 3 tries to illustrate this story.

(Insert Figure 3 Here)

On one side of this figure we have a vaguely defined network of roles which could be described as the "resource system," including the knowledge builder, the experts, and the producers. Many of the roles within this system are capable of several kinds of output to several kinds of audiences. Experts are influential largely through their contact with community leaders, including the top layers of government. Scholars and basic researchers, of whom the experts are essentially a sub-class, exert their influence largely through applied research and development but also influence the general public (all consumers) through their guardianship of general education and academic curricula. They may also influence the public through intermediary conveyor roles such as the science reporter.

Applied R & D influences the user either through conveyors, such as extension specialists and county agents and perhaps now the regional laboratories in education, or, more commonly, through producers (manufacturers, publishers). The producers in turn rely on such conveyors as advertisers, salesmen, and retailers to move their products on to the consumer.

On the other side of this figure we have another vaguely defined region which has been called the "client system." It includes first of all the "user," who, within this imagery, is the "little man" in the system. He could be the ultimate consumer, the patient in medicine, or the student in education, but for the most part within this presentation we have been thinking of the individual practitioner in this role: the practicing physician, the teacher. Just who the "user" is, of course, depends on the type of knowledge conveyed. If the knowledge to be disseminated and utilized is on educational administration, then the typical superintendent and school principal are the "users," and so forth.

Relating to the user in a very direct way is the "leader," whether he be the officially designated leader or the informal opinion leader. For the most part, the majority of users depend on the leaders of their reference groups for decision making on adoption of innovations.

The users also depend to some extent on the "defenders" to screen new knowledge for them and to alert them to hidden dangers.

The leader may also depend on the innovator to advance-scout and pre-test new ideas.

Outside both resource and client systems are the conveyor and the consultant. The conveyor receives knowledge in various degrees of packaging from all parts of the resource system and transmits it directly to leaders and innovators within the user group. He is aided by the consultant, who prepares the client system for acceptance of new ideas, helping to diagnose the needs and giving help in adapting new ideas to local conditions. The consultant can also aid the conveyor by advance scouting, indicating the most favorable times, places, and persons for introducing innovations to the client system.

Finally, it was also noted that effective linking agents, in reality, are able to perform in several ways, as conveyors, consultants, defenders, and leader-coordinators for the client system. In particular, we find this multiple role capability in the county agent of the agricultural extension

service. However, questions about the optimum division of labor in the linking process and the methods by which several linking roles can be coordinated will be put off until the next section.

B. THE LINKING ROLE IN ITS INSTITUTIONAL CONTEXT:

It is probably not very meaningful to discuss linking roles outside the institutional - organizational context in which they are embedded. In the preceding section we had occasion at several points to touch on institutional questions, particularly in the discussion of leadership, and wherever mention was made of installing, coordinating, and combining roles and building lasting interrelationships among them. We also touched on institutional issues when we spoke of where roles come from: the "Agricultural Extension Service," the "Office of Education," the "industrial corporation," the "university," and so forth. Indeed, institutional factors are ubiquitous in any analysis of the utilization process. In this section we will try to nail down some of these issues as they pertain to linking roles.

There are three institutional questions of highest relevance to the topic of linking agent: first, what sort of institutional barriers, both in the resource system and in the client system, most frequently affect knowledge dissemination and utilization? Second, what kind of institutions are most effective for fathering (supporting, controlling) linking roles? And third, what kinds of institutions serve as linkers?

1. Institutionalization in Resource and Client Systems: Its Effects on Knowledge Linking:

In figure 3 the resource and client system were presented as two large and vaguely defined regions between which knowledge must pass. We now ask: how are these regions defined and how do these definitions affect knowledge flow? Institutions are more or less permanent structures through which society assures the performance of certain functions. Thus the existance of institutions should be the proof of society's good intentions with respect to knowledge utilization. If it is seen as an important function, there will be institutions which directly and indirectly facilitate the process.

When we look at existing institutional structures in our society the vista is not too encouraging in this regard. The primary institutional form in which the resource system is realized is the university. The university is the focal center of all the expert resources, stored cultural heritage, scientific knowledge, and scientific knowledge-building capacity of the entire culture. Yet, as it is typically structured, access to the university and utilization of university resources by non-academic people is strictly circumscribed. The primary repository of all the expertese of universities is the faculty, a very tight reference group with the highest standards of membership (most advanced degree offered in the specialty and proven expertese through publication and recognition). Within the faculty, knowledge may flow relatively freely, but informally. Faculty members view themselves as autonomous and guard their "academic freedom" vigilantly. As a result, any attempts to coordinate their efforts or systematize their communication patterns are resisted with vigor.

The typical faculty member probably does not like to think of himself as a linker and probably has the image of the linker which Halpin describes (see again the discussion of "conveyor"). There are, however, two thoroughly legitimate ways for academic faculty members to dispense knowledge: first, through the courses taught in the academic curriculum, and second, through publications and papers addressed primarily to colleagues. Even in teaching, however, favored treatment is generally accorded students who are concentrators, especially honor concentrators, and graduate students, since these are potential recruits into the academic world, hence future colleagues.

Linkage of a sort does occur through the establishment of professional schools as a part of the university establishment. Here too, however, faculties operate on very much the same norms, addressing their primary efforts to communicating among colleagues and to training neophytes. Extension and continuing education are relegated to secondary status if they are handled at all. Carey's account of the development of evening colleges within this university illustrates the marginal status accorded extension activities by all other university divisions (3602).

Ironically, in spite of its mimicry of basic academic norms, the professional school still sufferes from them. Faculty members recruited from academic departments to professional schools are treated as lepers by former colleagues even when they join the established and prestigious faculties of medicine. The fact is that the typical university is pervaded by an attitude which denigrates practice and practical concerns. On the one hand, this attitude makes the special role of linker all the more vital since the resource persons themselves lack the motivation and cannot be relied upon for effective linkages. On the other hand, the attitude makes it all the more difficult for the linker to link effectively to these expert resources. Even such models of effective linkage as agriculture's extension subject matter specialists are likely to be accepted as only marginal members of the agricultural college. Richert notes that in spite of an official pattern of trifunctional units, including resident instruction, research, and extension, the extension specialists (in home economics) were a part of this team in only one third of the nation's fifty land grant colleges (3835).

Turning now from the resource system to the client system, two principal institutional patterns emerge. The first, not unlike the university in some respects, is the "profession," a high status group of independent operators bound together in a reference group with exceedingly tough membership prerequisites. Specifically, of course, we are talking about the legal and medical fraternities. But there are major differences between these groups and the university: First, they are dispersed throughout the community and are likely to have extensive contacts with a great variety of clients. Second, they are not primarily oriented to sharing knowledge with colleagues or to building knowledge as such. Thirdly, they are primarily oriented to providing service and to being practical. There is, therefore, motivation to receive knowledge and a capability of understanding it in relatively complex unpackaged forms.

In spite of those factors which would make them ready targets for new knowledge, lawyers and physicians in private practice are not linked to the resource system to any extent. Apart from the drug detail

man, the practicing physician has no ready access to such expert sources through any medical extension service. For lawyers, the lack of linkage may be partly a problem or orientation. The law is seen as based on tradition and statute rather than on science, so that the needs of lawyers are most likely to be perceived in terms of ready access to cases and laws. To some extent lawyers are adequately serviced by publication of all court cases and continuously updated legal encyclopedias to which all lawyers have ready access. It seems doubtful, however, that these devices substitute for a fully developed network of legal extension specialists.

When we compare these more exalted professions with the farmer, it appears that the latter is well served, indeed. In spite of barriers and hurdles represented by geographical dispersal, relatively low educational background and scientific competence, and the vast cultural separation from the academic world, the farmer has access to and uses a great number of innovations directly based on scientific knowledge. He is able to do this largely because of a system of linking roles designed to serve him.

But practice in the client system is also institutionalized in another way, in bureaucracies, and it is probable that the problems and opportunities for linkage under these circumstances are quite different. Bureaucracies, whether we are talking about businesses, schools, or hospitals, are characterized by a formalization of division of labor, leadership, and interdependence, which are absent in the organization of the professions discussed above and only vaguely present in the university. The presence of any of these three attributes, specilization, leadership, and coordination, should, in theory, facilitate linkage.

With specialization there should be an increase in competence within the specialty, a better definition of the requirements of the role and its resource needs, and an easier task of retrieval from a more limited knowledge store.

Where effective leadership exists, as noted earlier, it is possible to influence more people more successfully. An effective leader in a well-organized system is related to all other members through overlapping

group memberships[27] which allow influence to be shared and flow downward and upward easily. If the leader in such a system is made aware of new and useful knowledge, he can become an inside change agent or catalyst.[28]

Influence through leadership may be relatively ineffective, however, if the organization is poorly coordinated. Such lack of coordination could be reflected in mutual distrust and hostility between hierarchical levels or across specialites and among colleagues. A major aspect of organization health is the ability to cooperate and to keep lines of communication open. In summary, then, the bureaucratic organization is a very promising target for the linker, provided that it is healthy.

2. Effective Institutional Fathers for Linking Roles:

Having considered the type of institutions with which linkers have to cope, we can now turn to consider the types of organizations in which they should be based: first, the general type of base or parent organization in which they should be embedded, and then in Section #3, below, the type of sub-unit or "linking institution" in which they can be organized.

Five primary types of institutional base should be noted: university, government, commercial, practice, and independent. Let us look briefly at each in turn.

a. The University:

The university, as discussed earlier, is not the most hospitable home for the linker, particularly if he is unable to show many credentials to back up his claim to expertise. The weakness of extension services run by universities seems to attest the continued

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27 Well described by Likert, 5202.

28 Schein and Bennis, 6077, note the success of this model exemplified in the organizational effectiveness of a clothing manufacturing concern headed by a social psychologist in close contact with outside social action researchers.

unwillingness of the university to indulge in the kind of linkage to practitioners and consumers which comes under the loathed heading of "service."

There are some kinds of linkage which do typically come under the university wing, however. One of these roles is that of the high level expert. He has the credentials and his status within the university is secure enough that he need not be very concerned about engaging in marginal activities. The other role is that of the applied researcher attached to university research centers and professional schools. Here there may be some questions raised. Is the university the proper locus for the kind of applied research which is useful and does get disseminated? Certainly in agriculture this does seem to work. In technology and medicine it is more difficult to say. In education, even with the recently established R & D centers, the production of useful knowledge seems to be a pitiful trickle in proportion to the investment.

Here is part of the dilemma is assessing the generation of useful knowledge within the university: there is no accounting, no assessment of what is done in terms of value to society, nor is the research administrator in the university under any pressure in this regard. The orientation is inward toward the university and to the evaluation of academic colleagues. Productivity is measured in terms of number of articles in "prestige" journals, not in terms of the number of people helped or number of people informed.

b. Government:

Knowledge linkage is a serious problem and a massive problem. Effective retrieval alone, disregarding dissemination, is becoming a problem with which individual universities and companies can no longer cope. Add to this the dissemination needs, including packaging, conveyor and consultant services, and effective opinion leadership, and we are then talking about a multi-billion dollar enterprise involving the coordinated efforts of tens of thousands of skilled professionals. This is what we have in the Agricultural Extension Service. We have no equivalent in any other field.

It is difficult to envisage a coordinated system of linkage without heavy government involvement, either by itself, or in partnership with the university and private profit and non-profit organizations.

At the present time the government is dabbling in the extension-knowledge linking business in technology, medicine, and education, with rather mixed results. The technology information program undertaken by the National Aeronautics and Space Administration has been very well financed and elegantly organized, but, so far, evaluation studies[29] lead to one conclusion: pitiful. In Medicine, the government has been less ambitious so far but the funds expended on such projects as the National Library of Medicine's automated information retrieval system (MEDLARS) have not been clearly justified.[30]

In education there has been considerable activity, particularly in institution building in the last three or four years. First came the R & D centers established with firm university bases, and perhaps suffering in effectiveness as linkers for that reason. Then came the ERIC centers, university-based and coordinated at the federal level, but so far equipped primarily to service the information needs of researchers. Finally, we now have the Title III centers at the school system level and the regional laboratories originally created as semi-autonomous research, training, and service centers to serve groups of states on a regional basis. In spite of this flowering of institutional structures and substructures, and in spite of planning and funding from one source, there is no explicit relationship among these various units. This would appear to be in contrast to the system in agriculture.

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29 6111, 6199, 6200.

30 Atwood notes that is far too expensive and time consuming for even small scale research use. For very large research projects it appears to be useful. Apparently, the individual practitioner is not yet viewed as a possible user (2342).

There may never be a day or reckoning for this government supported non-system for development and diffusion in education, especially when we are still struggling for satisfactory criteria for success in this area. Nevertheless, some comments are in order on how it will affect the evolution of linking roles. First of all, it doesn't seem possible in light of our experience in agriculture and elsewhere that linking roles could be established in education without heavy federal support. David Clark's comment that "the total cost of such an educational extension service would not be great" (6085, page 117) would appear to be questionable. The total cost of the AES and the subsidies to the associated land grant colleges over the last 100 years would be hard to compute in today's dollars, but it is undoubtedly on the order of several billions of dollars.

Secondly, it would seem advisable for the government to involve itself directly as well as indirectly in the diffusion process. County agents and extension specialists are government employees. While this is disadvantageous in some respects, it does provide a unique home base and an independence from university requirements on the one hand and commercial requirements on the other. The farmer looks on the county agent as a reasonably objective information source. The same cannot be said for the detail man, the publisher, or the seed salesman.

Thirdly, the government should be specific in defining the roles it wishes to establish. This should be a matter of public policy. Thus far the various roles generated by different centers have been richly innovative but they hardly give a chance for the development of a professional identity and esprit de corps, which are essential to put a new role on a solid footing. Having allowed these various roles to flourish for a time, the government should decide what specific linking role or roles are best and devote its resources to the development of such roles, to the exclusion of others.

c. Commercial:

Having said that government involvement is essential, we would now add that commercial involvement is probably essential also. Nowhere can one gain a greater appreciation for the mixed economy than through the study of processes of dissemination and utilization. In agriculture, the county agent, the farm magazines, commerical agents, and other farmers all seem to play complimentary and important roles in the ultimate adoption of new ideas, products, and practices.[31]

Both the strengths and the weaknesses of the commercially based linker are related to his special motivation. On the positive side, unlike other linkers he has a real stake, a direct survival stake, in adoption. While this may infuse him with greater zeal it also stands in his way because the client generally does not give him high credibility for this reason. Beal and Rogers, for example, found that farmers were generally suspicious of the motives of the commercial agent, and even innovators did not use him as a short cut to new ideas (1351). The dangers of doing so are illustrated in the story of the grass-incubator, a useless "innovation" pushed by some dealers. Farmers who were in good touch with the county extension service as well as commerical agents were not taken in (1409, 1410). Hence they successively utilized the more truly scientific counter-knowledge of the AES.

Increasingly in recent years the government has taken to contracting out much of the research and development work that it needed for space and military programs.[32] This has been used in part to circumvent bureaucratic roadblocks such as fixed salary schedules.

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31 Abell, 3886, cites his own work and 13 other works to illustrate this fact. Research by Lionberger, 2690, and Wilkening, 5385, testify to the same point.

32 See Marx, 5231, and Lindveit, 2836, for analysis of this trend.

There are some signs that in education, too, the government is beginning to move in this direction. There is no question that private enterprise should be heavily involved in diffusion to our educational system. It would appear from the above findings that the government would be ill-advised to leave the field entirely, however.

d. Practice Institutions as Bases for Linkers:

Should the linking agent be especially supported by the individual hospital? school system? business organization? Such a proposition is attractive in some respects and is actively endorsed by a number of authors. Anderson (1059) argues that his "educational engineer" must be hired by and be responsible to the local school system. The "Research Implementation Teams" now being developed by Research for Better Schools, Inc. (a regional lab) are founded on the same philosophy (6065).

The advantages of such an arrangement would appear to be related primarily to the concept of "insideness." The linker is right there at the locus of need. He understands the client system in all its uniqueness.

On the other hand, there are many tough problems associated with this arrangement. One is recruitment; how do we attract people with the requisite skills to work on such a local and presumably lowly level? Another is access to resources: from such a base how does the linker keep himself in touch with new developments? How does he stay linked to the resource system, itself? Finally, how does he gain acceptance in the local system, itself? We cannot assume that, having a local practice base, the linker will be seen as a legitimate source. We cannot create instant opinion leadership. Indeed, he may be viewed as an interloper, policeman, or busybody.

e. Independent Linkers:

There are probably innumerable bona fide knowledge linkers in our society who do not go under any official title as linkers. The informal role of opinion leader is a case in point.

Although there is a place for independent and free lance linkers, there are major limitations. First of all, they cannot serve as linkers on a full time basis. Secondly, their efforts are likely to be sporadic and their influence haphazard. Thirdly, they cannot be relied upon to provide training, special skills, and equipment and supplies which are often the necessary accompaniments of innovations.

Nevertheless, there are some outstanding cases in which free lancers have played a major role. Clark (1172) notes a pattern of "private committees serving as connectors between public authorities notably between federal agencies, and local authorities in the curriculum reform movement." He goes on to cite the PSSC as an example.

As inventors of new products and practices free lancers play a surprisingly important part even in technical areas (0941, 6094). In one study (0941) it was found that 33 of 61 inventions, when traced to their source, turned out to originate with independents. When it comes to diffusion, however, it seems doubtful that individuals working along without legitimation and without financial and organizational support can play a major role.

To summarize this discussion, there appear to be four principal institutional bases for the linker: university, government, commercial and practice. University and practice bases may be facilitative in gaining entry to the resource system and the practice system but there is little evidence that outsiders are less effective in this regard. Both government and commercial linkers were seen as operating very effectively from the outside and in complementary ways. A well functioning knowledge diffusion and utilization network includes government and commerical channels. However, when one is used without the other, distortions and imbalances which affect the process adversely are likely to result.

3. Linking Institutions:

From the broader question of institutional parentage or base we now move more specifically to a consideration of the types of institutions which could in themselves be called "linking institutions." Throughout this paper the linker has been viewed as an individual person and when we have talked of several linking functions we have seen them as roles which acted in complementary ways to help build a knowledge linking chain or system.[33] We also noted how these ideal role types defined by function could be combined in one actual linker, the county agent being a prime example of this. At this point, however, it should be recognized that a number of individuals serving complementary linking functions can combine organizationally to serve as one unit. Thus the extension subject matter specialist and the county agent both belong to one institution, the AES, which as a whole is the knowledge linker between the university and the farm family.

It has not been deemed appropriate in this paper to discuss the many institutional arrangements, actual and possible, which serve as knowledge linkers. This would be the topic of another paper. All that should be noted here is the range of possible structures and the implications of various type of structures for the individual linker.

Overriding other aspects of a typology of institutions is the distinction between permanent and temporary organizational units.[34] Institutions of the permanent type include such entities as "centers," "institutions," "laboratories," "companies," and "associations," while those of the temporary type include such entities as "projects," "programs," "committees," "courses," "conferences," and "conventions." The effective installation and manipulation of both these types of institutions plays a major part in insuring the viability and the effectiveness of the individual linking agent.

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33 See again Figure 3.

34 This distinction is most fully developed and utilized by Miles, 1189.

a. Permanent Linking Institutions:

Permanent linking institutions provide three important possibilities for the individual linker: (1) security, (2) identity, and (3) coordination. Security means a home base and a degree of independence from both practice world and research world demands and dependencies. These seem to be basics of survival for any role in a social system. A chronic problem is the perception of the linker as an adjunct, not a necessary part, of either research or practice. This means that inclusion of linkers in these other institutional homes would perpetuate insecurity.

Identity comes from the awareness by the linker, himself, and by those with whom he deals that he is somebody; somebody who does something not only valuable but clearly distinquishable from what other people do. In some degree identity is something each individual has to achieve by himself through his own labors, but in face-to-face interactions with other role holders depend heavily upon the generalized impression or "image" that their role has attained. This is an especially severe problem when we are attempting to introduce new roles and when we are attempting to introduce roles which overlap and interconnect well established existing roles such as "researchers" and "practitioners." How the linker is judged and how well he is welcomed will depend greatly on the image of the organization he is seen to be a part of.

Coordination serves what might be called the rational function of organizations: through division of labor to accomplish as a group what the individual alone cannot accomplish. In terms of linking roles, coordination means the capacity to fuse the many functions discussed earlier in this paper while allowing individuals to specialize in providing those functions with which they are most skilled. Some can concentrate on the task of retrieval of knowledge from research, some on translating and packaging this knowledge, some on conveying it to clients. Still others can specialize in consultation, helping clients diagnose needs, helping them adapt,

building openness, providing reinforcement and so forth. If all these functions had to be performed by one person, or through one role, they could not be done.

Unfortunately, coordination works better in theory than in practice. As noted earlier in the discussion of leadership in the R & D laboratory, there is a constant tug of war between independent basic research and application concerns, between science and management within the industrial laboratory. Conflicts of the same order might well arise in linking institutions, let us say between those who believe the conveyor role is paramount and those who believe the consultant role if paramount. In settings where there are no external pressures to produce, for example in university applied research centers in contrast to industrial R & D centers, the manager is likely to escape from such conflicts by letting each man or each sub-group go his own way. It would be unfortunate if the directors of linking institutions took this completely laissez-faire attitude. Coordination is difficult to achieve but it is a prize worth the struggle. When a manager evades his responsibility in this area his organization will fall far short of its potential.

b. Temporary Systems:

With the advantages of the permanent institution's security, identity, and coordination go twin disadvantages of isolation, self-satisfaction, and rigidity. These would be fatal shortcoming for any organization trying to be alinker. It is largely through a sub-organization into temporary systems, that linking institutions avoid these pitfalls and maintain their validity.

The actual work of linkage is not a continuous routine process. It simply doesn't work that way. Even the conveyor is not a conveyor belt. The work of a county agent, for example, is structured around programs, special projects, campaigns, etc. (Stone, 1129, Penders, 6042) as is the work of the Extension Subject Matter Specialist (Brown 2866),

as is the work of the cross-cultural development worker (Schmitt, 0816, Holmberg, 2030). It is important for the motivation of the linker to see his work in time limited segments which follow a meaningful sequence from initiation to completion.

The temporary system is also important in being the vehicle through which interaction and exchange with clients and researchers is carried on. The training course, the conference and the convention are traditional types of temporary systems in which knowledge linkage of a sort takes place. Most recently, however, many new models of temporary systems for linking to new knowledge are taking shape. Human relations training laboratories (Bradford, et.al., 6196)"grid" management training programs (Blake, and Mouton, 6198), organizational survey and survey feedback projects (Mann and Neff, 3912), traveling seminars (e.g., Richland, 3698), and collaborative action-inquiry projects (Thelen, 3692), represent a few of the unique temporary systems which have evolved in the last decade to bring the linking agent (often called "trainer," "consultant," or "change agent") together with the client in a meaningful sequence of steps designed to improve the client by making him more expert, more open to new ideas, more adaptive, and so forth.

Another type of temporary system this time bringing researchers (at least social researchers) more into the picture is the action research project. Here the program or change activity is experimental and the researcher's involvement, at least initially, is restricted to evaluation and creating instruments and a design which allows for evaluation. As a method for linking researchers to practice this model of action research may be open to question. Relations between the research and action roles can be stormy and there is always resistance on the part of the researcher to getting his hands dirty with application and utilization activities.

It has been suggested by Jacobson (himself citing Palmer Johnson) that very large scale experimentation in education, whatever its value scientifically, is an effective means of disseminating new knowledge.

The more people who take part and the more disciplines and different knowledge sources they represent, the better the chance for cross fertilization and new learnings by all and the better the chances of publicity and hence diffusion to non-participants (6086). The same type of research is criticized by Blackwell (1218) who believes that enforced "togetherness" restricts productivity and creativity, reducing everything to the lowest common denominator. Massive inter-university inter-disciplinary research action projects such as the Cooperative Project for Educational Development (COPED), when they are evaluated, should answer such questions for us.

There are other temporary systems which do involve the researcher directly in a collaborative knowledge retrieval and application activity with linkers and practitioners. At the highest level we have seen this in the Physical Science Study Committee.[35] There is yet another model, however, which seeks to involve not only researchers and linkers, but also policy makers, administrators and practitioners ("direct workers") in a sequential activity of problem diagnosis, research retrieval, derivation of implications and future action planning. This is the "derivation conference" now being pioneered by Jung and Lippitt (6197).

It has not been our intent to dwell on these various temporary institutional forms in any great depth, but this brief summary should give an indication of the many tools which the linker potentially has at his disposal. A permanent linking institution should have a capability of generating a great variety of temporary systems to suit specific occasions, clients, and topics, for it is largely through the overlapping group memberships and collaborative activities of these temporary systems that linkage between resources and user can be achieved. Figure 4 is intended to be schematic representation of this pattern of inter-interstitutional linkage.

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35 It was perhaps the most successful knowledge utilization project of all times in education, although this could not all be attributed to its structure. Within five years, 50% of the schools in the U.S. had adopted it, an extraordinary record (Clark, 1172).

C. ENDEMIC PROBLEMS IN LINKING ROLES: A Summary

Throughout this paper we have seen certain issues which seem to keep coming up again and again, problematic aspects in the linker role which run as themes through the discussion of function, coordination, institutional context and so forth. These problems were suggested in Table 2 where a comparison of conveyor and consultant linkers was presented, but they can probably be summarized under just two headings: overload and marginality.

1. Overload:

The linker's activities can be grouped into three kinds of processes: getting information (input), processing information (thruput), and distributing information to others (output). In each of these processes the linker may have too much to do. He may have too much information to handle, too many people to get it from, too many steps to put it though, and too many people to give it to. In Table 3, the various problems related to overload are summarized.

(Insert Table 3 Here)

If Table 3 shows anything if shows us the magnitude of the job of the linker. It highlights the need for a drastic division of labor and a clear definition of sub-function which can only be accomplished through institutionalization. It also highlights the need for the linker to focus his activities in projects, time limited and objective limited sequencies.

With all these potential overload problems and a job to be done, one might ask: how can it be done, and how is it done now? The answer may be: "not too well!" When we can't do something right we muddle through; we cut corners; and we do "something" even if the something doesn't work, isn't useful, even if it raises expectations which can't be met or leaves the client spinning in the middle of nowhere.

What compounds the problem is our human tendencies: (a) to avoid defeats and failures by thinking of them as victories; (b) to disguise the inadequacies of our knowledge by saying that there is nothing more out there worth knowing and (c) to hide the inadequacy of our range of skills by saying that what we know how to do is the only important thing which needs to be done.

These tendencies to hide limitations have serious effects in producing divisiveness between linkers with different skill mixes and knowledge bases. The learning people disparage the human relations trainers who disparage the survey researchers and so forth. Thus, people who should be getting together go separate ways, forming their own competing models of "the" change process, and their own institutions and programs for linking.

2. Marginality:

The second problem theme which seems to be present whenever we discuss linking roles is "marginality." Marginality may well be inherent in this role for strategic reasons. The linker is necessarily and by definition and in-betweener. He takes from the research world but he is not clearly a part of that world and he gives to the practice world while not being clearly a part of that world either. He can attain partial membership in either the practice or research world by overlapping memberships yet these associations only party legitimate his presence.

This marginality is not entirely in the nature of things, however. The linker may be fortunate in belonging to an independent linking institution with a long and distinguished record and a good image. If he is, his structural marginality, his outsideness, will be more an asset than a hindrance.

Another element which is often causing the marginality is recency. Any role is marginal when it is first created and developed. Thus in education where the role is only now emerging we may expect more difficulties related to marginality than we find, let us say, in agriculture where the county agent is so well established. As we all know, anyone who has a new job is marginal to the organization and if our job itself is newly created it is just that much more of a problem. It is compounded by suspicion by various persons and groups who feel infringed upon (role-conflict) and others who are in the "same" roles as we are but seem to be behaving very differently (role-consensus).[36]

[36] For a more adequate definition and discussion of the problem of marginality in organizations and how it affects the role holder see Kahn et.al., 6055. The classic in role analysis is, of course, that of Gross, et.al., of the school superintendant, 5169. Additional empirical studies of that calibre and that depth are now needed to evaluate the role of knowledge linker as such.

These are some of the causes of marginality,[37] but what about its effects? Here we must confront the basic fact of viability. Marginality of the role means stress for the role holder. Put this together with the stress which results from overload and we have a completely untenable position. Nobody will get in it and nobody will stay in it. The social engineers who are designing linking roles will have to find ways to reduce either marginality or its ill effects.

D. IMPLICATIONS FOR EDUCATION:

We come at last to the implications of this analysis for education and for those who would foster the development of linking roles in education. Our prescription revolves primarily around solutions to the two big problem themes: overload and marginality. Looking at this from the point of view of planning and administration, there are four things that have to be done to build a functioning system of knowledge linkers: we need to build an institution which includes and supports the required roles; we need to recruit candidates to serve in these roles; we need to train these recruits to fill the roles; and finally we need to supply them with the equipment necessary to help them do a good job. We will discuss these four requirements under the headings: installation, recruitment, training and equipping.

1. Installation:

We need to build a secure base for the linker, a permanent institution which includes a mix of interdependent complementary linking roles, especially those described earlier under "conveyor" and "consultant."

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37 In a previous paper (3041) the author suggested that transiency was also a problem, i.e., the possibility that one's role would become obsolete as the user sophistication approached that of the linker. Further review of the literature does not yield any information to indicate that this by-passing phenomenon is a real problem. There always seems to be plenty of useful work for the linker still to do.

We must make certain that these roles are not only included but are coordinated by a director who appreciates the need and importance of each role and is motivated to work hard at bringing them together.

This linking institution could be based in a university or a school system but neither of these alternatives is entirely satisfactory. An independent base not identified with either the researcher world or the practice world is probably preferable. In any case the institution will be expensive to operate if it is to be an effective linker and will, therefore, require federal support either directly or indirectly through contracts and grants to universities, school systems, and commercial firms. The part played by the federal government should not end with financing, however. There is a more definitive, directive, and coordinative function which the government should not avoid. Eventually in the not too distant future, the government should come up with an overall plan for an educational extension service which includes well-defined linking roles at various levels. Furthermore, it should not shy away from coordination of state and regional services to reduce redundancy of effort and to insure that knowledge packages and programs developed in one area are effectively diffused throughout the national extension system.

2. Recruiting:

The question of how we can fill the need for a large number of linking agents in the next decade is of concern to many educators (3067) but we feel that there are ways of filling this gap. In part, we are inclined to go along with Pellegrin's observation (6030) that the roles get filled if the money is there, but in any case there are still many manpower resources which could be tapped for this role if it were adequately institutionalized. First of all, it should be an attrative role for the young teacher or teacher-in-training who wants a little more challenge and variety than he is likely to get in a routine teaching assignment. Secondly, there is the large reserve of female talent in this country which is becoming partially liberated from the housewife role. Finally, we should not forget the retired teacher who might be an exceptionally valuable change agent in working with older and more experienced client teachers.

If the need is for people with top-flight research backgrounds and credentials, then the recruitment picture is dim if not hopeless. However, the need for such people will not be great if we can provide talented candidates with training to make them proficient as knowledge retrievers and research assistants.

3. Training:

This brings us to the third task: training for the linking agent. We need to develop a new curriculum in our schools of education specifically designed to develop linking agents. We see at least four elements that would have to go into such a curriculum: (a) an understanding of the knowledge dissemination and utilization process as a whole including some awareness of various models of planned change, empirical studies which have been done, and research methods for studying it; (b) an understanding of how to work with client systems including strategies for collaboration, help on diagnosing of needs, and help in self-evaluation of effort; (c) an understanding of the resource system including an appreciation for research values, concerns, and methods, and a review of knowledge storage and retrieval methods and tools; and (d) an appreciation of the need for role-complementarily and coordination in the fulfillment of dissemination objectives.

4. Equipping:

Lastly we come to the important matter of equipment. It is not enough to train a man and send him out into the field. We must give him tools with which to work, and if we don't have these tools now, we should get busy and develop them. Again here we find that experience in agriculture and other fields points up the importance of putting well-designed, well-prepared working materials in the hands of the linker. At least six types of tools need to be developed for his use: (a) first he needs to have at his disposal a range of linking strategies or project designs for work with various clients under various circumstances so he can build the most suitable temporary systems for the task at hand; (b) second, if he is in a conveyor role,

he should be provided with a handbook of new practices, innovations, and usable research knowledge equivalent to the loose-leaf handbook which is the basic stand-by of the county agent; (c) thirdly, especially if he is a consultant but even if a conveyor, he should have a handbook on linking problems and solutions possibly accompanied by a checklist of problems to look for in utilization activities; (d) fourth, he would be helped by having a guide to the retrieval of knowledge in his particular area so that he can have access to knowledge beyond that contained in the handbook; (e) fifth, he needs to have at his disposal simple instruments to measure the success of his dissemination and utilization efforts. Such instruments which might be in the form of checklists, questionnaires, or interview questions, would be invaluable in giving him feedback on which to change his behavior for improving his performance as a linker; (f) sixth, and finally, particularly if he is a consultant he needs to have at his elbow client self-diagnostic tools again including checklists, formats for making force-field analyses, and self-administered questionnaires.

Any or all of these tools will be important in building a sense of security and competence in the linker and in reducing his overload.

There may yet be a nagging question to some educators on these proposals for the development of linking roles; a question which is raised again and again at educational research meetings. It is: "Do we have any knowledge worth disseminating?" We think that the answer should be an emplatic "yes." We have knowledge in the form of programmed instruction, driver training films, computers, texts in innumerable formats covering innumerable topics in innumerable ways, films, vidio-tape recorders, classroom feedback exercises, and so on and on and on.

The trouble is that this "knowledge" in most cases is untested, unevaluated. Its status as "scientific" knowledge is questionable, or its status as useful knowledge is questionable or both. Broadly what we need to do is to upgrade our store of knowledge in education

through translating it, evaluating it, trying it out and re-evaluating it. Our educational researchers must be involved in this process and a significant number of our educators and educational administrators and practitioners must be involved in it, too. This can be done through a coordinated extension and knowledge linking system.

TABLE 1.

KNOWLEDGE LINKING ROLES

ROLE TYPE	FUNCTION	FIELD	EXAMPLES	SAMPLE REFERENCES
1. Conveyor	To transfer knowledge from producers (scientists, experts, scholars, developers, researchers, manufacturers) to users (receivers, clients, consumers)	Agriculture	County agent (especially as seen by others)	3052, 3516
		Agriculture	Extension Specialist	2866
		Agriculture Medicine	Salesman, retailer, drug detail man.	1447, 2535, 2340
		Psychology	Science reporters	3897
		Education	Trainers, Informers, Demonstrators } Disseminators	3586
		Education	Teacher	
		Gov. Policy	Scientific expert	3382, 3402 3422, 1146
		Industrial R & D	Systems engineer	3872
2. Consultant	To assist users in identification of problems and resources, to assist in linkage to appropriate resources; to assist in adaptation to use: facilitator, objective observer, process analyst.	Various	Mental health consultant	1319, 2079 1335, 3947, 6097
		Various	Change agent	1343
		Organization	Change agent	6077
		Education	Change agent	6194, 6195
		Agriculture	County agent (as he actually operates much of the time)	1129, 6042
		Urban	Expeditor	3218
		Psychiatry	Legal mediator	3251
3. Leader	To effect linkage through power or influence in one's own group, to transfer by example or direction	Education	Administrator: superintendent, principal	1174, 3698 2607
		Various	Gatekeeper	2640
		Medicine	Opinion leader: physician	0295
		Agriculture	Opinion leader: "good farmer"	2492, 1923
		Community (urban)	Opinion leader: informal power structure	6193
4. Innovator	To transfer by initiating diffusion in the user system.	Agriculture	Innovator	1824
		Agriculture	Demonstrator: farmer	2492, 1923
		Industry	product champion	3025, 6094
		Industry	Entrepreneur	3025, 6094
5. Defender	To sensitize the user to the pitfalls of innovations, to mobilize public opinion, public selectivity, and public demand for adequate applications of scientific knowledge	Various	Defender	3691
		Agriculture	County agent	1409
		Education	"Quality controller"	6032
6. Knowledge-builders as linkers	To transfer through gatekeeping for the knowledge storehouse and through defining the goals of knowledge utilization.	Various	Scholar: scientific leader	6033
			General educator	
			Definers of human values	
		Various	Futurists and future planners	6199
	To transfer through maintenance of a dual orientation: scientific soundness and usefulness.	Industry	Applied researcher-developer	6062
		Education	Applied researcher-developer	3586
		Medicine	Clinical researcher	618,
		Industry	R & D Manager	3573, 6067

			Informers, Demonstrators, Disseminators	3586
		Education	Teacher	
		Gov. Policy	Scientific expert	3382, 3402, 3422, 1146
		Industrial R & D	Systems engineer	3872
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		Agriculture	Demonstrator: farmer	2492, 1923
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			General educator	
			Definers of human values	
		Various	Futurists and future planners	6199
	To transfer through maintenance of a dual orientation: scientific soundness and usefulness.	Industry	Applied researcher-developer	6062
		Education	Applied researcher-developer	3586
		Medicine	Clinical researcher	6183
		Industry	R & D Manager	2573, 6067
		Education	Res. coordinator	6187
		Education	Res. director	6187
		Education	Engineer	1059
		Education	Curriculum developer	1172
7. Practitioner as Linker	To transfer to clients and consumers through practices and services which incorporate the latest scientific knowledge.	All		
8. The User as Linker	To link by taking initiative on one's own behalf to seek out scientific knowledge and derive useful learnings there from.	Agriculture	Most advanced farmers	1549, 3872

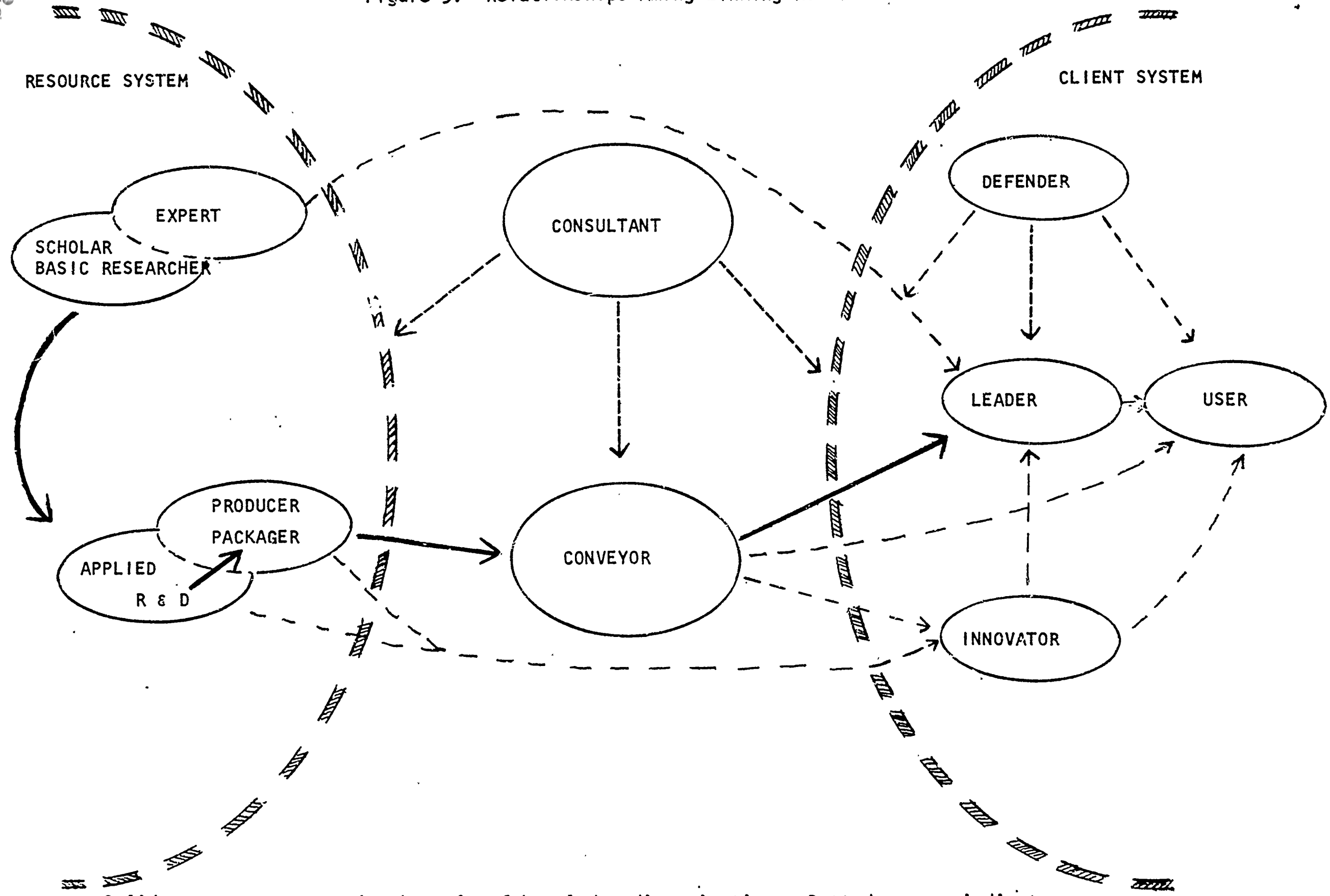
Table 2. Five difficulties with the Linkage Role: A Comparison of Two Approaches

Problem	Conveyor	Consultant
(1) Marginality	Because he is not "one of us" he may be excluded from inner circles of both research and practice where most sophisticated and appropriate formulations of knowledge and problems may reside.	Doesn't need to belong to "inner circle" because he doesn't need special knowledge.
(2) Two Masters	If he is seen as serving special interests of one client, the other client may not be open to him. May see his information as biased or illegitimate in one way or another.	Does not put himself in position of "selling" anything from someone else.
(3) Pain Remoteness	Must know the nature of the need in order to bring relevant knowledge to bear.	Makes sure initiative develops from client himself.
(4) Super-expertise	Over-strains the capacity of the linker. Over-isolates researchers. Builds dependency and problem-solving incapacity in client.	Required to have only general knowledge of retrieving information, deriving solutions, and diagnosing problems. Avoids being seen as a "walking encyclopedia."
(5) Structural Redundancy (channel inefficiency)	He is "on-line." If he pulls out he is in danger of disrupting flow, may not leave client with adequate skills. If he stays "on-line" we have lost manpower and we have created an additional potential source of error in the system.	Never puts himself "on-line,": ...doesn't constitute a direct block. (See Figure 3 also)

Table 3. Overload Problems for the Linker

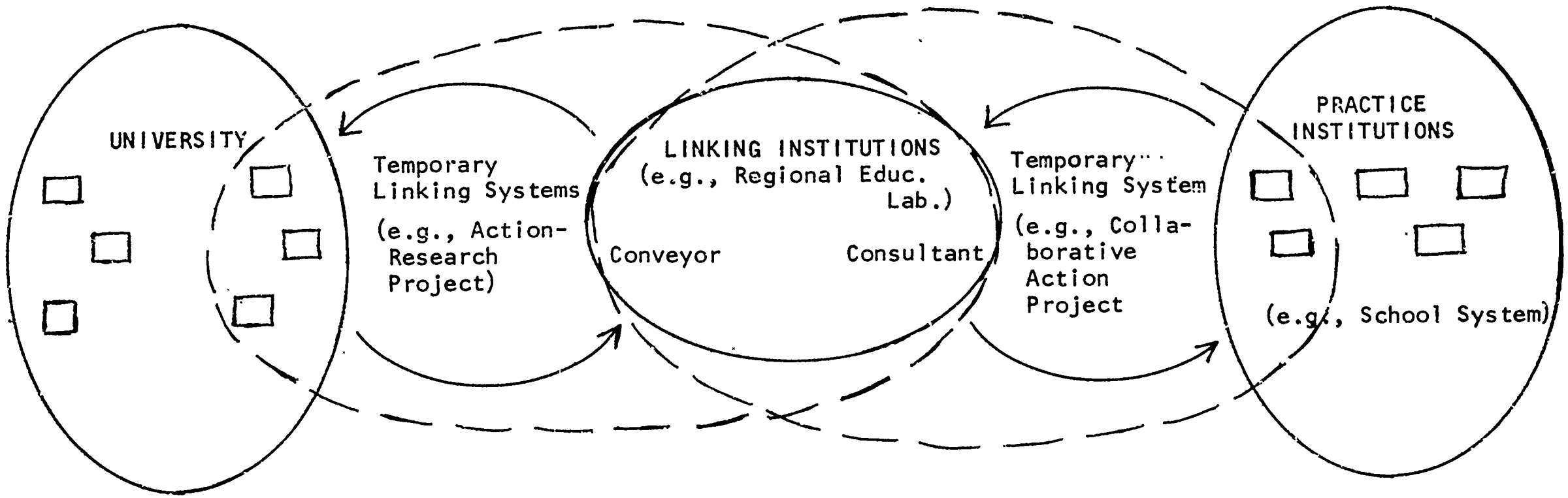
	Number	Complexity	Difficulty
Input	Information has to be assembled from too many sources	Sources are highly technical, requiring high degrees of scientific competence.	Information is inaccessible.
Through-put	Too many pieces of information need to be assembled.	Information has to be taken from a highly technical form to a highly simplified and packaged form.	The forms into which the knowledge must be assembled require a great expenditure of effort (e.g., construction of a complete training course).
Output	Information has to be distributed to too many people.	Information which is complex and difficult to understand must be communicated to the user.	Users are very hard to reach and to influence.

Figure 3: Relationships Among Linking Roles



Solid arrows suggest main channels of knowledge dissemination. Dotted arrows indicate subsidiary or secondary channels.

Figure 4: Linking Institutions: separateness and togetherness



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