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**EXPLORING THE DYNAMICS OF INNOVATION
IN ORGANIZATIONAL KNOWLEDGE
NETWORKS**

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ABSTRACT

We examine the patterns of action that characterize successful and unsuccessful discretionary, cross-functional, innovation networks in a large health care system. These networks are faced with the task of constituting themselves for successful generation of organizational innovation and change. Successful networks organized themselves sensitively to the knowledge system of the health care system; actions in the cognitive-structural and political domains reflected the close link between knowledge, structure, and power. Because of the close link between knowledge and power, only incremental change was obtained even by the more successful networks.

Key Words: Knowledge networks, Innovation, Self-organization; Constituted social orders.

Knowledge intensive organizations have a primary focus on the creation of new knowledge and its application in products and processes that will enable the firm to cope with the relentless pace of change in market expectations and maintain competitive advantage (Starbuck, 1992). For example, the health care industry needs to constantly innovate to address cost, quality and service pressures and also to incorporate new medical knowledge in treatment approaches and techniques. Lately there has been an academic and practitioner focus on discovering ways organizations can enhance the generation and incorporation of new knowledge (e.g., Leonard-Barton; 1998; Davenport and Prusak, 1997).

A critical feature of knowledge work and the creation of new insights is that they often require multidisciplinary expertise and mutual learning in order to achieve a complex synthesis of highly specialized state-of-the art technologies and knowledge domains (Dougherty, 1992). The pooling of multiple and distinct knowledge resources in order to create new knowledge has theoretical underpinnings in Ashby's (1956,1962) work on requisite variety: for survival, the internal diversity of a self-regulating system should match the diversity of the environment. Requisite variety as expressed in representation of multiple knowledge domains can provide a robust basis for learning and innovation. It ensures multiple perspectives, and can facilitate the innovative process by enabling a system to make novel associations and linkages (Cohen & Levinthal, 1990).

A clear example of the need to assemble the requisite variety in order to accomplish knowledge work is evident in Dougherty's (1992) study comparing successful and unsuccessful product innovations across five firms. She found that innovations that were commercially successful came out of collaborative knowledge networks that linked

and involved distinct knowledge domains such as R&D, marketing, manufacturing, quality, and business planning in idea generation and product development. Yet the process of collaboration is difficult in large part because of the unique interpretive repertoires (“thought worlds”) of the various disciplines that are based on their training and socialization, and because of the organizational segmentation of these disciplines and the resulting organizational routines that are barriers to collaboration.

Organizations are increasingly creating organizational knowledge or innovation networks that bring together actors representing multiple specialized and distinct knowledge domains in order to generate new forms of knowledge (Mohrman et.al, 1995; Boland & Tenkasi, 1995; Quinn, Anderson and Finkelstein, 1996). This general class of initiatives includes purposely created routines and programs that are intended to promote collaboration among organizational members (Dougherty, 1992), and to foster the formation of learning communities of practice (Brown and Duguid, 1992). A good example is the Work Innovation Network at Hewlett-Packard (Winby, 1996) that creates issue-based communities of diverse organizational participants around certain organization innovation goals such as quality or customer service.

Networks that emerge spontaneously in organizations have been found to have beneficial impacts on organizational innovation (Brown and Duguid, 1992; Quinn et.al. 1996). Networks can also be deliberately instituted in order to enhance organizational effectiveness (e.g., Boland and Tenkasi, 1995). With the emergence of the deliberate network organization (Larson, 1992; Nohria and Eccles, 1992) there have been suggestions for organizations to invest in, develop, and enforce policies, programs, and routines that systematically encourage the creation of informal networks (Dougherty,

1992; Hinds and Keisler, 1995). There have also been calls for research and theory development to expand our knowledge of how networks emerge and become effective. In this study, we examine innovation networks in a large health care delivery system. Because a core element of informal networks is their ability to self-organize, we examine these networks as “constituted social orders” (Parsons, 1949) that are created through the actions of their members. The purpose of this study is to understand the self-organizing processes in these networks, and how these impact the ability of the networks to achieve their purposes.

NETWORKS AS CONSTITUTED SOCIAL ORDERS

As Hinds and Keisler (1995) note, currently our knowledge of networks in organizations is limited both empirically and theoretically. We know that informal networks are emergent ad hoc linkages whose formation is enabled by physical proximity (Allen, 1977; Monge et. al., 1985; Kraut et.al., 1988), a history of prior personal relationships (Krackhardt, 1992), and demographic similarity (Wagner et. al., 1984; Zenger and Lawrence, 1989). Although there has been a recent proliferation of network organizational forms (Kanter, 1989; Badracco, 1991), existing studies offer only pieces of the picture and have minimal implications for theory building (Larson, 1992; Van Wijk and Van Den Bosch, 1998). They focus on limited variables such as personal relationships, trust, and concern for mutual reputation in contributing to the effectiveness of network forms (Coser, Kadushin and Powell, 1982; Walker, 1988; Doz, 1988; Jarillo, 1988). They do not offer much insight on how the network form is built, coordinated, and controlled, or how internal exchange processes are structured in order to sustain cooperative exchanges (Larson, 1992; Pettigrew, Conyon and Whittington, 1995). There

has been little empirical investigation of the conditions for successful collaboration in discretionary and deliberately instituted organizational networks and the utilization of such networks by organizational participants.

Because of the voluntary and often emergent nature of networks, they are best understood as constituted social orders (Parsons, 1949). Parsons argued that successful social action is possible through the creation of an appropriate social order, and that social action fails when the social order fails to match the requirements of the action. Such a mutual relationship between action and structure is central to practice theory (Bourdieu, 1990; Lave, 1988) and structuration theory (Giddens, 1993), both of which are grounded in the ongoing practical activities of human agents in particular historical, cultural and institutional contexts. These approaches argue that the actions of members are always shaped to some extent by the situation they find themselves in, which they often create for themselves. The features of the situation established by the members through their actions then enable and/or constrain the performances of members. Giddens (1993) addresses this as the ‘duality of structure’, which refers to the notion that social order or institutional properties of the social system are created by human action which then in turn serves to shape human action. For example, the attributes of the organizational structure such as hierarchy, and division of labor created as choiceful and purposive actions by members in turn mediate their action and account for the performance patterns and outcomes of the particular social order.

Although social order is a broad concept, and there are multitude domains one could focus on, according to Giddens (1993) there are three essential and interdependent components that can account for a social system’s ability to generate the desired

outcomes. Giddens (1993) specifies that all human interaction is inextricably composed of structures of meaning and interpretation, power relationships and norms, and that any action and/or interaction in a social system can be analyzed in terms of these three modalities (Orlikowski and Robey, 1991). He refers to these three modalities that link the realm of action and the realm of social order as Interpretive schemes, Resources, and Norms. These modalities determine the constitution of social order through human action and subsequently the recursive mediation of human action by the social order. This linkage between the realm of human actions and the constitution of social order is referred to as the 'process of structuration'.

Interpretive schemes or 'cognitive order' are the patterns actors' employ to deal with understanding and sense making issues within the social system. Resources or the 'power order' are the patterns of power relationships among actors through which intentions are realized and power is exercised in the social system. Norms or the 'normative order' are the patterns concerning norms of behavior in the social system. Norms are embedded in organizational rules or conventions governing legitimate or appropriate conduct that include elements such as roles, rights, and obligations of organizational members, which in essence forms the fabric of organizational structure. "Normative components of interaction always center upon relations between the rights and obligations expected of those participating in a range of interaction contexts" (Giddens, 1984. P. 30).

While creating an appropriate social order is generally purposeful and based on consciously applied intentions, there are also emergent aspects to the process that happen by accident and/or trial and error (Schegloff , 1982). Giddens (1984; 1993) and Bourdieu

(1990) share a sense of structure/social order as a generative set of rules and resources, rather than a static set of objective relations.

Since the role of social order in shaping human action and interaction is only partially transparent to human actors (Orlikowski and Robey, 1991), social orders can only be identified and understood by observing actors' behaviors and 'patterns of actions' as they go about trying to accomplish their intended purposes (Drazin and Sandelands; 1992). In order to understand the social order of a social system, one has to study the intentional and emergent patterns of action of actors in the social system. A useful framework to employ in this regard is Giddens's conception that any action or interaction in a social system can be analyzed in terms of the modalities of cognition, power and norms (Giddens, 1993).

Actions employed by actors to help accomplish the system's purposes have been referred to as 'organizing moves' (Pentland, 1992; Pentland and Reuter, 1995) building on Goffman's (1981; 1967) use of the term "move" to refer to a unit of analysis in situated interaction. The concept of 'organizing moves' provides a way to analyze the connection between particular actions (moves), the resultant structures/orders, and performance outcomes. Moves are the basic action units [or action-types in Giddens's (1993) terminology] that underlie the constituting activity of the social order by actors and the subsequent recursive mediation of human action by the social order.

This conceptual tool helps break down the more monolithic concepts of operating procedures (Cyert and March, 1963) and routines (Nelson and Winter, 1982) that dominate the organizational literature. By focusing on actions, rather than objects, one can develop a lexicon with which to express routines and organizational structures as

ongoing accomplishments (Pentland, 1992). Moves allow us to think less about organization and more about organizing (Weick, 1979). They are the component units that social orders and their organizing performances are made up of (Goffman, 1981; Ryle, 1949) and could include, for example, moves that enact a certain division of labor, i.e. its normative or structural order, or moves that enact a certain hierarchy, i.e. its power order, or moves that enact a certain 'frame of meaning' to interpret everyday events, i.e. its cognitive or interpretive order. Moves as organizing units are less about the *opus operatum* and more about the *modus operandi* (Bourdieu, 1990), and the structures/order that get created as a result can have differential impacts on performance outcomes.

A few studies have employed the concept of organizing moves to understand how participants are able to achieve effective performance in situations where pre-existing routines/structures are not available to guide action. Hutchins (1990) studied a ship's crew with a broken down navigation apparatus and the various organizing moves they progressively employed to constitute a new social order that enabled them to successfully navigate the ship back to the harbor. After struggling for a while and experimenting with various organizing moves the navigation crew was able to settle on one particular division of labor and patterns of social and technical action that constituted a social order which was most efficient to navigate the ship back into the harbor. Pentland (1992) examined two effective software support hot lines, and found a core set of 'organizing moves' employed by the technical support specialists to respond effectively to customer calls. The core moves both enacted and reflected the unique structure/social order of the hot lines—transferring a call enacted a certain division of labor, escalating a call enacted

a certain hierarchy and so on that could account for the above average performance of these two software support hot lines in resolving customer problems.

Orlikowski and Yates (1994) focused on communicative practices/moves, that may be construed as a subset of organizing moves. They examined a geographically dispersed group of computer language designers in a multiyear, inter-organizational project to define a new computer language (Common LISP). The project community used a rich array of communicative practices that members shaped and changed in response to project deadlines, time pressure, and media capabilities. Various types of communicative moves reflected how they organized/ordered their work during different times during the project, including the division of labor and responsibilities among the various collaborators and the types of information attended and not attended to. The variation in moves through the project contributed to task effectiveness.

The establishment of a knowledge network in a traditional hierarchical work organization entails constituting a new social order—one that is able to accomplish tasks such as knowledge sharing across boundaries that are not easily accommodated in the traditional organization. The routines to establish networks in organizations are not formalized or understood, and the success or failure of these networks in accomplishing their purposes therefore depends on the organizing moves that members make that constitute the social order.

In this paper we describe an exploratory, inductive field study in a major health care facility of the implementation of a deliberate program for fostering the creation of voluntary collaborative innovation networks of diverse organizational participants from multiple disciplines and various hierarchical levels. Our lens for approaching the study

was to contrast the constituted social order of successful innovation networks with unsuccessful ones, by paying particular attention to the ‘organizing moves’ that successful innovation networks employed for successful collaboration to create innovations. Drawing from Giddens (1993), our focus was on discerning the organizing moves pertaining to constituting the cognitive, power, and normative/structural orders of the different innovation networks.

Our interest in studying the implementation was to evolve theory and understanding about the nature of the collaborative innovation process through such networks. A secondary objective was to produce some managerial insights into those factors aiding and impeding the utilization and success of such knowledge networks. A few studies have used the concept of ‘organizing moves’ to look at the connection between moves, resultant social order and performance outcomes (e.g., Pentland, 1992; Hutchins, 1991). However, none of these studies have been comparative studies that examined how different groups interact and organize to accomplish similar kinds of work, and how similarities or differences in organizing moves could potentially account for observed differences in structure, outcomes and performance. This, we believe, is an additional contribution of this study.

We will first describe the research setting and the characteristics of the innovation program we studied. Second we will present our research methodology including our study approach, data collection and analysis procedures. Then we will discuss our framework and the data from which it was inducted. We conclude by tying the framework to our broader agenda of the fundamental organizational dynamics that underlie successful collaboration in organizational innovation networks.

RESEARCH SITE AND INNOVATION PROGRAM DESCRIPTION

The site for this study is a health care organization with multiple medical facilities located in a large metropolitan area of the United States. The organization is attempting to redefine the nature of its health care service to become more customer sensitive and to offer more integrated patient care. Part of this effort was the creation of an innovation fund program where various physician and non-physician specialists are encouraged to work with each other to develop customer sensitive health care innovations.

The Innovation Fund program was an outgrowth of the strategic planning process of the organization and its recognition of the need to support innovative healthcare pilot projects that improve the organization's cost effectiveness, service to its customers, and quality of care. Created in 1990, a certain amount of money was set aside each year to help pilot start-up projects that can accelerate organizational learning, change, and innovation in these arenas. Specific criteria outlined for funding of projects proposed were that they: 1) involve multiple departments; 2) increase value of services to patients, i.e., produce a potential benefit that is greater than cost; 3) be accomplished within specified time period and budget; 4) represent a departure from rather than an incremental change to the current way of doing things; 5) be able to be evaluated and learned from, even if they don't accomplish their stated aims; and 6) be easily dismantled if unsuccessful, and if successful be transferable to the rest of the organization ; and 7) clearly identify the potential receivers of the innovation.

The submission of a proposal for funding was open to any member of the organization as long as it was approved by the individual's manager and that manager was supportive of the idea, its trial, and the time commitment entailed. Proposals were

accepted once a year and final selections were made by an Innovation Fund Review Committee (IFRC) composed of a cross-section of managers of the organization representing different departments and disciplines.

In late 1993 we conducted a study of the project networks established by the IFRC. Council members and senior management were interested in examining why only some of the projects funded were getting implemented as planned, and why some successful innovations resulting from the fund were not diffusing through the organization. They were also concerned because many of the projects that were being put forward by the innovation networks were in their judgment incremental changes that did not introduce truly innovative approaches. They wanted to learn about facilitators and barriers to the utilization of the fund, as well as to assess whether the Innovation Fund was a sound approach to generating innovations in health care delivery.

STUDY METHOD

Because this study focused on a “how” and “why” question about a contemporary set of events (Yin, 1984, p. 13) and addressed a process not yet thoroughly researched, we used a case study approach. A case study is most appropriate when dealing with an exploratory research question, and neither hypotheses nor theory is well formed prior to data collection and the reliance is on a broad theoretical model and tentative research propositions (Glasser and Strauss, 1967; Eisenhardt, 1989). We approached our investigation as an open ended exploration of understanding the dynamics of collaboration and of participation/utilization associated with the Innovation Fund. Our broad framework was one of understanding the organizing moves underlying the creation of an appropriate social order to contribute to successful innovations.

Case study research follows two complementary forms of analysis, within-case analysis and across-case analysis. Within-case analysis typically involves detailed case study write ups for each unit of analysis. The overall idea is to become intimately familiar with the unique patterns of each case as a stand-alone entity before generalizing patterns across cases. From within-case analysis, cross-site pattern detection and overall impressions, tentative themes, concepts, and possibly relationships between variables begin to emerge.

A second step in exploring the research questions/proposition is by verifying the emergent relationships between constructs for the evidence in each case. Sometimes a relationship is confirmed by the case evidence, whereas at other times it is revised, disconfirmed or thrown out for insufficient evidence. Each research question/proposition is examined for each case, not for the aggregate cases. Thus the underlying logic of replication is the logic of treating a series of cases as a series of experiments with each case serving to confirm or disconfirm research propositions (Yin, 1984).

Through semi-structured interviews and archival data, we collected detailed information on a total of 20 innovation projects (cases) out of the 28 that had been funded by the innovation fund over the past three years. The projects we studied were selected by the organization based on availability of the involved staff (in some cases the initiators had left the organization) and on whether the project was rich enough to yield learning (in several cases the project never got started or was quickly abandoned or violated requirements for cross-functional collaboration). Out of these 20 projects, 15 had already been completed while 5 were on-going projects.

The mixing of retrospective and on-going projects helped us focus better on our exploratory questions. While studies have shown that the participants in organizational processes do not forget key events in these processes as readily as one might suppose (Huber, 1985), the participant informant in a wholly retrospective study may not have recognized an event as important when it occurred and may not recall it afterward. While completed projects are more definitive in their status as to whether they have been successfully completed and/or successfully diffused, the on-going projects can help in validating or extending additional insights into dynamics of collaboration in innovation networks, when examined from the perspective of whether they are progressing smoothly or having difficulties in making the collaboration work. According to Leonard-Barton (1995), this dual methodology for case studies of combining retrospective cases with real time cases offers opportunities for complementary and synergistic data gathering and analysis; the retrospective studies helps identify patterns of dynamic processes, while the real time cases provides a close-up view of those patterns as they evolve in time.

Borrowing from Van de Ven and Ferry (1980) we conceptualized the innovation network as all the participants who are meshed together in a social system to attain a collective goal or to resolve a specific problem. We considered the innovation network to be composed of initiators and other contributors who are helping shape ideas, providing resources, or helping pilot/test the innovation, including those who are potential innovation recipients.

We conducted a total of 46 interviews that included members of the IFRC, top management, innovation fund recipients and select participants/co-innovators from the 20 projects we studied, as well as some key recipients of the innovation. We used two semi-

structured interview protocols (See appendices 1 & 2). One interview protocol used with 6 top managers and IFRC members asked about factors facilitating and inhibiting innovation and learning in the organization and factors that are impacting the successful utilization of the innovation fund. The second protocol asked network participants (two per project) questions about their specific project, including the nature of the innovation, the way the idea and the project evolved, the dynamics of collaboration in the network, and the dynamics of implementation. Probes were used to establish details. Each interview typically lasted from 75 minutes to 90 minutes.

Data Analysis

We considered each innovation project as a unit of analysis. The 15 completed projects fit into three categories:

- A) Projects where the project evaluation indicated that the project had failed to attain its outcomes and did not succeed in establishing a pilot implementation (6 projects).

- B) Projects that were successfully completed, piloted and implemented locally (7 projects)

- C) Projects that were successfully completed, implemented and diffused to at least to one other part of the organization (2 projects).

Based on the perceptions of the interviewees, we split the five on-going projects into two categories:

D) Projects that were progressing satisfactorily (3 projects),

E) Projects that were encountering difficulties (2 projects).

Table 1 provides a description of the projects and their categorization. Using the interviews and secondary sources, a case description was constructed for each innovation project. As a cross-check on the emerging stories, two researchers read through the interviews and materials and formed independent views of each case. The researchers categorized all the cases similarly with respect to success or failure. Dialogue between the researchers was used to integrate their perspectives as to the important explanatory elements of the case study.

Once the individual case studies were completed, a cross-case analysis was used to develop the conceptual framework presented in the paper using methods suggested by Miles and Huberman (1984) and Eisenhardt (1989). As mentioned earlier there were no specific hypotheses but rather a broad framework in Giddens's structuration theory to guide our investigation. Our interest was in understanding the constituted social order of successful innovation networks by paying attention to the organizing moves of a cognitive, political and structural nature that enabled these discretionary networks to successfully collaborate and create innovations

While Giddens structuration theory provides a useful framework to grasp the dynamics underlying the constitution of social order, the theory is not without its limitations. A major methodological concern is that the theory provides a meta-theory, a

way of thinking about the world, rather than a middle range theory about specific phenomena that can be explored, tested, or described directly and empirically (for a discussion see Cohen, 1989). As Archer (1982. p. 459) notes “the theory of structuration remains fundamentally non-propositional.” Our interest was in ‘theory elaboration’ (Vaughan, 1992), an approach which consists of taking off from meta-level extant theories and developing them further in conjunction with qualitative case analysis. The elaboration process involves refining the theory by grounding it in data and arriving at rich descriptions so that the theory is more closely linked to “the daily realities (what is actually going on) of substantive areas, and so be highly applicable to dealing with them” (Glasser and Strauss, 1967; pp. 238-239). In this case the elaboration process involved exploring and understanding how the modalities of structuration in terms of the cognitive, political and structural moves manifested in practice as the innovation networks set about the process of constituting themselves

As part of this process, initially the cases were compared to identify common dynamics and to refine the unique understandings of each case. Charts and tables were used to facilitate these comparisons. Cases were then compared for similarities and differences in order to develop the emerging constructs and logic of the conceptual framework on the nature of these organizing moves. With each iteration, the conceptual framework became more refined and detailed. As more cases were folded into the analysis, the level of abstraction was elevated. We periodically went back to the original interviews to provide another check of our grounding in the data.

ORGANIZING MOVES IN CONSTITUTING THE INNOVATION NETWORK

Our interest was in developing grounded descriptions of organizing moves that enabled these discretionary networks to successfully collaborate and create innovations. The organizing move construct enables us to place the major factors that differentiated between the successful and unsuccessful cases in higher level categories. What emerged from our data analysis was that successful innovation projects combined two kinds of organizing moves that accounted for effective collaboration and creation of innovations.

Although we initially looked for moves that were indications of cognitive, political, and structural action patterns, we quickly found that because these are knowledge networks, the cognitive and structural aspects of the network are deeply intertwined. Structural elements relate closely to how various cognitive frameworks are included in the network, and cognitive elements relate to what structural elements were established. In fact, this pattern fits in with Giddens (1993) description of the modalities of structuration, in the sense that their separation into the cognitive, power, and normative domains represent “ideal types’ and are theoretical distinctions, -- while, in practice they intermingle and interpenetrate.

In contrast to unsuccessful projects, we found that successful innovation projects were characterized by certain patterns of cognitive-structural and political actions. Table 2 provides a brief summary of each of the projects with respect to each of the patterns of action that emerged. We will elaborate on each of these patterns and illustrate how they played out in the successful and unsuccessful projects:

Cognitive-Structural organizing moves:

In this medical system, successful projects in contrast to unsuccessful projects paid attention to creating an adequate cognitive/knowledge base for the project and concurrently instituted structural mechanisms and routines to reinforce the collaboration between the various knowledge bases involved. Specifically, successful projects 1) created an adequate, front-end conceptual knowledge base for the project that was facilitated by early identification and involvement of relevant parties; 2) attended to bridging cognitive differences among the collaborating parties; and 3) established a clear strategy for how to go about the innovation process, including defined plans, goals, and evaluation criteria that frequently drew on the front end conceptual knowledge base of the project.

Creating an adequate conceptual knowledge base through early identification and involvement of relevant parties

All 9 successfully completed projects and 3 successful on-going projects paid attention to creating an adequate conceptual knowledge base by early inclusion of members with the relevant knowledge perspectives to create a well thought out project definition. In all the 6 unsuccessful projects or the 2 on-going projects having difficulties there was only partial involvement of parties with the necessary knowledge.

A good example of creating a front-end knowledge base is the self-referral mammography project. This project was conceived by a breast cancer task force that included members from surgery, radiology, oncology, pathology, nurse practitioners, and program planning. All these members in one way or the other contributed to defining the parameters of the program prior to the application for innovation fund support. The

original impetus for this program came from the radiologists who felt medical resources could be more suitably deployed if a differentiation were made between the scheduling and staffing for high-risk breast exams (that might need extra studies- thus 30 minutes or more with a radiologist) and low-risk breast exams (that may not require a radiologist to be present). This evolved into the self-referral mammography project with exams being performed by a trained nurse practitioner following a specified protocol, who could differentiate between high risk and low risk exams. In addition to the multi-discipline groups represented on the breast cancer task force, others from family practice, internal medicine and OB/GYN were consulted since they are concerned with the on-going care and regular breast examination of patients.

The guided imagery project to reduce post-operative pain also created a strong interdisciplinary conceptual base. The idea came out of informal collaboration between a psychiatrist and an anesthesiologist. They wanted to pilot it with patients who had undergone abdominal hysterectomy. However, they realized that the obstetricians and gynecologists (OB/GYN) had to be an integral part of the program both for their expert input on their patients' post-operative care as well as to provide patient referrals. Even before they decided to apply for funding, the innovation initiators met with the OB/GYN staff and got their buy-in and expertise. As the psychiatrist said " We had to convince the surgeons." Referral of the patients to the project depends on the OB/GYN's being comfortable with the proposed intervention and ensuring that whatever new techniques are used will not jeopardize the patients' post-operative recovery. Further, the OB/GYN surgeons' expertise was required in identifying patients who would benefit from this treatment and their help was needed in reassuring patients.

The chronic illness model project was establishing new approaches to treating patients with chronic illnesses in general, but chose to pilot the concept with diabetes patients. A lot of groundwork had already been done when the project was funded. Some of the collaborators had conceived of the idea in 1988 and had been steadily bringing in various people as their understanding of the model developed. They created a steering committee and also had a diabetes advisory group in place when they approached the innovation fund for money. Physician managers, nurses, pharmacists, social workers and researchers from the Center for Health Research an affiliated research facility were all involved in conceptualizing the project.

The skilled nursing project is an example of an unsuccessful project that failed to incorporate the needed knowledge resources. One of the earliest projects to be funded, it was intended to reduce home visits by nurses and increase the quality of care by asking able and ambulatory patients to go to a skilled nursing clinic. The program was initiated by a nursing director in collaboration with other nurses. However, only after the project was set in motion and the skilled nursing facility had been set up did the initiators make any attempts to involve relevant others. For example, the home health department which coordinated home health was not approached for their input or collaboration until late in the project. The physicians were also brought into the picture quite late although they were the ones who made referrals for home health visits of patients. Consequently, there was no agreement on how this clinic fit into the overall set of options for delivering care. Protocols were not developed to determine which patients would be referred to the skilled nursing clinic. The innovation failed in large part because the skilled nursing center did not get the physician referrals needed to make it viable.

In summary, the successful projects quickly assembled the right parties to create an adequate conceptual knowledge base that included various content disciplines as well as the local knowledge of the parties who had to be involved in implementation and whose work would be impacted. The innovation network thus included the requisite variety of knowledge and perspectives to enable well-conceived projects. In several cases the project was formally initiated through the fund only after all key parties were included in the innovation network. The various knowledge bases were convened in order to shape the proposal itself. Unsuccessful projects tended to be proposed by individuals or groups with a limited perspective, who then looked for collaborators for the idea that had already been funded and, in some cases, defined.

Bridging cognitive differences in understanding among participants

Simply pulling the resources with the needed knowledge into the network was not sufficient. To achieve collaboration, the members had to find ways to bridge the cognitive differences between the various disciplines involved in the network—differences in their symbolic systems, rules, conventions, meanings and ideologies. Different professions and specialties embody different cognitive and symbolic systems, produce different rules, conventions and meanings, and are legitimated with distinct ideologies (Fleck, 1935/1979). This often leads to competing definitions of what is right and what is not. For example, within the profession of medicine, different specialties advocate different ways of handling and justifying patient discharge. The classical medical approach would favor rapid discharge based on the control of physiological conditions, with minimal patient input in the treatment or discharge decision. A psychosocial approach in contrast would emphasize the social milieu of discharge and

would include the patient in the decision process. These two approaches are legitimized by different ideologies about physician responsibility, the locus of knowledge, the location of the decision, and the criteria of “well” and “normal” (Strauss et.al., 1964). Unless there is a deliberate effort to bridge these cognitive systems, their advocates cannot easily share ideas or come to agreement about a course of action. Collaborating and building on multiple knowledge and expert domains in multi-disciplinary endeavors requires that members are able to take each others’ perspectives (Boland & Tenkasi, 1995) and integrate across the various “thought worlds” (Dougherty, 1992).

Interviewees in all but one of the successful completed and ongoing projects bought up areas where dissimilar cognitive perspectives had been successfully bridged. In all of the unsuccessful projects, cognitive differences were left unbridged. The guided imagery project presented an example of bridging. The OB/GYN staff traditionally treated post-operative pain medicinally, and the psychiatrist and anesthesiologist suggested alternative methods such as relaxation and guided imagery. As stated by the psychiatrist, “what convinced them was at the OB/GYN staff meeting I used an analogy for guided imagery-- I said it is similar to breathing exercises- it is like concentrating on the breath--and that convinced them.” Many of the OB/GYN surgeons were not familiar with guided imagery techniques but they were familiar with the series of breathing exercises taught to patients prior to surgery that can help avoid post-operative lung infection. By making this analogy, the psychiatrist highlighted the fact that the guided imagery exercise was simple and non-invasive, can help in reducing post-operative problems, and could easily become incorporated into their routine practice.

In the self-referral mammography project there was “continuous consensus development on approaches to treatment with the organization’s professional staff during the course of the project”. Members from surgery, radiology, oncology, and program planning came together and exchanged and explored their unique treatment approaches to create a common knowledge platform for the project. Even though this was one of the most successful innovation networks in terms of piloting and diffusing an approach that represented a true departure from accepted practice, it still ran into problems with unbridged worldviews. In the one facility which did not implement the new approach, the gynecologists felt that it was adequate to refer patients for mammograms when they showed up for pap smears. The members of the innovation team felt that this was illogical since “people [who need yearly mammograms] don’t necessarily need yearly pap smears, and organizationally these physicians are not dealing with patients on a population basis”. Although the physician members of the network that generated the self-referral mammography innovation came to understand the issue of access to mammograms in a new way, their colleagues who were not part of the network did not. This same issue was encountered by a number of the other networks. Another project, the geriatric enhancement project, was helped in this regard by strong physician sponsors who were able to talk to the other physicians about the soundness of the approach proposed and to translate it conceptually for them to comprehend.

In contrast, in the unsuccessful projects either the attempts to bridge cognitive differences failed or the differences were left unexplored. In the hypertension intervention project, for example, there were unresolved conceptual differences between the more behaviorally oriented members who believed that hypertension can be

controlled by life style choices and the medicinally oriented members who did not believe in behaviorally oriented medical approaches. Even among the medicinally oriented participants there were differences as to “ whether one can devise an algorithm for treatment of hypertension and can that happen except for simple cases?” The inability to find common ground in this network regarding these fundamental conceptual issues caused this project to grind to a halt.

Establishing a clear strategy for how the network will go about the innovation process

Innovation networks are purposeful, outcome-oriented groups, and their effectiveness will depend on the adoption of an appropriate task strategy ((Hackman, 1987). On the other hand, most of the members of these networks had little experience with innovation. These networks had no guidelines to follow and had to develop a cognitive understanding of the innovation process and implement patterns of action to attain their goals. Successful innovation networks laid down clear priorities and goals. They quickly laid out a plan in terms of what the project was going to achieve, how it was going to be achieved, the responsibilities of the collaborating members of the network, the time frame, and the evaluation criteria to determine if the project was successful. In other words, they generated and followed a very systematic process.

In many cases the first step in the process was to assemble and build on various knowledge and data bases to help with the crafting of the innovation. In several cases the project design and clarity in plans, priorities and criteria built on sound past clinical data. For example, the chronic illness model was planned in two modules with the first module serving to collect systematic clinical data for planning the second module. The

innovation initiator strongly believed that projects based on “sound clinical data can provide a strong foundation for innovations and improvements”, and the resulting approach in large measure reflected his leadership. The phase one dental treatment needs innovation network crafted their approach looking at data in the organization as well as experiments and clinical results in Europe and Canada. Interviewees reported that the examination of this data in turn helped in putting clear measurements in place to assess impact of the innovation.

Early crafting of an evaluation process helped some of the other innovation networks to clarify and refine their strategy. As examples, the self-referral mammography project, post-operative guided imagery, PC based data management project, and pre-pregnancy information for diabetics project each drew on an existing knowledge base to determine their approach, and lay out clear plans. They each used a pre-post evaluation design to assess whether the innovation shows significant impact. The use of this approach was connected in their mind with the systematic approach they took to defining the innovation and implementation plan. The geriatric enhancement model not only laid out clear evaluation criteria, but also took care to ensure that the objectives were well aligned with the organizational strategy.

In some of the successful projects where the innovation initiators did not have the required skills to come up with a well thought out design with clear goals and evaluation criteria, they sought out help from other relevant departments such as program planning, researchers from an affiliated health research facility, or other such parties who were well versed in program design and evaluation, and who in some cases added content expertise or project management expertise. In other words, they expanded their network to include

innovation and evaluation process knowledge. Members from program planning and/ or the health research facility were involved in the self-referral mammography, outreach to patients and teens, chronic illness model and the geriatric enhancement projects.

Explicit assignment of responsibilities characterized a number of the successful innovation networks. In the chronic illness model, the responsibilities of the various participating groups for providing manpower was clearly worked out. Likewise in the cardiac connections project the responsibilities of the nurses, clinical coordinator, and social worker were clearly delineated

The unsuccessful projects placed less emphasis on laying down clearly defined goals, responsibilities or evaluation criteria. In the new member outreach project, a key member expressed her frustration this way; “Yes, goals were defined but evaluation criteria were unclear- we had questions around evaluation-- how to evaluate?” The failure to evaluate the project reflected different understandings among members about the purpose of the project. Furthermore, responsibilities were never assigned and accepted, and some of the interviewees who were part of the network were frustrated because the innovation network’s task was not salient to some of the other members due to this lack of clarity.

The lack of a systematic approach was very evident in the personal health profile project. The project initiator commented: “ the goals changed mid-course and we did not plan it too well-- and we looked at too widespread a pilot and it became institutionalized too early and went into an approval process mode from the physicians who were to pilot and test it”. By selecting an unwilling pilot location for an ill-defined innovation, this

voluntary innovation network evoked resistance from the system that ended up in its ideas being formally rejected.

In the area of diffusion, almost all the networks fell down. Only the self-referral mammography and PC based data management systems had diffusion plans, and they were the only projects that achieved implementation beyond the local pilot. The breast cancer task force that became the network for the self-referral mammography project had been working on popularizing the idea in the various hospitals for several years prior to obtaining innovation funding. Thus, the road was paved for dissemination very early. The PC based data management system was primarily a technical change and was initiated by the microbiologist in the laboratory that was the central facility for all specimen analysis. Sharing knowledge about the improvement in flow of specimens between the central laboratory and one hospital's main laboratory helped with its duplication in the other hospital laboratories.

In several other cases there were no plans for diffusion, or just half-hearted attempts at diffusion due to a general feeling that diffusion is difficult. For example in the guided imagery project that was quite successfully piloted, the psychiatrist explored the idea of dissemination to another facility, although with little help from the other members of the innovation network. She decided to drop it when the responses were not positive. Instead she started focusing her energies on obtaining external research grants and sites outside the hospital to explore the idea further. Her general opinion based on past experience was that most of the facilities suffer from a "Not-Invented- Here" syndrome.

This cognitive-structural category of organizing moves for voluntary innovation networks dealt with three sub-categories of organizing moves that dealt with the need for

the network to assemble the requisite variety of knowledge and perspectives, find ways to cognitively bridge those diverse perspectives, and structure their collective activities in order to systematically innovate. The other major category of organizing moves that emerged strongly from the data is the need to act in a way that is sensitive to the political order of the organization. This category is discussed below.

Political organizing moves:

As evident from the above discussion, medical systems are characterized by a large variety of disciplinary experts who are interdependent in their activities and impact on patients. These differences have become embedded in institutional patterns of power that relate in part to the nature of their various knowledge bases. Habermas (1971) has differentiated between communicative or interpretative knowledge which contributes to mutual understanding and technical knowledge which is governed by technical rules based upon empirical knowledge. He points out that these two forms of knowledge clash. Over time, people from differing professional/knowledge specialties, technical and interpretive, negotiate and create an order of power and authority within an organization. A strong order has emerged in health care organizations. Traditional medicine, which seeks clear diagnostic classifications and technologies, has assumed dominance in the institutional order. Behaviorally oriented medical fields such as psychiatry, nursing and social work are characterized by more ambiguous or diffuse knowledge bases and this has fueled professional marginalization and lack of authority. (Toren, 1975, Larson, 1977, Huntington, 1981). Even among various physician specialties, there is a distinct hierarchy that relates in part to whether the knowledge base is technical or more diffused and interpretative. For example, surgeons occupy a higher status compared to

psychiatrists and specialists see themselves as superior to generalists (Strauss, 1978, Egger and Wagner, 1992)

Thus, a health care system represents a social order that has been constituted through repeated negotiations among professional disciplines with varying degrees of power. Agreements have been reached about what is to be done daily and by whom, what these activities mean, and how they should be justified. This institutional order acts as a cultural constraint on actions, interpretations, and modifications (Strauss et. al., 1964). As people from different professional disciplines work together as part of innovation networks, changes may be suggested that would reconfigure this negotiated order. This may result in conflict and in resistance from the dominant parties that feel their control would be adversely impacted (Manning, 1982).

The hope of management in this health care system we studied is that the innovation networks will introduce change in the way health care is delivered and thus deviate considerably from the status quo. However, we found a strong interplay of the existing institutional power arrangements and the knowledge network dynamics. Successful projects in contrast to unsuccessful projects carried out moves that: 1) attended to the institutional patterns of power and control among the collaborating parties; 2) enlisted strong physician sponsorship; and 3) enlisted support from the functional managers of individual participants.

Attending to the negotiated order of institutional patterns of power and control:

The cognitive differences and conflicts discussed above arose from multiple paradigms with differing assumptions, value systems, and beliefs, and from different organizational routines. In some of the innovation networks the tendency to not see

others' perspectives appeared to derived also from a sense of self interest and a preference by dominant parties to maintain certain institutionalized patterns of power and control. This was the case in all of the unsuccessful and both of the struggling on-going projects which met with resistance when they attempted to introduce innovations that would reconfigure the institutional order of power and control with their innovations. The dominant parties (usually the physicians) were unwilling to collaborate or contribute in helping create and/or pilot the innovation when they felt it would impinge upon their control over the patients.

Some members of the hypertension intervention project observed that disagreement with the concept being proposed reflected concern about loss of power. "The physicians questioned the validity of behavioral medicine --[the truth is] they are not willing to give up their power so easily." The personal health profile was also a case in point-- the physicians were dissatisfied with the use of a standard letter to patients to gather information since they felt that it would impinge upon their individual practice preferences. Likewise the skilled nursing clinic intruded into the traditional decision domain of the physicians and the home health department who together decide which patients get home care. In fact the home health department strongly felt that the skilled nursing clinic was attempting to replace part of its job.

The urgent care clinic follow-up project was another clear example. As the innovation initiator, himself a physician, said: " we are not progressing well with this project at all---It pushes down power to the RN to decide which patients need no follow-up, need a follow-up phone call, or need immediate follow-up----It gives the RN power to decide cases that physicians don't like". In the decision analysis for cancer screening

guidelines project, the other ongoing project experiencing difficulty, several physicians felt that to generate the explicit screening guidelines being proposed by the innovation would take away their autonomy to treat each individual patient as a unique case. In the allied health tutorial project the attempt to train the internists in the specialist areas was perceived as a violation of the prevailing hierarchical medical order. The specialists did not favor making ‘specialists out of internists’. Interestingly, in the self referral mammography project, which was the most successfully diffused project, a difficulty with the resistant facility was that “the physicians did not want to give up control over treatment” to RNs who would take over the administration of the breast screening.

Innovation network members in two of the successful projects were particularly cognizant of the negotiated order and attempted to place their innovations within the existing power structure. They made a point of not upsetting or threatening the institutionalized patterns of power and control in the organization. The psychiatrist and anesthesiologist who initiated the guided imagery project made it very clear that their specialties would not control the post operative patients. As the psychiatrist worded it, “[I knew] unless I get referrals and consent [of the OB/GYNs] I cannot do it-- I don't have control over new patients”. In the network dealing with the chronic illness model, powerful physician sponsors helped reassure physicians who initially felt threatened that “their patients were being taken over”. The other successful projects dealt with innovations that were not perceived as upsetting the current power order or had a sponsor such as a physician who represented the dominant coalition.

Although intended as a democratic enterprise open to any member of the organization, and potentially intended to transform the culture of the organization

including the re-distribution of power and authority patterns within the organization, the success of the discretionary network was based on conforming to, or at least working within the existing power distributions or through the dominant parties. In this organization, that largely meant attending to physician interests. This is reflected in the next two sub-categories, which deal with the need for strong physician sponsorship and to attend to physician time constraints, respectively.

Enlisting strong physician sponsorship for the project:

Irrespective of who initiated the project, strong physician sponsorship was necessary for project support. While the health care organization had a formal hierarchy and administrative structure, the real holders of power were the physicians. Their approval and sponsorship was necessary for moving any project forward. More physician sponsors enhanced the chances for success. For example the self-referral mammography project had support from physicians in general surgery, internal medicine, family practice, radiology, OB/GYN, legal medicine, and the regional cancer committee

All the successfully completed projects and well progressing on-going projects enlisted strong physician support and membership in the network. In some cases the project was initiated by physicians. Successful projects with non-physician initiators had physicians in the advisory board. This was true of the projects dealing with pre-pregnancy information for diabetics and outreach to parents and teens. The chronic illness model and the geriatric enhancement model projects were both initiated by non-physicians but recognized the importance of physician endorsement. One interviewee associated with the latter project said “ For any innovation to work in [this organization], you need strong physician leadership...otherwise any innovation can be easily dismissed

as too much staff time and a drain on resources... We got sign-off from the physician-in-charge and chief of internal medicine and buy-in from primary care, and now it is both the physician-in-charge and chief of internal medicine who are selling it to other physicians.”

Four of the six failed projects had no physician sponsor, and the other (the personal health profile project) had support from physician managers but not from the practicing physicians who would be involved in implementing the innovation. Likewise, with the allied health tutorial project the practicing primary care physicians and specialist physicians did not show enthusiasm. The initiator of the new member outreach project was an administrator and interviewees felt that the lack of physician support impacted the program adversely. According to the nursing director who initiated the skilled nursing project, the “major resistance came from the physicians-- at best they were neutral”. The hypertension intervention project had difficulties getting off the ground since “initially it was difficult to find a physician sponsor, and later the physician who acted as a sponsor was very busy and could not make it to meetings.”

Ensuring that the innovation reduces or at least does not increase physician workload

An area that particularly differentiated between successful and unsuccessful projects had to do with the impact of the innovation on physician’s time. Medical organizations largely deal in the time of their professional employees and time is the key scarce resource that was referred to throughout the interviews. All successful completed and ongoing projects ensured that the innovation reduced work or at least did not increase work, particularly for the physicians. In the self-mammography project, for example, the workload was significantly reduced for the physicians since the RNs now handled the

breast screening exams under the supervision of physicians. The electronic prescription note padding and notebook PCs were clear time saving devices for the physicians. With the chronic illness model, sick day management was being done over the phone and lessened the load on the emergency room physician. The geriatric enhancement model, by focusing on preventive care, reduced overuse of the medical facility by the frail. The key innovators in the guided imagery project were very sensitive that the innovation not create extra work for the physicians involved --" I had to promise the OB-GYN people that this did not create work for them."

Four of the five innovations attempted by the unsuccessful innovation networks entailed additional work for the collaborating parties, especially for the physicians. In the new member outreach program the pulling of a RN from triaging adversely impacted the physicians. One physician expressed his concern: "I am not sure how this [program] makes my job easier". In the skilled nursing clinic the workload was increased since the physicians now had to make two kinds of references-- to home care and the nursing clinic. One of the innovation initiators reported a retrospective realization: "[what I learned is] physicians do not want any added work--any innovation that is seen as reducing work will be accepted--any innovation that is seen as requiring more work even if it means better quality care or cost savings will not be welcomed". Even the automated strategy to develop personal health profiles was seen as more complex and entailing more work since it required that the physicians now review paper work.

One of the struggling ongoing projects, the urgent care clinic follow-up call project, is particularly interesting. Although it reduced the overall burden on physicians in general by eliminating unnecessary follow-up visits, it demanded more work on the

part of the emergency room or urgent care physician, who now had to make sure that the patient does not automatically get a follow up appointment. It required that the physician spend some time with the advice nurse in reviewing the cases and determining who needs follow-up care so that they can be contacted. This decreased the time demands on other physicians, but increased the demands on the physicians who provided initial treatment.

Enlisting support of functional managers

Another distinction we found between successful and unsuccessful collaboration was the extent to which the innovation network members successfully enlisted the support of their functional manager. In at least six of the successful completed projects, the functional manager was explicitly mentioned as supportive of the members' involvement in this discretionary network. The impact was largely in the area of providing resources, particularly in freeing up the members' time from their traditional job duties to participate in the creating the innovation and/or helping the members pilot the innovation. In some cases additional financial support was also needed. In the self referral mammography project, for example, nurse practitioners were freed up by departments of surgery in both facilities involved.

Four of the unsuccessful projects were visibly impacted by the lack of local management support. The strongest example was the new member outreach program which fell apart because a key member was pulled back. "The project fell apart when the RN had to be removed--- It was viewed as taking an RN off the floor". The hypertension intervention project encountered difficulties freeing up the staff to participate in the project. In the skilled nursing clinic project, the initiator complained that he received no support from medical office administrators. This project suffered because the financial

responsibilities of the various collaborating parties were not negotiated among managers, and the project could not get the necessary resources for implementation.

Related to this lack of support from the functional manager was that administrators and managers reported that there was no specific accountability for managers to support front line operational staff in supporting innovations. Managers had accountability for their own innovations embodied in their formal objectives, and were perceived as having no interest, time or energy to support innovation from their staff below. This made it all the more important for a project group to actively enlist the functional managers' support. The salience of support for network members from their managers cannot be understated in discretionary enterprises since, frequently, discretionary participation requires that members are given some slack from their traditional job duties and some additional resources by the concerned manager.

DISCUSSION

This inductive study in a health care explored the dynamics of successful collaboration in multi-disciplinary, multi-level, discretionary organizational networks intended to foster organizational innovation. Although enabled by a formal program that provided funding and encouragement, each of the knowledge networks was emergent—it grew out of grass-roots efforts to pull together the needed parties to effect a change in the way health care was delivered. Each network had to constitute itself and determine how to operate effectively. Given this need for self-design (Weick, 1977), the concept of structuration (Giddens, 1993) organizing moves (Goffman, 1981, Pentland, 1992,) offered a potentially rich framework to guide this exploratory research.

Using a comparative case study approach, very strong patterns of differences were found in two categories of organizing moves between successful and unsuccessful networks. Cognitive/structural organizing moves included creating an adequate conceptual base for the project by getting the various disciplines involved early in the project, finding ways to bridge across the various thought-worlds, and establishing a clear strategy for how the network would go about the innovation process. Political organizing moves included attending to the negotiated order of institutional power, enlisting strong support from the dominant group (physicians), ensuring that the innovation does not increase physician workload, and enlisting the support of functional managers.

Although similar realms of organizing moves can be hypothesized to be important in all organizational change networks, the particular manifestations in this organization related closely to the nature of the knowledge work that is done in this complex health care system and to the myriad of knowledge specialties that are interdependent in the delivery of medical care. In this organization, cognition, structure, and power are closely linked and are a formidable obstacle to changing the status quo. Participants are organized into narrowly defined departments and specialties based on their knowledge base. Physicians, with their technical medical knowledge base, are at the top of the institutional power order, and there is a power order among physician specialties based on the nature of their knowledge. Thus, the innovation networks spent an inordinate amount of energy establishing approaches to link in people with necessary but quite disparate knowledge bases and very uneven power.

These results demonstrate that in knowledge firms, moves that attend to the knowledge structure of the firm are as important as attending to the hierarchical/business

unit structure. Moves associated with the structuring of the networks could not be distinguished from moves addressing the diverse cognitive perspectives of the network. This finding supports Dougherty's (1992) finding in new product development projects that in order for collaboration to occur across contributors from different departments who work from different knowledge bases, a new social order has to be created that reflects the bridging of their different thought worlds. Simply setting up a new product development team as a formal organizational unit is not enough.

In some of the emergent innovation networks we studied, linking in hierarchical, departmental heads was viewed as fostering success, largely because these individuals controlled resources. Overall, however, this issue pales compared to the attention paid to the need to get the right knowledge resources on board. Effective implementation of many of the changes requires changes to routines that are part of specialists' methods and routines. In many cases, being part of these innovations requires a broadening of the cognitive schemes that guide behavior. Agreement from hierarchical leaders of the key knowledge domains was helpful but not sufficient. The fact that physician chiefs participated in a knowledge network did not mean that the practicing specialists who worked for the chief would participate in the innovation.

A tension within the organizational literature has been whether innovation is fostered by "organic" and more fluid, less structured approaches to organizing (Burns and Stalker, 1961; Levitt and March, 1988; Johne, 1985) or by high levels of clarity. These networks entailed emergent groupings of contributors from across the organizations. One might expect such discretionary innovation networks to entail fluid participation, loose rules, fuzzy responsibilities, and informal plans and priorities. However, we found just

the opposite in the successful networks in the study. The members of successful projects carried out organizing moves that resulted in considerable structure and clarity.

Specificity and clarity in planning the program was related to the creation of an adequate conceptual knowledge base that in turn enabled a clear and well conceived project.

Clarity of purpose and a distinct plan for evaluation of the project were particularly important because of the political issues involved in these changes. Clear goals and a strong and agreed-to evaluation process was critical to provide information that would enable people embedded in many different thought worlds to be persuaded that the change had indeed accomplished important objectives.

This finding concerning the importance of structure and clarity fits with earlier work dealing with cross-functional teams and inter-organizational networks. For example, early research by Levine and White (1961) found that role or task clarity among various organizations involved in an inter-organizational network was a critical determinant for successful collaboration and commitment to the network. In a similar vein, Brown and Eisenhardt (1997) found that firms with unsuccessful product development portfolios lacked well-defined responsibilities and priorities. Other research has found that failure to include important knowledge bases in any stage of a cross-functional project results in delays and the need to continually revisit decisions because important perspectives were not considered (Mohrman, Cohen, and Mohrman, 1995). In this health care system, the projects that had clearly defined priorities, responsibilities and time lines also had front end, early involvement of relevant parties. The adequate conceptualization of the project resulting from the integration of critical knowledge elements helped in laying out clear priorities and responsibilities.

In this culture, time is of the utmost premium and relates to the need for clarity and structure. The need for clearly defined plans and priorities with definitive end goals is especially salient given the discretionary nature of these participative networks and the fact that participants often “volunteer” their time over and above their mandated job responsibilities. Physicians, in particular, had tightly controlled schedules with a requirement to see numerous patients each day. They were less open to contributing their time to something that was ill specified or not clearly laid out. Furthermore they were not open at all to ideas that in their view added to their workload.

Top management in this organization was disappointed that the Innovation Fund approach was not yielding innovative ideas that departed in significant ways from the status quo. A rather disturbing implication of the close relationship between power, structure and cognition in this knowledge system is that the successful innovation networks achieved success in large part by not upsetting the “negotiated order”. They worked within the confines and patterns of existing knowledge based power and authority relationships. Many of the unsuccessful projects were advocated by people in disciplines with less power in the negotiated order, and with a more relational and less technical perspective guiding their ideas. Without the support of their more powerful co-workers, they were unable to achieve success.

This raises important questions about the potential of discretionary networks to initiate fundamental change in organizations. Adaptive structuration theory (Poole and DeSanctis, 1994) suggests that absent some significant discontinuity or external intervention, a new routine or program will be appropriated in a manner that reinforces the existing social context. There is no particular reason to expect that the use of a new

routine such as innovation fund projects would expand or alter the patterns of behavior beyond those which the group might consider appropriate to the existing social context of the group. Furthermore, none of these projects involved experts such as consultants with external knowledge bases and perspectives who could provide the network with a different way of viewing their system that might catalyze and legitimize more fundamental change.

On the other hand, this program did elicit a number of ideas that grew into either local or system-wide change in practice. Furthermore, participants reported that up until this point the organization's routines did not include ways for the rank and file technical performer to initiate change. Where success was achieved, it was because the networks instinctively carried out a number of key organizing moves that enabled them to successfully influence the larger system and to integrate perspectives across this complex knowledge organization.

It has been observed that fundamental change often springs from the confluence of knowledge and world views (Fleck, 1935/1979). Although in this organization the changes were largely incremental, this study provides a close look at how a discretionary knowledge network can constitute itself for collaboration across world views. It provides some useful action implications for organizations trying to foster knowledge networks and to help those involved in such networks know how to design themselves for success. Organizations wishing to stimulate change from within by establishing knowledge networks can provide network members with an understanding that their actions define the network, and determine its potential to promote successful outcomes. In particular,

the networks need to be aware of the criticality of building a knowledge framework that bridges the relevant specialized knowledge bases of the organization.

Future studies should examine how knowledge networks can organize themselves to create more fundamental change. Perhaps, we will find that this is only possible when the network is not operating within the confines of a deeply embedded politically negotiated order. Perhaps, as others have said (Perkins, Nieva and Lawler, 1983), the use of greenfield sites and spin-offs is the only way for existing organizations to stimulate discontinuous change. Only in the moment of creation of a new organization are the reins of the power order of the status quo unleashed. However, even within these start-up situations, participants will have to make moves to address the challenges of cognitive/structural bridging, and to overcome the power structures built into the larger society.

Given the complex knowledge settings that characterize many modern organizations and the need for innovation that challenges the status quo, it is imperative that we learn more about how to harness the various knowledge sets and energy of participants to introduce innovation. This study is limited to one organization, which limits its generalizability. There is a need to examine how networks structure themselves in a variety of organizational settings and for a variety of purposes. There is also a need to examine this question for both discretionary and mandated networks, and for networks that are doing incremental or radical change.

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**TABLE 1:
DESCRIPTION OF INNOVATION PROJECTS STUDIED**

1. COMPLETED PROJECTS

1.1 Projects where the project evaluation indicated that the project had failed to attain its outcomes and had difficulties with pilot implementation (6 projects)

- **Skilled Nursing Clinic**

The project involved training nurses and setting up nurse treatment rooms to treat ambulatory patients needing skilled nursing care such as dressing change or wound care. This treatment alternative was intended to avoid more costly home visits for patients referred to home health who are no longer home bound.

- **New member outreach**

The project involved new adult members coming in to do a self-health assessment and proactively guide them to appropriate health services based on their responses. The assessment data was aimed at being used for planning their health care needs in the hopes that this early interaction would “bond” new members to the hospital and avoid terminations/exits of patients. .

- **Hypertension Intervention Project**

The project entailed developing and testing a model for managing hypertension in outpatient medical offices. Included criteria for designating which level of provider, nurse or physician is appropriate for each patient. Also included development of a protocol to guide nurse providers in hypertension management.

- **Personal Health Profile**

The project involved on going development of an automated personal health profile as an aid in managing the preventive care of members. After filling in the profile and based on an assessment of the profile, members will be explained health risks and future preventive steps.

- **Outside Care Documentation Project**

This project involved the documentation of patient care outside the hospital where outside care will be chronologically integrated with the documentation of care delivered inside the system. This will result in a vastly enhanced continuous medical record.

- **Allied Health Tutorial**

The project involved developing seminars and hands-on practicums for physicians who work in internal medicine/primary care. The objective was for primary care physicians to be trained by a specialist each in each of the 10 specialists areas so that they can make more appropriate and better documented referrals to specialists and learn how to address more health problems on their own or through phone consultation.

TABLE 1 Continued

1. COMPLETED PROJECTS - Continued

1.2 Projects that were successfully completed, piloted and implemented locally (7 projects)

- **Negative Pregnancy test counseling**
The project involved having a coordinator follow up teenage negative pregnancy tests on the telephone and assessing the teen's need for further medical visits for birth control. Telephone follow-up was to occur at set intervals after the medical visit to reinforce contraceptive compliance.
- **Pre-pregnancy information for diabetics**
The project involved delivering an educational intervention to women members who have diabetes and who are potentially at risk for an unplanned diabetic pregnancy. Women who have diabetes and become pregnant are six times more-likely to have a baby with major birth defects than are non-diabetic members. The educational intervention will stress birth control and management of diabetes.
- **Guided Imagery to reduce post-operative pain**
The project entailed promoting the beneficial effects of positive emotion by teaching people who have to go through surgery, "guided imagery" and relaxation techniques to engage them in the healing process. This intervention was expected to reduce post-operative pain, anxiety, reduce the physiological stress response, enhance immunological function and improve patient attitude and satisfaction with the perioperative period. The project was also aimed at evaluating the effect of creative visualization on wound healing and the time to ambulation and the length of hospital stay. The target population was one hundred women scheduled for total abdominal hysterectomy.
- **Electronic RX note padding**
The project involved enabling prescriptions to be written on a pen based notepad computer. The prescription will then be transmitted electronically to the Pharmacy to be filled and distributed to the patient or printed for the patient. The project was also aimed at testing the acceptability of the technology with physicians as well as test a streamlined process for filling prescriptions.
- **Notebook PCs in Occupational Health**
The project was aimed at testing an electronic method of transferring occupational health data to and from a centralized patient data-base (the IMPACT data base). A pen-based computer will be used to interface with the IMPACT data-base so that the physicians receive relevant patient information when seeing patients and new/additional physician input about the patient gets updated in the IMPACT data base through the electronic link. The project also intended to test the acceptability of the technology among physicians.

TABLE 1 Continued

1. COMPLETED PROJECTS - Continued

1.2 Projects that were successfully completed, piloted and implemented locally (7 projects) -continued

- **Outreach to Parents and Teens Project**

The project was set up to improve services to teen members particularly in preventive health services for teens. Through educational interventions, it was aimed at educating teen-age members on making appointments, confidentiality issues, contacting advice nurses etc. Lack of teen skills in these areas has been shown to increase risks particularly in the area of reproductive health.

- **Cardiac Connections**

The project was established to encourage cardiac patients after they are discharged, through support group meetings to receive outpatient education about self-care through the Cardiac Adjustment Program. Although both in-patient and out patient cardiac programs existed a significant percentage of cardiac patients attempted to manage their disease without the benefit of cardiac education.

. 1.3 Projects that were completed successfully and diffused to at least one other part of the organization (2 projects).

- **Self-Referral Mammography**

The Project was established to promote accessible low cost mammographic screening among female members. The project would allow members to self refer to mammography with exams being performed by a trained nurse practitioner eliminating the need for visit to physician before the test.

- **PC based data management system for automation of sample handling and data transfer**

The project entailed the development of a PC based data management system that can interface between the Library information system (LIS) in the hospital central laboratory and high volume chemistry analyzers at the Regional laboratory for analyzing patient data. The system by incorporating the use of bar coding was designed to ensure reliable, accurate movement of patient data (blood, stool, sputum samples etc.) and results between the LIS in the hospital central lab and chemistry analyzers in the regional lab. The expectation was that the time involved in receipt of samples in the central lab to release of specimens to regional lab and final release of results will significantly decrease.

TABLE 1 Continued

2. ON-GOING PROJECTS -

2.1 Projects that were progressing successfully (3 projects)

- **Chronic Illness Model**

The project was aimed at developing and demonstrating a model of ambulatory assessment , treatment planning and case management for chronic disease using diabetic patients of interested physicians as a test group. The model included periodic screening and assessment through physical exams and questionnaires, a process to plan future care including a menu of alternative treatment and self care pathways to achieve various health goals, and a process to achieve the care management plan using a computer based tracking and reporting system to coordinate and monitor the plan.

- **Geriatric Enhancement Model**

The project was created to identify older adults (65 years and above) who are moderately or severely impaired by using screening tools, providing a geriatric assessment, and creating and implementing individual care plans. The logic was that a group of frail cannot be managed by regular services and require special programs. Otherwise they may tend to overuse the normal services of the facility.

- **Management of Phase 1 treatment needs**

The project aimed at identifying dental patients with unusually complicated needs and develop a care plan to manage their needs more quickly and effectively. .

2. ON-GOING PROJECTS -

2.2 Projects that were encountering difficulties (2 projects)

- ***UCC Follow-up call***

The project attempted to handle the follow up of patients from the hospital's Urgent Care Clinic (UCC) more effectively and efficiently. The standard protocol is to automatically give Urgent Care Clinic/Emergency Room users follow up appointments with their primary clinician before they leave the UCC. Appointments are often unnecessary or inappropriate. This project aimed at establishing a advice nurse to call patients to decide what follow-up care is necessary instead of automatically assigning appointments.

- ***Decision Analysis for screening guidelines***

The project was initiated to develop and test the use of decision tools and techniques for regional screening guidelines for selected cancers. The project sought to determine if the application of these tools can help clarify issues and facilitate decision making among clinicians.

Table 2
Dynamics of Collaboration Completed projects

1.1 Projects where the project evaluation indicated that the project had failed to attain outcomes and had difficulties with pilot implementation

CATEGORIES	<i>Skilled Nursing Clinic</i>	<i>New member outreach</i>	<i>Hypertension Intervention project</i>	<i>Personal health profile</i>	<i>Outside care documentation project</i>	<i>Allied Health Tutorial</i>
Cognitive-Structural organizing moves:						
Was there an adequate knowledge base created through early identification and involvement of relevant parties?	<p>No, --initial planning was done by a Nursing director--</p> <p>Did not involve physicians who are supposed to refer patients to skilled nursing clinic vs. home care</p> <p>Also appears the home health department was not involved part of whose job the clinic was supposed to replace</p>	<p>Yes,-- administrators involved-- pulled in several people from central office to write the proposal but did not involve physicians although they had an influence on member loyalty to the hospital.</p>	<p>No,--- it was difficult to get a physician on board</p>	<p>No, --- went through primary care steering committee- and only involved chiefs of primary care and the physicians were selected to work on the project by <u>default</u> when their medical office was selected as a pilot for the project</p>	<p>No, -- it was framed as a technical project that did not involve much collaboration. Initiated by an administrator in quality management along with others from the dept. who assumed it was a record management process. Physicians not involved although they were consumers of the outside medical records of patients.</p>	<p>Mixed, -- went through primary care steering committee- and mainly involved chiefs of primary care with selected involvement of some MDS from other specialties such as surgery and Opthamology..</p>

Table 2- continued

1.1 Projects where the project evaluation indicated that the project had failed to attain outcomes and had difficulties with pilot implementation- continued

CATEGORIES	<i>Skilled Nursing Clinic</i>	<i>New member outreach</i>	<i>Hypertension Intervention project</i>	<i>Personal health profile</i>	<i>Outside care documentation project</i>	<i>Allied Health Tutorial</i>
Was there Bridging of cognitive differences of understanding among participants?	No,--- not even attempted	No, --- “Physicians don't see what are we here to do” - don't care about retention and what it takes to get and keep new members” “Don't have shared sense of whole – the continuum of relationship with members gets fragmented”	No, --- there were conceptual conflicts between members— Questions around “can we devise an algorithm for treatment of hypertension and can that happen except for simple cases?”	No, --- physicians could not see the added value of the automated process - “ We anticipate that once a standardized process is in place for attaching members---- physicians will be more receptive and even pleased with the capability of automated health profile information to support them and their patients” (from report)	No, --- it was not attempted as quality management staff viewed it as a record management project.	No,--- there were differences of opinion both among Internal medicine physicians and specialist. Some internists saw it as added work , while specialists felt that it was an attempt to "try and make specialists out of internists"
Was there a clear strategy for how the network would go about the innovation process (defined plans & goals)?	Mixed, --- Goals defined clearly upfront but financial responsibility was not negotiated prior to launching the pilot project that led to issues later	Mixed, ---- Goals defined but evaluation criteria were unclear and not convincing-- “questions around how to evaluate? - we learned that members had a very vague recollection of things-- those who had been called did not necessarily remember it .	No, ---- there was lack of consensus on goals and objectives. Some physicians even questioned whether we can deliver care for hypertension?	No, --- goals changed mid course--- Also looked at too widespread a pilot-- “Became institutionalized too early and went into the approval process mode”.	Mixed, -- had some clear evaluation criteria in terms of improvement in availability of outside documentation. However, physician satisfaction with documentation was a stated criteria but did not involve physician in defining it.	Yes, -- Plans were laid out in terms of classes and on- the -job training for internists with specialists in 10 specialist areas

Table 2- continued
1.1 Projects where the project evaluation indicated that the project had failed to attain outcomes and had difficulties with pilot implementation- continued

CATEGORIES	<i>Skilled Nursing Clinic</i>	<i>New member outreach</i>	<i>Hypertension Intervention project</i>	<i>Personal health profile</i>	<i>Outside care documentation project</i>	<i>Allied Health Tutorial</i>
Political Organizing Moves						
Did the participants attend to the negotiated order of institutional patterns of power and control?	No,--- power differences were very much present-Physician vs, nurse	No,--- actually took away a RN resource from Physicians	No, --- Physicians questioned the validity of behavioral medicine put forth by the nursing member- “physicians are not willing to give up power easily”	No, --- they expressed dissatisfaction with the generation of a standard letter to patients that did not reflect their individual practice preferences.	No, --- physician role overlooked although they were a clear player and consumer of patient outside care documentation.	No, -- the attempt to train internists in the 10 specialist areas was seen as a violation of the prevailing hierarchical medical order-- specialists vs. generalists
Did the network enlist strong physician support for the project?	No,-- infect major resistance came from physicians- at best they were neutral— A major reason for failure was the clinic did not get referrals from physicians and had to be closed Also medical administrators were not supportive	No,--- Primary champion was an administrator--no physician involved No champion outside the facility	Mixed,--- Initially it was difficult to find a physician sponsor- and later the physician who acted as sponsor was very busy and could not make it to meetings	Mixed, -- the project was initiated by physicians but physicians selected by default showed varying levels of interest in participating	No, --- one of the lessons learned was the need for significant physician involvement up-front that was missing	Mixed, --- the project was initiated by physicians mainly primary care with support from some specialists. However, other physicians both primary care and specialists showed varying levels of interest.

Table 2- continued

1.1 Projects where the project evaluation indicated that the project had failed to attain outcomes and had difficulties with pilot implementation- continued

CATEGORIES	<i>Skilled Nursing Clinic</i>	<i>New member outreach</i>	<i>Hypertension Intervention project</i>	<i>Personal health profile</i>	<i>Outside care documentation project</i>	<i>Allied Health Tutorial</i>
Did innovation reduce or at least did not increase physician work load?	No,-- increased it by asking them to refer patients to clinic vs. home care “Physicians do not want any added work-- any innovation that is seen as reducing work will be accepted- any innovation that is seen as requiring more work even it means better quality care or cost savings will not be welcomed”.	Mixed,--- Physician not directly impacted but RN s time impacted-- Also physicians not sure as to how this makes their job easier-	Yes--, by designating some responsibilities to nursing staff but it also meant that physician had to let go off some control.	No,--- actually physicians perceived that the automated strategy was more complex and entailing more work since their previous experience did not require that they review any paperwork prior to attaching members to their panel.	No,-- Although, Physician not greatly impacted in terms of additional work load now had to review outside documentation.	No,---- It increased work load for primary care physicians to investigate more and possibly treat patients before referring them to specialists. For some specialists it was additional work in terms of training primary care physicians.
Was support of functional managers enlisted?	No,-- Lacking---- support from administrators was not enlisted	No,-- Lacking, The project fell apart when the RN had to be removed-- It was viewed as taking an RN off the floor from triaging— “Even though she was replaced at triaging she was an excellent nurse and left a void and had to be called back”	No- Lacking, it was difficult freeing up staff to participate in the project	Yes,--- Was enlisted	Yes, --- Was enlisted	Yes, --- Chiefs of Primary Care were supportive

Table 2- continued

1.2 Projects that were successfully completed, piloted and implemented locally

CATEGORIES	<i>Negative pregnancy test counseling</i>	<i>Pre-pregnancy information for diabetics</i>	<i>Guided imagery to reduce post-operative pain</i>	<i>Electronic RX note padding</i>	<i>Notebook PCs in occupational health</i>	<i>Outreach to patients and teens</i>	<i>Cardiac Connections</i>
Cognitive structural organizing moves							
Was there an adequate knowledge base created through early identification and involvement of relevant parties?	Yes,--- was initiated as a collaborative project between the OB-GYN regional committee and Health education.	Yes,--- hospital medical coordinator proposed and championed it with Health Education. It also involved diabetologist & Center for Health Research (CHR) Kept innovation committee informed of progress	Yes,--- idea evolved in collaboration with Anesthesiologist. Involved chief surgeon and also team went to a OB/GYN staff meeting before hand	Yes,--- Involvement between pharmacist and Physician to make sure about design of electronic form since both were impacted by the innovation.	Yes--, “ we started talking about it 3 years ago—chief and I-- The mgrs. were involved and did some lobbying--3 physicians involved in pilot-- also involved Info Systems Development early on-- In piloting unit all but one physician planning to use it	Yes,-- Was joint collaboration between Health Education, a Pediatrician, and a member from Central Health Research to help with design and evaluation	Yes, --- 3 nurses, coordinator and social worker involved in planning the pilot - Once designed all had shared responsibility for recruiting patients
Was there Bridging of cognitive differences of understanding among participants?	Yes, ---- OB/GYN and Health education were on the same page about supporting sexual responsibility for teens	Yes, --- the research information that diabetics were a high risk group for having babies with birth defects came from CHR and Diabetologist.	Yes--- “Many physicians conceptualize medicine to be a mechanical process- what convinced them was at the OB-GYN staff meeting I used an analogy for guided imagery- similar to breathing exercise- They are used to patients concentrating on the breath-- this was concentrating on the mind" -- that convinced them.	Mixed,--- Physician initiator feared suspicion from other physicians about use of such newer technology	Yes--, “For the most part- except for one physician who did not want to change” -	Yes,-- “CHR brought in a research perspective while pediatrics brought in knowledge of preventive health services for teens”	Yes--, “All parties were on the same page and shared equal responsibility”

Table 2- continued
1.2 Projects that were successfully completed, piloted and implemented locally

CATEGORIES	<i>Negative pregnancy test counseling</i>	<i>Pre-pregnancy information for diabetics</i>	<i>Guided imagery to reduce post-operative pain</i>	<i>Electronic RX note padding</i>	<i>Notebook PCs in occupational health</i>	<i>Outreach to patients and teens</i>	<i>Cardiac Connections</i>
Was there a clear strategy for how the network would go about the innovation process (defined plans & goals) ?	Yes— “We had a well laid out clear process”	Yes--, “It was well documented, clear objectives, good evaluation process, definitive time frame and well developed upto point of dissemination”	Yes--, “very clear objectives, well thought through and planned with scientific evaluation procedures”	Yes--, “ we had clear objectives”	Yes, “software already developed and tested to help in the process”	Yes, “ very straightforward , involved mailing information”	Yes--, “It was an educational intervention”
Did the participants attend to the negotiated order of institutional patterns of power and control?	Yes, --- “Health education made sure project was blessed by OB/GYN regional committee”	Yes,--- “involved diabetologist”	Yes, --- at least within team and also by recognizing authority of OB-GYN over patients. “what helped was Tom knew the chief surgeon-- we had to convince them-- many times they resist ideas like diseases are a result of life style”	Yes--, had a sponsoring physician	Yes,--- had a sponsoring physician	Yes,-- Pediatrician was involved	Yes,--- Cardiologist was involved who would recommend patients

Table 2- continued
1.3 Projects that were successfully completed, piloted and implemented locally

CATEGORIES	<i>Negative pregnancy test counseling</i>	<i>Pre-pregnancy information for diabetics</i>	<i>Guided imagery to reduce post-operative pain</i>	<i>Electronic RX note padding</i>	<i>Notebook PCs in occupational health</i>	<i>Outreach to patients and teens</i>	<i>Cardiac Connections</i>
Did the network enlist strong physician support for the project?	Yes---, The OB-GYN regional committee	Yes--- On paper at least 2 physician advisors involved and one who was a diabetologist”	Yes,--- Project was proposed by physicians even though psychiatrist traditionally of a lower status	Yes,--- Initiator is a physician	Yes, -- Project proposed by physician	Yes, --- a physician was part of committee	Yes, --- looped in cardiologist for support
Did innovation reduce or at least did not increase physician work load?	Yes, ---- Physicians work not impacted at all –Only Health education was involved in counseling	Yes,--- Physicians not impacted or participate in actually conducting the intervention- “The diabetologist saw none of these members”	Yes,---- “I had to promise the OB-GYN people that this did not create work for them-- you have to make sure that there is no more work”	Yes,---- will be more of a time saver for physicians -- can also create cost information for physicians	Yes, --- will save time for physicians -don’t have to write legibly- can access more information	Yes,--- Physician day to day work not impacted except for planning time by pediatrician.	Mixed,--- Physician minimally impacted,-- had to recommend patients to attend education-- - was an educational intervention
Was support of functional managers enlisted?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2- continued
1.3 Projects that were completed successfully and diffused to at least one other part of the organization

CATEGORIES	<i>Self-referral mammography</i>	<i>PC based data management system</i>
Cognitive-structural organizing moves		
Was there an adequate knowledge base created through early identification and involvement of relevant parties?	Yes,--- Created early breast cancer task force in 1990 that included members from surgery, radiology, oncology, center for health research and program planning	Yes,---- Between Microbiologist from Regional Laboratory and Pathologist from Hospital Central Laboratory
Was there Bridging of cognitive differences of understanding among participants?	Yes, - Continuous consensus development with the Organization s professional staff during course of the project	Yes, -- They discussed details of how best to design automated specimen flow including how to avoid sample mix-ups and provide patient ID for each specimen.
Was there a clear strategy for how the network would go about the innovation process (defined plans & goals)?	Yes,--- Clearly laid down priorities and evaluation procedures	Yes,-- Clear goals and evaluation criteria in terms of lead time reduction from receipt of samples in hospital lab to release of specimens for testing to release of results
Political organizing moves		
Did the participants attend to the negotiated order of institutional patterns of power and control?	Yes, within the team , - but Mixed with respect to diffusion---, Most facilities bought in-- But in one physicians don't want to give up control over treatment- " objections focused on the conceptual conflict of the clinician's control and management of preventive health services"	Yes, --- Microbiologist recognized Pathologist role in the process.
Did the network enlist strong physician support for the project?	Yes, --- Program was designed after consultations with physicians from general surgery, internal medicine, family practice, radiology, OB/GYN, regional cancer committee, and legal medicine	Yes,-- Involved the pathologist in other hospital lab where the technology was diffused.
Did innovation reduce or at least did not increase physician work load?	Yes, --- Reduced work considerably for physicians- trained RNs or other health professionals do breast screening now	Yes, --- Overall eliminates manual steps in specimen flow through the lab some of which involves the pathologist
Was support of functional managers enlisted?	Yes,---- The Nurse practitioner screening program was supported by both Depts of Surgery	Yes,---- Full support of Regional Laboratory Manager

Table 2- Continued
Dynamics of Collaboration On-going projects

difficulties	2.1 Projects that were progressing successfully	2.2 Projects encountering			
CATEGORIES	<i>Chronic Illness model</i>	<i>Geriatric enhancement model</i>	<i>Management of phase 1 treatment needs</i>	<i>UCC follow up call</i>	<i>Decision analysis for screening guidelines</i>
Cognitive-structural organizing moves					
Was there an adequate knowledge base created through early identification and involvement of relevant parties?	<p>Yes, --- Goes way back to 1988, lot of ground work---</p> <p>Kept everyone informed-- had steering committee that did planning - involved PIC, RNs, pharmacist , social worker etc, and diabetes advisory group</p>	<p>Yes, --- Involves nurse, psychiatrist, CHR, geriatric physician, pharmacy and social worker--</p> <p>got early sign off from Physician in charge & chief of internal medicine. and buy-in from primary care</p> <p>“you have to recognize that there are a lot of stake holders in anything we do and incorporate as many line staff we can in planning “</p>	<p>Yes, --- Had to involve the operational people for scheduling purposes and dentists have cooperated in terms of referrals</p>	<p>Mixed, -- Some Internal medicine module leads involved—However, others were not involved”</p>	<p>Yes, --- Sought out physicians from several specialties to be part of the steering committee</p>

Table 2- Continued
Dynamics of Collaboration On-going projects

2.1 Projects that were progressing successfully
difficulties

2.2 Projects encountering

CATEGORIES	<i>Chronic Illness model</i>	<i>Geriatric enhancement model</i>	<i>Management of phase 1 treatment needs</i>	<i>UCC follow up call</i>	<i>Decision analysis for screening guidelines</i>
Was there Bridging of cognitive differences of understanding among participants?	Yes, --- “There was good support from family practice and internal medicine physicians- They saw benefits of the model and keep referring patients”	Yes, --- “It was clearly achieved through physician support”	Yes, -- “Most of the other dentists could see the benefits of a preventive model”	No, --- “Other physicians could not understand how a RN could decide who needs follow-up and who does not”.	No, -- “There are differences between various physicians on utility of this approach”
Was there a clear strategy for how the network would go about the innovation process (defined plans & goals)?	Yes, --- “It was executed in two modules---also issues around manpower funding from different groups worked out clearly”	Yes, -- “There was well laid out evaluation criteria - also alignment with strategic initiatives of company”	Yes, --- “The idea for the project came from looking at the data and experiments in Europe and Canada—“ “we put in place clear measurements to assess impact”	Mixed, --- “Had some evaluation criteria but not that clearly laid out” --	Mixed,--- “The evaluation criteria still evolving.-- Recently completed a 1 day seminar for urologists and breast cancer group to expose them to outside experts and specialists, to do general overview and case studies—and to introduce basic tools of decision analysis”
Political organizing moves					
Did the participants attend to the negotiated order of institutional patterns of power and control?	Mixed--- “Some physicians were proponents-- others reluctant--”felt that we are taking over their patients” -- many got converted - 1or 2 still skeptical	Yes, --- “Got early endorsement of Physician in charge and Chief of Internal medicine”	Yes---, The group mainly involved other dentists and they were all involved.	No, --- It pushes power down to RN to decide which patients need no follow-up, need follow up phone call, or need immediate follow up “It gives RN power to decide cases that physicians don’t like”	No,--- “There are physician groups who don’t believe in explicit guidelines and believe every patient is unique. Explicit guidelines require conformance by those who believe in their own approaches.”
Did the network enlist strong physician support for the project?	Yes,--- “The Physician in charge was supportive , participative and well connected”	Yes,-- “Both Physician in charge and chief of internal medicine are selling it to other physicians	Yes,-- “Project initiated by two dentists”	Mixed,--- “Initiated by a physician but not sure if other physicians were involved in the idea”.	Yes, --- “A broad cross section of physician leadership involved”

Appendix 1

Interview Protocol for Top Managers and Innovation Fund Review Committee Members

1. How does this organization go about improving its capabilities to address the quality, service and cost requirements that it is facing? Give examples.
2. How (if at all) does this organization generate innovations and diffuse them? Give examples.
3. What are the barriers and facilitators to the development of innovations and the introduction of change?
4. What role does the Innovation Fund Review Committee play in the innovation and diffusion process in this organization? What are its strengths and weaknesses?
5. Please give examples of what you consider to be good innovations that have been introduced in this organization? Describe
 - Where did it come from?
 - Who was involved in generating or introducing it?
 - How was it disseminated and implemented?
 - How smoothly did the implementation go?, Did people accept its desirability?
 - Did it diffuse throughout the organization?
 - What have been its results? Did it result in increasing the capabilities of the organization? How do you know?
 - Why do you consider it to be a good innovation?
6. In general, are the kinds of projects/networks being funded by the Innovation Fund the kinds of innovative ideas that you feel are required to improve organizational capabilities as required by the areas of strategic focus? Why or why not? Please give examples.
7. Are there examples where the work of the Innovation Fund fails to influence organizational practice? Describe. Why?
8. Who picks the agenda of the Innovation Fund?
9. Do the various improvement initiatives used in this organization complement each other?
10. What do managers see as their role in improving organizational capabilities and performance in this organization?
 - What tools and approaches do they use to do it?

- How open are managers toward new ideas in general, and to the ideas coming out of the innovation fund in particular? Why or why not?
 - Are managers expected to innovate and improve organizational work processes and performance as part of their job?
11. What do physicians and other professional health care providers in this organization see as their role in improving organizational capabilities and performance?
- What tools and approaches are available to them?
 - How open are the healthcare providers to new ideas?
 - How open are the managers in the organization to the ideas that come from the health care providers?
12. How important it is to the individuals who work in this organization to be innovative? How do they get their sense of satisfaction and pride?
13. How are new ideas and improvements recognized and rewarded in this organization?
14. How do units in this organization learn about successful practices in other units, and how likely are they to implement them?
15. Is there general shared understanding among the employees of the organizational vision, goals and objectives?
16. Is there shared agreement concerning the need to change? – to continually improve in order to succeed in the market place? Explain
17. Where do you see the biggest needs for innovation in this organization?
18. What would this organization need to do differently in order to stimulate more innovation generation and diffusion?

Appendix 2

Interview Protocol for Innovation network participants

I would like to ask you questions about ---(name of innovation project/network)

1. What is its current status (e.g. pilot in process, in dissemination, or cancelled)
2. Please describe the innovation
3. What were its goals- i.e., how was it expected to contribute to improving performance in this organization?
4. Who's idea was it? Where did it come from? Who developed it? Who were the various parties involved?
5. Can you provide a time line of the innovation, in terms of sequence of events, activities etc. till date
6. Were there management champions/ sponsors? What help, if any, did these people provide?
7. If it was piloted:
 - Who was involved in planning the pilot?
 - Who was involved in executing the pilot?
 - What level of support was there in the piloting unit? Was there any disagreement about the desirability of the new practice?
 - Did the pilot require cooperation or support from beyond the piloting unit? If yes, was it easy to secure that cooperation or support? Describe.
 - What difficulties were encountered during the pilot?
 - How much time did it take to get this innovation working in the pilot area?
 - Describe the level of effort involved in putting it into practice?
 - Were there adequate resources to support the pilot?
 - Did the new practice require training or learning by the participants? If yes, how did this occur?
 - Did the new practice change individuals' level of authority or responsibility? How?
 - Did the new practice change individuals' work priorities?- How?
 - Did the new practice change how people work with each other? How?
 - What were the costs and benefits to the people in the pilot areas?
 - What was their comfort level with the new practice?
 - Was the new practice evaluated? How? How did the evaluation turn out?
 - Was the evaluation approach adequate to test the value of the innovation and to be convincing about its findings?

- What learnings emerged from the pilot?
 - Is this practice being continued or discontinued? Why?
 - To what extent were/are people external to the pilot organization aware of the pilot?
 - Has there been any diffusion of this practice? – or any attempt to diffuse it?
 - Has there been any diffusion of learnings from this pilot? How? To whom?
8. If this was a successful practice:
- What were the barriers to the dissemination of this practice to other units?
9. If this innovation did not reach the pilot stage:
- Why was this innovation never piloted?
 - Are there attempts underway to develop different approaches to dealing with the same problem area? Describe.
10. Do you consider the ideas embodied in this new practice to be innovative? If not, why not? If yes, how does this alter the traditional way in which business is done?