

A RECONSTRUCTIVE ANALYSIS OF CHANNEL EXPANSION
THEORY: INCORPORATING THE THEORY OF TASK-
TECHNOLOGY FIT

by
RAYMOND MATTHEW GERMONPREZ

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M.S., Colorado State University, 1997

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Abstract

Germonprez, Raymond Matthew (Ph.D., Information Systems), Systems Department
A Reconstructive Analysis of Channel Expansion Theory: Incorporating the Theory
of Task- Technology Fit

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This research describes the application of Jürgen Habermas' theory of communicative action to channel expansion theory. Channel expansion, from a critical perspective, was determined through an increasing number of challenged validity claims leading to a resolution in communication breakdowns. This research provides a new definition of channel expansion, an exploration of the relationships leading toward channel expansion, and a reconstruction of channel expansion process through tenets of the theory of communicative action. Further extending the examination of channel expansion theory, the normative technology characteristics of the communication channel were strengthened through the application of the theory of task-technology fit.

Through descriptive and interpretive analyses, support for both channel expansion theory and the theory of task-technology fit is provided. Extended beyond its original perspective, the process of channel expansion was evident through dialogue generated by virtual groups across a six-week period. As groups entered social actions, challenged validity claims, entered communication breakdowns and achieved subsequent resolutions, channel expansion was expressed. Also extended beyond its original perspective, the theory of task-technology fit impacted the process of channel expansion from the foundational components of channel expansion to challenged validity claims to the resolution of communication breakdowns.

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Chapter I

Introduction

With the rapid expansion of the Internet, distributed computing, and mobile services, the environment of electronic media use has changed. It is commonplace to see individuals talking on cellular telephones, stock quotes being monitored from a personal digital assistant, and children in daycare being checked on through web cams. These tasks, in these forms, are all accomplished through the use of technology. As technology pervades many everyday tasks, understanding the relationship of task and technology is critical.

Successful use of technology for a variety of tasks is still an unrealized goal in many cases. As our choice of technologies grows, so does our confusion about which technologies to use in which situations. The merging and blurring between different types of technology contributes to this confusion, and questions arise as to whether existing concepts and knowledge of technology use still apply.

Understanding the task-technology relationship is crucial, crucial because this relationship can have a significant impact on technology use and subsequent outcomes. Whether these outcomes are in the form of improving group performance (Zigurs et al., 1999), changing user perceptions (Carlson, 1995), or reproducing social structures (Ngwenyama and Lee, 1997), these outcomes are key components of task-technology fit and its impacts on the technology use process.

From a managerial perspective, identifying proper task-technology fit profiles can prove fruitful. Such identification can be used to improve worker performance (Goodhue and Thompson, 1995), support complex communications between employees (Markus, 1994), or understand power differences between organizational departments (Nord and Jermeir, 1992).

From a research perspective, several lines of inquiry have explored the task-technology fit relationship. One line of research examining this relationship is media richness theory (Daft and Lengel, 1984). Media richness theory (MRT) states that the presence of normative media characteristics leads to greater ability to handle message equivocality and uncertainty. MRT identifies managerial performance (Daft and Lengel, 1986; Daft et al., 1987) and the ability of a message to change individual understanding (Daft and Lengel, 1986) as key indicators of proper task-technology fit profiles. The theory has met with limited success, largely due to additional factors such as social influence (Fulk et al., 1990) and the interaction between technology and context (Lee, 1993) playing key roles in task outcomes.

MRT has been extended beyond its original scope, and towards an understanding of meaning in specific situations (Lee, 1993; Markus, 1994). The Lee (1993) and Markus (1994) studies used MRT as a technical foundation upon which to build a more comprehensive understanding of task-technology fit relationships and media use. These studies identified MRT as deficient in fully explaining the use of lean media for successfully transmitting messages of high equivocality. In both cases, a new definition of media richness was identified, based on the context and social setting within which media was used.

Recently, the study of MRT has expanded to not only include an examination from the technical research perspective (Daft and Lengel, 1986) and the practical research perspective (Lee, 1993; Markus, 1994), but also to include an examination from the emancipatory research perspective (Ngwenyama and Lee, 1997). This third perspective defines media richness as the ability of a media channel to support the resolution of communication breakdowns between communication partners. Together, these perspectives provide a complex view of media richness. Through these perspectives, a complete picture of MRT was produced, a picture incorporating complementary and integrated views of the research agenda (Orlikowski and Baroudi, 1991).

Media richness theory is not the only line of Information Systems research that investigates the task-technology relationship. A second line of inquiry in task-technology fit research focuses on the role experience plays in this relationship. Building on the task-technology relationship of MRT, experience with the technology, topic, context, and communication partner, shapes the way a communication channel is perceived (Carlson, 1995). This socially conscious perspective extends ideas about the use of technology, showing that characteristics of the technology alone are not sufficient to explain people's perceptions about it. Instead, perceptions of a communication channel evolve over time, based on experiences with a message topic, communication partner, organizational context, and the technology itself (Carlson, 1995; Carlson and Zmud, 1999). The process theory of channel expansion (CET) identifies foundational task-technology relationships based on the original media richness theory (Daft and Lengel, 1986), relationships that can

be strengthened by incorporating the task-technology definitions of TTF (Zigurs and Buckland, 1998).

Based on the theory of task-technology fit (TTF) (Zigurs and Buckland, 1998), technology is defined in terms of communication support, process structuring, and information processing, and task is defined in terms of complexity characteristics (Campbell, 1988). Optimal fit profiles are identified by properly matching technology characteristics to task types (Zigurs and Buckland, 1998; Zigurs et al., 1999). TTF identifies a variety of fit profiles to improve group performance outcomes when using group support systems. The theory of TTF provides an alternate, technical inner layer (Zigurs and Buckland, 1998) for CET upon which to build a comprehensive understanding of the task-technology relationship and its impact on technology use and measured outcomes. The theory of TTF offers CET a more extensive matching between task and technology than was provided by earlier MRT work.

In addition to normative technology characteristics, social and cognitive components have moved to the forefront as important determinants of successful technology use. Richer perspectives are needed to help examine these important new components. To date, a positivistic perspective has dominated the examination of technology use. Positivistic perspectives have helped develop our understanding of this area, but fall short in providing a complete picture of how contextual and cognitive components shape the technology use process. Components of the socially oriented perspective of critical social theory provide a richer examination of technology use.

Critical social theory (CST) examines how individuals are able to create a better environment around them through periods of critical reflection, a reflection based on historical experiences and the current contextual setting. As the diverging and blurring lines of technology continue, the ability of technology to resolve inhibiting factors for a better use environment becomes increasingly important. In particular, the critical social theory of Jürgen Habermas provides crucial components upon which to build a complementary lens through which to examine the process of channel expansion from a critically motivated perspective. This perspective strengthens CET in a way comparable to how Lee (1993), Markus (1994), and Ngwenyama and Lee (1997) strengthened the original work of MRT. The critical perspective provides a new definition of channel expansion while retaining the findings of Carlson (1995), accounting for the importance of experiences in shaping media richness perceptions.

The current research focuses on the following question: “How does task-technology fit impact channel expansion as reconstructed through a critical perspective?” This question incorporates two essential elements: (1) The influence that normative technology characteristics have on channel expansion, and (2) the examination of channel expansion from the contextually and cognitively motivated perspective of CST.

This in-depth examination of technology use brings together CET, the theory of TTF, and components of CST for the first time. The contributions of this research follow. First, the research applies components of the socially conscious perspective of CST to both CET and TTF. Tenets of the critical perspective provide a richer

examination of both theories, lending additional insight to both. Second, the research investigates channel expansion as a function of the channel-in-use and not perceptions of individuals using the channel. This is accomplished through group members using a communication channel in the resolution of communication breakdowns. Third, the technology use process benefits by viewing individuals as “actors” who are able to critically examine their context, reflect on their actions, and enact change that leads towards a better communication environment. Fourth, the process theory of channel expansion is strengthened through the application of the prescriptive theory of TTF.

Chapter II

Knowledge Perspectives

Intentional human activity produces knowledge (Habermas, 1976). Through specific goals, purposes, or aims, individuals intentionally produce knowledge. Knowledge producing goals exist in three forms: technical, practical, and emancipatory (Giddens, 1985). Knowledge is intentionally created when producing predicted outcomes (technical), when understanding meaning (practical), or when achieving individual autonomy from domination (emancipatory).

Each knowledge perspective corresponds to a single aspect of human society: labor, interaction, and domination. First, the *labor aspect* states that human activity is governed by mechanistic influences that affect individual production. Associated with the labor aspect of human society is technical knowledge. It is through empirical sciences and the positivistic perspective that technical knowledge is examined.

Second, the *interaction aspect* of human society states that symbolic interaction takes place to create individual interest in understanding situational meaning. Practical knowledge is associated with the interaction aspect of human society. It is through hermeneutic sciences, sciences based on the interpretation of literature, and the interpretive perspective that practical knowledge is examined.

Third, the *emancipatory aspect* of human society states that all societies involve levels of domination and individuals strive to achieve autonomy from the domination through deliberate actions. As an aspect of human society, domination is

associated with emancipatory knowledge. It is through critical social theory that emancipatory knowledge is examined. Table 1 shows the relationships between aspects of human society, knowledge perspectives, and their associated methods of study.

<i>Aspects of Human Society</i>	<i>Knowledge Perspective</i>	<i>Method of Study</i>
Labor	Technical (Prediction and control)	Empirical sciences/ Positivism
Interaction	Practical (Understanding of meaning)	Hermeneutic disciplines/ Interpretivism
Domination	Emancipatory (Emancipation)	Critical social theory

Table 1.
Aspects of Human Society (Adapted from Giddens, 1985)

Together, these three knowledge perspectives can be used in a complementary manner to pursue scientific inquiry. A closer examination of each knowledge perspective will highlight the value each provides and how knowledge perspectives can be used in a multi-perspective approach to provide rich examinations of questions, problems, or discovery.

Technical Knowledge

Technical knowledge is rooted in investigations of natural science. Technical knowledge is based on hypotheses that examine samples with the intent of producing predicted results (Stablein and Nord, 1985). Such an effort treats the sample as a basis of generalizable knowledge, as opposed to treating a sample as a single and pointed examination of the sample itself.

Studies based on technical knowledge have dominated the field of Information Systems (Orlikowski and Baroudi, 1991). These studies have provided valuable insight into how information systems are developed, deployed, and used. Technical knowledge studies have enforced standards upon which to examine discipline specific phenomena and have built a research base upon which research questions can be extended and integrated (Jarvenpaa, 1988; Lee, 1991; Orlikowski and Baroudi, 1991).

Practical Knowledge

Practical knowledge is based on attaining mutual understanding between individuals (Habermas, 1971; Lee, 1991). Practical knowledge accounts for the role that history plays in the formation of individual actions, group behavior, and social traditions. Individuals are not viewed as a resource that is unresponsive to their setting, as is the case with technical knowledge. Instead, individuals are viewed as actors within their social setting, actors who can produce change while operating in the world around them. In addition, practical knowledge does not produce generalizable laws. Practical knowledge examines a specific decision in an attempt to understand actions and to interpret meaning of the changing circumstances facing a society (Stablein and Nord, 1985).

Emancipatory Knowledge

Critical social theory examines emancipatory knowledge or the ability of an individual or group to increase their level of autonomy and responsibility in the world (Stablein and Nord, 1985). Often, the pursuit of autonomy and responsibility is the result of domination to which an individual is subjected. The ideal of exercising

power differences between individuals is the foundation of emancipatory knowledge (Giddens, 1985).

Literature matching emancipatory knowledge with either technical or practical knowledge in Information Systems is limited. The current research builds on the technical perspective while implementing an emancipatory view in the examination of two Information Systems theories: The theory of task-technology fit and channel expansion theory. This combination of technical and emancipatory knowledge allows for an integration and extension of both theories.

The combination of these two theories integrates technical and emancipatory knowledge in two ways. First, both TTF and CET are strongly rooted in the importance of the normative characteristics of technology driving users to produce successful outcomes or change their perceptions of a communication channel, a view rooted in the technical perspective. Incorporation of components of the emancipatory perspective removes the examination of “successful outcomes” or “increased perceptions.” Instead, it examines how communication participants use a communication channel in creating a better communicative environment. This exploration of communication channel use maintains the importance of normative technology characteristics, while refocusing the methodological lens toward the emancipatory perspective.

Second, this approach examines a slice of emancipatory knowledge by bringing the perspective to a quasi field study setting. This setting does not allow for a complete examination of emancipatory knowledge, toward a comprehensive leveling of power differences nor a complete creation of an ideal communication

environment. This approach does, however, draw frameworks from the emancipatory perspective into the current research to examine how individuals strive toward the creation of an improved communication environment in an empirically driven study (Parkin, 1996).

This chapter introduced the three interests of technical, practical, and emancipatory knowledge in an effort to represent three perspectives afforded to researchers. The current research uses tenets of critical social theory to explore a research agenda traditionally rooted in a technical approach by maintaining the importance of the normative characteristics of the technology and providing moderate control over the use of the communication channel. Yet, refocusing the methodological lens toward critical social theory brings the technical and emancipatory perspectives together, a synergy not often provided in Information Systems research.

Chapter III

Critical Social Theory

The emancipatory perspective uses critical social theory as the methodological lens through which it is investigated. As the current research incorporates aspects of the emancipatory perspective, the lens of critical social theory is addressed in more detail.

Introduced in 1937, critical social theory was used to represent a supradisciplinary philosophical perspective (Horkheimer, 1972; Kellner, 2001). The original purpose of critical social theory was to explain society through historical and contextual references across various scientific disciplines. This differs from traditional social theory that is directed by social determinism that “binds a scholar and his science into the apparatus of society” (Horkheimer, 1972, p. 194) and only reproduces existing society. Critical social theory seeks to understand social structures resulting in domination, articulate human activity striving to transform society (Kellner, 2001), and explore the production of the false-consciousness (Agger, 2001).

In the broadest sense, critical social theory acts more as a philosophical perspective than as a theory with constructs and relationships. Critical social theory (CST) is a broad perspective that examines the impact that political structure, economics, public opinion, law, fashion, individual development, etc. have on social situations (Kellner, 2001). A researcher using critical social theory is not concerned

with such familiar concepts as usefulness, performance, or productivity, but instead is intent on understanding how influences guide individuals in their actions. It is used to look beyond understanding individuals in a *status quo* environment, and toward individuals in an emancipatory setting (Ngwenyama et al., 1997).

Concerned with critiquing conflicts within a social setting (Orlikowski and Baroudi, 1991), CST is used to explain phenomena within an existing historical and contextual setting, and not to describe individuals studied outside of their investigated setting. CST is used to describe individuals as socially and contextually constructed actors upon their environment. Through the CST lens, individuals are able to enact meaning and change on their environment, an enactment that is constrained by the context within which they are functioning. In addition, data examined with the CST lens is not intended to prove or disprove theory. Instead, CST is used in understanding the regularities of process rather than cross-sectional differences (Orlikowski and Baroudi, 1991).

CST is a perspective that treats individuals as thinkers who live in a world where identity and difference are objects of struggle (Calhoun, 1995). CST has been used to explore how individual identity addresses personal differences in small groups, small organizations, or large organizations. With respect to the application of critical social theory to the field of Information Systems, several strengths and weaknesses are evident. The application of CST in IS has led to an investigation of the people and structures that guide the development (Janson et al., 1991; Janson et al., 1993; Klein and Hirschheim, 1993; Hirschheim and Klein, 1994; Myers and Young, 1997; Clarke and Lehane, 2000), implementation (Lyytinen and Hirschheim,

1988; Myers, 1994), and use (Ngwenyama and Lee, 1997) of information systems. These studies have improved the process of understanding information systems.

However, from an applied, empirically based approach, many of these research studies have fallen short. Often maintaining a view at the metatheoretical level provided through CST, little application of the frameworks evident in CST approaches have been used in the examination of concrete interactions (Parkin, 1996). By using CST based theories such as Habermas' theory of communicative action, analysis of daily activities can be empirically explored through the application of provided frameworks. The current research seeks to extend frameworks within the critical social theory of Jürgen Habermas in the creation of a new methodological approach in the empirical examination of communication channel use.

The Theory of Communicative Action

The application of CST to the communicative environment, as opposed to the nonverbal and physical environments, is one aspect of the endeavor of Jürgen Habermas through the theory of communicative action. The theory of communicative action (TCA) (Habermas, 1976; 1984; 1987) is rooted on two key premises. First, individuals strive toward the creation of an ideal speech situation. The ideal speech situation is one that allows equal opportunity for all individuals to enter discussion, no constraints are placed on individuals when enacting meaning on messages, and communication that is false, incomplete, insincere, or unwarranted (Ngwenyama and Lee, 1997) can be challenged and subsequently justified (Habermas, 1984; Giddens, 1985).

Second, communication is rational in nature and constructed to achieve, sustain, and review consensus, a consensus that rests on the individual recognition of disputable validity claims (Habermas, 1976). Rooted in speech act theory (Austin, 1962; Searle, 1969), TCA states that the rationality of communication comes in the forms of cognitive-instrumental rationality and communicative rationality. Cognitive-instrumental rationality is directed toward using communication to influence individuals to perform directed (instrumental) or strategically guided actions. Communicative rationality is directed toward using communication to produce mutual understanding between individuals. Each entry into rational communication, whether cognitive-instrumental or communicative, is termed a social action (Habermas, 1987). The theory of communicative action explicitly states that individuals partake in three social action types: instrumental, strategic, and communicative (Habermas, 1976; 1987; McCarthy, 1978). A fourth social action type, discursive action, is implicitly set forth by Habermas (1987; 1996) and echoed in other research (McCarthy, 1978; Lyytinen and Hirschheim, 1988; Ngwenyama and Lee, 1997; Huttunen and Heikkinen, 1998; Shabani, 1998; Germonprez, 2001).

TCA builds on the belief that within social actions, validity claims are implicitly or explicitly raised in all communicative acts, and are sometimes challenged. A communicative act is a speech act that ends when a speaker changes the subject or when another individual speaks (Poole, 2001). Through the challenge of validity claims, communication breakdowns occur resulting in two representations. First, through the challenge of validity claims, intelligent actors are able to resolve differences between communicating parties (Habermas, 1976). Second, through the

challenge of validity claims, intelligent actors are able to reconstruct political and social structures between communicating parties (Forester, 1992). From either perspective, individuals ultimately strive for resolution of communication breakdowns (Ngwenyama and Lee, 1997).

Individuals engaged in social actions are able to undergo periods of critical reflection when validity claims are accepted or challenged (Habermas, 1984). To accept the validity claims within a social action, a listener has accepted the communicative act set forth (Goldkuhl, 2000) and accepts the communicative act in the context in which it was set forth. The context (Habermas, 1987) is commonly shared knowledge about a world set of circumstances and events, a social world of people and community, and an inner world of the individual.

If a receiver of a communicative act challenges a sender's validity claim based on it being false, incomplete, insincere, or unwarranted, a communication breakdown occurs (Ngwenyama and Lee, 1997). A communication breakdown sets into motion critical discourse to resolve contested validity claims. It is through the temporal progression of critically discussing contested validity claims that communication breakdowns can be resolved (Figure 1).

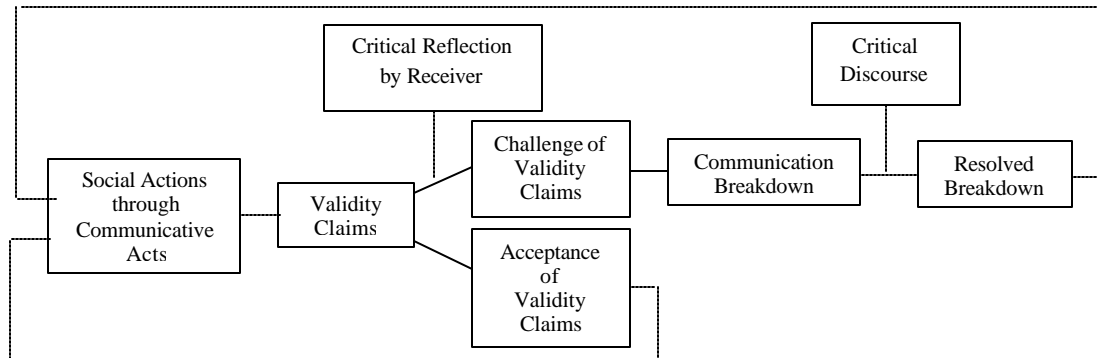


Figure 1.
Temporal Relationship of Social Actions to Resolved Communication Breakdowns

Social Actions

Four social actions identified by Habermas (1987) present a variety of rational communicative instances in which individuals engage. The four social actions are:

- (1) *Communicative* action views both communication partners as intelligent actors, and is intended to achieve mutual understanding between partners.
- (2) *Discursive* action is used to resolve disagreement aimed at producing generalizable interests between communication partners.
- (3) *Instrumental* action occurs when a communication sender views the communication receiver as unable to enact meaning on the message.
- (4) *Strategic* action occurs when a communication sender attempts to influence a communication receiver through communication.

In addition, each social action shapes the context within which they are being used (Habermas, 1984). Three contexts are shaped through social actions: world, social, and individual. The world context is oriented toward the production of laws of nature. The social context is oriented toward the production of rules within a social setting. The individual context is oriented toward the production of rules between

individuals. Understanding social action-context relationships is useful in understanding why individuals enter certain social actions and what constraints are placed on individuals when in a social action (Habermas, 1979; 1984). A framework used in the identification of social action types is addressed in Chapter 6.

Communicative action is focused on the creation of coordinated behaviors and mutual understanding between communication partners. As individuals interact through communicative action, common definitions of their context are constantly produced and used. The production and use of common definitions, through communicative action, acted as the basis for a rational and open society (Habermas, 1984). In addition, communicative action is the fundamental social action from the other social actions are derived (Habermas, 1979). Through communicative action, information is processed, understanding is pursued, and knowledge is distributed between communication partners (Habermas, 1979). This social action shapes the context of the individual, the social group, and the world within which all communication is occurring. Example 1 shows communicative action.

Example 1: Communicative Action

[M1] 9/17/01 8:59:49 PM - Lynda: Hi Bryan - I was just going to post a quick doc. to the files section...

[M2] 9/17/01 9:00:11 PM - Lynda: Ok ... what are you posting?

[M3] 9/17/01 9:00:26 PM - Lynda: It's just kind of a mess of thoughts on those 3 ?'s on the info board

[M4] 9/17/01 9:00:52 PM - Bryan: The 3 that are repeated over and over and over

[M5] 9/17/01 9:01:11 PM - Bryan: ?

[M6] 9/17/01 9:01:43 PM - Lynda: Yup, those 3 - but I think all the info presented before us has us going on all these side notes and thinking about all kinds of things...

In this example of communicative action, Bryan and Lynda were engaged in communication focused on understanding each other. With respect to the document posted by Lynda at M1, both group members were treated as actors on the messages, able to create and achieve mutual understanding between themselves.

Discursive action views a receiver of information as an intelligent actor. Discursive action is based on speech being able to be criticized and argued upon, and proceeds toward a conclusion through rationality and reason. Discursive action is concerned with the formation of the social and individual context within which communication is occurring (Lyytinen and Hirschheim, 1988). Example 2 shows discursive action.

Example 2: Discursive Action

[M1] 9/17/01 9:05:33 PM - Bryan: except for the fact that they are tracking our IP addresses

[M3] 9/17/01 9:06:09 PM - Bryan: You'll notice that the reply messages have an IP address of origin

[M5] 9/17/01 9:06:37 PM - Lynda: Yeah, but I've checked our Eneo site from all over campus and at home... I don't think I'm attached to just one computer

In this example of discursive action, Lynda disagreed with Bryan's statements regarding the tracking of IP addresses. Through the use of M5, Lynda engaged Bryan in to express her points, suggesting that in actuality, IP addresses were not tracked through the communication system.

Instrumental action is focused on the realization of explicit goals. Habermas (1984) identifies instrumental action as a means-end social action. Instrumental action is when one communication partner is intent on telling another to take action. In addition, instrumental action is intent on *production*. That is, instrumental action is

used in the production of temporal order, frameworks for action, and frameworks for the distribution of information and knowledge (Habermas, 1979). Such action is concerned with the formation of the world and social contexts of circumstances and events. That is, instrumental action is rarely concerned with the formation or reproduction of individual contexts within which communication partners engage (Habermas, 1984). Example 3 shows instrumental action.

Example 3: Instrumental Action

[M1] 9/17/01 9:28:03 PM – Lynda: The format of the first paper, is to do a number of things, but the last part, overall assessment of the project, is to provide a professional opinion of how well the project is progressing... I'm still not clear on THE PROJECT - the project of using this tool or the imaginary project of me working at Healthcare Inc and needing your assistance with problems we have at our company?

[M3] 9/17/01 9:28:42 PM – Bryan: Let's slow down

In this example of instrumental action, M3 was entered by Bryan to direct Lynda in the creation of temporal aspects of the communication. Prior to M3, many messages had been sent by both group members attempting to gain control of the project. In this example, Bryan was *telling* Lynda to change the temporal flow of the conversation in order to finally gain control, appearing to treat Lynda as unable to enact her own meaning on the message.

Strategic action, like instrumental action, is focused on the means-end form of communication. This view differs from instrumental action in the way the information is used. Strategic actions are geared toward the coordination of frameworks set forth through instrumental actions and occurs when one communication partner is intent on influencing another to take action, whether direct or latent (Habermas, 1979). Strategic action is concerned with the formation of the

world and social context of circumstances and events (Habermas, 1984). Example 4 shows strategic action.

Example 4: Strategic Action

[M1] 10/17/2001 6:38pm – Prasat:
 Subject: chat
 Hello Jack, I am sorry. I did not check the message board. I have mid terms going on this week. can [you] come online today (Wednesday) at 9.00 MT (your time)

Appearing subtle, this example of strategic action shows a communicative act sent by Prasat, treating Jack as an intelligent actor on the information. Attempting to influence Jack, Prasat appeared to encourage Jack to maintain contact in the group, an activity that may appear beneficial to both group members. It appeared, however, that the communicative act was actually used by Prasat to allow him to get back into the group processes, an important component group performance.

Table 2 shows the aforementioned relationships between social actions and the contexts they shape. These relationships are revisited later in the development of social action- validity claim relationships.

<i>Context</i>	<i>Social Actions</i>			
	Strategic	Instrumental	Discursive	Communicative
World	X	X		X
Social	X	X	X	X
Individual			X	X

Table 2.
Relationship between Social Actions and Contexts

Within each social action, communication participants raise claims of validity in their speech. In using validity claims within social actions, communication

participants reproduce existing contextual norms and shared beliefs between themselves and their partner, or establish new norms in the various contexts.

Validity Claims

In his original writings, Habermas (1976; 1984; 1987) identified three universal validity claims used in social actions. These validity claims are truth, normative rightness, and sincerity. Habermas states that communication is based on language as a medium of understanding and in this understanding, communication participants can raise validity claims that can be accepted or challenged (Habermas, 1984; Goldkuhl, 2000). That is, within *every* communicative act, claims of validity are set forth and these validity claims can be challenged or accepted by individuals who receive them.

Like social actions, the three validity claims of truth, normative rightness, and sincerity are each related to the three aforementioned contexts of world, social, and individual. Truth, associated with the world context, is defined as an individual correctly representing the existing state of affairs. Normative rightness, associated with the social context, is defined as the appropriateness of an action. Sincerity, associated with the individual context, is defined as the manifest intention of the communication partner (Habermas, 1984). Table 3 shows the validity claim-context relationships. Like the social action-context relationships, the relationships in Table 3 are revisited later to establish social action-validity claim relationships.

<i>Context</i>	<i>Validity Claims</i>		
	Truth	Normative Rightness	Sincerity
World	X		
Social		X	
Individual			X

Table 3.
Relationship between Validity Claims and Contexts

A fourth universal validity claim related to language as a medium of communication is comprehensibility. This validity claim is a basis for the three prior universal claims. If the language is incomprehensible, accepting or challenging the validity claims of truth, normative rightness, or sincerity is impossible (Goldkuhl, 2000).

In the current research, the four aforementioned universal validity claims are expanded beyond their original statements to provide a richer examination of the validity claim concept (Goldkuhl, 2000), and to provide framing for this research (Ngwenyama and Lee, 1997). When a communication participant speaks, they can set forth seven validity claims. The validity claims include:

- (1) *Contextuality* is appropriateness of the action.
- (2) *Efficiency* is ability of the action to achieve desired ends.
- (3) *Effectiveness* is authority of the communication partner.
- (4) *Clarity* is the precision of the message and associated jargon.
- (5) *Completeness* is the totality of the message.
- (6) *Truthfulness* is the honesty of the message.
- (7) *Sincerity* is the earnestness of the communication partner.

These seven validity claims are related to the four used by Habermas. First, Habermas' truth validity claim corresponds directly to Ngwenyama and Lee's

truthfulness validity claim. Second, Habermas’ sincerity validity claim corresponds directly to Ngwenyama and Lee’s sincerity validity claim.

Third, contextuality, efficiency, and effectiveness, as used by Ngwenyama and Lee, correspond to Habermas’ universal validity claim of normative rightness. A similar deconstruction of the normative rightness claim is provided by Goldkuhl (2000), where the validity claim of normative rightness is best addressed in terms of the appropriateness of the action with respect to a means–end relationship. In Ngwenyama and Lee’s words, normative rightness is addressed in terms of contextuality with respect to an effectiveness-efficiency relationship.

Fourth, the validity claims of completeness and clarity by Ngwenyama and Lee represent Habermas’ universal validity claim of comprehensibility. The two validity claims of completeness and clarity represent the ability of a speaker to present a comprehensible communicative act. Table 4 shows the relationship between Habermas and Ngwenyama and Lee in their representation of validity claims.

<i>Authors</i>	<i>Validity Claims</i>						
<i>Habermas</i>	Comprehensibility		Sincerity	Truth	Normative Rightness		
<i>Ngwenyama & Lee</i>	Completeness	Clarity	Sincerity	Truth	Context	Efficiency	Effectiveness

Table 4.
Deconstruction of Habermas’ Four Universal Validity Claims

Social Action-Validity Claim Relationships

As communication partners enter social actions to exchange ideas, argue points, or agree on issues, they continually raise claims of validity in their communicative acts. Relationships between social actions and validity claims provide

a framework around which communication actions can be studied. Based on social actions shaping and validity claims used in the aforementioned contextual contexts, relationships develop as to which validity claims are evident, and can therefore be challenged, in respective social actions. Table 5 provides an overview of the social action-validity claim relationships.

<i>Social Actions</i>	<i>Validity Claims</i>		
	Truth	Normative Rightness	Sincerity
Instrumental	X	X	
Strategic	X	X	
Discursive		X	X
Communicative	X	X	X

Table 5.
Relationship between Social Actions and Validity Claims

In their examination of MRT from an emancipatory perspective, Ngwenyama and Lee (1997) related social actions and validity claims as seen in Table 6, a table that differs from the relationships presented in Table 5 above.

<i>Social Actions</i>	<i>Validity Claims</i>						
	Completeness	Clarity	Sincerity	Truth	Context	Efficiency	Effectiveness
Communicative	X	X		X	X		
Discursive		X	X	X	X		
Instrumental					X	X	X
Strategic			X		X	X	X

Table 6.
Ngwenyama and Lee’s Validity Claim-Social Action Relationships (Adapted from Ngwenyama and Lee, 1997)

An examination of the relationships in Table 6 illustrates a problem in the application of the validity claims of contextuality, effectiveness, and efficiency to

only instrumental and strategic actions. This problem is remedied in Habermas' assertion that both instrumental and strategic actions are means-end actions set across both world and social contexts as seen in Table 2 (Habermas, 1984; Goldkuhl, 2000). With this, validity claims of contextuality, efficiency, and effectiveness are available not only for communicative and discursive action, but also instrumental and strategic action.

Sincerity, as used by Ngwenyama and Lee, is different than how it is applied by Habermas. Sincerity, as viewed by Habermas, is a validity claim that represents the manifest intention of a speaker and is associated with the individual context, suggesting that sincerity is applicable to only discursive and communicative action as seen in Table 5. This research uses the sincerity validity claim for both discursive and communicative action.

Truth, defined by both Ngwenyama and Lee and Habermas represents the presentation of the current state of affairs in a correct manner. This research *continues* to explore the truth validity claim as originally presented by Habermas and partially reproduced by Ngwenyama and Lee. The manner in which the truth validity claim is used is in accord with its association with the world context as seen in Table 2 and is manifest in the social actions of instrumental, strategic, and communicative.

Ngwenyama and Lee apply the validity claims of completeness and clarity to communicative action and clarity to discursive action. Discursive, instrumental, and strategic actions are also included in applying the full set of validity claims of completeness and clarity for the same reasons that comprehensible communication acts are an essential base for the other validity claims (Goldkuhl, 2000). This research

applies both completeness and clarity validity claims to all social actions. Table 7 shows the validity claim and social action relationships used in this research.

<i>Authors</i>	<i>Validity Claims</i>						
<i>Habermas</i>	Comprehensibility		Sincerity	Truth	Normative Rightness		
<i>Ngwenyama & Lee</i>	Completeness	Clarity	Sincerity	Truth	Context	Efficiency	Effectiveness
<i>Social Actions</i>							
Communicative	X	X	X	X	X	X	X
Discursive	X	X	X		X	X	X
Instrumental	X	X		X	X	X	X
Strategic	X	X		X	X	X	X

Table 7.
Validity Claim-Social Action Relationships Used in this Research

This chapter explored Habermas’ theory of communicative action and how the socially motivated lens of TCA had provided an original and unique view of information systems (Lyytinen and Hirschheim, 1988; Orlikowski and Baroudi, 1991; Alvesson and Willmott, 1992; Clarke and Lehane, 2000). From definitions to the establishment of the social action-validity claim relationship, this chapter introduced the components of TCA used in the current research. Providing the framework upon which to build a holistic understanding of the channel use process through the application of tenets of TCA, the current research explores how communication channels support social actions, communication breakdowns, challenged validity claims, and resolution of breakdowns over time. By empirically applying frameworks evident in TCA, the current research is intent on understanding the communication channel use process, what factors influence the process, and how the process evolves over time.

Chapter IV

Channel Expansion Theory and The Theory of Task-Technology Fit

The prior research discussed in this chapter focuses on important works and theories in Information Systems that frame the current research. In particular, two theories are explored: Channel expansion theory (Carlson, 1995) and the theory of task-technology fit (Zigurs and Buckland, 1998). Together, these two theories provide the framework upon which the communication channel use process is explored. The theories are investigated through the literature upon which they were established, competing theories, and through various methodological perspectives.

Media Richness Theory

A frequently examined theory in Information Systems is media richness theory (Daft and Lengel, 1984; Daft and Lengel, 1986). Media richness theory (MRT) proposed that different media channels have varied capabilities for transmitting information for tasks with varying degrees of equivocality (multiple outcomes) and uncertainty (availability of information). Media were defined on four characteristics: immediacy of feedback, ability to transmit cues, personalization, and support for language variety (Daft and Lengel, 1984).

Immediacy of feedback is the ability of a media channel to provide members of a group with feedback on previously sent information in a rapid manner. The ability to transmit cues is the number of signals that can be transmitted through a

media channel. Personalization is the ability to use a media channel in a manner that suits the needs of the sender. The support of language variety was based on earlier work by Daft and Wiginton (1979) on languages and their ability to convey information. Media channels that support multiple languages were proposed to have a better opportunity to support difficult, ephemeral, and social phenomenon (Daft and Lengel, 1984).

Daft and Lengel (1984) suggested that various media channels fall on a continuum with respect to providing these four characteristics, which defines their relative richness. As shown in Figure 2, face-to-face communication were proposed to support the highest number of characteristics and numeric messages the lowest number of characteristics.

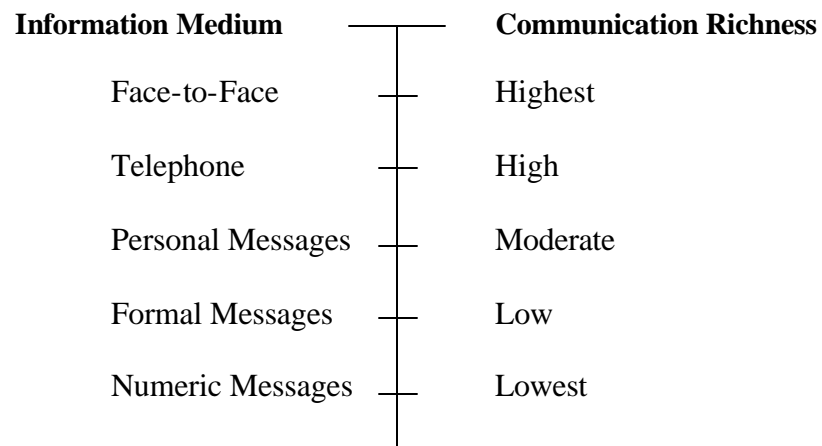


Figure 2.
Communication Richness Continuum (Daft and Lengel, 1984, Figure 1)

Media richness theory proposed that tasks of high equivocality and low uncertainty are best performed with communication media high on the richness scale.

According to the theory, face-to-face communication provides the highest level of support for the four media characteristics and should handle equivocality and uncertainty better than the media placed lower on the MRT continuum.

MRT has been the foundational theory for IS literature spanning all three knowledge perspectives. The following discussion provides a unique view, examining the MRT research stream through the three knowledge perspectives of: technical, practical, and emancipatory. Such an approach has not been set forth in a single research stream in the field of Information Systems.

Original MRT Research: A Technical Knowledge Perspective

In its original state, MRT is rooted in the technical knowledge perspective. The theory is based on predictive ability and the formation of generalizable laws. MRT proposed that media have specific structural characteristics that define the ability of the media to reduce equivocality or uncertainty. The original framework provided generalizable laws that defined the relationship between media channels and equivocal and uncertain tasks (Daft and Lengel, 1984). The model was extended to predict how organizational design can support the information needs of equivocality and uncertainty (Daft and Lengel, 1986).

Like the original MRT model, the application of the MRT model to organizational design attempted to provide a fixed framework around which a series of “appropriate” managerial decisions could be based. The framework did not account for the historical or contextual setting that an individual or group may engage in while using a particular media channel, how the channel is appropriated within a group, or how the group type, group history, or group goal influences channel use.

Following the original MRT work by Daft and Lengel (1984; 1986), additional technical research examining MRT emerged. This research included media selection and its impact on managerial performance (Trevino et al., 1987; Daft et al., 1987) and reformulation of the original MRT scale (Trevino et al., 1990; Schmitz and Fulk, 1991; El-Shinnawy and Markus, 1992; Kinney and Watson, 1992; Rice, 1992; Kinney and Dennis, 1994; Dennis and Kinney, 1998).

The original MRT model, and its impact on managerial performance, was supported by both Daft et al. (1987) and Trevino et al. (1987). Findings suggested that higher performing managers were sensitive to the MRT model when selecting media to deal with message equivocality or uncertainty (Daft et al., 1987).

However, the MRT scale defined by Daft and Lengel was brought into question by several studies. These studies found that media were improperly placed on the original MRT scale based on user perceptions (El-Shinnawy and Markus, 1992), performance indicators (Kinney and Watson, 1992; Rice, 1992; Kinney and Dennis, 1994; Dennis and Kinney, 1998), and task importance (Trevino et al., 1990).

The aforementioned studies examined media richness theory from a technical knowledge perspective. This rigorous foundation based on statistical accuracy, framed environments, and predictive power, provided an essential basis upon which to extend the investigation of the theory of media richness.

Redefining MRT: A Practical Knowledge Perspective

Early work that extended the technical knowledge examinations of media richness theory accounted for the role social influence and organizational context played in defining media richness. Based on the belief that social interaction in the

workplace shapes the creation of shared meaning, Schmitz and Fulk (1991, p. 488) supplemented technical research findings with practical knowledge examinations. They explored the impact that social influence plays on the use and perceptions of media in the workplace. In their findings, media richness was impacted by social influence and not only the invariant properties of the media, suggesting that the original MRT model was driven not only by technology but also by organizational context. Studies of this nature are referred to as social definition theories (Ngwenyama and Lee, 1997) and include the value of social influence (Fulk et al., 1990), the emergent network (Contractor and Eisenberg, 1990), and expanding perceptions (Carlson and Zmud, 1995), while still producing predictive power and general laws.

Media richness was also examined from the practical knowledge perspective *without* an interest in producing generalizable laws. Studies of MRT from a practical interest used earlier technical interest work to frame questions, guide reasoning, and explain findings. Studies of MRT from a practical perspective explained employee relationships within an organizational context, describing how and why media channels are used for specific tasks in a single organizational setting. Two works (Lee, 1994; Markus, 1994) define the examination of media richness theory from a practical knowledge perspective.

Supplementing survey data, Markus (1994) examined archived email conversations between organizational employees. Examination of the archival data displayed the use of a lean media channel, email, for conveying highly equivocal information. The practical knowledge perspective used by Markus examined

individual email messages within the larger context of an exchange of multiple messages. Such an examination showed how an apparently simple information request was actually a message rich with information and subtle meaning. Exhibiting the capability of handling equivocal information, email was demonstrated to act as a rich medium.

Second, Lee (1993) examined managerial email exchanges from a practical knowledge perspective. In his investigation, richness was defined, not as an invariant property of the media channel (Daft and Lengel, 1984), but as an emergent property of the interaction between the communication medium and its organizational context (Lee, 1993, p. 144). Applying the integrated framework of the technical and practical knowledge perspectives (Lee, 1991), the richness of a single email message carried extensive meaning beyond what the original author intended. Recipients of the email appropriated and acted on the message to build an understanding suitable to their socially constructed organization. The email quickly became distanced from the original sender, such that the message took on a life of its own within the organization. Such events extend the original MRT work by suggesting media low on the richness scale were able to carry messages with rich meaning beyond what the original author intended.

Redefining MRT: An Emancipatory Knowledge Perspective

Examining MRT from an emancipatory perspective, Ngwenyama and Lee (1997) applied the critical social theory of Jürgen Habermas (1987) to earlier media richness work of Daft and Lengel (1984) and Markus (1994). Ngwenyama and Lee proposed that a critical perspective goes beyond the perspectives of positivism and

interpretivism, and examines how individuals enter periods of critical reflection, challenge validity claims, enter communication breakdowns, and achieve subsequent resolution of those breakdowns.

In particular, they offered a theoretical perspective through which a new theory of media richness was developed (Ngwenyama and Lee, 1997, p. 163). They proposed Habermas' theory of communicative action as a new definition of communication richness. Using this perspective, communication richness was examined, not in a hypothetico-deductive manner, but from an inductive, critical approach. This approach examined communication between actors to determine whether richness was occurring, based on the ability of actors to resolve communication breakdowns through the challenge of validity claims. In the analysis, Ngwenyama and Lee examined dialogue between three communication participants engaged in the social action of communicative action. They found that media richness did exist, based on the emergence of challenged validity claims, communication breakdowns, and the resolution of those breakdowns.

Ngwenyama and Lee's analysis took the perspective that media richness either existed or did not exist. That is, if validity claims were challenged through the communication channel, and resolutions occurred, the channel was rich. Likewise, if validity claims were not challenged and resolutions did not occur, the channel was not rich. The current research states that this dichotomous thinking is too limited in scope. While the presence of media richness can be determined through the challenge of validity claims and the resolution of communication breakdowns, richness can also *vary* with an increase or decrease in the number of validity claims challenged across

time, and the subsequent resolution of communication breakdowns. This idea is examined by applying tenets of Habermas' theory of communicative action to channel expansion theory.

Channel Expansion Theory

Channel expansion theory (CET) (Carlson, 1995; Carlson and Zmud, 1999) extended the findings of media richness theory (Daft and Lengel, 1984) beyond its original prescriptive structure, exploring how individuals perceive the capacity of a communication channel, fluctuating over time. As discussed, MRT suggested that media channels, such as email, have characteristics associated with them that provide varying degrees of capability to handle message equivocality. However, contrary to what MRT proposed, empirical research showed that messages high in equivocality *are* able to be carried across lean media (Lee, 1994; Markus, 1994; Ngwenyama and Lee, 1997). The ability to carry information is not only about the technology characteristics described by Daft and Lengel, but also about such factors as social situations (Fulk, 1993; Schmitz and Fulk, 1991) and the contextual setting (Ngwenyama and Lee, 1997).

Carlson (1995) and Carlson and Zmud (1999) proposed that a channel's perceived richness expands over time, based on knowledge building experience with: (1) the channel, (2) the message partner, (3) the message topic, and (4) the organizational context. A knowledge building experience is an experience that contributes to the encoding and decoding of a message (Carlson and Zmud, 1999). In the initial cross-sectional study, Carlson found knowledge building experiences with

the channel, message partner, topic, and organizational context all to be significant indicators of *perceived* media richness (Table 8) and subsequent channel expansion.

<i>Measured Variable</i>	<i>T</i>	<i>P</i>
Experience with Channel	4.974	0.0000
Experience with Partner	3.213	0.0016
Experience with Topic	1.726	0.0862
Experience with Context	2.531	0.0123

Table 8.
Cross-Sectional Results: Experiences on Perceived Media Richness (Carlson, 1995)

A follow-up, longitudinal study was performed by Carlson to determine the impact of the aforementioned knowledge building experiences on perceived media richness and channel expansion in an experimental setting. The findings of the second study indicated that knowledge building experience with message topic was not a significant indicator of perceived media richness.

Three possibilities exist to explain the lack of significance in the topic-perceived media richness relationship. First, knowledge building experience with a message topic is not important in determining channel expansion. Second, the measurement instrument used did not correctly measure the impact knowledge building experiences with message topic played on perceived media richness. Third, deficiencies in the task-technology fit profile used by Carlson impacted the expansion process with respect to the task topic. That is, CET did not address the relationship between the technology and the task further than MRT required. In selecting a communication channel low on the media richness continuum, Carlson provided a task-technology fit profile based on the normative characteristics described by MRT.

These characteristics are based only on the *communication characteristics* of the technology, without addressing aspects of the technology that go beyond these characteristics. Additional work that has examined task-technology fit profiles based only on communication characteristics, as defined by MRT, has also met with limited success (McGrath and Hollingshead, 1993; Suh, 1999; Mennecke et al., 2000).

In addition to the insignificant findings of knowledge building experiences with the message topic, CET examined the shape of the channel expansion curve that individuals undergo when using a channel and gaining experience with that channel. Carlson originally proposed an S-shaped curve, such that the perceived media richness would be low when the channel is first used and would increase over time toward a leveling-off point (Figure 3).

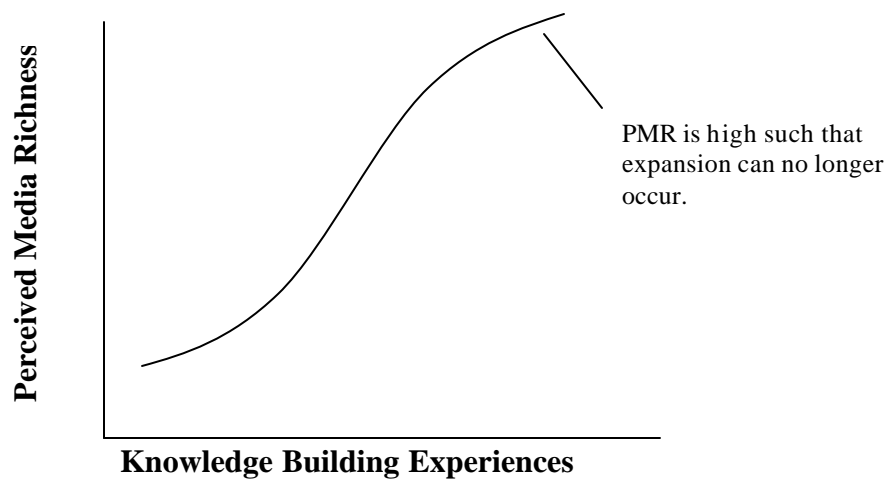


Figure 3.
Perceived Media Richness/Knowledge Building Experience S-Curve (Carlson, 1995)

The proposed S-shaped expansion curve was not found to exist. Instead a U-shaped curve was discovered, suggesting an acclimation period that technology users undergo prior to channel expansion. A reexamination of this curve could provide additional understanding and support for the channel expansion process with respect to how groups appropriate and use communication channels.

The current research explores two lines of inquiry with respect to CET, through the integration of three theories. First, it extends the work of Ngwenyama and Lee (1997) to employ tenets of Habermas' theory of communicative action to reconstruct the process of channel expansion, a reproduction of the concepts of CET, examined through the lens of TCA. Through the examination of group communication, entry into social actions, the challenge of validity claims, and the resolution of communication breakdowns, the process of channel expansion is investigated.

Second, the technical inner layer used by Carlson (1995) through the task-technology fit relationship provided by MRT is reexamined. As the task-technology relationship in MRT has contributed to inconsistent findings in both earlier MRT work and the current CET work, a reexamination of this relationship through the application of the theory of task-technology fit (Zigurs and Buckland, 1998) provides strengthening of the original CET model.

Task-Technology Fit

Studies on task-technology fit have been varied and numerous. Some have *proposed* task-technology fit relationships (McGrath and Hollingshead, 1993; Goodhue and Thompson, 1995; Zigurs and Buckland, 1998) and others have *explored*

task-technology fit relationships (Hollingshead et al., 1993; Suh, 1999; Mennecke et al., 2000; Shirani et al., 1999; Zigurs et al., 1999). Here, both proposed and explored TTF relationships are presented in more detail to provide a clearer picture of what defines task-technology fit and to illustrate how task-technology fit plays a crucial role in the current research.

Task-Media Fit Hypothesis

The task-media fit hypothesis (McGrath and Hollingshead, 1993) is based on a matrix that identifies task information richness requirements and media channels providing increasing levels of richness. This work is an extension of earlier MRT work, attempting to explain earlier inconsistencies. In their proposition, McGrath and Hollingshead stated that the more interdependent a task is between communication participants, the greater the channel richness required to support the task. Channels are “fit” to appropriate tasks based on their ability to support participant interdependent tasks. Tasks are defined as idea, intellectual, judgment, and negotiation. Idea tasks result in the generation of ideas and plans. Intellectual tasks result in choosing a correct answer. Judgment tasks result in choosing a preferred answer. Negotiation tasks result in solving conflicts of interest (McGrath and Hollingshead, 1993).

Mixed support for the task-media fit hypothesis was reported by Hollingshead et al. (1993), Suh (1999), and Mennecke (2000). The studies found performance differences between groups for negotiation and intellectual tasks, but not for decision or generation tasks (Hollingshead et al., 1993), no difference in satisfaction or performance measures (Suh, 1999), and improper placement of media channels in the

task-media fit continuum based on decision quality and decision time (Mennecke, 2000).

Several solutions were proposed for the mixed findings in the examination of the task-media fit hypothesis. First, Suh (1999) proposed that the MRT continuum might be more compact than originally thought. That is, richness between media is difficult to determine due to the similarities between channels, therefore impacting the task-media fit hypothesis. Second, Mennecke et al. (2000) proposed that media may be required to vary in its richness capabilities according to the needs of the group using the media. They supported the perspective that media and task characteristics do not fully explain group performance.

The task-media fit hypothesis has proven to be a useful model in presenting and exploring the concept of the task-technology relationship. However, as the model is largely based on the richness continuum of Daft and Lengel (1984), shortcomings of the task-media fit hypothesis can likely be attributed to shortcomings of the MRT continuum.

Task and Technology Fit

A model of *individual* task and technology fit was set forth by Goodhue and Thompson (1995). The model was used to explore how individual task and technology fit profiles improve user performance (Jarvenpaa, 1989; Vessey, 1991) and technology utilization (Fishbein and Ajzen, 1975; Baroudi et al., 1986; Davis, 1989). As shown in Figure 4, perceived performance impacts were explored through a task and technology fit profile and utilization.

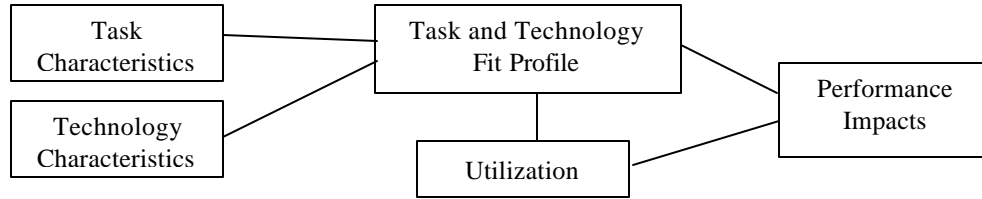


Figure 4.
Task and Technology Fit Model (Goodhue and Thompson, 1995, Figure 3)

In Figure 4, task characteristics are based on non-routineness, interdependence, and job title. Non-routineness is how often an individual performs an ad-hoc, ill-defined task. Interdependence is the coordination that is needed by an individual to complete a task between organizational units. Job title is used as an indicator of the types of tasks that people within an organization perform (Goodhue and Thompson, 1995). Job title was not defined or explored further in the original study.

Technology characteristics are defined as the technology used and the department within which the technology is used. The study assumed that all technologies have the same characteristics. As opposed to looking at any specific characteristic of a system, the technology was defined as the number of different systems used. This approach allowed for the capture of differences between technologies without the explicit definition of those differences. In addition, the department within which the technology is used captures the influence the department has on technology use (Goodhue and Thompson, 1995).

Task and technology characteristics then produce a fit profile. This profile is defined by eight measures including data quality, locatability, authorization,

compatibility, timeliness, reliability, ease/training, and relationship (Goodhue and Thompson, 1995). In the study, users first defined task and technology characteristics based on a current task and technology combination and then identified the fit profile based on the aforementioned fit characteristics.

Once a fit profile was identified as proper or improper, performance and utilization were assessed through self-reported perceived impact measures. The findings suggested that through user evaluations, task and technology fit profiles are a function of task and technology characteristics and fit profiles are a significant indicator of perceived user performance.

This model was directly examined and met with limited success (Goodhue et al., 2000). In the examination, individual task and technology fit profiles affected performance and users were able to identify what the underlying task and technology fit profiles were. Task and technology fit profiles were however not found to be useful *predictors* of individual performance, leading to limited support of the original model.

The Goodhue and Thompson (1995) model has been extended to incorporate the technology acceptance model (Davis et al., 1987; Marcolin et al., 2000) and to look beyond individual perceptions and toward group performance by Shirani et al. (1999). Ultimately, the model developed by Goodhue and Thompson (1995) has proven useful in exploring individual use of task and technology and warrants continued examination.

The Theory of Task-Technology Fit

The theory of task-technology fit (Zigurs and Buckland, 1998) can be used to extend the fit profiles used in MRT (Daft and Lengel, 1984; 1986), the task-media fit hypothesis (McGrath and Hollingshead, 1993), and Goodhue and Thompson's (1995) task and technology fit model. This is accomplished through prescriptions based on group task-technology fit profiles around technology characteristics of information support, process structure, and communication support, and task characteristics based on Campbell's (1988) task complexity definitions.

The theory of task-technology fit differs from the aforementioned task and technology fit models in three key ways. First, the theory of TTF defines five *task types*: simple, problem, decision, judgment, and fuzzy. The task types are based on complexity features of Campbell (1988) (Table 9).

<i>Task Characteristics</i>	<i>Task Type</i>				
	Simple	Problem	Decision	Judgment	Fuzzy
Outcome Multiplicity	No	No	Yes	No	Yes
Solution Scheme Multiplicity	No	Yes	No	No	Yes
Conflicting Interdependence	No	Yes or No	Yes or No	Yes or No	Yes or No
Solution Scheme/Outcome Uncertainty	Not Applicable	Low to High	Low to High	Low to High	Low to High

Table 9.
The Theory of Task-Technology Fit: Task Categories (Adapted from Zigurs and Buckland, 1998)

Outcome multiplicity is when a task has more than a single acceptable outcome. Solution scheme multiplicity refers to a task having more than one course of action to obtain a single goal. Conflicting interdependence is when one solution

scheme conflicts with another for the same task, and both are mutually exclusive. Solution scheme/outcome uncertainty is the uncertainty that a particular solution scheme will lead to an optimal output (Zigurs and Buckland, 1998).

Second, the theory of TTF defines three dimensions on which to classify a *technology*. It is through these three technology dimensions that proper fit profiles are prescribed. The technology dimensions include communication support, process structure, and information processing (Table 10).

<i>Dimension</i>	<i>Examples of Dimension Elements</i>
Communication Support	<ul style="list-style-type: none"> • Simultaneous and Anonymous Input • Input Feedback • Group Display
Process Structuring	<ul style="list-style-type: none"> • Agenda Setting and Enforcement • Facilitation • Complete Record of Group Interaction
Information Processing	<ul style="list-style-type: none"> • Gather Information • Aggregate Information • Structure Information

Table 10.
The Theory of Task Technology Fit: Technology Dimensions and Elements
(Adapted from Zigurs and Buckland, 1998)

Third, *fit* is defined as “ideal profiles composed of an internally consistent set of task contingencies (task complexity dimensions) and GSS elements (technology dimensions) that affect group performance” (Zigurs and Buckland, 1998, p 323). Fit is treated as a contingency between two variables (task and technology) and a resultant dependent variable (group outcomes) (Figure 5).

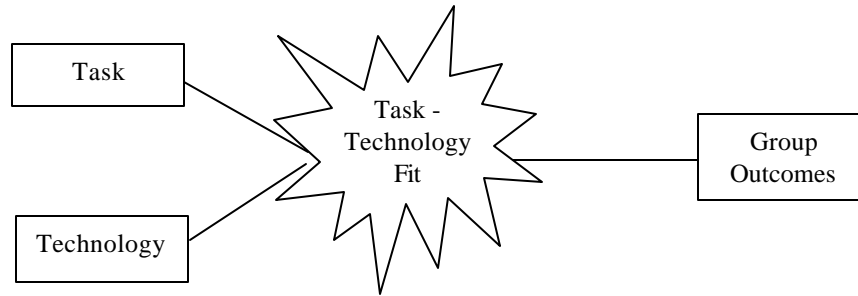


Figure 5.
The Theory of Task-Technology Fit Relationship

Zigurs and Buckland developed a series of propositions that bring tasks and technology together to define appropriate fit profiles. For example, a simple task such as brainstorming has a single outcome, a single solution scheme, and no conflicting interdependence. The simple task only requires communication support based on the need to exchange ideas without process structure or information processing hindering the process (Zigurs and Buckland, 1998). Table 11 displays the full set of fit profiles.

<i>Task Type</i>	<i>Technology Characteristics</i>		
	Communication Support	Process Structuring	Information Processing
Simple	High	Low	Low
Problem	Low	Low	High
Decision	Low	High	High
Judgment	High	Low	High
Fuzzy	High	Medium	High

Table 11.
The Theory of Task-Technology Fit Profiles (Adapted from Zigurs and Buckland, 1998)

The theory of task-technology fit was tested through the exploration of previous literature (Zigurs et al., 1999). Using the theory of task-technology fit to

explain inconsistent findings in previous GSS literature, Zigurs et al. (1999) explored 37 experimental studies and 20 different tasks to determine the impact fit profiles had on group outcomes. Tasks and technologies were coded to provide consistency between studies, according to the five complexity and three technology dimensions of the theory.

The examination by Zigurs et al. (1999) was based around group support systems (GSS) to provide matched or mismatched fit profiles and the subsequent impact on group outcomes. The results (Table 12) indicate that the theory of task-technology fit is generally consistent. The examination of TTF found that groups using a proper task-technology fit GSS performed better than groups not using a GSS, and that mismatched GSS fit profiles resulted in worse or similar performance than groups not using a GSS. In addition, groups with matched GSS fit profiles performed better or the same as groups not using a GSS.

<i>Task Type</i>	<i>Results with Matched Fit Profiles</i>	<i>Results with Mismatched Fit Profiles</i>
Simple	GSS better, 3 studies	GSS better, 1 study GSS same, 1 study
Problem	GSS better, 1 study	Not Tested
Decision	Not Tested	GSS same, 1 study
Judgment	Not Tested	Not Tested
Fuzzy	GSS better, 3 studies GSS same, 1 study	GSS worse, 4 studies GSS same, 2 studies

Table 12.
The Theory of Task-Technology Fit Findings (Zigurs et al., 1999, Table 9)

As shown in Table 12, not all tasks were examined with systems that provided proper or improper fit profiles. Also, no individual study examined proper and

improper fit profiles within a single technology with the same task. The current research explores both of these opportunities. First, this research explores a single technology and configures the technology to provide proper and improper fit profiles to different groups. Second, this research explores decision tasks, which, as indicated in Table 12, have not been explored beyond mismatched fit profiles. Through the incorporation of TTF and CET, both aforementioned examinations are provided for a richer examination of the theory of task-technology fit.

This chapter provided an overview of the two foundational theories explored in this research. First, channel expansion theory (Carlson, 1995) provides a foundation upon which to explore the communication channel use process. Through the application of tenets of the theory of communicative action, group dialogue is examined to provide a new definition as well as a reconstruction of the channel expansion process. Second, the original model of CET is extended through prescriptions set forth in the theory of task-technology fit. In addition to directly examining TTF, CET is extended beyond its original perspective to determine the impact of normative technology characteristics on the communication channel use process.

Chapter V

Research Model and Questions

Several opportunities have been identified in both channel expansion theory and the theory of task-technology fit. These opportunities include the exploration of decision tasks under the TTF model, the examination of varying task-technology fit profiles on a single technology, the strengthening of the task-technology fit profile in CET, and the reconstruction of CET through tenets of TCA. By bringing these three theories (CET, TTF, and TCA) together, a cohesive model is developed to address all four of the aforementioned opportunities through the investigation of virtual group communication.

Research Model: Task-Technology Fit and Channel Expansion

The theory of task-technology fit provides a technical inner layer to examine how technology impacts the group communication process. Used in conjunction with channel expansion theory, the impact of technology characteristics on a communication channel's capacity to expand is examined.

In addition, the examination of TTF from a longitudinal approach provides a new inquiry into the theory. The original model of TTF was examined in cross-sectional settings, never extending the model beyond a single point in time. The current research not only explores the impact of task-technology fit profiles on channel richness at a single point in time, it also explores its impact on the channel expansion process across multiple, sequential time periods.

To begin the integration of these two theories, a closer examination of the CET research model is provided. The model of CET is a modified version of a larger model that examines both information and media richness perceptions (Figure 6).

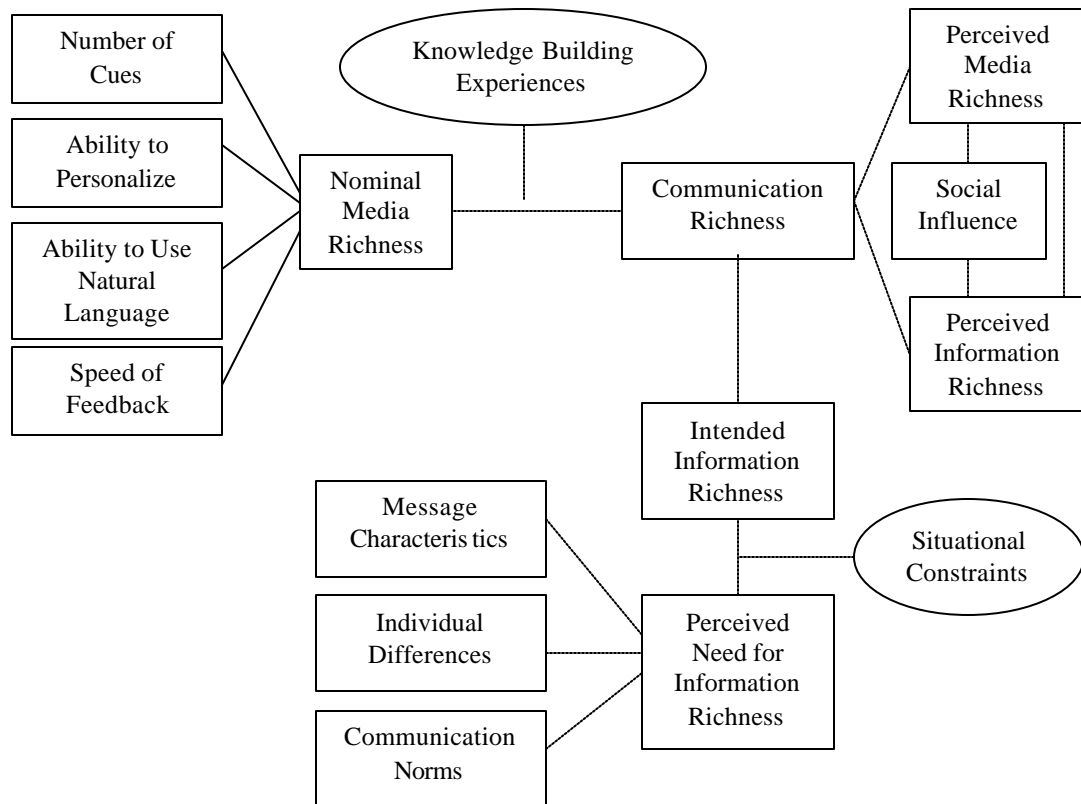


Figure 6.
Model of Media Richness and Information Richness (Carlson, 1995, Figure 3-1)

Nominal media richness is developed through channel characteristics set forth by Daft and Lengel (1984; 1986) and impacted by knowledge building experiences an individual has with the channel, topic, context, and communication partner (Carlson, 1995). In this model, nominal media richness and intended information richness are precursors to communication richness. Distinct from nominal media richness and

intended information richness, communication richness is the actual richness in use during communication. In other words, communication richness is the capacity of the channel (nominal media richness) and its interaction with a user's perceived need for information (intended information richness). The model continues, illustrating that perceptions of media and information richness are a function of communication richness. In addition, both media and information perceptions influence the other, and both perceptions are shaped by social influence.

Through a series of assumptions, Carlson (1995) reduced the model to explore the impact that knowledge building experiences and social influence have on perceived media richness. Such assumptions included the examination of a single channel, multiple communication events, and group communication. The final research model by Carlson is shown in Figure 7.

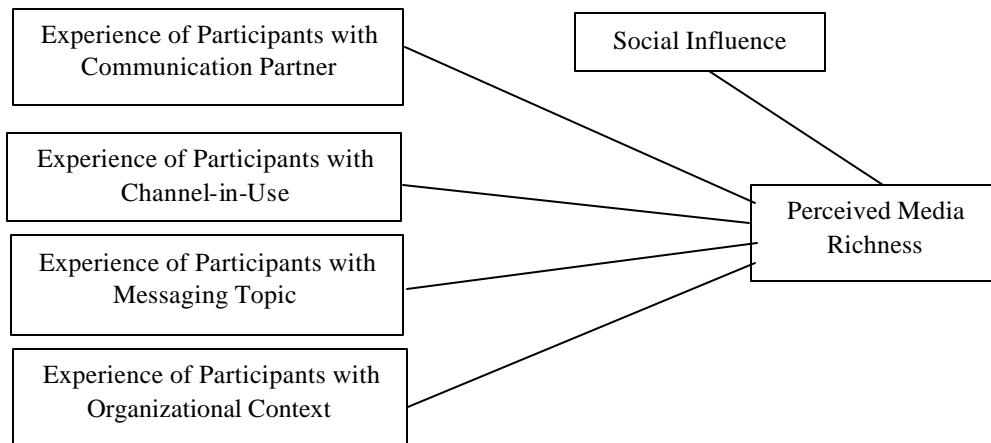


Figure 7.
CET Research Model (Adapted from Carlson, 1995)

Similar to the Carlson study, this research focuses not on the intended information richness of a system, but on the characteristics of the channel and the impact that knowledge building experiences have on the channel. The modifications to Carlson's research model occur on three fronts. First, social influence is not examined because social influence is a factor used when determining richness *perceptions*. This study does not explore perceptions, but explores the ability of the channel to provide richness objectively. That is, this examination does not explore the model presented in Figure 6 beyond the "communication richness" factor.

Second, this research modifies the model used by Carlson (1995) to incorporate fit profiles based on the theory of task-technology fit. As the fit profile used by Carlson is suggested to be too limited in its design, aligning task characteristics and technology dimensions will strengthen the normative media characteristics as described in Figure 6.

Third, knowledge building experiences with topic, partner, and context are not directly examined as part of the current research. While they are still considered important components of the channel expansion process, their influence is assumed to be equal across all groups. Figure 8 represents their importance, illustrating that they are not examined as part of the current research. The final research model used in this study is shown in Figure 8.

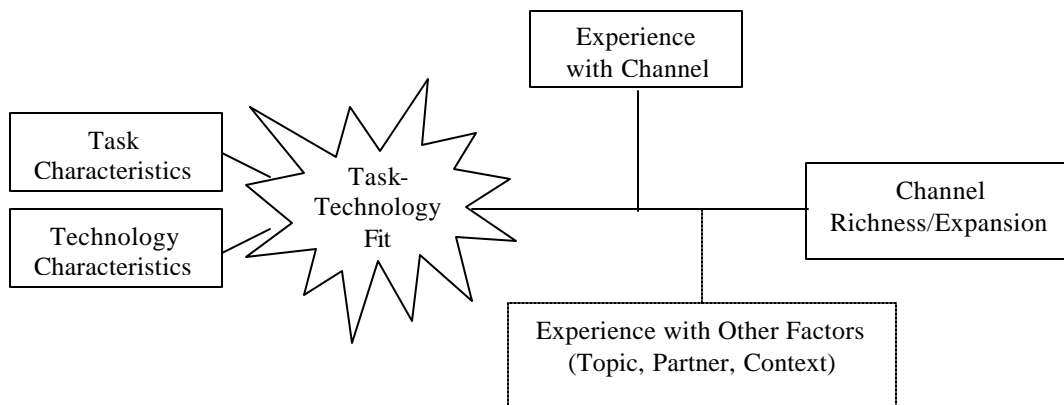


Figure 8.
Research Model

Procedural Model: The Reconstruction of Channel Expansion

Through the manipulation of the task-technology fit profile, the impact of TTF on CET is determined. This determination is made through an initial reconstruction of the CET process through tenets of TCA, followed by a reconstruction of the channel expansion process accounting for the impacts of TTF. Both reconstructions of the CET process are framed around a procedural model that explores social actions, challenged validity claims, communication breakdowns, and resolutions. Table 13 recalls the definitions of each of these components.

<i>Term</i>	<i>Definition</i>
Social Action	Various rational communicative instances in which individuals engage in the form of instrumental, strategic, discursive, and communicative.
Validity Claim	Statements of truth, sincerity, normative rightness, and comprehensibility that occur within every communicative act.
Communication Breakdown	Communication acts that are false, incomplete, insincere, or unwarranted.
Resolution	Communication acts that accept a challenged validity claim to restore truth, sincerity, normative rightness, or comprehensibility.

Table 13.
Definition of Terms Used in the Reconstruction of Channel Expansion

In the procedural model, six relationships are examined in the reconstruction of CET through tenets of TCA. First, as the communicative act is the unit of analysis, all acts occur within a social action, through a communication type (synchronous or asynchronous communication), and on a message type (topic, process structure, or “other”). Table 14 shows the definitions of each term.

		<i>Definition</i>
<i>Social Action</i>	Communicative	Intended to achieve mutual understanding between communication partners.
	Discursive	Resolves disagreement to produce generalizable interests between communication partners.
	Instrumental	A communication sender attempts to directly manipulate a receiver to serve the sender’s needs.
	Strategic	A communication sender attempts to influence a communication receiver through communication.
<i>Communication Type</i>	Synchronous	Chat room based communication
	Asynchronous	Message board based communication
<i>Message Type</i>	Topic	Concerned with the central task topic.
	Process Structure	Concerned with task coordination and timing, work distribution, and statements regarding completed work
	Other	Often focused on humor, greetings, and issues regarding the technology.

Table 14.
Channel Expansion Foundational Component Definitions

By better understanding the generation of communication acts, the foundational component relationships of social actions, communication type, and message type represent essential aspects of the channel expansion process as determined through tenets of TCA.

Second, challenged validity claims are treated as a deconstruction of the communication breakdown. While all communicative acts generate claims of validity, not all validity claims are challenged. The current research explores the presence and occurrence of *challenged* validity claims resulting in communication breakdowns.

Third, through the generation of communicative acts, communication breakdowns may occur on the dialogue. Examining the relationship between the foundational components and communication breakdowns aids the understanding of the channel expansion process as breakdowns are essential precursors to resolutions.

Forth, the relationship between communication breakdowns and resolutions is explored. Resolutions of communication breakdowns represent channel richness and subsequent channel expansion. Returning to Habermas, as individuals strive toward the ideal speech situation, one of their goals is the creation of a communicative environment that allows for the challenge and subsequent justification of all validity claims. The current research views the resolution of communication breakdowns as a move toward the ideal speech situation, thus providing the capacity for a richer communicative environment. Figure 9 shows the procedural model.

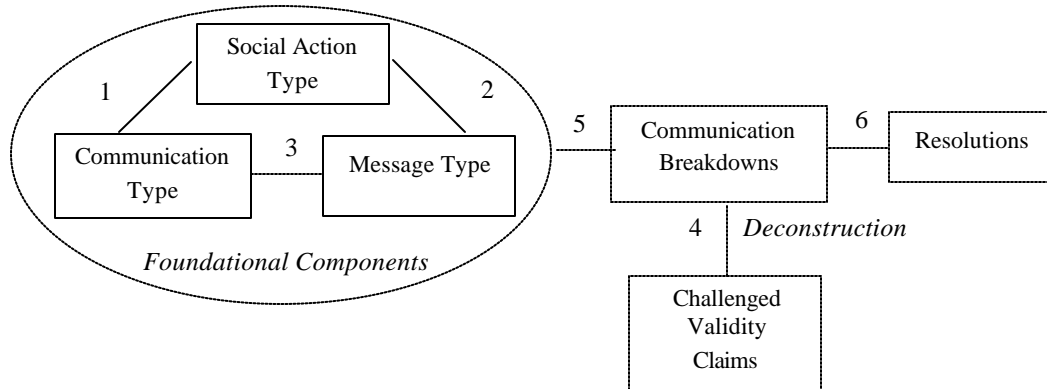


Figure 9.
Procedural Model: Reconstruction of CET Through Tenets of TCA

The Reconstruction of Channel Expansion: An Example

Channel expansion theory states that as communication partners gain experience with the communication channel, other team members, and the message topic, media richness varies. Carlson (1995) originally examined this idea through the use of survey instruments and found that a communication channel can vary in perceived richness, indicating channel expansion. The perspective of TCA provides a lens through which to examine channel expansion theory by analyzing dialogue between group members. Specifically, this example explores the entry into social actions, challenged validity claims, communication breakdowns, and the resolution of communication breakdowns, extending the use of these components as a dynamic measure of channel expansion.

Using components of TCA, channel expansion is determined based on the ability of the technology to (1) support communicative acts within social actions leading to (2) the use of validity claims leading to (3) the challenge of more validity

claims over time leading to (4) more communication breakdowns over time leading to (5) the resolution of more breakdowns over time (Figure 10).

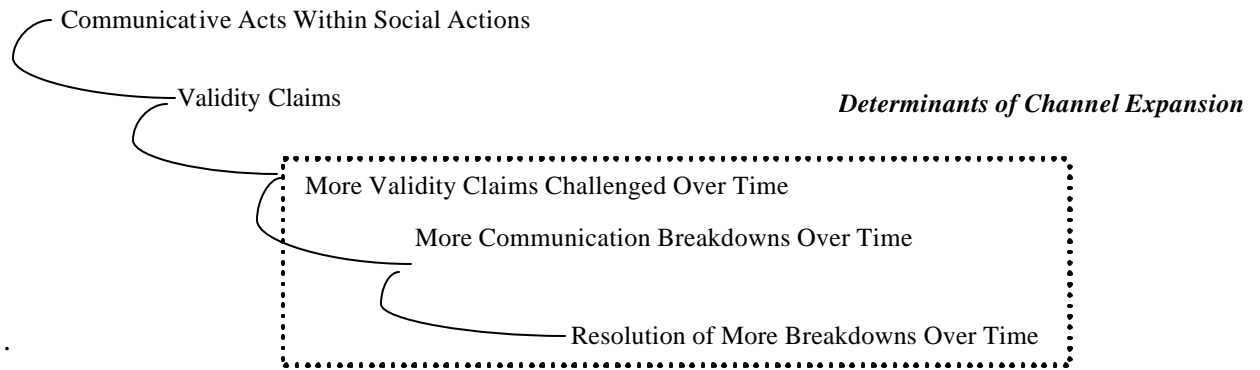


Figure 10.
Determinants of Channel Expansion from a Critical Perspective

Determining Channel Richness and Channel Expansion: An Example

To illustrate channel expansion as determined through communicative acts, social actions, challenged validity claims, communication breakdowns, and the resolution of those communication breakdowns, dialogue between group members is examined across three time periods. This example looks at dialogue from time period one, identifying challenged validity claims, communication breakdowns, and the resolution of those breakdowns. Dialogue from time periods two and three is represented in summary form to identify channel expansion as determined through tenets of TCA.

In this example, group members used an integrated web communication system that supported both synchronous and asynchronous communications to perform a three-part task. The task was built around the task framework used by

Carlson (1995), requiring group members to discuss the merits of Internet cookies and to produce three interrelated position papers across three successive time periods. For brevity, not all the messages in time period one are examined. Instead, sample messages that produced challenged validity claims, communication breakdowns, and resolutions are examined (Table 15).

<i>Message No.</i>	<i>Date</i>	<i>Time</i>	<i>From</i>	<i>Message</i>
101	3/7/01	2:04:47	Tom	Tell me about cookies.
102	3/7/01	2:05:12	Tom	Do you think they are good or bad?
103	3/7/01	2:05:48	Sue	I think that they are good for certain businesses ex: [online book stores].
104	3/7/01	2:06:22	Sue	but I do not think that people should be prohibited from a site b/c they don't have the [cookie].
105	3/7/01	2:06:33	Tom	I agree.
106	3/7/01	2:06:39	Tom	What about sharing information?
107	3/7/01	2:07:09	Sue	Sharing is okay if the user is informed about it and agrees to it, not behind their back.
108	3/7/01	2:07:17	Tom	Sharing information with other companies, that's what I meant.
109	3/7/01	2:07:56	Sue	That is what I meant too...they can share if the user agrees.
110	3/7/01	2:09:01	Tom	Should [there] be laws made to prevent companies from using cookies in certain ways?
111	3/7/01	2:09:37	Sue	If it violates personal privacy yes...credit card info should not be shared.
112	3/7/01	2:10:32	Sue	I think that if there is an agreement [between] a user and a company there is no problem.
113	3/7/01	2:10:59	Sue	I don't like the idea of my info being passed around, but I just deal with it.

Table 15.
Reconstruction of Channel Expansion Example: Time Period One Dialogue

Richness in time period one was determined through group members' ability to challenge validity claims and resolve communication breakdowns resulting from those challenges. Concerned with gaining and maintaining a mutual understanding, group members were engaged in two separate instances of the social action, *communicative action*. During the first instance of communicative action, M102

appeared to be a straightforward question sent from Tom to Sue. In Sue's responses to Tom, M103 and M104 indicate that she believed M102 to be a simple question asking the virtues of Internet cookies. More specifically, M103 directly addressed how cookies are "good" and message 104 directly addressed how cookies are "bad."

Messages 106 and 110 from Tom extend the meaning of M102 beyond the original "good" or "bad" dichotomous question and toward a deeper question that elaborated on the impacts of good and bad uses of Internet cookies. While M102 was still the same set of words that were originally sent at time 2:05:12, the meaning of M102 was extended with the inclusion of M106 and M110.

In the case of M102, Sue originally had no reason to extend the meaning of the question to include the issues presented in M106 and M110. Messages 106 and 110 resulted in a breakdown of the original understanding of M102, prompting Sue to challenge the validity claim of *completeness* upon receiving M106 and M110. Addressing the completeness of the original question, Sue indicated that she understood the extended meaning of M102 by replying to both M106 and M110 with additional responses to Tom in the form of messages 107, 108, 111, and 112. By addressing the communication breakdown caused by M106 and M110, Sue resolved a communication breakdown that occurred on M102.

In addition to M106 and M110 causing a communication breakdown on M102, M107 produced a second communication breakdown that occurred within *communicative action*. Tom used M106 to ask Sue what she thought about companies sharing cookie information with other companies. Tom experienced a communication breakdown on M106, as indicated at M108, when he believed that Sue had

misunderstood his original question at M106. Attempting to resolve the communication breakdown, Tom challenged the validity claim of *clarity* at M108. The challenge was shown to be successful in improving the clarity of the communication as indicated in M109 when Sue replied to Tom that she was in agreement with his concern.

A total of 52 messages were generated during time period one within which three communication breakdowns occurred. The validity claims of completeness and clarity were challenged with all communication breakdowns being resolved in time period one.

The final two time periods are presented in summary form to highlight communication breakdowns and their subsequent resolution. A total of 97 messages were generated between the group members during time period two. Within those 97 messages six communication breakdowns occurred and five of the six communication breakdowns were resolved.

A total of 33 messages were generated between the group members during time period three. Two communication breakdowns occurred between the group members with group discussions leading to the resolution of both breakdowns.

Recalling that the dynamic view of media richness is represented as the number of resolved communication breakdowns, the three time periods examined in this example illustrate an expansion in channel richness between time periods one and two and a reduction in richness between time periods two and three. This is shown in Figure 11.

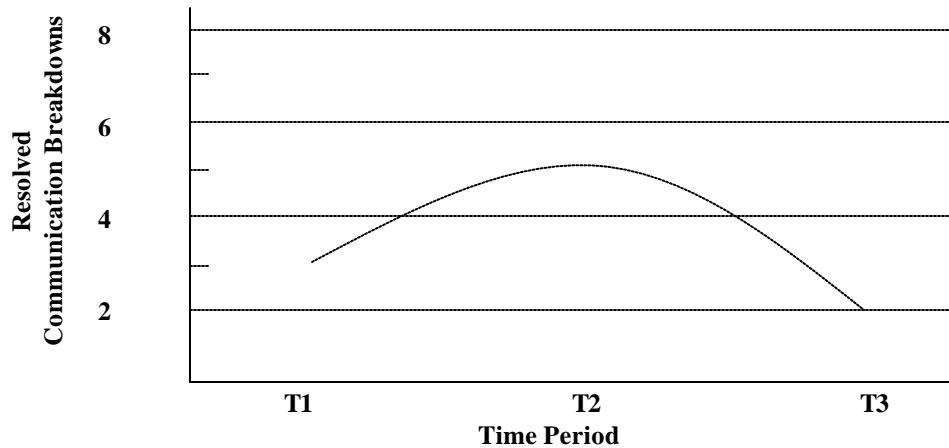


Figure 11.
Reconstruction of Channel Expansion Example: Change in Resolved Communication Breakdowns

This example illustrated how communication breakdowns and their subsequent resolution can be used to reconstruct the channel expansion process. However, the impact of the number of communicative acts generated over each time period can prove deceptive as a greater number of communicative acts often translate to a greater number of communication breakdowns and resolutions.

Two views of the data provide complementary analyses that remove the impact of the volume of communicative acts. First, the ratio of resolutions per communication breakdowns indicates how *effectively* the communication channel was used. As communication breakdowns arise, using the communication channel to achieve resolution is an effective pursuit (Habermas, 1984). Figure 12 illustrates how this view shows a U-shaped curve, indicating the greatest channel *effectiveness* at time periods one and three.

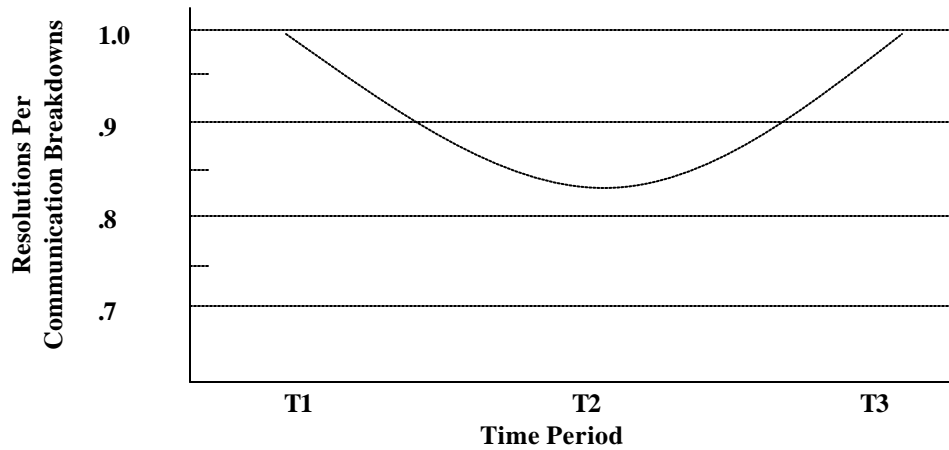


Figure 12.
Reconstruction of Channel Expansion Example: Resolutions/Communication Breakdown (Effectiveness)

Second, the number of resolutions per communicative act indicates how *efficiently* the communication channel was used. As resolutions increased, irrespective of the *volume* of communicative acts, the channel was used in a more efficient manner. Figure 13 displays a U-shaped curve, indicating that the communication channel was used most efficiently at time periods one and three.

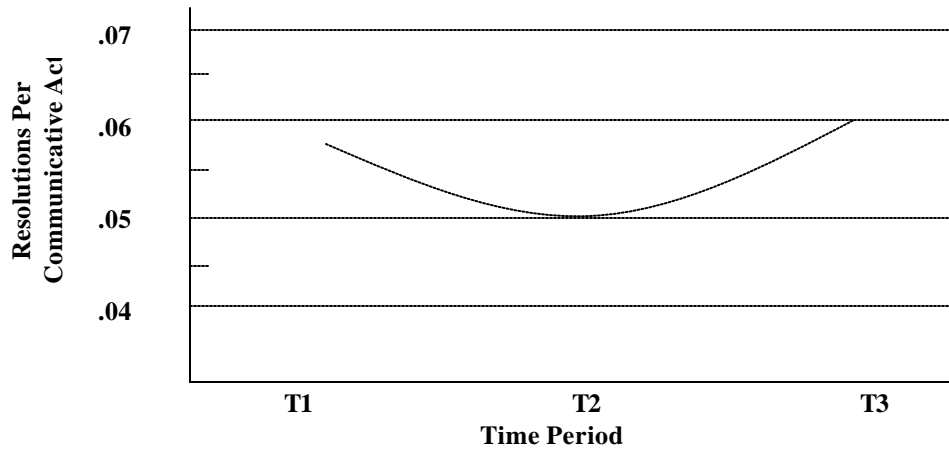


Figure 13.
Reconstruction of Channel Expansion Example: Resolutions/Communicative Act (Efficiency)

The views of effectiveness (Figure 12) and efficiency (Figure 13) show complementary views of the channel expansion process. Together the views provide a holistic view of the channel expansion process, exploring the capacity of the communication channel and how it evolves over time. First, the ratio of resolutions per communication breakdown (Figure 12) illustrated that while the communication channel supported fewer communication breakdowns upon which resolutions could be provided, the effectiveness of group members in resolving communication breakdowns varied over time.

Second, as channel expansion is defined as a change in the resolution of communication breakdowns, the relationship between resolutions and communication breakdowns is embedded in social actions, resulting in a need to account for the communicative act. The figure of efficiency (Figure 13) accounts for resolutions achieved in relation to the communicative act, providing a useful picture of the channel expansion process. Together, both views show that the group's use of the

communication channel to resolve communication breakdowns and to support a greater number of communicative breakdowns and subsequent resolution varied over time, reconstructing the channel expansion process similar to that of Carlson (1995).

This example provided a process related view of channel expansion accounting for the impact of communicative acts, social actions, challenged validity claims, communication breakdowns, and resolutions have on the channel expansion process. In addition, this example showed that tenets of TCA can be used to illustrate channel expansion as a variable process from both an effectiveness and efficiency perspective.

A Critical Investigation: The Theory of Task-Technology Fit

As an important aspect of this research is the determination of the impacts that task-technology fit profiles have on the channel expansion process, the use of tenets of TCA not only apply to CET but also to TTF. Early examinations of TTF focused on performance measures as indicators of task-technology fit profiles being appropriate. Such measures include number of group iterations to conclusion, group satisfaction, and individual deliverable quality (Zigurs et al., 1999).

Not based around measures of satisfaction or deliverable quality, the application of TCA extends TTF beyond its original design. In the current research, communication is used as the measure of performance and is defined as the dynamic process through which two communication partners verbally exchange information in the production of knowledge and the management of activities. As used in the current research time between exchanges was bound within the six-week project. The application of TCA to TTF examines the impact task-technology fit profiles have on

group communication, channel richness, and the subsequent channel expansion process as determined through communicative acts to the resolution of communication breakdowns. With this, TCA is not only used to examine the channel expansion process, but also to examine the impact task-technology fit profiles have on this process.

Research Questions

Channel expansion is determined based on the ability of technology to provide group members an ability to resolve communication breakdowns. Channel expansion is then a consequence of entry into social actions and the challenge of validity claims resulting in communication breakdowns. With this, examination of social actions, challenged validity claims, and communication breakdowns will occur along with a resolution of communication breakdowns.

First, social actions are essential in the determination of channel expansion. Entry into social actions by group members is a precursor to validity claims, challenges of those claims, and the subsequent resolution of communication breakdowns. Beyond being a precursor to the aforementioned issues, an examination of what media types (synchronous or asynchronous) constrain or promote various social actions can prove valuable in further understanding channel expansion through tenets of TCA. Questions regarding social actions include:

- (1) In what social actions do communication partners engage?
- (2) What social actions are engaged in across varying communication types?

Second, the presence of validity claims alone and any subsequent challenge will not act as an indicator of channel richness. Challenges toward validity claims must resolve communication breakdowns between communication partners for channel richness and subsequent channel expansion to exist. In this case, a determination first needs to be made that a communication breakdown has occurred during the social action, as evident in the group dialogue, leading to the third research question:

- (3) Has dialogue between communication partners become false, incomplete, insincere, or unwarranted?

Third, once a communication breakdown is determined, the challenged validity claim upon which the communication breakdown is occurring is identified. As discussed, challenged validity claims are treated as deconstruction of the communication breakdown in the current research. Questions regarding challenged validity claims include:

- (4) What validity claims are being challenged?
- (5) Are the validity claims being challenged consistent with the respective type of social action?

Fourth, with the challenge of a validity claim comes a possible resolution of the communication breakdown. As a resolution is the indicator of the move toward Habermas' ideal speech situation, an increasing number of resolutions is the indicator of channel expansion. Questions regarding the resolution of communication breakdowns, channel richness, and subsequent channel expansion include:

- (6) Are the communication partners engaging in dialogue in an attempt to resolve the communication breakdown?
- (7) Does the group dialogue resolve the communication breakdown?
- (8) Are a varying number of communication breakdowns being resolved over time?

The volume of communicative acts generated may prove to be an influencing factor when determining channel expansion. The effectiveness of the channel, or the ratio of resolutions per communication breakdown, is a useful examination when determining channel expansion. The effectiveness of the channel removes the impact that the *volume* of communicative acts has on the expansion process, exploring how groups effectively resolve communication breakdowns apart from the communicative act.

The efficiency of the channel needs to also be considered when examining channel expansion, in order to understand how well the channel supports communication breakdowns and their subsequent resolution per communicative act. Such an approach also removes the impact that the *volume* of communicative acts has on channel expansion. Still accounting for the importance of the communicative act, the measure of efficiency explores how often groups resolve communication breakdowns within their communicative acts. Both the efficiency and effectiveness measures raise important research questions when studying channel expansion through tenets of TCA, exploring the capacity of the channel and not the performance. Questions are:

- (9) Does the channel expansion process occur from an effectiveness perspective?
- (10) Does the channel expansion process occur from an efficiency perspective?

Fifth, implementing a proper TTF profile is expected to impact channel expansion. This impact is anticipated to occur across social actions, challenged validity claims, communication breakdowns, and the resolution of those breakdowns.

As groups communicate more, they are expected to generate a greater number of social actions, validity claims, communication breakdowns, and resolutions. A communication channel with a proper technological fit is suggested to increase group communication (Yoo and Alavi, 2001), resulting in the aforementioned increase in TCA components. From the perspective of the number of communicative acts generated, implementing a proper TTF profile is expected to result in more communicative acts. Such an increase is anticipated to result in a greater volume of communication breakdowns and subsequent resolutions.

As mentioned, the volume of communicative acts generated may prove to be an influencing factor when determining channel expansion. The efficiency and effectiveness of the channel also needs to be considered when examining the impact of TTF on the channel expansion process. Questions regarding the impact of TTF on channel use are:

- (11) What impact do task-technology fit profiles have on social actions? Communication breakdowns? Challenged validity claims? Resolution of communication breakdowns?
- (12) Does a proper task-technology fit profile result in higher channel richness and channel expansion from an effectiveness perspective?
- (13) Does a proper task-technology fit profile result in higher channel richness and channel expansion from an efficiency perspective?

The questions presented provide the framework around which to build an understanding of the channel expansion process from the socially oriented perspective of TCA. In addition, the affect of fit profiles on channel expansion is provided by examining their impact on social actions, validity claims, communication breakdowns, and subsequent resolutions.

The research questions presented in this chapter represent the process of reconstructing channel expansion and are addressed in two ways. First, questions regarding the occurrence of social action types, challenged validity claims, and the impact of TTF on these occurrences are addressed through a descriptive, quantitative analysis of coded dialogue. Second, the examination of a deeper level of understanding, rooted at identifying the entry into social actions, the entry into communication breakdowns, and the subsequent resolution of those breakdowns is addressed through an interpretive, qualitative approach. Together these two analyses provide a comprehensive view of channel expansion and the impact that task-technology fit profiles have on this process.

Chapter VI

Research Method

This research utilized a single longitudinal study. An experiment was conducted and three data sets were gathered: questionnaire data, group deliverables, and group dialogue. The study used student subjects from two geographically distributed universities. The two person groups were free to discuss issues regarding the topic using synchronous or asynchronous communication tools, at any time of the day, and in any communicative approach they felt useful. Groups were asked to communicate exclusively through the system provided and use the provided information outlets when forming opinions. The six-week project resulted in three individual deliverables from every participant. The deliverables were based on discussions with their project partner through the provided communication system.

Project Groups and Group Formation

Subjects were drawn from four different courses. Three courses were Masters level information systems courses, where students were expected to have advanced knowledge of computer systems. These three courses were from the University of Nebraska at Omaha (UNO). The fourth course was an undergraduate, junior level information systems course, where students were expected to have limited knowledge of computer systems. This single course was from the University of Colorado at Boulder (UCB).

Students from UNO played the role of a Healthcare Inc. employee and students from UCB played the role of an E-Neo Consulting employee. The roles in this project provided students different perspectives on the tasks and their associated deliverables. Varying perspectives were used to generate a realistic project setting, generate unique discussion between the group members, and encourage group members to communicate in order to share differing ideas and opinions. In addition, the Healthcare Inc. employees were provided additional information regarding the project. Providing key information to one group member, in association with existing group member differences in educational experience, built differences between group members. It is through these differences that communication breakdowns and their subsequent resolution were expected to occur.

The groups were created to form a sense of group responsibility and a commitment to the group experience, both essential to encouraging group communication (Fisher and Ellis, 1980). Group responsibility was created through the production of project deliverables that rely on ideas, concepts, and opinions of both group members. Commitment to the group was created by providing group members a unique opportunity to work in a virtual team, using new communication technology, and discussing a new topic as part of a class project.

Project credit of 10% was given to all UCB students and one class at UNO and in both classes participation was mandatory. Extra credit of 10% was given in two UNO classes and participation was voluntary. Hartwick and Barki (1994) found that voluntary and mandatory users were significantly different in their use of information systems. To lessen this problem, an equal number of voluntary students

were placed in proper and improper task-technology fit profiles. The flyer used to recruit voluntary students is shown in Appendix A.

A student from an upper level information systems (IS) course was randomly assigned to a student from the lower level IS course, forming zero-history, geographically dispersed groups. The use of zero-history groups was assumed to limit the possibility of group members communicating with each other outside of the provided technology and limited the experience that one member had with the other member, an important factor in channel expansion theory.

The groups were then randomly assigned to properly or improperly fit task-technology fit profiles. One half of the groups were provided a detailed project agenda through the communication system (proper fit), while the other half were not provided a detailed project agenda (improper fit). Groups were unaware of their task-technology fit profile assignment.

All group members were notified individually of their group assignment via email. Following individual email notification of group assignment, group members were emailed an information packet regarding details of the project, their role in the group, and project deliverables. Appendices B, C, and D show all material handed out to group members; this includes the project cover letter detailing the association of the project with the UCB and the UNO human research subject committees (Appendix B), the project handout to the UNO students (Appendix C), and the project handout to the UCB students (Appendix D).

Assumptions about the Group Members

The group members using the technology were assumed to have an interest in technology and the role it played in both learning and business settings. This assumption was based on the fact that the group members were all IS majors and their interest in technology aided project learning and group processes. Also, students were expected to be able to use all components of the system including the help page, the information board, the message board, the chat room, and the file upload utility. Finally, individuals were assumed to be able to react and communicate within their context and enact change that lead to the resolution of communication breakdowns.

Treating the communication channel use process as an identical experiential process across all groups, equal opportunity was provided to all group members to gain experiences with their partner, context, topic, and communication channel. As the system was used to move toward task completion, all groups were assumed to gain experience with each component at similar rates. This study did not identify the “rate” at which these knowledge building experiences changed. Instead, the study assumed that knowledge building experiences occurred and their occurrence was equally supported across all groups and through all communicative acts. It was also assumed that the research design produced low initial levels of experience on topic, context, partner, and channel components.

Project Topic

The topic of electronic privacy (e-privacy) was introduced to all group members through individual emails as discussed above. Eprivacy is an important topic focused on issues surrounding the pros and cons of personal privacy on

corporate intranets, extranets, and the Internet. The topic was used to provide a current and provocative set of issues to engage students. More specifically, the topic was built around the context of the healthcare industry, accommodating the three phases of the longitudinal study. First, groups discussed what e-privacy is and what e-privacy tools are currently available to provide security of sensitive information. Second, groups discussed the relationship of e-privacy to the healthcare industry with respect to governmental regulation. Third, groups discussed how governmental regulation of e-privacy supports and contradicts best practice policies of organizations.

The project topic, like the group formation, was one that group members were assumed to have had little prior exposure to. This topic is in its early stages of development with healthcare organizations as, just recently, collecting and sharing healthcare information over the world wide web has become common practice. To further reduce the chance of prior exposure to this topic, articles no older than three years were selected for the group members. Reducing prior exposure to the topic was to allow for knowledge building experiences with the topic, an important component of channel expansion theory.

Project Context

The context within which all group members functioned was a virtual project team. Virtual project teams are defined as geographically dispersed teams, working with computer groupware tools to accomplish specific tasks (Chidambaram and Ziguers, 2001). The geographic dispersion was across two time zones and 550 miles. Groupware tools were in the form of a synchronous communication tool (chat), an

asynchronous communication tool (message board), a file sharing utility, and an agenda for providing groups with useful project information.

The project context, like the project topic, was one that group members were assumed to have had little prior exposure to. As virtual teams are in their early stages of implementation, it was assumed that few group members have significant prior experience working in virtual teams across geographic and temporal bounds (Chidambaram and Ziguers, 2001). Reducing prior exposure to virtual teams allowed for knowledge building experiences with the context, an important component of channel expansion theory.

Project Technology

Task-technology fit theory identifies three dimensions of technology, and a high or low presence of each dimension is specified for proper task-technology fit (Ziguers and Buckland, 1998). To provide a proper task-technology fit for decision tasks, the technology had **low communication support**, **high process structure**, and **high information processing**. Table 16 shows the levels of each dimension and how they were implemented in the context of a proper task-technology fit communication channel for the current research.

<i>Dimension</i>	<i>Elements Provided/Limited</i>
Low Communication Support	<ul style="list-style-type: none"> • Communicative input was not necessarily simultaneous or in the same location. • Group members are not anonymous • Group members see the input of other group members
High Process Structure	<ul style="list-style-type: none"> • Activities are set for the group members • A task agenda was provided
High Information Processing	<ul style="list-style-type: none"> • Communication information was accumulated • Communication information was aggregated and presented to group members through various services

Table 16.
Technology Dimensions and Elements Provided

The technology was manipulated to determine the impact that a proper task-technology fit profile has on the channel expansion process. Process structure was the only technology dimension manipulated as per the current research project for two reasons. First, the manipulation of the communication support dimension may have adversely affected group member's ability to generate communication, a key component of the current research. Second, as the current research was part of several larger university curriculums, providing students the ability to revisit group communication and shared documents was assumed to better support the learning process. Table 17 shows the levels of each dimension, in the context of an improper task-technology fit communication channel for the current research.

<i>Dimension</i>	<i>Elements Provided/Limited</i>
Low Communication Support	<ul style="list-style-type: none"> • Communicative input was not necessarily simultaneous or in the same location. • Group members are not anonymous • Group members see the input of other members
Low Process Structure	<ul style="list-style-type: none"> • Activities are not set for the group members • A task agenda was not be provided
High Information Processing	<ul style="list-style-type: none"> • Communication information was accumulated • Communication information was aggregated and presented to group members through various services

Table 17.
Technology Elements Provided for an Improper Fit Task-Technology Profile

In addition, similar to the project topic and project context, the technology was assumed to be relatively unknown to group members. While individual components of the technology (i.e. message board, chat room, or information board) may have been known to group members, the collection of these components into an integrated communication tool was both new and unique. Reducing prior experience with the communication tool allowed for knowledge building experiences with the technology to have an impact, per channel expansion theory.

The Integrated Web Communication System

To provide or limit the associated technology elements defined by the task-technology fit, a communication channel was constructed specifically for the current research. The communication channel incorporated a variety of tools commonly found on the Internet and combined them into a single system. Groups had the opportunity to use a message board system (Appendix F), a chat room (Appendix G), and a file sharing tool (Appendix H), to communicate with their group member as part of an integrated web communication system (IWCS). In constructing an IWCS

specifically for the current research, greater flexibility in configuring the technology, more rapid response to problems with the IWCS, and a proper fitting of the technology to the task was provided. The IWCS was web based, hyperlink driven, and easy to use. Moreover, the system was available from any computer that has access to the web.

Training on the tool was *not* provided for several reasons. First, the communication tool was designed around tenets of standard web design including point and click navigation, hyperlink guides, consistent formatting between pages. The communication system was designed to be easy to use. Second, a help page (Appendix I) was provided as a link on the IWCS. The help page guided users on how to use the control panel (Appendix E), the chat room, the message board, the information board, and the file sharing utility. Third, a technical support email link was provided to all group members. Emails regarding technical problems or difficulties with the system were sent to the administrator of the system (author of the current research) for rapid response.

The difference between the two task-technology fit profiles was the presence of project activities and a project agenda on the communication system information board. From a technological perspective these differences were accommodated through the presence of a web-based agenda (Appendix J) and the absence of a web-based agenda (Appendix K).

The layout of the communication tool is shown in Figure 14. The diagram shows the main entry point of the system and the communication system that was

reproduced for every group. Every group was provided an individual chat room, message board, information board, file share, and control panel.

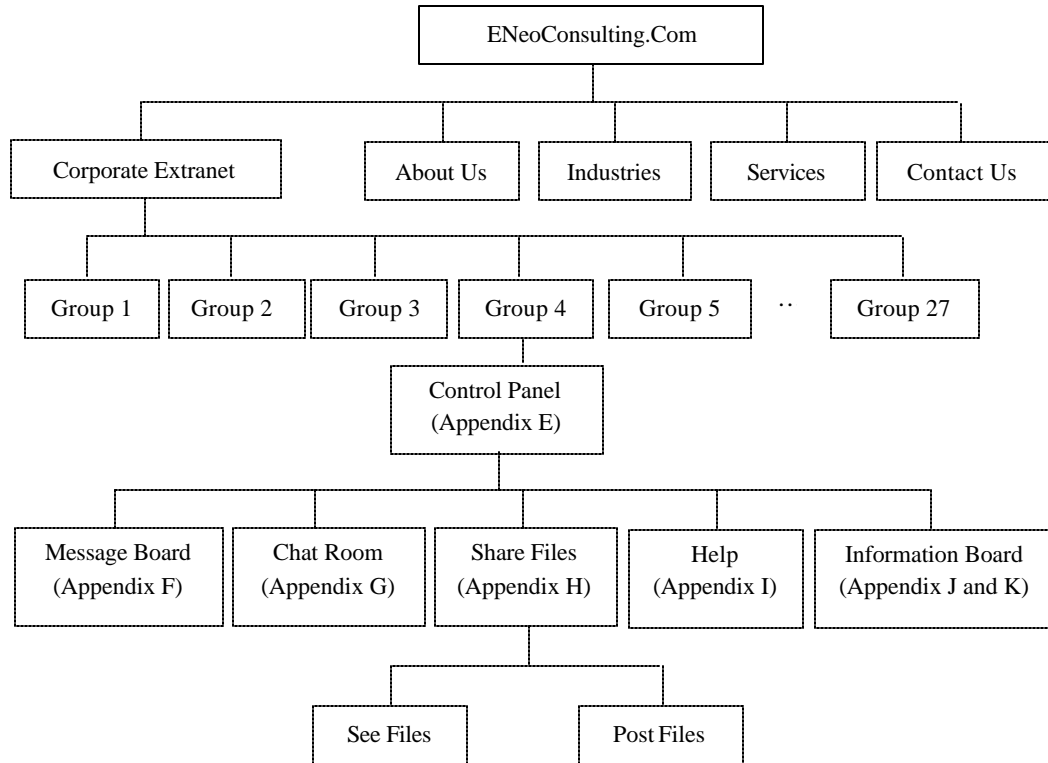


Figure 14.
Layout of the Integrated Web Communication System

Assumptions about the Technology

The technology used in this study was assumed to be able to provide proper task-technology fit profiles. In addition, the technology was assumed to be user friendly to all students: That the technology was accessible to all students (through the Internet), that all tools of the technology were equally accessible to all students, and no features of the technology discouraged use of the IWCS.

Project Task

Tasks used in MRT and CET research were ones of high equivocality. This type of task can be deconstructed along the complexity characteristics used in TTF. First, an equivocal task has multiple interpretations of an outcome (outcome multiplicity) and a situation where a clear outcome was not forthcoming. Second, many equivocal tasks used in prior MRT research have provided guidance to the actors performing the task, resulting in a single solution scheme. Third, as only a single solution scheme was provided, conflicting interdependence does not occur. Fourth, the outcome was sometimes unknown to the actors on equivocal tasks (Markus, 1994) and sometimes known (Carlson, 1995). These aforementioned factors of equivocal tasks, as used in prior MRT/CET literature suggests a close alignment with decision tasks, defined by Zigurs and Buckland (1998) in the theory of task-technology fit. While these two approaches are different in the specific characteristics used to define tasks, the classification schemes used in TTF, MRT, and CET are sufficiently similar to provide a basis for comparison.

With this, a decision task was used to provide proper and improper fit profiles in the strengthened examination of channel expansion. Using a decision task enabled a framework upon which to provide fit profiles to CET.

Each group performed three separate, yet interrelated tasks. Treating tasks separately, students examined each task individually without relying on previous task decisions. While a task did not rely on previous decisions, its completion pulled from *knowledge* gained during the completion of earlier tasks. The tasks were structured such that each group was only working on a single task at a time.

The tasks followed the previous task design used by Carlson (1995), and the task guidelines set forth by Mennecke and Wheeler (1993). First, each task was designed to accomplish the goal of generating communication between group members, maintain a high level of interest from the subjects so to promote the exchange of ideas and information, and were of a high level of complexity so that they could not be completed in a minimal number of communication events (Carlson, 1995).

Second, the tasks were aligned with the technology as defined by the theory of task-technology fit, and the tasks maintained a high level of equivocality so channel expansion could occur. If the task did not contain high levels of equivocality, and they did not have proper fit profiles, expansion was not expected to occur.

Third, the tasks were interrelated such that experience from earlier tasks was applied to subsequent tasks. Interrelation between tasks was essential to allow for knowledge building experience with the topic to increase over time. Dramatic fluctuations in the knowledge building experience with the message topic would result in unpredictable changes in media richness (Carlson, 1995).

Following the aforementioned requirements, the task for this study was divided into three interrelated tasks, requiring individual group members to write a two-page position paper during each task. The position papers reflected a consensus position of the group, and not a random assortment of disparate ideas, views, and opinions of the group members. The tasks drove the use of technology and the completion of three interrelated papers:

1. *Paper #1* – Identify all problems Healthcare, Inc. is experiencing with electronic privacy. What tools are available to address these problems and how are the tools used?
2. *Paper #2* – How have federal/state regulatory structures aided in resolving (or hindering) the problems regarding electronic privacy?
3. *Paper #3* – How do existing privacy policies cooperate with or contradict regulatory structures (self-regulation)?

Each task included information that was used to prepare the deliverable. This information was distributed through hypertext links that were available to all group members through the IWCS. The information was provided to guide subjects in the preparation of the deliverable, and was not intended to provide answers to the questions.

Assumptions about the Task

The three decision tasks used in this experiment were expected to encourage discussion through the IWCS. Focused on eliciting opinions, ideas, and comments, the decision tasks provided students the opportunity to interact with their respective group member in the production of task outcomes.

In addition, the topic associated with the task was assumed to be of interest and value to the students participating in the project. The topic was intended to guide students in the facilitation and synthesis of concepts and ideas, and not to simply provide students with “facts and figures.”

Data Collection

Three sets of data were collected in this project. First, the original survey instruments administered by Carlson (1995) were used to collect perceptions

regarding channel expansion, demographics, and user comments. Second, three task deliverables were collected from every group. Third, group dialogue was recorded across synchronous and asynchronous communication.

Channel Expansion Survey Instruments

A pretest instrument was administered after the groups were formed, introduced to the topic and tasks, and exposed to the technology, but prior to use of the technology. A second instrument was administered during use of the technology and accomplishment of the tasks, administered in weeks two, four, and six (longitudinal instrument). Table 18 shows the two instruments and the data they gathered.

<i>Variable</i>	<i>Pretest Instrument</i>	<i>Longitudinal Instrument</i>
Demographics	X	
Experience with the technology	X	X
Experience with communication partner	X	X
Experience with context	X	X
Experience with task	X	X
Perceived richness of the technology	X	X
Problems		X
Self-reported, non-IWCS communication		X

Table 18.
Pretest and Longitudinal Instrument Data Collection

The survey instruments were not examined in the current research. They were used to collect demographic information, problems with the system, self-reported communication that occurred outside of the IWCS, and for future analysis outside the scope of the current research.

Group Deliverables

The papers represented points of analysis similar to some of the original TTF studies where group outcomes were examined to determine the impact of task-technology fit profiles. The papers were used to direct group members toward the synthesis of ideas, the generation of dialogue, and the creation of concrete deliverables. Like the survey instruments, the group deliverables were not examined as part of the current research.

Group Dialogue

Dialogue was collected from all groups through the message board and the chat room components of the IWCS. Together, the dialogue generated through these two components of the IWCS was consolidated to provide a linear timeline of group discussions. The collected dialogue was coded and analyzed as per the current research. The coding sheet used in this project is shown in Appendix N. The sheet was used to gather 8 distinct components of group dialogue:

- (1) *Message Number* – A message was identified on the group dialogue. A message is a single communicative act and ends when a speaker changes the subject or another individual speaks (Poole, 2001).
- (2) *Synch/Asynch* – Whether the message board (asynch) or chat room (synch) was used to communicate the message.
- (3) *Message Type* – Whether the message concerns the topic (e-privacy), process structure (group coordination or paper writing processes), or other (greetings or discussions outside of the project scope).
- (4) *From* – Which group member sent the message.
- (5) *Social Action* – What social action the message is entered in (communicative, discursive, strategic, or instrumental).
- (6) *Breakdown* – If the sender questions a validity claim of the ir group partner and the message number on which the breakdown occurred.
- (7) *Validity Claim* – What validity claim a sender was challenging and the message number at which the challenged validity claim occurred.
- (8) *Resolution* – If, as evident in a message(s), the communication breakdown was resolved and the message number upon which the resolution occurred.

An example of how the coding sheet was used is presented in Figure 15. The example does not provide a full critical analysis of group dialogue. Instead, the example illustrates how the coding sheet was used to display three messages that result in a communication breakdown and a subsequent resolution.

Message Number	Synch/Asynch	Message Type	From	Social Action	Breakdown	Validity Claim	Resolution
15	S	T	Tom	2			
16	S	T	Sue	2	Yes	(15), [1]	
17	S	T	Tom	2			Yes (16)

Figure 15.
Coding Sheet Example

In this example, three chat room messages were exchanged between Tom and Sue. All messages were exchanged in the social action of communicative action and were related to the group topic. A communication breakdown occurred at message 16. The validity claim that was called into question was set forth in message 15 and the validity claim was that of contextuality (coded by the number “1”). A resolution of the communication breakdown at message 16 was provided in message 17. This brief example illustrates how the coding scheme was used to identify and relate challenged validity claims, communication breakdowns, and subsequent resolution of the breakdown.

Inter-Rater Training

The analysis of the dialogue included three levels of examination (Habermas, 1976). At each level, important questions were asked that must be addressed when determining a communication breakdown and a subsequent resolution. The three levels are intent on providing an interpretation of observed events and include:

- (1) Was it a communicative act? Within what social action was the communicative act occurring?
- (2) Was the communicative act comprehensible and clear? Does the communicative act contribute to the communication at hand?
- (3) Does the communicative act result in a communication breakdown? The challenge of what validity claim requires resolution? Was a resolution of the communication breakdown provided?

Using the coding system to analyze group dialogue, the translation of the message was extended to include the reconstruction of the communication situation within which group members communicate. The coding system was used to peer through the surface structure of the communicative act to discover the rules under which the communicative act was produced (Habermas, 1976).

Two raters were used in this research project, the author and a colleague who was unfamiliar with the goals of the research. Training on how to approach the three levels of understanding was provided across two projects. First, both raters were introduced and acclimated to the concept of reading group dialogue to identify the aforementioned codes through a pilot study of the current research. Second, raters performed similar duties in the coding of the dialogue during the final research project, as presented here.

A guideline sheet was used by both raters when coding group dialogue. The sheet, as shown in Appendix L, provided both raters with definitions, social action-validity claim relationships, and a flow chart of how to approach the coding process. In addition, an example coding sheet was provided to guide raters in consistently coding group dialogue. This sheet is shown in Appendix M.

Raters met a total of four times. The first meeting described the coding process, introduced terms used, discussed group tasks, and identified potential areas of difficulty. The final three meetings compared and contrasted the coding of three groups to ensure high levels of reliability between the raters. Of the three randomly chosen training groups, two groups were from proper TTF profiles, and one group was from an improper TTF profile. Through debate and discussion, the training groups provided a deep and thorough coding of group dialogue, coding that was reproduced at high levels when done individually. For brevity, the entire dialogue set from all training groups will not be shown. Examples will be provided to illustrate the training approach, rater disagreements, and resolution of those disagreements on key points during the coding process. The three levels of understanding produced by the raters represent a best attempt at identifying and coding the dialogue.

First Level Understanding

The first level of understanding guided raters to identify when a communicative act occurred. Based on Poole's (2001) definition of a communicative act, an act was identified as ending when a speaker changes the subject or someone else speaks. Teasing out communicative acts from large blocks of dialogue proved valuable as the communicative act was the unit of analysis upon which this research was based.

At the first level of understanding was identifying the social action within which communication partners are engaged. Differences in the identification of social actions were largely based on the rater's ability to identify social actions outside of communicative action. As the vast majority of social actions were communicative,

the identification of instrumental, strategic, and discursive action required the most attention. An example where the two raters disagreed on the coding of a social action is provided below:

Training Example: The Identification of a Social Action

[M1] 09/11/2001 7:04 PM – Georgio

Subject: Greeting...

Hello Tina! How are you doing? It's nice to meet you. My name is Georgio, and I'm a MIS graduate student at University of Nebraska at Omaha(UNO). I go by George, by the way. Again, it's my pleasure to work on this project with you. I look forward to hearing from you soon... Regards, George.

[M2] 09/12/2001 10:38 AM – George

Subject: Are you there?

Just wondering if you're ready to start working on this project. I'm in the middle of reading the assigned articles for this week. Ready when you are...

[M3] 09/14/2001 1:34 PM – George

Subject: Hello

Hi, Tina! Nice to meet you. [the system administrator] just sent me an e-mail saying that we will be working as a team for this project. I'm pleased to work together with you. Leave me a message when you're in so we can get started with this project. Thanks, George

[M4] 09/17/2001 9:15 PM – George

Subject: Still waiting...

Hey, I'm still waiting for you to reply to my earlier message. Please let me know what your status looks like ASAP. Thanks! George

[M5] 09/18/2001 2:59 PM – Tina

Subject: Sorry

I am sorry that it has taken me so long to get on but I just found out yesterday that you were my partner.

In this example, one rater coded the entire message set as communicative action, while another coded M5 as strategic. Following discussions between the raters, M5 was determined to be strategic as the message was used to address the four previous messages sent by George. M5 was used to alleviate concerns that George had regarding the group communication process, influencing George through information that was not intended to be acted upon. In this case, Tina viewed George

as an unresponsive information receptacle, not requiring a response, and attempting to influence his attitude toward the group communication process.

Second Level Understanding

The second level of understanding was used to understand if the communicative acts were clear and comprehensible, and if the communicative act contributed to the task at hand. At no time during the training process was a communicative act recognized as deficient on either of these fronts. All communicative acts were clear and comprehensible.

The second level of understanding should not be confused with Habermas' universal validity claim of comprehensibility. The second level of understanding provides structure in order to frame comprehensibility around the context within which the communication was occurring, and identify communication that deviates from this context.

Third Level Understanding

The third level of understanding was used to train raters in identifying communication breakdowns, challenged validity claims, and subsequent resolutions. Communication breakdowns and their subsequent resolutions were oftentimes subtle, and other times obvious in appearance. Considerable training was spent on the identification of the third level of understanding.

Identified as communications that are incomplete, insincere, false, or unwarranted (Ngwenyama and Lee, 1997), the identification of communication breakdowns represented an essential entry into understanding channel richness and

expansion as determined through tenets of TCA. As communication breakdowns may vary in size, the current research is not intent on the identification of “levels of communication breakdowns.” The current research treats the identification of communication breakdowns as a binary process. The following example illustrates how the two raters came to agreement regarding the presence of a communication breakdown.

Training Example: The Identification of a Communication Breakdown

[M1] 09/20/2001 1:15 PM - George

Subject: My status

Hi Tina, I'm in the middle of writing the very first paper right now. I'll be available to resume to our discussion tonight. Just let me know when you're ready. What I want to do is to finish our discussion about the first topics and jump into the second stage. If you could answer to my last question, which was about important factors, I would greatly appreciate it. Thank you! – George

[M2] 09/24/2001 8:07 PM - George

Subject: What's going on?

Hey Tina, What's going on? I just completed the second survey. How did your first paper go? Just wondering when we could resume to our discussion... Please let me know. Take care!

In this example, one rater did not code a communication breakdown at either message. The second rater coded a communication breakdown at M2. Ultimately, M2 *was* coded as a communication breakdown. The identification was based on M2 calling into question the ability of M1 to create an efficient communication environment through which the project tasks could be completed. As four days passed between the messages, George created a communication breakdown on his previous message in an attempt to encourage group communication through different communication actions.

Following the identification of communication breakdowns, the validity claims that were challenged were coded. As challenged validity claims acted as an important platform upon which to better understand communication breakdowns and their subsequent resolution, coordination between raters in their identification was essential. In the following example, both raters identified a communication breakdown, however the validity claim type upon which the breakdown was based differed.

Training Example: The Identification of a Validity Claim

[M1] 9/20/2001 9:15 PM – Mark
Subject: I'm good, thanks.
Thanks for your help. See you on the next one.

[M4] 10/03/2001 2:02 PM - Carol
Subject: my thoughts
Hey Mark, I haven't heard back from you lately, but I started writing my paper anyway. I haven't finished it yet, but I posted what I have finished on the file sharing thing so that you can see what I have so far. I think all I really need to add is the HIPAA info. I posted my paper now because I can't access the file sharing utility for some reason from my home computer. Anyway, I hope to hear from you soon and I'll keep checking the message board :-)

This example shows how Mark, in M1, stated that he was willing to help Carol in the production of the group deliverable during the next phase of the project. During this two week gap between the messages, Mark did not respond to Carol, causing Carol to ultimately respond to M1 with M4, resulting in a communication breakdown. One rater coded the communication breakdown as occurring on the validity claim of truthfulness, stating that Carol was calling into question Mark's truthfulness as indicated in M1. The other rater coded the communication breakdown as occurring on the validity claim of efficiency, or the ability of the communication process to achieve the desired ends. Through a reexamination of the dialogue by both

raters, it was determined that the validity claim being challenged by Carol was *efficiency*. This was based on the fact that Mark may have had every intention of communicating with Carol prior to M4, and no where in M4 did Carol directly address Mark's statement in M1. Carol was questioning the ability of the group communication process to accomplish the group task.

Finally, once a communication breakdown and challenged validity claim were coded, a resolution of the communication breakdown was identified. At no point during the training process did the raters disagree on the identification of a resolution. The following example shows the resolution of a communication breakdown and returns to the prior example of Carol and Mark.

Training Example: Identification of a Resolution

[M1] 9/20/2001 9:15 PM – Mark
Subject: I'm good, thanks.
Thanks for your help. See you on the next one.

[M4] 10/03/2001 2:02 PM - Carol
Subject: my thoughts
Hey Mark, I haven't heard back from you lately, but I started writing my paper anyway. I haven't finished it yet, but I posted what I have finished on the file sharing thing so that you can see what I have so far. I think all I really need to add is the HIPAA info. I posted my paper now because I can't access the file sharing utility for some reason from my home computer. Anyway, I hope to hear from you soon and I'll keep checking the message board :-)

[M5] 10/08/2001 5:49 PM – Mark
Subject: second project
well, I think that I really screwed up with the paper! I didn't know when it was due or anything... I did read yours though and it seems to have some good content.

[M6] 10/08/2001 7:20 PM - Carol
Subject: don't worry
Hey Mark, don't worry about not responding much for the second paper, we've still got a third to make up for it.

Following Carol's challenge of the efficiency validity claim, Mark responded with M5, addressing the communication breakdown and providing a resolution of the breakdown, a resolution echoed by Carol in M6. This training example illustrated not only the resolution of a communication breakdown, but entry into the breakdown and the validity claim upon which the breakdown occurred. Together, the three levels of understanding provide a solid foundation upon which both raters read, interpreted, and coded the dialogue to determine channel expansion through tenets of TCA.


Assumptions about the Data Collection and Analysis

Five assumptions were made regarding the data that was collected and the methods through which it was examined. First, using CET questionnaires to capture knowledge building experiences and channel richness perceptions, this study supported the assumption that these measures can capture a one-to-one relationship between independent and dependent variables. Second, attempting to reproduce the findings of Carlson (1995), this study assumed that his earlier findings could be controlled, predicted, and explained. Third, this study assumed the researcher to be "value-free," or able to provide an objective, impartial analysis of the channel use process. Unable to ever truly know what a message represented, the researcher moved toward a strong understanding through techniques provided above. Fourth, this study assumed that resolution from communication breakdowns was always desired. Fifth, this study assumed that the data did not to prove or disprove theory. Instead the analysis echoed Orlikowski and Baroudi (1991) that TCA can be used in the understanding of the channel use process rather than cross-sectional differences.

Project Activity Timeline

A week by week project timeline is shown to give a clear picture of the sequence of events surrounding the week of initial group formation, the six-week longitudinal project, and the data collected during this time. This timeline shows the formation of the groups to the administration of the questionnaires to the completion of the task deliverables (Table 19).

<i>Week</i>	<i>Event</i>	<i>Event Description</i>
1	1	Distribute project flyer to classes where participation was voluntary.
	2	Notify students about the project where participation was mandatory.
	3	Collect class rosters and sign-up sheets to determine the number of groups that need to be formed.
	4	Randomly form groups making sure that group makeup was geographically distributed.
	5	Randomly assign groups to proper and improper task-technology fit profiles, ensuring that voluntary students were equally distributed across fit profiles.
2	1	Email students individually regarding their group number, their group partner's name, the URL of the communication tool, and a note of gratitude for participation in the project.
	2	Email students individually regarding their role in the project, HRC information, and the project details that go along with their role (Appendix B, C, and D).
	3	Email students individually to state that they should fill out the pretest questionnaire, begin use of the communication tool to engage their group partner, and begin the project.
3	1	Administer first longitudinal questionnaire.
	2	Collect first deliverable.
4	1	Contact groups to begin communication on the second deliverable.
5	1	Administer second longitudinal questionnaire.
	2	Collect second deliverable.
6	1	Contact groups to begin communication on the third deliverable.
7	1	Administer third longitudinal questionnaire.
	2	Collect third deliverable.



Collect dialogue from all groups.

**Table 19.
Activity Schedule**

The methodology presented in this chapter provided a detailed outline of the approach taken when reconstructing the process of channel expansion. Through frameworks provided by TCA, dialogue was captured and analyzed to better understand how channel capacity is socially produced and evolves over time.

Chapter VII

Descriptive Results and Analysis

Described in this chapter are the results of the current research described in previous chapters. The results explore (1) the relationships between social actions, communication type, message type, and task-technology fit profiles, (2) channel expansion reconstructed through tenets of Habermas' theory of communicative action, and (3) the impact that task-technology fit profiles had on the channel expansion process. These three aspects of the research are explored through two approaches. First, Chapter 7 presents the results and analysis of the coded dialogue gathered during the project. Little interpretation is provided on the dialogue. Interpretive results and analyses on the dialogue are provided in Chapter 8. Together, both chapters provide a holistic view of the findings set forth in the current study.

Prior to beginning the analysis, it should be noted that eleven groups were omitted from this study. Two groups reported the use of additional communication tools other than the ones provided in this study. One of these groups reported heavy use of email and another group reported frequent use of the AIM instant messaging system. Eight groups experienced attrition in the form of total lack of participation or the loss of one group member prior to project completion.

The eleventh group was removed because of the high volume of communicative acts they generated over the course of six weeks. During the six week period, a total of 2320 messages were generated by all groups. With the removal of a single group that generated 611 communicative acts alone, a total of 1709

communicative acts were analyzed. A cluster analysis was run on all groups to confirm that this group was an outlier and should be removed from the analysis. The cluster analysis results are shown in Appendix O. With the removal of these groups, a total of 27 groups were analyzed, or 71% of the original groups.

Sample Demographics

An initial channel expansion survey, used to capture the original channel expansion measures of Carlson (1995), captured demographic information. The survey was web-based and the response rate was 100%. The individuals in the sample had an average age of roughly 24 years, 27% were female, the average university education was approximately 5 years, and the majority of individuals had not used an IWCS often. Table 20 displays the sample demographics.

Number of Groups:	54
Age (years):	23.7
Gender (percent)	
Male:	73.2%
Female:	26.8%
University Education (years):	5.2
Used an IWCS two or fewer times (percent):	98.2%

Table 20.
Sample Demographics

Inter-Rater Reliability

Two raters coded the dialogue generated by all groups. Each rater was responsible for approximately 50% of the coding and groups were randomly assigned to each rater. Raters met four times during the study to discuss disagreements and discrepancies in the coding process. The raters also met numerous times during the

pilot phase of this research study and the coding scheme used during the pilot phase was virtually the same as used in the final study. Through continued meetings and negotiation over nine months between raters, high levels of inter-rater reliability were obtained.

To determine inter-rater reliability, three groups were randomly selected for comparison. The raters met at three different times, on the three different groups during the data analysis process to coordinate and focus coding efforts. Inter-rater reliability was determined using a percent agreement approach. This approach compared the coding of a single group along the coded components of message type, social actions, communication breakdowns, challenged validity claims, and resolutions to determine agreement per communicative act. An overall inter-rater reliability of .90 was achieved in the comparison of the 3 groups, or 11.1% of all groups. The inter-rater reliability of message type, social actions, communication breakdowns, resolutions, and challenged validity claims was .85, .91, .92, .93, and .89 respectively.

Research Questions

This study provides a process view of communication channel use. Through the application of communication breakdowns and their subsequent resolution as indicators of channel expansion, a longitudinal view of how communication partners used a specific channel is provided. This approach extends the work of Carlson (1995) who examined channel expansion theory through individual perceptions.

As the average number of communicative acts generated between groups varied significantly, standard deviations were large. This was a result of groups

entering into the synchronous tool (chat) of the communication system. As groups entered the synchronous tool, the number of communicative acts greatly increased, causing large variations between groups who used the tool and groups who did not. While standard deviations were high, they were not considered detrimental to the findings.

Social Actions

As social actions are essential precursors to communication breakdowns and subsequent resolutions, a detailed examination of their occurrence proved valuable when understanding the channel expansion process. The first two research questions are:

- (1) In what social actions do communication partners engage?
- (2) What social actions are engaged in across varying communication types?

The current analysis extended these two questions by exploring the relationship between the foundational channel expansion components of social actions, communication type, and message type. This analysis provides an understanding of the foundational components of the channel expansion process. While no one particular component examined was the sole determinant of channel richness or channel expansion, they provided a valuable basis upon which to understand the channel expansion process. Each of these components was coded at every communicative act. That is, every communicative act occurred within a social action, through a communication type, and about a message type. Figure 16 shows the relationships examined.

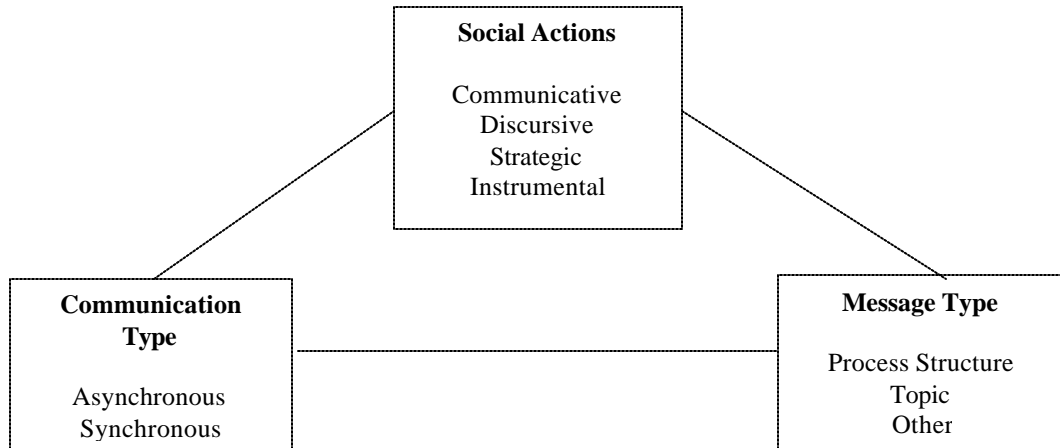


Figure 16.
CET Foundational Component Relationships

A formal statistical analysis of social actions and their relationship with communication type and message type required the removal of the social action, communicative action, due to its high occurrence throughout group dialogue. Removal of such an integral social action was not practical. Therefore, this analysis explores frequency relationships of social actions, message type, and communication type.

During group communication, the social action of communicative action occurred 96% of the time (n=1709), indicating that groups were often concerned with gaining a mutual understanding between themselves and the task at hand. This finding may be the result of two methodological treatments. First, group members may not have been inclined toward the production of project frameworks (instrumental), the coordination of those frameworks (strategic) (Habermas, 1979), nor debate geared toward project norm creation (discursive) (Lyytinen and Hirschheim, 1988), as frameworks and norms were already created by the researcher

and accepted by the participants. Second, zero history with group members, topic, context, and the communication tool may have led to group member confusion about the project deliverables, group members frequent engagement in the obtainment of mutual understanding to facilitate coordination and cooperation was expected (Tan, 1994). In addition, group members may have been focused on creating an environment of acceptable validity claim use (Habermas, 1976; Tan, 1994), again supporting the high use of communicative action. Following the social action of communicative action was both discursive and strategic action at 1.76% and instrumental action at .35%. These findings echoed Habermas (1979; 1984), Lyytinen and Hirschheim (1988) and McCarthy (1978) stating while *all* social actions are available to communication participants, one type usually becomes dominant in-use. In particular, communicative action was expected in group dialogue as a basis through which the remaining three social actions were derived (Habermas, 1979).

Between the two different communication types used by groups, slight variation was found in the aforementioned breakdown of social actions. Table 21 shows the social action-communication type relationship as a percent of social actions engaged in across synchronous (chat) and asynchronous (message board) communication types.

<i>Communication Type</i>	<i>Social Action</i>			
	Communicative	Discursive	Strategic	Instrumental
Asynchronous	93.7%	1.1%	4.4%	.8%
Synchronous	97.5%	2.1%	.3%	.1%

Table 21.
Social Action-Communication Type Relationship

These findings suggest that while communicative action dominated the social actions engaged in by group members, asynchronous communications were used in a more strategic manner than were synchronous communications. An explanation of this relationship was provided through a reexamination of the dialogue indicating that the asynchronous communication tool was used more often to explain a missed meeting, a missed posting, or an apology for lack of participation. These communicative acts were often treated as strategic because the sender of such a message did so to reengage communication, get their partner back onto the project task, or reestablish rapport between group members. Such actions were not as common in the synchronous communication tool as that tool was often used to move forward on task issues and not to dwell on prior indiscretions.

Continuing the examination of social actions, the relationship between social actions and message type is shown in Table 22.

<i>Message Type</i>	<i>Social Action</i>			
	Communicative	Discursive	Strategic	Instrumental
Topic	94.2%	5.1%	.5%	.2%
Process Structure	96.0%	.1%	3.2%	.7%
Other	99.2%	0%	.8%	0%

Table 22.
Social Action-Message Type Relationship

This relationship shows a fairly even distribution of message types across communicative action. Interestingly, the means-end social action of strategic action showed increased levels of process structure message types. This finding extends the idea that process structure message types were used for directive commands where

one communication partner views the other as an information receptacle (Habermas, 1984). On the reverse side, discursive action was a social action through which topic message types were often engaged. As group members entered disagreements and moved toward compromise and agreement, it was frequently on topic related issues and not issues regarding how to structure group processes.

The final relationship showed that communication type was related with message type, such that as groups entered into synchronous communication, they were more likely to engage in topic and “other” message types than if they were communicating through the asynchronous tool. The relationship between communication type and message type is explained by the use of the synchronous communication tool to focus the efforts of groups on topic issues, and the use of the asynchronous tool to engage in more “chat-type” communication, falling into “other” message type. The asynchronous tool was not often used to engage in discussions regarding the topic or to enter “other” message types outside of greetings. Table 23 shows this relationship.

<i>Message Type</i>	<i>Communication Type</i>	
	Asynchronous	Synchronous
Topic	30.5%	69.4%
Process Structure	49.8%	50.2%
Other	17.9%	82.1%

Table 23.
Communication Type-Message Type Relationship

Communication Breakdowns

As group members generated communicative acts through social actions, communication types, and message types, they created communication breakdowns. Moving toward a deeper analysis of the components of the channel expansion process, question 3 is:

- (3) Has dialogue between communication partners become false, incomplete, insincere, or unwarranted?

This question proved difficult to answer through the descriptive analysis of the coded dialogue used in this research. However, moving from the aforementioned foundational components of social actions, communication type, and message type toward the more time sensitive relationships of communication breakdowns and resolutions, the channel expansion process began to surface. As channel richness and subsequent channel expansion were ultimately determined through the resolution of communication breakdowns, the identification of breakdowns was essential. The examination of question 3 was best accomplished through an interpretive analysis provided in Chapter 8, and not a “yes/no” answer provided through the descriptive analysis.

Validity Claims

Validity claims were viewed in this research as a deconstruction of communication breakdowns. Their variety, frequency, or absence did not imply the resolution of communication breakdowns. Understanding on what types of validity claims were challenged provided a deconstruction of the communication breakdown itself. Research questions four and five are:

(4) What validity claims are being challenged?

(5) Are the validity claims being challenged consistent with the respective type of social action?

All validity claim types were challenged across social actions, through communication types, and across message types. Addressing research question 4, Table 24 shows challenged validity claims, how frequently they were challenged, and how these challenges varied across time periods.

<i>Validity Claim</i>	<i>Total</i>	<i>Time Period</i>		
	<i>N (%)</i>	<i>T1 N (%)</i>	<i>T2 N (%)</i>	<i>T3 N (%)</i>
Contextuality Appropriateness of the action	9 (5%)	9 (9%)	0 (0%)	0 (0%)
Efficiency Ability of the action to achieve desired ends	68 (41%)	33 (34%)	20 (51%)	15 (48%)
Effectiveness Authority of the communication partner	1 (1%)	1 (1%)	0 (0%)	0 (0%)
Clarity Clarity of the message and related jargon	52 (31%)	32 (33%)	10 (26%)	10 (32%)
Completeness Completeness of the message	23 (14%)	14 (14%)	3 (8%)	6 (19%)
Truthfulness Truthfulness of the communication partner	2 (1%)	1 (1%)	1 (3%)	0 (0%)
Sincerity Sincerity of the communication partner	12 (7%)	7 (7%)	5 (13%)	0 (0%)

Table 24.
Challenged Validity Claims

As shown in the deconstruction of communication breakdowns, two validity claims accounted for 72% of all challenged claims: efficiency and clarity. Efficiency is when one communication partner questions the ability of an action to achieve a desired end. Challenges of efficiency were often oriented toward process structure

message types, where one group member questioned the ability of a meeting time, a work approach, or a method of exchanging ideas to accomplish group tasks. The second frequently challenged validity claim was clarity. Clarity was used by group members to gain clearness on a statement, question, or approach their group member was engaged in. Challenges to the clarity validity claim provided a strengthened communication environment through which other validity claims could be challenged (Goldkuhl, 2000).

Three additional validity claims challenged with some regularity included completeness, sincerity, and contextuality. Completeness, like clarity, provided a strengthened communication environment. Sincerity was frequently challenged to question the honesty of a communication partner in not providing information they said they would provide, skipping a meeting they said they would attend, or not communicating when they said they would communicate. Contextuality was evident only in the first time period, as shown in Table 24. The challenge of the contextuality validity claim was based on one group member questioning another group member on actions that were prohibited in the design of the project (i.e. using email, using third party chat, visiting other group sites, etc.), actions that did not resurface in time periods two or three.

Research question five was a framing mechanism in the coding process and is not answered beyond a “yes/no” answer. Examination of the dialogue showed that, in fact, all challenged validity claims were consistent with their respective social action type.

Resolutions

Research questions six through eight address the reconstruction of the channel expansion process. By examining all groups, channel expansion was reconstructed through communicative acts, the foundational expansion components, communication breakdowns, and the resolution of breakdowns. The three research questions are:

- (6) Are the communication partners engaging in dialogue in an attempt to resolve the communication breakdown?
- (7) Does the group dialogue resolve the communication breakdown?
- (8) Are a varying number of communication breakdowns being resolved over time?

Through coding of the group dialogue, the presence of communication breakdowns was recorded. As mentioned earlier, communication breakdowns were evident across all time periods, in social actions, in communication types, and on message types. Likewise, group members engaged and resolved communication breakdowns through group dialogue.

Research question 6 is addressed through the interpretive analysis provided in the next chapter. Momentum is built to address questions seven and eight, in the sense that the *process* of channel expansion is reconstructed through the coded dialogue to illustrate the communicative act, the foundational components (social actions, communication type, and message type), communication breakdowns, and their subsequent resolution in a temporal order. To begin, figure 17 shows the total number of communicative acts generated across *all groups*

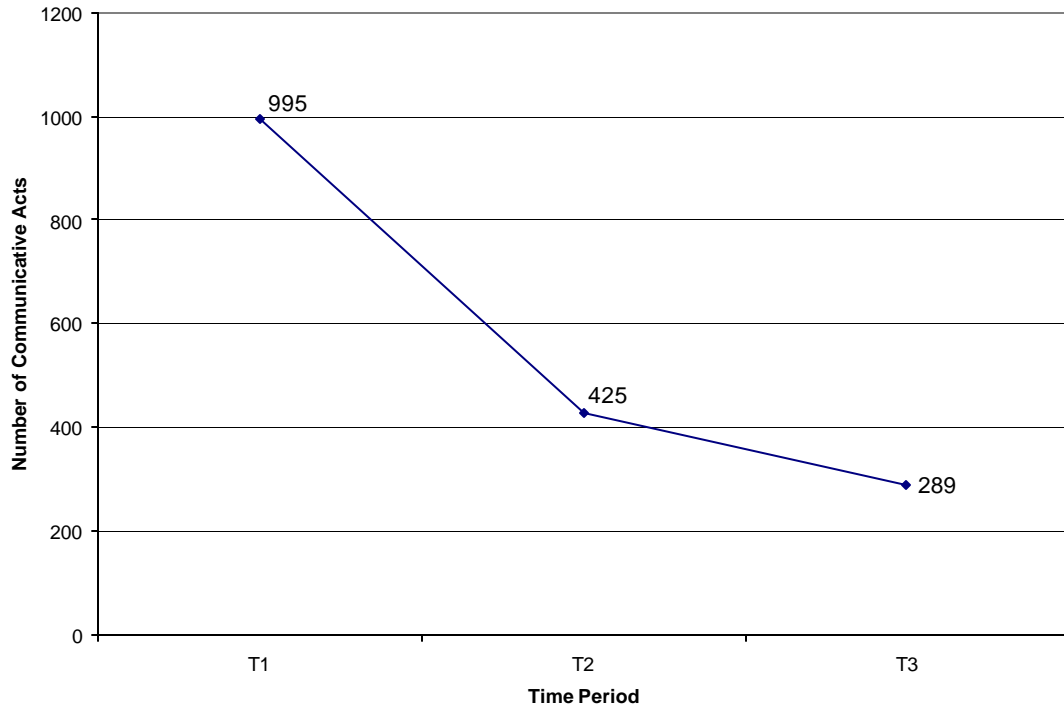


Figure 17.
Total Communicative Acts

This graph shows a general downward trend of communicative acts generated across three sequential time periods. This trend is broken down to explore the message type (topic, process structure, and “other”) communicated on within groups. The downward trend was largely the result of a drop-off in process structure (57.8% drop) and “other” (74.3% drop) message types between T1 and T2. This finding was not surprising as “other” messages types often involved greetings and introductions, communication that is evident only in early group development (Wheelan, 1994; Tuckman, 1977).

In addition, the drop in process structure message types may indicate group members coming to agreement on how best to approach an unknown topic, through

an unknown communication channel, and in an unknown context. Figure 18 shows the breakdown of message types across time periods.

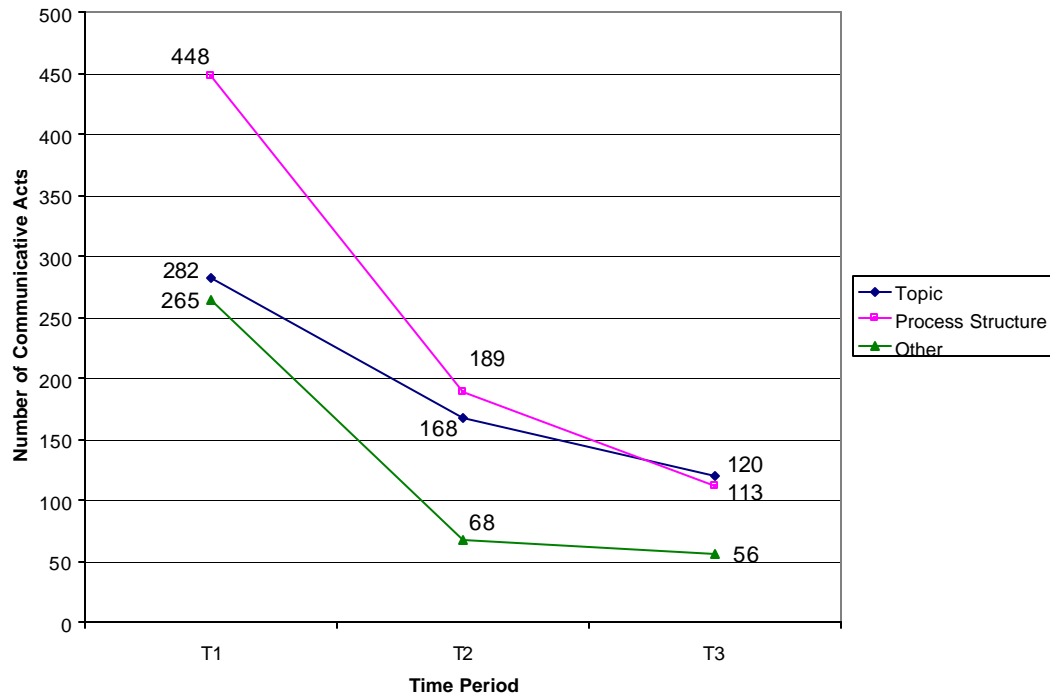


Figure 18.
Message Type Across Time Periods

Following a similar trend and corresponding to the previously examined communication type-message type relationship, synchronous communications showed drops between the three time periods (Figure 19). This trend was expected as both topic and “other” message types coincided with synchronous communication. As groups communicated less frequently on both topic and “other” message types, related decreases were found in synchronous communication.

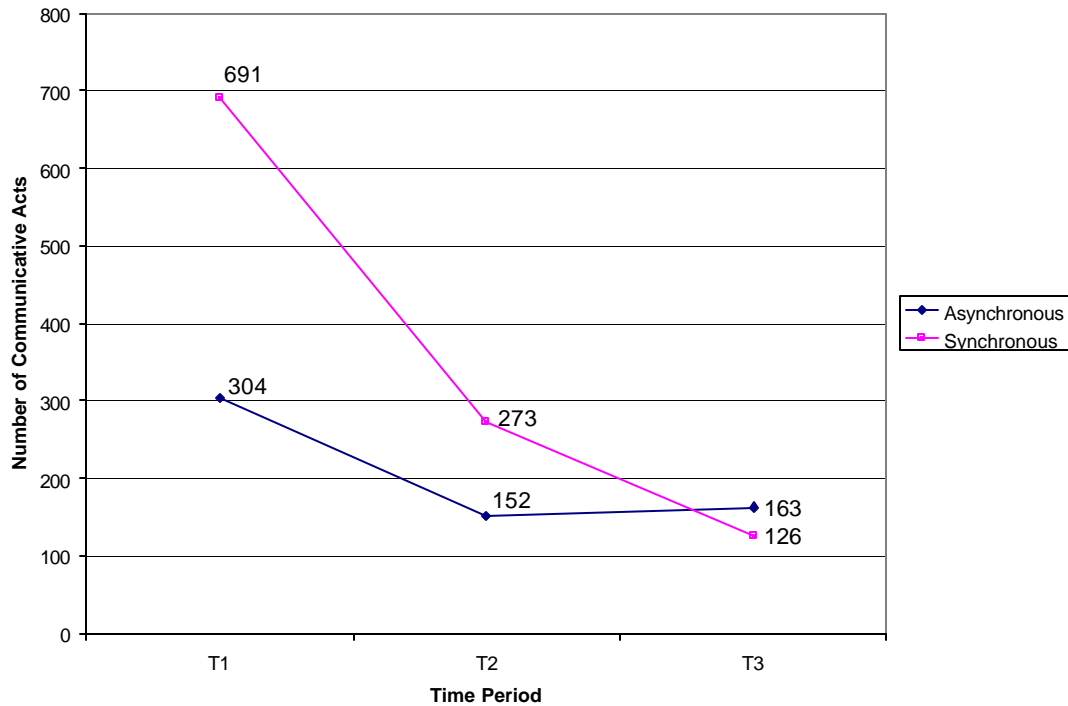


Figure 19.
Communication Type Across Time Periods

While these trends do not show a direct relationship between the foundational channel expansion components and communication breakdowns, they provide a basis of understanding why communication breakdowns decreased across the three time periods. In addition, they graphically support earlier findings of the relationships between communicative acts, communication type, and message type.

Continuing the reconstruction of channel expansion, as groups generated fewer communicative acts, the total number of communication breakdowns, and subsequent resolutions, decreased as well. The downward trend of the total number of communication breakdowns and resolutions is shown in Figure 20.

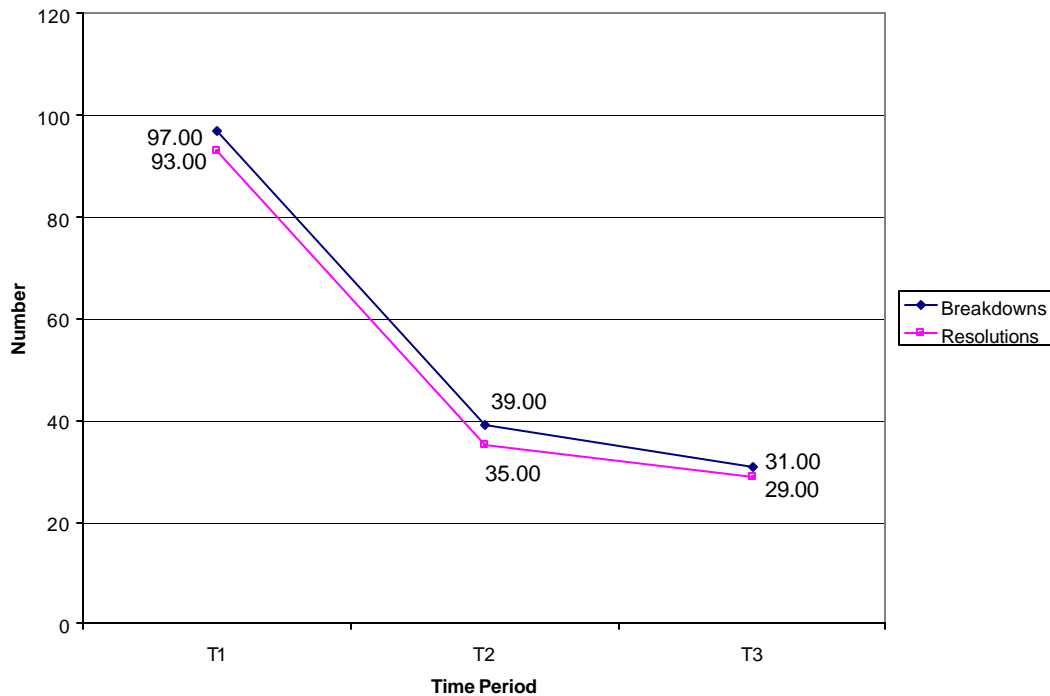


Figure 20.
Total Communication Breakdowns and Resolutions

As the trend of communication breakdowns and resolutions appeared based on the volume of communicative acts generated by group members, channel expansion was best determined by removing the impact of the volume of communicative acts, as set forth in questions 9 and 10:

(9) Does the channel expansion process occur from an effectiveness perspective?

(10) Does the channel expansion process occur from an efficiency perspective?

In doing this, the more telling trends of resolutions per communication breakdown (effectiveness) and the number of breakdowns and resolutions per message (efficiency) were produced. First, the effectiveness ratio shows how group

members used the communication system effectively to resolve communication breakdowns. Figure 21 shows a U-shaped curve across three time periods.

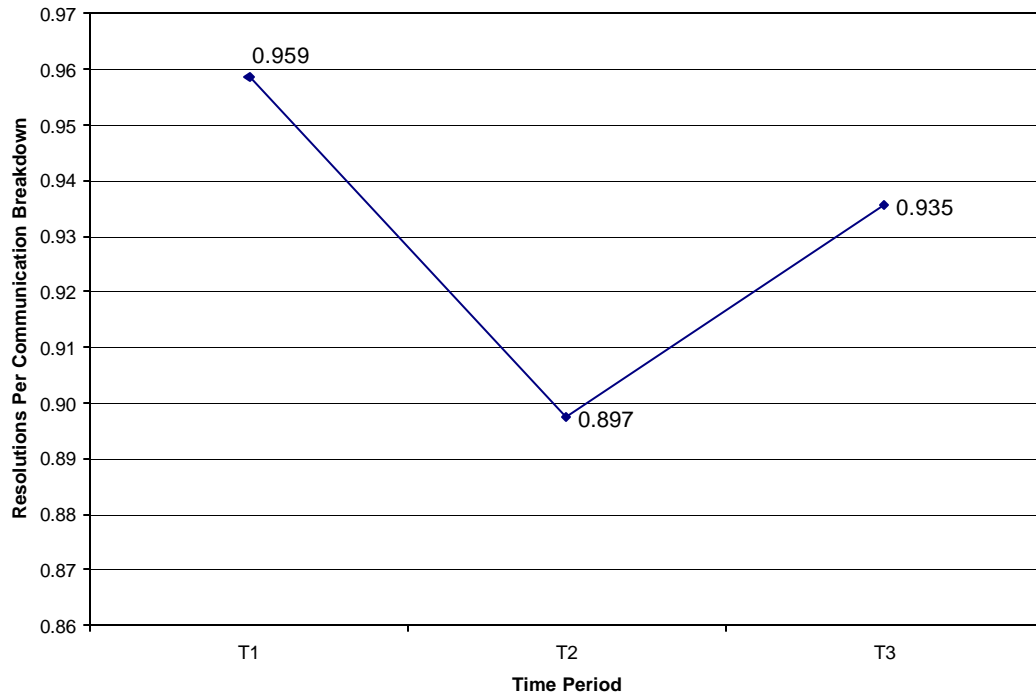


Figure 21.
Resolutions Per Communication Breakdown (Effectiveness)

Figure 21 shows that groups were most effective resolving communication breakdowns at T1 (95.9%) and T3 (93.5%), with a drop at T2 (89.7%). The high rates of resolution and the shape of the resolution curve may correspond to numerous factors. First, the high rates of resolution may have been the result of the methodological design that (1) produced low level communication breakdowns resulting from zero-history groups and (2) encouraged quick resolutions due to time project time pressures.

Second, the U-shaped effectiveness curve may correspond with groups' ability to provide resolution through the communication channel. This ability corresponds to high resolution rates at T1 adversely impacting group effort set forth in resolving communication breakdowns at T2. Recognizing a drop in effectiveness at T2, group effort was refocused to provide resolutions at higher rates as shown at T3.

Third, the drop at T2 may represent a correction in the expectations of the communication channel (Carlson, 1995). Group members were initially enthusiastic and energetic toward the communication channel, only to realize that the channel did not meet their expectations, causing the drop at T2. As group members continued to build experiences through T3, resolution patterns began to reflect the original expectations of the channel.

Fourth, appropriation of the communication channel may have impacted the effectiveness ratio. As individuals used the communication channel in faithful and unfaithful ways (DeSanctis and Poole, 1994; Dennis et al., 2001), effectiveness fluctuated as group members found use patterns that fit their use styles.

Fifth, group development processes may have played a role in the use of the system. As groups initially formed, high levels of focused communication (T1) gave way to periods of group inactivity and sporadic group communication (T2). Finally, as groups reached a midway point, communication again became focused toward the completion of the task, in its entirety (T3) (Gersick, 1988; 1989).

While Figure 21 removed the impact of the total number of communicative acts, Figure 22 still *accounts* for the communicative act by showing the efficiency patterns of groups, providing a second reconstruction of the channel expansion

process. Figure 22 shows a U-shaped trend, also consistent with the shape found by Carlson (1995) in the original channel expansion study.

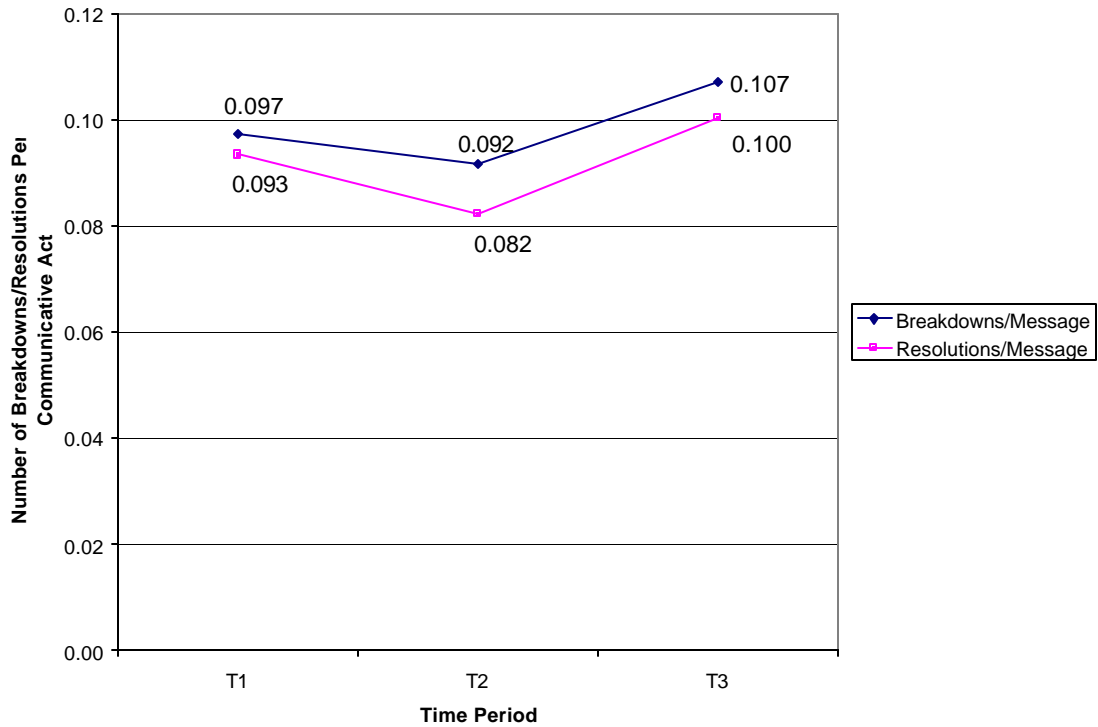


Figure 22.
Communication Breakdowns and Resolutions Per Message (Efficiency)

As group members moved toward the completion of a task, starting with zero history of context, partner, communication channel, or topic, they were variable in their ability to communicate in a rich manner as indicated through the decrease and increase in the number of communication breakdowns and resolutions per message. The U-shaped curve can be explained as, “a lag between an individual’s gaining experiences through communication, developing more sophisticated knowledge-bases, eventually leveraging those knowledge-bases to communicate more effectively

(Carlson, 1995, p. 73),” impacting channel capacity based on the more effective channel use.

In summary, this reconstruction of the channel expansion process from an examination of the relationships between the three foundational components, through the resolution of communication breakdowns, is shown in the procedural model of Figure 23.

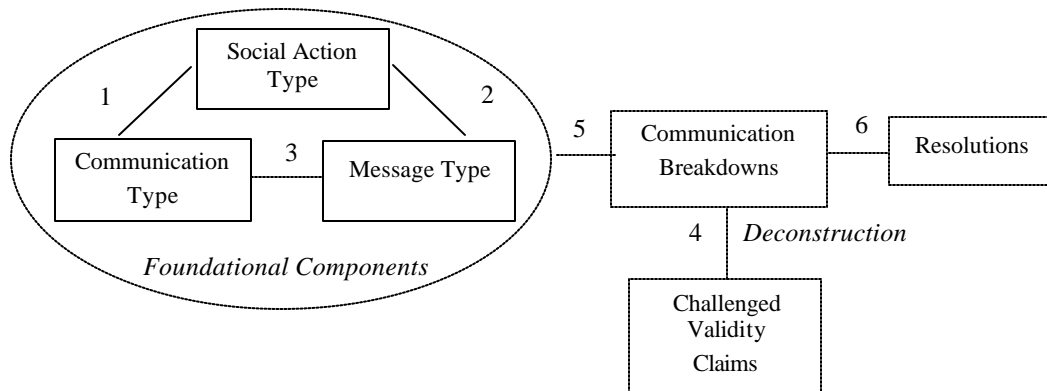


Figure 23.
Relationship Between Foundational Components, Communication Breakdowns, Challenged Validity Claims, and Resolutions.

This figure shows the six relationships of analysis provided through a descriptive analysis. Arrow 1 examined the relationship between social actions and communication type, finding that asynchronous communications supported strategic action more frequently than did synchronous communications. Arrow 2 illustrated that topic message types occurred frequently in discursive action, and process structure message types occurred more frequently in strategic actions. Arrow 3 showed a relationship between communication type and message type such that topic

and “other” message types occurred more frequently through synchronous communications. Together these three relationships built a deeper understanding of the foundational components of the channel expansion process.

Arrow 4 provided a deconstruction of communication breakdowns through the examination of challenged validity claims. This relationship showed that five of the seven challenged validity claims accounted for 98% of the communication breakdowns with efficiency and clarity representing 72% of all challenged validity claims.

Arrow 5 built an understanding between the three foundational components and communication breakdowns. Findings showed that communication breakdown and resolution trends were similar to those shown in the number of communicative acts generated across three time periods, trends that appeared based on decreases in process structure and “other” message types through synchronous communications.

Finally, arrow 6 directly addressed the ability of the communication channel to support communication breakdowns and their subsequent resolutions. By removing the impact of the high volume of communicative acts, the channel expansion was reconstructed from both an effectiveness and an efficiency perspective.

Through the examination of group dialogue, it was clear that tenets of the theory of communicative action can be used to describe media richness (Ngwenyama and Lee, 1997) and the subsequent channel expansion process. This view extends the work of Carlson (1995), Chidambaram and Burke (1996), and Tan (1994) in using a longitudinal approach to identify and describe communication channel use through a reconstruction of the channel expansion process. Table 25 summarizes the findings.

<i>Research Questions</i>	<i>Findings</i>	<i>Evidence</i>
Q1: What social actions are communication partners engaged in?	Communicative: 96% Discursive: 1.76% Strategic: 1.76% Instrumental: .35%	Through coded group dialogue, high communicative action was evident.
Q2: What social actions are engaged in across varying communication types?	Moderate variation existed in the social action-communication type relationship.	Through coded group dialogue, strategic action was shown to exist in 4.4% of asynchronous communication, compared with .3% in synchronous communication.
Q3: Has dialogue between communication partners become false, incomplete, insincere, or unwarranted?	Yes. Dialogue exhibited these characteristics.	<i>An interpretive analysis provides support of this research question.</i>
Q4: What validity claims are being challenged?	Contextuality: 5% Efficiency: 41% Effectiveness: 1% Clarity: 31% Completeness: 14% Truthfulness: 1% Sincerity: 7%	Through coded group dialogue, communication breakdowns existed largely on two validity claims.
Q5: Are the validity claims being challenged consistent with the respective type of social action?	Yes. Appropriate validity claims were raised in their respective social action.	Through coded group dialogue, social actions and their appropriate validity claims were matched.
Q6: Are the communication partners engaging in dialogue in an attempt to resolve the communication breakdown?	Yes. Communication was used to resolve communication breakdowns.	<i>An interpretive analysis provides support for this research question.</i>
Q7: Does the group dialogue resolve the communication breakdown?	Yes. Resolutions of communication breakdowns were achieved.	<i>An interpretive analysis provides support for this research question.</i>
Q8: Are a varying number of communication breakdowns being resolved over time?	Yes. The number of resolutions varies.	Across three time periods, 93, 35, and 29 communication breakdowns achieved resolution.
Q9: Does the channel expansion process occur from an effectiveness perspective?	Yes. Channel expansion exists from an effectiveness perspective.	The ratio of resolutions per breakdowns showed channel expansion as a U-shaped curve.
Q10: Does the channel expansion process occur from an efficiency perspective?	Yes. Channel expansion exists from an efficiency perspective.	The ratio of breakdowns and resolutions per communicative act showed channel expansion as a U-shaped curve.

Table 25.
Summary of Channel Expansion Descriptive Findings

The Impact of Task-Technology Fit: Social Actions

This section explores the impact of task-technology fit profiles on the channel expansion process and examines (1) the relationship of task-technology fit with social action, communication type, and message type relationships, (2) the impact of task-technology fit profiles on challenged validity claims, and (3) the impact of task-technology fit profiles on the channel expansion process as determined through the resolution of communication breakdowns. A total of 14 proper task-technology fit groups and 13 improper task-technology fit groups were examined.

Returning to social actions, communication type, and message type, task-technology fit profiles were examined to determine their impact on the relationships between these three foundational channel expansion components. In this section, the first part of research question 11 is addressed:

(11a) What impact do task-technology fit profiles have on social actions?

Examining the social actions entered, little variation was found as proper task-technology fit profiles entered communicative, discursive, strategic, and instrumental actions at rates of 95%, 3%, 1%, and 1% respectively. Improper task-technology fit groups entered communicative, discursive, strategic, and instrumental actions at rates of 92%, 5%, 1%, and 1% respectively.

Examining the relationship between social actions and communication type yielded two differences between task-technology fit profiles. Table 26 shows the similarities between the two fit profiles and the social action-communication type relationship.

<i>TTF Profile</i>	<i>Communication Type</i>	<i>Social Action</i>			
		<i>Communicative</i>	<i>Discursive</i>	<i>Strategic</i>	<i>Instrumental</i>
Improper	Asynchronous	91.6%	1.1%	6.3%	1.1%
	Synchronous	97.0%	2.9%	0%	.1%
Proper	Asynchronous	95.5%	1.2%	2.7%	.6%
	Synchronous	98.9%	0%	1.1%	0%

Table 26.
Social Action-Communication Type Relationship: The Impact of TTF

Two differences evident in Table 26 were the use of the asynchronous tool for strategic actions and the use of the synchronous tool for discursive actions by improper task-technology fit groups. The difference on strategic actions may be based on improper fit groups missing meetings as a result of the absence of an agenda, and engaging in strategic action to remedy these situations. The discursive action difference may be based on improper fit groups' use of the synchronous tool, entering the aforementioned topic message type-discursive action relationship more often.

Like the impact that task-technology fit profiles had on the social action-communication type relationship, differences were identified in the social action-message type relationship (Table 27).

<i>TTF Profile</i>	<i>Message Type</i>	<i>Social Action</i>			
		<i>Communicative</i>	<i>Discursive</i>	<i>Strategic</i>	<i>Instrumental</i>
Improper	Topic	93.4%	6.2%	.2%	.2%
	Process Structure	95.5%	0%	3.8%	.7%
	Other	99.6%	0%	.4%	0%
Proper	Topic	96.6%	2%	1.4%	0%
	Process Structure	96.7%	.3%	2.4%	.6%
	Other	98.6%	0%	1.4%	0%

Table 27.
Social Action-Message Type Relationship: The Impact of TTF

A moderate difference shown in Table 27 was a higher entry into topic message types during discursive action by improper task-technology fit groups. This difference may be due to improper task-technology fit groups being engaged in a greater number of topic discussions throughout all social actions, offsetting the percentage of process structure and “other” message types entered across social actions. This was the result of focus and direction needed on topic discussions as a result of little topic direction provided through the lack of an agenda. Ultimately, Tables 26 and 27 show modest differences in the frequency of social actions across communication type and message type respectively.

Table 28 shows the impact task-technology fit profiles had on the communication type-message type relationship. Unlike the two prior foundational relationships, task-technology fit profiles created strong differences in the frequency of various message types across different communication types.

<i>TTF Profile</i>	<i>Message Type</i>	<i>Communication Type</i>	
		Asynchronous	Synchronous
Improper TTF	Topic	16.4%	83.6%
	Process Structure	45.4%	54.6%
	Other	10.0%	90.0%
Proper TTF	Topic	70.9%	29.1%
	Process Structure	55.9%	44.1%
	Other	54.1%	45.9%

Table 28.
Communication Type-Message Type Relationship: The Impact of TTF

As shown in Table 28, large differences were evident in topic message types across communication types. Improper task-technology fit groups used the

synchronous communication tool for topic message types at much higher rates than did proper task-technology fit groups. This finding suggests that fit profiles played an important role in how the synchronous and asynchronous communication tools were used in the entry into topic message types. As improper fit groups were not provided an agenda of how to approach the topic, which articles to read at what point in the project, and how the articles were related, they were inclined toward synchronous communication to resolve questions regarding topic issues.

Likewise, improper task-technology fit groups entered “other” message types more regularly in synchronous communication. As groups used the synchronous tool to discuss topic related issues, the tool was used for a higher exchange of non-project related discussion, resulting in higher instances of “other” message types.

In summary, the relationships examined in this section include the three foundational components of the channel expansion process and the impact that task-technology fit profiles had on them. Moderate differences were found between the relationship of social actions and communication type, moderate differences in the social action-message type relationship, and large differences in the communication type-message type relationship. Figure 24 shows these findings.

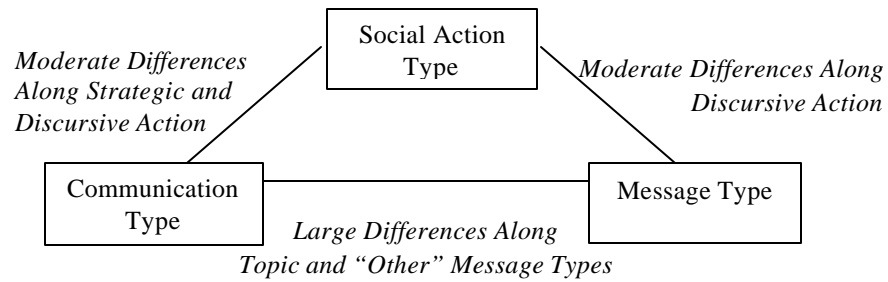


Figure 24.
CET Foundational Component Relationships: The Impact of TTF

The Impact of Task-Technology Fit: Communication Breakdowns

Moving past the foundational components of channel expansion, the process was explored through communication breakdowns and their subsequent resolution, as asked in the second part of question 11:

(11b) What impact do task-technology fit profiles have on communication breakdowns?

Communication breakdowns showed no difference between proper and improper fit groups and are addressed in the interpretive analysis provided in the next chapter.

The Impact of Task-Technology Fit: Validity Claims

From the descriptive perspective, the coding scheme was used to deconstruct communication breakdowns in the analysis of validity claims challenged across the fit profiles. Table 29 illustrates these differences addressing the third part of question 11:

(11c) What impact do task-technology fit profiles have on challenged validity claims?

<i>TTF Profile</i>	<i>Validity Claim</i>	<i>Total</i>	<i>Time Period</i>		
		<i>N (%)</i>	<i>T1 N (%)</i>	<i>T2 N (%)</i>	<i>T3 N (%)</i>
Improper	Contextuality	8 (7%)	8 (12%)	0 (0%)	0 (0%)
	Appropriateness of actions				
	Efficiency	41 (36%)	22 (32%)	9 (43%)	10 (43%)
	Ability of action to reach desired ends				
	Effectiveness	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Authority of partner				
	Clarity	35 (31%)	20 (29%)	7 (33%)	8 (35%)
	Clarity of message and jargon				
	Completeness	21 (19%)	13 (19%)	3 (14%)	5 (22%)
	Completeness of message				
	Truthfulness	2 (2%)	1 (1%)	1 (5%)	0 (0%)
	Truthfulness of partner				
	Sincerity	6 (5%)	5 (7%)	1 (5%)	0 (0%)
Sincerity of partner					
Proper	Contextuality	1 (2%)	1 (4%)	0 (0%)	0 (0%)
	Appropriateness of actions				
	Efficiency	27 (50%)	11 (39%)	11 (61%)	5 (63%)
	Ability of action to reach desired ends				
	Effectiveness	1 (2%)	1 (4%)	0 (0%)	0 (0%)
	Authority of partner				
	Clarity	17 (31%)	12 (43%)	3 (17%)	2 (25%)
	Clarity of message and jargon				
	Completeness	2 (4%)	1 (4%)	0 (0%)	1 (13%)
	Completeness of message				
	Truthfulness	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Truthfulness of partner				
	Sincerity	6 (11%)	2 (7%)	4 (22%)	0 (0%)
Sincerity of partner					

Table 29.
Challenged Validity Claims: The Impact of TTF

As shown in Table 29, differences between fit profiles occurred most noticeably on three validity claims: efficiency, completeness, and sincerity. Efficiency was challenged more often in proper task-technology fit groups, a finding that may be explained by a complacency provided by the project agenda. The agenda provided to proper task-technology fit groups created reduced efforts in posting new

information and sharing ideas, resulting in group members challenging the claims of efficiency.

Sincerity was evident at slightly higher rates for proper task-technology fit groups. Returning to the earlier explanation of challenges on the efficiency validity claim, sincerity of a communication partner may be questioned as proper task-technology fit group members skipped postings, missed meetings, and failed to communicate as they stated they would as a result of complacency instilled by the agenda.

Finally, completeness appeared at higher levels for improper task-technology fit groups. This finding suggests that improper fit groups, in using the synchronous communication tool to discuss topic discussions, generated short incomplete messages through the rapid-fire environment of synchronous communications. These short messages resulted in completeness being challenged and were later completed to provide comprehensibility to the communication environment.

Other challenges of validity claims appeared fairly similar across fit profiles and consistent with earlier examinations of challenged validity claims. Trends between the fit profiles and the challenge of validity claims across time periods also appeared reasonably similar. The clarity trend differed between fit profiles as proper task-technology fit groups showed variations in the challenge of the clarity validity claim while improper task-technology fit groups showed fairly even challenge of that validity claim over time. This finding is neither consistent nor complementary to earlier findings and may be explained by proper fit groups immediately using the detailed project agenda as a mechanism to engage project goals early. This early

engagement resulted in high challenges of the clarity claim as groups looked to understand group practices toward task completion.

The Impact of Task-Technology Fit: Resolutions

This section reconstructs the *process* of channel expansion by exploring the impact that task-technology fit profiles had on communicative acts, communication type, message type, communication breakdowns, and resolutions. The fourth component of question 11 is addressed in the reconstruction of channel expansion:

(11d) What impact do task-technology fit profiles have on the resolution of communication breakdowns?

It was shown in the earlier sections that communication breakdowns and subsequent resolutions provide a useful and unique view of the channel expansion process. As the number of groups varied between proper and improper task-technology fit profiles, averages will be used to demonstrate differences and similarities.

Figure 25 displays the average number of communicative acts generated between proper and improper task-technology fit groups. As shown in Figure 25, groups that were provided improper fit profiles generated a larger average number of communicative acts.

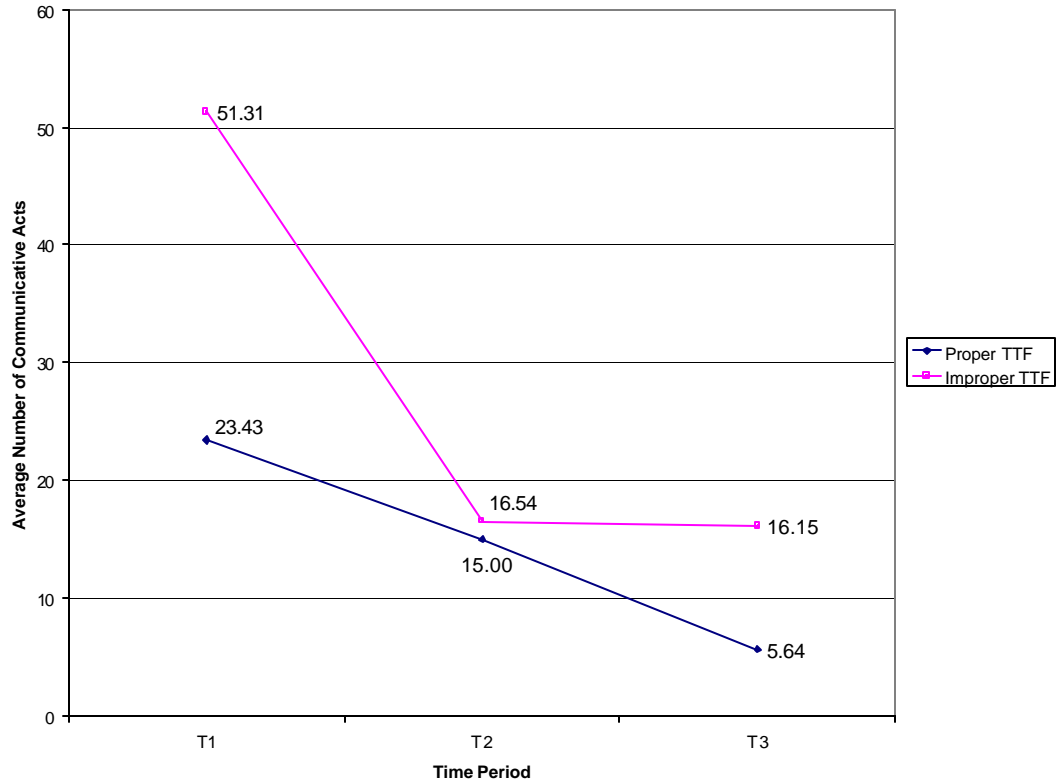


Figure 25.
Average Communicative Acts by Period: The Impact of TTF

A deeper investigation of Figure 25 shows that improper task-technology fit groups used the synchronous tool to engage in topic and “other” discussions more frequently than their proper fit counterparts. This statement is represented in Tables 30 and 31 that show improper task-technology fit groups used the synchronous communication tool, engaged in topic and “other” message types, and generated a larger number of communicative acts than proper fit groups.

<i>TTF Profile</i>	<i>Communication Type</i>	<i>Average Communicative Acts</i>	<i>Average Number of Communicative Acts Across Time Periods</i>		
			T1	T2	T3
Improper	Asynchronous	21.92	10.23	5.08	6.62
	Synchronous	62.08	41.15	11.46	9.46
Proper	Asynchronous	23.86	12.21	6.21	5.43
	Synchronous	20.21	11.21	8.79	0.21

Table 30.
Average Communicative Acts by Communication Type: The Impact of TTF

<i>TTF Profile</i>	<i>Message Type</i>	<i>Average Communicative Acts</i>	<i>Average Number of Communicative Acts Across Time Periods</i>		
			T1	T2	T3
Improper	Topic	32.46	15.92	10.08	6.46
	Process Structure	32.38	21.62	4.69	6.08
	Other	19.15	13.85	1.77	3.54
Proper	Topic	10.57	5.36	2.71	2.50
	Process Structure	23.50	11.93	9.14	2.43
	Other	10.00	5.86	3.14	0.71

Table 31.
Average Communicative Acts by Message Type: The Impact of TTF

As discussed earlier, the agenda provided to proper task-technology fit groups may have acted as a topic focusing mechanism, leaving group members less inclined for topic discussions, staying out of synchronous communications, therefore generating fewer communicative acts.

In addition, Figure 25 showed a gradual decline in the number of communicative acts generated by proper task-technology fit groups, and a more L-shaped graph for improper fit groups. A closer examination of message type shows that both process structure and “other” message types drop off markedly for improper fit groups, as shown in Figures 26 and 27 respectively.

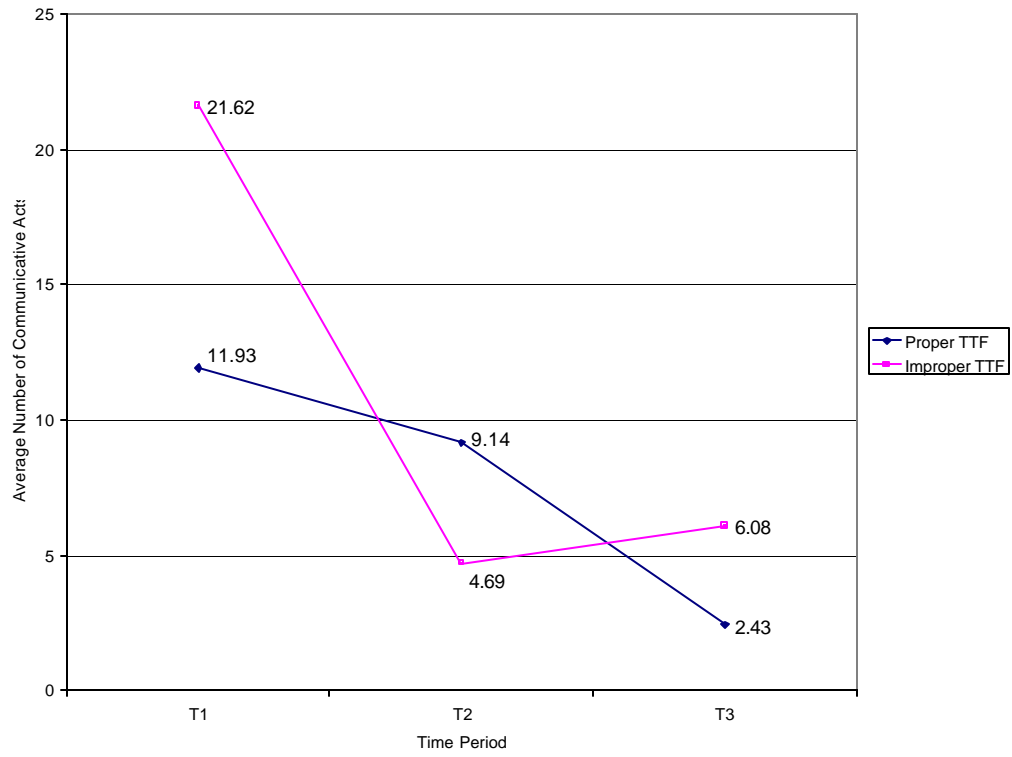


Figure 26.
Average Process Structure Message Type by Period: The Impact of TTF

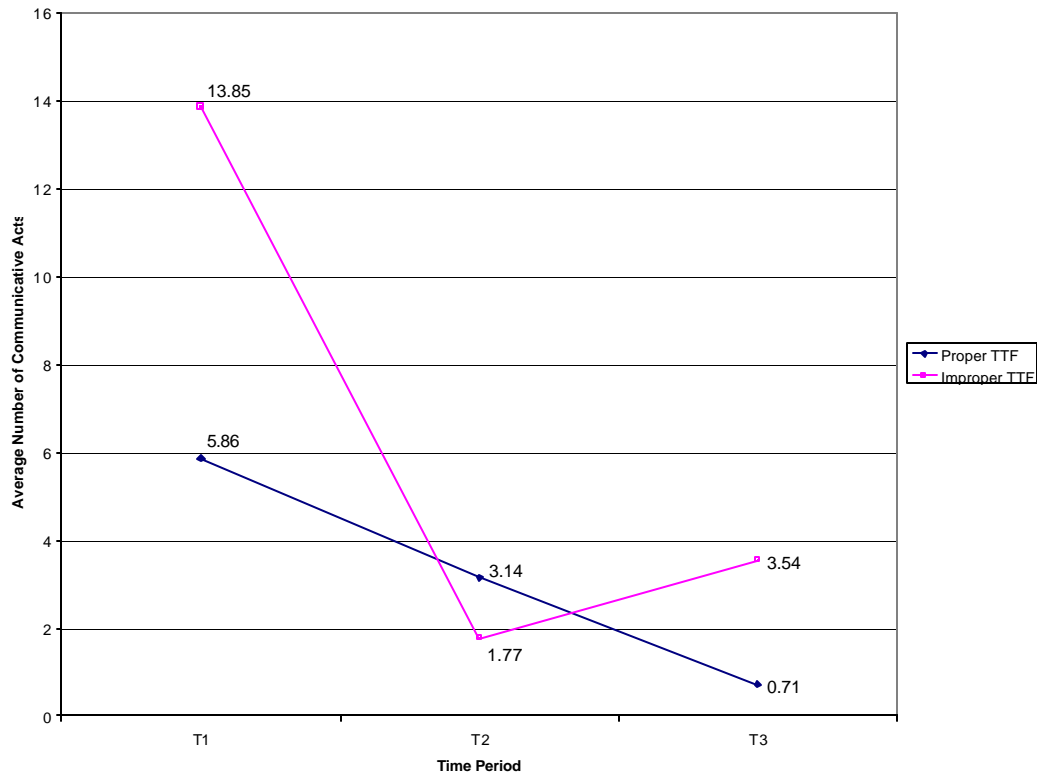


Figure 27.
Average “Other” Message Type by Period: The Impact of TTF

Figure 26 shows that improper task-technology fit groups dedicated a larger number of communicative acts toward providing process structure to a potentially confusing communicative environment in T1 than did their proper fit counterparts. Through process structure message types, improper task-technology fit groups were striving toward control over a situation that was provided to proper fit groups through an agenda.

The final message type, topic, showed a more gradual decline in both proper and improper task-technology fit groups. As shown in Figure 28, improper fit groups generated a larger number of communicative acts related to topic message types. Such a finding is explained through the aforementioned discussion of topic confusion,

the lack of a structured agenda, and the entry into high communicative act environment of synchronous communication.

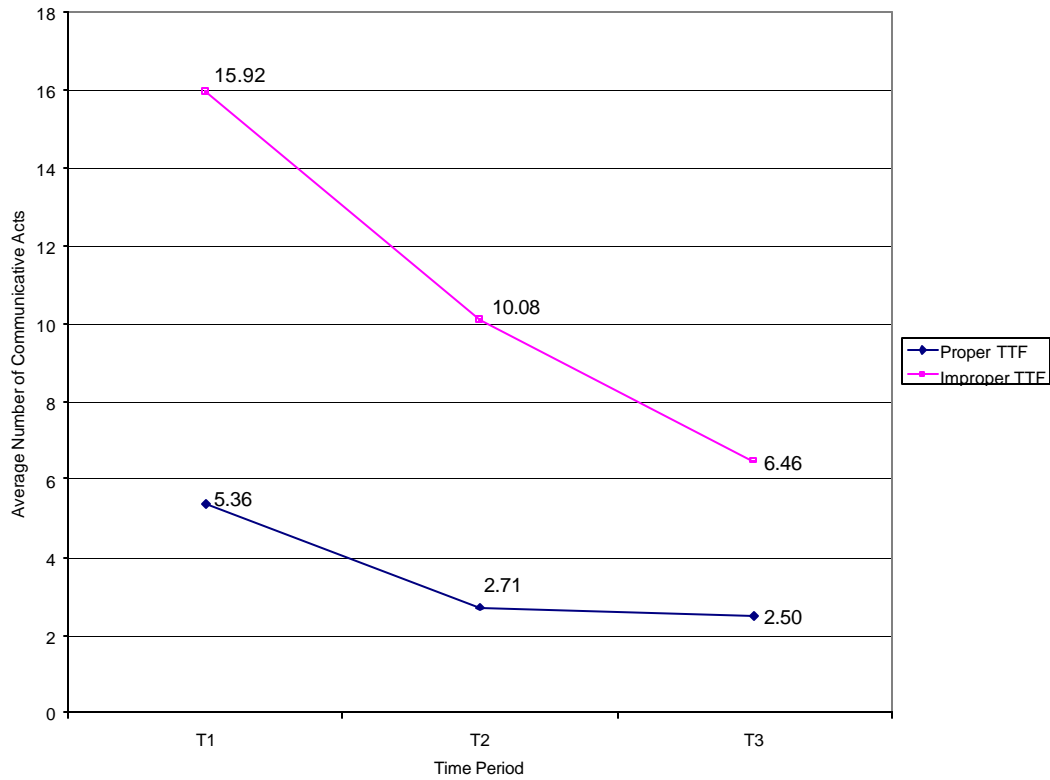


Figure 28.
Average Topic Message Type by Period: The Impact of TTF

Similar to what was found in the original reconstruction of channel expansion, as the average number of communicative acts decreased, so did the average number of communication breakdowns and subsequent resolutions. This is shown in Figures 29 (communication breakdowns) and 30 (resolutions).

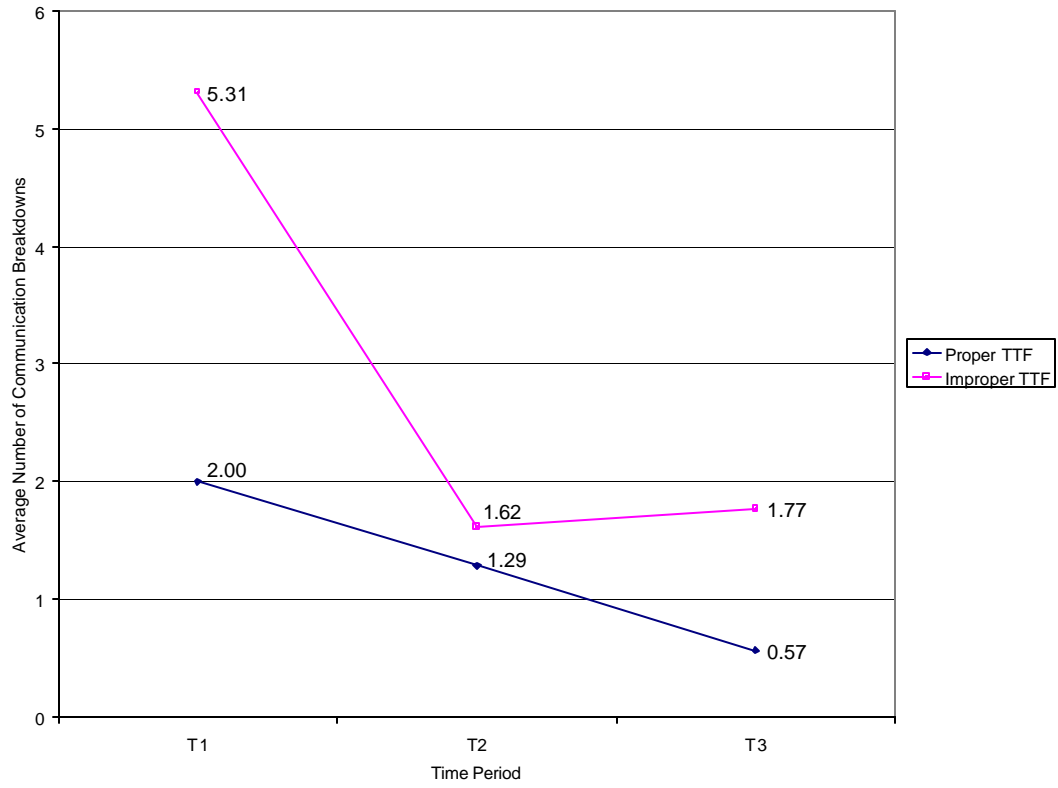


Figure 29.
Average Communication Breakdowns by Period: The Impact of TTF

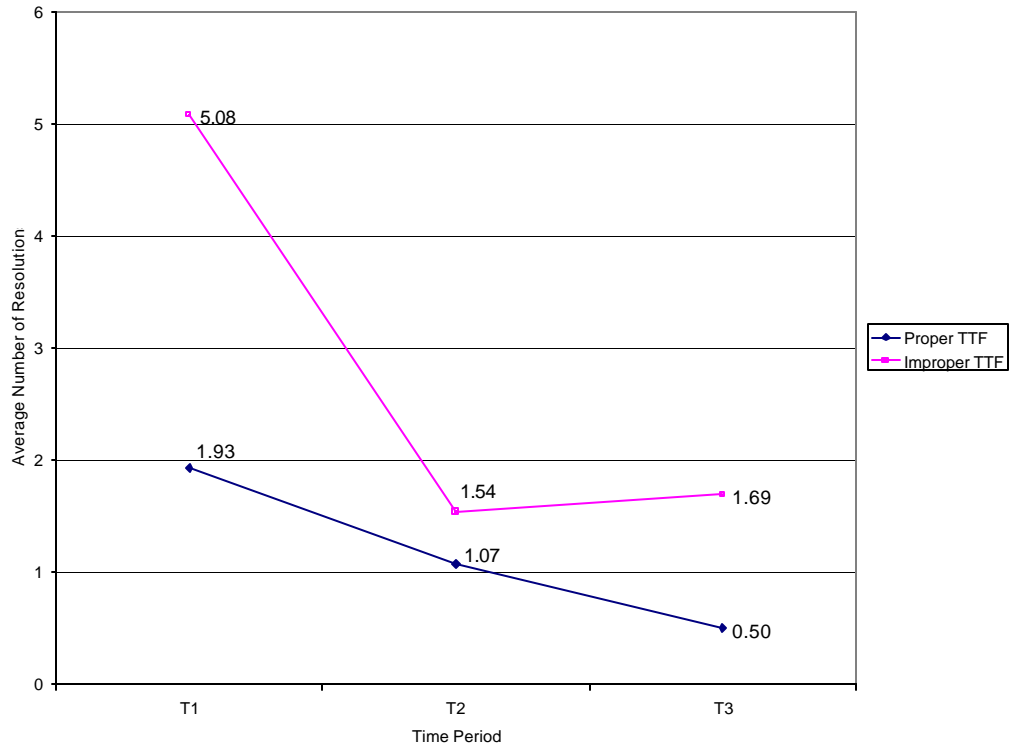


Figure 30.
Average Resolutions by Period: The Impact of TTF

As improper task-technology fit groups entered synchronous communication to discuss topic issues, a larger number of communicative acts were generated, resulting in higher numbers of communication breakdowns and resolutions. Removing the impact of the volume of communicative acts addresses the final two research questions:

- (12) Does a proper task-technology fit profile result in higher channel richness and channel expansion from an effectiveness perspective?
- (13) Does a proper task-technology fit profile result in higher channel richness and channel expansion from an efficiency perspective?

As shown in Figure 31, the average number of resolutions per communication breakdown shows that improper task-technology fit groups were consistently higher in their ability to resolve communication breakdowns. Proper task-technology fit groups showed a more U-shaped effectiveness curve, similar to the prior analysis of all groups.

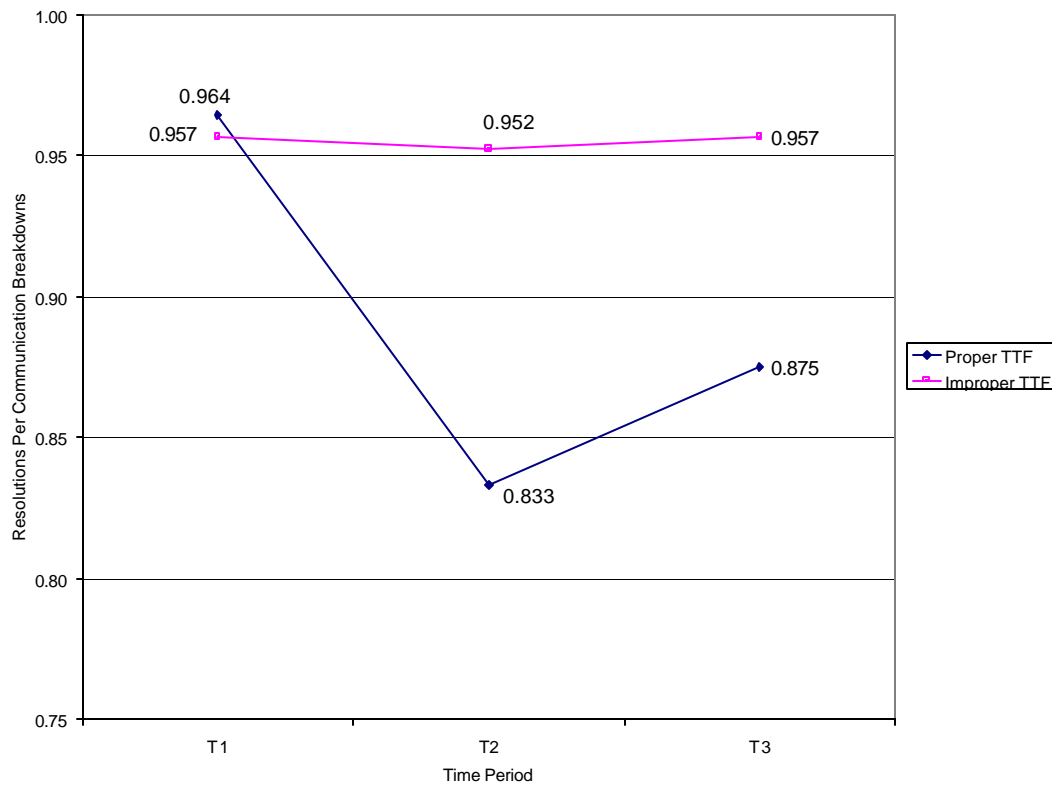


Figure 31.
Average Resolutions Per Communication Breakdown by Period: The Impact of TTF

This indicates that proper task-technology fit profiles may not have provided users the opportunity to effectively resolve communication breakdowns. As indicated earlier, proper task-technology fit groups often used asynchronous communication,

which produced time gaps between communicative acts, with respect to synchronous communication. These gaps resulted in group members not addressing and resolving earlier communication breakdowns, forming an assumption that a communication breakdown was resolved without their intervention, or the communication breakdown was no longer relevant and did not need to be addressed. In addition, the high rates of resolution may be a residual of the methodological design that encouraged easily resolved communication breakdowns and forced resolutions per project outcomes. Again, high ratios may be the result of methodological design issues encouraging group resolution of easily resolved communication breakdowns.

Examining the average number of communication breakdowns and resolutions per communicative act shows that both proper and improper task-technology fit groups exhibited similarly shaped channel expansion curves. In addition, improper task-technology fit groups supported a higher number of communication breakdowns and resolutions per communicative act. As the average number of communicative acts, communication breakdowns, resolutions, and the breakdown/resolution ratio was consistently higher for improper task-technology fit groups, so too was the efficiency per communicative act. Such findings indicate that improper task-technology fit groups generated a greater number of communicative acts, utilized the synchronous communication tool with greater regularity, generated a higher number of communication breakdowns and resolutions, and used the communication channel in a richer fashion with respect to communication breakdowns per communicative act (Figure 32) and resolutions per communicative act (Figure 33).

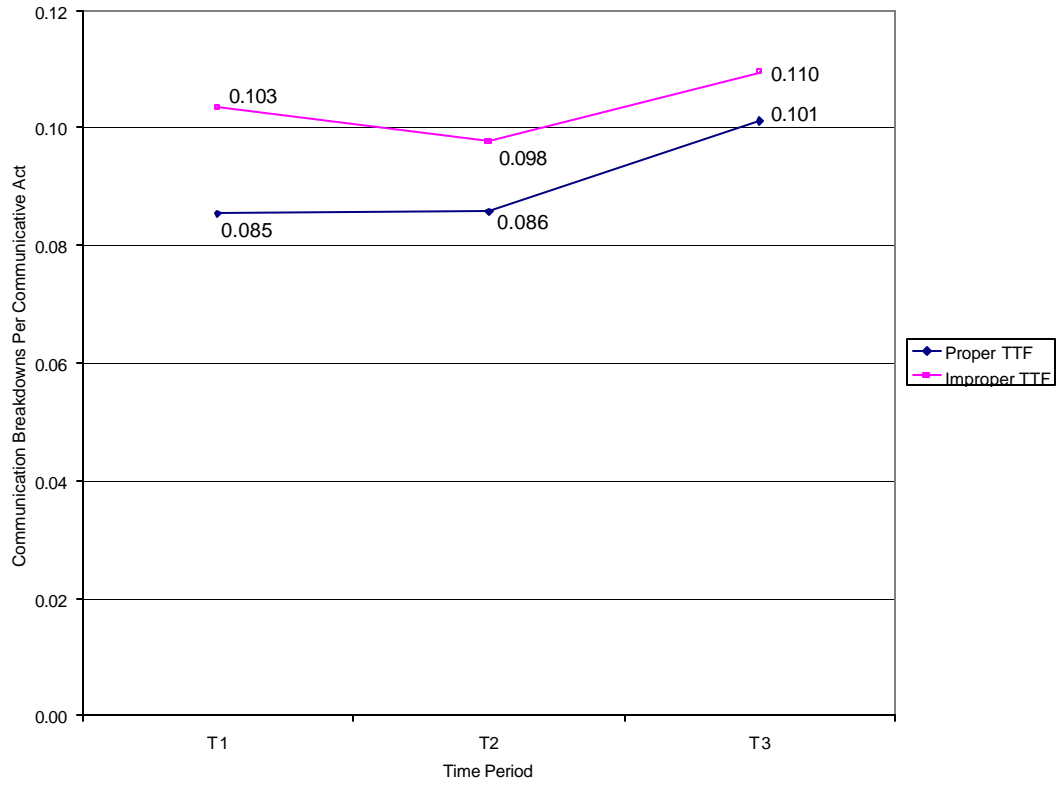


Figure 32.
Communication Breakdowns Per Communicative Act by Period: The Impact of TTF

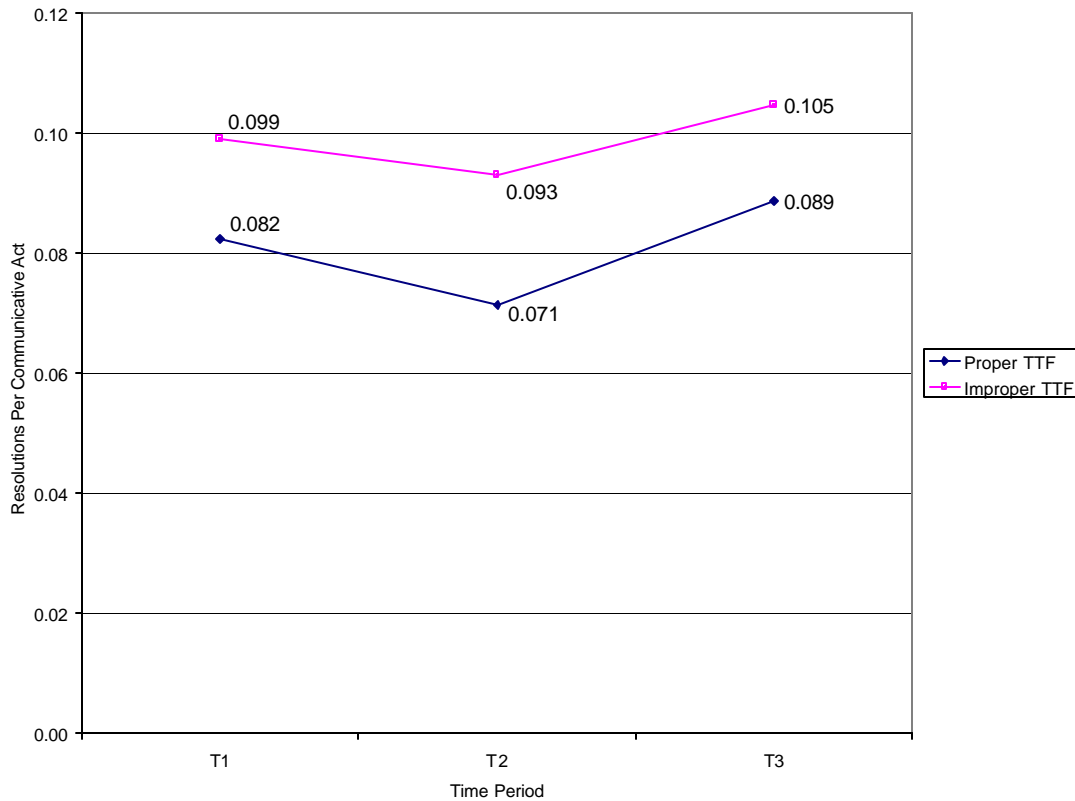


Figure 33.
Resolutions Per Communicative Act by Period: The Impact of TTF

While channel expansion curve findings in Figures 32 and 33 appear subtle, changes of roughly 1% represent a change of two communicative acts. For example, the proper task-technology fit decrease between T1 and T2 indicates a change of one resolution every 12.15 communicative acts at T1 and one resolution every 14.00 communicative acts at T2.

Interestingly, both Figures 32 and 33, display the U-shaped curve found in the initial reconstruction of channel expansion across all groups. These findings suggest that proper and improper task-technology fit profiles had little variation in their impact on the channel expansion shape from an efficiency perspective. The

differences between the two fit profiles lie in the higher effectiveness and efficiency rates for improper task-technology fit groups, and the larger variation in effectiveness rates for proper fit groups. Figure 34 provides an picture upon which to summarize these variations.

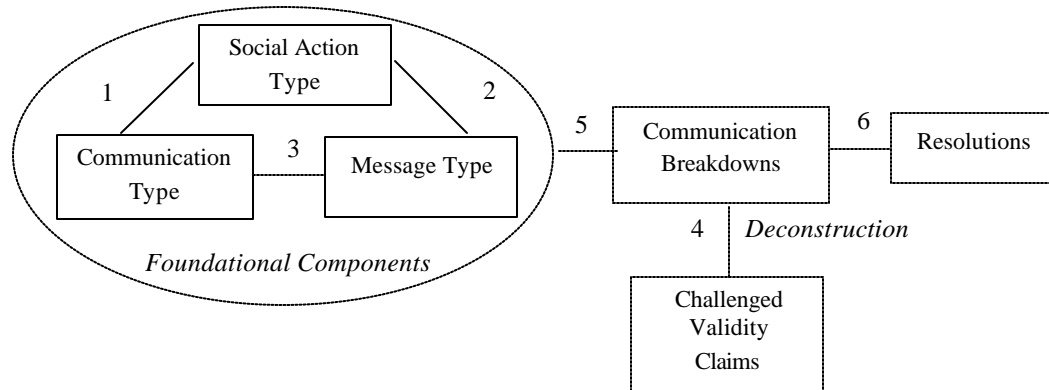


Figure 34.
Relationship Between Foundational Components, Communication Breakdowns, Challenged Validity Claims, and Resolutions: The Impact of TTF

First, at arrows 1 and 2, task-technology fit profiles had moderate impacts on the social action-communication type and the social action-message type relationships. These findings indicate that variations in fit profiles had modest impacts on social actions.

Arrow 3 found that the communication type-message type relationship was considerably different between proper and improper task-technology fit groups. The findings showed that improper task-technology fit groups used synchronous communication to enter topic message types at higher rates than did proper fit groups.

Arrow 4 was shown to vary on three challenged validity claims in the deconstruction of communication breakdowns. The challenged validity claims of efficiency, completeness, and sincerity differed between task-technology fit profiles. These findings corroborated earlier findings of a project agenda impacting communication channel use.

Arrow 5 was strengthened through an understanding of how the communication type-message type relationship impacted channel expansion. The use of synchronous communication to enter topic message types by improper fit groups appeared to act as an influencing factor in the channel expansion process. Through the generation of a higher number of communicative acts, improper task-technology fit groups generated a higher volume of communication breakdowns and subsequent resolutions.

Arrow 6 showed that improper fit groups generally had higher levels of single period *channel richness* from both an effectiveness and efficiency perspective, and lower levels of *channel expansion* from an effectiveness perspective. These findings suggest that improper fit groups used the communication channel in a richer manner across most time periods and at steadier rates than did proper task-technology fit groups. Table 32 summarizes these findings. The entire set of coded data is available in Appendix P.

<i>Research Questions</i>	<i>Findings</i>		<i>Evidence</i>
	Proper Fit	Improper Fit	
Q11a: What impact do task-technology fit profiles have on social actions?	Communicative: 95% Discursive: 3% Strategic: 1% Instrumental: 1%	Communicative: 92% Discursive: 5% Strategic: 1% Instrumental: 1%	Through coded dialogue, slight variations were evident in social actions.
Q11b: What impact do task-technology fit profiles have on communication breakdowns?	Little variation was evident between social action in the way communication breakdowns were entered.		<i>An interpretive analysis provides support of this research question.</i>
Q11c: What impact do task-technology fit profiles have on challenged validity claims?	Contextuality: 7% Efficiency: 36% Effectiveness: 0% Clarity: 31% Completeness: 19% Truthfulness: 2% Sincerity: 5%	Contextuality: 2% Efficiency: 50% Effectiveness: 2% Clarity: 31% Completeness: 4% Truthfulness: 0% Sincerity: 11%	Through coded dialogue, variations were evident in challenged validity claims.
Q11d: What impact do task-technology fit profiles have on the resolution of communication breakdowns?	Average Resolutions T1: 1.93 T2: 1.07 T3: 0.5	Average Resolutions T1: 5.08 T2: 1.54 T3: 1.69	Through coded dialogue, variations in the average number of resolutions across time periods were evident.
Q12: Does a proper task-technology fit profile result in higher channel richness and channel expansion from an effectiveness perspective?	Yes. The effectiveness perspective on channel expansion varied between fit profile groups. Improper task-technology fit groups showed higher levels of single period channel richness and less variation in the channel expansion process.		Through coded dialogue, the ratio of resolutions per communication breakdowns was produced.
Q13: Does a proper task-technology fit profile result in higher channel richness and channel expansion from an efficiency perspective?	No. While improper task-technology fit groups showed higher rates of efficiency, little difference was found in the shape of the channel expansion curve from an efficiency perspective.		Through coded dialogue, the ratios of communication breakdowns and resolutions per communicative act were produced.

Table 32.
Summary of Descriptive Findings: The Impact of TTF

Chapter VIII

Interpretive Analysis and Discussion

The findings from the descriptive analysis reconstructed channel expansion and showed differences between proper and improper task-technology fit profiles and their role in this process. The descriptive analysis showed that the resolutions of communication breakdowns acted as a useful indicator of channel expansion. Differences between proper and improper task-technology fit groups were found along the lines of the foundational component relationships, challenged validity claims, the shape of the channel expansion curve from an effectiveness perspective, and the rates at which resolution efficiency was achieved. Such findings indicate that both proper and improper fit groups were able to use and expand the communication channel, albeit in slightly different ways.

Research Questions

The interpretive analysis in this chapter reexamines some of the research questions from the descriptive analysis, providing additional support for the findings. In addition, several questions are answered exclusively through the interpretive analysis. By providing a direct examination of group dialogue, a deeper picture of the channel expansion process is provided. Table 33 identifies the research questions that are reexamined and the research questions that are directly examined in this chapter. In addition, Table 33 illustrates what aspect of the data the examination occurs on.

<i>Research Questions</i>	<i>Interpretive Analysis Provided</i>	<i>Aspect of Data Examined</i>
Q1: What social actions are communication partners engaged in?	No	
Q2: What social actions are engaged in across varying communication types?	Yes	The entry into strategic action across communication types.
Q3: Has dialogue between communication partners become false, incomplete, insincere, or unwarranted?	Yes	Examples of communication breakdowns specifically examining breakdown types.
Q4: What validity claims are being challenged?	Yes	The use of the contextuality and effectiveness validity claims.
Q5: Are the validity claims being challenged consistent with the respective type of social action?	No	
Q6: Are the communication partners engaging in dialogue in an attempt to resolve the communication breakdown?	Yes	Examples of dialogue moving a communication breakdown toward resolution across both communication types.
Q7: Does the group dialogue resolve the communication breakdown?	Yes	Examples of communication breakdowns being resolved across both communication types.
Q8: Are a varying number of communication breakdowns being resolved over time?	No	
Q9: Does the channel expansion process occur from an effectiveness perspective?	No	
Q10: Does the channel expansion process occur from an efficiency perspective?	No	
Q11a: What impact do task-technology fit profiles have on social actions?	No	
Q11b: What impact do task-technology fit profiles have on communication breakdowns?	Yes	Examples of communication breakdowns specifically examining breakdown types.
Q11c: What impact do task-technology fit profiles have on challenged validity claims?	Yes	The use of the completeness and sincerity validity claims.
Q11d: What impact do task-technology fit profiles have on the resolution of communication breakdowns?	No	
Q12: Does a proper task-technology fit profile result in higher channel richness and channel expansion from an effectiveness perspective?	No	
Q13: Does a proper task-technology fit profile result in higher channel richness and channel expansion from an efficiency perspective?	No	

Table 33.
Components of the Interpretive Analysis

In a similar approach to what was used in the previous chapter, the research questions analyzed as part of this chapter are grouped based on social actions, communication breakdowns, challenged validity claims, and resolutions. In addition, throughout these sections, the impact of task-technology fit profiles are explored to strengthen earlier descriptive findings.

Social Actions

A relationship between social actions and communication type was shown to exist in the descriptive analysis addressed in research question 2:

- (2) What social actions are engaged in across varying communication types?

As groups engaged in asynchronous communication they entered into strategic action at rates over 4% higher than in synchronous communication. To illustrate the entry into strategic action, and to further strengthen the descriptive analysis of research question 2, two examples are provided. The first example illustrates strategic action through asynchronous communication, the second example illustrates strategic action through synchronous communication.

Example 1: Strategic Action in Asynchronous Communication

[M1]9/18/2001 10:02PM - Joe:
Subject: I'll respond soon
Sorry, I've not forgotten about responding to your ideas. I'll respond soon. In fact I was reading some articles related to e-privacy. Joe

In this example, asynchronous communication was used in a single communicative act by Joe to influence his group partner. By not responding for several days, Joe believed that group communication would stall if he did not address

the situation. Creating an environment to atone for his past indiscretions, Joe sent M1 to influence his communication partner to continue producing ideas, forget about Joe's lack of participation, and believe that Joe was creating knowledge useful for the group deliverables. This type of social action was prevalent in asynchronous communication to achieve the similar goals as shown in this example.

The entry into strategic action in synchronous communication was not as straightforward as a single communicative act. Instead, synchronous communication supported strategic action through a series of communicative acts where the social action surfaced during group dialogue. Example 2 illustrates this.

Example 2: Strategic Action in Synchronous Communication

[M1]9/19/01 8:11:49 PM - Carl: I have no clue how much you know, but I am supposed to ask you these questions

[M2]9/19/01 8:11:58 PM - Dowan: *ok*

[M3]9/19/01 8:12:18 PM - Carl: I guess you're in the same boat, but from the other end

[M4]9/19/01 8:12:53 PM - Dowan: Data that they are carrying, they should not share with a whole lot of people

[M5]9/19/01 8:12:55 PM - Dowan: *sure, whatever*

[M6]9/19/01 8:13:37 PM - Dowan: *let do this for five more minutes and then we will have ideas of each others "Ideas"*

[M7]9/19/01 8:14:07 PM - Dowan: Tools available are firewall and encryption

[M8]9/19/01 8:14:18 PM - Carl: Yeah, but what kinds of data? Have you experienced any security breaches so far?

[M9]9/19/01 8:14:18 PM - Carl: I agree, but I think we both understand that neither one of us wants to make a production out of this :)

More subtle than strategic action in asynchronous communication, example 2 illustrates the entry into strategic action by Dowan in M2, M5, and M6. These

communicative acts represent strategic actions used by Dowan to get Carl to generate ideas while bringing closure to the dialogue. By treating Carl, not as an intelligent actor, but as an information repository, Dowan created a means-end environment to accomplish his goals associated with the project.

As shown in the two examples, strategic actions were entered through different communication tools. In asynchronous communication, a single communicative act was used to create the means-end environment of strategic action. In synchronous communication a more complex weave of communicative acts were entered to produce this environment. This analysis illustrated that entry into strategic action may be more easily attained through the use of a single communicative act, as was often identified in asynchronous communication, accounting for the 4% difference of strategic action entry across communication types.

Communication Breakdowns

As communication breakdowns are essential precursors to channel expansion, research questions 3 and 11b were used to identify their presence. As the descriptive analysis was not used beyond providing a “yes/no” answer regarding the presence of communication breakdowns, the interpretive analysis provided in this section addresses this issue. Research questions 3 and 11b ask:

- (3) Has dialogue between communication partners become false, incomplete, insincere, or unwarranted?
- (11b) What impact do task-technology fit profiles have on communication breakdowns?

Communication breakdowns were evident in nearly all groups, across all social actions, through both communication types, and in all three message types. In addition, their presence was *not* found to differ across task-technology fit profiles. Through the coding system, both raters became aware of the generation of communication breakdowns in a variety of forms. The identification of the forms of generation was the result of frequent meetings between raters, and the comfort level of the raters with the coding process to look beyond breakdowns as dichotomous circumstances and towards breakdowns as active points of group engagement. While communication breakdowns consistently resulted in what Ngwenyama and Lee (1997) defined as acts that are incomplete, false, insincere, or unwarranted, the manner in which they were generated varied.

The first type of communication breakdown generation was when a person did not understand/believe/trust their partner so they challenged the validity claim upon which the breakdown occurred. This is the traditional type of communication breakdown that the current research was originally based around. This breakdown is framed around two communication partners where one partner believed the other to be incomplete, insincere, false, or unwarranted within a communicative act. This communication breakdown generation is an *unintentionally generated group communication breakdown*. An example of this type of generation follows.

[M1]9/18/01 8:04:25 PM - Mike: do you have it on a word doc?

[M2]9/18/01 8:04:50 PM - Tom: no, I have just gotten it from the information that we have access to

[M3]9/18/01 8:04:54 PM - Tom: on this extranet

[M4]9/18/01 8:05:27 PM - Mike: do you mean the links from the information board?

[M5]9/18/01 8:05:36 PM - Tom: yes

In this case, Mike asked for clarity in M4 on M2/M3. Resolution for this communication breakdown was provided in M5. As a breakdown was defined by the validity claims that are challenged, this example challenged the Habermasian universal validity claim of comprehensibility.

While this example may not present the obstacle a communication breakdown implies, it is not the intent of this analysis to identify “grades” or “sizes” of breakdowns. Instead, a binary approach to identifying breakdowns was used. As discussion points within dialogue were often slight, so were breakdowns. It was not the size of any given breakdown that moved discussion participants toward “emancipation,” but a collection of small and large breakdowns embedded within a series of communicative acts. This example was one of many breakdowns the group encountered.

A second type of communication breakdown generation was when a person believed a prior message of *theirs* might be incomplete or insincere so they posted a second message to resolve the anticipated breakdown. This is a less traditional generation of a communication breakdown than an *unintentionally generated group communication breakdown*. This type of communication breakdown was more

common in asynchronous communication, as asynchronous communication provided the opportunity of reading and reflecting on a posted message. It involved one person correcting an earlier message of theirs based on their belief that the message may appear incomplete, insincere, or unwarranted by their communication partner. This communication breakdown generation is an *unintentionally generated self-referential communication breakdown*. An example of this generation type follows.

[M1]10/17/01 1:43 PM - Mary: My paper is due Thursday in class, so I'll post a copy on the file sharing board tonight when I'm done with it. Maybe we would meet in the chat room and discuss tonight? What time might work for you? I should be home around 9pm mountain time....

[M4]10/18/01 11:06 PM - Mary: Sorry I forgot to post my paper last night, I was really busy and wasn't home much.... anyway, I don't know exactly when yours is due, so in case you haven't finished your paper yet, I'm posting mine for you to look at if you want :-)

In this example, Mary used M4 to resolve the communication breakdown on efficiency that she believed may have occurred when her partner read M1. To resolve this possible communication breakdown, she posted M4. This example shows the resolution of the communication breakdown that may have occurred on M1. These messages are presented as a larger set of messages where communication between group members was evident.

A third way in which communication breakdowns were generated was when a person asked a leading question, completing the thought of the question later in the dialogue. This type of communication breakdown was uncommon and often difficult to detect. This breakdown was dependent on one person providing information with the full intention of adding additional information later in the communication. Such communication caused a breakdown on the original message and relied on both

communication partners being directly involved in the communication breakdown and resolution. Such a communication breakdown is an *intentionally generated group communication breakdown*. An example of this generation type follows.

[M1]10/15/01 9:22:18 PM - Fred: Do you have AOL?

[M2]10/15/01 9:22:58 PM - Bob: My parents do, so I log on every once and a while. I have cable internet at my apt. I never want to go back to dial up again!!!!

[M4]10/15/01 9:23:38 PM - Fred: I am sure.....mine stinks

[M5]10/15/01 9:23:58 PM - Bob: how much is AOL now a month?

[M6]10/15/01 9:24:28 PM - Fred: I am tempted to get AT&T DSL

[M7]10/15/01 9:24:37 PM - Fred: I think 22.95 a month

[M8]10/15/01 9:24:56 PM - Bob: Yea, DSL is good if you are near the company switch. Cable is much easier to setup

[M10]10/15/01 9:25:25 PM - Fred: For example....I have a huge lag time after typing something to you and you actually seeing it on here

[M12]10/15/01 9:25:51 PM - Bob: What's huge? I have at least a sec or two

[M13]10/15/01 9:26:10 PM - Fred: about 5 seconds

In this example, Fred used M1 to pose an initial question. It becomes clear that the information presented in M1 was more than just a question of having an AOL Internet account. The communication breakdown on M1, being more than its original statement, occurred at M10 when Fred explained that his original question was intended to explain lag time in his use of the communication channel. These types of communication breakdown generations have only been recognized within strategic action.

A fourth, and final, type of communication breakdown generation was when a person expected another group member to respond or communicate in a particular

way based on prior group experience. Such a breakdown did not require a direct communicative interaction between group members. This type of communication breakdown is an *unintentionally generated experiential communication breakdown*. An example of this generation type follows.

[M8] 09/21/2001 7:15PM – John: We need to discuss on this topic. Write to me on the message board when we can chat.

This message was the fourth of a series of messages sent by John regarding a lack of group communication. This, the fourth and final message, illustrated that John questioned the ability of his partner to communicate on this topic, resulting in a communication breakdown. The breakdown was not based on direct discussions between the group partners and was not based on a single, prior message. Instead, this breakdown was a breakdown framed around the expectation of group communication based on earlier group communication activities.

These four types of communication breakdown generations were evident across all groups. While not examined as part of the current research, examination of their relationships between task-technology fit profiles, social actions, communication type, message type, validity claims, and resolutions could prove fruitful into further understanding the channel expansion process.

Validity Claims

Challenged validity claims were used as a deconstruction mechanism of the communication breakdown in the descriptive analysis. The analysis found that challenged validity claims varied in their frequency of occurrence, a frequency that

was impacted by task-technology fit profiles. Research questions 4 and 11c address the challenge of validity claims by asking:

(4) What validity claims are being challenged?

(11c) What impact do task-technology fit profiles have on challenged validity claims?

In the descriptive analysis, question 4 found that two validity claims accounted for 72% of all communication breakdowns. The challenged validity claim of effectiveness is illustrated below in Example 1. The other challenged validity claim of contextuality, a validity claim that was only evident in T1 across all groups, is illustrated in Example 2. These validity claims are examined because they present claims that are not explored in other interpretive examples, and they represent uncommon, unique, and challenging validity claims to identify.

Example 1: Challenge of the Effectiveness Validity Claim

[M1]9/16/2001 6:17PM – Ray

Subject: Introduction

This is Ray. I'm a student at the University. As part of the class requirements I was told to contact someone whom I've not find out his/her name to discuss about e-privacy and security to enrich our knowledge. So, if you get this message let me know what you think about e-privacy and share ideas.

[M2]9/17/2001 8:17PM - Gary

Subject: Reply

I was not sure if you were still in this project. I will post some of my ideas tomorrow evening. I will also need your ideas soon because we have a report due on Thursday Thanks

This example shows the challenge of the effectiveness validity claim. Recalling that this validity claim relates to the authority of one communication partner, Gary's reply in M2 was a direct challenge of Ray's authority. As Ray had not communicated for over a week, his authority about how to move the group forward

was challenged in M2. Questioning Ray's membership in the group, refocusing how to approach the project tasks, and providing statements for Ray to follow, Gary clearly does not believe Ray has the authority to direct group activities.

Example 2: Challenge of the Contextuality Validity Claim

[M1]9/16/2001 9:21PM - Jodi

Subject: important

Kylie, there is info on the information board that we need for our paper. However, this information is not accessible via our group number so to get [it] you will have to visit another group's area. Finding all of this out was frustrating to say the least. Good luck. Jodi

[M3]9/19/20017:59 AM - Kylie

Subject: eprivacy

Hi Jodi, even I was wondering what to do about the information board but did not feel like going to other numbers and checking it out. Well you know eprivacy and we may be invading somebody else's privacy. I was just kidding. reply ASAP. Kylie.

As contextuality questions the appropriateness of an action, Kylie clearly challenged the contextuality validity claim set forth by Jodi in M1. As each communication channel was specifically designed for each group, spying or using another group's communication channel was discouraged, as illustrated in M3. All challenges to the contextuality validity claim occurred during the first time period, indicating that groups identified problems of appropriate action and resolved those problems early during group development.

Addressing question 11c, task-technology fit profiles impacted the types of challenged validity claims. As improper task-technology fit groups entered synchronous communication more frequently than did proper task-technology fit groups, the validity claim of completeness was challenged more often. In the rapid exchange environment of synchronous communication, many communicative acts were challenged and completed across multiple time periods. Example 3 illustrates

the challenge of the completeness validity claim by an improper task-technology fit group member in synchronous communication.

Example 3: Completeness in Synchronous Communication: Improper Fit Group

[M1]10/15/01 9:17:06 PM - Ted: I think that the government has a good idea in hand

[M2]10/15/01 9:17:06 PM - Jeffrey: They can't develop the software without them

[M3]10/15/01 9:17:25 PM - Ted: They are imposing stiffer penalties and newer technology to detect violations

[M4]10/15/01 9:17:46 PM - Jeffrey: government or private?

This example illustrates the challenge of the completeness validity claim at M4. In M4, Jeffrey challenged the completeness of the communicative act at M3, asking Ted to complete his statement. Not to be confused with the challenge of the clarity validity claim, Jeffrey showed no signs of not being unclear on the communicative act at M3. Instead, he attempted to gain comprehensibility by asking Ted to complete his original statement set forth at M3.

In addition, as the sincerity validity claim was challenged at varying rates across fit profiles. Improper task-technology fit groups challenged sincerity at higher rates as a result of asynchronous communication supporting apologies for past indiscretions or corrections on prior messages and statements. The fourth example shows the challenge of the sincerity validity claim through asynchronous communication in a proper task-technology fit group.

Example 4: Sincerity in Asynchronous Communication: Proper Fit Group

[M1]10/16/2001 8:55PM – Oliver

Subject: article and meeting time

Kelsy, I have read the first article, and will read the other two tonight or tomorrow. I have a good idea of what we are supposed to do, and how we should attempt the first paper. I also think it would be good for us to try the chat room option. If you could post a message with certain times you are available, I would appreciate it. Monday or Tuesday evenings are both open for me. thanks, Oliver

[M2]09/16/2001 8:57PM – Oliver

Subject: sorry

Kelsey, Sorry for misspelling you name.

The communication breakdown shown in this example was an unintentionally generated self-referential communication breakdown. Generated entirely by Oliver, M2 was posted to provide resolution on M1, resolution that Oliver felt may have existed on a challenge of his sincerity toward the project. In the simple statement of apologizing for misspelling his partner's name, Oliver resolved the lack of sincerity toward the group process that he believed Kelsey may have had on his original message. Caring about the spelling of her name, Oliver used, challenged, and resolved his own validity claim of sincerity.

These four examples showed the detection and coding of challenged validity claims used in the descriptive analysis. In particular, the examples illustrated the challenge of unique validity claims (effectiveness and contextuality) and the presence of various validity claims across task-technology fit profiles and communication types (completeness and sincerity).

Resolutions

The resolution of communication breakdowns is *the* vital component in the determination of channel expansion through tenets of TCA. This section addresses research questions 6, 7, and 11d:

- (6) Are the communication partners engaging in dialogue in an attempt to resolve the communication breakdown?
- (7) Does the group dialogue resolve the communication breakdown?
- (11d) What impact do task-technology fit profiles have on communication breakdowns?

Questions 6 and 7 are examined in tandem as the research questions are related. As group members engaged in communication toward the resolution of communication breakdowns (question 6), resolution was often achieved (question 7). Two examples are illustrated to address the resolution of communication breakdowns.

In the descriptive analysis, communication type was found to support differences on strategic social actions, topic and other related message types, and the number of communicative acts generated. As these three differences may impact the resolution process, synchronous and asynchronous communication types are examined to illustrate the resolution of communication breakdowns on the same validity claim, completeness.

Example 1: Resolution of Completeness: Synchronous Communication

[M1]9/30/01 8:54:31 PM – Todd: The computer will handle everything. You will have a systems administrator to make sure the computer is fully functional

[M2]9/30/01 8:54:38 PM – Doug: or can you handle the whole thing from a contractor perspective?

[M3]9/30/01 8:54:48 PM – Todd: you can also do that

[M4]9/30/01 8:55:07 PM – Doug: I like that, it gives me a scapegoat!

[M5]9/30/01 8:55:37 PM – Todd: But if your information systems are in house - there may be some time lag for them to fix the computer

[M6]9/30/01 8:56:17 PM – Doug: you aren't trying to talk me out of this are you?

[M7]9/30/01 8:56:27 PM - Todd : no, just stating all of your alternatives

This examples illustrates the challenge of the completeness validity claim at M6. Making sure that Todd was not leading him toward a particular solution, Doug challenged the completeness of M5. Suggesting that Todd was trying to talk him out of alternatives to the problem, Doug engaged Todd to resolve the challenged validity claim (question 6). Todd's response at M7 indicated that he was willing to engage Doug, and provided resolution to the communication breakdown (question 7).

Example 2: Resolution of Completeness: Asynchronous Communication

[M1]10/01/2001 9:58AM - Amy

Subject: Government and e-privacy

What do you think of the privacy act of 1974. Do you think it takes care of the privacy issue or is it incomplete?

[M2]10/01/2001 4:29PM - Veronda

Subject: yes us govt. should be involved

yes the us government should be involved with the e-privacy concept not just in the areas like business but also on the various aspects of delicate and sensitive information posted on the web. And I believe that they should come out with some kind of codified laws that are applicable to all the performing organizations who are in the web business. In fact as any other laws applicable for various disciplines there should be standard laws governing all the issues concerning e-privacy.

[M4] 10/02/2001 10:15AM - Amy

Subject: comment

The privacy act 1974 is good because it protects sensitive information like medical and personal records. Since this act was made in 1974 when computers were a new idea and the Internet was not even heard of, it is somewhat incomplete. This act needs to be upgraded to include records stored on computers and transferred over the Internet.

[M5]10/02/2001 11:18PM - Veronda

Subject: comment on 1974 act

yes the 1974 act is good because it protects the individual rights on their information needs and makes necessary changes whenever they want. And it definitely needs to be upgraded as the whole bunch of information about many of us will be on a new platform (internet) than otherwise it used to be in the hands of federal agency. Even the disclosure and violation procedures are really good during the past before the internet evolution but need to take a new form and shape.

Analyzing the same challenged validity claim, completeness, illustrates the use of asynchronous communication to resolve a communication breakdown. In this example, Amy used M1 as an entry point into group discussion regarding the Privacy Act of 1974. Amy then intentionally produced a breakdown on M1 at M4, stating that the original question was more than a simple question to the group, but a springboard upon which to discuss the Privacy Act of 1974. When the breakdown occurred at M4, Veronda accepted the entry into the breakdown and engaged Amy in dialogue to

complete the message set forth at M1 (question 6). In addition, both Amy and Veronda provided resolution to M1 by extending their understanding of the Privacy Act of 1974 in M4 and M5 (question 7).

These two examples represent the use of different communication types in the resolution of the challenged validity claim of completeness. However, the ultimate goal of resolution was not found to be dramatically different across communication type or message type.

Like message type and communication type, the direct impact that task-technology fit profiles have on the resolution process appeared insignificant. Research question 11d is therefore not illustrated. These findings echo earlier findings that social actions, communication type, message type, and task-technology fit profiles do not impact communication breakdowns as messages that are false, incomplete, insincere, or unwarranted. Differences in the resolution process appear to lie directly in the aforementioned generation of communication breakdowns and the types of validity claims challenged, and not in the foundational components of channel expansion. This finding corresponds to earlier findings that state the relationships between foundational components of channel expansion and the resolution process are through communication breakdowns.

Through the interpretive analysis, research questions 2, 4, and 11c were examined to strengthen earlier descriptive findings. Research questions 3, 6, 7, and 11b were examined from an interpretive perspective to provide a direct examination of the questions not explored in the descriptive analysis. Table 34 shows the findings from the interpretive analysis.

<i>Research Questions</i>	<i>Type of Examination</i>	<i>Findings</i>
Q2: What social actions are engaged in across varying communication types?	Supportive	Strategic actions appeared easier to enter through asynchronous communication.
Q3: Has dialogue between communication partners become false, incomplete, insincere, or unwarranted?	Direct	Four ways to enter communication breakdowns were discovered.
Q4: What validity claims are being challenged?	Supportive	The challenge of contextuality and effectiveness illustrated the detection of two validity claims.
Q6: Are the communication partners engaging in dialogue in an attempt to resolve the communication breakdown?	Direct	The communicative process was essential in the resolution of communication breakdowns.
Q7: Does the group dialogue resolve the communication breakdown?	Direct	Resolutions were illustrated. The resolution process did not vary along the foundation channel expansion components.
Q11b: What impact do task-technology fit profiles have on communication breakdowns?	Direct	Little variation existed in the entry into communication breakdowns between fit profiles. Four methods to enter communication breakdowns were discovered.
Q11c: What impact do task-technology fit profiles have on challenged validity claims?	Supportive	The challenges of completeness and sincerity validity claims illustrated differences in fit profiles on the claims they challenge.

Table 34.
Supportive and Direct Examination Provided Through the Interpretive Analysis

Discussion

A large volume of information has been presented in the preceding two chapters. This following discussion of the data in a coherent framework will provide an understanding of what was found from an integrative perspective with respect to social actions, communication breakdowns, challenged validity claims, and resolutions.

Social Actions

First, of the social actions entered by group members, communicative action dominated all communication acts. Little variation on the entry into social actions was found when task-technology fit profiles were introduced.

Second, the foundational components of the channel expansion process were examined. The examination found moderate relationships between social actions and communication type and social actions and message type. A strong relationship was found between communication type and message type.

Within these relationships, the social action-communication type relationship was related in the use of asynchronous communication for strategic actions. The social action-message type relationship was related in the entry into topic discussions in discursive actions and the entry into process structure discussion in strategic actions. Finally, the communication type-message type relationship was strongly related in the use of synchronous communication for topic and “other” message types. Figure 35 shows these relationships.

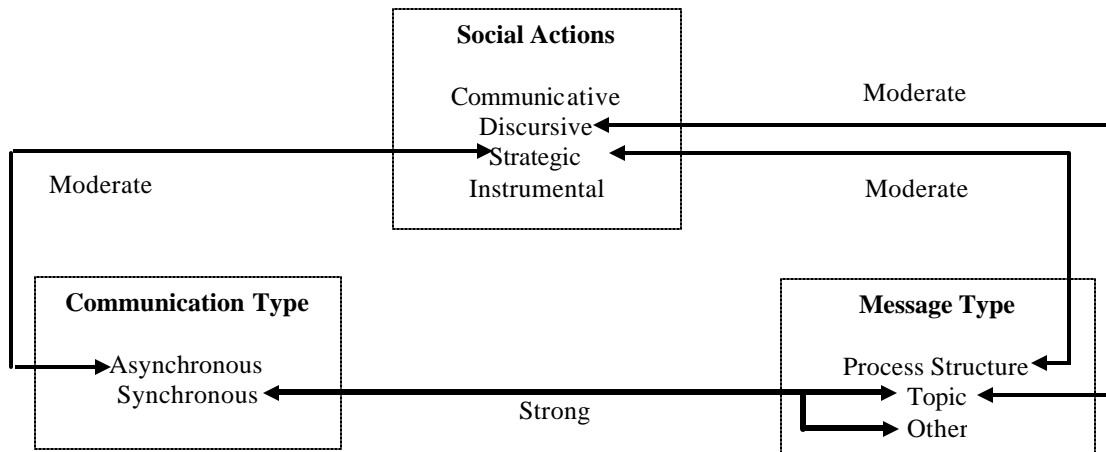


Figure 35.
Detailed Examination of Foundational Component Relationships

When task-technology fit profiles were introduced, moderate to strong variations occurred in the foundational component relationships. With respect to the social action-communication type relationship, a moderate relationship was found in the higher use of asynchronous communication for strategic action and synchronous communication for discursive action by improper task-technology fit groups.

The social action-message type relationship was moderately impacted by task-technology fit profiles. This impact was such that improper fit groups engaged in higher percentages of topic message types when in discursive action.

Finally, the communication type-message type relationship was strongly impacted by task-technology fit profiles. The relationship showed that improper task-technology fit groups engaged in topic, process structure, and “other” message types often through the synchronous tool, while the proper task-technology fit groups engaged in these message types through the asynchronous tool. Figure 36 shows these differences.

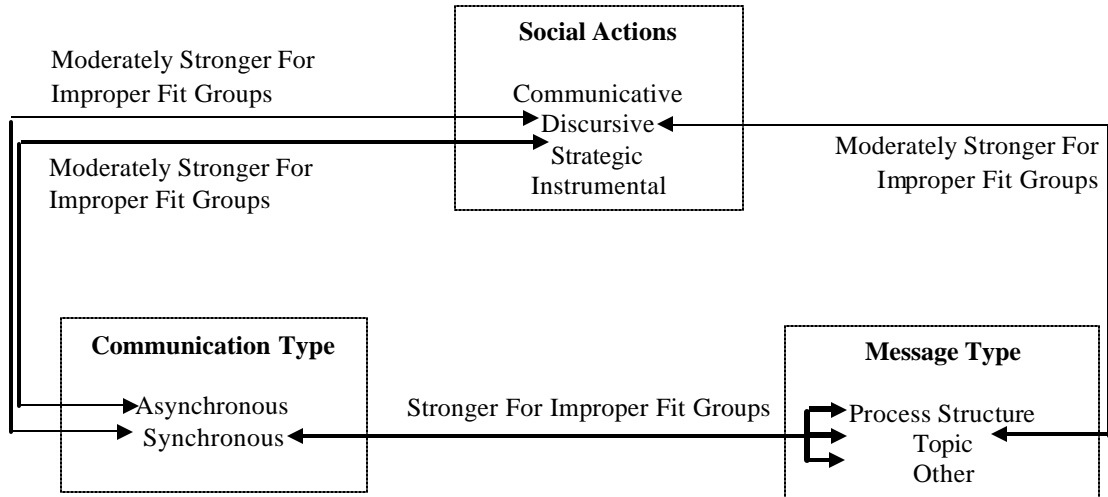


Figure 36.
Detailed Examination of Foundational Component Relationships: The Impact of TTF

The two figures representing the foundational component relationships and the impact of task-technology fit profiles on these relationships illustrated three essential findings of this research. First, moderate relationships existed between communication type and social actions. With respect to this relationship, asynchronous communications supported strategic action and synchronous communication supported discursive action at increased rates for improper fit groups. These findings suggest that the social action-communication type relationships across all groups are related to their presence in improper fit groups as shown in Figure 36.

Second, a moderate relationship existed between social actions and message type in the form of topic message types evident in discursive action. The presence of process structure message types in strategic action, as seen in Figure 35, appeared fairly evenly distributed across fit profiles. However, the topic message type and

discursive action relationship across all groups is likely a residual of its use by improper fit groups as shown in Figure 36.

Third, a strong relationship between communication type and message type was found, such that synchronous communication was used in the generation of topic and “other” message types (Figure 35). Introducing fit profiles, showed much of this relationship was the result of improper task-technology fit groups using synchronous communication at higher rates than improper fit groups for topic, process structure, and “other” message types.

Communication Breakdowns

Communication breakdowns represented an important component of the channel expansion process. While no difference was evident in the communication breakdown itself, the volume of communication breakdowns generated and the validity claims that were challenged in the breakdown differed across task-technology fit profiles. In addition, the way in which communication breakdowns were generated varied throughout all groups.

First, the number of communication breakdowns that were generated was related to the number of communicative acts generated. As groups entered synchronous communication, a high volume of communicative acts was generated, resulting in a high volume of communication breakdowns. As improper task-technology fit groups were inclined toward the use of synchronous communication, a corresponding increase in communication breakdowns resulted. Figure 37 displays this relationship.

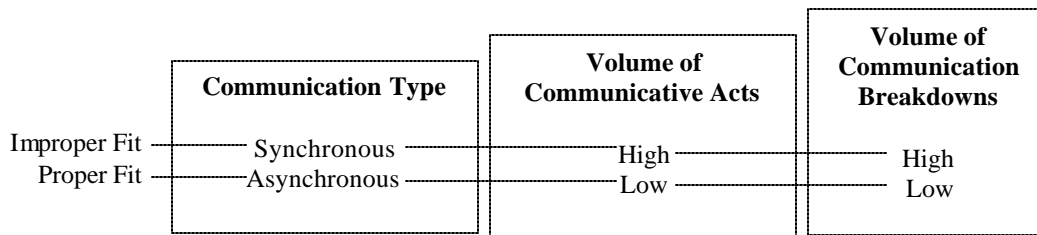


Figure 37.
Impact of Task-Technology Fit on Number of Communication Breakdowns

Second, as group members engaged in dialogue, claims of validity were challenged, resulting in communication breakdowns. The validity claims that were challenged throughout all groups consisted largely of four types: efficiency, clarity, completeness, and sincerity.

When task-technology fit profiles were introduced, it was evident that certain challenged validity claims were related with the communication actions engaged in by the different groups. In improper task-technology fit groups, higher incidences of challenges to the completeness validity claim were found. In those groups, nearly two-thirds of the completeness validity claim challenges occurred within synchronous communication. As improper task-technology fit groups engaged in higher volumes of synchronous communication, the challenge of the completeness validity claim increased as well.

Likewise, from the perspective of proper task-technology fit groups, both sincerity and efficiency were challenged at higher rates. These findings suggest that being provided a topic agenda, groups became complacent in their communicative actions, not feeling a need to enter topic discussions through the synchronous

communication tool. The high number of process structure message types through asynchronous communication may have lead to higher challenges of the sincerity and efficiency validity claims as group members questioned methods to complete the task (efficiency) and the ability of their partner to faithfully contribute to the project (sincerity). Figure 38 shows these relationships.

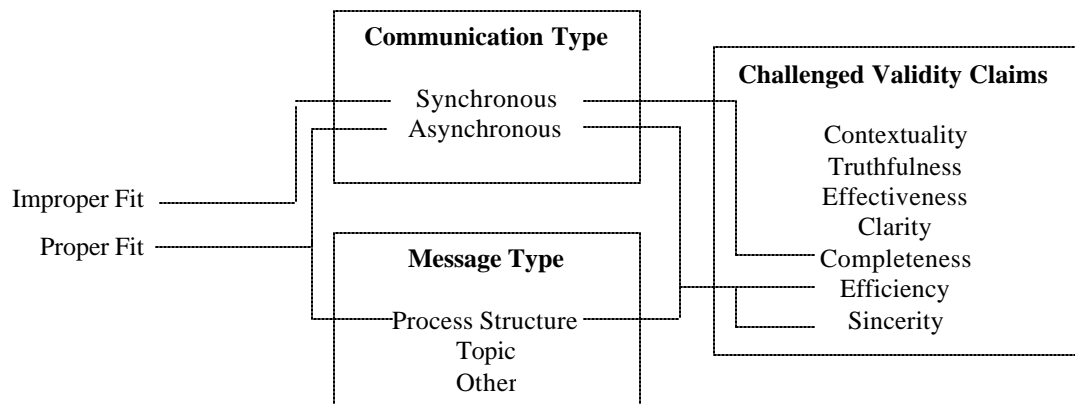


Figure 38.
Relationships between Fit Profiles and Challenged Validity Claims

The relationships presented between validity claims and the foundational components are exploratory. A deeper investigation is required to strengthen the understanding of the relationships across the entire set of the generation of communication breakdowns, challenged validity claims, communication types, message types, and social actions.

Third, communication breakdowns were generated four different ways. That is, while communication breakdowns were always false, incomplete, insincere, or unwarranted, the manner that groups generated the breakdowns varied. Table 35 shows the four ways that groups generated communication breakdowns.

<i>Ways of Generating Communication Breakdowns</i>	<i>Explanation</i>
Unintentionally Generated Group	When a person did not understand/believe/trust person so they challenged the claim of validity. This breakdown was framed around two communication partners where one partner believed the other to be incomplete, insincere, false, or unwarranted in their communicative act.
Unintentionally Generated Self-Referential	When one person corrected an earlier message of theirs based on their belief that the message may appear incomplete, insincere, or unwarranted by their partner.
Intentionally Generated Group	When one person provided information with the full intention of adding additional information later in the dialogue. Such intention produced a breakdown on the original message and relied on both communication partners being directly involved in the communication breakdown and resolution.
Unintentionally Generated Experiential	When one person expected another group member to respond/communicate in a particular way based on prior group experience. Such a breakdown does not require a direct communicative interaction between the group members.

Table 35.
Ways that Communication Breakdowns were Generated

Resolutions

The final component in the reconstruction of the channel expansion process is the resolution of communication breakdowns. Like the communication breakdown, no differences were found in how resolutions were achieved across groups, through social actions, across communication types, in message types, or in different task-technology fit profiles. However, volume of resolutions generated, and the effectiveness and the efficiency at which they were resolved varied over time and across task-technology fit profiles.

First, like the communication breakdowns, the volume of resolutions over time was related to the number of communicative acts generated. As improper task-technology fit groups entered synchronous communication they generated a high volume of communicative acts, ultimately resulting in a high number of resolutions. Figure 39 shows this relationship.

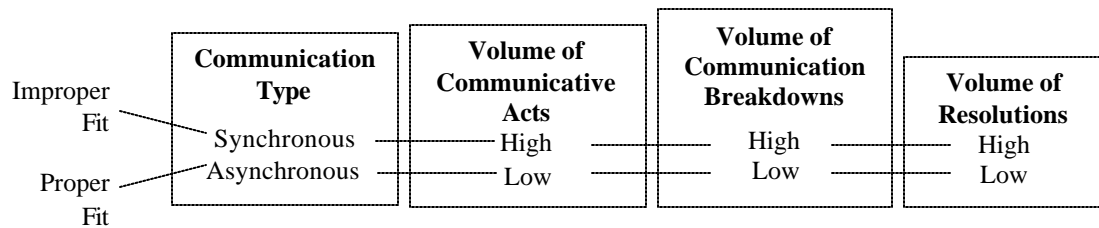


Figure 39.
Impact of Task-Technology Fit on Resolutions

Second, from the perspective of *all groups*, both effectiveness (resolutions per communication breakdown) and efficiency (resolutions per communicative act) varied over time, displaying U-shaped curves. Explanations on the shape of the curves range from group acclimation to the adaptive structuration of the technology. From the perspective of *task-technology fit profiles*, proper fit groups had generally lower rates of effectiveness and efficiency and greater variation in resolution effectiveness. Table 36 illustrates these findings.

<i>Task-Technology Fit</i>	<i>Resolution Effectiveness (Resolutions/Breakdowns)</i>	<i>Resolution Efficiency (Resolutions/Communicative Act)</i>
Proper	(1) Lower individual ratios. (2) Higher change in ratios over time.	(1) Lower individual ratios. (2) Same variation over time.
Improper	(1) Higher individual ratios. (2) Lower change in ratios over time.	(1) Higher individual ratios. (2) Same variation over time.

Table 36.
The Impact of Task-Technology Fit on Resolution Ratios

With respect to the resolutions from an effectiveness and efficiency standpoint, variations in fit profile groups likely existed on the communication environment within which group members communicated. The communication environment includes the generation of communication breakdowns, the validity claim upon which the breakdown was occurring, the communication tool that was being used, the message type that was being used, and the social action that was being entered. While some of these relationships have been explored and discussed in the current research, others have yet to be investigated, providing fertile ground upon which to continue this research.

In addition to exploring the use of frameworks provided by TCA in the reconstruction of channel expansion and the impact that task-technology fit profiles have on this process, both CET and TTF were explored and extended in their own right. First, as the original study of Carlson explored how the capacity of a channel changed over time with respect to individual perceptions, the current research was successful in reconstructing this process through the examination of group dialogue. That is, through the extension of Ngwenyama and Lee (1997), the current research

provided a new definition of channel expansion based on the ability of the channel to support varying capacities in the resolution of communication breakdowns.

Second, TTF was extended across various levels ranging from its impact on communication processes to direct empirical investigation of the theory. The theory of TTF proved influential in its ability to impact the process component of group outcome creation. This is a reasonable finding as the original investigation of TTF concluded that the theory had an impact on group outcomes. As outcomes are the result of group processes, it is expected that TTF would impact this aspect of groups. In addition, through the manipulation of the task-technology fit profile, differences were found between groups provided proper fit profiles and groups provided improper fit profiles. While the results were unexpected, they illustrated that conclusions of “produced more messages” and “generated more topic discussion” are strengthened through an understanding of the communication processes that groups engage in (i.e. synchronous versus asynchronous communication).

This chapter was intended to illustrate findings in a coherent and simplified manner. Winding through the complex weave of data, it was shown that channel expansion can be reconstructed through tenets of Habermas’ theory of communicative action. In addition, task-technology fit profiles had various influences on the process of channel expansion, ranging from social actions to resolutions. Together, the three theories used in this research provided a strong theoretical base upon which a rich data set was produced, intriguing findings were discovered, and a strong foundation upon which to continue the exploration of CET and TTF was provided.

Chapter IX

Conclusions

This study was motivated by several factors revolving around the impact of normative technology characteristics on a socially constructed communication channel use process. First, extending channel expansion theory beyond its original perspective of user perceptions proved useful. Such an extension, through the application of tenets of TCA, allowed for the examination of the richness of the channel utilized by communication partners and not the richness perceptions of an individual. Such a unique examination focused on group communication when reconstructing the communication channel expansion process.

Second, the original model of CET was strengthened through the incorporation of the theory of task-technology fit. Combining these two theories strengthened CET by improving the MRT-based task-technology fit relationships upon which CET was originally designed.

Third, this work explored how TTF impacted the process model of channel expansion. As no prior work had explored TTF from the perspective of its impact on the communication use processes, this study provides fertile ground upon which to continue the exploration this relationship. This research also provided a single point of examination of the theory of task-technology fit and an examination of fit profiles and their relationship with decision tasks.

Fourth, this research explored the use of web-based communication technology and the role that normative characteristics of the technology played in the use process. From determining what message types groups enter to how well groups resolve communication breakdowns, this research provided a rich and unique view of the communication channel use process, a view that can be extended in both an academic and managerial setting.

Summary of Findings

Overall, the results are supportive of the theory of channel expansion as determined through tenets of the theory of communicative action. As group members gained experience with the communication channel, fluctuations in channel richness were evident across the three time periods. The descriptive and interpretive analyses were used successfully in the exploration of the channel expansion process on social actions, message type, communication type, communication breakdowns, challenged validity claims, and resolutions.

In addition, task-technology fit profiles were shown to be an important factor in the channel expansion process. Not only influenced through experiences that group members gained through the project, the normative characteristics of the technology likewise proved influential in the channel use process.

Implications for Research

This study makes theoretical, empirical, and methodological contributions to communication channel use research. This research refocused theoretical attention to include various channel use models when describing how virtual groups

communicate. This research supported the notion that theories of channel use (channel expansion) and channel matching (task-technology fit) can be combined and studied in a complementary fashion.

From a theoretical perspective, few studies have attempted to explore the channel use process through the complex integration of channel use and channel matching theories from the unique perspective of the theory of communicative action. This study has shown that both normative channel characteristics and individual experiences contribute to the process of communication channel use, more specifically, channel expansion. Future research can use the findings and design of the current research to build frameworks through which to integrate multiple theories in the investigation of technology use studies. Through the identification of theoretical deficiencies, deeper investigations can root at inputs, processes, and outputs that guide individuals, groups, and organizations in their use of technology.

From an empirical perspective, this study focused on group communication and the ability of the group to expand a communication channel, looking specifically at the channel characteristics that aid or hinder the expansion process. By creating groups as equally able to generate communicative acts, an investigative eye was placed squarely on the normative characteristics of the technology and the ability of those characteristics to impact the channel expansion process. Findings support the idea that communication channel use is not a static process, but instead is dynamic in nature. Additionally, the dynamic nature of the channel use process can be influenced through the alignment of normative technology characteristics with task characteristics. In addition, the current research provided a day to day empirical

application of frameworks provided through Habermas' theory of communicative action. As TCA is rarely empirically applied (Parkin, 1996), this research bridges the gap between theory and the experimental setting through the direct examination of social actions, validity claims, communication breakdowns, and resolutions.

As organizations become more global in their reach from both an internal and an external perspective, understanding how communication channels are used is an increasingly important endeavor. This study provided insight as to how virtual groups use a communication channel to coordinate activities moving toward group outcomes. Through understanding the process of communication channel use in virtual teams, support is provided in understanding the entire chain of events needed for virtual groups to perform more efficiently, generate more ideas, improve their perceptions of the technology, or reduce specific types of communication breakdowns evident in certain situations.

From a methodological perspective, components of the theory of communicative action were used to provide a new definition of channel expansion. The approach focused on the group members and their ability to use a communication channel across time. By examining the dialogue generated between group members, this study explored the *communication* in a communication channel use study.

In addition, this study provided the methodological framework in the form of data collection tools around which to explore communication channel use from a critically motivated perspective. Identifying social actions, challenged validity claims, and the resolution of communication breakdowns, a perspective conscious of how

virtual groups dynamically construct the use of a communication channel was provided.

As the current research was rooted in the integration and extension of three theories, academic implications cover a broad range of contributions. From empirically applying TCA to extended CET, TTF, and TCA to exploring group communication in a virtual environment, this study provides a rich bed of findings on which to extend research in a multitude of ways.

Managerial Implications

Understanding the communication process between employees and clients is viewed as a unique and important skill in system administration. Often, communication channels are set in place and left to run on their own devices with little intervention from administrators or managers. Such interventions, in the form of training, task-technology alignment, or appropriation support can prove valuable when understanding aspects of a group they wish to foster, develop, or minimize through the communication channel. As organizations enter into the virtual world (Chidambaram and Zigurs, 2001), a keen understanding of how employees and clients use communication components of collaboration technologies can prove valuable.

This study identified and examined a process of communication channel use between virtual group members. This can prove valuable when examining “what to expect” from a particular communication system, what a particular communication system design may provide, and how a communication system is used. As a system

manager, understanding what issues arise, what problems occur, and when these issues and problems become visible is vital in communication channel administration.

Managers must also consider the importance that experiences with the context, users, topic, and the communication channel itself play in the development and shaping of how a communication channel is used. Such an understanding can help managers understand that the implementation of a communication system alone is not enough encourage employees to use the system. Providing employees an opportunity to become acquainted with their partner, context, and communication channel is important in supporting use.

From an functional perspective this research contributes on three fronts. First, the orientation of new employees within an organizational is often supported through the use of electronic communication. As new employees become acquainted with the organization, the ability of the communication channel to support their questions, concerns, and comments may be necessary for their future effective involvement within the organization.

Second, as managers often rely on electronic communication to gather input from partners and subordinates to form decisions, the use of electronic communication must support the ability to express ideas, responses, and concerns. Whether the decisions are based on reporting, information retrieval, or group argumentation, a communication channel should support a rich communicative environment within which to coordinate activities.

Third, the identification of how to use a communication channel with respect to persuasion, effective negotiation, and critical thinking may prove valuable. Skills

that are taught in face-to-face settings as effective business skills must be translated to the electronic communication environment. Effective use of such skills as negotiation, debate, and persuasion can prove useful in both internal and external organizational electronic communication.

As a manager of an organization's computing infrastructure, a keen eye needs to be directed toward the communicative aspect. Understanding how a communication channel is used, how it can enhance, and how it can hinder aspects of organizational communication is key in promoting and maintaining its use. This research lays the foundation in understanding the communication aspect of a computing infrastructure and how this component can be used effectively for a variety of goals.

Limitations

Four limitations were evident in this study. First, this study was not a critical social theory study in the truest sense. A critical social theory study would explore the relationship of power differences between communication partners more closely than was done in the current research. Benefit is still taken from the application of frameworks within TCA in this study through the detailed examination of group dialogue and the capacity of a communication channel to support the resolution of communication breakdowns.

Second, limitations exist in viewing communication as an endeavor toward rationality (Habermas, 1979; 1984; 1987). The limitation comes, not from the view itself, but from the underdetermination evident in this approach (Kosso, 1992). As numerous other communicative theories likely map onto the data collected in the

current research, the best view of how virtual groups communicate and the impact that technology has on this process is unknown. However, the approach taken in the current research, while one of many, contributes to a deeper understanding of how technology characteristics impact the group communicative process.

Third, the study used both graduate and undergraduate university students as its sample. In this, the findings are difficult to extend beyond the context of the study. University students provide a rich and unique examination of individuals and their use of technology, however they often lack the same motivations, incentives, and context that employees in an organizational setting do. As is the case with many experimental studies that have been run a single time and in a controlled setting, the external validity is questionable. To be able to relate what has been concluded from this study across numerous contexts, at different times, and with different people is difficult. Additional research would provide a foundation upon which the external validity of this, and related studies could be extended. Even so, the students that participated in this project are current and future users of communication technology. Whether for work or entertainment purposes, the project participants represent an important demographic when understanding communication channel use.

Fourth, the communication channel used in this study experienced sporadic problems. Many of the problems were unavoidable, and included connectivity problems at two buildings at the University of Nebraska-Omaha campus and the removal of Flash Player (essential for synchronous communication) from one building at the University of Colorado–Boulder campus. These problems may have inhibited the channel expansion process by encouraging individuals to pursue other

means of communication. However, like the findings of Carlson (1995), the findings in the current research might be more conservative than presented. Nonetheless, technical difficulties are common in practice and their presence in this research study was considered ordinary.

Strengths

This study benefited from a strong theoretical base. The findings from this study were integrated into a thorough understanding of both channel expansion and task-technology fit. Extending both theories beyond their original designs stressed the merit of each theory, as they both proved valuable and extensible in the current research.

In addition, this study provided a unique synergy between the experimental setting provided through the original channel expansion and task-technology fit studies and the field study approach often afforded to studies rooted in critical social theory. This synergy allowed for a quasi field study, such that control was provided (task-technology fit alignment, use of a single communication channel) while examining group communication generated in an open and unrestricted channel use environment (no limits on message types, communication types, or system use). This method brought the critical approach closer to an experimental setting while extending theories previously studied in a positivistic environment. In effect, this approach took the first steps at extending channel use (channel expansion) and channel matching (task-technology fit) research agendas to incorporate the process related aspects of TCA.

Finally, because of the commitment to a process view of communication channel use, the approach incorporated a dynamic view of the technology (Carlson, 1995), while emphasizing the role context played for individuals using the technology (Habermas, 1976). This approach was sensitive to the role that both technology (fit profiles) and an individual (actor) played in determining communication channel use.

Future Research

This study is able to branch in many different research directions, highlighting the number of different perspectives, methodologies, and theories that the current research touched. Future research directions exist in two forms, (1) research that extends from the existing data set and (2) research that extends from questions left unanswered in this research.

Existing Data Set

First, the dialogue can be revisited to determine the frequency and relationships between the aforementioned generation of communication breakdowns. This investigation can extend the framework of the theory of communicative action used in this research in a similar way that Goldkuhl (2000) extended validity claims and Lyytinen and Hirschheim (1988) extended social actions. The exploration of the generation of communication breakdown can provide valuable insight as to how and when communication channels support or inhibit the generation of various breakdown types and how these breakdowns are related to resolutions.

Second, the data can be used to explore the concept of faithful or unfaithful appropriation of the communication system (DeSanctis and Poole, 1994). As it was

recognized in the current research that group members used the file share tool to communicate (unfaithful), the concept of appropriation could be examined further. The current research can build on the work of Dennis et al. (2001), by extending the examination of the channel use process from the perspective of what they define as a fit-appropriation model. Dennis et al. (2001) used TTF (Zigurs and Buckland, 1998) to build a new model of technology use that not only incorporates normative technology characteristics but also appropriation aspects. Their approach incorporated a temporal component to the theory of task-technology fit, similar to what is accomplished in this research.

The Fit-Appropriation Model (FAM) (Dennis et al., 2001) removes the process structure component of TTF, labeling it “appropriation support.” Once removed, fit is determined based on the normative technology characteristics of communication support and information processing support and their relationship with generation, choice, and combination tasks. A fit profile is then developed and the technology is used and appropriated in such a way to impact group performance. Using the FAM model to modify the research model used in this research, results in a model that accounts for the dynamic view of time and examines the process of channel use through communication breakdowns and not group performance. Such a view is more dynamic and constructive than the original research model by incorporating the component of appropriation.

The current research manipulated passive appropriation support (agenda), provided proper fit profiles in all groups, provided active appropriation support (daily use tips), and accounted for habitual routines (knowledge building experiences) in the

use of the communication channel. The use of this new model does not change the results of what was found in this research, however, it provides an association with a new research model that incorporates many components and explanations of what was set forth in this research. With that, manipulating appropriation support and accounting for habitual routines impacts the process of channel expansion. This is consistent with what Dennis et al. (2001) would expect as they explain that fit profiles are expected to cause variations in use patterns which, in turn, are expected to influence performance measures.

Third, as there was much communicative action (mutual understanding) entered in this work, it is reasonable to explore mutual understanding further than was done in this study. Mutual understanding is an important component of the client-analyst relationship (Tan, 1994). Exploring how mutual understanding is developed in virtual groups is essential as client-analyst relationships extend beyond same-time, same-place environment. The data collected in this study supports the examination of the development of mutual understanding from the perspectives of managing transaction, establishing rapport, and perspective shifting (Tan, 1994). In her study, Tan found that groups use the following techniques to establish mutual understanding:

- (1) Perspective Shifting: Several groups use this to identify the “role” of their partner to better understand their own role and the requirements of the project.
- (2) Managing Transaction: Groups showed a good ability of structuring, controlling, turn-taking, and topic development to form a mutual understanding on both process structure and topic issues.
- (3) Establishing Rapport: Not many, but some, groups were able to develop a friendly, versatile, relaxed, and open discussion. Such a relationship aided the development of mutual understanding.

The data collected in this study can be explored using approaches described by Tan (1994) to determine how mutual understanding between group members was developed.

Fourth, the existing data set that was not explored as part of this research could prove fruitful in providing additional insight to CET and TTF during short time periods. Maintaining the research model, a detailed examination of each two-week period could provide insight as to how groups shape the capacity of the communication channel during the two-week periods apart from the six-week project.

In addition, this micro-analysis of two-week time periods could shed light on the group development process. A linear model of group development by Wheelan (1994) that incorporated the stages of dependency and inclusion, conterdependency and fight, trust and structure, and work and termination could be explored. Such an approach could examine the group dialogue across the six week project and determine entry and departure from these stages. Gersick (1988) described the punctuated equilibrium model, suggesting that group development is *not* linear. Instead, the process is driven by factors that drive groups to work in periods of concentration and

relaxation. Again, the dialogue captured in this study could be used to explore the punctuated equilibrium model of Gersick (1988). A combined model by Chang et al. (forthcoming) incorporates aspects of both the Wheelan and Gersick models, suggesting that through periods of concentration and relaxation, a linear order can develop with respect to group formation. Like the earlier models, group dialogue could be examined to explore the Chang et al. model. The examination of all three group development models could be applied to both six-week and two-week time periods.

Fifth, this study captured questionnaire data regarding knowledge building experiences and perceived media richness, and this data could accomplish two tasks. First, the data could provide understanding of channel expansion (1) of a different communication channel, and (2) during a different period of time (6 v. 13 weeks). The analysis could examine the survey data to determine expansion in a manner similar to that used by Carlson (1995). Second, the survey data could be mapped to the qualitative information presented as part of the current research. Combining the two data sets could provide an increasingly rich investigation of how user perceptions relate to the entry into social actions, communication breakdowns, challenged validity claims, and resolutions.

New Research

Moving beyond the data collected as part of this study, new research studies could prove useful in further understanding the concepts presented here. First, a more extensive examination of the relationship between task-technology fit and channel

expansion theory could be addressed in future research. Extensions could come in the form of various tasks, various fit profiles, or various technologies.

Second, a future research consideration could explore how various experiences impact the process of channel expansion. An example of such an approach includes the recent work of Yoo and Alavi (2000). Such an approach could build zero history versus experienced groups to explore the impact that preexisting experiences have on channel expansion.

Third, this research could prove valuable in exploring how existing, in-use communication channels are used, the types of communication breakdowns communication participants generate when using the channel, and if resolutions are provided through the channel. Technologies that could be explored include handheld email, instant messaging, and integrated systems similar to the one used in this study.

All of these research directions indicate the rich set of data, questions, and methodological approaches that the current research produced and touched. This research has provided new insight to the channel use process through the extensive integration of theories and methodologies. The results showed that new views on channel use can be applied to explore how the normative characteristics of communication channels aid or hinder message types, how they promote the use of communication types, and how well they support the resolution of communication breakdowns. The results of the current research have created more opportunity in the exploration of communication channels than they have impeded and through the application of new and intertwined views of existing practices, a world of opportunity awaits.

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Appendix A – Project Recruitment Flyer

E-PRIVACY PROJECT FLYER

For more information or registration, contact Dr. Ilze Zigurs at
izigurs@mail.unomaha.edu
Phone: 554-3182

E-Privacy

As organizations move data through public lines of the Internet, an enormous number of issues need to be addressed. Such issues include how information is transferred securely through the Internet to how customer confidentiality is maintained. These issues, referred to as E-Privacy, are essential in truly understanding the subtleties of how online systems are developed, built, and implemented.

This project provides you an opportunity to gain insight into the concept of E-Privacy. You will learn what E-Privacy is, how governmental regulation is impacting E-Privacy, and what tools are available to address E-Privacy issues.

Virtual Teams

Organizations constantly implement projects outside the realm of a single location. More and more, organizations are using computer technology to turn to the global marketplace in forming virtual teams to find ideas and solutions to complex issues.

Working in a virtual team you will explore the complex issue of E-Privacy. You will be provided access to specific computer technology, a corporate extranet, to communicate with a project partner regarding the issue of E-Privacy.

Electronic Tools

Gaining hands-on experience with technology tools is vital in today's competitive computer marketplace. Tools range from coding to auditing to communication systems.

This project will provide you access to an integrated communication system through a corporate extranet. In addition, you will have an opportunity to explore tools specifically geared toward building and maintaining E-Privacy.

Extra Credit

Full participation in this project will result in a 10% increase in your course grade.

For more information or registration, contact Dr. Ilze Zigurs at
izigurs@mail.unomaha.edu
Phone: 554-3182

Appendix B – Human Research Subject Cover Letter

Cover Letter for the E-Privacy Project

You are invited to participate in a research study about the use of an extranet in communication practices project conducted by Matt Germonprez, a graduate student in the University of Colorado's College of Business, Campus Box 419, Boulder, CO 80309, and Professor Ilze Zigurs, College of Information Science and Technology, University of Nebraska at Omaha, PKI 284E.

You will be asked to fill out questionnaires, write 3 short papers, and communicate through an extranet. This will take approximately 10-12 hours total of your time. We expect the project to benefit you in these ways:

- (1) Exposure to an Extranet
- (2) Working in Virtual Teams
- (3) Learning about E-Privacy and healthcare

If you have decided to participate in this project, please understand that your participation is entirely voluntary and you can stop at any time. You may refuse to answer specific questions and may discontinue participation at any time. In addition, *your individual privacy will be maintained* in all data resulting from this study.

If you have questions regarding your rights as a subject, any concerns regarding this project or any dissatisfaction with any aspect of this study, you may report them -- confidentially, if you wish -- to the Executive Secretary, Human Research Committee, Graduate School, Campus Box 26, Regent 308, University of Colorado-Boulder, Boulder, CO 80309-0026 or by telephone to (303) 492-7401.

Appendix C – UNO Student Handout

HEALTHCARE PRIVACY PROJECT Guidelines for Healthcare Inc. Employees

OVERVIEW

Healthcare Inc. has contacted E-Neo Consulting to discuss the use of their extranet to interact with existing and future healthcare clients. In particular, Healthcare Inc. has initially contacted E-Neo Consulting to discuss privacy issues related with (1) the storage and handling of sensitive information located on Healthcare Inc. computers and (2) the transmission of sensitive information across the public domain of the Internet. Healthcare Inc. intends to store client records on their extranet and send client records across the Internet. E-Neo Consulting must work with Healthcare Inc. to identify privacy issues and tools to help protect this information, identify problems with existing governmental privacy policies, and identify how privacy practices could be implemented.

As an employee of Healthcare Inc., you will be provided a single point of contact at E-Neo Consulting with whom the aforementioned issues should be discussed. Through the use of the *E-Neo* corporate extranet, you and one member from E-Neo Consulting will discuss privacy policies and how they relate to what Healthcare Inc. is trying to accomplish.

You are responsible for the production of three short papers, specifically regarding electronic privacy in the healthcare industry. These papers should represent an individual effort, a synthesis and expression of ideas, and grammatical cleanliness.

EXTRANET

Team members will communicate *exclusively* through the E-Neo corporate extranet. The tool is available at <http://www.eneoconsulting.com>. The tool provides team members the ability to use the following components:

- (1) Chat Room – This component allows team members to communicate in a synchronous environment.
- (2) Message Board – This component allows team members to communicate in an asynchronous environment.
- (3) File Sharing Utility – This component allows team members to share files between them.
- (4) Information Board – This component allows team members to have access to information that is useful in the development of the project deliverables.
- (5) Help – This component provides team members online assistance with any component of the extranet.

All components are available exclusively to each individual team member (i.e. chat occurring between members of Team 10 will only be seen by members of Team 10).

DELIVERABLES and GUIDELINES

Three two-page reports are due during the course of this project. All three reports will require you to evaluate the performance of your consulting partner. The reports will require that you read articles provided through the E-Neo extranet system and discuss these articles with your consultant at E-Neo Consulting in Boulder, CO. This is an individual report.

I) Specifically, the reports should be centered around the consultant's ability to understand privacy and its relation to healthcare based around the following questions:

1. Period #1 – Identify problems with electronic privacy. What tools are available to address these problems and how are the tools used?
2. Period #2 – How have federal/state regulatory structures aided in resolving (or hindering) the problems regarding electronic privacy?
3. Period #3– How do existing health care privacy policies cooperate with or contradict regulatory structures (self regulation)?

II) The reports should identify key issues in the discussions between you and the E-Neo consultant. The reports should adhere to the following structure:

1. Introduction – Identify the purpose of the report
2. Project Description – Identify the purpose and scope of the project
3. Progress Summary – Identify work done, work in progress, and work to be done
4. Problems Encountered – Identify problems and how they may impact the project
5. Overall Assessment of the Project – Provide a professional opinion of how well the project is progressing

III) The reports should be written for a senior manager at Healthcare Inc. This senior manager is the individual that assigned you to the project and is interested in the progress of the aforementioned key issues.

IV) The following guidelines should be used when writing each of your reports.

1. 12-point font, double spaced, times new roman
2. No heading. Simply include your name and student ID in the upper right hand corner of the report.
3. Staple your report.
4. Put careful effort into the articulation of ideas, the synthesis of concepts, and grammatical editing.

V) The reports should be emailed to the senior manager at healthcaresubmissions@hotmail.com. The following are report due dates:

1. Report #1 – September 20th
2. Report #2 – October 4th

3. Report #3 – October 18th

PROJECT GRADING

Healthcare Inc. Employee

35% -- Use of the Extranet*

20% -- Completion of the Surveys (5% each)**

45% -- 3 2-page reports (15% each)***

*Use of the Extranet is participation in communication with the project partner through the tool in some form. Each two-week period will be examined to determine if team members are using the tool to communicate.

**Completion of each survey results in 5% of the grade. Grades are not based on the selections made through the survey.

***Reports will be graded on their completion. In the reports, you should demonstrate the ability to articulate points, represent ideas, and synthesize concepts.

ALTERNATE PROJECT

An alternate project is available for those who do not wish to participate in the aforementioned project. The alternative project is the completion of three individual papers written regarding privacy and the healthcare industry. The papers will be due on the following dates:

1. Paper #1 – September 20th
2. Paper #2 – October 4th
3. Paper #3 – October 18th

Each paper will be approximately 10 pages in length, specifically addressing the following discussion points:

1. Paper #1 – Identify problems with privacy in the electronic world. What tools are available to address these problems and how are the tools used?
2. Paper #2 – How have federal/state regulatory structures aided in resolving (or hindering) the problems regarding electronic privacy?
3. Paper #3 – How do existing health care privacy policies cooperate or contradict regulatory structures (self regulation)?

Papers will be graded on their ability to make and defend arguments, synthesize ideas, and express opinions.

SUPPLEMENTAL MATERIAL FOR HEALTHCARE INC. EMPLOYEES ONLY

Healthcare Inc. which is based in Omaha, Nebraska and operates throughout the fifty United States has developed proprietary tools that enable insurance companies, managed care companies and doctors to communicate via Healthcare Inc.'s extranet. Healthcare Inc. uses the power of the Internet to serve medical professionals and third party payers, and is a provider of electronic data interchange (EDI) and similar services used by physicians, hospitals, pharmacies, third party payers, and administrators to conduct electronic healthcare transactions. These transactions include immediate online insurance eligibility verification, referrals, lab tests and clinical reports.

Healthcare Inc. facilitates these transactions electronically over an extranet while capturing the data at the source thus reducing the costs of claims handling, eligibility and coverage determination, patient billing, and provider reimbursement. These services streamline processes that are crucial to the healthcare payment cycle. Healthcare Inc. also facilitates electronic prescribing and electronic ordering and reporting of lab tests.

Transaction services revenue was \$25.2 million for the June 2001 quarter compared to \$35.3 million in the March 2001 quarter and \$23.4 million in the June 2000 quarter. Total electronic transactions were 110 million for the June 2001 quarter compared to 148 million in the March 2001 quarter and 103 million transactions in the June 2000 quarter. The increase in revenues and transaction volumes compared to the June 2000 quarter was a result of increased usage of our system by existing customers.

Healthcare Inc. has been tracking HIPAA (www.hippa.gov) from its inception, and has made a commitment to be HIPAA compliant and to also assist our customers in becoming compliant. Healthcare Inc. realizes that privacy and security are critical to their business as well as to their customers. HIPAA industry activities include:

1. Tracking and participating in the regulatory process
2. Staff and customer training programs
3. Providing testimony at public hearings
4. Developing educational tools for providers
5. Developing implementation best practices

In addition, Healthcare Inc.'s customers are interested in having several applications extended to provide access to the doctor's patients due to several business issues.

1. *The high cost of treatment:* The insurance companies and managed care companies think the cost of care can be reduced by using on-line tools in some cases for treatment. Healthcare Inc. sees an opportunity to create these applications for their customers.
2. *The high cost of customer support and the quality of customer data :* Clients will have access to these records, which should reduce the number of inquiries requiring human intervention, and they can update this information where it is incomplete or incorrect (medical records).
3. *The high cost of reproducing, mailing and entering information to/from third parties:* Third parties, including experts, family members, etc., can be brought in to view and add/update information that will help with the treatment process.

Appendix D – UCB Student Handout

HEALTHCARE PRIVACY PROJECT Guidelines for E-Neo Consulting Employees

OVERVIEW

Healthcare Inc. has contacted E-Neo Consulting to discuss the use of their Extranet to interact with existing and future healthcare clients. In particular, Healthcare Inc. has initially contacted E-Neo Consulting to discuss privacy issues related with (1) the storage and handling of sensitive information located on Healthcare Inc. computers and (2) the transmission of sensitive information across the public domain of the Internet. Healthcare Inc. intends to store client records on their extranet and send client records across the Internet. E-Neo Consulting must work with Healthcare Inc. to identify privacy issues and tools to help protect this information, identify problems with existing governmental privacy policies, and identify how privacy practices could be implemented.

As an employee of E-Neo Consulting, you will be provided a single point of contact at Healthcare Inc. with whom the aforementioned issues should be discussed. Through the use of the *E-Neo* corporate extranet, you and one member from Healthcare Inc. will discuss privacy policies and how they relate to what Healthcare Inc. is trying to accomplish.

You are responsible for the production of three short papers, specifically regarding electronic privacy in the healthcare industry. These papers should represent an individual effort, a synthesis and expression of ideas, and grammatical cleanliness.

EXTRANET

Team members will communicate *exclusively* through the E-Neo corporate extranet. The tool is available at <http://www.eneoconsulting.com>. The tool provides team members the ability to use the following components:

- (1) Chat Room – This component allows team members to communicate in a synchronous environment.
- (2) Message Board – This component allows team members to communicate in an asynchronous environment.
- (3) File Sharing Utility – This component allows team members to share files between them.
- (4) Information Board – This component allows team members to have access to information that is useful in the development of the project deliverables.
- (5) Help – This component provides team members online assistance with any component of the extranet.

All components are available exclusively to each individual team member (i.e. chat occurring between members of Team 10 will only be seen by members of Team 10).

DELIVERABLES and GUIDELINES

Three two-page papers are due during the course of this project. All three papers will require you to communicate with the Healthcare Inc. employee, synthesize new ideas, and express opinions. The papers will require that you read articles provided through the E-Neo extranet system and discuss these articles with your client at Healthcare Inc. in Omaha, Neb. These are individual papers.

I) Specifically, the papers should be centered around your ability to understand privacy and its relation to Healthcare Inc. Questions that should be explicitly addressed in your conversations with the Healthcare Inc. employee include:

1. Paper #1 – Identify all problems Healthcare, Inc. is experiencing with electronic privacy. What tools are available to address these problems and how are the tools used?
2. Paper #2 – How have federal/state regulatory structures aided in resolving (or hindering) the problems regarding electronic privacy?
3. Paper #3 – How do existing privacy policies cooperate with or contradict regulatory structures (self-regulation)?

II) The papers should identify key issues in the discussions between you and the Healthcare Inc. employee. The papers should adhere to the following structure:

1. Introduction – Identify the purpose of the paper
2. Project Description – Identify the purpose and scope of the project
3. Addressing Questions – Directly address the associated paper questions
4. Conclusion – Provide an assessment of how well the project is going

III) The reports should be written for a senior manager at E-Neo Consulting. This senior manager is the individual that assigned you to the project and is interested in your recommendations of the aforementioned questions.

IV) The following guidelines should be used when writing each of your papers.

1. 12-point font, double spaced, times new roman.
2. No heading. Simply include your name and student ID in the upper right hand corner of the paper.
3. Staple your paper.
4. Put careful effort into the articulation of ideas, the synthesis of concepts, and grammatical editing.

V) Papers should be turned in at the beginning of class in hard copy form. The following are paper due dates:

1. Paper #1 – September 20th

2. Paper #2 – October 4th
3. Paper #3 – October 18th

PROJECT GRADING

E-Neo Consulting Employee

35% -- Use of the Extranet*

20% -- Completion of the Surveys (5% each)**

45% -- 3 2-page papers (15% each)***

*Use of the Extranet is participation in communication with your project partner through the tool in some form. Each two-week period will be examined to determine if team members are using the tool to communicate.

**Completion of each survey results in 5% of the grade. Grades are not based on the selections made through the survey.

***Papers will be graded based on their completion. In the papers, you should demonstrate the ability to articulate points, represent ideas, and synthesize concepts. The information in these papers will be a critical success factor in completing the larger team project.

Appendix E – IWCS Control Panel

E-Neo Consulting

Corporate Extranet

CONTROL PANEL

Welcome to the **Group 2** E-Neo Corporate Intranet. *Bookmark this page.* If this is not your group number, please click [HERE](#) to return to the login page.

INFORMATION BOARD

This site will provide all the material you need to communicate with your project partner. On the left are links to important tools that will help you along the way. This site will provide you and your partner the appropriate tools to learn more about Computer Privacy.

SHARE FILES

CHAT ROOM

MESSAGE BOARD

HELP

E-Neo Messages

October 2nd: Tip: The Information Board provides you with key information when discussing and writing ideas and opinions.

October 4th: Notice: Problems with University of Colorado web-servers have resulted in minor connection problems today.

*October 8th: Reminder: Discussions with your project partner are an ***essential*** part of the writing process.*

*October 9th: Reminder: **Fill out the 3rd Survey if you have not done so already.***

Appendix F – IWCS Message Board

Group 2 Control panel

E-Neo Message Board

Group 2 Discussion Board

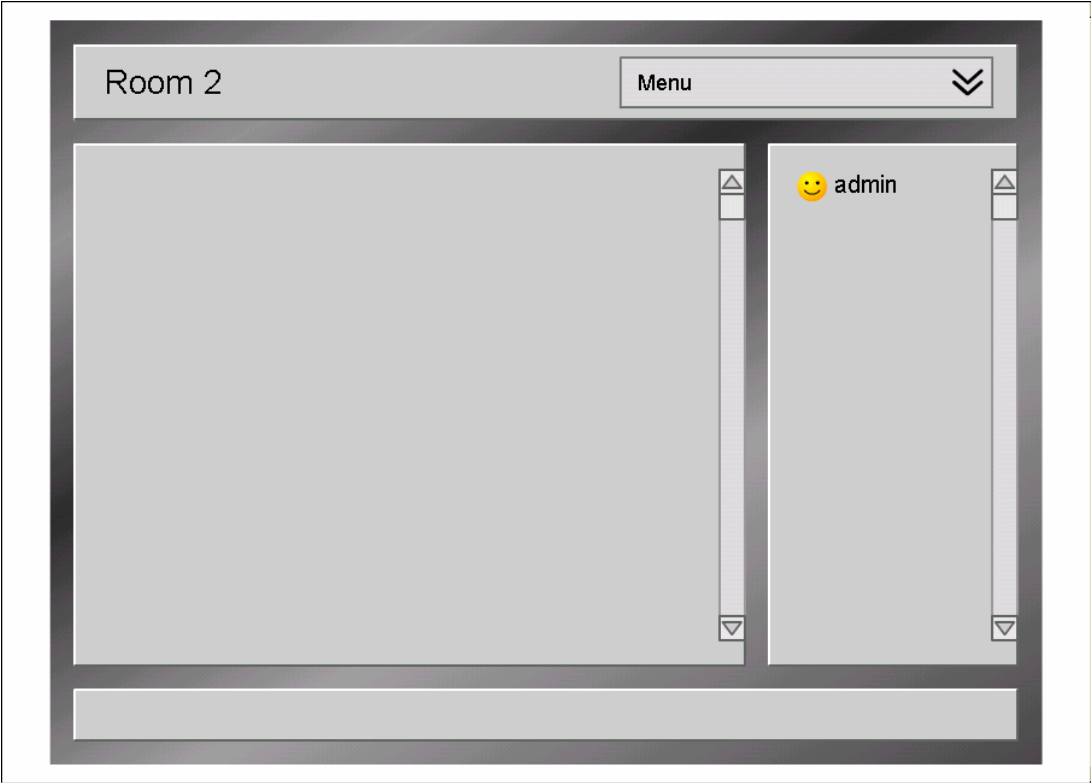
[Post a new message](#)

The list of messages:

- **Assignment Three** - Diana 10/10/2001 (22:16)
 - **Assignment 3** - Tawney 10/11/2001 (13:58)
- **Article Response** - Diana 09/18/2001 (00:31)
 - **next paper** - Tawney 09/19/2001 (17:23)
 - **Re: Assignment Two** - Diana 09/26/2001 (19:06)
 - **article response** - Tawney 09/27/2001 (18:58)
 - **questions** - Tawney 10/01/2001 (12:44)
 - **Response** - Diana 10/03/2001 (13:46)
 - **Assignment Two Response** - Di 10/03/2001 (00:13)
- **Introduction** - Diana 09/13/2001 (15:07)
 - **Introduction** - Tawney 09/14/2001 (13:03)
 - **Discussion** - Diana 09/15/2001 (20:56)
 - **article response** - Tawney 09/16/2001 (13:27)

[Post a new message](#)

Appendix G – IWCS Chat Room



Appendix H – IWCS File Share

E-Neo Consulting

Corporate Extranet

CONTROL PANEL

Use this page to share files between you and your partner

INFORMATION BOARD

The first link (See Files) allows you to see all files that have been uploaded to the site since the start of the project. The most recently uploaded files will appear at the top of the page. The second link (Upload Files) allows you to post files to the page. Once you have written a paper or made changes to an existing paper, upload the file to the See Files location.

SHARE FILES

[SEE FILES](#)

HELP

[UPLOAD FILES](#)

Appendix I – IWCS Help

E-Neo Consulting

Corporate Extranet

CONTROL PANEL

This manual will provide you information that will assist in your use of the integrated web communication tool (IWCT). Included are screen shots, descriptions of features, and tips and tricks on how to use the tool effectively. Take a few minutes to examine the help pages and explore the information to orient yourself with your IWCT. If you wish to contact someone regarding the use of this tool, send an email to **Technical Support** with specific questions.

INFORMATION BOARD

SHARE FILES

Listed below are the available services provided by this tool and the location that you can find information about them. Use this index as a guide to further your understanding of your IWCT.

HELP

- [The Control Panel Help](#)
- [Information Board Help](#)
- [Chat Room Help](#)
- [Message Board Help](#)
- [File Share Help](#)

Appendix J – IWCS Information Board: Proper TTF

		Day 1	Day 2
CONTROL PANEL INFORMATION BOARD SHARE FILES HELP		<p>The Integrated Web Communication System</p> <p>Become acquainted with the IWCS. Please explore the following functions:</p> <ul style="list-style-type: none"> • The File Upload Utility • The Message Board • The Chat Room <p>Meet your team member</p> <ul style="list-style-type: none"> • Introduce yourself to your team member • Use the Message Board • Use the Chat Room • Share such information as: <ul style="list-style-type: none"> ○ Name ○ Work Experience ○ Hobbies <p>Introduction to Privacy Case</p> <p>Read the case entitled, Grappling With Information Access Issues and Privacy. This case will provide you valuable insight to the concept of electronic privacy. More</p>	<p>What Comprises E-Privacy?</p> <p>Read the following articles:</p> <ul style="list-style-type: none"> • Americans Want a Privacy Guarantee • A Primer on Internet Privacy <p>These articles will introduce you to the concept of Electronic Privacy. They will aid in understanding the important components and implementation of privacy issues.</p> <p>Optional Information:</p> <ul style="list-style-type: none"> • The Cookie Concept • Deciphering Encryption <p>Use the Message Board or the Chat Room to discuss the articles. The discussions should focus on issues in the articles, how these issues can be used to explore E-Privacy, and useful questions as:</p> <ul style="list-style-type: none"> • Is privacy an attainable goal? • What are important factors when considering privacy?
	Week 1		

Appendix K – IWCS Information Board: Improper TTF

E-Neo Consulting

Corporate Extranet

CONTROL PANEL

Privacy Case

- Case

INFORMATION BOARD

What Comprises E-Privacy?

SHARE FILES

- Americans Want a Privacy Guarantee
- A Primer on Internet Privacy
- The Cookie Concept
- Deciphering Encryption

HELP

E-Privacy: Monitoring

- Monitoring Internet Use
- Monitoring *Intranet* Use
- Study: Monitoring of employee e-mail escalates
- Is your employer monitoring your Internet use?

E-Privacy: Protecting

- Browse the Internet/Intranet autonomously
- Protect Your PC from Outside Intruders

Privacy Tools

...

Appendix L – Rater Guideline Sheet

DETERMING CHANNEL EXPANSION FROM A CRITICAL PERSPECTIVE

Matt Germonprez

DEFINITIONS

Richness: Resolution of distorted communication. Richness is not defined as a reduction of distortion. Richness is defined as a resolution of both process structure and topic related distorted communication.

Process Structure Communication: Communication that is concerned with task coordination and timing, work distribution, and statement regarding completed work.

Topic Communication: Communication that is concerned with the central task topic. In the case of the current set of data, topic communication is centered around “Internet cookies.”

Other Communication: Communication that is not concerned with process structure or topic. Instead the communication centers around humor, the benefits/drawbacks of the current technology, and greetings.

Communication Breakdown: Communication acts that are false, incomplete, insincere, or unwarranted (Ngwenyama and Lee, 1997).

Resolution of Distorted Communication: Communication acts that accept and act upon the raised validity claims to provide clearness in the communication.

Communicative Act: A communicative act ends at the speaker’s function change or when another individual speaks (Poole, 2001).

Communicative Series: A series of related communicative acts. A communicative series ends at a function change in the set of related communicative acts.

Validity Claims:

- (1) contextuality – appropriateness of the action.
- (2) efficiency – ability of the action to achieve desired ends.
- (3) effectiveness – authority of the communication partner.
- (4) clarity – clarity of the message and associated jargon.
- (5) completeness – completeness of the message.
- (6) truthfulness – truthfulness of the message.
- (7) sincerity – sincerity of the communication partner.

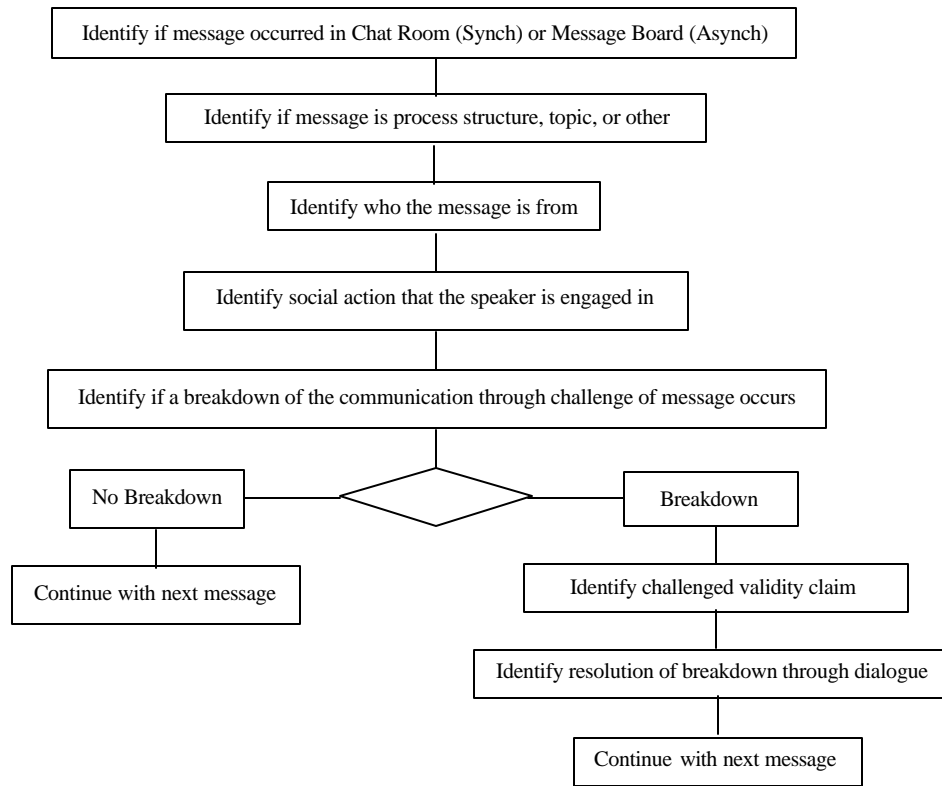
Social Actions:

- (1) Instrumental - When a communication partner views the other partner as an information receptacle, rather than as an actor. Often, instrumental action can be thought of as an individual giving orders to another individual.
- (2) Communicative - To obtain a mutual understanding between communication partners. This type of action is different from instrumental action in that it treats both members of the dialogue as actors, and not receptacles of information.
- (3) Discursive - To achieve agreement between communication partners. Such a situation occurs when there is a disagreement between individuals and the disagreement needs resolution.
- (4) Strategic - When one actor attempts to influence another through communication.

Social Actions	Validity Claims						
	Comprehensibility		Sincerity	Truth	Normative Rightness		
	Completeness	Clarity	Sincerity	Truth	Context	Efficiency	Effectiveness
Communicative	X	X	X	X	X	X	X
Discursive	X	X	X	X	X	X	X
Instrumental	X	X		X	X	X	X
Strategic	X	X		X	X	X	X

Validity Claim/Social Action Relationships

FLOW CHART



Appendix M – Coding Example

Coder Name _____

Date _____

Transcript Description _____

Message Number	Synch/Asynch	Message Type	From	Social Action	Breakdown	Validity Claim	Resolution
12	A	T	Greg	2			
13	A	T	Sue	2	(12)	(13) [4]	
14	A	T	Greg	2			(13)
15	A	T	Sue	2			

Breakdown on Message Number

Validity Claim Type on Breakdown at Message Number

Resolution on Validity Claim at Message Number

Appendix N – Dialogue Coding Sheet

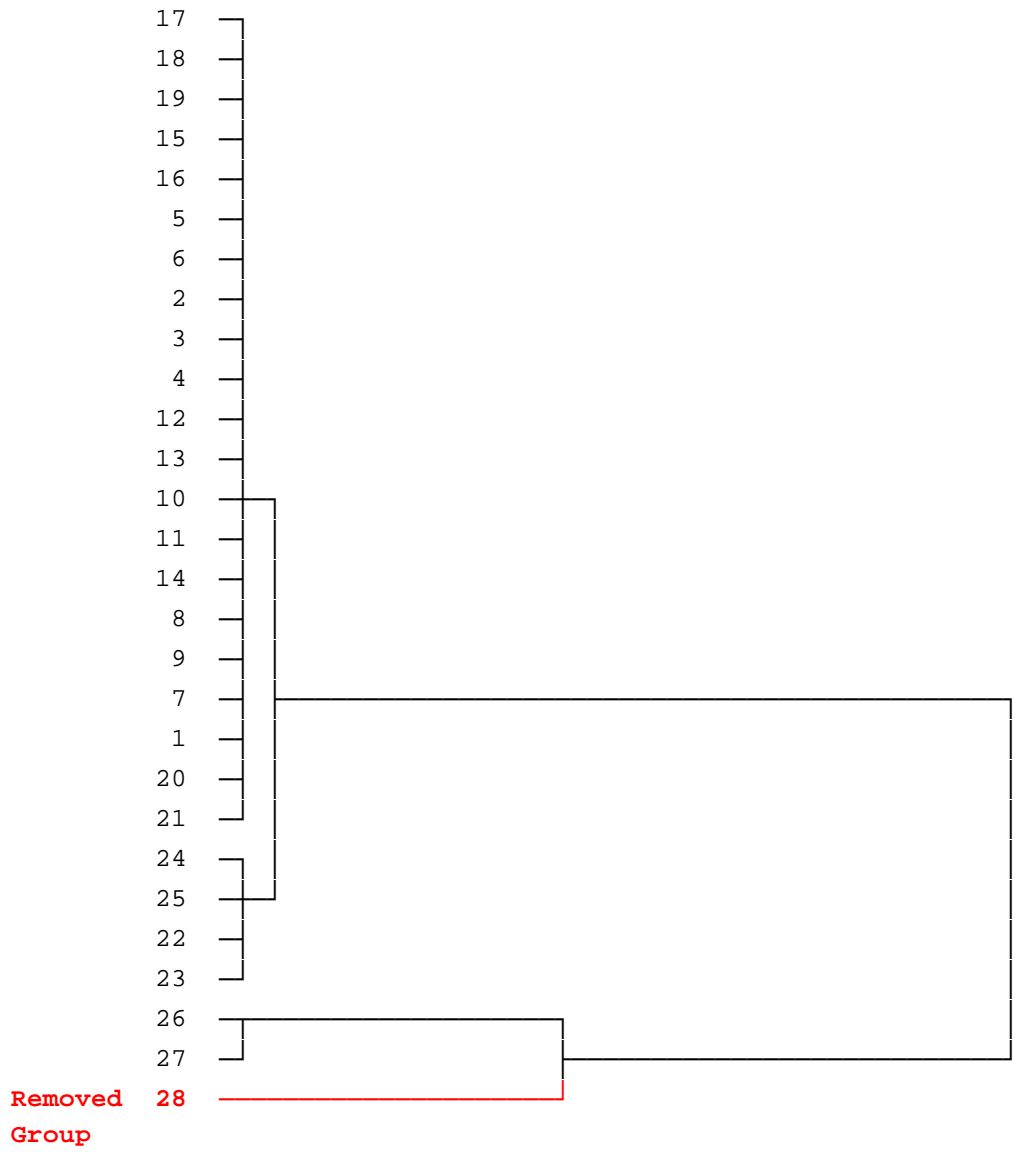
Message Number	Synch/Asynch	Message Type	From	Social Action	Breakdown	Validity Claim	Resolution
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

Appendix O – Group Removal Cluster Analysis

* * * HIERARCHICAL CLUSTER ANALYSIS * * *

Dendrogram using Average Linkage (Between Groups)
Rescaled Distance Cluster Combine

C A S E 0 5 10 15 20 25
Label Num +-----+-----+-----+-----+-----+



Appendix P – Table of Findings

		Proper Fit			Improper Fit			All Groups		
			%	Std. Dev.		%	Std. Dev.		%	Std. Dev.
Average Number of Communicative Acts	Total	44.07		43.95	84.00		124.0	63.30		92.10
	T1	23.43		29.10	51.31		80.49	36.85		60.13
	T2	15.00		33.86	16.54		40.74	15.74		36.60
	T3	5.64		3.48	16.15		33.87	10.70		23.75
Average Number of Social Actions	Instrumental	0.14	1	0.36	0.31	1	0.48	0.22	1	0.42
	Communicative	42.79	95	43.71	80.31	92	120.7	60.85	94	89.72
	Discursive	0.29	1	0.61	2.00	1	6.34	1.11	1	4.41
	Strategic	0.86	3	1.17	1.38	5	1.50	1.11	4	1.34
Average Message Type	Topic	10.57	34	6.54	32.46	29	65.15	21.11	31	45.88
	Process Structure	23.50	47	28.57	32.38	55	45.00	27.78	51	36.92
	Other	10.00	19	13.38	19.15	16	35.01	14.41	17	26.02
Average Communication Type	Asynchronous	23.86	81	8.74	21.92	76	8.25	22.93	79	8.40
	Synchronous	20.21	19	41.12	62.08	24	124.1	40.37	21	91.74
Average Social Actions by Period	Instrumental									
	T1	0.14	.08	0.36	0.15	1.3	0.38	0.15	1	0.36
	T2	0.00	0	0.00	0.08	2.6	0.28	0.04	1	0.19
	T3	0.00	0	0.00	0.08	1.9	0.28	0.04	1	0.19
	Communicative									
	T1	22.64	95.4	28.63	49.92	92.4	79.88	35.56	94	59.69
	T2	14.79	94.8	33.92	14.77	90.1	36.16	14.76	94	34.34
	T3	5.36	93.9	3.50	15.62	92.6	33.98	10.26	93	23.81
	Discursive									
	T1	0.07	.4	0.27	0.62	.9	1.71	0.33	1	1.21
	T2	0.14	4.4	0.36	1.31	.9	4.71	0.69	1	3.27
	T3	0.07	2.4	0.27	0.08	.7	0.28	0.07	2	0.27
	Strategic									
	T1	0.36	3.2	0.50	0.69	5.4	1.11	0.52	4	0.85
	T2	0.07	.8	0.27	0.38	6.4	0.51	0.22	4	0.42
	T3	0.21	3.7	0.43	0.31	2.8	0.63	0.26	3	0.53
Average Message Type by Period	Topic									
	T1	5.36	23	7.03	15.92	28	31.88	10.44	26	22.86
	T2	2.71	42	2.13	10.08	30	31.57	6.26	36	21.82
	T3	2.50	50	1.56	6.46	31	16.30	4.41	41	11.31
	Process Structure									
	T1	11.93	53	13.53	21.62	49.8	37.72	16.59	51	27.80
	T2	9.14	53	22.39	4.69	66.5	4.03	7.00	59	16.22
	T3	2.43	37	2.82	6.08	57.9	8.08	4.19	47	6.13
	Other									
	T1	5.86	21	9.48	13.85	22	27.73	9.70	22	20.41
	T2	3.14	5	10.63	1.77	3.4	5.79	2.48	4	8.51
	T3	0.71	13	0.91	3.54	8.4	10.17	2.07	11	7.09
Average Communication Type by Period	Asynchronous									
	T1	12.21	85	4.06	10.23	74	5.36	11.26	80	4.74
	T2	6.21	93	3.45	5.08	92.5	1.89	5.67	92	2.81
	T3	5.43	98	3.27	6.62	86.9	4.21	6.00	93	3.73
	Synchronous									
	T1	11.21	15	28.16	41.15	26.1	80.00	25.63	21	59.86
	T2	8.79	8	32.30	11.46	7.5	41.33	10.07	8	36.22
	T3	0.21	2	0.80	9.46	11.2	32.92	4.67	6	22.86
Average Breakdowns by Period										
	T1	2.00		2.35	5.31		6.79	3.59		5.18
	T2	1.29		2.23	1.62		2.02	1.44		2.10
	T3	0.57		1.16	1.77		2.59	1.15		2.03
Average Resolutions by Period										
	T1	1.93		2.34	5.08		6.54	3.44		5.00
	T2	1.07		1.82	1.54		2.03	1.30		1.90
	T3	0.50		1.16	1.69		2.59	1.07		2.04
Average Resolutions Per Average Breakdowns										
	T1	0.96			0.96			0.96		
	T2	0.83			0.95			0.90		
	T3	0.88			0.96			0.94		
Average # Messages Per										

Average Breakdowns	T1	11.71		9.67		10.26	
	T2	11.67		10.24		10.90	
	T3	9.88		9.13		9.32	
Average # Messages Per Average Resolution	T1	12.15		10.11		10.70	
	T2	14.00		10.75		12.14	
	T3	11.29		9.55		9.97	
Average # Breakdowns Per Message	T1	0.09		0.10		0.10	
	T2	0.09		0.10		0.09	
	T3	0.10		0.11		0.11	
Average # Resolutions Per Message	T1	0.08		0.10		0.09	
	T2	0.07		0.09		0.08	
	T3	0.09		0.10		0.10	
Validity Claim Frequency:							
Contextuality	Total	1	2	8	7	9	5
	T1	1	4	8	12	9	9
	T2	0	0	0	0	0	0
	T3	0	0	0	0	0	0
Efficiency	Total	27	50	41	36	68	41
	T1	11	39	22	32	33	34
	T2	11	61	9	43	20	51
	T3	5	63	10	43	15	48
Effectiveness	Total	1	2	0	0	1	1
	T1	1	4	0	0	1	1
	T2	0	0	0	0	0	0
	T3	0	0	0	0	0	0
Clarity	Total	17	31	35	31	52	31
	T1	12	43	20	29	32	33
	T2	3	17	7	33	10	26
	T3	2	25	8	35	10	32
Completeness	Total	2	4	21	19	23	14
	T1	1	4	13	19	14	14
	T2	0	0	3	14	3	8
	T3	1	13	5	22	6	19
Truthfulness	Total	0	0	2	2	2	1
	T1	0	0	1	1	1	1
	T2	0	0	1	5	1	3
	T3	0	0	0	0	0	0
Sincerity	Total	6	11	6	5	12	7
	T1	2	7	5	7	7	7
	T2	4	22	1	5	5	13
	T3	0	0	0	0	0	0