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THE EFFECTS OF WEAK TIES ON PERCEIVED ORGANIZATIONAL
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By

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The Effects of Weak Ties on Perceived Organizational Innovativeness
and Innovation Characteristics

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DISSERTATION ABSTRACT

This longitudinal study examines the effects of weak ties on perceived organizational innovativeness and innovation characteristics. Data were gathered at four points in time from self-report questionnaires completed by organizational members (n = 90) within the Cancer Information Service (CIS), a geographically-dispersed government health information agency that is implementing innovative intervention strategies to disseminate cancer information to traditionally underserved sectors of the public. Results indicate that individual perceptions about innovation and innovativeness are diffused in organizations through informal communication structure. However, the impact of weak ties on perceptions of innovation characteristics and perceived organizational innovativeness is not immediate; the most notable impact of weak ties is produced by unexpected lag effects. These findings suggest that informal communication structure has long term rather than short term effects on organizational innovativeness. Further, functional role differences reveal the existence of groups who play key roles in the innovation process. Results are discussed in terms of challenges that managers face in orchestrating innovation-related communication.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The CIS must remain sturdy yet flexible, stable yet progressive to meet the challenges in the field of cancer communication in the 1990's and to have an impact on that challenge. As the CIS successfully implements (emphasis added) the new program concept, it will continue to be a template for national and international health communications programs for the 1990s and beyond (Morra et al., 1993, p. 32).

The Nature of Organizational Innovation

Innovation has been defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1983, p. 11)[1]. Perhaps the most compelling justification for studying organizational innovation is that organizations are expected to innovate if they are to survive in today's rapidly changing environment (Johnson, 1993). According to Deal & Kennedy, innovation enhances the corporate image of modernity and vitality: "Change has become such a regular activity in the business world that companies suddenly become suspect if they stay the same" (1982, p. 157). Government organizations, as well as private industry, are experiencing similar pressures to reinvent themselves (e.g., Osborne & Gaebler, 1993). Increasingly, innovation researchers have examined innovations developed as a means to make US businesses or governmental agencies more competitive in an increasingly complex global economy (Rakow & Navarro, 1993; Johnson, Donohue, Atkin, & Johnson, 1995). In contrast, perhaps because of an over-emphasis on the desired outcomes associated with

1

successful innovation implementation, there is a lack of research that studies failed innovations (Kanter, 1983; Weenig and Midden, 1991).

Currently, organizational scholars are placing emphasis on the need for longitudinal studies of the process of organizational innovation (Huber & Van de Ven, 1995). It is by examining the antecedents and consequences of innovation, as well as the ways in which innovation is generated, adopted, implemented, reinvented, or rejected that we can begin to understand the nature of organizational innovation, along with its subsequent successes and failures.

Preview of the Study

In this longitudinal study, weak ties, representing informal communication structural indices, perceived organizational innovativeness, and perceptions of innovation characteristics form a useful framework with which to examine perceived outcomes of organizational innovation. Over four points in time, organizational members' weak ties are examined with respect to: a) their impact on the extent to which organizational members consider their organization to be innovative in general, and b) the extent to which they affect organizational members' perceptions of specific innovation characteristics. In addition, this study examines the extent to which an innovative climate is a predictor of the degree to which organizational members will be supportive of a particular innovation. Longitudinally, this research explores the degree to which organizational members form general perceptions about organizational innovativeness based on their experience with a specific innovation. On the basis of our knowledge about the relationship between organizational members' communication patterns and their perceptions about innovation characteristics and organizational innovativeness, we can begin to understand the process by which innovation is generated, adopted, implemented, reinvented, and rejected through communication in an organizational setting.

The following section reviews relevant research on innovation, considers the relationships between weak ties, perceived organizational innovativeness, and innovation characteristics over time, and identifies key roles in the innovation process.

CHAPTER ONE

REVIEW OF THE LITERATURE

Fifty years of innovation research

Much of the existing research on the phenomenon of innovation is summarized by Rogers' review of the diffusion literature in which he constructs a theoretical framework for the study of innovation (Rogers, 1983). Rogers defines innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (1983, p. 11)[1]. According to Rogers, early scholars in the field of rural sociology can largely claim credit for laying the intellectual foundation used to guide research about the diffusion of innovation. In particular, maverick researchers Ryan and Gross (1943) investigated the spread of new agricultural techniques among midwestern farmers.

In these early diffusion studies, the diffusion of innovation was viewed as a process by which new ideas spread among individuals in a larger social system. Many early studies described innovations in terms of their characteristics and potential adopters in terms of sociodemographic variables (Kivlin & Fliegel, 1967; Allan & Wolf, 1978). At the outset, organizational innovativeness studies had their shortcomings: Research methodologies copied from individual-level diffusion studies resulted in the outcome variable, innovativeness, being measured as an organization's composite score aggregated across innovations. This operationalization of innovation effectively removed the process aspects of innovation adoption as well as the unique elements of individual innovations (Rogers, 1983). Without intending to, these studies equated individual adoption with organizational adoption, when they should have equated individual adoption with organizational implementation. In addition, data were typically gathered only from the top executive of the organization under analysis (Bach, 1989). This static, top-down approach to data collection created at best an incomplete picture of organizational innovation behavior.

4

According to Van de Ven and Rogers (1988), an important turning point for innovation research was reached in the 1970's when innovation studies were initiated in an organizational context. With this outgrowth came three notable developments to innovation studies: a focus on the organization, rather than the individual in a larger social system, as the unit of adoption; a stress on innovation implementation over innovation adoption; and an emphasis on process research rather than variance research, a shift that drew attention to the temporal stages in the adoption process. Over the past two decades, organizational studies have addressed innovation as it relates to issues such as organizational climate, new technology, and structural properties of communication networks (Weenig & Midden, 1991). Organizational communication researchers have studied innovation as an outcome of the systemic functioning of communication networks (Johnson, 1993). If we hope to understand innovation as a process that occurs over time, through communication, within a social context (Rogers, 1983), there is a need to examine causal processes related to innovation, specifically the ways in which individual perceptions about innovations are diffused through communication in an organizational setting over time to affect innovation adoption and implementation.

Innovation Outcomes

Innovation outcomes, or consequences of innovation, are the changes that occur in an organization as a result of the adoption or implementation of an innovation. While desired outcomes might include increased efficiency, effectiveness, productivity, technical development, or increased ability to innovate, such consequences are experienced subjectively by organizational members, so it is essential to differentiate between actual and perceived outcomes. There is very limited research in the area of the perceived effectiveness of an innovation compared with actual effectiveness (e.g., organizational performance outcomes). Damanpour (1988, 1990) is one scholar who has conducted research in this area. In his research about the relation between an innovation's rate of adoption, top management's perceived effectiveness of an innovation, and

objective organizational performance outcomes, Damanpour (1990) concluded that organizational members' perceptions of innovation outcomes are not necessarily congruent with actual innovation outcomes. In general, subjective perceptions of performance exceeded objective performance levels in highly effective innovations, and objective perceptions of performance exceeded subjective performance levels in highly ineffective innovations. Jorde-Bloom (1988) also demonstrated how both objective and subjective judgments are considered when evaluating innovation in decisions to adopt an innovation.

In sum, organizational members' perceptions of innovation outcomes are formed through subjective experience, so actual and perceived outcomes are not equivalent: Most organizational members tend to either overestimate or underestimate innovation performance. The discrepancy between actual and perceived outcomes will be discussed in some depth at the end of this chapter. Meanwhile, as Van de Ven points out, "objectively, of course, the usefulness of an idea can only be determined after the innovation process is completed and implemented" (1986, p. 592). At the time of this data collection, the innovation under scrutiny was in the implementation stage; hence, we are concerned with perceptions of innovation outcomes rather than objective outcomes.

Predictors of Perceived Innovation Outcomes

In a recent meta-analysis of the organizational innovation literature, Damanpour (1991) found the following determinants to be significantly associated with innovation: Specialization, functional differentiation, professionalization, centralization, managerial attitude toward change, technical knowledge resources, administrative intensity, slack resources, and internal and external communication. Damanpour's results indicated that specialization, functional differentiation, professionalization, managerial attitude, technical knowledge resources, administrative intensity, slack resources, and internal and external communication were positively correlated with innovation, while centralization, formalization, and vertical differentiation had an inverse relationship with innovation.

While Damanpour's results indicate that a wide range of factors are associated with innovation processes in organizations (e.g., Damanpour, 1991), his work reflects the larger academic literature, in which the majority of the factors addressed have been formal structural variables. Comparatively little work, until recently, has investigated the impact of informal structure on organizational members perceptions about the degree to which they work in an innovative organization (Johnson et al., 1996). Informal structure is salient to innovation adoption and implementation because communication processes can ultimately determine the extent to which an innovative idea is assimilated into the constraints of an organization's existing structure (Johnson, 1993). Further, communication processes are particularly relevant to generating informally-generated innovations (Kanter, 1983). The next section will focus on the ways in which informal communication structural variables contribute to organizational innovation in general and individual perceptions of organizational innovativeness in particular.

Informal Communication Structure

Much is known about the relationship between formal organizational structure and innovations, but comparatively little work has been done on the relationship between innovation and the informal structure of organizations (Johnson, 1993). In the 1960 and 1970's researchers focused on formal approaches and the implementation of innovation sanctioned by top-management (Rogers, 1983). More recently, network approaches to informal communication have been tied to innovation adoption (Burkhardt & Brass, 1990). This focus on innovation adoption, rather than implementation, is characteristic of the larger organizational innovation literature (Lewis & Seibold, 1993). Currently, there is a growing focus on innovation implementation (Lewis & Seibold, 1993) as well as the initiation of innovations by lower level organizational members (Johnson, 1993). The initiation of innovations in organizations by non-administrative staff is more likely to occur in an internal environment where such innovation is normative: people have easy access to information, there are permeable boundaries between organizational units, there

are rewards for sharing, seeking and utilizing new information, there are rewards for risk taking, accepting, and adapting to change, and the organization encourages its members to be mobile and to develop interpersonal contacts (Goldhar, et al., 1976).

Rogers (1983) discussed the impact of social network characteristics on innovation adoption behavior. He concluded that "in all cases it seems that social systems whose members are more closely linked by communication networks have a stronger diffusion effect and a faster rate of adoption of innovations" (1983, p. 235). However, in order to understand the extent to which social networks impact an organization's ability to innovate, one must be willing to assess critically the impact of communication on perceptions of innovation characteristics. If organizational network members harbor favorable perceptions about an innovation's characteristics, and the network is highly interconnected, then that innovation is likely to be adopted rapidly. If, on the other hand, an innovation is regarded by organizational members in an unfavorable light, and the organization is highly interconnected, then that innovation is likely to be rejected rapidly. Renn (1991) referred to this diffusion phenomenon, in a nutshell, as the "social amplification effect". In a highly segmented, sparse communication network, perceptions of innovation will still be subject to the social amplification effect, but to a lesser extent, and at a much slower rate.

Weenig and Midden (1991) studied the effect of communication network influences on environmental innovation diffusion in two Dutch neighborhoods. They hypothesized that the process of information diffusion would be linked to the number of social ties in an individual's social network, and the adoption decision would be linked to advice received by strong communication ties. Similar energy conservation programs were implemented in cohesive (highly interconnected) and non-cohesive (highly segmented) neighborhoods. Interviewers collected communication network data as well as information about program awareness, attention to program activities, and adoption decisions. Their findings supported the hypothesis, reminiscent of Katz and

Larzarsfeld's (1955) two-step flow model, that innovation adoption is a two-stage process of information diffusion and persuasion. Weenig and Midden's research is relevant to the diffusion of organizational innovations in two ways: 1) a large number of weak social ties between potential adopters and influential organizational members who advocate change can increase the rate of communication and information dissemination; and 2) program participation of potential adopter's strong network ties can reduce the uncertainty inherent in innovation.

Weak Ties

Intuitively, the strength of a social tie is a function of time, emotional intensity, intimacy, and reciprocity (Granovetter, 1973). Weak ties refer to our less developed relationships which are more limited in space, place, time, and depth of emotional bonds (Adelman, Parks, & Albrecht, 1987; Weimann, 1983). The "strength of weak ties", derived from the work of Granovetter (1973) on how people acquire information related to potential jobs, is perhaps the most well-known concept related to network analysis (Granovetter, 1982). It turns out that the most useful information comes from individuals in a person's extended networks; casual acquaintances and friends of friends. This information is the most useful precisely because it comes from infrequent or weak contacts.

Most weak ties have been found in work-related networks rather than friendship or kin networks (Granovetter, 1982), and single-content rather than multiplex networks (Albrecht & Ropp, 1984). While weak ties have been conceptualized quite broadly in terms of relationships that are limited along a number of dimensions (e.g., interdependency, intimacy, variety, physical and temporal contexts, density, social distance, and range of information) (Adelman, Parks, & Albrecht, 1987), most operationalizations have focused on the pattern of network linkages, which is perhaps the most objective method of measuring the strength of a tie (Krackhardt, 1992). Although

some researchers argue that strong ties are important to organizations in general (Krackhardt, 1992), and innovation generation in particular (Albrecht & Ropp, 1984), they concede that weak ties play a key function in gaining access to information within organizations (Adelman, Parks, & Albrecht, 1987). In fact, the weak ties concept has been intimately tied to the flow of information within organizations (Weimann, 1983; Burt, 1992). Individuals who have many weak ties have increased access to information, due to the diverse nature of their sources of information as well as to the sheer number of their contacts alone. In contrast, strong contacts are likely to be people with whom there is a constant sharing of the same information. As a result, individuals who share strong ties come to have the same information base. Information from outside this base gives unique perspectives and, is, thus, often a source of innovative ideas.

Range and prominence measures are indicators of informal communication network structure (Burt, 1991), specifically weak ties, which have important implications for innovation. Individuals who are exposed to information about innovation from a variety of sources are more likely to perceive that they work in an innovative environment, and use that information to make evaluations about the pros and cons of innovation. The present research will measure weak ties with the, range measures of contacts and nonredundant contacts and the prominence measure of choice status. Since these indices are characteristics of an organizational member's number of diverse contacts, they are comparable to that individual's number of weak ties within the network (Granovetter, 1973). Thus, high range and prominence scores indicate individuals who have been exposed to information about innovation from a variety of sources. Since both range and prominence are characteristics of an organizational member's strategic location within the network, we expect that the two constructs will not necessarily be mutually exclusive.

Range. Range is an estimate of an individual's access to valued social information, or the extent to which he or she has bridge linkages to other groups in the

network. Range is one indication of an individual's weak ties in a network (Burt, 1991). Individuals with high levels of contacts (direct communication linkages) and non-redundant contacts (contacts independent of one another) are exposed to information about innovation from a variety of sources. They are likely to perceive that they work in an innovative environment and to be exposed to innovation-related knowledge.

Prominence. Prominence arises from being the object of relations from powerful others in the network (Burt, 1991). In Burt's (1991) view, prominence is a reflection of the extent to which an individual is in demand, as reflected by the strength of relations focused on an individual. Thus, prominence tends to reflect an individual's formal status within an organization (Burt, 1991). Individuals with high levels of choice status have a large proportion of individuals contacting them out of the total people in the network who could have done so. In this way, increased prominence may elevate an organizational member's awareness of a myriad of activities in an organization, thus enhancing perceived organizational innovativeness and providing an individual with knowledge with which to evaluate specific innovations. Because of varying levels of prominence within the innovation-related communication network, formal or informal groups of organizational members may form distinctly different perceptions of the pros and cons of innovation.

Key roles in the innovation process. Earlier, it was stated that organizational members' perceptions of innovation outcomes are formed through subjective experience, so perceived outcomes are not equivalent to actual outcomes (Damanpour, 1990). There are several factors which lead to such differences in perception of innovation outcomes. Kossek (1989) found that differences in the acceptance of several human resource program innovations were based upon respondents' level within the hierarchy, seniority, experience, and organizational unit affiliation. Alternatively, distinct groups of stakeholders are likely to have differing interests in the evaluation process (Weiss, 1983). In an effort to evaluate innovation outcomes from their own perspective and situation,

different groups also will focus on different data in their assessment of outcomes (Brimm, 1988; Ashmos, McDaniel, & Duchon, 1990). For example, in examining the perceptions of success for the same innovation, King (1990) found differing views between groups based upon a group's stake and role in the innovation process as well as the groups degree of identity with the organization. Hence, innovation outcomes are not necessarily congruent with the perceived utility that organizational members ascribe to the innovation. Because of varying experiences in the innovation process, indicated by number of weak ties, formal or informal groups of organizational members may form distinctly different perceptions of the pros and cons of innovation.

Organizational innovation requires the fulfillment of specific key roles that guide a new idea through the innovation process. These roles are carried out by members of the organization, and are commonly referred to as idea generators, sponsors, and orchestrators (Galbraith, 1984), who are likely to be prominent individuals in innovation networks. While critical to the innovation process, these roles are not formal positions, but rather informal roles that can be assumed by individuals throughout the organization. In organizations implementing a variety of innovations, however, there may be potentially more innovation roles than there are adopters. This shortage of organizational members to fill innovation roles may be exacerbated by the lack of slack resources in a contractual network such as the CIS.

Idea generators are the creators of the innovative ideas that could be of potential use to the organization. Idea generators initiate innovation by reformulating a particular problem through a creative perspective that they are willing to promote within the organization (Brimm, 1988). In organizations with informally-generated innovations (Johnson, 1993) idea generators are usually low level staff who are close enough to the problem to create an innovative solution. Because of their low status, idea generators require sponsors to help promote the idea in the organization. In formally-generated innovations, however, higher status idea generators may be their own chief advocates.

The sponsor, or idea champion, usually a management level person, is responsible for recognizing the usefulness of the idea to the organization, and lending authority and resources to the innovation throughout the development and implementation period (Galbraith, 1984). The sponsor of an innovation plays a significant role in gaining organizational acceptance of the innovation. Sponsors are committed to a particular innovation, which is demonstrated through a personal identification with the innovation and its outcomes (Brimm, 1988).

The third role needed in the innovation process is that of an orchestrator. Innovations are rarely neutral. Instead they are often disruptive, and may be perceived as impinging upon territorial rights and personal investments of others within the organization. Therefore, orchestrators are needed to maneuver the innovation through the organization's political process. The orchestrator must protect the innovation process by supporting idea generators, finding sponsors for innovations, and promoting the trial period and testing of innovative ideas. As the organization's political process is biased toward those who have authority and control resources, orchestrators are the organization's top managers. Orchestrators use their authority and resources to promote the innovation process.

This research takes place in the CISRC, an organization that provides a innovation-centered strategic alliance between researchers and practitioners within a geographically-dispersed network (see Methods section for a complete description of the context in which the study took place as well as the sample characteristics). In this case, Program Project staff are simultaneously cast in dual roles: First, they are idea generators who conduct research and evaluation related to new intervention strategies; second, they play a key role as orchestrators in building support for innovation by developing and maintaining an innovation-related communication structure across the network. Office of Cancer Communication staff are officials at the policy level who are most involved in centralized decision-making processes related to innovation adoption and

implementation. Project Directors are officials at the local level who have day-to-day responsibility for managing the CIS. To this end, OCC and Project Directors would be ideal sponsors or idea champions for the innovation. While people in other functional roles (e.g., program officials at the local level, including Telephone Service Managers, Outreach Coordinators, and Principal Investigators) do not hold key innovation roles, they are nevertheless important stakeholders in the innovation process: They are concerned about how innovation implementation will impact their organization's day-to-day operation, especially the effectiveness with which they deliver the services that they provide to the public.

Organizational members who play key roles in the innovation process are likely to have more favorable attitudes toward innovations than other stakeholders. Key players are active participants in innovation who "buy in" to the innovation process because they have a great deal at stake. Since Program Project staff are idea generators and orchestrators of innovation, and Office of Cancer Communication staff and Project Directors would be ideal idea champions, one would expect that they would report higher levels of pros and lower levels of cons associated with innovation than organizational members in other functional roles. Further, since Program Project Staff are orchestrators of innovation, it would seem reasonable to expect that they would report higher levels of weak ties associated with innovation and be more prominent in innovation networks than organizational members in other functional roles.

Perceived Organizational Innovativeness

An organization's perceived innovativeness provides a viewpoint from those most intimately aware and knowledgeable, its members, of the organization's overall approach to innovation. Perceptions of innovativeness within an organization have been directly linked to employee satisfaction and their willingness to participate in innovation processes generally (Hurt & Teigen, 1977).

In the past, scholars have measured organizational innovativeness in two ways. The first method is a behavioral variable in which innovativeness is measured as an outcome variable, the rate of the adoption of innovations. Thus, the level of innovativeness can be measured as the number, or percentage, of innovations adopted within a given period of time. The second method has been adapted from self-report of individual willingness to change (Hurt & Joseph, 1976) to measure employee perceptions of organizational willingness to change, or Perceived Organizational Innovativeness (PORGI) (Hurt & Teigen, 1977). PORGI is a 25-item scale generated from Rogers' innovation attributes (Rogers, 1983) and Hurt and Joseph's Innovativeness Scale (1976). Through exploratory factor analytic procedures, Hurt and Teigen (1977) have determined that PORGI was a unidimensional construct (all factor loadings > .60) with a split-half reliability coefficient of .96. It is interesting to note, at least at the level of face validity, that PORGI seems to consist of a potpourri of items that tap several different constructs related to organizational structure, communication quality, and innovation attributes. These constructs may include formalization, decentralization, communication quality, and perceived organizational innovativeness in terms of receptivity to new ideas. Hurt and Teigen's (1977) blind multiple groups approach to factor analysis may have precluded the identification of a multidimensional model. The present dissertation will employ only those items adapted from PORGI that demonstrate content and face validity with respect to the construct of perceived organizational innovativeness.

<u>Innovation Attributes</u>

While there has been a wealth of research relating to innovation processes in organizations (see Johnson, 1993, for a recent review), comparatively few studies have examined innovations over time (Johnson et al., 1995). Historically, researchers have described innovations in terms of their <u>attributes</u>. While attributes were initially considered to be objective characteristics, they came to be seen as perceived characteristics. In 1963, Katz saw the adoption of an innovation as being contingent upon

its compatibility, or the degree to which the attributes of an innovation matched the attributes of potential adopters. Katz characterized compatibility as being composed of communicability, pervasiveness, risk, and profitability.

Two decades later, Rogers (1983) developed perhaps the only commonly recognized scheme available for examining differing properties of innovations. Much of the existing research on the impact of perceptions of innovation attributes on innovation adoption is summarized by Rogers in his review of the diffusion literature (Rogers, 1983, 1995). In this diffusion of innovations 'anthology,' Rogers identified five perceived attributes of an innovation: relative advantage (the degree to which an innovation is perceived as being better than the idea it supersedes), compatibility (the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters), trialability (the degree to which an innovation may be experimented with on a limited basis), complexity (the degree to which an innovation is perceived as relatively difficult to understand and use), and observability (the degree to which the results of an innovation are visible to others).

In addition to Rogers' five innovation attributes, two additional characteristics may be key factors in the innovation adoption process. Dearing, Meyer, & Kazmierczak (1994) found that reliability (the extent to which an innovation is communicated as being consistent in its results) played a salient role in innovation-related communication. Leonard-Barton & Sinha (1993), in their study of the dissemination of technological innovations to operational subunits within an organization, found that mutual adaptation, the degree to which users refine a system to fit their particular need, is a key factor in successful technology transfer. Thus, innovations can be characterized in terms of their adaptability, or the degree to which they can be adapted to fit the local needs of potential adopters, and their lack of reliability, or riskiness, the degree to which they present uncertain outcomes for potential adopters.

While these attributes present an array of constructs with which to describe innovations, there is a general lack of scale development in the literature about innovation attributes (Meyer, Johnson, & Ethington, 1996). Rogers' five innovation attributes have been operationalized in various, often conflicting ways in the literature. With respect to relative advantage, Dearing et al. (1994) isolated three aspects of relative advantage: economic advantage, effectiveness, and reliability. Effectiveness is the degree to which an innovation is communicated as being relatively more capable in achieving an ideal end-state. Reliability is the degree to which an innovation is communicated as being consistent in its results. Dearing et al.'s (1994) study indicated that more than two-thirds of comments related to relative advantage were non-economic.

Rogers distinguishes between two types of relative advantage: economic and social advantage. Economic advantage can be equated with profitability, and Rogers argues that an innovation perceived to be highly profitable is likely to be adopted. Related to economic advantage is the award of incentives, payments that are given to an individual or system in order to encourage overt behavioral change. Social aspects of innovation involve the extent to which the innovation conveys social prestige or status to the adopter. Rogers found that innovations with high levels of social prestige are likely to be adopted because of the status that is gained by the adopter.

However, the effects of perceived social and economic aspects of advantage have been inconsistent across studies. Kivlin and Fliegel (1967) found that payoff, or profitability, was significantly related to innovation adoption. Social approval, however, was not significantly associated with innovation adoption, illustrating that the social and economic attributes of relative advantage are distinct perceived characteristics of innovation. Allan and Wolf (1978) examined the relationships between educators' innovation adoption behavior and perceived innovation attributes. Their finding that relative advantage was not significantly related to innovation adoption may be due to the fact that two sub-attributes "money saved" and "popularity increased" were inversely

related to innovation adoption, the former negatively related and the latter positively related.

Compatibility has also been operationalized in conflicting ways in the literature, leading to inconsistent relationships with innovation adoption across studies. For example, Kivlin and Fliegel (1967) viewed compatibility as the "similarity of an innovation to older methods or ideas" (p. 88), or consistency with past experience. These researchers found that compatibility was not of central importance in the innovation adoption process. Alan and Wolf (1978) measured compatibility in terms of congruence with past experience and existing values. While the former relationship was positively correlated to adoption, the latter subscale was positively correlated with innovation adoption. These inconsistent findings about the relationships between innovation attributes and innovation adoption may be partially due to measurement limitations.

Besides the use of inconsistent, and often conflicting, operational definitions of innovation attributes in early innovation studies, perhaps the most problematic issue is the way in which innovation characteristics have been measured. In one study that is representative of past research on innovation attributes (Fliegel & Kivlin, 1966), dimensions of innovation characteristics such as relative advantage, risk, trialability, and observability were measured by single-item measures. In light of the limitations inherent in this type of measurement technique with respect to reliability and validity, one must question whether past researchers were actually measuring the innovation characteristics that they purported to measure.

Indeed, a review of exploratory factor analyses in innovation attributes indicates that the distinction between innovation characteristics is not very clear-cut. Although Rogers calls for working toward "a comprehensive set of characteristics of innovations that are as mutually exclusive and as universally relevant as possible" (1983, p. 211), there is little empirical support for the content validity of the classic innovation attributes. This goal may be in part precluded by a dependence on the blind multiple groups (e.g.,

atheoretical) approach to factor analysis. For example, in Hahn's (1974) examination of 231 potential adopters' perceptions of social studies innovations, four factors emerged from the data: Factor 1 "Observability of Valued Outcomes" consisted of relative advantage items, compatibility items, and observability items. Factor 2 "Complexity" was comprised of relative advantage items and observability items. Factor 3 "Feasibility" consisted of relative advantage items, compatibility items, and trialability items. Hahn's fourth and final factor, "Similarity" was composed of 2 compatibility items.

Similar "fuzzy construct" results were obtained by Haebegger's (1988) study of 260 internal audit directors' perceptions of three accounting innovations. In his study that examined innovation in three different contexts, five factors emerged from the data: Factor 1 consisted of complexity items. Factor 2 was comprised of relative advantage items, compatibility items, and, in one context, the addition of an observability item. Factor 3 consisted of a potpourri of relative advantage items, observability items, trialability items, and, in one context, a single additional compatibility item. Haebegger's fourth factor consisted of observability, and, in one context, two relative advantage items. Haebegger's final factor, was composed of trialability items, with the addition of a compatibility item in one context. Haebegger concedes that there is a "possibility that the attributes are not unique" (p. 74).

Clinton's 1973 study of 338 teachers' perceptions of innovation characteristics identified five factors across 16 educational innovations. Like Haebegger, Clinton's factor structures varied between contexts, but he identified five factors that cropped up consistently across innovations: Factor 1 "Relative Advantage" was comprised of efficiency, advantage, pleasure, association with teaching, clarity of results. Factor 2 "Cost" encompassed initial and ongoing economic costs. Factor 3 "Compatibility" consisted of reverse-scored novelty items and compatibility items. Factor 4 "Complexity" dealt with disadvantages, or repercussions and penalties. Finally, Factor 5 "Communicability" was composed of social relative advantage items. In examining

Clinton's 20 pages of factor loadings for five factors, one must ask whether there is potentially a much simpler interpretation of the data.

Berman's (1994) study of 84 small manufacturing firms' executives' perceptions of export innovations identified nine innovation characteristics. Relative advantage was broken up into competitive advantage and profit. Compatibility was divided into compatibility with objectives, compatibility with sales policies, and compatibility with business policies. Berman also differentiated between three types of complexity: Factor 6, Factor 7, and Factor 8. Berman's final factors consisted of observability, and trialability, which he rejected as a scale because of an unacceptably low alpha.

Finally, Karahanna (1993), examined differences in perceptions of information technology innovations among 161 potential adopters and 107 users. Like Berman, she identified eight factors: "Usefulness and compatibility", "trialability", "ease of use", "image", "visibility", "result demonstrability", "compatibility", and "voluntariness".

Reconceptualizing Innovation Attributes: The Pros and Cons of Innovation

In sum, past studies of innovation attributes have encountered measurement problems. To address the general lack of scale development in the literature about innovation attributes, a recent study employed confirmatory factor analytic techniques to determine the extent to which these constructs are mutually exclusive (Meyer, 1996). Results indicated that the innovation attributes of relative advantage, observability, adaptability, and acceptance tap a manifest trait, pros, while complexity and risk comprise cons. The present dissertation will employ this alternate conceptual framework, the pros and cons of innovation, because, unlike traditional innovation attributes, the pros and cons of innovation demonstrate content, as well as face validity.

The pros of innovation are indicative of advantages that organizational members associate with an innovation. Essentially akin to the extent to which organizational members think that an innovation is a good idea, pros are linked closely to the traditional innovation attribute of relative advantage. Pros may also encompass other attributes that

are positively related to innovation adoption, such as observability, adaptability, compatibility, and trialability. Pros also gauge the level of acceptance for an innovation: Organizational members who report high levels of pros associated with an intervention are likely to support or "buy in" to that innovation. Research in health psychology has identified pros as a factor positively related to adopting mammography screening behaviors (Rakowski et al., 1992).

The cons of innovation can best be understood in contrast to the pros of innovation. Cons are indicative of disadvantages that organizational members associate with an innovation. Closely related to the innovation attributes of complexity and risk, cons tap the extent to which organizational members perceive that there are drawbacks or negative unintended consequences associated with an innovation. Cons may gauge the level of resistance to change: Organizational members who report high levels of cons associated with an intervention may fail to support, or even sabotage, the innovation. Recent research in health psychology has identified cons as a factor that represents perceived negative aspects of obtaining a mammogram (Rakowski et al., 1992).

A Model of The Effects of Weak Ties on Perceived Organizational Innovativeness and Innovation Characteristics

Based on the previous discussion, it seems likely that weak ties, perceived organizational innovativeness, and the pros and cons of innovation are intimately connected constructs. Individual perceptions about innovation and innovativeness are diffused in organizations over time through communication, so informal structure at one point in time should impact perceived organizational innovativeness and perceptions about the pros and cons of innovation at later points in time. An innovative climate should be a predictor of the degree to which organizational members will be supportive of a particular innovation. Likewise, organizational members should form general perceptions about the extent to which they work in an innovative climate through their experience with a specific innovation in the organizational context. In order to present a

parsimonious model, it is hypothesized that predictor variables will have immediate, direct effects on outcome variables from one data collection to the time period that directly follows it. Hence, no lag effects are predicted. The conceptual model "The Effects of Weak Ties on Perceived Organizational Innovativeness and Innovation Characteristics" is presented in Figure 1.

Individuals with many weak ties are exposed to information about innovation from a variety of sources. They are likely to perceive that they work in an innovative environment and be exposed to innovation-related knowledge. Information from diverse sources gives unique perspectives and, is, thus, often a source of innovative ideas. Thus, it is hypothesized that:

H1: Weak ties at T2 will be positively correlated with perceived organizational innovativeness at T3.

The "amplification effect" (Renn, 1991) suggests that weak ties should impact future perceptions of innovation by amplifying existing attitudes about the pros and cons of innovation. If people communicate with their weak ties about the favorable aspects of the innovation, then this could have a positive effect on attitudes about innovation over time. If, on the other hand, organizational members communicate with their weak ties about the unfavorable aspects of the innovation, then this could have a negative effect on attitudes about innovation over time. In contrast to the amplification effect, the "spiral of silence" phenomenon (Noelle-Neumann, 1974) suggests that attitudes about innovation may not necessarily get converted to talk among weak ties: Organizational members may share dissimilar views about innovation, but the person with relatively less knowledge about the topic may fail to express his or her opinions because he or she perceives that he or she lacks expertise. In this case, opinion leaders' views about innovation would eventually become paramount in the network. Since the extent to which organizational

members advocate innovation through innovation-related communication is not known, the following research questions are generated:

RQ1: How will weak ties at T1 influence attitudes about the pros of innovation at T2?

RQ1a: How will weak ties at T1 influence attitudes about the cons of innovation at T2?

RQ2: How will weak ties at T3 influence attitudes about the pros of innovation at T4?

RQ2a: How will weak ties at T3 influence attitudes about the cons of innovation at T4?

Since perceptions of innovativeness within an organization have been directly linked to employee willingness to participate in innovation processes (Hurt & Teigen, 1977), it is expected that an innovative climate is a predictor of the degree to which organizational members will be supportive of a particular innovation. At the beginning of the first data collection period, the innovation (see Methods section for a detailed description of the setting of this study and Figure 2 for a timeline of the innovation) was in the early stages of implementation. At an early stage (T1), perceptions of organizational innovativeness should have been especially salient to acceptance of the innovation at T2, because organizational members would not yet have had much specific information with which to evaluate the innovation. At the time of the third data collection period, the innovation was in the later stage of implementation. At this later stage (T3), perceptions of organizational innovativeness should have still been important,

although somewhat less salient, to acceptance of the innovation at T4, because organizational members would have had more specific information with which to evaluate the innovation. Thus, it is hypothesized that:

H2: Perceived organizational innovativeness at T1 will be positively correlated with the pros of innovation at T2.

H2a: Perceived organizational innovativeness at T1 will be negatively correlated with the cons of innovation at T2.

H3: Perceived organizational innovativeness at T3 will be positively correlated with the pros of innovation at T4.

H3a: Perceived organizational innovativeness at T3 will be negatively correlated with the cons of innovation at T4.

Organizational members form perceptions about the extent to which they work in an innovative climate through their hands-on or vicarious experience with a specific innovation in the organizational context. By sampling organizational members' perceptions about a particular innovation within an organization, we may be able to gauge future levels of perceived organizational innovativeness across the entire organization. Since data about the pros and cons of innovation were gathered as the innovation was in a later stage of implementation, organizational members had specific information with which to evaluate the innovation. So, organizational members' perceptions about the pros and cons would have influenced their level of perceived organizational innovativeness at T3. Thus, it is hypothesized that:

H4: Attitudes about the pros of innovation at T2 will be positively correlated with levels of perceived organizational innovativeness at T3.

H4a: Attitudes about the cons of innovation at T2 will be negatively correlated with levels of perceived organizational innovativeness at T3.

Often, in longitudinal studies, the clearest, strongest relationship between variables are with themselves at different points in time (Blalock, 1982). According to Finkel (1995), there may be substantive reasons for assuming that Y_{t-1} is a cause of either Y_t or ΔY, because prior orientations may exert some causal effect on either current outlooks or changes in orientations over time. Thus, it is hypothesized that:

H5: Attitudes about the pros of innovation at T2 will predict levels of pros at T4.

H5a: Attitudes about the cons of innovation at T2 will predict levels of cons at T4.

H6: Attitudes about perceived organizational innovativeness at T1 will predict levels of perceived organizational innovativeness at T3.

Finally, since communication structures tend to be relatively stable over time (Johnson, 1993), and it has been suggested that the best predictor of a variable at T2 is a baseline measure of that variable at T1, it is hypothesized that:

H7: Weak ties at T1 will predict levels of weak ties at T2, weak ties T2 will predict weak ties T3, and weak ties T3 will predict weak ties T4.

Insert Figure 1 about here

The following section describes the setting in which this research took place and the methods used in collecting the data. In addition, the next section details analytic procedures used to test the measurement models, hypotheses, and research questions. Finally, confirmatory factor analysis results are presented.

CHAPTER TWO

METHODS

Setting

This longitudinal study takes place in the Cancer Information Service (CIS), a federal government health information agency that is implementing innovations to meet strategic objectives, simultaneously striving to deliver services and to maximize its innovative potential.

The Cancer Information Service

The CIS was implemented in 1975 by the National Cancer Institute (NCI) to disseminate accurate, up-to-date information about cancer to the American public (Morra, Van Nevel, Mazan, & Thomsen, 1993). Over time, the CIS has become a community-based laboratory for state-of-the-science communication research (Marcus, Woodworth, & Strickland, 1993). The Cancer Information Service Research Consortium (CISRC) is a research arm of the CIS that is currently involved in the process of generating, implementing, and evaluating preventive health innovations to reach traditionally underserved sectors of the American public (Johnson, Berkowitz, Ethington, & Meyer, 1994). In this endeavor, the CIS must be creative in its attempts to manage innovation in order to generate organizational members' acceptance of change that at times may be challenged by geographic and institutional barriers.

Perhaps the most unique characteristic of the CIS is its geographic dispersion across 19 regional offices serving the entire U. S. (Marcus et al., 1993). What brings all of the regional offices together is a fee for services contract, which in effect creates partnerships between contractors for a five-year period, during which time they work together toward the accomplishment of a common goal. These offices, however, still retain their membership in their local organizations (e.g., cancer centers) and identify with their regional concerns. Still, there is a strong normative thread that runs through the activity of this network, a commitment to providing high quality information, free to

the public, concerning cancer (Marcus et al., 1993). A high degree of formalization, evidenced by a well-developed policies and procedures manual, ensures uniformity of service and adherence to a structured protocol across the CIS network.

The unique characteristics of the CIS become apparent when you contrast the CIS with more conventional organizational forms, because, even though people in the regional offices are formally members of other organizations, the CIS network itself has many of the characteristics of unitary organizations; with centrally determined goals, a formal bureaucratic structure of authority, a division of labor, formal plans for coordination (e.g., sharing of calls), and a high normative commitment to providing service to callers (See Table 1 for a description of the major goals and objectives of the CIS and Figure 2 for an overview of the CIS network.) Performance standards for telephone calls are set nationally and are monitored by an extensive formal evaluation effort (Kessler et al., 1993). However, personnel issues such as salaries and fringe benefits are locally determined.

Table 1 and Figure 2 about here

Many of the decisions that pertain to major national initiatives (e.g., prostate cancer, breast cancer, affiliations with other organizations) related to innovation are made in collaboration with organizations outside the immediate context of the CIS (e.g., the NCI and the National Institutes of Health). This places CIS members in an interesting position in terms of their relationship to the innovation adoption and implementation process. Traditionally, innovation studies have focused on adopters or end-users, individuals who actually make adoption decisions. In contrast, the majority of CIS members are key stakeholders, rather than adopters or end-users. Exceptions to this characterization would be the Office of Cancer Communication (OCC) staff at NCI and

Project Directors. Of all CIS members (see Sample Characteristics for complete descriptions of all functional roles), OCC staff and senior Project Directors are most like adopters because they are most involved in centralized decision-making processes related to innovation implementation.

Innovation in the Cancer Information Service

Over the past two years, the CISRC has been piloting three new intervention strategies to facilitate the dissemination of cancer information to the public. In this study, we will examine the second intervention, Project 2, Making Outcalls to Promote Mammography, because it is the only project that was completed during the data collection period (see Survey Procedure for a detailed discussion of sampling intervals and design issues). A chronology of key events that occurred in the CISRC during the data collection period was compiled from archival documents (see Appendix C).

Project 2, Making Outcalls to Promote Mammography, is connected to the CIS 1-800-4-CANCER telephone service, utilizing the toll-free number as a nexus from which to disseminate cancer information to targeted populations who are traditionally underserved sectors of the American public. Specifically, Project 2 is concerned with encouraging women to receive regular mammograms. This new intervention strategy reaches out to women by making cold calls from the CIS to low income and minority women in targeted communities in Colorado. This intervention strategy is unique in that it focuses on making outcalls from the CIS, an activity that is substantially different from the traditional role of a telephone service that answers calls placed by people in the community to a toll-free number. In February, 1994, at the time of the first data collection, Project 2 was engaged in the pilot study for Making Outcalls. In July, 1994, one month before the second data collection, Project 2 was just beginning the main pilot study, and the CISRC was discussing various strategies to reach working women (e.g., making outcalls in the evening), and to create incentives for information specialists to make outcalls (e.g., financial reimbursements or hiring a half-time information specialist

to make outcalls). By March, 1995, Project 2 reported reaching women with a lower mammography adherence rate than women who were calling in to the CIS. The main study was completed by the end of June, approximately two months before the third data collection. In October, 1995, one month before the fourth data collection, Project 2 reported a 76% six-month follow-up response rate.

Currently, the CISRC is engaged in outcome evaluations associated with Project 2. First, the CISRC is conducting summative evaluation to determine the effectiveness of Project 2 in promoting mammography screening in low income women. In addition, the CISRC is conducting a study to determine the extent to which Project 2 is a cost effective approach to delivering cancer information to the public. This study examines changes over time in organizational members' perceptions of Project 2.

Sample Characteristics

The participants in this study (n = 90) were highly educated. At baseline, 94 percent of respondents (n = 106) had earned college degrees, 62 percent of which were graduate degrees. The majority of respondents were low in tenure: less than one-third of respondents had worked for the CIS for five years or more, while nearly two-thirds had worked for the CIS for under five years. This study focused on the key decision makers within the CIS: the Office of Cancer Communication (OCC) staff at NCI, Principal Investigators (PIs), Project Directors (PDs), Telephone Service Managers (TSMs), and Outreach Coordinators (OCs) at the regional CIS offices. People in these functional roles all play a different part in the adoption and implementation of innovations in the CIS: OCC staff (13 percent of respondents) are most involved in centralized decision-making processes related to innovation implementation; PIs (11 percent of respondents) provide overall strategic direction for offices; PDs (15 percent of respondents) provide day-to-day operational management for the projects, integrating national programs at the local and regional level; TSMs (21 percent of respondents) are responsible for training and managing the information specialists who actually operate the telephone service for

cancer information; and OCs (21 percent of respondents) form partnerships with local organizations and the media in order to disseminate cancer information to the public. The remaining 19 percent of respondents were CISRC Program Project staff (PP), who conduct research and evaluation related to new intervention strategies. Table 2 reports the baseline demographic characteristics of the participants in this overall research project.

Table 2 about here

Survey Procedure

This research was part of a much larger project designed to evaluate the impact of three planned innovations over a four year period (see Johnson et al., 1994 for a much more complete discussion of methods and design issues). As part of the February 1994, August 1995, August 1996, and November 1996 recurring quarterly data collections associated with this larger project, a mailing was sent to respondents which included a network questionnaire and a battery of questions relating to innovation. To ensure completion, the self-report questionnaires were sent to the respondents approximately ten days prior to the sample time period. A personalized letter was included to explain the issues that would be examined and urge participation in the project. At the same time, an e-mail was sent to all participants to notify them that they would be receiving the questionnaire. A second e-mail was sent the day before the sample time period, reminding participants that they should begin recording their communication contacts for the next three days. A third e-mail was sent the day after the sample time period has concluded, to remind participants to return their questionnaires in the stamped, self-addressed envelope provided. Many follow-up steps (e.g., letters, faxes, e-mails) recommended in the literature (e.g., Dillman, 1978, 1991) were taken in these recurring

data collections (see Johnson et al. 1994 for more details). Through these extensive follow-up efforts, we achieved a very satisfactory response rate (95%, 96%, 91%, 85%).

Sampling Interval

Selection of a sampling interval is always a problematic issue, and one outcome of this research will be a better feel for the most appropriate sampling interval for studying changes in communication network structure, perceived organizational innovativeness, and perceptions of innovation characteristics. With respect to communication structure, extensive pretesting of the communication log in the summer of 1993 and discussions with members of the network led to the decision to focus on a three-day period every three months, rotating days of the weeks and weeks of the month throughout the duration of the overall research project (a span of 40 months). It was felt that this would be the best compromise for a number of reasons. First, this sampling interval was frequent enough to detect major cycles of activities within the CIS network. Second, sampling a three-day period was determined to be preferable to recording all communication activities within a three-month period because of the limitations of respondent memory, the desire to reduce respondent burden, and the vast volumes of data that can be generated by more exhaustive measurement strategies.

With respect to the self-report questions that were distributed at the same time as the communication log, collaboration with members of the network led to the decision to focus on a few central issues over the course of the overall research project. Five key issues were rotated over 14 data collection periods, with approximately equal intervals between the distribution of a survey at three points in time. For example, Perceived Organizational Innovativeness and Perceptions of Innovation Characteristics, the surveys that pertain to this study, were disseminated at intervals of 18 months and 15 months, respectively. Baseline measures of innovativeness were planned to coincide with the initial piloting of the innovation, and baseline measures of perceptions of innovation characteristics were gathered soon after the main study was implemented. Follow-up

measures of innovativeness were collected soon after the main study was completed, and follow-up measures of perceptions of innovation characteristics were gathered at the time of the six-month follow-up to the main study.

Measurement

Two types of measurement approaches were used for the variables contained in the model: classic self-report network analysis and self-report questionnaires focusing on innovations. All survey instruments appear in their entirety in Appendices D - G.

Network Variables

Network analysis research is extremely vulnerable to low response rates and missing data. It also differs from the sampling procedures and randomization approaches more traditionally found in the social sciences. As a result several key issues, instrument design, follow-up, boundary specification, and sampling interval, had to be explicitly confronted in research decision about how network analysis research would be carried out within the CIS (see Johnson et al., 1994 for more detail).

Perhaps the most well known, and at times most difficult, issue associated with the context of networks is where to draw the boundaries around them. This is especially problematic since boundaries imply some discontinuity in relationships; that relationships across boundaries are in some sense qualitatively different than those within the network's boundary (Monge & Eisenberg, 1987). In one of the more extended discussions of this issue, Lauman, Marsden, & Prensky (1983) distinguish between nominalist and realist views of this problem. In the realist approach, the researcher adopts the vantage point of the actors in defining boundaries, while the nominalist imposes a conceptual framework that serves his/her own analytical purposes. This study used a combination of these approaches in determining the boundaries of the CIS.

The analytical power and breadth of any network analysis is determined by how the relationships between nodes (i.e., members of the CISRC network), referred to as links, are defined. Links are the basic datum of network analysis (Rogers & Kincaid,

1981). Essentially the measurement of linkages focuses on the classic question of who speaks to whom about what using which communication modality. Although self-reports of communication behavior have been questioned because of their effect on accuracy (e.g., Bernard & Killworth, 1977), many still assert their validity on a conceptual level (Corman & Scott, 1994). As Richards (1985) maintains, since self-report reveals a person's perceptions of social reality, it often provides richer types of information than mere reliance on observations and researchers who have reanalyzed the Bernard and Killworth data have come to the opposite conclusion (Kashy & Kenny, 1990). Even Bernard and Killworth have seen the utility of self-report for some problems (see Killworth, Bernard, & McCarty, 1984). Indeed, while the accuracy of self-report network data has been questioned on many grounds, for pragmatic reasons it has been the predominant method used for network analysis (Marsden, 1990). Some have also argued, from balance theory perspectives, that self-reports of behavior are more meaningful than actual behavior, since they more closely reflect the individual's perceptions and thus are more closely linked to their attitudes about and reactions to a particular social system (Kilduff & Krackhardt, 1994), a particularly important issue for perceived organizational innovativeness.

Only interpersonal contacts, either face-to-face or by telephone, that were initiated or received during the three day sampling interval, were recorded in the communication log. In practice, because of geographic dispersion, interpersonal contacts were primarily by telephone. The larger project examines links with two types of work-related communication message content: intervention strategies and other work-related. Intervention strategies, including, but not exclusive to, the efforts proposed in other elements of the CISRC, focus on methods of reaching the target audiences of the CIS. Other work-related issues focus on maintaining and/or enhancing the day-to-day operation of the CIS (e.g., administrative chores such as budgeting). Respondents also had the option of reporting that any one conversation contained both types of content.

Since this study's focus is on innovation, the analysis will concern only intervention strategies contacts.

Separate predated forms were provided for each day of the data collection period. Detailed examples were provided on how to fill out the log in the packet. In addition, as part of the informed consent and follow-up procedures most members of the network were contacted by telephone (or at conferences) and were given more detailed instructions on how to fill out the logs. The CISRC network was defined for individuals by their functional roles. In addition, a directory was provided of all members of the network. This approach reduced respondent burden associated with paging through a complete roster, while also providing a means for securing some of the advantages of rosters. Often this is the only practicable means of recording data for larger social systems (Marsden, 1990). Thus, individuals were asked to record the complete names of individuals with whom they had contact. They also recorded their name, region, and position on every page of the log.

Despite an extensive pretest, the communication log was modified twice during the course of the research project, in response to issues raised by respondents (the communication logs are included in Appendices D and E). In May 1995, nearly half-way into the research project, the communication log was modified to capture only communication at the national level. In August 1995, the communication log was changed to include communication conducted by facsimile and electronic mail. The first change may have reduced the level of communication reported across the network, especially intraoffice and other work-related communication. The second change may have led respondents to substitute one mode of communication for a variety of others. Since this study is concerned with interpersonal innovation-related communication contacts only, the impacts of the change in measurement instruments on communication structure is minimal.

Psychometric Indicants

The procedure by which self-report questionnaires were developed followed the stages suggested by Devellis (1991). First, we identified the constructs to be measured through a theory-driven process: We began by identifying nine factors based on a review of the academic literature: relative advantage, compatibility, observability, complexity, trialability, adaptability, riskiness, acceptance, and perceived organizational innovativeness. Next, we generated a good-sized pool of items that could potentially be included in the scales, wording questions carefully to avoid multicollinearity between constructs. Data from initial, exploratory, qualitative interviews, and from formal agency documents were used to adapt items to the organizational context of the CIS. While we generated items, we carefully considered the format and the number of response categories to be included in the questionnaire: All items were based on eleven point semantic differential type scales. Once we generated a draft of the scales, we determined face validity by having the draft reviewed by experts in the area of organizational communication, health communication, and the diffusion of innovations. In the pretest stage, we administered the revised scales to a sample of participants in the target audience. In addition, we utilized participant feedback to fine-tune the questionnaire and to improve the ease with which the directions could be understood and followed.

Perceived Organizational Innovativeness

In February 1994 and August 1995, six items tapping perceived organizational innovativeness were adapted from PORGI (Hurt & Teigen, 1977). For example, one item read "The CIS is receptive to new ideas". In some cases, items were tailored to the context of innovation in the CIS. For example, one of Hurt and Teigen's items addressed creativity in general, whereas in this study, creativity was more specific: "Most people who work for the CIS are very creative in how they go about implementing innovations". During the pretest phase, the word "innovations" was changed to "new intervention

strategies", reflecting the language of innovation in the CIS. Low factor loadings associated with a confirmatory factor analysis of the scale indicated measurement problems with the items "The CIS is receptive to new ideas" and "The CIS responds quickly to necessary changes related to new intervention strategies". In the pretest of the August 1995 revised Perceived Organizational Innovativeness survey, this item was replaced with "Members of the CIS are innovative". Items that appear in the final Perceived Organizational Innovativeness scale (see Appendix F) were collected at both points in time.

Pros and Cons of Innovation

In August 1994 and November 1995, items were generated to tap the classic innovation attributes of relative advantage, compatibility, complexity, trialability, and observability, as well as more recent attributes of riskiness, adaptability, and acceptance. In the process of having the initial draft items reviewed by organizational communication experts, concerns were raised about multicollinearity. It was noted that reliability (the reverse of riskiness) and relative advantage are not mutually exclusive. In addition, it became apparent that it was problematic to operationalize observability in a way that was clear, yet value neutral.

Next, the revised draft was pretested with a sample of participants in the target audience. We asked pretest participants to evaluate the three program projects with respect to each item. Two pretest participants were worried about the quality of their responses to projects other than the ones that was being piloted in their offices. In order to address this concern, two additional response options were inserted: "DK" for "don't know" and "NR" for "no response at this time". In the directions, respondents were given a brief description of the projects under assessment as well as the following assurance:

We understand that you may not be completely familiar with each of the components of the program projects: This is not meant to be a test, rather

we would like to find out peoples' current level of awareness about the component parts of each program project. If you do not yet have enough information to evaluate an item with respect to a particular program project, write "DK" (for "don't know) in the space provided for item evaluation. If you feel uncomfortable responding for another reason (e.g., the program project doesn't relate to your work or you have heard conflicting things about the intervention strategy), write "NR" (for "no response at this time").

As a result of the August 1994 pretest, several items were altered or omitted. Many of the revisions had to do with observability. The observability item "This intervention strategy places a number of demands on our office" was clarified by specifying the nature of demands at the level of the telephone information specialist. The observability item "This intervention strategy will be easy to evaluate" was omitted because respondents felt it was too vague. Further, because pretest participants felt that the effects of cancer information interventions on callers would not necessarily be observable in the short run, additional observability items were revised to reflect more short-term, observable effects. For example, "This intervention strategy will produce a noticeable change in publics desire for cancer information" became "This intervention strategy will change the way information is disseminated by the CIS", and "This intervention strategy provides direct evidence that it has an effect on the target audience" became "This intervention strategy will have an effect on the target audience".

With respect to trialability, the items "can be tried on a limited basis" and "can be pre-tested before implementation" were rejected because of ambiguity. A new stem was added for trialability items: "piloting this intervention strategy in a few offices..." which tapped the extent to which respondents thought that piloting an intervention strategy was a good idea.

With respect to riskiness, the (reversed) riskiness item "This intervention strategy is a tried and true method for communicating cancer information to the public" was omitted because respondents felt that innovation could not be "tried and true". Additionally, the item "This intervention strategy has a high probability of succeeding " was changed to "...is a reliable way to communicate cancer information to the public", due to the apt perception of one participant that success can be measured in many ways.

In the revised November 1995 Innovation Characteristics scale, items with low factor loadings were deleted if, when omitted, would raise the scale alpha (e.g., "This intervention strategy has many different components" and "This intervention strategy is something we can build on in the future"). As a result of the pretest of the revised survey, in which it was acknowledged that the interventions were at different stages of implementation than they had been at time one, a footnote was dropped to instruct respondents to answer the questions as they pertained to current status of each project.

Perhaps foreshadowing future problems with respondent burden, one pretest participant requested a reduction in the number of redundant questions (e.g., items that tapped disadvantageous innovation characteristics such as complexity and risk). Since this redundancy is a necessary evil for attaining acceptable levels of reliability and validity of measurement, we did not reduce the number of items for each construct (five).

Again, a pretest participant responded that it was difficult to evaluate the program projects because her office was not piloting an intervention strategy. Additionally, a new organizational member had difficulty answering questions related to past initiatives about which she know little or nothing. This difficulty was especially salient to relative advantage and compatibility items. She added that outside of piloting an innovation in her office, she felt that innovation outcomes were unpredictable. Items that appear in the final Innovation Characteristics scale (see Appendix G) were collected at both points in time.

Analysis

An investigation of the proposed hypothesized relationships required a four step procedure. First, the informal communication structure data were analyzed by means of STRUCTURE. The next step was the evaluation of the measurement model with the confirmatory factor analysis subroutine of the PACKAGE computer program (Hunter & Lim, 1987). The third step was generating descriptive statistics and testing hypotheses of mean differences with ANOVA in SPSS for Windows. Finally, the path model was analyzed with path analytic techniques of the PACKAGE computer program (Hunter & Lim, 1987). The critical value was set at .05 for all analyses.

STRUCTURE

STRUCTURE is based on the work of the sociologist Ron Burt (1991), and, as such, has explicit linkages to his theoretical work (e.g., Burt, 1982). STRUCTURE calculates a large number of indices related to an individual's structural positioning within the network. Structural Autonomy indices, revealed in part in range measures, relate to the extent to which an individual's relationships may constrain his/her opportunities for individual action within a network. Individuals high in structural autonomy have more freedom of action within a network. Two measures of range, contacts and nonredundant contacts, reflect the breadth of an individual's network ties. Contacts reflect counts of an individual's direct and indirect contacts, while nonredundant contacts is a count of the number of independent contacts (see Burt, 1991, pp. 180-183).

STRUCTURE also calculates a number of measures of the extent to which an individual is prominent within a social network. Choice status measures the proportion of an actor's contacts from others in the network to the total number of contacts possible. While range focuses on the horizontal axis of the organization, prominence is typically associated with the vertical axis, and tends to reflect an individual's formal status within an organization (Burt, 1991).

Confirmatory Factor Analysis

The measurement model for the first order scales was analyzed by means of the confirmatory factor analysis subroutine of the PACKAGE computer program (Hunter & Lim, 1987). Confirmatory factor analysis is a superior technique when the a priori specification of items expected to cluster together is possible (Fink & Monge, 1985; Hunter & Gerbing, 1982). Three criteria proposed by Hunter (Hunter, 1980; Hunter & Gerbing, 1982), homogeneity of item content (face validity), internal consistency (i.e., Spearman product rule), and parallelism (i.e., 'flat' correlation matrix), were used to determine unidimensionality. Tests of unidimensionality are essential to scale development since it has been demonstrated that alpha provides an unbiased estimate of reliability only if scale items are unidimensional (Hunter, 1980; Hunter & Gerbing, 1982). In addition, because this study employed a longitudinal multiple indicator measurement model, the data were examined for evidence of specific error (Hunter, Coggin, & Gerbing, 1984). Since the inter-item correlations for scale items across time were not inflated, specific error was not a problem in these data.

Weak Ties

For the August 1995 prominence and range data, a two-factor solution failed tests of internal consistency and parallelism, indicating that range and prominence are not mutually exclusive. Further analyses revealed that the prominence and range data were consistent with a unidimensional model in that final scale items met the following criteria for internal consistency: face validity, primary factor loading of .7 or greater (see Table 3), and small residual errors between predicted and observed correlations (see Table 4). Further, when compared against the Perceived Organizational Innovativeness scale, the final scale demonstrated parallelism. A nonsignificant sum of squared errors did not depart from the hypothesized measurement model (x^2 = 8.2, df 9). Standardized alphas for the final scale, Weak Ties, were .93, .96, .93, and .90, respectively, across the four time periods.

Perceived Organizational Innovativeness

Five Perceived Organizational Innovativeness items adapted from PORGI (Hurt & Teigen, 1977) were analyzed with confirmatory factor analysis techniques. Three final items met the following criteria for internal consistency: face validity, primary factor loading of .7 or greater (see Table 5), and less than 6% of the discrepancies between predicted and observed correlations were outside the bounds of the confidence interval at T1 and T2, respectively (2.0%, 5.5%, p < .05) (see Table 6). Further, when compared against formal structural variables and communication process variables, the final Perceived Organizational Innovativeness scale demonstrated parallelism. At T1 and T3, a nonsignificant sum of squared errors showed no departure from the hypothesized measurement model ($x^2 = 62.2$, df 149, $x^2 = 128.8$, df 164). The standardized alphas for perceived organizational innovativeness were .85 and .89 at T1 and T3, respectively.

Pros and Cons of Innovation

In August 1994 and November 1995, items were generated to tap the classic innovation attributes of relative advantage, compatibility, complexity, trialability, and observability, as well as more recent attributes of riskiness, adaptability, and acceptance. Confirmatory factor analytic techniques indicated that the original subscales, with the exception of trialability, were below acceptable parameters for internal consistency and parallelism. Items not only failed to load highest on the factor to which they were hypothesized to belong, but they also did not correlate highly with other items hypothesized to load on that same factor. In fact, many items were highly correlated with items hypothesized to load on other factors. Further, initial factor analyses of the subscales across all three innovations revealed a relatively uniform pattern of high inter-factor correlations between the innovation attributes of acceptance, relative advantage, observability, adaptability. A similar pattern of multicollinearity was found with the innovation attributes of complexity and risk (see Meyer, 1996 for details). Conversely, both complexity and riskiness items had negative or small positive correlations with

relative advantage, observability, adaptability, and acceptance. Further analyses regrouped innovation attributes into pros and cons of innovations. In the process, several items dropped from the scales because they did not fit the criteria for parameters for internal consistency and parallelism. The final set of items met the Spearman product rule, since the predicted correlations were within sampling error of the observed correlations. A nonsignificant sum of squared errors showed no departure from the hypothesized model in August 1994 (x^2 = 74.5, df 79) and November 1995 (x^2 = 78, df 79). At T2 and T4, standardized alphas were .96 and .95 for pros, and .88 and .77 for cons, respectively.

With respect to the homogeneity of error for pros, eight items met the following criteria for internal consistency: face validity, primary factor loading of .6 or greater (see Table 7), and 3.6% of the discrepancies between predicted and observed correlations were outside the bounds of the confidence interval (p < .05) during both data collections (see Table 8). With respect to the homogeneity of error for cons items, three met the following criteria for internal consistency: face validity, primary factor loading of .4 or greater (see Table 9), and no significant discrepancies between predicted and observed correlations (p < .05) during both data collections(see Table 10). In terms of heterogeneity of error, 12.6% and 6.3% of the discrepancies between predicted and observed correlations were outside the bounds of the confidence interval (p < .05) at T2 and T4 respectively. It is important to note that pros were composed primarily of relative advantage and acceptance items, with two additional items from observability and adaptability. Cons were comprised of complexity and negatively-valenced observability items. Compatibility and riskiness items dropped out of the scale altogether. Due in part to the fact that pros was derived from a greater number of innovation attributes (and hence a larger initial pool of items) than were cons, there are overall more final items tapping pros than cons.

Tables 3 - 10 about here

CHAPTER THREE

RESULTS

This chapter presents the results of longitudinal research investigating the relationships between weak ties, perceived organizational innovativeness, and innovation characteristics. This chapter can be divided into three sections. The first section presents descriptive statistics. The next section sets forth the test of the causal model. A revised model follows.

Descriptive Statistics

Preliminary analysis of the scales' mean, standard deviation, and Pearson correlations are reported in Table 11. The factor with the lowest average item mean was weak ties at T4 (.57), a sizable decrease from the baseline level of 4.85. Repeated measures MANOVA indicated that, across all four time periods, the decline in weak ties from 4.85 at baseline to .57 at T4 was significant (F = 11.19, df 3, p =.000). The scale with the highest average item mean was perceived organizational innovativeness at T3 (6.77), a slight but nonsignificant increase from the baseline level of perceived organizational innovativeness (6.22). Other nonsignificant changes included a slight decrease in the pros associated with Making Outcalls from T2 (6.69) to T4 (6.01), and a minor concurrent increase in cons (4.72) to (5.67). Over time, perceived organizational innovativeness was strongly correlated with itself (r = .53), while pros and cons had strong negative correlations with one another at T4 (r = -.42).

Insert Table 11 about here

A Test of the Model "Short Term Effects of Weak Ties"

The data were analyzed with path analytic techniques of the PACKAGE computer program (Hunter & Lim, 1987). Path analysis evaluates the fit of a model

with both global and local tests. A global test of the fit of a model is obtained by calculating chi square, or the sum of squared errors for each predicted correlation, with degrees of freedom equal to the number of unconstrained residuals. If the obtained chi square does not exceed the critical value at the .05 probability level, then the model provides a good fit to the data. Local tests of each parameter are conducted by drawing confidence intervals around the value of the predicted correlation. If a predicted correlation falls between the upper and lower endpoints of a 95 percent confidence interval, then that parameter is significant at the .05 level. As shown in Figure 3, the results indicated that the model provided a less than satisfactory fit to the data (χ^2= 38.9, df 27, p = .06). Most predicted links were nonsignificant (see Table 12 for path coefficients and confidence intervals); unexpected lag effects produced the most notable unspecified paths.

Perceptions of innovation characteristics at T2 were predicted only weakly by perceived organizational innovativeness at T1, failing to provide support for Hypotheses 2 and 2a: The path coefficient between perceived organizational innovativeness at T1 and pros T2 was .11, and the path coefficient between perceived organizational innovativeness at T1 and cons at T2 was .20. With respect to Research Questions 1 and 1a, the links between weak ties at T1 and pros and cons at T2 were even weaker. The path coefficient between weak ties at T1 and pros T2 was .05, and the path coefficient between weak ties at T1 and cons at T2 was -.07. The level of perceived organizational innovativeness T3 was weakly predicted by pros at T2 with a path coefficient of .13, and cons at T2 (path = -.12), failing to support Hypotheses 4 and 4a. The path between weak ties at T2 and perceived organizational innovativeness at T3 was practically nonexistent at -.04, so Hypothesis 1 was not supported. Only perceived organizational innovation T3 was significantly predicted by itself at T1 with a path coefficient of .54, providing support for Hypothesis 6.

At T4, perceptions of innovation characteristics were predicted only weakly by themselves at T2, failing to provide support for Hypotheses 5 and 5a: The path coefficient between pros T2 and pros T4 was .04, and the path coefficient between cons T2 and cons T4 was -.01. In addition, Hypotheses 3 and 3a were not supported, because innovation characteristics at T4 were only weakly predicted by perceived organizational innovativeness at T3: The path between perceived organizational innovativeness T3 and pros T4 was = .03, and the path between perceived organizational innovativeness T3 and cons T4 was -.19. With respect to Research Questions 2 and 2a, the links between weak ties at T3 and pros and cons at T4 were virtually nonexistent: The path coefficient between weak ties at T3 and pros T4 was .05, and the path coefficient between weak ties at T3 and cons at T4 was -.01. Weak ties was only a significant predictor of itself from T3 to T4, with a path coefficient of .21, providing partial support for Hypothesis 7.

With respect to the individual link analysis, errors, or the difference between actual and reproduced correlations, are presented in Table 13. For predicted links, errors were insignificant. However, it must be duly noted that two relationships were in the opposite direction than expected: Perceived organizational innovativeness at T1 had a positive impact on the level of cons at T2 (path = .20), which in turn had a slight negative effect on itself at T4 (path = -.01). Of the 27 unpredicted links, seven significant errors were found when the Z values exceeded 1.645, suggesting these paths should be added to the model. The errors, listed in terms of magnitude, affected the following cross-lag correlations: pros and cons at T4 (-.44); cons at T2 and weak ties at T3 (-.37); pros at T2 and cons at T4 (-.35); weak ties at T2 and pros at T4 (-.35); weak ties at T1 and pros at T4 (-.32); perceived organizational innovativeness at T1 and pros at T4 (-.29); and cons at T2 and pros at T4 (.24).

Insert Figure 3 and Tables 12 - 13 about here

The Revised Model "Long Term Effects of Weak Ties"

A revised model that consisted of significant paths from the original model with the addition of the seven missing links, which can be conceptually justified, was tested with path analysis. The additional links produced the following strong path coefficients: Pros and cons at T4 (path = -.40); cons at T2 predicting weak ties at T3 (path = -.37; pros at T2 predicting cons at T4 (path = -.36; weak ties at T2 predicting pros at T4 (path = -.26; weak ties at T1 predicting pros at T4 (path = -.19); perceived organizational innovativeness at T1 predicting pros at T4 (path = -.22); and cons at T2 predicting pros at T4 (path = .23. The revised model, shown in Figure 4, provided an excellent fit to the data (χ^2= 14.88, $\underline{df}$ 26, p .96), with no significant errors between the original and reproduced correlations (see Table 14). All but two paths were significant at the .05 level (see Table 15 for path coefficients and confidence intervals).

While the χ^2 statistic offers an indication of the goodness of fit for a model, it is more meaningful to use the χ^2 statistic to compare alternative models (Bartunek & Franzak, 1988). By employing Bentler and Bonnett's (1980) method of comparing a series of nested models, we can assess a significantly better fitting model with a high, positive incremental fit index (above .9), calculated as $\rho = (Q_0 - Q_f) / (Q_0 - 1)$ when $Q_0 = \chi^2 / \underline{df}$. Results indicated that Model 2 was a significantly better fit to the data ($\rho = 1.98$).

Insert Figure 4 and Tables 14 - 15 about here

CHAPTER FOUR

DISCUSSION

This chapter discusses the implications of the analyses presented in Chapter Three. The chapter begins with a general consideration of the findings, specifically the short and long term effects of weak ties on perceptions of organizational innovativeness and the pros and cons of innovation. Second, functional role differences are discussed with respect to key roles in the innovation process. Third, limitations of the study are presented. Finally, implications are discussed for future research as well as for practitioners.

Summary

This research demonstrated that, over time, informal communication structure (weak ties) affected perceptions of innovation characteristics and perceived organizational innovativeness impacted perceptions of the pros of innovation. These findings suggest that an innovative climate is a predictor of the degree to which organizational members will be supportive of particular innovations.

Although informal communication structure (weak ties) affected perceptions of innovation characteristics, predicted links were surprisingly weak; the most notable effects were produced by unexpected lag effects. This finding indicates that it takes time for organizational members to process novel ideas. Although individuals with high levels of weak ties may exposed to information about innovation from a variety of sources, this type of communication does not have an immediate impact on the degree to which they perceive that they work in an innovative environment, nor does it noticeably impact the degree to which they are supportive of particular innovations in the short term. In the long run, however, informal innovation-related communication can have more pronounced consequences for organizational members' evaluations of the pros and cons of innovation.

Congruent with the "amplification effect" (Renn, 1991), the data suggest that weak ties do indeed impact future perceptions of innovation, by amplifying existing attitudes about the pros and cons of innovation. Two of the links added to Model 2 indicate that, at least in this case,

weak ties at T1 and T2 had relatively strong negative impacts on perceptions of the pros of innovation at T4. The time lag between weak ties at T1 and T2 and pros of innovation at T4 may be due in part to the sparseness of innovation-related communication in this organization. This finding suggests that perceptions of innovation are influenced by the social amplification effect in highly segmented networks, but to a lesser extent, and at a much slower rate than would be expected in dense networks. This finding suggests the importance of studying the strength of strong ties (Krackhardt, 1992) in securing support for innovation

In addition, the lag effects mirror Weenig and Midden's (1991) unexpected finding that negative advice was obtained more frequently from weak than strong ties. While we can only speculate about the reason for this finding, it may be that organizational members are more likely to make negative evaluations of an innovation if they do not have a vested interest in it. Since perceived organizational innovativeness at T1 had a strong negative impact on pros at T4, organizational members may have been unsupportive of this particular innovation because they did not perceive it to be a good match with the current innovative climate of their organization. These unanticipated findings accent the importance of evaluating the fit of an innovation within an organization.

Additionally, the unexpected finding that cons at T2 had a strong negative effect on weak ties at T3 points to a structurational account of innovation and communication (Lewis & Seibold, 1993). Apparently, perceptions of negative outcomes associated with innovation can put a damper on future levels of innovation-related innovation communication among organizational members. This finding puts a new twist on the old saying "If you don't have anything nice to say, don't say anything at all". Unfortunately, this spiral of silence can have negative consequences for the course of particular innovations in organizations.

Functional Role Differences

The scales had high standard deviations, an indication of between-groups variance. Analysis of variance was employed to determine if there were significant differences in perceptions of organizational innovativeness and the pros and cons of innovation among organizational members in different functional roles. While there were no significant between groups differences in perceived organizational innovativeness, there were several significant differences in how people in different functional roles perceived the innovation. When compared to members of other functional roles, Program Project staff reported higher levels of pros at T2 and T4 and lower levels of cons at T4. In addition, there were significant group differences in informal communication structure: Project Directors and Outreach Coordinators generally reported more weak ties than Telephone Service Managers and Principal Investigators (see Table 16). The unexpected findings about functional role differences have interesting implications for innovation in the CISRC. Functional role differences may be associated with prominence and the fulfillment of particular innovation roles.

Insert Table 16 about here

As we have seen, functional roles may be associated with prominence and the fulfillment of particular innovation roles. When compared to members of other functional roles, Program Project staff reported higher levels of pros at T1 and T2 and lower levels of cons at T2. This indicates that Program Project staff have bought in to the innovation process, more so than other CISRC members. Counter-intuitively, Project Directors and OCC staff did not report higher levels of pros and lower levels of cons than members of other functional roles within the CIS. This pattern may reflect their role as spokespersons for and disseminators of information to their regional offices. In fact, at two points in time, they reported considerably different views about the pros and cons of

innovation than Program Project members. What reasons might contribute to the discrepancy among idea champions' and orchestrators' perceptions of innovation?

Historical events may shed some light on the reasons behind Project Directors and OCC staff's less favorable evaluations of the innovation (see Chronology in Appendix C). Specifically, process evaluation data released in national meetings during the summer and fall of 1995 cited evidence of low job satisfaction among Telephone Information Specialists, measurement problems, and low cost effectiveness associated with Making Outcalls. This evaluation information may have highlighted negative unintended consequences of innovation for Project Directors, who may be concerned with the negative impact of this innovation on staff and service delivery, and OCC staff, who may have questioned the feasibility of demonstrating significant outcomes associated with the intervention at a reasonable price.

Whatever the reason for the idea champions unfavorable response to this innovation, the finding of the discrepancy among idea champions' and orchestrators' perceptions of innovation is particularly disturbing: If Project Directors and OCC staff have the power to champion innovation, they most likely also wield the power to subvert it. Interestingly, a recent document released by leaders in the CISRC indicates that the consortium leadership did not perceive that this attitudinal dissonance existed:

> From the outset, the plan was to mobilize and recruit CIS Project Directors to serve as "idea champions"...If the Project Directors remained unenthusiastic, the opportunity to establish the CISRC would suffer a serious if not irrevocable set-back...Fortunately for the CISRC, the CIS Project Directors perceived this challenge as an opportunity and became highly effective idea champions within their organizations (Marcus et al., 1996, p. 14).

This finding, when coupled with the fact that Program Project staff did not report more weak ties than other functional roles, may indicate that the orchestrators of innovation have dropped the baton. The lack of communication initiated by the orchestrators of innovation to other CISRC members suggests that they are out of the loop, relatively unaware of how practitioners are appropriating their innovation. Alternatively, this finding could indicate that Program Project staff are primarily idea generators and not orchestrators.

Kanter (1988) discussed the subjective nature of perceptions of innovation outcomes by exploring the phenomenon of pro-innovation bias (Rogers, 1983). She made the point that most research about organizational innovation is characterized by an implicit assumption that innovation is a good thing. According to Van de Ven, "innovation is often viewed as a good thing because the new idea must be useful--profitable, constructive, or solve a problem. New ideas that are not perceived as useful are not normally called innovations: they are usually called mistakes" (1986, p. 592). Kanter found that it was extremely difficult to identify innovations that fail (1983).

Kanter concluded that the organizational context has a major impact on the conceptualization of innovation within an organization. According to Kanter's content analysis of participant dialogue, the difficulty inherent in identifying the failure to innovate can be attributed to one or more of the following reasons: the taboo nature of mentioning failure; the threatening nature of failure that discourages risky ventures; the multiple goals of many projects that prevent them almost by definition from being an outright failure; and the strategies by which clever innovators convert potential "failures" into minor successes. In the case of the CISRC, perhaps innovation orchestrators' failure to acknowledge the discrepancy among idea champions' and orchestrators' perceptions of innovation indicates that the consortium leadership is reluctant to identify an innovation as a mistake. Ultimately, however, when would-be idea champions call an innovation a mistake, orchestrators need to listen. Stakeholders' valuable input can be utilized

by managers to modify innovations mid-stream or reconsider their communication strategies for promoting innovation.

The Political Context of Innovation

According to Frost and Egri, "innovation is, at its core, a political and social process of change" (1991, p. 229). If, as Van de Ven (1986) argues, the extent to which new ideas are "managed into good currency" is a key measure of innovation outcomes, then organizational stakeholders' perceptions about the advantages and disadvantages associated with innovations may be an indicator of the extent to which managers are apt at manipulating innovation-related communication. Deetz (1985) identifies naturalization, neutralization, legitimation, and socialization as political strategies that actors use to systematically distort reality for their own benefit. Organizational innovation orchestrators manipulate information, control resources, set agenda, acquire power bases, and frame decision premises to promote the political capital that they have invested in a given innovation (Frost & Egri, 1991).

Poole, Gioia, and Gray (1989) consider the efficacy of various processes, or influence modes, that managers use to produce changes in organizational schema in the interest of promoting planned organizational change. The authors identified four modes for actively managing organizational schema: *enforcement* (interpersonal communication about rewards or sanctions associated with expected change), *instruction* (logical explanation of change in a group forum), *proclamation* (written announcement about impending change), and *manipulation* (resource reallocations where hidden intents are veiled by the rationale provided for the announced change). Interestingly, the authors found the more coercive strategies of enforcement and manipulation to be most successful in bringing about organizational transformation. These findings are counter to previous research, which suggests that decentralization is positively associated with involvement or active participation in innovation processes (Johnson et al, 1995). Decentralization is generally considered to be positively correlated with innovation because participatory work environments facilitate innovation by increasing organizational members' awareness, commitment, and involvement (Damanpour, 1991). Poole et al's counter-intuitive

findings could be explained in part because their research took place in a bank in the private sector, an organization with a strong hierarchical structure. In an organization with a less centralized power structure, enforcement and manipulation modes could easily boomerang and result in resistance to change. As the CIS is a unique organizational form which brings together previously autonomous regional organizations under a centralized bureaucratic structure, one can only conjecture about which influence mode would be most likely to effect change.

<div align="center">Resistance to Change</div>

Organizational members who "buy in" to the innovation implementation process become more active, enthusiastic participants because they perceive that there are certain advantages to doing so. Desired outcomes associated with innovation may include increased efficiency, productivity, effectiveness, and technological development. In contrast, stakeholders who perceive high levels of disadvantage associated with an innovation may be more resistant to change, and thus more likely to engage in dysfunctional outcomes such as sabotaging the innovation or leaving the organization.

Rokeach and Grube (1979) employ Cognitive Dissonance Theory to argue that we can explain resistance to organizational change as a function of the degree to which organizational members experience dissonance when an organization's original values are supplanted by a new set of cultural values. Bartunek and Moch (1987) discuss the importance of schemata, or cognitive frameworks, in understanding different types of change that organizations experience. The authors posit the following typologies of change: first-order or incremental change that takes place within organizational member's existing schemata; second order change that modifies existing schemata in a particular direction; and third-order change that trains organizational members to be aware of their present schemata and empowers them to change these schemata as they deem appropriate. In the case of the CIS, Making Outcalls involves second-order change, since it involves a procedure that departs significantly from previous methods of disseminating cancer information to the public.

Bartunek and Moch (1987) present a preliminary model of the second order change process, visualizing organizational change as the outcome in a situation where a strong impetus (e.g. environmental constraint) leads organizational members to experience a crisis or to perceive that their existing schema is inadequate. In this case, a strong, clear presentation of alternative schema will lead to conflict between the two schemata for each organizational member. Orchestrators of innovation act as negotiators and facilitators to allow personnel to retain or revise their own schemata. Bartunek and Moch found that two factors contributed to organizational members resistance to change: First, conflicts that resulted from differences in schemata were perceived by organizational member to be due to personality differences, and this led to unproductive conflict. Second, organizational members use the conflict resolution strategies that they are familiar with -- notably, patterns that tend to reinforce the existing schema. Because of this tendency to engage in communication behaviors that reinforce the existing schema, it is essential for orchestrators of innovation to be aware of communication patterns that contribute to resistance to change.

Limitations

Overall, this study was characterized by disappointingly low levels of innovation-related communication. The low levels of innovation-related communication reported in this study is also reflected in previous research that has indicated that innovation-related communication in organizations is relatively sparse (Albrecht & Ropp, 1984; Farace & Johnson, 1974; Monge, Cozzens, & Contractor, 1992; Johnson, 1993). Still, the paucity of informal communication about innovation in this study may have suppressed expected effects, especially in the short term.

A second limitation related to the sparseness of innovation-related communication is that the significant decline in weak ties may be in part due to changes in measurement instruments: As discussed previously, the communication log was modified to capture only communication at the national level in May 1995, and later changed to include

communication conducted by facsimile and electronic mail in August 1995. The first change may have reduced the level of communication reported across the network, especially intraoffice and other work-related communication. The second change may have led respondents to substitute one mode of communication for a variety of others. Thus, the significant decline in weak ties from T1 to T4 should be interpreted with caution, as it may have resulted in part from changes in instrumentation.

It must be noted that the participants in this study were limited in number and in scope, two common limitations of network analysis. First, the small sample size (N = 90) limited not only the statistical power of the analysis, but also the generalizability of the results. Second, the participants were restricted to six functional roles in the CIS. This relatively small sample was chosen under the assumption that individuals who hold positions as OCC staff, PIs, PDs, TSMs, and OCs have the longest tenure and are probably the most influential players in the adoption and implementation of preventive health innovations at the CIS. While these individuals are key stakeholders in the innovation process, they are not end-users of the innovation. It is possible that their perceptions would differ significantly if they were actually using the new system. Since information specialists are the individuals who actually operate the telephone service at the CIS, it would probably be appropriate to determine, in future studies, information specialists' perceptions of innovation attributes. Alternatively, it could be informative to study organizational stakeholders' perceptions about a different type of innovation, such as a technological innovation. Thus, replicating this study in other contexts could increase the generalizability of these initial findings about the ways in which organizational members evaluate the pros and cons of innovation adoption and implementation, as well as the ways in which they form perceptions of innovativeness through communication in organizational settings.

This study was conducted within the larger political context of an evaluation of a federal health services agency: One implicit understanding related to the research is that

the results will be utilized to demonstrate that the CIS can be used as a research arm of NCI. For this reason, respondents may have been somewhat guarded in the extent to which they felt free to give a critical assessment of innovation. If this were the case, then one could expect that the between-groups differences in perceptions of innovation were smaller than they may actually be.

Implications for Future Research

What are some implications of these findings for managers and scholars of organizational innovation and of health communication? First, an earlier analysis of the data found that a large percentage of participants chose not to respond to items evaluating innovations based on their current level of knowledge (Meyer et al., 1995). This finding suggests that there is also a need to examine, over time, the extent to which organizational members feel inadequately informed to evaluate new innovations. When coupled with the dramatic decrease in innovation-related communication during the course of the study, such an increase in knowledge does not appear to be highly plausible.

The finding that many respondents chose not to answer items in this study based on their current level of knowledge about innovation also suggests that stakeholders who are not directly involved in the piloting of new intervention strategies may have limited access to the information necessary for reducing their uncertainty about an innovation's expected consequences. Stakeholders' limited, often vicarious knowledge may create a tendency for them to make general evaluations of the pros and cons of an innovation rather than specific attributions about innovation characteristics. Thus, it appears that reconceptualizing perceptions of innovation attributes in terms of pros and cons is a highly appropriate framework for understanding stakeholders in the context of organizational innovation in future research. This leads to the proposal that it would be interesting to examine, in future research, the relationship between organizational members' level of involvement with an innovation and the extent to which they feel inadequately informed to evaluate it. Perhaps those individuals who have hands-on

experience with an innovation would be likely to make specific attributions about innovation characteristics based on their current level of knowledge, while stakeholders who are not direct users of the innovation would tend to make general evaluations of the pros and cons of an innovation.

The significant functional role differences in perceptions of the pros and cons of innovation and weak ties suggest that distinct groups play key roles in the innovation process, and that these groups have varying perceptions of the utility of innovations. In his work on rethinking technology transfer, Dearing (1993) stresses the importance of measuring effectiveness of use by comparing source and receiver perceptions of utility. Future research needs to explore more systematically the factors that contribute to the discrepancy in perceptions of utility among key stakeholders in the process of innovation, paying special attention to the features of the structural, cultural, and political environment in which innovation occurs over time.

Finally, the most notable impact of informal communication (weak ties) on perceptions of innovation were produced by unexpected lag effects. This finding has two implications: First, it takes time for organizational members to process novel ideas; second, informal innovation-related communication has pronounced long-term consequences for organizational members' evaluations of the pros and cons of innovation. This finding raises the issue of the match between the time lag between waves and the length of time in which the causal process occurs (Williams & Podsakoff, 1989). Moreover, future research needs to consider the importance of formulating dynamic theories and process hypotheses in longitudinal research (Monge, 1990).

Implications for Practitioners

Organizational stakeholders' perceptions about the advantages and disadvantages associated with innovations may provide managers of preventive health innovations with a diagnostic tool (Dearing & Meyer, 1994) that can determine the extent to which individuals are supportive of new ways of doing things. Organizational members who

"buy in" to the innovation implementation process become more active, enthusiastic participants because they perceive that there are certain advantages to doing so. In contrast, stakeholders who perceive high levels of disadvantage associated with an innovation may engage in dysfunctional outcomes such as resistance to change (Coch, & French, 1948). Resistance to change can result in sabotage if organizational members do not perceive that their voices are heard in the dialogue about innovation.

The CISRC provides a strategic alliance between researchers and practitioners within a geographically-dispersed network. In this case, Program Project staff could ideally play a key role as orchestrators in building support for innovation by developing and maintaining an innovation-related communication structure across the network. In this role as orchestrators of innovation, managers need to develop competent conflict resolution skills in order to mediate conflicts that may arise as a result of competing interests between groups of stakeholders. Since researchers and practitioners represent distinct groups of stakeholders in the innovation process, they are likely to have differing interests in the innovation process (Weiss, 1983). For example, practitioners may be primarily concerned with the consequences of innovation that impact their organization's functioning, while researchers may be chiefly interested in the theoretical implications or the generalizability of their findings. While involving multiple stakeholders in evaluating innovations can lead to unproductive conflict that bogs stakeholders down in time-consuming discussion and debates, it can also democratize access to innovation-related information (Weiss, 1983). Thus, strategic innovation-related organizational communication can facilitate the process by which stakeholders pool resources to generate, adopt, or implement multiple innovations in the face of competitive pressures.

Managers need to be aware that contextual factors impact the ways in which innovation attributes affect innovation outcomes (Downs & Mohr, 1976; Bigoness & Perreault, 1981). For managers of preventive health innovations, a failure to consider contextual factors could be costly in two ways: In the short term, innovations that are

perceived to be high in disadvantage run the risk of being rejected in less-than-innovative innovative organizational climates. In the long run, the failure of a risky innovation can have a dampening effect on the innovative climate of an organization, causing organizational members to view future innovations as having increasingly uncertain outcomes. On the other hand, members of a highly innovative organization could perceive a conservative innovation as not radical enough to connote change.

Managers who assess organizational members' perceptions of innovation attributes can employ this information as a diagnostic tool to evaluate the fit of an innovation with an organization, to anticipate problems arising as a result of innovation, and to modify innovations to reflect the changes that stakeholders deem necessary. These steps are ones which will enable managers to secure the successful implementation of an innovation within their organization. In addition, the process of asking organizational members about their perceptions of innovation creates a dialog about innovation within the organization. This dialogue has the potential for generating creative solutions to problems and reinventing an innovation to produce more effective interventions in the future. Additionally, these outcomes of innovation-related communication may increase the extent to which organizational members perceive that they work in an innovative climate.

Three decades ago, Katz stated that "the capacity of interpersonal channels to provide social support and enhanced confidence in the outcomes of the innovation can be crucial in innovation implementation" (Katz, 1963). Pragmatically, managers should carefully match their communication efforts to the nature of the innovations they are implementing (Johnson et al., 1995). The attributes of innovations may entail more or less challenging communication tasks (Fidler & Johnson, 1984), which in turn may make more or less salient the role of communication in innovation processes, suggesting a contingent impact of innovation attributes.

Managers of preventive health innovations need to be aware that knowledge about the attributes of innovations may provide us with information about how best to manage communication in the interest of innovation adoption and implementation. The use of mediated communication, such as company newsletters, videos, magazines, etc., may create an atmosphere of involvement and interest, producing a certain receptivity to organization-wide innovations (Johnson et al., 1995). These channels are also more cost efficient than interpersonally-driven participation or persuasion strategies (Fidler & Johnson, 1984; Nutt, 1986). Especially in situations where there is a highly motivated set of organizational members, the direct provision of information may be a highly effective strategy (Katz & Kahn, 1978). Likewise, for innovations with high levels of perceived relative advantage and acceptance, a mediated communication strategy is perhaps most appropriate. Alternatively, in the case of certain complex and risky preventive health innovations, direct interpersonal communication may be a necessary ingredient for successful innovation implementation (Fidler & Johnson, 1984, Dearing, et al., 1994).

Finally, managers must not only be concerned with the successful adoption and implementation of innovations to meet specific strategic objectives; they must also focus on the generation of innovations, the process by which organizational members become more innovative. The way in which managers respond to stakeholders' perceptions of innovation influences the organization's ability to generate future innovations. For example, managers who demonstrate the importance of organizational members' perceptions of innovation by soliciting feedback and incorporating suggestions to reinvent innovations are also cultivating the climate of innovation within their organization. If organizational members, particularly idea champions, feel that their voices are heard, then they will perceive that they have a higher level of participation in innovation processes. In contrast, organizational members or idea champions who do not perceive that management listens to their ideas will experience lower levels of involvement in the innovation process. Since participation has been linked to

innovativeness in general (Albrecht & Ropp, 1984; Fidler & Johnson, 1984; Johnson et al., 1995; Johnson, et al., 1996), managers who are responsive to stakeholders' participation in innovation processes have the potential to influence an organization's level of innovativeness, hence its ability to generate future innovations. In organizations such as the CISRC, where innovation is a central goal, understanding how to teach organizational members to innovate is the key to the future.

FOOTNOTE

[1]In this study, innovation is defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1983, p. 11). More generally, innovation can be conceived of as "the adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization" (Damanpour, 1991, p. 556). However, if one defines organizational innovation broadly (à la Damanpour), one risks confusing it with organizational change. While innovation and organizational change processes may overlap, the terms are not interchangeable (although they are frequently treated as such in the literature). How, then, does one distinguish organizational innovation from organizational change?

According to West & Farr (1990), all innovation is change, but not all change is innovation: Unintended change, undesired change, and routine change (e.g., work stoppages and seasonal lay-offs) fall outside the rubric of innovation. For example, organizational change encompasses the areas of administration, technology, and products or services (Moberg & Caldwell, 1988), while innovation would most likely involve only the latter three contexts. Thus, administrative changes, such as reorganizations, personnel moves, downsizing, and changes in policies and procedures would be considered organizational change efforts, but not necessarily innovations. On the other hand, the development and introduction of a new technology, product, or services could be conceived of as either organizational change or innovation. Note that, while innovations may involve creative idea generation, not all innovations will be creative in the absolute sense--they may just be perceived to be new by potential adopters.

It is important to make a distinction between organizational change and innovation, because administrative changes entail outcomes that may be substantially different from technological, product, and service innovations. While desired outcomes of an administrative change might include increased efficiency, effectiveness, or

productivity, such consequences are not necessarily tied to innovations, where the goal may be technical development or increased ability to innovate. In addition, organizational change efforts and innovation may entail different sources of resistance. For example, downsizing will, by definition, result in job loss for many organizational members. This fear of personal loss may create an immediate source of resistance to change. In contrast, sources of resistance associated with technological innovation, such as the introduction of a new computerized communication system, may be rooted in uncertainty, which can be reduced with information dissemination and training.

APPENDICES

APPENDIX A

Table 1

Overview of the Major Goals and Objectives of the Cancer Information Service

---

Goals

- To use communication strategies to reduce cancer incidence, morbidity, and mortality.
- To provide NCI-designated cancer centers and other major community cancer organizations and intermediaries with a resource for developing outreach programs to reach their various audiences.
- To establish a high-quality system that can serve as a resource and a database for stimulating the development and implementation of new research projects in cancer communications.

Objectives

- To support a network of regional CIS offices throughout the country that will serve as local outlets for NCI to disseminate information on cancer to communities and serve as catalysts for the adoption and adaptation of NCI/OCC education programs, materials, and messages in the community.
- To operate a toll-free telephone service in the regional offices.
- To mobilize local media and community-based organizations to use and adopt OCC programs, materials, and messages in support of NCI education initiatives.
- To establish reliable data collection strategies and dissemination techniques to facilitate evaluation of the role of communication strategies in reducing morbidity and mortality from cancer.

Note. Abstracted from the Cancer Information Service Request for Contract Proposals, January 3, 1992; National Cancer Institute, National Institutes of Health.

Table 2

Demographics for the Cancer Information Service

Demographic	N	Percentage
Education		
High School Graduates / Some College	4	4
College Graduate	16	15
Some Post Graduate	22	21
Graduate Degree	62	58
Other	2	2
Lenth of Service		
Less than 1 year	24	23
1-2 years	25	24
3-4 years	18	17
5-6 years	17	16
7-8 years	7	7
9+ years	12	11
missing	3	3
Functional Roles		
Office of Cancer Communication staff	14	13
Program Project staff	20	19
Project Directors	16	15
Telephone Service Managers	22	21
Outreach Coordinators	22	21
Principal Investigators	12	11

N = 106

Note. Demographics calculated for participants who responded to the self-report questionnaire or the communication log component of the baseline data collection in November 1993.

Table 3

Items, Factor Loadings, and Reliablilities for Weak Ties

Item	Factor Loading T1
1. Choice status	.73
2. Contacts	1.01
3. Nonredundant contacts	.96

Standard Score Alphas for Factor at T1, T2, T3, T4 = .93, .96, .93, .90

Table 4

Internal Consistency Error Matrix for Weak Ties

T1

Item	Error		
	1	2	3
1	0		
2	1	0	
3	1	2	0

Table 5

Items, Factor Loadings, and Reliablilities for Perceived Organizational Innovativeness

Item	Factor Loading	
	Time 1	Time 3
1. The CIS is creative in its method of operation.	.72	.82
2. The CIS seeks out new ways to do things.	.87	.94
3. The CIS frequently tries out new ideas.	.84	.79

Standard Score Alphas for Factor at T1 and T3 = .85, .89

Table 6

Internal Consistency Error Matrices for Perceived Organizational Innovativeness

T1

Item	Error		
	1	2	3
1	0		
2	0	0	
3	0	1	0

T3

Item	Error		
	1	2	3
1	0		
2	1	0	
3	1	1	0

Table 7

Items, Factor Loadings, and Reliablilities for Pros

Item	Factor Loading	
	Time 2	Time 4
This intervention strategy...		
1. is a good idea.	.74	.92
2. is a positive way to reach members of a target audience.	.78	.81
3. is a sound policy option for reaching members of a target audience.	1.00	.97
4. is an acceptable method of outreach.	.80	.83
5. is something we can build on in the future.	.80	.88
6. is a more efficient means to reach targeted populations than techniques we have used in the past.	.87	.84
7. will result in greater behavioral change for members of the target audience.	.91	.66
8. is a better way to provide targeted populations with cancer information.	.95	.86

Standard Score Alphas for Factor at T2 and T4 = .96, .95

Table 8

Internal Consistency Error Matrices for Pros

T2

Item	Error							
	1	2	3	4	5	6	7	8
1	0							
2	6	0						
3	1	2	0					
4	5	5	7	0				
5	8	6	0	7	0			
6	1	3	0	7	6	0		
7	4	4	2	3	1	1	0	
8	4	8	3	5	2	4	7	0

T4

Item	Error							
	1	2	3	4	5	6	7	8
1	0							
2	1	0						
3	3	2	0					
4	7	3	1	0				
5	5	5	1	1	0			
6	6	1	4	10	4	0		
7	2	1	4	3	3	17	0	
8	1	0	2	**16**	7	3	18	0

Note. Significant errors are in bold.

Table 9

Items, Factor Loadings, and Reliablilities for Cons

Item	Factor Loading	
	Time 2	Time 4
This intervention strategy...		
1. means that information specialists can't meet other job responsibilities as well as they used to.	.74	.94
2. will produce a visible change in our office's call busy rate.	.94	.88
3. will produce a visible change in our abandonment rate.	.87	.40

Standard Score Alphas for Factor at T2 and T4 = .88, .77

Table 10

Internal Consistency Error Matrces for Cons

T2

Item	Error		
	1	2	3
1	0		
2	1	0	
3	1	1	0

T4

Item	Error		
	1	2	3
1	0		
2	1	0	
3	0	1	0

Table 11

Descriptive Statistics among Variables

	Mean	sd	1	2	3	4	5	6	7	8	9	10
							Correlation					
1. Weak ties (T1)	4.85	6.50	1.00									
2. Weak ties (T2)	3.97	5.70	.12	1.00								
3. Weak ties (T3)	3.02	4.77	.17	.06	1.00							
4. Weak ties (T4)	.57	1.11	.14	.02	.21	1.00						
5. Innovativeness (T1)	6.22	1.75	.35	.08	.04	-.02	1.00					
6. Pros (T2)	6.69	2.24	.09	.02	.22	-.01	.13	1.00				
7. Cons (T2)	4.72	3.23	-.01	-.17	-.37	-.05	.17	.01	1.00			
8. Innovativeness (T3)	6.77	1.82	.26	.03	.12	.10	.53	.19	-.02	1.00		
9. Pros (T4)	6.01	2.73	.31	-.35	.06	.14	.28	.06	.24	.04	1.00	
10. Cons (T4)	5.67	2.79	.25	.19	.03	.02	.18	-.38	-.00	-.19	-.41	1.00

N = 90

Table 12

Path Coefficients and Confidence Intervals for Model 1

"Short Term Effects of Weak Ties"

Parameter	Path coefficient	95 percent confidence interval	
		lower endpoint	upper endpoint
$p_{1,2}$	.12	-.10	.34
$p_{1,6}$	.05	-.19	.29
$p_{1,7}$	-.07	-.32	.18
$p_{5,6}$	.11	-.14	.36
$p_{5,7}$	.20	-.05	.45
$p_{5,8}$	.54*	.34	.74
$p_{2,3}$	.06	-.16	.28
$p_{2,8}$	-.04	-.28	.20
$p_{3,4}$	.21*	-.01	.43
$p_{3,9}$	.05	-.19	.29
$p_{3,10}$	-.01	-.28	.26
$p_{6,8}$	.13	-.11	.37
$p_{6,9}$	.04	-.20	.28
$p_{7,8}$	-.12	-.37	.13
$p_{7,10}$	-.01	-.28	.26
$p_{8,9}$	.03	-.21	.27
$p_{8,10}$	-.19	-.45	.07

Note. Parameters are numbered as follows: 1 = Weak ties (T1); 2 = Weak ties (T2); 3 = Weak ties (T3); 4 = Weak ties (T4); 5 = Innovativeness (T1); 6 = Pros (T2); 7 = Cons (T2); 8 = Innovativeness (T3); 9 = Pros (T4); 10 = Cons (T4).

* statistically significant, alpha = .05.

Table 13

Error Matrix for Model 1 "Short Term Effects of Weak Ties"

Scale					Error					
	1	2	3	4	5	6	7	8	9	10
1. Weak ties (T1)	0									
2. Weak ties (T2)	0	0								
3. Weak ties (T3)	16	0	0							
4. Weak ties (T4)	14	0	0	0						
5. Innovativeness (T1)	0	4	4	-2	0					
6. Pros (T2)	0	1	21	-1	0	0				
7. Cons (T2)	0	-17	**-37**	-5	0	-1	0			
8. Innovativeness (T3)	7	5	12	10	0	0	1	0		
9. Pros (T4)	**-32**	**-35**	1	13	**-29**	1	24	1	0	
10. Cons (T4)	28	19	-2	2	-7	**-35**	0	0	**-41**	0

N = 90

Note. Significant errors are in bold.

Table 14

Error Matrix for Model 2 "Long Term Effects of Weak Ties"

Scale					Error					
	1	2	3	4	5	6	7	8	9	10
1. Weak ties (T1)	0									
2. Weak ties (T2)	0	0								
3. Weak ties (T3)	17	-1	0							
4. Weak ties (T4)	14	0	0	0						
5. Innovativeness (T1)	0	0	10	-1	0					
6. Pros (T2)	0	0	22	-1	0	0				
7. Cons (T2)	0	0	0	3	0	0	0			
8. Innovativeness (T3)	8	-1	15	11	0	12	-11	0		
9. Pros (T4)	0	0	15	16	0	11	0	19	0	
10. Cons (T4)	16	6	6	1	-24	-4	10	23	-4	0

N = 90

Table 15

Path Coefficients and Confidence Intervals for Model 2

"Long Term Effects of Weak Ties"

Parameter	Path coefficient	95 percent confidence interval	
		lower endpoint	upper endpoint
$p_{1,9}$	-.19	-.43	.05
$p_{2,9}$	-.26*	-.46	-.06
$p_{5,8}$	.53*	.33	.73
$p_{5,9}$	-.22	-.47	.03
$p_{6,10}$	-.36*	-.58	-.14
$p_{7,3}$	-.37*	-.57	-.17
$p_{7,9}$	.23*	-.01	.47
$p_{3,4}$	.21*	-.01	.43
$p_{9,10}$	-.40*	-.62	-.18

Note. Parameters are numbered as follows: 1 = Weak ties (T1); 2 = Weak ties (T2); 3 = Weak ties (T3); 4 = Weak ties (T4); 5 = Innovativeness (T1); 6 = Pros (T2); 7 = Cons (T2); 8 = Innovativeness (T3); 9 = Pros (T4); 10 = Cons (T4).

* statistically significant, alpha = .05.

Table 16

Functional Role Differences in Weak Ties and Perceptions of Innovation Characteristics

Scale	Functional Role Differences					
	OCC (12)	PD (20)	TSM (20)	OC (22)	PI (9)	PP (7)
2. Weak ties (T2)	4.04	7.67ab	1.80a	3.62	.07b	6.45
3. Weak ties (T3)	4.44	2.85	1.23a	5.81ab	.08b	1.17
4. Weak ties (T4)	.24a	.49b	.24c	1.41abcd	.00d	.39
6. Pros (T2)	4.41a	7.37	6.06	6.78	6.67	8.47a
9. Pros (T4)	5.78	4.01ab	5.78	7.32a	7.55	8.32b
10. Cons (T4)	6.25	6.88a	7.50b	4.79	4.42	2.28ab

N = 90

Note. N's are reported in parentheses under functional role. Within each row, pairs of matching letters indicate significant between groups differences in scale means (p<.05). Scale means were calculated by summing items that tap the same construct and dividing that sum by the total number of items in each scale.

APPENDIX B
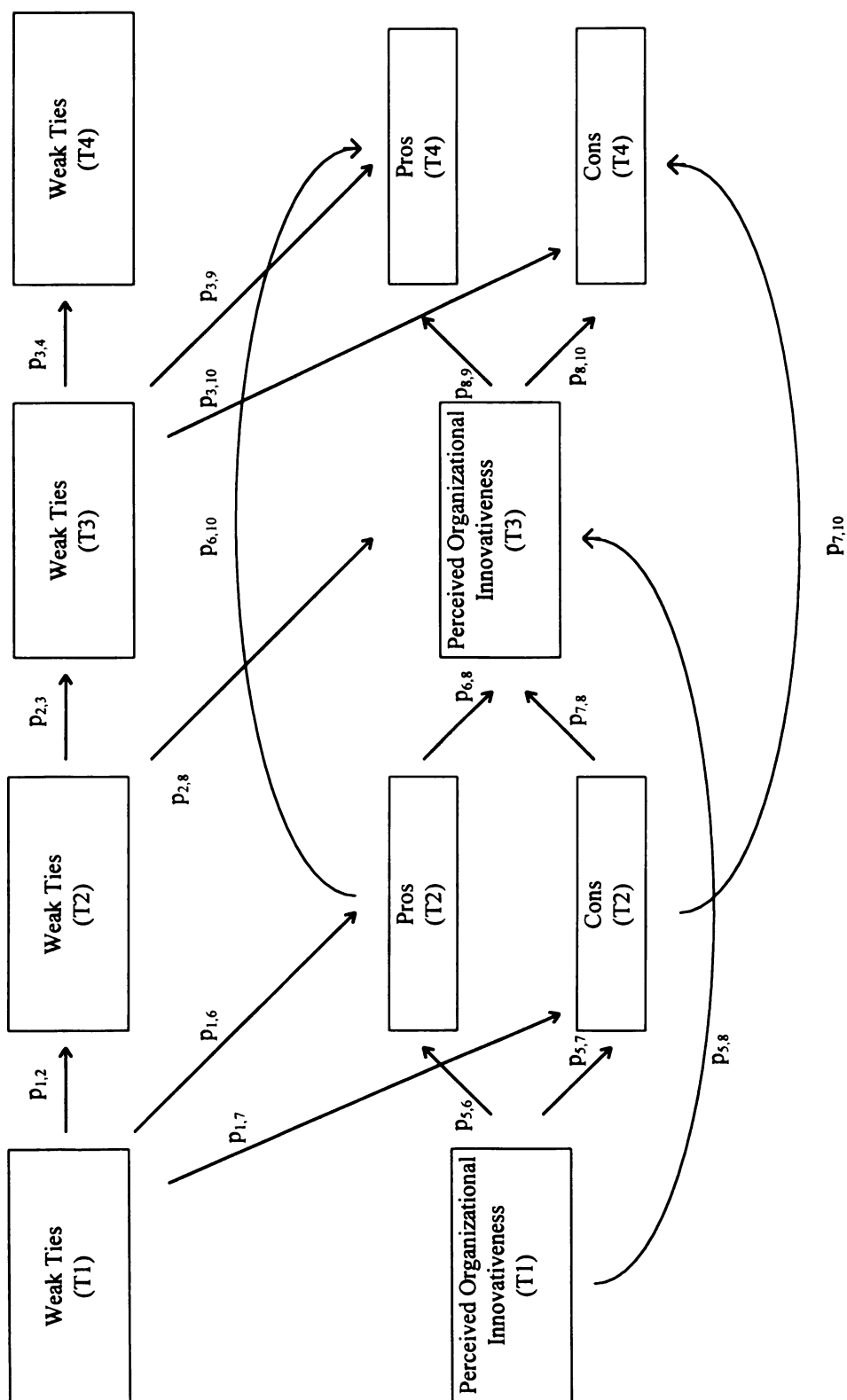
Figure 1. "The Effects of Weak Ties on Perceived Organizational Innovativeness and Innovation Characteristics"

1994

February: Perceived Organizational Innovativeness (T1)

Project 2 (Making Outcalls) pilot study begins

August: Innovation Characteristics (T2)

Project 2 (Making Outcalls) main study begins

1995

August: Perceived Organizational Innovativeness (T3)

Project 2 (Making Outcalls) main study completed

November: Innovation Characteristics (T4)

Project 2 (Making Outcalls) conducts six-month follow-up

1996
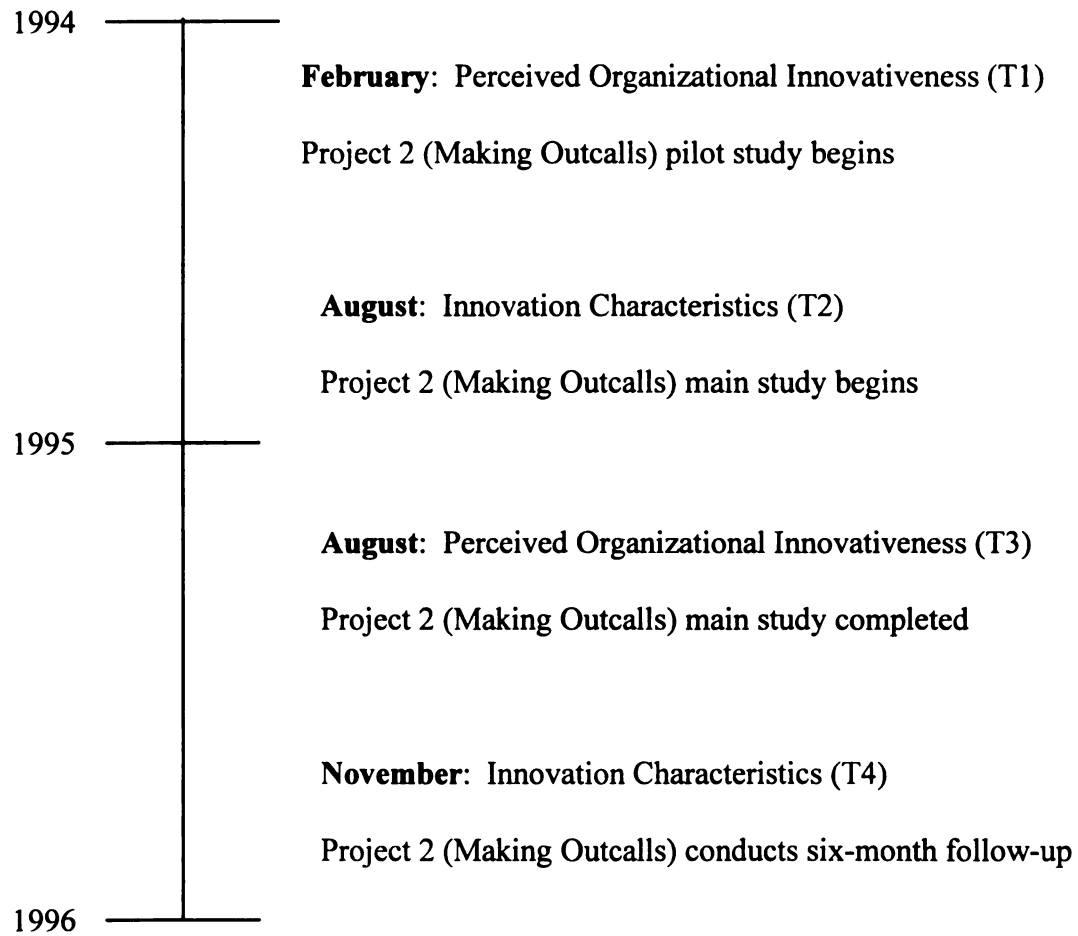
Figure 2. Project 2 Timeline

```
┌─────────────────────────────────────┐
│       National Cancer Institute      │
│    Office of Cancer Communications   │
└─────────────────────────────────────┘
                   │
                   ▼
┌─────────────────────────────────────┐
│      Cancer Information Service      │
│           1-800-4-CANCER             │
└─────────────────────────────────────┘
                   │
                   ▼
┌─────────────────────────────────────┐
│         19 Regional CIS Offices      │
│ - Telephone information specialists/individual │
│   response to callers/mailouts to callers │
│ - Physician Data Query               │
│ - Resource materials                 │
│ - Subject-matter specialists/consultants │
│ - Referral files (for local referrals) │
│ - Booklets, pamphlets, flyers, etc., for mailouts │
│ - Community outreach coordinators    │
│ - Mass-media campaigns               │
└─────────────────────────────────────┘
                   │
                   ▼
┌─────────────────────────────────────────────────┐
│ Major strategies for reaching selected target populations │
└─────────────────────────────────────────────────┘
         │                              │
         ▼                              ▼
Telephone service/            Community outreach/
Information specialists/       Community intermediaries/
Publication distribution       Mass-media campaigns
```

Figure 3. Overview of the Cancer Information Service Network
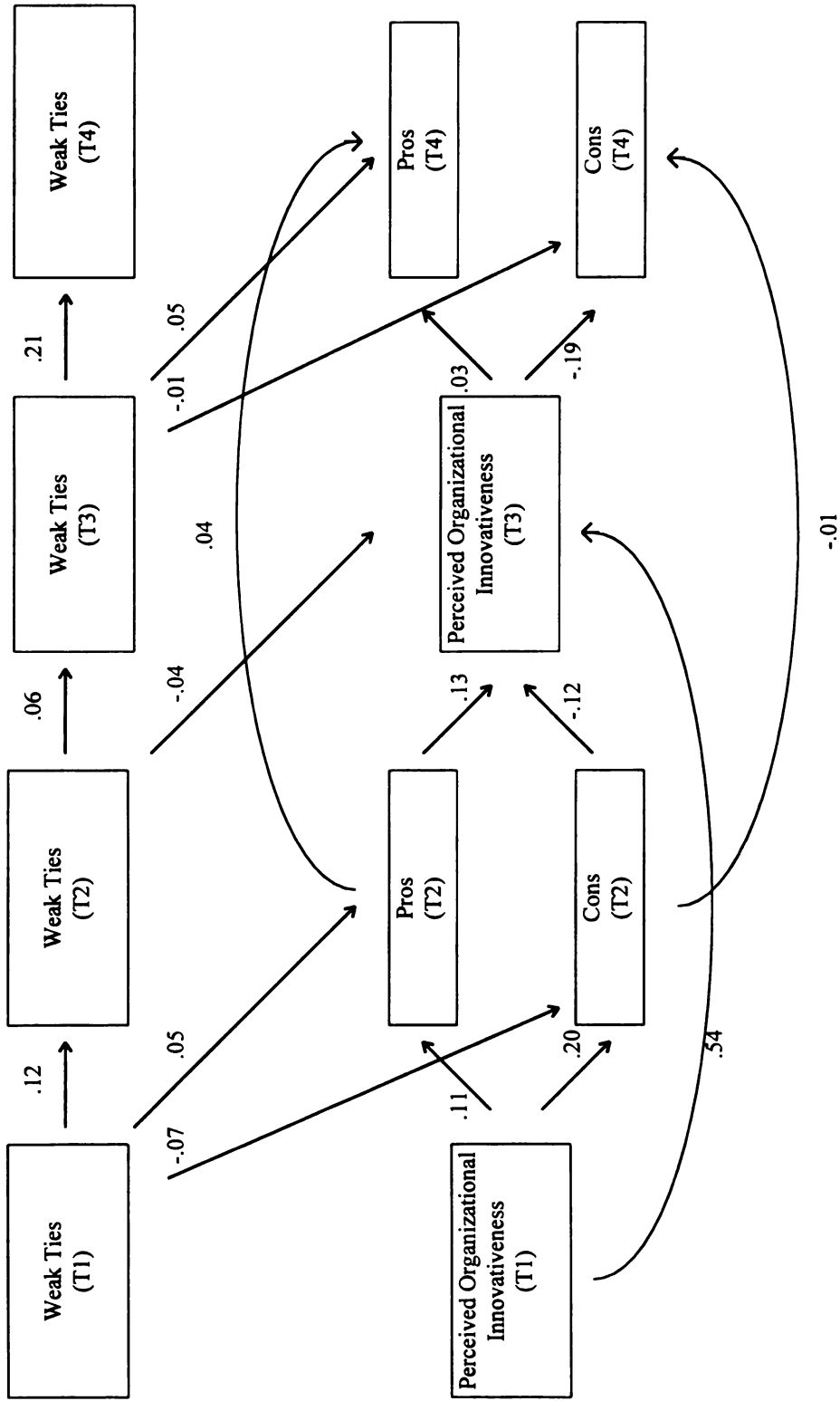
$\chi^2 = 38.9$, df 27, p < .05

Figure 4. Model 1 "Short Term Effects of Weak Ties on Perceived Organizational Innovativeness and Innovation Characteristics"
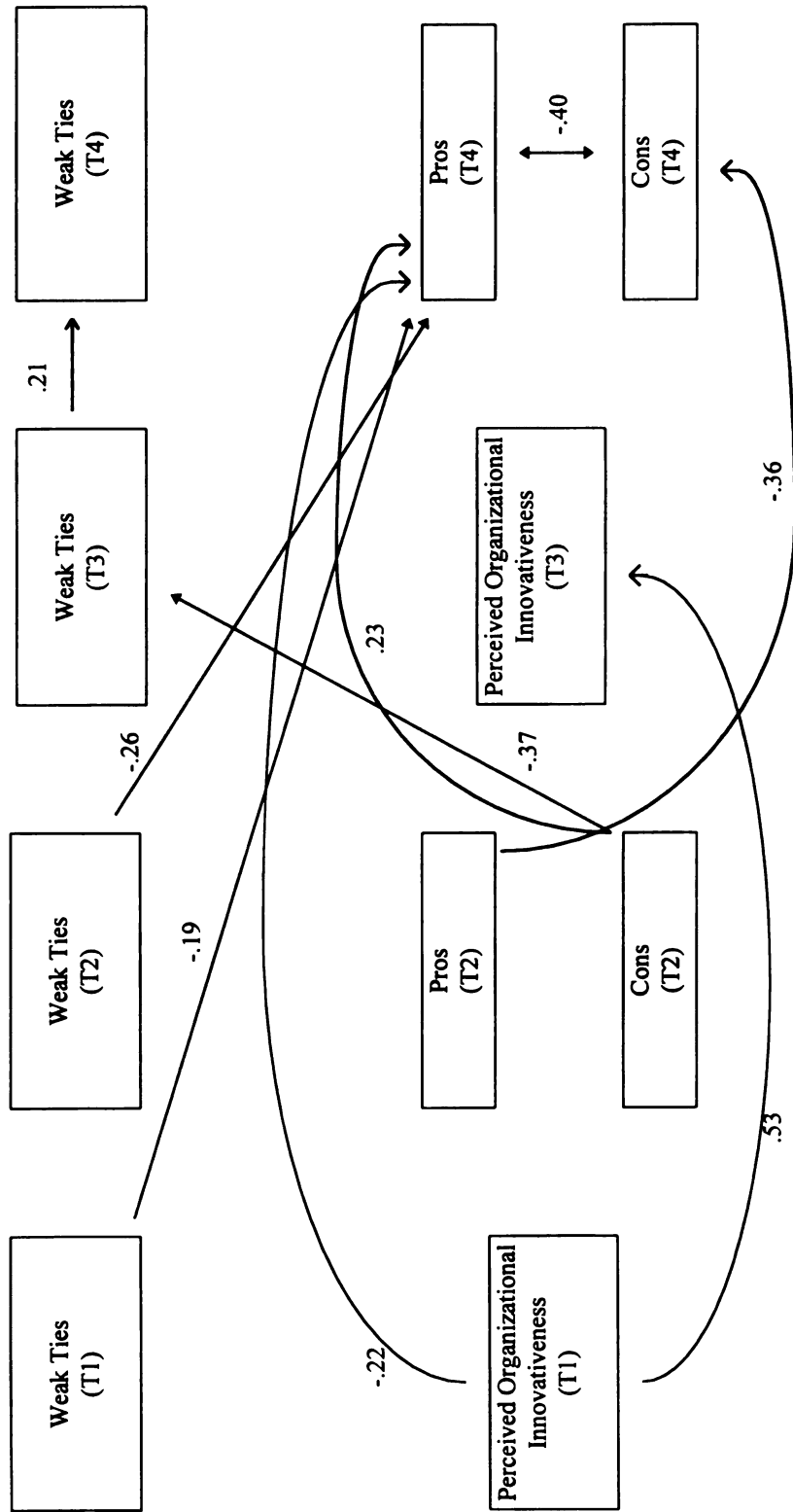
$\chi^2 = 14.88$, df 26, p .96

Figure 5. Model 2 "Long Term Effects of Weak Ties on Perceived Organizational Innovativeness and Innovation Characteristics"

APPENDIX C

CISRC CHRONOLOGY

In June, 1993, the CISRC began the process of staffing, training, and piloting a new intervention strategy to encourage women to receive regular mammograms. The new intervention strategy, Project 2 (Making Outcalls to Promote Mammography) utilizes the toll-free 1-800-4-CANCER number as a nexus from which to make cold calls from the CIS to low income and minority women in targeted communities in Colorado. The following document gives a detailed summary of major developments in Project 2 over time, as well as a chronology of key events that affected the CISRC.

Date	Project 2	National Meetings	Network Analysis	Other Key Events
9/93 -11/93:	Project 2 staff conducted formative research, including focus groups and a review of the literature. The findings were used to formulate outcall protocols.	In November, OCC staff participated in a quality control meeting in Washington. The Steering Committee Meeting took place in Denver on September 8-9.	The first Network Analysis data collection took place November 3-5, during the same month there were numerous changes in the e-mail system.	The final regional office was in place and the program project grant was officially budgeted. Negotiations took place for evening hours on the telephone service.
12/93 - 2/94:	In January, training for the outcall protocol began at the Rocky Mountain CIS. In February, 1994, project staff began a two-month pilot of the outcall protocols. Debriefing surveys and follow-up surveys were developed at this time.	In December, 1993, the National Conference was held in Atlanta.	The second Network Analysis data collection took place February 8-10, at which time baseline perceived organizational innovativeness data were gathered. Harsh winter weather may have contributed to the delayed receipt of questionnaires for some offices.	In January, an OCC memo specified routing of requests from regional offices to other OCC staff through the Project Officer. In February, Kate Duffy Mazan announces her sabbatical, and Chris Thomsen becomes head of the CIS. At that time, task forces were in the process of forming. Individual e-mail id's were in place for people at the National Office, and a voice mail system was added across the network.

Date	Project 2	National Meetings	Network Analysis	Other Key Events
3/94 - 5/94:	Biostat core collaborated with project staff to computerize outcall protocol. In May, CIS staff were trained to implement protocol. Debriefing surveys and follow-up surveys were pretested. In addition, TISs completed a process evaluation about making outcalls.		The third Network Analysis data collection took place during May 16-18.	
6/94 - 8/94:	In July, 1994, Project 2 was just beginning the main pilot study, and the CISRC was discussing various strategies to reach working women (e.g., making outcalls in the evening), and to create incentives for information specialists to make outcalls (e.g., financial reimbursements or hiring a half-time information specialist to make outcalls). Debriefing interviews were conducted , and by mid-August, Project 2 reported reaching women with a lower mammography adherence rate than women who were calling in to the CIS.	The national CIS meeting took place in Washington, DC in June, 1994. The CISRC Members Council Meeting took place simultaneously with the meeting of the newly-formed Network Analysis Advisory Board in Washington from June 21-24. The CISRC Investigators Meeting took place in Denver on August 30-31.	The fourth Network Analysis data collection took place during August 24-26, at which time baseline innovation characteristics data were gathered.	On June 9, the first issue of CISRC NEWS was distributed to the network in the Weekly Package.

Date	Project 2	National Meetings	Network Analysis	Other Key Events
9/94 - 11/94:	Initiated evening hours for making outcalls to reach more working women. 650 subjects had been accrued into Project 2 at this time.	The Telephone Services Managers Meeting took place in Bethesda, MD, November 7-9. The Computerization Task Force met in Denver in November.	The fifth Network Analysis data collection took place during November 1-3.	Erroneous minutes of the General Session of the June CISRC Members Council Meeting were distributed by the CISRC. Revised minutes were sent out the following week.
12/94 - 2/95:	Six-month follow up interviews were conducted . Lori Crane received a Department of Defense grant to add a fourth arm to the study, contingent upon receiving written informed consent from participants.	The External Advisory Meeting took place in Denver on January 5-6. The Evaluation Task Force met in Washington on January 19-20.	The sixth Network Analysis data collection took place during February 6-8.	
3/95 - 5/95:	Received 60 % of the needed sample in the three arms of Project 2. Preliminary results reported at the May Steering Committee indicate a statistically significant difference in mammography adherence rates between intervention and control groups. Also, TISs reported lower job satisfaction associated with making outcalls.	The CISRC Members Council Meeting took place in Denver on March 30-31.	The seventh Network Analysis data collection took place during May 16-18. Communication log changed to capture only communication at the national level.	

Date	Project 2	National Meetings	Network Analysis	Other Key Events
6/95 - 8/95:	Project 2 exceeded accrual goals, completing the project by the end of June.	On June 1, the CISRC Steering Committee Meeting convened in Chicago. Seven concepts were identified and targeted for development in the CISRC renewal application, including: Project 1 renewal, Project 2 renewal, Project 3 renewal, Network Analysis renewal, Internet study, Outreach Coordinator evaluation, minority accrual to clinical trials, and pain control.	In July, Dave Johnson, co-director of the Administrative Core, went on sabbatical. The eighth Network Analysis data collection took place during August 22-24, at which follow-up perceived organizational innovativeness data were gathered. During this data collection, the communication log was changed to capture communication conducted by facsimile and electronic mail.	
9/95 - 11/95	76% six-month follow-up response rate. Discrepancies noted between respondents self-reports at baseline and follow-up.	On October 16-17, the CISRC Member's Council met in Denver. Eight concepts were discussed for development in the CISRC renewal application.	The ninth Network Analysis data collection took place during November 6-8, at which time follow-up innovation characteristics data were gathered.	In October, evening hour telephone service was eliminated due to budget cutbacks. In November, the OCC staff was furloughed due to the federal government budget impasse.

<u>Sources</u>

CISRC Investigators Meeting minutes, August 1994

CISRC Members Council Meeting minutes, June 1994, October 1995

CISRC PO1 Conference Call minutes, August 1993 - February 1996.

CISRC Steering Committee Meeting minutes, September 1993

APPENDIX D

This log asks you to record your work-related communication with individuals within the CISRC network on the dates of February 8 through 10. We would like you to keep a diary of your work-related interpersonal contacts with members of the CISRC Network. It may be easier for you to record each communication event as it occurs. For your convenience, we have provided pre-dated pages for you to record your communication contacts within the CISRC network from **February 8 through 10.** If you need additional space, please copy the extra page provided, date it, and attach it to the beige log.

For purposes of this study, this network includes the Office of Cancer Communication staff, Principal Investigators, Project Directors, Outreach Coordinators, and Telephone Service Managers at the CIS regional offices, and members of the Cancer Information Service Research Consortium (the Program Project Grant). A directory of individuals within the CISRC Network has been included for your convenience (see enclosure).

The next two pages describe in more detail how to complete the log. Each page of the communication log contains definitions for each of the categories for your convenience.

If you did not communicate with other members of the CISRC Network on a given day, please place a check in the appropriate space on the page for that day.

Please write your name and job title in the space provided below:

Name: _____

Job Title: _____

If you did not have any communication with other members of the CISRC Network between February 8 and February 10, please check this space _____, place this survey in the enclosed envelope, and complete the questionnaires in the blue and green packet.

COMMUNICATION CONTACTS LOG
Key Term Summary

NAME: Please print your name in the space provided.

TITLE: Please place a check in the space preceding your title. If your title is not listed, please check "Other", and record your title in the space provided.

REGION: Please record the number assigned to the CIS regional office in which you work. For example, the staff in the Kentucky office would record a "9" in the space provided. If you work in the National Office, please write the word "National" in the space provided. If you are a member of the Program Project staff only, please write "Program Project" in the space provided.

CONTACTS: We are only interested in the work-related communication you *initiate* or *receive* with the Office of Cancer Communication staff, Principal Investigators, Outreach Coordinators, Telephone Service Managers, and Project Directors, and members of the Cancer Information Service Research Consortium (the P01 grant). Please indicate the *full name* of the person with whom you communicated. (See enclosed directory as needed.) Include as a contact phone calls where messages were left, even though you were not able to speak with the person directly. Please also indicate if the contact was part of a conference call (see details below).

TOPIC: We are primarily interested in national communication relating to CIS and Program Project issues. Please indicate whether the communication addressed
  1) *intervention strategies*, (initiatives that relate to the development or implementation of programs which focus on reaching various target populations such as counseling protocols, targeted outreach activities using the telephone, responses to calls associated with communication campaigns, etc.), especially like the ones developed by this Program Project;
or dealt with
  2) *other work-related* issues focusing on maintaining and/or enhancing the day-to-day operation of the CIS (e.g., budgets, record keeping, ordering materials, or other administrative activities). Please place an "X" in the space preceding the appropriate category. If both areas were discussed, place an "X" in the space preceding "*Both*". We are interested in important communication contacts you have which focus primarily on network-wide, national issues. Do NOT record conversations which are purely of local interest (e.g., "Would you please put toner in the copier?").

MINUTES: Please record the length of the communication contact in minutes.

CONFERENCE CALLS ONLY: For conference calls, please estimate the number of individuals who took part in the call, provide a general description of the topics discussed, and a description of the call participants' role within the CIS (e.g., Project Directors). For "Communication Contact," pleade record the name of the individual who led the conference call.

If you have any questions about these changes or how to complete any part of this log, Principal Investigators and Outreach Coordinators contact Caroline Ethington at (517) 355-2170; Project Directors, Telephone Service Managers, members of the Office of Cancer Communication and Program Project staff may contact Marcy Meyer or Judy Berkowitz at (517) 355-5148.

EXAMPLE

COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name: _Jay Doe_ .

Date: **February 8, 1994**

Title: ___ Principal Investigator   ___ Outreach Coordinator   Region: 24

      _✓_ Project Director   ___ Telephone Service Manager

      ↑ Other (please specify)

___ Place a check in the space provided if you did not communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	MINUTES	TOPIC	FOR CONFERENCE CALLS ONLY
Chris Thomson	50	___ Intervention Strategies _✓_ Other work-related ___ Both	No. people: 18 Topic: monthly call to all project directors Roles: project directors
Al Marcus	15	_✓_ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:

AN EXAMPLE: On February 8th, the following communication contacts occurred for the Project Director in Region 24. A conference call for all Project Directors with Kate Duffy Mazan which lasted 50 minutes relating to work-related matters. A call to Al Marcus which lasted 15 minutes concerning staff training on the new breast cancer counseling protocol. A personal visit by the telephone service manager from Region 27 in which their upcoming skiing outing was discussed for an hour over lunch. Note: The personal visit by the telephone service manager from Region 27 was omitted since it was not work-related.

COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name: _____

Date: **Tuesday, February 8, 1994**

Title: _____ Principal Investigator   _____ Outreach Coordinator   Region: _____

_____ Project Director   _____ Telephone Service Manager

_____ Other (please specify) → _____

_____ Place a check in the space provided if you **DID NOT** communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	MINUTES	TOPIC*	FOR CONFERENCE CALLS ONLY**
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:

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COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name: _____.

Title: _____

_____ Principal Investigator
_____ Project Director
_____ Other (please specify) ➔

_____ Outreach Coordinator
_____ Telephone Service Manager

Region: _____

Date: **Wednesday, February 9, 1994**

_____ Place a check in the space provided if you **DID NOT** communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	MINUTES	TOPIC*	FOR CONFERENCE CALLS ONLY**
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:

COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name: _____

Date: **Thursday, February 10, 1994**

Title: _____

_____ Principal Investigator
_____ Project Director
_____ Other (please specify) ➔

_____ Outreach Coordinator
_____ Telephone Service Manager
_____

Region: _____

_____ Place a check in the space provided if you **DID NOT** communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	MINUTES	TOPIC*	FOR CONFERENCE CALLS ONLY**
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:
		_____ Intervention Strategies _____ Other work-related _____ Both	No. people: Topic: Roles:

COMMUNICATION WITHIN THE CISRC NETWORK

Your Name: _____

Date: _____

Title:
___ Principal Investigator
___ Project Director
___ Other (please specify) →

___ Outreach Coordinator
___ Telephone Service Manager

Region: _____

___ Place a check in the space provided if you **DID NOT** communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	MINUTES	TOPIC*	FOR CONFERENCE CALLS ONLY**
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:
		___ Intervention Strategies ___ Other work-related ___ Both	No. people: Topic: Roles:

NOTES

Please provide any comments you have regarding communication within the CISRC network in the space provided. If you need additional space, please continue on the back of this page or attach other pages as necessary.

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Thank you very much for your participation.

Please return this form by **February 15, 1995**
in the enclosed self-addressed stamped envelope to:

Dr. J. David Johnson
Department of Communication
473B Communication Arts & Sciences Bldg.
Michigan State University
East Lansing, MI 48824
(517) 432-3311
FAX (517) 432-1192

APPENDIX E

AUGUST 1995 CISRC COMMUNICATION CONTACTS LOG

This packet contains three parts. Please note that the gray communication log is considered
Part A.

NOTE: there has been a change made to the communication log. We are now asking you to indicate whether your work-related contact was made using one of the following channels: ☎ = telephone (including face-to-face communication), 🖥 = e-mail (including FTS-2000 and all other types), 📄 = fax.

Part B asks about your perceptions regarding your role within the CIS.

Part C asks for your opinions about innovations in general within the CIS.

Please feel free to write down any comments you have concerning communication within the CISRC in **Part D**, the Notes section of this booklet.

This questionnaire may be completed at any time, but we do request that you return both the pink questionnaire and the gray communication contact log to us in the enclosed self-addressed, stamped envelope by **August 30, 1995**.

Please write your name and job title in the space provided below:

Name: _____

Job Title: _____

EXAMPLE

COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name:

*Jay Doe*_____.

Date: **Tuesday, August 22, 1995**

Title: ___ Principal Investigator
✓_ Project Director
___ Outreach Coordinator
___ Telephone Service Manager
___ Other (please specify): ➜ _____.

Region: 24___ .

_____ Place a check in the space provided if you did not communicate within the CISRC Network on this day.

NOTE: **Please use the following to determine your mode of communication for each contact (circle ONE):** ☎ = telephone, ⌨ = e-mail (including FTS-2000 and all other types), 🗎 = fax

COMMUNICATION CONTACTS	NUMBER IN GROUP*	LENGTH	TOPIC*		MODE		
Chris Thomsen **PURPOSE:** *PD Call*	Number: 19	50	___ Intervention Strategies ✓_ Other work-related ___ Both		☎	⌨	🗎
Al Marcus **PURPOSE:**	Number: 4		_✓_ Intervention Strategies ___ Other work-related ___ Both		☎	⌨	🗎
Jay Doe **PURPOSE:** *Training*	Number: 8	3	_✓_ Intervention Strategies ___ Other work-related ___ Both		☎	⌨	🗎

AN EXAMPLE: On August 22, the following communication contacts occurred for the Project Director in Region 24. A conference call for all Project Directors with Chris Thomsen which lasted 50 minutes pertaining to other work-related matters. A four-page fax was sent to Al Marcus concerning staff training on the new 5 A Day counseling protocol. Jay Doe sent a three-page, broadcast e-mail to eight people about training procedures in relation to intervention strategies.

Note: The visit by the telephone service manager from Region 24 was omitted since it was not a national contact.

COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name: Title: ___ Principal Investigator   Region: _____.

_____.   ___ Project Director

                                ___ Outreach Coordinator

Date: **Tuesday, August 22, 1995**   ___ Telephone Service Manager   _____.

                                  ___ Other (please specify): ➜

_____ Place a check in the space provided if you did not communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	NUMBER IN GROUP*	LENGTH**	TOPIC	MODE***
PURPOSE:	Number:		___ Intervention Strategies ___ Other work-related ___ Both	☎ 💻 📄
PURPOSE:	Number:		___ Intervention Strategies ___ Other work-related ___ Both	☎ 💻 📄
PURPOSE:	Number:		___ Intervention Strategies ___ Other work-related ___ Both	☎ 💻 📄
PURPOSE:	Number:		___ Intervention Strategies ___ Other work-related ___ Both	☎ 💻 📄
PURPOSE:	Number:		___ Intervention Strategies ___ Other work-related ___ Both	☎ 💻 📄
PURPOSE:	Number:		___ Intervention Strategies ___ Other work-related ___ Both	☎ 💻 📄
PURPOSE:	Number:		___ Intervention Strategies ___ Other work-related ___ Both	☎ 💻 📄

*Topic: We are primarily interested in communication relating to CIS and Program Project issues. Please indicate whether the communication addressed

        1) *intervention strategies*, (initiatives that relate to the development or implementation of programs which focus on reaching various target populations such as counseling protocols, targeted outreach activities using the telephone, responses to calls associated with communication campaigns, etc.), especially like the ones developed by this Program Project;

or dealt with

        2) *other work-related* issues focusing on maintaining and/or enhancing the day-to-day operation of the CIS (e.g., budgets, record keeping, ordering materials, or other administrative activities).

Please place an "X" in the space preceding the appropriate category. If both areas were discussed, place an "X" in the space preceding "*Both*". We are interested in important communication contacts you have which focus primarily on network-wide issues. Do NOT record conversations which are purely of local interest (e.g., "Would you please put toner in the copier?").

Conference Calls: For conference calls **only**, please estimate the **number of individuals** who took part in the call, a **general description of the topic(s)** discussed, and the **roles within the CISRC Network** (e.g., Project Directors) of the individuals who participated. Record the name of the lead individual under "Communication Contacts."

COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name:

_____.

Date: **Wednesday, August 23, 1995**

Title: ___ Principal Investigator
___ Project Director
___ Outreach Coordinator
___ Telephone Service Manager
___ Other (please specify): ➔

Region: _____.

_____.

_____ Place a check in the space provided if you did not communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	NUMBER IN GROUP*	LENGTH**	TOPIC	MODE***		
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄

COMMUNICATION CONTACTS WITHIN THE CISRC NETWORK

Your Name: Title: ___ Principal Investigator   Region: _____ .

_____ .   ___ Project Director

                                      ___ Outreach Coordinator

Date: **Thursday, August 24, 1995**   ___ Telephone Service Manager   _____ .

                                      ___ Other (please specify): ➔

_____ Place a check in the space provided if you did not communicate within the CISRC Network on this day.

COMMUNICATION CONTACTS	NUMBER IN GROUP*	LENGTH**	TOPIC	MODE***		
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄
PURPOSE:	Number:		____ Intervention Strategies ____ Other work-related ____ Both	☎	💻	📄

NOTES

Please provide any comments you have regarding communication within the CISRC in the space provided. If you need additional space, please continue on the back of this page or attach other pages as necessary.

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Thank you very much for your participation.

Please return this form by **August 30, 1995**
in the enclosed self-addressed stamped envelope to:

Dr. J. David Johnson
Department of Communication
473B Communication Arts & Sciences Bldg.
Michigan State University
East Lansing, MI 48824
(517) 432-3311
FAX (517) 432-1192

APPENDIX F

CIS INNOVATION SURVEY

Directions: The following statements deal with your opinions about **new intervention strategies** within the CIS nationally. Intervention strategies are initiatives that relate to the development or implementation of new methods for reaching target audiences such as counseling protocols for special target populations, targeted outreach activities using the telephone, responses to calls associated with communication campaigns, and other national initiatives like those developed by this program project.

We would like to respond by indicating how much you agree or disagree with each statement on a scale of 0 to 10 where **0** indicates **"total disagreement"** and **10** indicates **"total agreement"**. Please answer these questions for the CIS as a whole, rather than focusing on purely local concerns.

Scale:

Total Disagreement 0   1   2   3   4   5   6   7   8   9   10   *Total Agreement*

Evaluation

_____ I have a reasonable amount of input into the creation of new intervention strategies at the CIS.

_____ My job description accurately reflects the nature of my work.

_____ There is a reliable source of funding for new intervention strategies at the national level.

_____ I am satisfied with the quality of communication within the CIS.

_____ Information is shared by members at all levels of the CIS.

_____ I learn about new intervention strategies at CIS in the best possible way.

_____ Most people who work for the CIS are very creative in how they go about implementing new intervention strategies.

_____ The policy and procedures manual for the CIS covers what happens in a typical day.

_____ There are a number of people who have the skills necessary to implement new intervention strategies.

_____ The amount of information I receive related to new intervention strategies is adequate.

_____ I am able to communicate important work-related problems to people at all levels of the CIS.

_____ Decisions about new CIS intervention strategies are made by those who best understand the work.

_____ The CIS is creative in its method of operation.

_____ When a decision is made regarding a new intervention strategy, those people most likely to be affected are usually asked for their ideas.

_____ Materials and supplies are available when needed for new intervention strategies.

_____ CIS's formal communication system is efficient.

_____ I am pleased with the quality of information that I receive from people at higher levels of the CIS.

```
Scale:
        Total Disagreement   0   1   2   3   4   5   6   7   8   9   10   Total Agreement
```

Evaluation

_____ The CIS provides me with a rationale as to how the new intervention strategies fit into its goals and objectives.

_____ The CIS is receptive to new ideas.

_____ Policies and procedures are strictly enforced at CIS.

_____ New intervention strategies can easily be added to what we are already doing.

_____ The CIS maintains good communication between its members.

_____ I have access to information from individuals at my same level in the CIS.

_____ I am convinced by what I am told that new interventions are worthwhile projects.

_____ The CIS responds quickly to necessary changes related to new intervention strategies.

_____ I am usually consulted before the CIS adopts new intervention strategies.

_____ I follow established procedures exactly.

_____ I have the time to pursue new approaches to intervention strategies.

_____ The CIS has reached a consensus about how to accomplish objectives at the local and national level.

_____ I fully understand the importance of new interventions at the CIS.

_____ The CIS seeks out new ways to do things.

_____ I feel I can initiate ideas for new intervention strategies

_____ I feel free to change the way I do things at work.

_____ CIS members communicate frequently about new intervention strategies.

_____ The CIS frequently tries out new ideas.

When you were answering Part C dealing with innovations, which intervention strategy or strategies came to mind?

_____

_____

_____

APPENDIX G

CANCER INFORMATION SERVICE/PROGRAM PROJECT NETWORK
CISRC INNOVATION CHARACTERISTICS SURVEY

Part B asks for your opinions on several issues related to **the separate projects contained in the CISRC Program Project grant.**

The questions in **Part B** of this packet could be interpreted in multiple ways. Please take each question at its most general level and try to overlook specific instances that differ from your overall impression. We would like you to respond to each question **from your perspective in your office**, answering every item as it relates to each project.

We understand that you may not be completely familiar with each of the components of the program projects: This is not meant to be a test, rather we would like to find out peoples' current level of awareness about the component parts of each program project. If you do not yet have enough information to evaluate an item with respect to a particular program project, write "DK" (for "don't know) in the space provided for item evaluation. If you feel uncomfortable responding for another reason (e.g., the program project doesn't relate to your work or you have heard conflicting things about the intervention strategy), write "NR" (for "no response at this time").

This questionnaire may be completed at any time, but we do request that you return both the ivory questionnaire and lavender communication contact log to us in the enclosed self-addressed, stamped envelope by **August 29, 1994**.

Please write your name and job title in the space provided below:

Name: _____

Job Title: _____

CISRC INNOVATION CHARACTERISTICS SURVEY

Directions: The following items are statements regarding the three **new intervention strategies** developed by the CISRC program project: **Project 1** consists of the development and implementation of proactive mammography screening counseling, **Project 2** is geared toward making outcalls to low-income women in underserved neighborhoods in order to promote mammography screening, and **Project 3** implements a mass-media campaign that employs culturally sensitive videos to encourage African American smokers to call the CIS for more information about smoking cessation.

We would like you to respond to the following items relating to these projects by indicating how much you agree or disagree with each statement on a scale of 0 to 10 where 0 indicates **"total disagreement"** and **10** indicates **"total agreement."**

We would like you to respond to each question from the perspective of your office, answering every item as it relates to each project. **If you are not familiar enough with a particular program project to answer an item, please write "DK" ("don't know") in the space provided for item evaluation. If you feel uncomfortable responding for another reason, write "NR" ("no response at this time").**

Scale:													
Total Disagreement	0	1	2	3	4	5	6	7	8	9	10		*Total Agreement*

DK = "don't know"   NR = "no response at this time"

Item	Assessment		
	Project 1 proactive counseling	Project 2 making outcalls	Project 3 smoking cessation
This intervention strategy...			
will change the way that information is disseminated by the CIS.			
is similar to the techniques we have used in the past.			
places a number of additional demands on information specialists.			
can be adapted to fit local needs.			
presents risks to our office.			
is more effective in communicating with targeted populations than our previous efforts.			
is a good idea.			
is compatible with our office's customary method of providing cancer information to the public.			
will have outcomes that will be easy to measure.			
is too complex.			
can be modified for use in future campaigns			
has a number of uncertain outcomes.			
will have a greater impact on the target audience's cancer awareness than previous national initiatives.			

Scale:													
Total Disagreement	0	1	2	3	4	5	6	7	8	9	10		*Total Agreement*

DK = "don't know"   NR = "no response at this time"

Item	Assessment		
This intervention strategy...	Project 1 *proactive counseling*	Project 2 *making outcalls*	Project 3 *smoking cessation*
should be supported by people at all levels of the CIS.			
has required our office to change the ways we do things.			
will have clear outcomes.			
has many different components.			
can accommodate unique outreach efforts in our regional CIS office.			
is a risky method for communicating cancer information to members of a target audience.			
will result in greater behavioral change for members of the target audience.			
is a positive way to reach members of a target audience.			
will produce a visible change in our office's call busy rate.			
means that information specialists can't meet other job responsibilities as well as they used to.			
is something we can build on in the future.			
is a reliable way to communicate cancer information to members of a target audience.			
is a more efficient means to reach targeted populations than techniques we have used in the past.			
is a sound policy option for reaching members of a target audience.			
is different from previous national initiatives.			
will produce a visible change in our abandonment rate.			
raises a number of issues for information specialists.			
can be easily adapted to different situations that arise at our office.			
has predictable results.			
is a better way to provide targeted populations with cancer information.			
is an acceptable method of outreach for the CIS.			
will have a clear effect on the target audience.			

Scale:

Total Disagreement   0   1   2   3   4   5   6   7   8   9   10   *Total Agreement*

DK = "don't know"   NR = "no response at this time"

Item	Assessment		
	Project 1 *proactive counseling*	**Project 2** *making outcalls*	**Project 3** *smoking cessation*
Piloting this intervention strategy in a few offices ...			
informs people in other offices about its strengths and weaknesses.			
informs people in other offices about its effectiveness before it is adopted by the entire network.			
enables people in other offices to see how well the strategy works in the target audience.			
provides a valuable learning experience for other CIS offices.			
helps people in other offices gain information about whether the project will work across the entire network.			
lets people in other offices learn about new procedures before the entire network is asked to adopt them.			

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117

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