Framing Information Systems Requirements: 
An Investigation of Social Cognitive Processes in Information Systems Delivery

by

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Submitted to the Alfred P. Sloan School of Management
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Management
at the
Massachusetts Institute of Technology
February, 1996

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ABSTRACT

In this dissertation, information technology (IT) requirements definition processes are examined through the theoretical lens of social cognitive theory and structuration theory. An in-depth, longitudinal field study of two IT development projects at one research site was undertaken to investigate the influence of frames on the interpretations, actions and interactions of key information systems development (ISD) participants during requirements definition activities and on the proposed design of the information technology artifact. Analytic categories were developed to examine technological frames and to identify similarities and differences in frames. Findings suggested that incongruence in the frames of two stakeholder groups (team members, system constituents), particularly aspects of frames related to user support, IT usage, and information legitimacy, contributed to difficulties in IT development, adoption, and use. An unexpected finding was that frame congruence could also be dysfunctional when problematic assumptions and expectations about requirements were not surfaced or examined.

The extent and mechanisms for frame change through ISD participants' interactions in requirements activities was also considered. Despite numerous episodes of negotiations around requirements, there was little frame change apparent. Analysis of findings suggested several contributing factors. System constituents had little effective participation in requirements definition activities, thus their frames carried little weight in negotiations around requirements. Commonly used requirements artifacts (data models, work plans, systems and project documents) did not facilitate frame sharing between technical developers and users. A variety of sensemaking devices were identified, such as organizational stories, scenarios for IT use, and metaphors. However, these devices, used tacitly in face-to-face interactions, were not included in requirements artifacts.

Social cognitive theory, structuration theory, and empirical data were used to develop and elaborate the framing model. This model depicts IT requirements definition processes in terms of episodes in which participants' technological frames, changes in the discourse, changes in the organization context, and underlying structurational processes influence ISD participants' negotiations. Empirical data from two projects were used to illustrate the model. These findings suggested that dominant technological frames, those assumptions, expectations and knowledge that most strongly influenced ISD participants' decisions at a point in time, changed and evolved, thus influencing requirements and ISD outcomes.

Thesis Committee:  Professor Wanda Orlikowski (chair)  
Professor John Rockart  
Professor John Carroll
Acknowledgments

I am deeply indebted to my dissertation committee: Wanda Orlikowski, John Carroll, and Jack Rockart who gave me their support, encouragement, and guidance while allowing me the freedom to explore and develop my research study according to my own interests and style. My advisor, Wanda inspired my study through her research and served as a role model for the highest standards of scholarship. She also assured me that the despair I felt was all just a part of the process and that the result would be worth the effort. Wanda deserves special thanks for generously and patiently sharing her time to help me focus my thinking and analysis and to carefully review and edit my voluminous chapters. I want to thank John Carroll for his questions and comments which challenged me to clarify the fuzzy areas in my thinking and writing and for his practical suggestions which helped me to avoid "dissertation meltdown." I also want to thank Jack Rockart for pressing me to relate my work to the actual concerns of management and to keep in sight a key goal -- finishing!

I am also very indebted to the men and women of GHI, Inc., who shared their time and experiences with me and assisted my study in countless ways. Many individuals not only tolerated my presence but made special efforts to ensure I had access to the personnel, events, documents, and so on that were critical to my study. Their interest and concern made my experiences in the field both pleasant and memorable.

Many others at MIT also helped me to survive and complete this dissertation. The Center for Information Systems Research provided generous funding for my studies at MIT. Debra Hofman and Judith Quillard provided thoughtful feedback on my work as well as personal support and encouragement through several particularly difficult times. Professor Chris Kemerer's practical and pragmatic advice helped me to maintain a positive perspective on the academic world. My fellow doctoral students, in particular Rob Fichman and Mike Gallivan, offered not only thoughtful ideas but also friendship and encouragement. Sharon Cayley steered me through the administrative aspects of the doctoral program and handled many issues and activities for me, saving me countless precious hours.

Completing this dissertation was much more than an intellectual process. It was also a life experience which required juggling numerous responsibilities and demands on my time and attention. I would not have made it through without the unwavering support, encouragement, and understanding of friends and family. In particular, I would like to thank my mother, sister, father-in-law, and mother-in-law for their willingness to help out in any ways that I needed help. I would also like to thank my children for their understanding and patience. Most importantly, I want to thank my husband, Bill Donahue, without whose love, friendship, and unfailing support this would not have been possible.
This dissertation is dedicated to my husband, William Donahue, and to our children Meredith and Brenden.
Framing Information Systems Requirements: An Investigation of Social Cognitive Processes in Information Systems Delivery

Table of Contents

Abstract 2
Acknowledgments 3
Table of Contents 5
List of Tables and Figures 8

Chapter 1: Introduction 9

Chapter II: Theoretical Foundations 13
A. Conceptualizing requirements definition as a social process 13
A.1. Social cognitive themes in IT research 15
B. Building a social cognitive perspective in IT research 17
B.1. The concept of schemas in social cognitive theory 17
B.2. Applications of social cognitive theory in organizational studies 19
B.3. Exploring the concept of technological frames of reference 20
C. Structuration theory: a meta-theoretic framework for theory development in IT research 24
C.1. Key ontological assumptions of structuration theory 24
C.2. Applying structuration theory in IT research 27
D. Summary and integration of implications for the current research 30

Chapter III: Research Strategy and Design 33
A. Research Questions 33
B. Research Strategy 34
B.1. Research site selection factors 34
B.2. Research site description 35
B.3. Description of projects studied 37
B.4. Researcher role 38
C. Research Design and Methods 41
C.1. Data Collection 41
C.1.a. Data sources and collection techniques 42
C.2. Data analysis and interpretation 46
C.2.a. Identifying frames and assessing similarities and differences 47
C.2.b. Analyzing the influence of frames on actions and interactions 51
C.2.c. Developing the \textit{framing} model 53
D. Assumptions and limitations of the research design 56

Chapter IV: Technological Frames in Requirements Definition Activities 59
A. Frames categories and stakeholder groups 59
A.1. Framework of analytic categories 62
B. Findings on Frames of Reference for Key Stakeholder Groups 64
Category 1: Essence of the ISD initiative 66
Category 2: Essence of the IT Application 79
Category 3: Essence of the Organizational Environment 90
Category 4: Project Context 99
Category 5: Project Identity 106
C. Congruence and Incongruence in Frames: Consequences and Implications for ISD outcomes
   C.1. Sub-categories congruent in content and structure 
   C.2. Sub-categories incongruent in content and structure 
   C.3. Sub-categories incongruent in structure (salient primarily to core team members) 
   C.4. Sub-categories congruent in content, incongruent in structure (more elaborate for core team members) 
   C.5. Partially aligned sub-categories (similar in some but not all content and structure) 
D. Chapter Summary

Chapter V: Technological Frames in Action and Interaction
   A. The influence of technological frames in the BIS project
      A.1. What's it all about? 
      A.2. How does it relate? 
      A.3. What to do? 
      A.4. How to work with system constituents? 
      A.5. Summary of key aspects of the influence of technological frames on actions and interactions in the BIS project
   B. The influence of technological frames in the INFOSYS project
      B.1. What's it all about? 
      B.2. How does it relate? 
      B.3. What to do? 
      B.4. How to work with system constituents? 
      B.5. Summary of key aspects of the influence of technological frames on actions and interactions in the INFOSYS project
C. Discussion and Implications
   C.1. Characterizing the influence of technological frames on actions and interactions
   C.2. Artifacts as a medium and outcome of frame negotiations
   C.3. Sensemaking devices which facilitated communicating and sharing frames
   C.4. Assessing how and to what extent frame change occurred
D. Chapter Summary

Chapter VI: Framing: Social Cognitive Processes in IT Requirements Definition
   A. Framing IT requirements: a social cognitive process model
      A.1. Components of the framing model
      A.2. Limitations of the framing model
   B. Framing in action
      B.1. Framing requirements in the Business Information System (BIS) project
         Episode 1 
         Episode 2 
         Episode 3 
         Episode 4a 
         Episode 4b 
         Episode 5 
         Episode 6 
         Episode 7 
         Episode 8

(6)
B.2. *Framing* requirements in the INFOSYS project
   Episode 1  
   Episode 2  
   Episode 3  
   Episode 4
C. Comparing the *Framing* of IT Requirements in the INFOSYS and BIS projects
D. Chapter Summary

Chapter VII: Discussion and Conclusions
A. Summary of key findings in each research area
B. Discussion of findings and implications
   B.1. Consequences of frame congruence and incongruence for ISD outcomes
   B.2. Constraints on frame change and alignment
   B.2.a. Limitations of sensemaking devices and requirements artifacts for frame sharing
   B.2.b. Structural constraints on frame change
   B.3. Change and evolution in dominant frames
   B.4. Social cognitive implications of change triggers in the *framing* process
C. Conclusions
   C.1. Contributions and areas for future research
   C.2. Assumptions and Limitations
   C.3. Management implications

References

Appendix A: Interview Protocol

Appendix B: Event Tables
   Table B-1: Key events at research site during time period of interest
   Table B-2: Summary of Major Events in the BIS Project
   Table B-3: Summary of Major Events in the INFOSYS Project

Appendix C: Story Examples
   Table C-1: Example of a Story's Influence in Multiple Contexts
   Table C-2: Examples of the RBC, Inc. Story as Told by Various Informants
## List of Tables and Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>II-1</td>
<td>Gidden's Forms of Institutions in <em>The Constitution of Society</em></td>
<td>27</td>
</tr>
<tr>
<td>II-2</td>
<td>Orlikowski's (1992) Structurational Model of Technology</td>
<td>29</td>
</tr>
<tr>
<td>II-3</td>
<td>Structurational Model of the Influence of Technological Frames</td>
<td>32</td>
</tr>
<tr>
<td>III-1a</td>
<td>Organizational Chart for Key Project Participants</td>
<td>39</td>
</tr>
<tr>
<td>III-1b</td>
<td>Organizational Chart for Key Project Participants after the Reorganization</td>
<td>39</td>
</tr>
<tr>
<td>IV-1</td>
<td>Categories of Technological Frames of Reference</td>
<td>60</td>
</tr>
<tr>
<td>IV-2</td>
<td>Key Aspects of Core Team Members' Technological Frames</td>
<td>114</td>
</tr>
<tr>
<td>IV-3</td>
<td>Key Aspects of System Constituents' Technological Frames</td>
<td>114</td>
</tr>
<tr>
<td>VI-1</td>
<td>Framing: A Social Cognitive Process in Requirements Definition</td>
<td>210</td>
</tr>
<tr>
<td>VI-2</td>
<td>Chronological Flow of Episodes in the BIS Project</td>
<td>216</td>
</tr>
<tr>
<td>VI-3</td>
<td>Episode 1 of <em>Framing</em> in the BIS Project</td>
<td>219</td>
</tr>
<tr>
<td>VI-4</td>
<td>Episode 2 of <em>Framing</em> in the BIS Project</td>
<td>222</td>
</tr>
<tr>
<td>VI-5</td>
<td>Episode 3 of <em>Framing</em> in the BIS Project</td>
<td>225</td>
</tr>
<tr>
<td>VI-6</td>
<td>Episode 4a of <em>Framing</em> in the BIS Project</td>
<td>231</td>
</tr>
<tr>
<td>VI-7</td>
<td>Episode 4b of <em>Framing</em> in the BIS Project</td>
<td>234</td>
</tr>
<tr>
<td>VI-8</td>
<td>Episode 5 of <em>Framing</em> in the BIS Project</td>
<td>240</td>
</tr>
<tr>
<td>VI-9</td>
<td>Episode 6 of <em>Framing</em> in the BIS Project</td>
<td>246</td>
</tr>
<tr>
<td>VI-10</td>
<td>Episode 7 of <em>Framing</em> in the BIS Project</td>
<td>255</td>
</tr>
<tr>
<td>VI-11</td>
<td>Episode 8 of <em>Framing</em> in the BIS Project</td>
<td>261</td>
</tr>
<tr>
<td>VI-12</td>
<td>Chronological Flow of Episodes in the INFOSYS Project</td>
<td>264</td>
</tr>
<tr>
<td>VI-13</td>
<td>Episode 1 of <em>Framing</em> in the INFOSYS Project</td>
<td>266</td>
</tr>
<tr>
<td>VI-14</td>
<td>Episode 2 of <em>Framing</em> in the INFOSYS Project</td>
<td>272</td>
</tr>
<tr>
<td>VI-15</td>
<td>Episode 3 of <em>Framing</em> in the INFOSYS Project</td>
<td>278</td>
</tr>
<tr>
<td>VI-16</td>
<td>Episode 4 of <em>Framing</em> in the INFOSYS Project</td>
<td>283</td>
</tr>
<tr>
<td>II-1</td>
<td>Key Findings in Orlikowski and Gash's (1994) Study of Technological Frames</td>
<td>22</td>
</tr>
<tr>
<td>III-1</td>
<td>Key features of ISD Projects Studied</td>
<td>38</td>
</tr>
<tr>
<td>III-2</td>
<td>Informants Interviewed and Interviews Conducted</td>
<td>44</td>
</tr>
<tr>
<td>III-3</td>
<td>Analytic Categories of Technological Frames of Reference</td>
<td>48</td>
</tr>
<tr>
<td>IV-1</td>
<td>Core Team Members</td>
<td>63</td>
</tr>
<tr>
<td>IV-2</td>
<td>System Constituents</td>
<td>63</td>
</tr>
<tr>
<td>IV-3</td>
<td>Frames of Reference of Core Team Members and System Constituents</td>
<td>64</td>
</tr>
<tr>
<td>IV-4</td>
<td>Congruence and Incongruence in Technological Frames</td>
<td>113</td>
</tr>
<tr>
<td>V-1</td>
<td>Technological Frames Which Were Particularly Influential in Negotiations in Each Thematic Area</td>
<td>128</td>
</tr>
<tr>
<td>V-2</td>
<td>Examples of Frame Change and Lack of Change over Time</td>
<td>204</td>
</tr>
<tr>
<td>VI-1</td>
<td>Episodes of <em>Framing</em> in the BIS Project</td>
<td>217</td>
</tr>
<tr>
<td>VI-2</td>
<td>Episodes of <em>Framing</em> in the INFOSYS Project</td>
<td>265</td>
</tr>
<tr>
<td>VI-3</td>
<td>Comparison of the Framing Process for BIS and INFOSYS Projects</td>
<td>289</td>
</tr>
<tr>
<td>VII-1</td>
<td>Findings on Consequences of Frame Congruence and Incongruence</td>
<td>302</td>
</tr>
<tr>
<td>VII-2</td>
<td>Consequences of Frame Congruence and Incongruence in Varying Contexts</td>
<td>303</td>
</tr>
<tr>
<td>VII-3</td>
<td>Examples of the Influence of Change Triggers on the Framing Process</td>
<td>314</td>
</tr>
</tbody>
</table>
Chapter 1
Introduction

Identifying, defining, and agreeing on the requirements for an information technology (IT) application are some of the most difficult, yet most important, tasks in the information systems delivery (ISD) process. There are frequently a variety of stakeholders involved with an ISD project -- business managers, potential system users, technical developers, vendors, customers -- who have different perspectives on what the IT application should do or how it should operate. Differences in understanding can be complicated by goal conflicts and power struggles (Kling and Iacono 1984; Markus and Pfeffer 1983; Markus 1983; Robey and Markus 1984; Robey, Farrow, and Franz 1989). Failure to reach and maintain a common understanding of requirements can lead to difficulties in design and implementation, resulting in substantial increases in IS development costs (Jones 1990) or users' rejection of a system (Ginzberg 1981; Szaja and Scamell 1993).

Information systems development (ISD) methodologies typically treat IT requirements definition as tasks in the early phases of the information system delivery process and prescribe various techniques for eliciting requirements, such as user interviews, joint application design (JAD) sessions, early prototype development, and so on (Davis and Olson 1985; DeMarko 1979; Martin 1982; Wetherbe 1984). Numerous IT researchers have considered how to improve requirements definition methods (see for examples Checkland 1978; DeMarko 1978; Kumar and Welke 1992 Liou and Chen 1993; Mantel and Teorey, 1989; Martin 1990; Naumann and Davis 1980; Naumann and Jenkins 1982; Rockart 1979; Sakthevel and Moily 1993; Watson and Frolick 1992; Welke 1977, 1983; Wetherbe 1991; Zmud, Anthony and Stair 1993) or have focused on assessing or comparing effectiveness of various methods (see for examples Akavu 1984; Byrd, Cossick and Zmud 1992; Hachathorn and Karimi 1988; Mahmood 1987; McKeen 19983; Munroe and Davis 1977; Necco, Gordon and Tsai 1987; Vessey and Conger 1994; Watson and Frolick 1993).

In contrast to these approaches, recent studies of software development in an organizational context suggest that ISD methodologies which focus on successively refining definitions of an IT application through design artifacts do not adequately address the social aspects of ISD (Curtis, Krasner and Iscoe 1988) nor the organizational complexity of requirements definition (Bansler and Bødker 1993). Instead, research suggests that IT requirements definition should also be addressed as a social process of learning, communication, negotiation, and conflict resolution (Curtis, Krasner, and Iscoe 1988; Hirschheim and Newman 1991, Newman and Noble 1990, Newman and Robey
1992; Robey, Farrow, and Franz 1989; Walz, Elam, and Curtis 1993). Because business personnel from various functional departments and technical developers from an IS organization typically work together in development activities, ISD can be understood as an instance of collaborative team work among organizational members representing diverse "thought worlds" (Dougherty 1992). Because diverse interpretations can be a barrier to successful collaboration in such work (Dougherty 1992), examination of social cognitive processes could provide insight into problems in ISD. While there has been a cognitive thread through IT research, for example, several IS researchers have considered the influence of designers' and other ISD participants' interpretations and understanding of IT on technology design and ISD outcomes (Bostrom and Heinen 1977; Boland 1979; Dagwell and Weber 1983; Ginzberg 1981; Hirschheim 1986; Hirschheim and Klein 1989; Markus and Bjørn-Andersen 1987; Preston 1991), IT research has not systematically articulated a social cognitive prospective (Orlikowski and Gash 1994).

Recently, Orlikowski and Gash (1994) have suggested that such a social cognitive perspective, drawing on the theoretical concept of frames of reference and focused on frames related to technology and technology-related change, offers a unique lens and new insights into ISD processes and outcomes. For example, the ways in which IT managers and designers interpret and understand information technology features and uses affect their decisions to adopt a particular technology and to implement specific features of that technology, thus influencing the capabilities and limitations of the technology provided to users. The ways in which business managers and users understand and interpret IT applications influence their appropriation of information technology in their work practices and thus the actual rather than the desired or projected outcomes of IT implementation.

This research study adopts the social cognitive perspective suggested by Orlikowski and Gash (1994) and draws on their theoretical concept of technological frames of reference to investigate the negotiations of key stakeholders around IT requirements definition. In particular, this research addresses questions such as (i) what are the technology-related frames of reference of key individuals and groups involved in IT requirements definition activities, and how do they influence their actions and interactions?, (ii) what are the consequences of congruence and incongruence in frames of reference of key groups?, (iii) do frames of reference change through participation in ISD activities and if so, in what ways and through what kinds of mechanisms?, and, (iv) how do participants' frames of reference and their interactions during ISD activities influence ISD outcomes, including definition of IT requirements and design of physical artifacts?

To address these research questions, I undertook an in-depth, longitudinal field study of two IS development projects at one research site. I used variety of data collection
and analysis techniques to allow for triangulation of findings (Leonard-Barton 1990), including multiple, in-depth interviews with organization members participating in requirements definition activities, observation of activities such as project presentations, team meetings, training sessions, etc., and review and analysis of project-related communication and documentation. I used techniques for qualitative analysis (Miles and Huberman 1984) and grounded theory (Glaser and Strauss 1967; Martin and Turner 1986; Strauss 1987) to develop descriptive categorizations of the technological frames of reference which influenced ISD participants as they defined IT requirements and to assess the extent to which they were shared among individuals and groups. I then examined the influence of frames on the interpretations, actions and interactions of key ISD participants during requirements definition activities, considered the extent and mechanisms for frame change through interactions in ISD, and assessed the influence of technological frames on the proposed design of the information technology artifact. In the final stage of analysis, I used empirical data to develop and elaborate a process model for framing IT requirements. In this model, which depicts the evolving nature of requirements through episodes of negotiations, I draw on Orlikowski's (1992) structurational model of technology to situate the social cognitive analysis in the institutional context of the organization.

The dissertation is organized as follows: In Chapter II, I review relevant social cognitive research and discuss the theoretical framework of structuration theory (Giddens 1984) as it has been applied to IT research (Orlikowski 1992; Orlikowski and Robey 1991). I then articulate the research assumptions drawn from these two theoretical domains. In Chapter III, I describe the research questions, methodology, data collection and analysis techniques and the research site and ISD projects studied.

I present findings and analysis from the field study in Chapters IV, V, and VI. In Chapter IV, I develop a framework of categories to analyze the technological frames of reference which were salient to two stakeholder groups (core team members and system constituents) and use the framework to examine congruence and incongruence in frames within and between the two groups. I examine the influence technological frames had on key ISD participants' actions and interactions in requirements definition activities and thus on decisions about the nature and design of the information technology application in Chapter V. I also assess the extent to which frames changed through interactions in requirements definition activities and identify the mechanisms which facilitated frame change. In Chapter VI, I extend the analysis through development of a social cognitive process model for framing IT requirements and use empirical data from two ISD projects to illustrate the model. In Chapter VII, I discuss key conclusions of this research, assumptions and limitations, contributions to IT research, and future research directions.
Chapter II
Theoretical Foundations

In the previous chapter I noted that IT researchers have begun to address social processes in information systems delivery (ISD) and outlined how the proposed study would continue this focus by investigating social cognitive processes in requirements definition activities. In Chapter II, I now develop the theoretical basis for the research study, which draws primarily on two theoretical domains: social cognitive theory informs the analysis of frames of reference; and structuration theory (Giddens 1984) provides a meta-theoretical framework for theory development (Orlikowski 1992; Orlikowski and Robey 1991). The chapter is organized as follows. In Section A I review relevant IT research on social aspects of ISD. I outline the social cognitive concept of schema (i.e., frames of reference) and its application in the organizational studies literature and discuss Orlikowski and Gash's (1994) research on technological frames of reference in Section B. In Section C I describe key aspects of structuration theory and its application in IT research. I then summarize and integrate the insights and implications for the current research in Section D.

A. Conceptualizing requirements definition as a social process

Requirements for an information technology application are typically addressed in practice through a variety of tasks, methods, and techniques in the early phases of an IS development project. Much IT research has been devoted to assessing the effectiveness of various techniques or methods,¹ and to developing improved methods.² Such a research focus can be limited, however, by conceptualizing requirements definitions in terms of activities or tasks to be done rather than as social process. For example, in a study of how a structured analysis technique was applied in practice, Banseler and Bødker (1993) found that the methodology's depiction of requirements definition as a linear, rational process was of little value to designers and users engaged in ongoing negotiations over both problems and solutions. They concluded:

¹See for example, Alavi (1984); Byrd, Cossick and Zmud (1992); Hachathorn and Karimi (1988); Mahmood (1987); McKeen (1983); Munroe and Davis (1977); Necco, Gordon and Tsai (1987); Vessey and Conger (1994); Watson and Frolick (1973).
²See for example, Checkland (1978); DeMarko (1978); Kumar and Welke (1992) Liou and Chen (1993); Mantel and Teorey (1989); Martin (1990); Naumann and Davis (1980); Naumann and Jenkins (1982); Rockart (1979); Sakthevel and Moily (1993); Watson and Frolick (1992); Welke (1977, 1983); Wetherbe (1991); Zmud, Anthony and Stair (1993).
Our findings suggest that there is a gap between the way systems development is portrayed in the mainstream of scientific and technical literature and the way it is carried out in real life. This is not only the case for textbooks on proprietary methods ... but also pertains to much of the academic critique of these methods. One reason for this is that researchers attach too much importance to tools, methods and principles, and pay too little attention to the behavioral and social aspects associated with systems development (p. 190).

In a study of large-scale software development projects, Curtis, Krasner, and Iscoe (1988) found that changing requirements and communicating requirements effectively were two of the most frequently occurring problems, and they reached a similar conclusion:

Our interviews [with developers] indicated that developing large software systems must be treated, at least in part, as a learning, communication, and negotiation process ... These processes are poorly described in software process models that focus instead on how a software product evolves through a series of artifacts such as requirements, functional specifications, code, and so on. Existing software process models do not provide enough insights into actual development processes to guide research on software development technologies (pp. 1282, 1284).

Some IT researchers have contrasted the rational, technical aspects of ISD with social processes such as political conflict (Markus 1983; Robey and Markus 1984), power struggles (Franz and Robey 1984; Markus and Pfeffer 1984), and conflict resolution through interactions between developers and users (Newman and Nobel 1990; Robey and Farrow 1982; Robey, Farrow, and Franz 1989). Others have addressed learning and communication processes in requirements definition (Curtis, Krasner, and Iscoe 1988; Walz, Elam, and Curtis 1993). In all such research, the picture of requirements definition which emerges is one of ongoing negotiations among stakeholders with varying perspectives, goals, and knowledge. Bansler and Bødker (1993) described this process:

Problems are ill-defined more often than not. Objectives and goals are vague, changing, and often in conflict with one another. In most cases the design process is one of collective inquiry and search where several actors, in cooperation or conflict, define relevant problems and possible solutions -- doing so more or less simultaneously. Problems and ends can not be taken as givens, they are negotiated and clarified during the design process (p. 173).

IT requirements definition activities within an organizational context can also be conceptualized in terms of collaborative team work among organizational members who typically represent diverse functional areas, such as various business areas, technical development departments, and so on. In such work, diverse interpretations among team
members from different functional areas or "thought words" can be a barrier to successful collaboration (Dougherty 1992). This suggests that examination of social cognitive processes in IT requirements definition could provide insights into the social aspects of ISD and the problems and issues around requirements definition that typically occur in ISD.

Although a social cognitive prospective has not been systematically articulated in IT research (Orlikowski and Gash 1994), there has been a cognitive thread. In the following section, I discuss IT research and analysis which suggest the value of a social cognitive perspective in the study of requirements definition processes.

A.1 Social cognitive themes in IT research

In an early attempt to describe social cognitive processes in IT requirements definition and design, Malhotra, Thomas, Carroll, and Miller (1980) analyzed dialogues between developers and users and developed a model of their interactions. With this model they contrasted the assumption that users come to designers with pre-defined problems for which designers develop a design solution, with their interaction model, in which goal elaboration, solution identification, design generation, and design evaluation are both iterative and interrelated. This study illustrated how requirements, rather than existing a priori, are socially constructed through interactions between ISD participants. The model addressed the interaction context between designers and users as an isolated event, however, providing little insight on requirements definition processes in an organizational context.

Boland (1978) and Salaway (1987) also examined interactions between designers and users and found that the style or type of interaction influenced what requirements were identified, acknowledged, and legitimized. When designers acted as diagnosticians or problems solvers during interactions, their ideas and conceptualizations of the system requirements were dominant. When the sequence of and rules for interaction were altered to foster a more collaborative, joint problem-identification style of interaction, different requirements were identified. In Boland’s study, for example, the collaborative problem solving teams outlined IT requirements related to information sharing among nurses (the user group), whereas the designer-as-diagnostician groups focused on requirements for centralized control of materials and personnel. Boland and Greenberg’s (1988; 1992)

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3Research on designer / programmer's cognitive processes at the individual level is not directly applicable to the current study. See the June, 1995 issue of Communications of the ACM for examples of this type of research.
examined the influence of metaphors in requirements definition activities and suggested that language use in interactions, particularly use of metaphors, influenced designers' and decision makers' assumptions and expectations about IT requirements and IT use:

Our analysis suggests that language use and metaphors are actively involved in the construction of the organizational features that information system analysts take to be real, the problems they take as simply given, and the action choices they make based on these understandings (Boland and Greenberg 1992 p. 138).

The asymmetry of designers' influence and control over requirements definition compared to users' and the consequences of this asymmetry for IT design and use has been a recurring theme in IT research. Markus and Bjørn-Anderson (1987) posited that technical developers, through their knowledge of information technology and IT development, typically exert power and control in information systems delivery. Because technical developers tend to have simplified, control-oriented ideas about technology users (Dagwell and Weber 1983; Boland 1979), some IT researchers have found this to be problematic. Bostrom and Heinen (1977) were among the first IT researchers to highlight the influence of technical developers' implicit theories about people, organizations, and the change process and their focus on technical optimization in IT design, and to recommend adoption of socio-technical design methods. Boland (1979) argued that technical developers' particular orientation toward users and to analysis results in IT designs that assume a passive user and a need for mechanistic control (p. 260). Preston (1991) posited that the implications of such influence extend beyond the problem of poorly designed IT systems to how organization members can think about and define problems:

It is notable that MIS not only ignores the various modes of informing and the sense-making dimensions of information, but in a very real sense is involved in eliminating them. The emphasis and concern on the problem, problem-solving and the rationalist imperative to create structure, relegates social interactions, observations, and personal records to, or casts them as, idle gossip, a waste of time, unproductive, inefficient, a duplication of effort, inconsistent, uncoordinated, and possibly even dysfunctional (p. 65).

Hirschheim and Klein (1989) similarly contended that the assumptions and expectations IT developers hold about IT capabilities and IT use in organizations shape not only the design of an IT application but have implications for the social organization and control of work. They noted that in any application context, different assumptions, and thus different IT designs, are possible. Mason (1991), for example, suggested that war metaphors have dominated the discourse around strategic uses of information technology (e.g., IT as a
competitive weapon), limiting what strategic IT applications have been identified and how they have been applied. He posited that different strategic uses for IT might be identified using different metaphors.

To summarize, IT researchers have suggested that investigation of social processes in ISD is essential to understanding this complex organizational phenomenon. Researchers who have addressed social cognitive aspects of ISD have found that requirements for an IT application are negotiated and created in interaction, that the style of interaction and the language used influence what requirements are identified and legitimized, and that technical designers' assumptions and expectations about IT design and use are typically dominant in design decisions.

B. Building a social cognitive perspective in IT research

The conceptualization of requirements definition in ISD methodologies as a technically-oriented series of tasks and activities contrasts sharply with the view of requirements definition processes outlined. Orlikowski and Gash (1994) suggest that a social cognitive perspective in IT research offers a number of theoretical and practical insights into these social aspects of ISD processes and outcomes. They draw on social cognitive research on frames of reference, or cognitive structures that are shared among groups of individuals, to define the concept of technological frames of reference, which they propose as a focus of such research on IT development, implementation, and use. In the next section, I outline key aspects of and insights from research on the social cognitive concept of schema.\(^4\) I then review how this concept has been applied in organizational research. Finally, I discuss Orlikowski and Gash's (1994) research on technological frames of reference and related organizational studies of particular relevance to the current study.

B.1 The concept of schemas in social cognitive theory

As social psychology began to focus on social information processing, the concept of schemas as cognitive structures developed (Markus and Zajonc 1985). Drawing on early work on memory by Bartlett (1932), researchers examined the influence of schemas on perception and information processing, memory and information retrieval, and inference

\(^4\)Terms such as schema, frames, mental models, mental maps, scripts, interpretive schemes, and so on, are used by a variety of researchers in social psychology and organizational studies to represent related, overlapping concepts (Orlikowski and Gash 1994). In this research, I adopt Orlikowski and Gash's use of the term, frames of reference. In this discussion, however, I use the terminology representative of the research reviewed.
(Fiske and Taylor 1984; Markus and Zajonc 1985; Schneider 1991; Sherman 1989). Although the cognitive structures underlying the schema concept have proven difficult to specify (Markus and Zajonc 1985), a broad range of research provides a consensus on functional aspects of schemas and their influences on information processing and action:

i) *Function of schemas:* Schemas are defined as cognitive structures that represent organized knowledge about a concept or stimulus (Fiske and Taylor 1984; Markus and Zajonc 1985; Lord and Foti 1986). Schemas allow individuals to draw on knowledge and prior experience to make sense of the vast array of data available in any context, to simplify it by directing attention to certain aspects of the context, and thus to respond efficiently. Schemas influence perception and memory by reducing ambiguity in perceived information and enhancing recall of information. They may provide templates for problem solving and evaluation and thus influence inference.

ii) *Influence on information processing:* Schemas are presumed to both facilitate and constrain information processing and thus sensemaking. Schemas are functional in that they allow individuals to deal with vast amounts of data quickly and efficiently and to utilize prior experience and knowledge in interpretation (Ford and Foti 1986). Schemas distort information processing, however, by focusing attention on information consistent with the existing schema, by distorting inconsistent information, and by "filling gaps" in information with expectations consistent with the schemas (Fiske and Taylor 1984; Gioia 1986; Markus and Zajonc 1985; Ford and Foti 1986).

iii) *Types of schemas:* Research in a variety of subject areas suggests several types of schemas are typical, including self-schemas, person-schemas, role schemas, and scripts or action/event schemas (Abelson 1981; Fiske and Taylor 1984; Lord and Foti 1986).

iv) *Schema development and change:* Schemas tend to become more abstract, complex, and organized with experience. For example, experienced professionals have fewer, but more complex schemas (Lurigio and Carroll 1985). Once established, schemas do not change readily, and existing schemas may inhibit learning new schemas or schema change (Fiske and Taylor 1984; Ford and Foti 1986; Markus and Zajonc 1985). Schemas may change when inconsistent information cannot be integrated with existing frameworks, leading to new schemas or revised schemas (Fiske and Taylor 1984; Lord and Foti 1986).
Research in social psychology related to the schema concept has focused primarily on social information processing at the individual level. In the next section, I discuss how organizational researchers have applied the concept of schema and expanded it to address group and organization level phenomena, such as organizational learning and change.

B.2 Applications of social cognitive theory in organizational studies

Weick's (1979a, 1979b) description of organizations as bodies of thought and of thinking practices is illustrative of the importance many organizational researchers attribute to social cognitive processes in organizational research. Within this broad and extensive literature, there are several areas that are particularly relevant to the current study:

i) Social cognitive processes in managerial cognition: Several researchers, applying the concept of schema from social psychology, have addressed the influence of managerial cognition on managerial decision-making. Kiesler and Sproull (1982), for example, characterized ways in which managers' schemas affect their response to environmental change, and they identified problems which may arise when managers do not "notice" key events in the environment. Porac and Thomas (1990) illustrated how managers create simplified competitor models -- a mental taxonomy -- which influence perceptions of competitors as well as guide the organization's competitive response. Melone (1994) found that executives' experience-based expertise and roles influenced what information they attended to and how they interpreted events. Isabella (1988) found that career stage served as a frame for managers' interpretation of organizational change.

ii) Organizations as interpretive systems: Daft and Weick's (1984) definition of organizations as interpretive systems suggests that social cognitive processes could, and should, be studied at the organizational level:

The organization interpretation process is something more that what occurs by individuals ... Individuals come and go, but organizations preserve knowledge, behaviors, mental maps, norms, and values over time. The distinctive feature of organization level information activity is sharing (p. 285).

Researchers have posited that individuals within an organization share interpretive schemes (Bartunek 1984; Bartunek and Moch 1987; Harris 1994; Louis 1983; Smircich 1983) and that the visions or interpretations of executives tend to be dominant (Bartunek 1984; Daft and Weick 1984; Gioia et. al. 1994; Isabella 1990). For example, executives' interpretive
schemes mediate interpretation of the organization's environment and changes in the environment and thus the organizational response (Bartunek 1984; Daft and Weick 1984; Gioia et. al. 1994, Porac and Thomas 1990).

**iii) Interpretive schemes and organizational change:** For organizational change to occur, interpretive schemes must change or evolve (Bartunek 1984; Bartunek and Moch 1987; Bartunek, Lacey, and Wood 1992). Managers' or executives' interpretations of organizational change (Isabella 1990; Gioia et. al 1994) are critical, and managers can facilitate changes in interpretive schemes which support organizational change, for example, by manipulating organizational symbols (Gioia 1986; Gioia et. al 1994; Poole, Gioia, and Grey 1989).

**iv) Sharing and communicating interpretive schemes:** Symbols, created or manipulated by management, are an important medium for both sensemaking and influence, in particular, the metaphors, language and stories of powerful individuals (Dandridge 1983; Gioia et. al 1994; Martin and Powers 1983; Pondy 1983; Smircich 1983; Wilkins 1983). Actions as well as lack of action, for example, executive inaction, can be a powerful organizational symbol (Gioia 1986; Gioia et al. 1994). Use of such symbols is common also in the day-to-day interactions and problem-solving activities of organization members (Boje 1991; Brown and Duguid 1991).

To summarize, the concept of schemas as cognitive structures which influence social information processing has been applied in analyses of managerial interpretation and decision making, suggesting specific ways in which social cognitive processes may influence organizational outcomes through managers' interpretations. At the organizational level, the concept of interpretive schemes suggests that managers' interpretations are dominant, particularly in interpretation or enactment of the organization's environment and that changes in interpretive schemes are critical to organizational change. Symbols such as metaphors and stories are important not only in communicating and sharing interpretive schemes but also in changing them.

**B.3 Exploring the concept of technological frames of reference**

Orlikowski and Gash (1994) have suggested that understanding how key groups in organizations interpret information technology is critical to understanding how IT artifacts
are developed, used, and changed. They propose a social cognitive perspective on the study of IT development and use in organizations focused on the notion of *technological frames of reference*. They define technological frames as the assumptions, beliefs, and knowledge that organization members hold about the role of technology in their organization and posit that, although frames exist at the individual level, individuals within critical social groups tend to develop shared frames of reference that guide their interactions around technology and their understanding and use of technology. They suggest technical developers, users, and managers will tend to share their group's technological frames but that significant differences among groups' frames are likely.

Orlikowski and Gash define the notion of *congruence* in frames as alignment along key elements, that is, similarity in structure (common categories) and content (common values). They posit that when there is incongruence in the frames of key stakeholder groups, problems such as mis-aligned expectations, contradictory actions, resistance, skepticism, and poor appropriation of IT may result. This proposition has been supported by earlier IT research. Ginzberg (1981), for example, found that when users' understanding of an IT application differed from that held by designers and managers, their satisfaction with and use of the IT application was low. Orlikowski and Gash also suggest that technology frames tend to become institutionalized, leading to a kind of cognitive inertia which can inhibit adaptation to changing conditions.

Orlikowski and Gash (1994) presented the results of an empirical study of organizational adoption of a groupware product to illustrate the insights available from this social cognitive perspective. In the analysis, they identified three main dimensions of frames relevant in the study and found significant differences in managers' / users' and technologists' interpretations of the technology and in their expectations for its uses. Users appropriated the technology in a limited fashion, consistent with their interpretation of it as a personal productivity tool. This contrasted sharply with technologists' expectation that the IT product would "revolutionize" users' work practices and the organizational culture. Table II-1 summarizes their findings.

Because project teams composed of users and managers from multiple business areas and technical developers from an IS department often undertake IS development jointly, frame incongruence may be problematic during IT development activities, and these differences may influence ISD outcomes at the point of implementation and adoption. Dougherty's (1992) study of new product innovation in cross-functional development teams suggested that social cognitive differences are typical of such collaborative team
Table II-1

Key Findings in Orlikowski and Gash's (1994) Study of Technological Frames

work. Dougherty identified two types of interpretive schemes which influenced new product innovation by cross-functional development teams: departmental "thought worlds" and organizational routines. She defined departmental "thought worlds" as funds of knowledge available to members of various functional departments (research and development, product marketing, sales), which influence what members know about and how they understand product innovation. Because "thought worlds" differed between functional groups, each group emphasized different aspects of the process and understood the whole process in different ways. Organizational routines such as practices for inter-departmental relations, market-technology definition, and product standards (such as required payback periods) reinforced interpretive barriers in some cases and, in a few instances, facilitated collaborative efforts and lowered interpretive barriers.

Orlikowski and Gash (1994) suggest that differences in technological frames among key stakeholder groups may explain a range of organizational outcomes related to technology implementation, such as difficulties and conflicts around developing, implementing, and using technology, and posit that the extent of difficulty should correlate with the extent of incongruence in frames. They note that further research will be needed to assess the extent of frame difference, in structure or in content, that constitutes frame incongruence and to elaborate the different organizational consequences of varying degrees of frame incongruence. Two organizational research studies provide insight into these
questions of frame incongruence. Walsh, Henderson, and Deighton (1988) identified two structural properties of group-level schema or frames: potential coverage, i.e., the breadth of content (i.e., the categories or dimensions) when all individuals' frames are aggregated, and potential consensus, i.e., the extent to which individuals share content in a given category or dimension. They defined a negotiated belief structure as the realized coverage and realized consensus in the group-level frame when patterns of influence and domination are considered in decision-making processes. Drawing on Hogarth (1980)'s concept of a veridical belief structure as one which accurately captures the environment, they posited that through assumption surfacing and dialectical inquiry, groups with high realized coverage (breadth in content) and low consensus (diverse content) would perform better on decision-making tasks. They found, to the contrary, that groups with low realized coverage and high realized consensus performed better in the experimental decision-making task. They concluded that in the well-defined experimental decision-making task assigned, a group's ability to quickly agree on a strategy and focus their actions increased their effectiveness but suggested that their original hypothesis might hold in situations when the problem was ill-defined.

Fiol (1994) offered a similar perspective on intra-group frame structure and processes. She defined the content of a group's frame of reference as the labels or symbols used to classify ideas and topics. the structure, or framing of communications, as the ways individuals construct their arguments, regardless of the content, for example the breadth of issues considered and the rigidity or fixedness of framing, and consensus as the level of collective agreement in content or framing. Fiol rejected the notion that consensus in both dimensions is needed for coordinated action and collaboration and posited that, when groups agree on framing of communications but not on content, organizational learning is facilitated. She presented data from a longitudinal study of new product development to illustrate how lack of consensus in content and framing of communications initially resulted in conflict and stalemate, but, over time, the group recast the problem in a broader, more comprehensive framework in which diverse ideas were accommodated. This led to eventual agreement on the product concept, a new frame for understanding the project innovation, and, she posited, organizational learning by the managers involved.

To summarize these findings, Orlikowski and Gash (1994) have suggested that the concept of technological frames of reference be applied as a focus of investigations of social cognitive processes in IT development, implementation, and use. They posit that although frames are individually held, members of critical social groups will share frames,
that frame differences are likely to exist among groups, and that frame differences may have unintended and undesirable consequences for ISD outcomes. Walsh, Henderson, and Deighton (1988) and Fiol (1994) suggest that incongruence is not necessarily detrimental and may even be desirable, if differences are surfaced and acknowledged and the group's frame of reference expanded as a result.

Although I am focusing on a social cognitive perspective in this research, it is clear that other social processes influence requirements definition and ISD outcomes, for example, political and power struggles. I have found structuration theory valuable to situate the social cognitive analysis within a comprehensive social meta-theory which encompasses these and other critical social processes. In Section C, I discuss structuration theory and in Section D, I describe how I have integrated these two theoretical foundations.

C. Structuration theory: a meta-theoretic framework for theory development in IT research

In this research, I draw on the ontological assumptions of structuration theory to orient and guide the development of empirical theory related to social cognitive processes in requirements definition. In the following sections, I briefly outline key aspects of structuration theory and discuss how it has been applied in IT research.

C.1 Key ontological assumptions of structuration theory

Gidden's main goal in his development of structuration theory is to provide an ontology of human agency and social institutions which reconciles theories of action and theories of social collectivities in a unified social theory (Giddens 1984; Cohen 1987, 1989). Structuration theory integrates consideration of human agency and of structure through the concept of the duality of structure. To arrive at this concept, however, Giddens first specifies a number of ontological assumptions [emphasis indicates Giddens' key terms]:

i) Human actors: Giddens posits that human beings are knowledgeable agents, possessing both practical, or tacit, knowledge, and discursive, or articulated, knowledge. He does not draw a strict line between these types of knowledge, characterizing the difference as "what

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can be said and what is characteristically simply done" (p. 7). Human actors rationalize and reflexively monitor their action by drawing on mutual stocks of knowledge which they share with other social actors about appropriate action or behavior in a given context. Thus, he maintains, "To be a human being is to be a purposive agent, who both has reasons for his or her activities and is able, if asked, to elaborate discursively upon those reasons (including lying about them)" (p. 3).

**ii) Human agency:** Giddens specifies agency simply as the capability of acting, of "making a difference" in the flow of events or of acting differently at any phase in a given sequence (p. 9). He therefore rules out deterministic influences on action, although he acknowledges and elaborates contextual and structural constraints on action. Giddens also separates agency from intention, that is, between intentional acts and the unintended consequences of action, noting "I am the author of many things I do not intend to do, and may not want to bring about, but nonetheless do" (p. 9).

**iii) Power:** Giddens defines power broadly as transformative capacity which human agents exercise through resources and, more narrowly, as control, which arises from actors' asymmetrical access to resources. He maintains that, in all situations in which less powerful actors are dependent on more powerful actors, they maintain some access to resources, however limited, which affords a degree of autonomy, which he then terms the dialectic of control.

**iv) Structure:** Giddens defines structure as rules and resources which social actors draw on, across time and space, in their social practices. Rules are like generalizable procedures which apply over a range of contexts and occasions and that both constitute, or give meaning to what is ordered, and sanction modes of social conduct (p. 20). Giddens specifies two types of resources: allocative (related to raw materials, means of production, goods) and authoritative (temporal / spatial, organizational / relational, self-development / self-expression). Structure exists only as it is instantiated in practice and in memory traces of knowledgeable human agents (p. 17). A hierarchy of structures can be conceived, however, which includes structural principles, or the deeply embedded structural properties of social totalities (e.g., capitalism as an economic system), and institutions, i.e., structural principles with the greatest time-space extension (p. 17).
v) **Social systems:** Social practices are the actions, interactions and activities of knowledgeable human agents. Structures bind together social practices in *social systems*, which may be understood as reproduced social practices. Giddens notes that systems do not have structures but rather exhibit structural properties which "make it possible for discernibly similar social practices to exist across varying spans of time and space and which lend them 'systemic' form" (p. 17). *Structuration* is then the production and reproduction of social systems by knowledgeable, situated actors, who draw upon rules and resources (structure) in their actions and interactions (p. 25).

vi) **Duality of Structure:** Giddens defines the notion of the *duality of structure* by commenting that "the structural properties of social systems are both medium and outcome of the practices they recursively organize" (p. 25). That is, structure exists only as it is instantiated in practice (i.e., is the outcome of action), yet structure shapes and guides, enables and constrains, practice (i.e., is the medium for action). Structures that have emerged in the past shape, but do not determine, ongoing action. In each instance in which human actors reproduce a social practice or social system, they enact the structural properties which the practice exhibits. By choosing to act differently, human actors may choose not to enact structural properties, and if new practices are sustained and routinized, change in structural properties occur.

vii) **Modalities of structuration:** Giddens identifies three dimensions of structure (*signification, domination, and legitimization*), three corresponding 'modalities' of structuration (*interpretive schemes, facility, norms*) which actors draw on in their reproduction of systems in interaction, and three aspects of interactions (*communication of meaning, power, and sanction*), but he notes that these aspects are interrelated and separable only in analysis. Figure II-1 contains Giddens depiction of these relationships.

*Interpretive schemes* are the stocks of knowledge which actors draw on to communicate meaning and which represent the structures of signification, or rules that define and organize interaction. *Facilities or resources* are the means through which actors exert power in the broad sense (transformative capacity) and control in interactions, and thus represent structures of domination, or asymmetry of resources. *Norms* are codes for legitimate action that actors draw on in interaction to sanction behaviors and thus represent
structures of legitimization, or normative control. Giddens does not order these dimensions of structure or modalities of structuration in terms of effect or influence.

![Diagram of Giddens' Forms of Institutions](image)

**Figure II-1: Gidden's Forms of Institutions in The Constitution of Society, p. 29**

This brief summary of key aspects of structuration theory does not, of course, do justice to the breadth, complexity, or interrelatedness of Gidden's concepts and omits some concepts that are not of immediate salience to the current research. It does, however, outline the key ontological assumptions on which this research is based. In the next section, I discuss the relevance of these assumptions for IT research.

### C.2 Applying structuration theory in IT research

Structuration theory (Giddens 1984) provides an account of the generic processes of social life but does not propose substantive or 'grand' theory (Cohen 1989 p. 1). Rather, structuration theory provides ontological resources for development of empirically oriented theories (Cohen 1989, p. 2). Orlikowski and Robey (1991) have suggested that structuration theory provides such a meta-theoretic framework to inform the study of information technology development and the outcomes of IT implementation in

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6For example, Giddens specifies the basis of routinization of social practices as the unconscious need for ontological security. He also cites the importance of social integration (social practices in face-to-face encounters) and system integration (social practices for interactions which are not co-present). While such concepts are important in Gidden's specification of a comprehensive social theory, they do not bear directly on the focus of this research.
organizations, one which overcomes the schism between objective and subjective approaches to research. Information systems delivery can be understood in terms of the process of structuration, that is, as the production and reproduction of social systems related to IT development by knowledgeable actors (ISD participants), who draw upon rules and resources (structure) in their actions and interactions. For example, systems development methodologies exhibit structural properties of signification in their recommended practices, procedures, terminology, and so on. ISD participants instantiate these structural properties as they draw on interpretive schemes in their actions and interactions to communicate meaning, for example, to make sense of events and to plan and carry out ISD activities. Knowledge and understanding of such methodologies is an authoritative resource -- a structure of domination -- which developers may draw on to establish their power and control over ISD activities. Such methodologies also exhibit properties of normative control (structures of legitimization) because, through their application and use, certain behaviors and interactions are sanctioned in ISD activities. These structures are instantiated only in human action, however, when ISD participants carry out the social practices and actions implied in methodologies. Thus, the structural properties exhibited in the social practices and systems described by ISD methodologies are both the medium and outcome of human action. Orlikowski and Robey (1991) outline a comprehensive framework for investigating the interaction of human actors and social structure during ISD based on structuration theory (p. 159) and suggest that various facets of structuration, singularly or in combination, may be the focus of a particular research study.

Orlikowski (1992) draws on structuration theory to reconceptualize the technology concept in organizations and thus to overcome the schism between structural and social construction views of technology. She posits the duality of technology in a similar manner to Giddens's duality of structure, that is, that technology is both an outcome and medium for human action. Technology is the product of human action, because it is physically constructed through the actions of designers / developers and socially constructed through the actions of users who interpret and appropriate the technology (p. 406). Technology also exhibits structural features, however, because it has embedded structures of signification (interpretive schemes), domination (access to resources), and legitimization (norms). Once implemented, technology tends to become reified and institutionalized and thus it becomes the medium of human action. Orlikowski notes that the dual nature of technology is frequently masked by the separation in time between its construction and its
use. That is, when technology is examined during its design and development, human agency in decisions and actions is apparent, while the structural features of technology may be most apparent during use.

Orlikowski identifies two iterative modes of human interaction with technology: the design mode and the use mode (see Figure II-2) and defines the notion of interpretive flexibility to designate "the degree to which users of the technology are engaged in its constitution (physically and/or socially) during development or use" (p. 409).

![Diagram](image)

**Figure II-2: Orlikowski's (1992) Structurational Model of Technology:**
(adapted)

1. Technology is physically constructed through human agency in design and development.
2. Human agents draw on institutional properties as they develop technology.
3. Technology is socially constructed through human agency in appropriation and use.
4. Technology enables and constrains human action during appropriation and use.
5. Human agents draw on institutional properties as they use technology.
6. Human agents enact existing institutional properties or change them through their ongoing use of technology.

Orlikowski and Robey (1991) and Orlikowski (1992) propose that structuration theory can serve as a broad theoretical basis to address the interactions of human agents, organizational structures, and information technology, although individual studies may focus on particular aspects of the structuration process. This has been the case with the growing body of research on technology development and implementation which has utilized structuration theory. Barley (1986), for instance, focused on structural change resulting from technology implementation, while Douzou and Légaré (1994) found that technology deployment tended to reinforce existing social practices and institutions (lines 4, 5, and 6 in Figure II-2). DeSanctis and Poole (1994) addressed the interpretive flexibility of IT during appropriation and use (lines 3 and 4 in Figure II-2) in their articulation of adaptive structuration theory, and other IT researchers have applied adaptive structuration
theory in studies of cooperative work group technology (Miranda and Bostrom 1993; Nagasundaram and Bostrom 1994). Korpela (1994) drew on structuration theory to examine the interplay between institutionalized practices and adoption of an IT application (lines 3 and 5 in Figure II). In this research study, I utilize structuration theory in the analysis of the physical and social construction of IT in the design mode (lines 1 and 2 in Figure II-2).

D. Summary and integration of implications for the current research

In the structurational meta-theory, technological frames of reference can be conceptualized as interpretive schemes related to IT development, implementation, or use in an organizational context. That is, technological frames are stocks of knowledge which organization members draw on to communicate meaning in their actions and interactions around IT development, implementation, and use. As interpretive schemes, they "map our experience of the world, identifying its constituents and relevances and how we are to know and understand them ... [they] reveal deep-seated bases of orientation which operate in every encounter in organizations as shared assumptions about the way to approach and proceed in the situation" (Ranson et. al. 1980, p. 5). Examination of technological frames may reveal how organization members individually understand information technology, and, to the extent that frames reflect shared knowledge and assumptions, how they jointly interpret technology and its uses in the organizational world.

Technological frames are both articulated (discursive) and tacit (practical). Tacit knowledge of routine social practices is particularly influential in action: "Interpretive schemes typically are taken for granted by organizational members: the assumptive frames which shape their agency usually remain unarticulated in the routine of action. Yet this does not preclude the possibility in principle that members are able to unravel, sometimes at length, the reasons that lie behind their immediate purposes and intentions" (Ranson et. al. 1980, p. 6). This suggests that ISD participants tacitly draw on their technological frames in ISD activities but that, when questioned or when unusual situations disrupt routine practice, they can articulate a rationale for their actions.

Technological frames embody structural properties of signification, that is, the rules and resources which define and organize activities and which enable social practices for ISD and IT use to endure over time and space. Thus, examination of technological frames may reveal structural properties related to IT development and use. Although technological frames are cognitive, and may be addressed separately for analytical purposes, they are
interrelated with resources (and thus structures of domination) and norms (and thus structures of legitimization): "The more explicit and reflective process of formulating structural scaffolds, of formally implementing structures of roles, rules, and authority relations, typically draws upon the more immediately accessible values of the frame to underpin and legitimize its task" (Ranson et al 1980, p. 6). Examination of technological frames may reveal structural properties of domination and legitimization that underlie social practices for ISD.

Technological frames may be shared among members of a group or even throughout the organization, however, structuration theory does not require consensus. On the contrary, both internal contradictions within social systems and contradictions across social systems are likely, although the frames of powerful organization members are likely to be dominant (Ranson et al 1980). Examination of technological frames of key groups or constituencies in ISD may reveal contradictory frames and suggest problematic social practices. As discussed earlier, IT researchers have noted the dominance of technical developers' interpretations of IT in ISD activities, despite the rhetoric of user involvement.

By conceptualizing technological frames as interpretive schemes, structuration theory can inform the development of a substantive process theory of the influence of frames on ISD participants' actions and interactions in requirements definition activities. Figure II-3 illustrates the general characteristics of such a process model. In this model, ISD participants draw on technological frames to interpret actions and events, to communicate meaning, and to plan and take action (lines at (1) in Figure II-3). Technological frames embody the rules and resources which define and organize social practices for requirements definition. When ISD participants draw on frames to enact routine social practices, they instantiate these structural properties in the process of structuration (lines at (2) in Figure II-3). Although structuration theory rules out determinant influences on action, it specifies both a facilitative and constraining influence of structure on human agency and suggests that routine reproduction of social systems is typical.

Changes in social practices and systems may occur, however, when routine enactment produces unintended consequences which alter the context of practice (Macintosh and Scapens 1990, p. 459), when environmental constraints, shaped by and interpreted through organizational members' interpretive schemes, necessitate an organizational response (Ranson et al 1980, p. 13), when organizational uncertainty undermines dominant coalitions and new interpretive schemes emerge (Ranson et al 1980,
p. 13), when human actors, drawing on multiple sources of rules and resources which may be inconsistent or in conflict, chose to "act differently" (Whittington 1992), and so on (lines at (3) in Figure II-3). When ISD participants routinize new social practices, changes in underlying structural properties may occur as new rules and resources for ISD become institutionalized (lines at (4) in Figure II-3). This is consistent with the ontological assumption of structuration theory that human agency is not determined, thus outcomes of events are always to some extent indeterminate (Orlikowski and Robey 1991).

![Diagram of Structuration Model](image)

**Figure II-3**  
Structural Model of the Influence of Technological Frames

In Chapter VI, I elaborate this general structurational model using empirical data collected in the field study of two ongoing ISD projects to develop the *framing* model for requirements definition.

To summarize, in the proposed research study, I adopt a social cognitive perspective focused on the concept of technological frames of reference to examine requirements definition processes in ISD. I draw on the ontological assumptions of structuration theory to situate the social cognitive analysis in a meta-theoretic framework which integrates agency and structure and which addresses not only structures of signification, but also of domination and legitimacy. In the next chapter, I discuss how I have applied this theoretical foundation in my research strategy and design.
Chapter III
Research Strategy and Design

In Chapter II, I discussed the theoretical foundations and motivations for this research. In this chapter, I describe the research strategy and design. The chapter is organized as follows: In Section A I outline the specific research questions addressed in this study. In Section B I discuss the research approach and describes the research site. I provide a detailed explanation of the methodology, including data collection and analysis techniques in Section C. I conclude the chapter in Section D with a discussion of assumptions and limitations of the research strategy and design.

A. Research Questions

Given the theoretical orientation discussed in Chapter II, I defined four areas of research interest and focus. First, I examined the technological frames of reference which influence key ISD participants as they defined IT requirements, identified and described frame dimensions, and assessed the extent to which frames were shared among key individuals or key groups. Second, I investigated how technological frames of reference guided the interpretations, actions and interactions of key ISD participants during requirements definition activities, whether frames of reference of individuals or groups changed as a result of their interactions in ISD activities, and if so, in what ways, to what extent and through what kinds of mechanisms. A related area of interest was how artifacts such as technical systems documentation and project documents mediated participants' interpretations, actions, and interactions during ISD activities. I then considered how to describe the social cognitive processes which influenced the evolution of an ISD project and the IT artifacts produced. Of particular interest was whether technological frames of reference mediated the effects of contextual change on project direction and, if so, in what ways. Finally, I investigated how technological frames of reference, through their influence on the actions and interactions of ISD participants, affected ISD outcomes, particularly how their influence was manifested in the proposed design of the information technology artifact.
B. Research Strategy

I conducted a longitudinal, in-depth, qualitative field study of on-going ISD processes in one organization. This approach reflected both the goals and interests of the researcher and the nature of the research problem. A social cognitive perspective in IT research has not been systematically developed nor articulated (Orlikowski and Gash 1994). Therefore, there was little theoretical or empirical work on social cognitive processes in IS development on which to build. In this situation, exploratory research utilizing in-depth case studies was appropriate (Yin 1989) to facilitate theory building (Eisenhardt 1989; Glaser and Strauss 1967; Martin and Turner 1986; Strauss 1987, Yin 1989). Inductive concepts generated through such analysis was then combined with insights from formal theory (social cognitive theory; structuration theory) to extend generalization from the case study to theoretical concepts (Glaser and Strauss 1967; Yin 1989). The nature of the phenomena of interest (frames of reference) suggested that a qualitative study would be efficacious for collection of data on language use and interpretation in specific contextual settings (Moch and Fields 1985). A longitudinal design allowed for observation and analysis of change as it unfolded (Leonard-Barton 1990; Pettigrew 1990; Barley 1990).

B.1 Research site selection factors

Given the research questions and research approach, I considered several criteria important in selecting a research site. First, to examine the influence of technological frames on interactions during IT requirements definition activities and observe changes in frames over time, I needed a site with one or more IS development projects underway during the time of the field study. Since I was interested in the influence of frames on interactions between technical developers and users during requirements definition activities, I wanted a site undertaking in-house IS development rather than commercial software development.\footnote{There is usually a significant time lapse between definition/design and adoption/use in commercial software development, and the relationship between developers and users is different than in in-house development. Therefore, this context would not have been appropriate for my study. Assessing frame differences in this context would, however, be an interesting future research area.} Industrial sector or geographic location were not of theoretical importance and therefore I did not considered these criteria in site selection. Finally, I considered the site's willingness to accept an academic researcher over an extended period of time and to allow employees time to participate in data collection activities (interviews, observation, informal interactions) an important criterion in site selection.
Having selected a site, I envisioned the ideal type of project for my study as one in the requirements identification/definition phase of ISD at the time my field work commenced but scheduled for completion within a year, with extensive user involvement in ISD activities. I also wanted a project involving development of an IT application for business-area personnel, rather than system software for technical developers (e.g., operating system, data base management system, etc.). This would enable me to gather data on users' frames and on interactions between technical developers and users. Other project or technology features were not of theoretical interest and therefore I did not consider them in selection of the projects for study.

There were many research sites that could have satisfied these research criteria. I was referred to Group Health, Incorporated (GHI) through a fellow researcher. I negotiated access to the site with an executive contact and identified an apparently suitable project, the Business Information System (BIS) project. Not surprisingly, all things did not progress at the research site as I had hoped, but I was able to adjust plans to minimize problems with the research strategy. For example, after commencing field work I learned that a major requirements determination study for the BIS project had been completed shortly before my field work began. However, I had access to extensive documentation that provided a wealth of useful data, such as transcriptions of requirements interviews the project team had conducted. Due to various events in this project and at the research site, detailed requirements and design activities were delayed, as was the scheduled implementation of the IT application. As a result, the designer/user interactions which I had expected to observed did not take place. On the other hand, the team's reconsidered of project requirements over the next months proved to be an unanticipated, yet interesting, phenomenon, and I therefore decided to continue observation of this project. I did, however, add a second ISD project, the INFOSYS project, to my study. This project team had implemented several pilots and was addressing requirements for future development phases during the time of my field study. In this way, I increased my access to a group of users who experience with the IT application. By adapting to the contingencies of the research site by adding a second project, I was also able to compare and contrast the cases, adding to the generalizability of findings (Leonard-Barton 1990; Yin 1989).

B.2 Research site description

Group Health, Inc. (GHI) is a non-profit health care insurance company in the eastern United States. At the time of my study, there were approximately 6,000 employees located
at headquarters and in distributed sales, customer service, and health care service locations.

Fifteen years ago, GHI was the largest health care insurance carrier in the region, providing insurance to individuals directly or to groups through their employers, as is common practice in the U.S. GHI had little effective competition at that time and was frequently characterized as bureaucratic and inefficient. Market conditions changed, however, as membership in Health Maintenance Organizations (HMO) grew and as other insurance companies developed or expanded health care product offerings. By the early 1990's, GHI's market share had dropped significantly from its historic high, although it was still the largest single provider in the region.

Changes in competition reflected significant changes in the health care insurance market in the United States. Health care as a percent of GNP in the U.S. has grown significantly, which has attracted competitors. Escalating costs of health care and of health insurance premiums, however, have brought scrutiny from U.S. employers, who pay for or share the cost of insurance with employees. Employers, seeking ways to reduce their cost, have fostered competition among health insurance carriers, have in some cases moved to self-insurance, and have demanded that insurance carriers provide extensive information on insurance claims experience, utilization, cost efficiency, and so on. During the time of my field study, there was also a major debate in the U.S. over governmental regulation and intervention in the health care insurance market, President Clinton's National Health Care Reform (NHCR) proposal.2

Executives and managers at GHI responded to these changes in a number of ways: i) new product lines focused on the HMO concept were developed and implemented; ii) cost reduction and cost containment were major concerns, and several restructurings and staff reductions were implemented; iii) interest in sales and marketing increased; and, iv) GHI executives redefined the mission or strategy of the organization from being a health insurance provider to being a health services provider, and began to implement this strategy through acquisition of HMOs and health care delivery organizations.

The history of IS at GHI is both interesting and relevant to the research study. In the early 1990s, the IS department at GHI comprised about 10% of all GHI employees. An executive characterized the department at that time as "a large utility," which was largely mainframe-based with disparate, ineffective transaction processing systems, dependent on vendors and purchased software, and with no coherent communications network in place.

2Table 1 in Appendix B summarizes key events at GHI which influenced the projects studied during the time period analyzed in this study.
During the late 1980's and early 1990's, GHI undertook a number of major IS development projects to replace out-of-date transaction processing systems and to build management information and analysis systems. These systems were to have improved GHI's operating efficiency and customer service and to have provided managers and customers with access to data for analysis. The projects, referred to jointly as the MIS Initiative, failed, resulting in many tens of millions of dollars of loss as well as public and governmental scrutiny of GHI's financial situation. To address the financial issues, rapidly update the skill base of the IS organization, and gain access to a proven platform of health insurance transaction processing systems, GHI executives decided to outsource the entire IS operations and development functions to a IT vendor, Information Systems, Inc. (ISI) in early 1992. IS personnel were transferred to ISI, Inc, with the exception of a small internal staff of business analysts, and projects related to the MIS initiative were scrapped. Over the next two years, major transaction processing systems were converted to the ISI platform. This process was still underway at the time my field study began.

B.3 Description of projects studied

During my field study, I collected data on two ongoing ISD projects: the Business Information System (BIS) project and the INFOSYS project. As can be seen in Table III-2, the two projects were were similar in many ways. Both projects involved building a relational data base to "warehouse" data from transaction processing systems in order to make current and historical data available to end-users for analytic reporting. A key technological feature of both applications was to include a user-friendly, "point-and-click" user interface. The technical platform of both projects utilized client-server design approaches, that is, the user interface operated on a workstation / personal computer, whereas the relational database resided on a larger, shared computer. Both the BIS and INFOSYS projects also had a long history of what one informant characterized as "fits and starts." Tables 2 and 3 in Appendix B contain event history charts describing key activities and events that occurred in each project during the time period of analysis.

Both projects were managed by liaison personnel who held staff positions in business functional areas. These individuals worked with technical developers in ISI, Inc. and other IS groups to plan for development and to implement the technology. Tables IV-1 and IV-2 in Chapter IV describe the roles and responsibilities of these key project participants.
<table>
<thead>
<tr>
<th>IT Application</th>
<th>BIS Project</th>
<th>INFOSYS Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>marketing data warehouse</td>
<td>• marketing data warehouse</td>
<td>• medical claims data warehouse</td>
</tr>
<tr>
<td>user-friendly interface</td>
<td>• user-friendly interface</td>
<td>• user-friendly interface</td>
</tr>
<tr>
<td>query tools for ad-hoc reporting</td>
<td>• query tools for ad-hoc reporting</td>
<td>• standard reports and ad-hoc reports through</td>
</tr>
<tr>
<td>notebook computers for sales force automation</td>
<td>• notebook computers for sales force automation</td>
<td>the interface for ad-hoc reporting</td>
</tr>
<tr>
<td>ISD Approach</td>
<td>• purchased software tools for sales force automation</td>
<td>• purchased proprietary software package for database, interface</td>
</tr>
<tr>
<td></td>
<td>• custom-developed warehouse and interface if no packages found</td>
<td>• in-house construction of data extract routines</td>
</tr>
<tr>
<td>IT Platform</td>
<td>Client-server: Informix database on Unix system; Windows as workstation operating system</td>
<td>Client-server: OS/2 workstation operating system, IBM mainframe for DB2 database</td>
</tr>
<tr>
<td>Target user groups</td>
<td>• Sales representatives and managers; administrative support to sales personnel</td>
<td>• Health care analysts</td>
</tr>
<tr>
<td></td>
<td>• General management, product management</td>
<td>• Account reporting analysts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Medical management managerial personnel</td>
</tr>
<tr>
<td>Project Duration / Cost</td>
<td>3+ years of studies, pilostr admx. $500K spent; over $500K to completion</td>
<td>4+ years of development and implementation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>over $3.5MM+ spent, $1MM to complete.</td>
</tr>
</tbody>
</table>

**Table III-1: Key features of ISD projects studied**

During the time period analyzed (30 months), GHI reorganized business functional areas and shifted personnel several times. Figure III-1(a) depicts the organizational position of key project participants during my initial onsite study. Figure III-1 (b) depicts their organizational position after a critical reorganization in which Executive VP of Sales Sam Brady moved into a subsidiary organization, a new CIO, Tony Foley, was appointed, and the GHI staff managing the BIS project were transferred into the CIO’s organization.

**B.4 Researcher role**

A fellow researcher referred me to a contact at Group Health, Incorporated (GHI), Executive Vice President Sam Brady. I had an initial meeting with Mr. Brady to discuss the goals of my research and to determine if GHI would be a suitable research site. At this meeting, Mr. Brady indicated that he would support my research and suggested the Business Information System (BIS) project as suitable for study. I subsequently met with personnel in charge of the project to explain the research study and methods and to ascertain their willingness to participate. I found them to be both interested and accommodating. For example, project sponsor Leslie Thomas made desk space available.
Figure III-1 (a): Organization Chart for Key Project Participants

Figure III-1 (b): Organization Chart for Key Project Participants after the reorganization
to me in her department. I decided to begin exploratory field work immediately and began to visit the site on a regular basis.

At my initial meeting with Mr. Brady, he mentioned that he would be interested in an outsider's views on IS development in the organization, since the outsourcing agreement was relatively new and no new development projects had yet been completed. He made no specific requests for information, consultation, or assistance, however, and did not appear to expect me to act as a consultant or change agent. After three months of field work, my advisor and I met with Mr. Brady and Ms. Thomas to review the research goals and my role in the organization. At this time, Mr. Brady again stated only a general interest in my "impressions about this place." Given this understanding of my research, I believed I was not expected, nor did I have authority, to attempt any interventions based on my observation of problems or issues in the projects studied.

My intention, then, was to act as an impartial observer, and I soon realized that, in order to gain the trust and confidence of project personnel, it would be important to maintain this role in the project. Because Mr. Brady was their manager, and it was he who had authorized my research, it was important that informants feel comfortable that I would not report back to him what they said or did. Although project personnel were generous in their time and appeared to be forthcoming in the information they provided, their comments and actions at times suggested to me that this was of concern to them. In addition, when I began to observe the INFOSYS project, one informant told me that I could be viewed with suspicion because the newly appointed CIO, who was not an INFOSYS project supporter, had officially endorsed my study. Thus, I believed it was imperative to distance myself and my study from GHI management to reduce the impression that I was conducting a management evaluation.

During the field study, there were many instances in which I had to consider the practical implications of this role for my response to particular situations, and several experiences heightened my awareness of the delicacy of my role as a researcher versus a management consultant. For example, at the end of one interview with Mr. Brady, he asked about my overall impressions of the ISD process, and I cited an example of apparently poor communication that I assumed he had knowledge of. I quickly realized he was not aware of this issue, and that it could be viewed as a criticism of project personnel. In other instances, I became aware of information in the course of my observations that might be of value to project personnel. In these cases, I considered whether I could be helpful by acting simply as a conduit for information without jeopardizing my role as an
impartial observer or compromising the confidentiality I had promised informants. On one occasion, I related the gist of a conversation that I had observed in a meeting to someone who arrived late, with the qualification that the person follow up my information with other team members who had attended the meeting. In this situation I decided that passing on the information was generally helpful but could not have negative consequences for informants or jeoparize my role. Other situations were more problematic. Project personnel were aware of my professional background in ISD and, on several occasions, asked my professional opinion on specific project-related issues, for example, did I agree that the ISI estimates for project completion were excessively high? Because I realized that the questions were usually politically charged, I treated such inquiries cautiously. I did, however, offer very general professional advice on a few instances (e.g., what typically is the role of a user project sponsor?) and attempted to be helpful in nonconsultive ways (e.g., helping put together packages of materials, running errands, etc.). As tensions among project personnel mounted during my time onsite, I found some individuals would talk about problems with me. These individuals told me that they felt free to "unload," because I was not involved in their political struggles and they trusted me to keep their comments in confidence. On such occasions, I attempted to be sympathetic yet noncommittal and nonjudgemental of anyone's actions.

To summarize, my intention was to act as an impartial observer and I believe I was successful at maintaining that role overall. By agreement with GHI management and study participants, I would provide only general feedback about the research findings after the analysis was complete but would not act as a change agent or consultant during the course of my study. Because all of my key informants left GHI, Inc. for new jobs shortly after my on-site field study ended, however, this feedback session did not occur.

C. Research Design and Methods

In the following sections, I discuss the rationale for selection of data collection methods and describe techniques used. I then discuss analytic methods and procedures.

C.1 Data Collection

Orlikowski and Gash (1994) define technological frames as the assumptions, knowledge, and expectations people have about technology. They note that frames are often taken-for-
granted or implicit and their salience varies across context. Asking informants to articulate their frames in response to questions such as, "What are your underlying assumptions about this IT application?" is therefore unlikely to be effective. Even if informants could surface some of their underlying knowledge, assumptions, and expectations through guided self-reflection, they might not reveal them accurately to a researcher, for example, withholding socially undesirable frames or espousing normative assumptions. Instead, Moch and Fields (1985) suggest that, since individuals employ frames\(^3\) when they produce speech or written materials, it should be possible to work back from these materials to identify and describe relevant frames. They recommend that attention be paid to language use, with close examination of metaphors, tropes, and figures of speech and of the specific context of the interaction. Decisions about data sources and data collection techniques thus centered on how to collect data on language use in contexts that might reveal underlying technological frames and how to sample data, given the volume of potentially interesting data.

### C.1.a Data sources and collection techniques

I considered three types of sources to be most useful: i) interviews in which informants reflected on the project, IT application, ISD activities, and so on; ii) interactions among project participants that occurred naturally in the project; and, iii) written documents which project participants created. Each source had different benefits and limitations. In interviews, informants' reflected on their own and others' actions. This provided data on events and incidents that had happened in the project's history and informants' interpretation of events. However, there were several disadvantages with interviews. Informants appeared to be forthcoming, but they may have edited their responses for various reasons. Although the flow of discussion could be steered to cover topics of interest to the researcher, directing the conversation may have elicited responses or frames that were not salient to the informant in his or her day-to-day activities. Collecting observational data on interactions helped to address these problems because informants were engaged in their routine tasks and activities and thus naturally drew on salient frames. Observational data also provided insights into joint sensemaking among ISD participants in their interactions. A disadvantage of observational data was that not all interactions were

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\(^{3}\)Moch and Fields (1985) use the term interpretive schema, which is similar to the concept of "frame of reference."
observed (due to the researcher's time limitations and limits set by project participants), and therefore data on some critical incidents could not be collected. These incidents could, however, be related and interpreted by informants in interviews or informal discussions. Thus, observational and interview data together created a more complete picture of what had happened in the projects and what sense project participants made of events, which then revealed a more extensive array of salient frames. Written communications, including memos, hand-written notes, and official project or system documents, added further evidence about events, topics of concern, and negotiated agreements. Language use in documents suggested underlying assumptions and expectations. Using this variety of data sources allowed for triangulation of findings (Leonard-Barton 1989) during analysis.

I used purposive rather than random sampling methods, and collected data iteratively, following the theoretical sampling technique of grounded theory and based on ongoing data analysis (Martin and Turner 1986). I initially concentrated on observing and interviewing members of the project teams and users who had participated in requirements definition activities and events. I focused my observations on interactions rather than solitary performance of tasks or activities. Later, I sought information in areas of specific theoretical interest. For example, after it became evident that the relationship between GHI, Inc. and ISI, Inc. was an important contextual issue, I sought informants who could comment on structural properties of the organization related to the outsourcing agreement with ISI, Inc. and directed conversations in interviews with other key informants to these topics. I also collected data from multiple sources at multiple points during the projects' life cycles in order to detect change or evolution in technological frames over time.

Interviews:
I conducted one or more interviews with 52 GHI, Inc. and ISI, Inc. organization members who were responsible for management and control of the IS projects studied, project team members, or users in business functional areas who had been involved with either the BIS or INFOSYS project (See Table III-3). I identified personnel whom I wanted to interview through my observation of project activities, review of project documents to see who had participated in the past, and discussions with the project managers and users. My access to informants was largely open and determined by me. Early in my study, however, I was discouraged from talking to ISI, Inc. personnel until disagreements between GHI and ISI were worked out. I later was able to interview ISI personnel, although two key individuals had been reassigned and relocated and were therefore inaccessible.
I approached individuals whom I had met directly to ask for an interview. The BIS project manager contacted system users to let them know I would be calling for an interview. The CIO issued a memo to a list of INFOSYS informants I had compiled to introduce me and to let them know my study had been authorized. In all cases, I clarified to informants that their participation was voluntary and that all comments were confidential. At the interview, I asked for the informants' permission to audio-tape the session, and in most cases, they agreed. Audio-taped interviews were later transcribed for analysis.

Interviews with BIS project team members tended to be open-ended and unstructured. However, through the course of multiple interviews and informal discussions, I covered all important topics with them. Midway through the field study, I developed a semi-structured interview protocol (See Appendix A) which I then used with all INFOSYS project informants and with BIS users. This increased the consistency of topics covered with these informants. With some informants, I added topics of special interest (e.g., about ISI / GHI relationship problems).

<table>
<thead>
<tr>
<th>Position</th>
<th>BIS</th>
<th>INFOSYS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-technical project team members (additional multiple interviews with informants)</td>
<td>4 (6)</td>
<td>5 (2)</td>
<td>9 (8)</td>
</tr>
<tr>
<td>Technical project team members</td>
<td>3</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>IS Managers / Executives (additional multiple interviews with informants)</td>
<td>3 (2)</td>
<td>*</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Business Executives (additional multiple interviews with informants)</td>
<td>3 (2)</td>
<td>0</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Business users of IT application (additional multiple interviews with informants)</td>
<td>11</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>Total number of informants (Total number of interviews)</td>
<td>24 (34)</td>
<td>28 (30)</td>
<td>52 (64)</td>
</tr>
</tbody>
</table>

Table III-2 Informants Interviewed and Interviews Conducted

*same individuals for both projects

Observation of project activities / informal interactions:
I spent 12 months doing data collection at GHI, averaging two to four days per week onsite during core periods of the study. During that year, I attended and observed a variety of

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4 Three informants refused permission to auto-tape, and in these cases, I took extensive notes. In three other instances, a meeting turned into an interview and I was not prepared to tape. Again, I took extensive notes.

5 There were several weeks during which I had little time onsite, i.e., during initial, exploratory field work; while I was preparing for a doctoral consortium and conference; and later, when there was little active work on the BIS
activities in which ISD participants interacted, including project planning meetings, informal and formal working sessions among team members, meetings with vendors, meetings / presentations to management, presentations or demonstrations to users, team members' interviews with users, and training sessions. In formal meetings, I introduced myself and briefly explained my purpose. In addition, I was allocated a desk in the BIS project sponsor's department and thus had many opportunities for informal interactions and discussions with project personnel.

My access to key activities and events was limited to some extent by project participants and to some extent by personal constraints. For example, the BIS project sponsor at times did not allow me to attend meetings in which she expected particularly sensitive topics to be discussed or when she met one-on-one with her manager, EVP Brady. Unfortunately, I was excluded from one meeting which proved to be critical to the BIS project, and I had to rely on participants' descriptions of the meeting. I also was not invited to planning meetings with sales managers in which presentations about the BIS project were made. My opportunities to observe INFOSYS activities was also limited, because team members, under pressure of delivery deadlines, were concerned about committing time to the research. In addition, due to my personal time constraints, I was not able to observe activities which team members undertook during evening hours.

In most of the contexts in which I observed interactions, audio-taping was not feasible, although I was allowed to tape approximately seven hours of team meetings in the BIS project. When audio-taping was not possible, I took detailed notes, transcribing the language use and conversation patterns as closely as possible and describing the context in detail (setting, purpose, attendees, etc.). Verbatim note-taking was not possible during my informal discussions or interactions with informants, however, I wrote detailed field notes the same day, highlighting figures of speech, metaphors, or new terminology that had been used.

**Project documentation:**

I was given access to general project files and the project managers' personal files to review and / or photo-copy. Documentation available included the following:

- project presentation materials
- project / system proposals for projects studied and some related projects
- training materials
- work plans
- memos and correspondence
- notes from team meetings
- existing system documentation
- ISD requirements, design documents
- budget spreadsheets
- notes from personal files
- in BIS project, detailed notes on over 20 interviews and transcriptions of approximately 20 interviews which team members had conducted prior to my field study.

In the BIS Project, I was able to obtain copies of key documents at various stages of production, with comments from multiple individuals. This data was useful both to assess the uses for requirements artifacts and to identify the influence of key individuals in the production of the artifact.

C.2. Data analysis and interpretation

I utilized methods and techniques for grounded theory development (Glaser and Strauss 1967; Martin and Turner 1986; Strauss 1987) and qualitative analysis (Miles and Huberman 1994) to analyze the data collected. I began initial content analysis in the first weeks on-site, through open coding of field notes, interview transcripts, and project documentation. In this way, I identified a wide variety of potential theoretical concepts. I explored these concepts by writing theoretical memos, which then suggested additional areas of data collection and analysis around key themes. Some early insights later proved uninteresting. Others evolved throughout the study into the analysis presented here. Still others I deemed interesting but out-of-scope for the current analysis, and I put them aside for later consideration. Midway through the field study, I assessed what I had done and what remained to be done in the kind of site report recommended by Miles and Huberman (1994). This helped me to focus the remainder of my data collection activities in areas of theoretical interest on which I needed more data. I began closed coding of data near the end of the data collection period, iteratively developing category frameworks from earlier theoretical memos, applying them to a sample of materials, and revising them. Although I
utilized grounded theory techniques and methods to develop categories, I also drew on the ontological assumptions of structuration theory and substantive concepts of social cognitive theory to analyze and interpret data and to refine the category framework.

In the following discussion, I describe more specifically the analytic processes through which I identified technological frames and assessed frame similarities and differences (i.e., Chapter IV findings), analyzed influences of frames on actions, interactions, and decisions (Chapter V findings), and developed and illustrated the social cognitive process model of framing (Chapter VI findings).

C.2.a. Identifying frames and assessing similarities and differences

My first research question concerned examining technological frames of reference, identifying and defining their dimensions, and assessing the extent to which they were shared among key individuals or key groups. This analysis involved several steps: developing a framework of analytical categories for assumptions, expectations and knowledge; applying this framework to data from individual informants; determining which informants shared frames and therefore should be grouped together; comparing frame similarities and differences among groups to assess frame congruence / incongruence; and, assessing the consequences for ISD outcomes.

I developed the analytical categories through an iterative process: i) developing an initial set of categories from earlier theoretic memos and early coding attempts; ii) applying categories to a subset of interviews and field notes; iii) refining the categories and applying them to the same subset of data (several iterations); iv) finally revising categories and applying them to all data. Initially, I identified five major frame categories containing a total of 39 sub-categories. In later analysis and writing, I consolidated and merged subcategories into the 16 subcategories listed in Table III-4.

I used the categories to analyze the content of all materials relevant to each individual informant (i.e., interviews, observation and field notes, written documents and project communications). I used several techniques in this task, for example, using color-coded "sticky" tags for hard-copy only materials (e.g., project documentation), inserting indices containing codes into electronic format data (interviews and field notes), creating tables from multiple sources of data for key informants, and using a qualitative analysis

6I used the index and glossary features of Microsoft Word for this purpose.
Table III-3: Analytic Categories of Technological Frames of Reference

software package (NUDIST) to code and categorize data. With these electronic tools, I thengenerated a profile of categories for each informant, for example by generating an index in interview transcripts coded with Microsoft Word. In data obtained from each informant, there were somewhat different categories apparent. That is, a particular frame category might not have been salient to an informant in the data collection context and thus did not appear in that individual's profile. There were data on each category from multiple informants and from each type of data source (interviews, observation and field notes, documents), however, and I felt assured that the categories adequately represented the data of interest.

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7 A few notes on my use of NUDIST may be of benefit to other qualitative researchers. I began using the software midway through the analysis, after all materials had been typed or transcribed. Since NUDIST requires format-free ASCII files and uses paragraph markers as its segment indicators, I had to reformat all materials which I wanted to analyze with this tool and to create duplicate copies of materials. Since this took a fair amount of time, I decided to use NUDIST only for materials I had not yet coded, rather than going back over materials coded using Microsoft Word's index features. Although this reformatting requirement was annoying, NUDIST did have a major advantage, in that it allowed for quick retrieval of text segments across selected documents by category.

8 I was not attempting to categorize all phenomena that might be gleaned from the data, e.g., interpersonal dynamics, organizational culture, gender differences, etc. but rather was focusing on the phenomena of theoretical interest. Other researchers, with other interests, could develop completely different categories.
The next step was to determine which informants shared frames and therefore should be grouped together for analysis. Orlikowski and Gash (1994) describe shared frames as having *family resemblances*, that is, some core cognitive elements that are similar despite individual variations in specific assumptions, knowledge, or expectations, and they suggest that frames are shared among individuals with close working relationships. In a study of IT implementation, they identified two distinct groups, technical developers and users (including executives, managers, and professionals), whose members shared core frames. Dougherty (1992) similarly found that "thought worlds" related to functional department. Sachmann (1992) identified sub-groups based on shared dictionary knowledge (descriptions, words), directory knowledge (commonly employed practices), recipe knowledge (prescriptions for repair / improvement), and axiomatic knowledge (causal reasoning, knowledge of final events). Her results were similar to Dougherty's, however, because the most distinctive category (directory knowledge) coincided with functional / departmental knowledge.

With these findings in mind, I expected that individuals would probably be grouped as technical developers or users (in various functional area). As I analyzed the data, I did find that similarities among individuals' frames corresponded to their relationship to ISD activities. That is, informants whose major job function was planning, development or support of IS systems shared core assumptions, expectations, and knowledge, regardless of their precise job function. This grouping was similar to Orlikowski and Gash's (1994) grouping and consistent with Dougherty's (1992) "thought worlds." However, I wanted to consider the possibility that, if technical developers and users worked closely in ISD activities, they might develop shared knowledge related to the IT development project, and in this way come to share frames. I therefore called this group *core team members* rather than technical developers. (See Table IV-1 in Chapter IV for a list of core team members.) Since such collaborative work did not occur in the projects studied, the core team members group could have been renamed *technical developers*. I chose, however, to maintain the term *core team members* to allow for the possibility that, in other organizational contexts, non-technical personnel might function as part of a project core team. In such a case, there might be frame incongruence as well as shared frames within the group, and core team members' frames might differ in interesting ways from the thought worlds of technical developers. (See Table IV-1 for a list of core team members.)

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9 Orlikowski and Gash (1994, p. 178) borrow the notion of *family resemblances* from Wittgenstein (1953).
As I analyzed data on the remaining informants, I decided that minor frame differences attributable to the specific IT application (i.e., a management reporting system for sales versus one for claims reporting) or to organizational level (managers versus non-managers) did not warrant treating these individuals as separate groups in analysis but instead could be treated as intra-group variation. I named this group *system constituents* for two reasons. First, I found this term was used extensively at one time in the BIS project to describe the broad base of individuals in the organization who might directly use or indirectly benefit from the system and therefore might support its development. The term *constituency* also suggested the relationship of these individuals to the core team of developers relative to the development project. That is, the core team, in its negotiations and decision-making about IT requirements, were acting as representatives of the user community who were their constituents. (See Table IV-2 for a list of system constituents.)

I had difficulty categorizing only one informant in this way. EVP Sam Brady had a background in IS development, participated in some high-level ISD activities, and had a strong influence on the BIS project's direction and BIS core team members' interpretation of the project. This suggested that he be treated as a core team member. On the other hand, he was an executive in a business functional area (sales and service) and his interests and concerns were much broader than the BIS project. He did not fit into the system constituents group, however, because his frames were quite different from this group's. For these reasons, I analyzed his influence in requirements definition activities individually. Because his technological frames were similar to and influential on core team members' frames, in Chapter IV I present data on his frames with my discussion of the core team members' frames. In Chapter V, I highlight and illustrate the influence his frames had on this group's interpretations and negotiations. I also note his influence on the framing process in the BIS project in Chapter VI.

The next steps in analysis were to examine similarities and differences in frames among members of each group and to assess the extent of frame congruence or incongruence between groups. Having decided how to sort individual informants into groups, I examined similarities and differences in each analytical category among individuals within groups. I then assessed congruence and incongruence between groups in terms of *structure* (breadth of assumptions, expectations, knowledge) and *content* (actual assumptions, expectations, knowledge) (Orlikowski and Gash 1994; Fiol 1994; Henderson, Deighton, and Walsh 1988) in each of the 16 analytical sub-categories. The results of this analysis, and of my assessment of the consequences of frame congruence or
incongruence for ISD outcomes, are presented in Chapter IV, Section C and summarized in Table IV-3.

C.2.b. Analyzing the influence of frames on actions and interactions

My second research question addressed several related areas: i) how technological frames guided the interpretations, actions and interactions of key ISD participants, ii) whether frames of reference of individuals or groups changed as a result of their interactions; iii) what kinds of mechanisms facilitated frame communication, sharing, and change; and iv) how artifacts mediated participants' interpretations, action, and interactions. Analysis in each of these areas is discussed briefly below.

i) Technological frames in action and interaction: Orlikowski and Gash (1994) identify technical developers, executives, and users as critical social groups whose actions and interactions influence the process and outcome of technological change (p. 179). Analysis of the influence of frames on actions and interactions could potentially address within-group actions and interactions, between-group interactions groups (i.e., technical developers / users; technical developers / executives; users / executives), or some combination. My analysis was directed by my research focus (e.g., requirements definition versus system usage) and the contingencies of the field study at GHI (i.e., I had no opportunity to observe interactions between users and executives). Thus, I focused on the following areas:

- Actions of core team members / technical developers, using interview data from both projects and observational data primarily from the BIS project;
- Interactions among members of the core team, using primarily observational data from the BIS project;
- Interactions between core team members and executives, primarily from the interactions between EVP Brady and the BIS team; and,
- Interactions between core team members and users, using interview and observational data from both projects and project documents (e.g., transcriptions of project participants' interviews with users for the BIS project).

These data provided ample evidence of the influence of frames in specific action or interaction contexts, however, there were at first no obvious patterns across contexts. That is, project participants drew on multiple frames in any one instance and different frames in
different instances of negotiation. Overwhelmed with this wealth of apparently patternless data, I moved on to analysis and writing related to my third research question. After organizing data from both projects studied to illustrate the framing process model, I had detailed the instances of negotiations that had occurred in each project in each episode and identified the categories of frames that were apparently most influential in each instance. By comparing these instances across episodes and between projects, four patterns or themes emerged: 1) negotiations around the project identity, i.e., the scope, direction, intentions of IT development and implementation; 2) negotiations centered on how the IT application related to other organizational initiatives and projects; 3) negotiations around development and project implementation approaches, tasks, and activities; and 4) negotiations related to conducting IS development in the outsourced IS environment. Within these thematic areas, I then examined in detail data on the actions and interactions of technical developers and their interactions with executives (in the BIS project).10 Because I had a strong research interest in the influence of frames on interactions between technical developers and users, I examined data on these interactions.

ii) Changes in technological frames: My analysis of individual frame change is derived primarily from data from a subset of informants, i.e., BIS core team members. During this time, there were numerous changes and upheavals in the project and the organizational context which team members had to interpret and respond to. This provided me with numerous opportunities to ask these informants to reflect on what had happened and to consider whether their assumptions or expectations had changed as a result. I also had the opportunity to observe BIS project activities for nearly a year, and therefore to collect data on what these informants said to each other and what actions they took. Thus, I could look at their frames over time as well as compare and contrast informants’ retrospective sense-making with observational data. I also examined Infosys informants’ responses in interviews to my questions about whether or how their expectations or assumptions had changed. Informants did acknowledge some changes, for example, new interpretations of the IT application and its uses. I view retrospective interviews as a less reliable source of data on frame change, however, because informants might not have been conscious of tacitly-held frames at all, and therefore not sensitive to changes in frames.

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10Note, I address the first three themes in Chapter V. I decided to address negotiations around IS development policies and practices in the discussion of the framing model in Chapter VI to reduce redundant description of structuration processes.
iii) Mechanisms for frame communication, sharing, and change: In my first weeks onsite, I began to realize that project participants frequently employed mechanisms such as stories and metaphors to express their ideas. My interest in and recognition of these types of sense-making devices was stimulated as I began to read literature on metaphors (Lakoff and Johnson 1980; Boland 1987; Boland and Greenberg 1992, Mason 1991), narratives (Bruner 1990, Tenkasi and Boland 1993), and stories (Polanyi 1989, Boje 1991). As I coded data according to frame categories, I also coded instances in which stories, metaphors, scenarios-of-use, or analytic models were used to communicate knowledge, to express ideas, to share insights, and so on. I then looked at the data sources in which these sense-making devices occurred, for example, in my interviews with informants, in interactions among project participants (i.e., observational notes), or in written documentation. Through this analysis, I determined in what contexts different sense-making devices were used and identified several instances in which specific stories or metaphors were used across contexts. (See Appendix C Tables 1 and 2 for examples of stories used in multiple contexts.)

iv) Use of artifacts: I first looked in project files to determine what kinds of documents they contained. Since both projects had been ongoing for more than two years, there were thousands of pages of system documents, project proposals, memos, correspondence, and so on. I then assessed and categorized the contents of documents, i.e., what was the subject matter, what might the document have been used for, who was the author, who was the apparent audience, and so on. I considered how informants described or discussed their creation or use of artifacts in interviews with me. Finally, I looked at what "props" project participants used in their interactions to focus attention, discussion, and negotiations. In this way, I could better assess what artifacts contained in project files were actually used in negotiations and how they were used. Through my observation of their interactions, I also identified the existing IT system as a key artifact for communicating and sharing frames around the IT application beyond those artifacts contained in paper files.

C.2.c. Developing the framing model

My third research question concerned how to describe the social cognitive processes which influence the evolution of an ISD project and the IT artifacts produced. To conceptualize
these processes, I drew on the ontological assumptions of structuration theory (Giddens 1984; Cohen 1989; Orlikowski 1992) and the social cognitive concept of technological frames proposed by Orlikowski and Gash (1994). I expected the model to depict social actors (ISD participants) drawing on interpretive schemes (technological frames) in their actions (negotiations around requirements) and enacting structures by drawing on institutionalized rules and resources (structuration). I planned to focus on how technological frames influenced the evolution of the IT artifact through various developmental stages (e.g., requirements documents, design specifications, software).

My conceptualization of the model changed after several months of field work, however, due to developments in the projects studied and consideration of the phenomena these developments revealed. The projects I studied had been underway for more than two years at the time my field study ended. During this time, there were significant changes and events at GHI that influenced how the projects were defined, how the IT application was understood, and thus what requirements were defined. Changes included reorganizations which removed some and added other key players to the projects, operational problems that influenced executives' priorities and focus, changes in strategy that resulted in creation of new products and services, and on on. Core team members, recognizing and responding to these changes, interpreted the implications for the project (its goals and intended outcomes) and for the IT application (its features, uses, etc.). Their understanding of the project and the technology then changed dramatically or shifted incrementally. This occurred in the BIS project early in my field study, when EVP Brady redirected the project, forcing the core team to reconsider what the project was about, how the IT application would fit into the systems flow, and therefore what the requirements were. As I tried to make sense of this occurrence and to interpret the implications for my understanding of the project, I began to develop the theoretic concept of framing requirements. That is, I began to conceptualize the social cognitive process of negotiating requirements as an ongoing process of interpreting and responding to change, in which core team members' assumptions about the goals, objectives, and expected outcomes of IT implementation were either confirmed or altered. My interest shifted from the IT artifact per se to the evolving project identity, changes which triggered re-examination of the project identity, and the discourse around requirements which influenced how project participants interpreted the project identity. I then elaborated and tested the framing model by examining data from the BIS and INFOSYS projects longitudinally. The framing model which I developed from this iterative process of theoretic conceptualization, empirical
testing, and reconceptualization is presented in Chapter VI. I also illustrate the model using data from the BIS and INFOSYS projects.

I conclude this discussion of data analysis and interpretation by describing my methods for applying the model to data from these projects. Through retrospective interviews, searches of document files, and on-site observation, I compiled data on over two years of history in both projects. While observational data obtained primarily from the BIS project was most useful for analyzing negotiation processes, examination of informants' stories about the project's history (with some probing in interviews) revealed much about their interpretation of the project identity and how it had changed over time.¹¹ In the INFOSYS project, for example, most informants mentioned the influence of a prominent customer (RBC, Inc.) in the decision to acquire the software package (See Appendix C, Table 2 for informants' versions of this incident). This was consistent with historic project files that described the project as a pilot for RBC, Inc. In the BIS project, I was also able to observe changes in team members' understanding of the project that occurred during my time on-site. Careful examination of individuals' recitations of the project history also provided evidence of individuals' frames, and shared aspects of these stories suggested shared assumptions and expectations that were influential in negotiations around requirements. For example, in both projects, team members had experienced months in which little progress had been made. GHI team members tended to account for delays by blaming ISI, Inc. for "sabotaging" the project, for not "coming up to the plate," for not treating GHI like a "customer." In the BIS project, I observed how these assumptions about ISI, Inc. influenced project participants' negotiations around the IT application, ISD strategy, and IS development policies and practices relevant to the project.

I examined informants' use of language, metaphors, prominent stories, and so on, to identify changes in the discourse, to ascertain what the project identity was, and to identify influential participants. I also looked for changes in the GHI organization that may have triggered new episodes of framing, primarily in informants' descriptions of events but also in project files and documents and in my field notes. In this way, I constructed a kind of genealogy of the discourse (Preston 1991) which shaped the evolving project identity and which influenced decisions about IT requirements. This analysis revealed interesting

¹¹My discussion of the INFOSYS project is briefer and more general than my discussion of the BIS project. I observed this project for a shorter period of time (over four months) and had limited access to project activities. My analysis therefore draws primarily on interviews with project participants in which they retrospectively recalled project events. Several of the earliest team members were still actively involved with the project and recounted its history and development in detail. There were also extensive historical project files available.
aspects of frame sharing and communication, such as changes in metaphors as an indicator of changing assumptions and expectations for the IT application, the importance of informants' stories about key events in shaping their thinking about the project and about requirements, and evolving project narratives as a negotiated interpretation of events.

A key aspect of applying the framing model is identification of episodes of framing. To do this, I examined the data noted above chronologically. I did not have hard and fast rules for delineating episodes, but instead looked at a variety of indicators, including:

- Did informants specify changes in thinking or understanding of the project or IT application in their recitation of the project history?
- Had new, influential individuals joined the team?
- Were there apparent changes in the discourse around requirements? Were there changes in the types of issues or concerns being debated?
- Were there change triggers or events that had altered project participants' negotiations around requirements?
- Had the project or system name changed?
- Had metaphors used to describe the IT application changed?

In this way, I identified eight framing episodes in the BIS project and four framing episodes in the INFOSYS project. In the BIS project, there were several distinct transitions from one episode to the next resulting from an obvious change trigger (i.e., executive intervention). In other instances, transition between episodes was less distinct, and in the INFOSYS project, episodes appeared to overlap or evolve gradually. Episodes of framing did not coincide with specific types of ISD phases, that is, with requirements definition phases or tasks, and in some cases spanned multiple ISD phases.

D. Assumptions and limitations of the research design

This research design was based on a longitudinal field study using qualitative data collection and multiple qualitative analytical techniques. It was conducted at one research site, where the influences of cultural change, reorganizations, and industry turmoil were

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12 Appendix D, Tables D-1 and D-2 chronologically display data on key events, decisions, changes in project participants, etc.

13 Tables VI-1 and VI-2 in Chapter VI summarize the framing episodes identified in each of the two projects.
evident in the analysis. Such research can be prone to researcher influences, particularly when the project is a dissertation and therefore, by necessity, an individual rather than a team research effort. I do not suggest that this study is free of such influences, however, I have tried to minimize them through my use of proven techniques and methods (Strauss 1987). With this description of research methods, my goal was to provide the reader with sufficient information on research strategy, design, and methods, to judge the validity of my interpretation. To this end, I conclude this chapter with a few remaining qualifying comments.

Although I spent considerable time on-site at GHI and came to know some individuals well, my interest and attention was focused on some aspects of events and circumstances at the site to the exclusion of other potentially relevant phenomena. On several occasions, I was reminded of my status as an outsider when informants related personal or political issues that I was unaware of or insensitive to. Because my interest was in social cognitive processes rather than in interpersonal dynamics or political processes, I may have minimized the importance of such issues in my analysis and have certainly not emphasized them in my write-up of findings and analysis.

Because I did come to know and like key informants, because I cared about their future at GHI, and because I felt gratitude to them (as well as to all informants) for their openness and generosity with their time, I at times had difficulty maintaining an impartial observer perspective. However, the elapsed time spent analyzing data after my time on-site, paying strict attention to the data, and being systematic in my analytical process helped me to maintain an impartial interpretation. The IT tools I used, for example, made it easy and feasible to review data files multiple times and from a variety of perspectives, and in this way to continually challenge my assumptions and interpretations.

In the end, however, this is my interpretation of events, actions, frames, and episodes. My goal was not to present data from my informants' perspective, but to formally analyze and interpret what they said and did within the theoretical context of my research perspective, that is, from the theoretical foundation of social cognition and structuration theory. Alternative interpretations, within this context, or from other perspectives, are of course possible.14

14 Most importantly, the individuals at GHI whom I studied may view things quite differently. Since my key informants left GHI during the time I was analyzing the data, I was unable to get their feedback on my analysis and findings.
Chapter IV
Technological Frames in Requirements Definition Activities

In order to understand how technological frames of reference may influence requirements definition processes and, ultimately, IS development outcomes, it is important to examine the kinds of frames which influence key ISD participants as they define IT requirements, to identify and describe their dimensions, and to assess the extent to which they are shared among key individuals or key groups. To accomplish this, I first derived dimensions (i.e., categories) of technological frames of reference from data obtained in my field study of two ISD projects, focusing on critical assumptions and expectations of two groups (core team members and system constituents). I then examined frames of individuals and compared frames to assess the extent to which frames were shared within and between these groups. In this chapter, I discuss the results of this analysis.

The chapter is organized as follows. In Section A I briefly describes the analytic categories and the two stakeholder groups whose frames were examined. In Section B I present detail data on the frames of members of these groups. In each sub-category, I first discuss frames of core team members, followed by those of system constituents. I then compare frames between the groups using the analytical framework and discusses possible consequences and implications for ISD outcomes of frame congruence and incongruence in Section C. In Section D I briefly summarize findings and conclusions.

A. Frames categories and stakeholder groups

A.1 Framework of analytic categories

As I analyzed data collected during the field study, I found that ISD participants drew on a variety of assumptions, expectations, and knowledge as they participated in requirements definition activities and as they reflected, in interviews, about the IT application under development. Through an iterative process of defining, applying, and modifying analytical categories, I developed the framework depicted in Figure IV-1. This framework grouped informants' assumptions, expectations, and knowledge into three sets of general categories (categories 1, 2, and 3), a background or contextual category (4), and project-specific category (5).
The first category -- the *Essence of the Information Systems Delivery (ISD) Initiative* -- related to general assumptions and expectations that organization members drew on as they thought about how to approach definition and development of the IT application: What should users' role in ISD be? What kinds of individuals should be involved in development activities? What strategy should be used to develop and implement the technology? How should the project relate to other organizational initiatives? How would the application be transitioned from development into ongoing use?

The second category -- the *Essence of the Information Technology (IT) Application* -- focused on assumptions and expectations regarding the technology itself:
What features and functions were characteristic of the technology? How would users interact with the technology? How should the technology be built, over time, and how might it evolve? How did the IT application fit into the IT infrastructure of application systems, hardware, and operating software?

The third category -- the *Essence of the Organizational Environment* -- centered on organization members' knowledge of and assumptions about the potential for using information technology in the organizational environment: How could the IT application help the organization succeed in its environment? How could IT be employed to change and improve existing business processes? What understanding of the "real world" could organization members derive from using the technology?

The fourth category -- the *Project Context* -- related to expectations and assumptions about how IS development could be accomplished in the organization: What aspects of the organization had to be taken into account? What cultural or political issues might arise? What were the rules, policies, and practices for IS development?

The fifth category -- the *Project Identity* -- focused on organization members' interpretation of the IS development project at a particular point in time. This category represented the synthesis of assumptions, expectations, and knowledge in the first four categories applied to the specific work at hand: Why was the project started? What were its goals and scope? What organizational changes were expected to result from the project?

The depiction of these categories in Figure IV-1 suggests several characteristics of technological frames of reference. ISD participants' drew on general assumptions and expectations about how to accomplish ISD (category 1), about IT capabilities (category 2), and about organizational uses of IT (category 3) as their assumptions and expectations about the specific ISD project (category 5) formed. The project context (category 4) represented background knowledge and expectations about the setting in which the project occurred. Although categories are depicted separately, assumptions and expectations were interrelated and overlapping. For example, participants' assumptions about how to do IS development influenced their expectations for the IT application. At the same time, their knowledge about the IT application influenced their assumptions about how to proceed with development. While it is useful analytically to identify categories of technological frames of reference, I do not claim that such a *structure* of frames actually existed in the heads of my informants. Rather, I have used these categories to facilitate examination of the many assumptions and expectations that ISD participants drew on in IT requirements definition activities and to assess similarities and differences in frames within and between groups.
A.2. Stakeholder groups

In the course of my field study at GHI, Inc., I observed and interviewed organization members who were involved in two IS development projects. As the field study progressed and as I began analysis of the data, it became apparent that, in terms of their knowledge about, understanding of, and assumptions about these projects, there were two distinct groups. There was a core group of project participants, who had experience with IS development and for whom ISD activities were a major part of their job responsibility. Members of this group held various positions in the organization. The project sponsors, managers, and business systems analysts held staff positions in business functional areas of Group Health, Inc. (e.g., sales, actuarial and accounting, quality assessment). Some technical project managers, programming leaders, and programmers were members of GHI’s internal IS department. Others IS personnel were employees of the outsourcing company, Information Systems, Inc. (ISI). Tables IV-1 lists key roles in the project, responsibilities and pseudonyms. In my analysis of the data from these informants, whom I call the core team members, I found minor variation in frames due to job level or functional specialization, and, between the two project teams, differences attributable to specific characteristics of the IT application or the stage of development of the project. In all but one sub-category of frames, however, the frames of these individuals were similar. I therefore discuss frames for the group as a whole, noting differences in individuals' frames where relevant. As discussed in Chapter III, EVP Brady stood out as an individual in this analysis, however, I include references to his frames in my discussion of core team members' frames, because his frames were similar in many respects to their frames and had a strong influence on them.

The second stakeholder group consisted of GHI organization members from various business functional areas who had had some involvement in requirements definition activities in either the BIS or INFOSYS project (See Table IV-2). In my analysis of data for these ISD participants, whom I call the system constituents, I found similar themes in the frames of individuals within and between the two project teams. Although there were a few differences in the salience of frames among individuals based on their functional area, job responsibilities, ISD participation, and project team experience, frames were more similar than dissimilar. I therefore included senior managers, line managers, and professionals from both projects in this group, noting differences in individuals' frames where relevant.

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1See Chapter III for an extended discussion of how I conducted the individual and group level analysis.
### Table IV-1: Core Team Members

* included here for discussion purposes

<table>
<thead>
<tr>
<th>Role in Core Team</th>
<th>Responsibilities</th>
<th>BIS Project</th>
<th>INFOSYS Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Sponsor</td>
<td>Articulated &quot;vision&quot; for project and provided some funding</td>
<td>EVP Sam Brady*</td>
<td>Sam Brady (earlier in IS position)</td>
</tr>
<tr>
<td>CIO</td>
<td>Managed in-house GHI IS staff and planning for IS</td>
<td>Tony Foley</td>
<td>Tony Foley</td>
</tr>
<tr>
<td>IS Manager</td>
<td>Managed IS development staffs</td>
<td>Peter Deutch (GHI) Paul Stone (ISI)</td>
<td>Peter Deutch Paul Stone (ISI)</td>
</tr>
<tr>
<td>Project Sponsor</td>
<td>Managed project funds; managed staff of GHI team members</td>
<td>Leslie Thomas</td>
<td>Fred Davis</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Developed work plans; led business requirements analysis; worked with user areas</td>
<td>Jane Flynn Alan Thompson</td>
<td>Heather Johnson</td>
</tr>
<tr>
<td>Project Leader / Analyst</td>
<td>Participated in detailed analytic tasks; assisted in training</td>
<td>Mark Smith Tim Wilson</td>
<td>Joyce Harris Hank Williams</td>
</tr>
<tr>
<td>Technical Project Manager</td>
<td>Supervised technical team members; assisted in project planning, estimating, etc.</td>
<td>Mary Kelly (GHI) Joe Galvin (ISI)</td>
<td>Lauren Wilkins (ISI) Kevin Gaffney (ISI)</td>
</tr>
<tr>
<td>Programming leader / analyst</td>
<td>Participated in systems analysis, design and development (programming) activities</td>
<td>Tim Schwartz (GHI)</td>
<td>Ted Crane (GHI) Andy Katz (ISI) Jessie Turner (ISI)</td>
</tr>
<tr>
<td>Other IS personnel</td>
<td>Participated in systems analysis and design activities</td>
<td></td>
<td>INFOSYS, Inc. (3) Business Analysts (2)</td>
</tr>
</tbody>
</table>

### Table IV-2: System Constituents

<table>
<thead>
<tr>
<th>System Constituent Role</th>
<th>Responsibilities</th>
<th>BIS Project</th>
<th>INFOSYS Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Area Project Sponsor / Champion</td>
<td>Manage business functional areas; Endorse project, supply business personnel to work on, implement pilots in business area, etc.</td>
<td>Jeff Green Rick Forrest Karen Jones</td>
<td>Dr. Jolene Fisher</td>
</tr>
<tr>
<td>End-users of IT appl. (analysts)</td>
<td>Research and provide analytic reports; &quot;hands on&quot; users of various databases</td>
<td>Sales and Marketing reporting analysts (2)</td>
<td>Health Care Analysts and Managers (5) Customer Reporting Analysts and Managers (6)</td>
</tr>
<tr>
<td>End-users of IT appl. (general)</td>
<td>Sell insurance products to organizations; manage sales territories and sales staff</td>
<td>Sales Managers, Executives, and Representatives (9)</td>
<td>Managers in Service Utilization (3)</td>
</tr>
</tbody>
</table>
### Frames of Reference for Key Stakeholder Groups

In this section, I present detail data on the technological frames of reference of members of two stakeholder groups (core team members and system constituents) in the sixteen subcategories listed in Figure IV-1. In each sub-category, I first discuss core team members frames. I then describe system constituents frames. In this discussion, I provide multiple illustrations of informants' frames in quotations drawn from interviews, observation of project activities, and project files. Since these are voluminous, textual data, the section is lengthy. Table IV-3 therefore serves as a summary of the data which follows and as a guide through the detail data. I have also noted the assessment of frame congruence and incongruence in each subcategory, which I discuss in Section C.

<table>
<thead>
<tr>
<th>Category 1: Essence of the ISD Initiative</th>
<th>Frames of System Constituents</th>
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<tbody>
<tr>
<td><strong>(a) Users' Role in ISD</strong> (congruent content; incongruent structure)</td>
<td>- Users should be involved in ISD, but ...</td>
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<tr>
<td></td>
<td>- Users never know what they want.</td>
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<td></td>
<td>- Users' role in ISD is to contribute business knowledge, not opinions on technology.</td>
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<td></td>
<td>- User involvement in ISD must be controlled.</td>
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<tr>
<td><strong>(b) ISD Participants</strong> (incongruent structure)</td>
<td>- ISD participants are either &quot;technical&quot; or &quot;non-technical,&quot; and this determines the role they can / should play.</td>
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<tr>
<td></td>
<td>- &quot;Mainframe programmers&quot; lack the skills to work on new client / server technology.</td>
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<tr>
<td><strong>(c) ISD strategies</strong> (congruent content; incongruent structure)</td>
<td>- Buy, don't build IT applications.</td>
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<td>- Deliver IT applications in phases or &quot;chunks.&quot;</td>
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<td></td>
<td>- Deliver &quot;quick hits.&quot;</td>
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<tr>
<td></td>
<td>- Keep on implementing.</td>
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<tr>
<td><strong>(d) Transition to Use</strong> (partially aligned)</td>
<td>- Technical tasks are the major focus in transitioning IT into use.</td>
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<tr>
<td></td>
<td>- &quot;Build IT, and they (users) will come,&quot; although there are &quot;computer phobes.&quot;</td>
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<td></td>
<td>- Training on system mechanics is important.</td>
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<tr>
<td><strong>(e) Inter-project Coordination</strong> (incongruent structure)</td>
<td>- Coordination among ISD projects is essential to reduce redundant efforts.</td>
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<td>- Projects compete for resources and legitimacy.</td>
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<td>- Being in control is desirable.</td>
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Users act as a resource in ISD but cannot be involved in day-to-day activities.

Acceptable packaged software is usually available, and this is the best ISD strategy.

Training is just the beginning.

Time is needed to learn a new system.

Developing expert users to share knowledge facilitates system use.

A critical mass of users is needed.

Who ultimately uses the technology depends on individual characteristics.

* indicates no salient frames in category

Table IV-3 Frames of Reference of Core Team Members and System Constituents

Chapter IV (64)
<table>
<thead>
<tr>
<th>Category 2:</th>
<th>Essence of the IT Application</th>
<th>Frames of System Constituents</th>
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</thead>
</table>
| (a) IT Application Design | - User-friendly (GUI) interfaces enable end-users to access databases without technical assistance.  
- Client-server software and hardware is best for this type of system.  
- Frames include detailed understanding of the technology design. | - The new IT reporting system will be a tool that may replace existing tools. |
| (b) IT-in-Use (partially aligned) | - End-users will interactively generate ad-hoc reports.  
- Operational efficiency is critical to acceptance / success of IT applications. | - Both analysts and support personnel will use the IT application.  
- Standard, batch reports will be needed in addition to ad-hoc reports. |
| (c) IT Stages (congruent content; incongruent structure) | - New IT is understood in contrast to present technology.  
- IT is built in stages, evolving to the finished application over time. | - IT applications change and evolve as business conditions change. |
| (d) Systems Landscape (incongruent structure) | - IS reporting systems fit into a "big picture" of existing applications (legacy systems), and their fit is described using spatial metaphors.  
- IT should fit into an overall architecture. | * |

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<tr>
<th>Category 3:</th>
<th>Essence of the Organizational Environment</th>
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</table>
| (a) External Environment | - IT use enhances understanding of the external environment.  
- IT use can change the way GHI operates.  
- IT use lends credibility and legitimacy to the organization. | - IT use improves relationships with customers, vendors, partners.  
- IT use lends credibility and legitimacy to the organization. |
| (b) Business Practices and Processes (congruent content; incongruent structure) | - IT can change the way sales is done, resulting in more face-to-face sales time  
- IT use will reduce administrative support requirements.  
- IT can be used to "capture" human knowledge.  
- IT use reduces reliance on human actors and human interaction.  
- IT can shift responsibility for producing ad-hoc reports from IS technical staff to end-users. | - IT is a tool to improve individual productivity and effectiveness.  
- IT does not replace human actors in business processes. |
| (c) Information and Data Legitimacy (partially aligned) | - Business processes can be understood in terms of data.  
- Data quality and integrity are important.  
- Data quality depends on source systems.  
- Quality data is legitimate. | - Data quality depends on source systems.  
- Data must be interpreted by human actors to determine if it reflects "reality."  
- There are many valid ways to interpret data and therefore "reality."  
- Data that makes sense in the total information environment is legitimate data. |

Table IV-3 Frames of Reference of Core Team Members and System Constituents

* indicates no salient frames in category
<table>
<thead>
<tr>
<th>Frames of Core Team Members</th>
<th>Frames of System Constituents</th>
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<tbody>
<tr>
<td><strong>Category 4:</strong></td>
<td>Project Context</td>
</tr>
<tr>
<td>(a) Organizational Context (incongruent content and structure)</td>
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</tbody>
</table>
|  | • The culture at GHI is not vital or dynamic.  
|  | • GHI is a highly politicized organization.  
|  | • Battles between project teams are common.  
|  | • Developing IT is critical to the organization.  
| (b) IS Development Context (incongruent content and structure) |  |
|  | • **GHI members:** ISI, Inc. is a vendor that does not treat GHI as a customer; ISI is the cause of project delays.  
|  | • **ISI members:** ISI, Inc. is a partner with GHI and is responsible for controlling IS costs.  
|  | • GHI's strategy is changing, and effective IT use is now more critical.  
|  | • Developing IT is one of many priorities.  
|  | • Business areas may not cooperate in ISD efforts.  
|  | • Developing IT at GHI requires gaining support from diverse constituents at GHI. This complicates ISD processes.  

| **Category 5:** | Project Identity |
| (a) Project Definition (congruent content; incongruent structure) |  |
|  | • The project goal is to replace existing IS reporting systems with an improved system.  
|  | • The goal is also to create an "information environment" with new IT tools.  
| (b) Project Outcomes (congruent content and structure) |  |
|  | • End-users will have direct access to data; this will improve their jobs.  
|  | • There will be new and improved information.  
|  | • Through better access and better information, business personnel will make better decisions.  
|  | • Implementation of the system will require ongoing development and support.  
|  | • Data access will be improved.  
|  | • There will be enhanced information and information flows.  
|  | • Personal productivity and effectiveness will be improved.  

| **Table IV-3 Frames of Reference of Core Team Members and System Constituents** |
| * indicates no salient frames in category |

**Category 1: Essence of the ISD initiative**

Project participants drew on their assumptions about and experience with IS development, their expectations for roles in these activities, and their experiences with transferring IT from development into use as they planned and participated in requirements definition activities. In the following sections, I discuss aspects of core team members' and system constituents' frames related to each of the five sub-categories of the major category, *Essence of the ISD initiative*.

**(1a) Users' role in ISD: core team members:**

In a presentation of the BIS project to a sales vice president, Jane Flynn, the BIS project manager, explained why she wanted him to become the executive sponsor:
It's been proven that IS can't do it [ISD] alone. They need users to work with them.

This comment reflected core team members' espoused frames about user involvement in IS development, i.e., that involving users in ISD, garnering supporters for the project, and having an executive project sponsor are vital to system acceptance. In an interview, CIO Tony Foley similarly articulated this view [emphasis added]:

You can't start a technology project from the IS project. It has to be a business need and there has to be a business leader, a business sponsor who owns the project. People support what they help build. If you just throw it on them and say, 'Here, use this,' they are going to find excuses not to use it. It's like giving a person who doesn't want a PC a PC. You walk into their office and what do you see? Hundreds of post-it notes all over the monitor. They use it as a bulletin board.

However, as they considered specifically what users' role in ISD activities would be, their espoused assumption that user involvement is vital to ISD success was inconsistent with other assumptions about user involvement in ISD, i.e.:

- "Users never know what they want" -- Team members assumed that users do not really understand the potential of technology and how to apply it in their jobs, and that core team members need to filter requirements users identify to determine "real" requirements, as these core team members' comments illustrate:

  He's just a user. He doesn't know what he wants ... He knows what he doesn't want.

  Users don't know what they want, need, so we let them play with [a system], then we change it as they get used to it.

  You could be interviewing people all over, all these different functions, and assume that people understand their roles in the puzzle ... you end up having to weed through data, not data, just information, comments, opinions.

- Users' role in ISD is to contribute business knowledge, not opinions on technology -- Core team members looked to users to contribute business knowledge and expertise, to participate in analytic tasks such as data modeling exercises, and to generally support the project. Core team members considered it inappropriate, and problematic when users expressed preferences for particular types of technology or development approaches, as these core team members commented:

  Our users are telling us what technology to use, what they think is the best technology in their limited experience ... When a divisional vice president with P&L responsibility says what kind of LAN he wants, that's a problem.
Ten years ago, we would just say, 'We're going to build you a sales and marketing information system and here are the business requirements. Do you agree?' Boom. And we'd do it. And there wouldn't be all this discussion around what the technology is ... Maybe I'm old-school, maybe I'll be proven wrong, but there's a fine line as to who determines the best technological use.

- **User involvement in ISD must be controlled** -- The tension between core team members' assumption that user involvement and support for a project is essential, yet can be problematic, is consistent with their assumption that user involvement in ISD must be controlled. For example, a BIS core team member commented about the project's executive sponsor:

  My job is to manage him. He thinks he owns the whole project.

Similarly, a member of the INFOSYS project team commented on the perceived need to keep a user group under control:

  We've had to wrestle the control back from the POQA group, from other departments, who are trying to again usurp us.

(1a) **Users' role in ISD: system constituents**

The system constituents I interviewed had been involved in one or more types of requirements definition activities, for example, requirements interviews, brainstorming sessions, or hardware and software package demonstrations. For the most part, system constituents had a casual, limited role in IS development activities. Many of the system constituents I interviewed assumed this was their proper role. For example, a sales manager commented on his role in the BIS Project:

  We're in sales. We're trying to get clients to buy our products and services ... I'd rather be a resource than someone involved in the actual day-to-day development and detail of it. So, I haven't paid much attention to it.

When I asked what his role in the INFOSYS project had been, a health care analyst made this observation:

  I'm a user and that's probably the extent of my involvement with it. As far as the planning goes or anything like that, I didn't really have a part of that. I was interviewed initially about what data elements we'd like to see ... we let them know and that was about it. And then I got a terminal, got a little bit of training and I'm getting the newsletters. That's probably the extent of my involvement.

In both projects, there were a few system constituents who took a more active role. Jeff Green had volunteered to be the Business Sponsor for the BIS project, and had agreed to pilot prototype applications in his sales district. Amy Grant, a manager in the Provider,
Outcome, and Quality Analysis (POQA) group, had spent much time learning the INFOSYS software herself, had led an effort to define reports for the PAR project, and had worked directly with INFOSYS, Inc. to set up demonstrations to various user areas. A few INFOSYS users participated in testing tasks. However, active involvement in ISD activities was more of an exception than a rule.

1(b) ISD participants: core team members

In planning for and carrying out the ISD initiative, core team members discussed at length who should be part of the core team, what mix of skills (business expertise, specific technical capabilities) would be needed, how suitable team members could be obtained, what roles various team members should play, and how much of their time would be dedicated to the project. In these discussions, core team members tended to stereotype themselves and others as "technical" or "not technical" [emphasis added]:

Katie's very good analytically. She's very good at the reporting piece. She's very good at the data side of it, but she's not a technical person...

I am not a technical person.

They had some very good people on it [BIS project] ... Some were very technical in nature...

Sam's very technical and a lot of the people that are reporting to him aren't extremely technical.

The meaning associated with stereotyping an individual as "technical" or "not technical" varied. For instance, some core team members maintained they were "not technical" as justification for not taking responsibility for technical tasks. In other instances, labeling someone "not technical" suggested the individual was in some way less competent. In the BIS project, team members made a further value-laden distinction between technical personnel who were "mainframe programmers" and those who had experience with client-server technology and open systems architecture. This technical project manager's comparison of the HMO-2 staff and the technical staff of ISI suggests underlying assumptions about the superiority of having technical skills related to client-server technology [emphasis added]:

At HMO-2 ... they have the UNIX operating system background. They understand relational databases, they understand SQL, how that all works, they understand a lot about interpretability in using Windows-type applications and networking and that type of thing. So there's a lot of core knowledge there ... The ISI folks, on the other hand, are mainframe-based and don't understand a relational database technology, don't understand the UNIX environment ... There's no way, in one month, I'm going to take somebody with that
background and translate them into somebody who now I can teach client-server, GUI-design type of technology to and made them proficient in a one month.

This distinction was not salient in the INFOSYS project. The INFOSYS package was based on IBM's mainframe technology and workstations operating system, which both GHI and ISI technical personnel had experience with this technology.

1(b) ISD participants: system constituents
The system constituents I interviewed did not articulate assumptions about who ISD participants should be, what their characteristics were, or what roles they might fulfill. They associated specific individuals, particularly the project manager, with the project and looked to that person for updates on project activities. Beyond this, they typically referred to ISD participants (excluding business area personnel) generically as "systems people."

1(c) ISD strategy: core team members
At GHI, members of the core team were responsible for planning and carrying out the ISD project, e.g., devising implementation approaches, obtaining funding, and implementing the technology. Their assumptions about and their experiences with IS development influenced their thinking about the requirements for the IT application, particularly, how to deliver or "package" functionality. Core team members frames centered around four themes:

- Buy, don't build -- Many core team members expressed their assumptions that, whenever possible, software packages should be bought and customized, rather than developed from scratch, and that software was often available that would meet "80%" of requirements, as this IS project leader commented:

  I have an inherent bias towards packaged systems. I believe the cost in terms of dollars, frustration, and other things should you implement something from scratch should only be made when you can't find something that satisfied 70 to 75% of your known requirements. And generally, you do that because you haven't looked and researched long enough, or because you have inherent biases that are irrelevant to the actual issue.

Team members actions' were consistent with this assumption. The INFOSYS team, for example, chose to buy a package rather than work with a team developing a reporting system in-house. The BIS team looked at packaged software several times during the project and decided to buy a package for a pilot program. However, core team members did not expect implementing packages to be easy, as this IS manager's complaint about users' pressure to buy packages illustrates:
You know, it's like, 'Buy a package, and you can put it in and it'll be ready the next day.' Well, I know, as well as anybody knows, that's not going to happen, and there's not a package that's going to meet all our needs.

- *Deliver IT applications in phases or "chunks"* -- In various contexts, core team members articulated the assumption that large projects should be broken into "chunks" or "phases" and delivered incrementally, as Leslie Thomas explained in an interview:

  I feel more comfortable in doing things like this if we can break it down into small chunks ... because I don't want to go in there saying it's going to cost us, if you will, five or six million dollars...and hang my hat on a five or six million dollar project... I'd rather hang it on chunks of it. So we do BIS, and we get that done and it's successful and we're scoping out the second phase and we break it down into workable pieces so it doesn't become a runaway project.

The INFOSYS project team similarly demonstrated their belief in this approach, by outlining a series of incremental steps for completing the project, such as adding new sources of data to the database as data became available and upgrading to new versions of the proprietary package.

- *Deliver "quick hits"* -- BIS core team members assumed that pieces of the IS application could be delivered quickly, to provide immediate benefits, to demonstrate progress and to gain legitimacy and support for the project. Leslie Thomas described the "quick hit" approach that the team had used in a pilot implementation phase [emphasis added]:

  What we wanted to do was get a tool out there on the notebooks that would then interface with the ultimate system. So if you will, it was quick hit ... we viewed it as, if we can get them bought in at this level, with these machines ... it will spark their interest for more. And their interest for more is the BIS project ... I think they're very enthusiastic to see that we're moving forward in that right direction.

Jane Flynn, the BIS project manager, echoed these sentiments in a steering committee meeting [emphasis added]:

  We need to take the project in pieces, get things done, show success, prove we can be successful.

Tony Foley, an IS manager, stated similar assumption in a team planning session [emphasis added]:

  I believe we need to deliver products quickly ...We need to create a vision -- two pages of bullets -- then figure out where it hurts today.
• *Keep on implementing* -- Consistent with the assumption that IT application functionality must be delivered quickly, in phases, was the assumption that implementation should be a continual process, as Tony Foley explained in an interview [emphasis added]:

We'll get in, do a prototype, deploy it ... that's how Peter and I operate, *we keep on implementing*. We don't worry about the 20%, we get in the 80%. We do the easy part first, and work on the hard part as they [users] learn about it.

An INFOSYS project leader similarly commented on the importance of continual IS development [emphasis added]:

We might as well *go after what is available and keep moving*. In a project like this, any down time in your mind, any lack of sense of urgency is deadly.

There were some minor differences among core team members' assumptions about ISD strategies. For example, at one point in the project, the team had defined a "throwaway" alternative for the BIS project, that is, a short-term, scaled-back BIS database which they believed could be implemented quickly, at low cost. Team members from HMO-2 (Tony Foley, Mary Kelly, Peter Deutch) challenged the notion of "throwaway" software, as this interchange in an early meeting illustrates

Kelly: Then when you say *throwaway*, you don't really mean throwaway?
Thompson: It isn't really throwaway, it more of a *bridge*.
Flynn: The first *building block* will be thrown away, but we've got to be sure we're building on something.

The HMO-2 team members preferred the term, and the concept "plug-and-play,"\(^2\) which reflected their experience with rapid applications prototyping and building incrementally towards a total, final solution. In early meetings with other team members, they promoted their approach through stories of their own project successes:

I'll say it again. I believe we need to deliver products quickly. Like the Authorization Card introduction. We created a vision, it was just a few pages ... We had overall objectives ... We built it over time ... We need to create a vision -- two pages of bullets -- then figure out where it hurts today.

Take DSDB. It's really quite simple. It uses scripting tools. We took an incremental approach. We didn't do heavy-duty research. It took ISI a couple of months to program ... It's a process. You get to change your mind.

---

\(^2\)"Plug and play" is a term used in the IS business press. It assumes that pieces of IT applications can be "plugged" into existing applications and users or technologists can "play" with them to learn about them.
However, these differences in assumptions were minor, involving clarification of terminology. All core team members shared basic, underlying assumptions about ISD strategy, that is, that rapid delivery of IT solutions was critical, that projects should be broken into pieces to increase control, and that packaged software could be purchased and "plugged in" or modified (especially if it were built in the client-server technology) quickly to meet "80%" of requirements.

1(c) ISD strategy: system constituents

System constituents' assumptions about ISD strategy centered on the advantages of buying packaged application software versus developing software in-house. Most assumed that buying a software package was the best approach, as these sales managers' comments illustrate:

I'm not one for building my own software. I believe in buying it off the shelf, then it's up and running from day one.

In my view, this is not rocket science. There's many many companies that have the same information and data requirements that we have ... Why do we think we're going to develop one from scratch? Or why do we think we even should think that? I'm sure there's great systems out there.

Managers who had participated in vendor evaluation activities for INFOSYS similarly thought that "partnering" with a software vendor was the most logical approach:

The philosophy, we decided [on is]... that you really get yourself partnered with a vendor that you're comfortable with and you sort of move together as the technology evolves.

What we decided as a group, was that we needed to create a partnership with one of these companies to be able to rely on them for the information that we would need, as well as to be able to support them in terms of defining for them what information is needed by an insurance company or by a health services company such as GHI.

1(d) Transition-to-use: core team members

Core team members understood the task of transitioning the IT application from development into ongoing use largely in technical terms, that is, tasks such as system testing, data clean-up, hardware roll-out, and training on system mechanics. This focus is evident in project descriptions, work plans and other planning documents, which list primarily technical tasks and discuss technical issues associated with transition-to-use. They seemed to take it for granted that system constituents would readily use the system, as a project leader commented:
I strongly believe that given the tools most people will strive to use them, and that's what I see beginning to happen with INFOSYS.

There were two notable exceptions to this generalization. Ideas, Inc. consultants on the BIS project did address the organizational complexity of implementation. However, their ideas in this regard did not have a strong influence on other team members' actions. EVP Sam Brady also discussed the potential that sales representatives would resist using IT as he envisioned. However, he believed that employees who could not adapt to new ways would leave the company.

BIS team members often commented that system constituents were eagerly awaiting the system, and, as they state in the BIS business case document, system usage would occur automatically:

Improvement in data quality, ease of use, and increased functionality will motivate end users acceptance and result in increased system usage.

Core team members attributed any hesitancy to use the system to individual differences. For example, Heather Johnson assumed that reluctance to use INFOSYS was due to being a "computer phobe:"

There are those who are going to take to it like a fish to water and there are going to be those that are kind of dragged slowly behind. Um..cause there's always going to be this certain few people, computer phobes and that type of thing, but I think that the...advantages and ease of use is going to file it way down.

Core team members' emphasis on the technical aspects of transition-to-use and their lack of emphasis on transition from the users' perspective was evident in the ways they described transition-related activities, for example, in the business case document which the BIS team used to present the project to Sales Executive Vice President Sam Brady. This document lists several major technical risks associated with the project but makes only one mention of users' role:

Sales leadership must enforce usage of the system ... Sales leadership should develop and enforce sanctions if BIS is not properly maintained.

Among numerous technology changes listed under the heading "Change Management Implications," only two points address implications for system users:

The implementation of Phase I will impact all current users of the [existing] MSIS system.

There will be increased requirement for data collection by the Customer Business Units. End users must input the required data.
The BIS core team's lack of emphasis on transition-to-use from the users' perspective was also apparent in their preparation for this critical presentation to EVP Brady. Leslie Thomas, instructing Jane Flynn on how to discuss this section of the proposal on change management issues, commented:

Just say, 'Implementation of the system will include some cultural changes and sales process change, which will be part of the roll out.'

In the meeting, Jane's discussion of these issues consisted of one brief mention:

Of course, change management will be part of the rollout.

The INFOSYS project team similarly focused on specific technical tasks to make the system "available." Work plans and other project documents focused on the technical tasks of building and testing the database. Memos outlining the project scope and goals list multiple technical objectives such as extracting data, providing updates, and modifying databases. Only one objective related to users, which limits team members' responsibility to "providing technology," is mentioned:

"Provide analysts with the ability to access data through the INFOSYS menu-driven reporting system."

Core team members did expect, however, that training in system use was important, and they assumed responsibility for it. Leslie Thomas commented on several occasions that training would be essential. BIS project plans and budgets included funds for training. The INFOSYS team had hired a full-time trainer and was conducting training at the time of my study. However, I noted that in both projects, training sessions were brief, half-day sessions which focused on the mechanics of logging on and off the system and moving through the menu of reports and queries, with little discussion of the meaning of data elements and none of actual use practices.

1(d) Transition-to-use: system constituents

System constituents' expectations for transitioning the IS application from development into use centered on their need to integrate the technology into their day-to-day work lives. This was more evident among constituents of the INFOSYS application, because two phases had been completed and implemented at the time of my field study:

• *Training is just the beginning* -- Like the core team members, system constituents assumed that training would be required in the mechanics of how to use the system.
However, they expected that, beyond classroom training, they would need to "play with" the system and to experiment with using the system in actual work situations to understand its limits and capabilities, as these comments by a variety of system constituents illustrate [emphasis added]:

It's a learning process. You get on a machine, you have to *learn the ins and outs*.

You have to be able to get in there, *start playing with it*, and it's something you develop.

A lot of time what I'll do is I'll *try to incorporate using the new system into a project* that isn't going to be going out to a provider.

To learn the system, I think, really, to me, the way I look at it, I really need to *just do it for an account* so I can just start doing some stuff instead of going training sessions ... because that's when it really matters.

• *Inadequate time to learn a new system limits its use* -- System constituents anticipated that it would be difficult to find the time to play and experiment with a new tool, while continuing their ongoing responsibilities:

  I haven't had the time really to devote to learning it, but it's there. It can be used.

  It's been extremely difficult for me to actually to go in and actually sit down and play with INFOSYS, go spend a week and play with it and find out how to research my accounts and everything else.

  Under the current environment I think it is going to be difficult to utilize it to is utmost because of the fact that my team, itself, is understaffed tremendously.

  We're really swamped right now ... I don't know how to find the time.

One data analyst explained how the conflict between ongoing job demands and the need for time to experiment and play resulted in limited system use [emphasis added]:

It's [INFOSYS workstation] sitting under there [desk], not being used. The reason - and this is an interesting thing, I think in terms of systems coming live ... when a system comes on, you have to test it before you can use it ... It's like a Catch 22. *If you use it, it's going to, first of all, cost you something, because you have to take the time to learn it ... If you don't go out and do that, then it just sits there and it's never been tested and it's never been used.*

• *Developing expert users to share knowledge facilitates system use* -- System constituents thought that having staff dedicated to using the technology, to learn it in depth and then sharing knowledge with others, was a solution to the "Catch-22," as several users commented:
I think if a group was formed ... where areas throughout the company that have interest in the INFOSYS data ... got together and made the commitment to develop an educational process and develop a feedback group, and develop a clear owner of that, then I think that would go a long way toward making it happen.

In order for anyone to use the system with any degree of certainty, they are going to need to understand what's in that system, how that data interacts. So, I would like to see some educational effort, whether that is centralized or decentralized, on understanding what's in the system.

The first thing would be, possibly, right now, would be to get a couple of people who were dedicated to just sitting down and playing with INFOSYS ... someone who could really become an expert at INFOSYS.

- **A critical mass of users is needed** -- System constituents assumed that having a critical mass of users and organized support for using the system, particularly from management, was critical to transitioning the system into use:

  Without someone pushing [us] to use the system and to give feedback and to meet regularly to discuss it, I think it is going to languish.

  If more people on my team had it, I think it would drive me to use mine more, and if our managers wanted to see stuff off of our notebook files.

  Unless our superiors are trained in it, it doesn't really help us that much because we end up having to do the things we did by hand, still by hand, because they can't take the data that we have and manipulate it themselves. So if anyone needs to be trained on the notebook, I think it's the people that make the requests for data.

- **Technology use depends on individual characteristics** -- Many potential users expected that, ultimately, the type of use and the extent of use of the IT application depended on personal characteristics of the user, as comments by these users illustrate [emphasis added]:

  I think in every sales group, you have high performers, you have low performers, you have medium performers ... you're dealing with a proficiency issue.

  *People are always afraid*, you know, if they are not familiar with computers and technology then you are almost afraid. I know, some of the reps that I work with ... they give their notebook to their service reps to use for field service but they have the old Compaq 286.

  I've always been interested in, I like programing to a certain extent. *Other people ... are not as happy working with computers.*

A sales leader explained how, acting on these assumptions, he had transitioned the BIS notebook pilot into use in his area [emphasis added]:

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Chapter IV (77)
My expectation from the beginning was very clear that this is how we are going to manage our business, through the use of this tool and that everyone was expected to bring themselves up to speed on that, with as much support as they needed, and I just had to be sensitive to the fact that some people were going to need more time and more support to be comfortable with it than others.

1(e) Inter-project coordination: core team members

As core team members became aware of other projects in the organization, they considered how such projects might influence requirements for the IT application they were developing. In doing so, core team members struggled with conflicting assumptions and expectations about inter-project coordination. On the one hand, they assumed that project teams should work cooperatively to make best use of organizational resources and to produce IT applications that worked together in a logical flow. On the other hand, they were committed to and believed in their own project. When faced with goal or resource conflicts, they wanted their own project (and themselves) to be supported. Team members' drew on different assumptions and held different expectations relative to other projects, depending on how they characterized the other project:

• "Critical success factor" projects -- Both the BIS and INFOSYS applications were dependent on data from other application systems, which were simultaneously under development by independent project teams. Success of the BIS and INFOSYS projects (i.e., meeting stated commitments for IT delivery) thus depended on these teams maintaining their schedule for IT delivery. Team members understood project coordination in these instances as communicating requirements to the other project team and making sure that management was aware of these dependencies. In the BIS project business case document, for example, completion of the Corporate Information System (CIS) was described as a "critical success factor" to emphasize that the BIS team's success was dependent on completion of this project but was beyond the team's control.

• Tails and dogs -- Both project teams encountered projects with overlapping but potentially complementary goals. In these cases, project team members assumed that coordination and cooperation were essential but struggled over control issues. The BIS project team struggled for months to coordinate their efforts with a re-engineering project, the New Business and Renewals (NBR) project. Members of the two teams disagreed about which was the broader-based, more critical project and therefore should control decision-making in key areas such as technology selection, a disagreement which team members sometimes characterized as "which is the tail, and which is the dog?"
INFOSYS project team joined forces with the Provider Analysis and Reporting (PAR) project team, when the PAR team recommended the INFOSYS software for this application. Most INFOSYS core team members saw this as fortuitous, because the INFOSYS project gained legitimacy and support as a result. Underlying tensions around control and recognition between the INFOSYS and PAR teams were also evident.³

- **Warring camps** -- In some cases, the goals and scope of two or more projects overlapped to such an extent that there was clearly redundant effort. In this situation, projects competed for resources and organizational support. This happened when the INFOSYS project came into direct competition with another project, the Decision Support Data Bank (DSDB) project. It became apparent to project and business managers that these projects were constructing duplicate databases. Some core team members assumed that a decision should be made to continue with one of the two projects to eliminate redundancy, but both teams assumed that their IT solution was better. Tensions arose between the teams, a situation which the INFOSYS project sponsor described in terms of “warring "camps."”⁴

1(c) Inter-project coordination: system constituents

The system constituents I interviewed had little knowledge about how the project in which they had been involved related to other IS development project or other organizational initiatives, unless they had been directly involved in a related initiative. For example, some of the potential INFOSYS users had been involved with the vendor selection process in the Provider Analysis and Reporting (PAR) project, and thus were aware of the merger of the PAR project and the INFOSYS project. Constituents who were users of the DSDB system were aware of the conflict between this project and the INFOSYS project, and they anticipated that a decision might be made about which project to continue. For the most part, however, system constituents had little knowledge of the relationship and the potential conflict among various projects, and, therefore, they expressed no assumptions or expectations in this regard.

**Category 2: Essence of the IT Application**

The second analytical category of assumptions and expectations that ISD participants drew on in requirements definition activities centered on their understanding and

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³The merger of the PAR and INFOSYS projects is discussed in Chapter VI, Episode 3 of the framing process for the INFOSYS project. Interactions between team members and user project sponsors is discussed in Chapter V, Section B.4.a.

⁴See Chapter V, Section B.2 for a discussion how team members acted and interacted in this situation.
conceptualization of the information technology application. These categories reflected both general knowledge and expectations about information technology and systems and specific assumptions about the application under design, i.e., the design and features of the applications, its operation and use, likely stages of development, and its fit or position in the total systems "landscape" or environment. In the following sections, I discuss the aspects of core team members and system constituents frames related to the four sub-categories of the major category, *Essence of the IT Application*.

2(a) IS application design: core team members
Core team members understanding of the IS application design included specific expectations about features and functions and more general assumptions about the type of features that were desirable. Both the INFOSYS and BIS project teams had defined lists of specific requirements that the proposed systems would provide. In the BIS project, core team members developed a data-entity model for the proposed customer and marketing database and identified types of reports ("pipeline" reports, "win-loss" analysis, forecast reports, etc.). The INFOSYS core team similarly focused their efforts on defining the data model and determining how to find suitable data from transactional systems to load into the database.

Underlying their expectations about these specific requirements were general assumptions about design features of the system and the hardware / software platform on which it would be implemented:

- *"User-friendly" access to relational databases for ad-hoc reporting:* BIS and INFOSYS core team members understood the IT application in terms of two related design features: i) a "user-friendly" interface with end-user reports and query tools; and, ii) a database or repository. Leslie Thomas, for example, characterized the BIS application in this way:

  Basically, what BIS is, in my estimation, is a huge database, relational database, with a report writer and other things attached to it.

Tim Crane, an INFOSYS project leader, similarly understood INFOSYS:

The INFOSYS system is really kind of made up of two pieces. There's the piece that runs on the mainframe, *the big database, the DB2 database*, processing that updates the database. And then there's the component that sits on the PC ... where you have the *graphic user interface*, where you have the point-and-click and all that stuff.

The "user friendly" interface was a key requirement to virtually all the core team members, as these comments from various informants illustrate [emphasis added]:

Chapter IV (80)
There's some theories that say, you don't have to spark their interest, because they're going to use it. But you need to want to use it, be able to use it, have it user friendly in order to use it.

Not all the other systems, or where they could get all that information, have a -- I hate the cliche, but a friendly front end, meaning, being able to log on and do it themselves.

We don't have a user friendly tool to get at the data. That's something a lot of people are concerned about ... The typical user shouldn't, I say, can't, shouldn't have to be writing SQL to access data.

INFOSYS has the, you know, user friendly, quote, unquote front-end. Which allows analysts to go and do reporting.

[We wanted] a user friendly, very user friendly mainframe system. If people could really query and get answers to different questions on their own, you know, empower the people.

A comprehensive, relational database, to be accessed through the "user friendly interface" was the second key feature. The BIS requirements study document states [emphasis added]:

Internal information requirements and external competitive pressures necessitate that the company develop a relational database which carries whole business relationship information down to the account and member level.

This requirement was reiterated months later in the business case document [emphasis added]:

The Business Information System (BIS) project will provide GHI, Inc. with a single repository of sales, marketing, and strategic information.

Core team members interpreted the fact that such a central database did not yet exist as a major deficiency. In an interview, this technical consultant articulated his amazement that this had not yet been accomplished:

I mean, here we are, in 1994, and they [GHI] don't have a single repository for all of their data.

Lack of an integrated database was also identified as a problem which the INFOSYS project would help address, as the technical manager commented:

[Users] need to go to flat files off a different system to get other information and right now. It's not all consolidated in one place ... people getting files and doing their own extract of things. It's really kind of a scary thought.
The INFOSYS application was thus described in project descriptions in terms of its database:

The INFOSYS system is a vendor package... It consists of a customized IBM DB2 database and the accompanying software to convert, edit, and load this database from GHI claims, provider, and enrollment data.

- **Client-server hardware / software platform** -- Several key core team members assumed that a client-server hardware / software platform was essential for providing a "user-friendly," graphical user interface (GUI) and access to large databases. Tony Foley, the CIO, expressed typical expectations about client-server technology:

  The client server architecture is perfect for tying together loosely coupled legacy systems ... you build a client on the front. It takes the customer number, goes to the legacy systems, gets the information, on insurance coverage, claims history, whatever. The information gets splattered on the screen ... that’s the reason for taking it off the mainframe, and putting it on a client.

Sales EVP Sam Brady was also a vocal advocate of client-server design approaches, as were team members from the HMO-2 MIS department. When they joined the BIS project, these individuals influenced the thinking of other team members, who had little personal experience with this new technology, yet they adopted the assumption that this technology was essential to the BIS application design.

INFOSYS core team members tacitly accepted the client-server design embedded in the INFOSYS package. They focused on the desirability of the package as a whole, rather than on its hardware and software design. An INFOSYS project leader articulated this assumption:

  Client server means nothing unless you have an application to put on it. Neither does mainframe.

In fact, INFOSYS team members generally did not use the terminology "client-server" to described the INFOSYS technical design. Only in conversations about a competing project (the DSDB project) did this terminology arise.5

2(a) **IT application design: system constituents**
System constituents' assumptions and expectations about the design and features of the IT application reflected what they had seen in demonstrations, in training classes, or in initial use of pilot applications and what they had heard about in presentations. In the BIS

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5See Chapter V, Section B.2.b for a discussion of how debates over client-server architecture arose between the INFOSYS and DSDB project teams.
project, system constituents focused on two aspects of the BIS application: i) technology tools such as notebook computers and word processing software; and ii) replacing the existing MSIS system with a new, improved database:

- **IT tools:** Members of various sales units had seen demonstrations of notebook computers with sales activity tracking software and some had received hardware and software in a "quick hit" pilot project. Their expectations for the BIS application mirrored the features of the software. One sales manager, who had led his group's use of the IT applications, described his expectations for the application in terms of the kinds of "tools" it would provide [emphasis added]:

  With the notebooks, it's a piece of software that allows them to, obviously, record all pertinent information that goes into developing a selling strategy for an account, so, first of all, it's an information gathering tool. It is also a storage tool ... They can sort it by various ways, like industry or like competitors ... when you speak to an account ... you can also put in a call back date or a send letter date or a meeting date ... as you talk to more and more accounts, you accumulate this information and it subsequently comes up in a calendar type format so that each day when you come in, you can essentially push a button on this notebook and at least a good portion of your day is right there in front of you ... So it's a good time management tool, as well.

Other members of the sales organization had less specific, but similar, ideas:

  I wasn't looking at it as anything more complicated than dialing into their notebook and asking for a report on their performance.

  We were supposed to get a system that could provide us the type of information that we were looking for, but that it would be, number one, we were going to be able to get that on PCs so that we could have access to it right away, and then we could just upload it from our PCs.

**ii) MSIS replacement:** Some of the system constituents also thought about the BIS application as a marketing database with reporting features:

  It was more of a marketing, account level database and reporting system. I think, also, it was supposed to add, have the added features of forecasting.

  So, at the very broad brush, it really should be, and what we need, an employer database for the territory that we cover, and historical data about companies that had had GHI, as well as all the companies that have an existing GHI product.

System constituents' expectations for the INFOSYS application similarly reflected the knowledge they had gained in demonstrations or in training, that is, that INFOSYS included a "user friendly" interface which provided various analytic metrics and reports, as these descriptions from system constituents illustrate:
... a professional system that could do some complex-type querying and pretty much point-and-shoot menu-driven type system.

... more menu driven and could really support the goal of being able to provide quick ad-hoc type information and to be able to as well import normative data and combine different elements rather easily.

... you can point and click ... tailor your own report.

... standard reporting capabilities, in some instances, like with DRG's and MDCs

I know they'll have a completion factor built in ... having some kind of statistical comparisons, physical model built into it, significance testing, chi-square testing.

2(b) IT-in-use: core team members

In addition to their assumptions and expectations about the design of the IS application, core team members drew on their prior experiences with IT, their assumptions about how the technology would be used, and what usage-related issues might arise, as they considered requirements. All core team members drew on their knowledge and experience with systems as they considered usage and operational requirements. However, managerial members of the core teams tended focus on usage, while technical core team members were more concerned about operational issues.

• Interactive, ad-hoc reporting by end users: Both the INFOSYS and BIS project team assumed that the IT application would be used by a broad array of organization members to generate "ad-hoc" reports interactively, without administrative or technical assistance, using the user friendly interface. BIS team members expected sales executives and managers to review summary reports on notebook computers and sales representatives to both update databases with data on their activities for transmission to managers and to generate their own ad-hoc queries from the BIS database. INFOSYS core team members expected data analysts from various functional areas to produce ad-hoc, analytic reports themselves, without technical assistance. Both groups sought to eliminate the need for programmers to do ad-hoc reports. The scenario described by this INFOSYS project leader is typical of how core team members envisioned users interacting with the system:

Let's say the account reporting people -- if they had a quick question that they needed an answer to ... they interactively could go into INFOSYS and get that answer. To get that answer themselves, it would be a matter of a couple of hours. Whereas today, I think that they would need some technical support in terms of writing a program.
• *Operational considerations* -- Operational considerations were not yet salient to the BIS team, perhaps because the project did not proceed to implementation during my field study. For INFOSYS team members, who had implemented the first two phases of the projects and thus were faced daily with daily operational problems, operational issues were salient. Technical team members were particularly concerned about how to get the IT application up and running, and how to maintain it on an ongoing basis. One INFOSYS technical team member's comments illustrate typical concerns and assumptions:

> We have some fairly awesome, I guess is the, to use the popular vernacular, some rather long-term, long-running jobs that deal with this amount of data and that it's sometimes like wrestling an alligator, getting into a manageable time frame and under control so you can predict it.

He noted that this poses a problem because of limited computer resources:

> On the one hand, you have one system that wants to take all kinds of time and all kinds of space. You can't let it do that. There have to be priorities between the applications and any ongoing stuff.

Team members did not expect operational issues to stop when the system "went live" but to continue as use of the application grew, as he continued:

> It's like, you know, you are climbing a cliff, you put in a spike, pull yourself up on that spike. When you're there, you then start nailing the spike as far as you can reach above you. What it seems, is, okay, we've achieved that much; now let's try for the next goal [to improve operational performance].

Core team members also expected that managing the operation of the system to ensure response time would be critical to user acceptance, as these technical team members commented:

> The assumption was that we would have 20 concurrent users going on, and so a certain performance level would be expected to support that level of activity and as long as those assumptions are held and the performance levels are met, I think that there is a great opportunity for INFOSYS to receive acceptance and become the leader as a tool in reporting.

> I think that's one of the most common complaints of any terminal user is -- how come I don't have enough -- how come I don't have a fast enough terminal?

2(b) IT-in-use: system constituents

System constituents drew on a variety of assumptions about how the IT application would be used and who would actually use it. Their assumptions reflected their limited knowledge of and experience with the IT application and their interpretation of the technology as a tool that would incrementally improve personal productivity.
In the BIS project, only a small pilot program was implemented during the time of my field study. In the pilot group, sales representatives who had received notebook computers expected that they would maintain personal databases on sales activities themselves, and that they would periodically provide files to managers for their analysis. However, they had only a general idea about how this would occur. They also assumed that support personnel in the sales offices should do some of this work, as this sales representatives commented:

I think the ideal was to free up our time so that we could sell, and I think we missed the boat by not giving the support people the availability to do some of the things that we have to do off the system.

System constituents for the INFOSYS project had more exposure to the technology at the time of my field study, because there was a pilot system installed. They were aware of the graphical user interface and the potential for generating reports interactively. Data analysts and their managers, who had received training or seen demonstrations, expected analysts to use the INFOSYS system, but, at the same time, they anticipated support or technical staff would also generate reports from the database:

I think, in the current setup it is going to end up being people like myself, and the health care specialists ... but I think, also, the systems people, themselves, are going to end up, at some point, utilizing the new system as well.

If I give them a request ... the systems people can determine which database they need to run it off ... they can run SAS against the INFOSYS database ... It looks like that is going to be something that we are going to be doing, as well.

Some system constituents of the INFOSYS application thought that a wide variety of people would use the system to do ad-hoc reporting, as one manager noted [emphasis added]:

I am hoping a lot of people will use it. In fact, I am guessing all the analytic staff will use it ... I think that INFOSYS is going to open up the doors to a lot of people ... And when the data opens up I think a lot of people are going to jump on the bandwagon and try to access it.

Others believed that usage would be more limited, due to time required to learn the system or system resource constraints [emphasis added]:

The fact is, INFOSYS, as nice as it is ... has a lot of nuances, and, really does require a commitment to sit down and learn how to use it that I don't think a lot of people are going to want to go through that. A lot of them are not inclined to do it.
I don't see people just jumping on because how much resource is there? ... The capacity of that CPU is what's going to drive how much people are going to be able to use it and who's going to be able to use it.

GHI analysts were also unsure whether they or the clients to whom they provided analytic reports would be the actual INFOSYS user, as this analyst noted:

I thought it was going to be more for our clients, our bigger clients in that they would actually have like a live terminal ... Then I heard talk about that some reporting people would be using it as a tool ... and we would use it for the account.

Although system constituents expected to use INFOSYS for ad-hoc, interactive reporting, they also realized that much of the reporting that was currently done or was planned involved producing large numbers of standardized reports on a periodic basis. As several analysts noted, it was infeasible to do these reports interactively through the interface:

I think in terms of profiling the doctors, I don't think that I will crank out 500 or 600 or 700 profiles at my local workstation and disseminate them.

Part of the standard report package we're putting together is that regionally we shouldn't be running information ourselves. It should be one state-wide production of this stuff.

They expected to access the INFOSYS database through batch processes, and, at the time of my study, two user areas were defining packages of standard reports to be programmed and run in batches using the INFOSYS database, rather than through the INFOSYS interface.

2(c) Stages in the IT application: core team members

BIS core team members' assumptions about requirements for the new IT application were strongly influenced by their knowledge of and experience with past or existing systems. The existing marketing system [MSIS] provided a structure for their thinking about the new system. Team members conceptualized new functions or capabilities in terms of replacements, enhancements, or additions to capabilities in the current system (MSIS). Their reliance on their understanding of the current system to understand the new system was evident in their actions. For example, to introduce new team members to the project, Mark Smith, the business analyst on the BIS team, would demonstrate and "talk through" the MSIS application. They drew requirements for the new BIS application, in large part, from the features in the existing MSIS application. This influence persisted even when the team was consciously trying to "think outside the dots." Note, for example, how Leslie Thomas characterized the limitations of an early BIS requirements study [emphasis added]:

Chapter IV (87)
We basically documented what we did today. We didn't look at the future. We
didn't look outside the dots. We didn't look at things we weren't doing, that
we should be doing.

After conducting a new requirements to identify new, strategic, or creative uses of IT in
sales, however, the team still interpreted the new technology in terms of the old. Again,
Leslie Thomas described the BIS application [emphasis added]:

The charter of this project is to replace the MSIS system with its current
functionality, and some added things we've added on to it, but not much. A
little enhancement to it. So, if you will, if you just take the MSIS system and
replace it, in a new technology, that is, I mean, if you added fields or data
elements or what have you.

INFOSYS team members, having selected a vendor package, were less influenced by their
understanding of existing reporting systems. In fact, they had given little consideration to
how the new system might fit in with or replace existing reporting systems.

Members of both teams did, however, envisioned the IT application as evolving
through multiple, future states. The INFOSYS team had planned a series of stages in the
application development, leading to the "full book of business" (i.e., data from all
customers and all products) available in the database and to new releases of the INFOSYS
package. BIS team members thought in terms of "throwaway" software (i.e., temporary
solutions) and of phasing in technology features in steps.

2(c) Stages in the IT application: system constituents
System constituents expressed few thoughts about how or why IT systems might be built
in stages and how they might change over time. However, a few INFOSYS users did
comment on the need for systems to evolve as business changes evolved:

Databases are constantly changing ... there's new programs, you've got to meet
the new business needs, new products ... It's constantly evolving, so I don't
think it will ever be so straight forward.

I also kind of got the impression that it was going to be an ongoing process that
as needs, future needs were identified, INFOSYS would be flexible to
incorporate the needs.

2(d) Systems landscape: core team members
Core team members conceptualized the IT application under design as fitting into the total
IT environment consisting of application software, operating systems, hardware,
networks, and so on. They expected "legacy systems" -- mainframe transaction processing
systems -- to be the "engines" which would supply data for the data "warehouses" (or
databases) to be accessed through "user-friendly interfaces." Team members' use of spatial metaphors such as front-end driver, back-end reporting system, up-stream data sources, etc., suggests the kinds of physical relationships they envisioned between IT applications. Spatial relationships between systems were graphically depicted with flow-chart or context diagrams.

Core team members also held assumptions about how the IT application would influence, or should be influenced by, the technology infrastructure of hardware, operating systems, database management systems, communication networks, and so on, at GHI, Inc. BIS team members, for example, tended to assume that the IT infrastructure needed to implement the BIS project would be in place when they needed it for implementation, or they could at least hold other IS personnel responsible for its creation. INFOSYS team members, on the other hand, had overseen installation of a limited amount of hardware to support implementation of the INFOSYS application. While they were aware of potential future issues (e.g., INFOSYS's OS-2 workstation did not comply with the corporate standard), they relied on the software vendor to upgrade the package in ways that might be needed.6

2(d) Systems landscape: system constituents

System constituents were familiar with key transactional systems in the organization and they were aware that data from these systems would be used in the data warehouses created by the BIS or INFOSYS projects. Beyond this, they had little knowledge of how these IT application would fit into the broader array of IS applications or what changes might be required to implement the new system.

System constituents also had direct experience with the IT architecture at GHI. For example, some INFOSYS users required two workstations -- one for INFOSYS and one for the DSDB system -- because these applications had different, incompatible technical platforms. Sales representatives who participated in the BIS pilot program had obtained notebook computers, but these computers could not be connected to the corporate network except through a modem and they were not connected to each other. However, system constituents I interviewed seemed to take this situation for granted. They apparently had little understanding of issues related to building and IT infrastructure and expressed few if any expectations or assumptions about how IT infrastructure issues might affect the BIS or INFOSYS project.

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6For example, several team members mentioned that INFOSYS was planning to release a Windows-based version of the software, which would make the package compliant with GHI standards. They also commented to me about INFOSYS, Inc.'s investigation of super-computers as a replacement for the mainframe in the future.
Category 3: Essence of the Organizational Environment

The third major category of assumptions and expectations that project participants drew on during requirements definition activities related to their understanding of Group Health, Inc.'s business and of how IT use might enhance or change business operations, including both general assumptions and expectations about how information systems should support an organization and more specific knowledge and understanding of GHI's activities, processes, and problems. In the following sections, I discuss aspects of frames related to the three sub-categories in the major category, Essence of the Organizational Environment.

3(a) External environment: core team members
Core team members expected that the kinds of IT applications they were developing could serve two purposes: i) to help organization members better understand GHI's customers, providers, etc.; and ii) to lend GHI status and legitimacy with its customers and providers.

i) Understanding the external environment: The goals of both the BIS and the INFOSYS projects were to collect, store, and present data related to GHI's external business environment (e.g., on customers, subscribers, health care providers, etc.) to organization members, and through their use of the technology, to enhance their understanding of the environment and of issues and opportunities. Sales EVP Sam Brady was a vocal proponent of the potential for IT to be used in this way [emphasis added]:

The key point was if we're going to start to focus on the revenue side of the business which I obviously thought we needed to, we needed to have system support in place to begin to understand and track both our current customers and prospects and also to help the salespeople prospect better and then have a higher opportunity to close business.

These assumptions were echoed by consultants Brady hired to work on the BIS project:

This system will be used as a way to use your data and value it and develop your strategies with that knowledge base, so that you can go out and sell your product with a competitive advantage.

Real high level, this should help GHI to understand the customer better.

BIS team members articulated similar assumptions in BIS project documents, for example in the requirements study documents [emphasis added]:

Building a successful sales culture requires the effective use of customer, marketing and sales information.
Internal information requirements and external competitive pressures necessitate that the company develop a relational database which carries whole business relationship information down to the account and member level.

BIS will be a tool to identify threats, opportunities, strengths, and weaknesses that GHI faces in its market.

Similarly, members of the INFOSYS core team expected that INFOSYS would help GHI organization members interpret its external environment better, by providing comprehensive information in databases and analytic tools to examine claims experiences of customers and performance of providers.

**ii) Gaining status and legitimacy:** Core team members assumed that using IT would add to GHI's "image" and thus enhance their influence with customers. EVP Brady articulated this assumption about INFOSYS, seeing it as a way to gain advantage with customers:

> We want to make it hard for customers to leave us by giving them this kind of technology support.

This expectation is also evident in INFOSYS project documents, for example, in this statement of expected benefits of the project:

> [INFOSYS project will assist] in the attainment of the GHI goal of being a market leader through our association with INFOSYS, Inc., a company which is widely recognized as being on the cutting edge of health care reporting and analytical trends.

Various members of the INFOSYS core team similarly commented on the potential for the INFOSYS technology to impress customers:

> I think there is a lot of use for it in dealing with specific accounts ... they can get their own information off the system which I think provides some good PR [public relations].

> I think that we would have accounts, customers, that were much happier with us. I think that we would be able to go out to a lot of our major accounts and say 'Here's a demo of what we have and here are your options.'

BIS core team members shared these expectations about the legitimacy to be gained from using IT. In several conversations with me, for example, Jane Flynn and Mark Smith expressed their belief that having notebook computers would make sales representatives seem "more professional." They expected sales representatives to carry the equipment with them on customer visits and provided each with carrying cases for this purpose.
3(a) External environment: system constituents

System constituents articulated a limited number of assumptions about how information technology might influence GHI’s position in its external environment. Several mentioned the potential of IT to help organization members understand and react to the external environment [emphasis added]:

In a service business you should just be so close to your customer, that you're just kind of standing outside their office door whenever they need you. And the way to really be there in any quick basis, when you're as large as GHI, is to have a really state-of-the-art management information system, or marketing information system.

From my perspective and the perspective of a lot of people who have to deal with the day-to-day issues relating to accounts and physicians and so forth, we see that you can't really do the core business correctly without the information, the data infrastructure, in place, and reporting to support that.

Others expressed the expectation that GHI, Inc., could be viewed more positively in some situations by using IT with customers. For example, one sales leader commented on this:

People can bring the notebook into the field ... It really gives us the ability, in a higher level presentation, a more sophisticated situation [for] a very polished, good looking presentation that you can interact with and I think today it is still cutting edge enough to impress people.

Similarly, managers were anxious to demonstrate the INFOSYS application to potential customers, to show accounts the advanced reporting that GHI would soon be able to do.

3(b) Business practices and processes: core team members

As they assessed information collected in requirements definition activities such as user interviews, core team members drew on several related assumptions about how IT could and should be used in business processes to change or improve processes and how roles and responsibilities would change as a result. Members of the BIS core team articulated the first four assumptions, which related to Brady's ideas about using IT ins sales processes and Thomas's objective of "fostering a sales environment," Members of both team shared the fifth assumption.

i) Using IT tools can change the way sales is done, resulting in more "face-to-face" sales time -- Increasing sales productivity and revenues through use of information technology -- "sales force automation" -- was one of Sales EVP Sam Brady's goals. He articulated his assumptions about how this would translate into more "face-to-face time" in a BIS project presentation:
There will be an integrated set of [IT] tools to help manage sales activity, which will free up more time to devote to sales, not to administration. We need to move up to 50% face-to-face time.

Leslie Thomas expressed similar assumptions about how IT use would benefit sales representatives:

We need to look at ... technology, that allows them to do their work, you know, faster, smarter, quicker, cheaper.

Members of the BIS core team expressed these expectations in interviews, team meetings, and in project documents. For example, as they prepared the BIS project business case document, Leslie Thomas and Jane Flynn estimated benefits of the BIS project by estimating reductions in sale representatives' administration time and translating time savings into projected increased sales revenue.

ii) IT use will reduced administrative support -- In addition to saving sales representatives' time, BIS team members expected that, by providing the BIS system, the need for administrative support personnel would be reduced. Leslie Thomas articulated these expectations:

We can make a business case from talking about the productivity of the new system versus the lack of productivity from the old system ... of reduction of people, by using this technology. Do we need as many admin people once we put all this in place? Do we need as much support personnel once we put this in place? My guess is no.

In fact, the cost justification the team created included estimated savings from headcount reduction.

iii) IT can be used to "capture" human knowledge -- In requirements documents, core team members characterized the fact that much information on accounts, customers, and competitors was collected and shared informally and maintained in hand-written files as a problem to be solved, with the underlying assumption being that such information handling is better done through information technology. For example, core team members expected sales representatives would maintain database files on notebook computers documenting all their activities (rather than on paper calendars or notebooks). They assumed that, in the event a sales representative left the company, new sales representatives could use the computer database to understand where relations with each account stood and thus more easily continue the sales process. Team members sometimes referred to these distributed
databases as the "organizational memory" and, in the BIS business case document, referred to BIS as the "corporate knowledge base," suggesting that sales personnel's knowledge of and experience with customers could be documented, preserved, and made widely available to other organization members.

iv) IT use reduces reliance on human actors and human interaction -- Leslie Thomas expressed a common assumption that IT can replace human actors in her interpretation of EVP Sam Brady's direction to make the BIS system a "front-end driver" for the enrollment system [emphasis added]:

I think what Sam was getting at is, how can we automate the majority of that work? You know, to keep human intervention out of it, which obviously allows us to have, if you will, a hundred percent quality, it that's ever doable?

In fact, Brady envisioned an "electronic office" in which personnel communicated through information technology rather than face-to-face.\(^7\) Other members of the BIS core team members echoed Sam's ideas of IT as a medium for human interaction.

v) IT use will shift responsibility for producing "ad-hoc" reports from IS technical staff to end-users -- Members of both the BIS and INFOSYS project teams assumed that IT would change job responsibilities and tasks related to producing ad-hoc, analytic reporting. With existing systems, report requests were handled by a number of people in turn, eventually ending up with a programmer. Core team members shared the expectation that, with "user-friendly" tools for doing database queries, end-users could be responsible for generating their own ad-hoc reports. This shift would both "empower" the end-user and improve life for technical personnel, as Heather Johnson commented:

So I can see people now dealing with the fact that they know the programmers are there for the more complex things ... But in the meantime [analysts] can be playing, and getting something themselves to the account, to satisfy the short term need.

3(b) Business practices and processes: system constituents
System constituents expected that IT could incrementally improve their task performance, by automating manual tasks or facilitating tasks already computerized. Thus, system constituents expected the BIS system to reduce administrative tasks, primarily by reducing the time sales reps spent manually generating reports on their activities, the status of their accounts, and so on. Sales representatives described their expectations in this way:

\(^7\) See Chapter V, Section A.1.a for a discussion of Brady's ideas about Sales Force Automation.
I guess my long term goal would be, ideally, would be if someone needs a report, not to have us actually even be involved with the report, as long as we were updating our data and making sure that the data that we have on our systems on our groups are complete and accurate.

The ideal was to free up our time so that we could sell.

If we can put information in once, and not get requests for paper reports from management, it will work.

System constituents of the INFOSYS application also expected that the system would give them more time to do data analysis by reducing the time required to obtain the data, as these analysts' comments illustrate:

It seems like it just allows you to spend a little more time looking at the data versus gathering the data.

When I send out these reports and I really don't have too much time to even analyze them ... If I had time then I can analyze it before I send it out ... I could become more proactive, I think, in meeting the needs of the client.

System constituents did not see themselves being replaced by the technology. Rather, they saw the technology as a tool that required human effort to be valuable:

INFOSYS is going to be a tool but you still are going to need people to interpret the data and have some experience doing that, in looking at all varieties of data. And that's where I can still see it remaining as a tool.

I mean, putting the thing on someone's desk doesn't give anyone any new information. There's still a lot of work that has to be done to actually get information out of the system ... a piece of software does not equal information to data.

3(c) Information and data legitimacy: core team members
Core team members tended to understand business practices and policies in terms of the data, data models, and data entity relationships embedded in computerized information systems. For example, as I observed Mark Smith, the business analyst for the BIS project, demonstrate the existing marketing system to new BIS team members, I noted that he discussed business policies and practices in terms of how data fields were used and described changes in the organization in relation to changes in what data had been entered into particular fields. As they considered requirements for the IT application in various meetings, BIS team members focused on the relationship between the data fields in their data model, inventing examples and drawing on stories of actual business practice to illustrate various aspects of the data entity relationships.
INFOSYS project team members similarly addressed the complexities in business practices and processes in terms of the implications for data elements they intended to put into the data warehouse. They defined requirements in terms of data fields to be added into the database. The majority of their analytic work involved researching various systems to determine how data fields had been used to identify suitable sources.

Core team members' assumptions and expectations about data quality and integrity were central to their frames about information and data. Members of both teams recognized data integrity as a major problem with existing systems. An IS manager commented on the INFOSYS project:

We really have a lot of data integrity problems and issues that surround the validity of our data ... we can't even balance it. We had to make a lot of calls about how to translate it.

A BIS team member commented on data problems in the existing MSIS system and the problems they entailed:

Data integrity was a big, big issue ... you had, just disparate numbers ... Where there's not a lot of data integrity, right, what do people do? They revert to flat files of their own, and informal networks where they know they can get the answer.

Though core team members realized that data accuracy was a problem with existing systems and expected to improve quality in the new IT application, members of both teams accepted the concept of "garbage in, garbage out" --- i.e., that the new system would only be as good as the data provided to it. For INFOSYS, this meant that, while the team could work to improve data, existing data sources limited how good the data could be. BIS core team members assumed that replacing the existing MSIS system with a new, technically updated system would improve data integrity and reduce data quality issues. They saw this as a symbolic move to motivate sales personnel to maintain sales and marketing data in a computerized system.

3(c) Information and data legitimacy: system constituents

System constituents' expectations about information and data reflected their need to interpret "real world" events from computerized data sources. Like core team members, they assumed that the quality of data available in information systems was dependant on the transactional systems from which data was derived and that data quality problems were inevitable [emphasis added]:

I don't think there is any reporting system that fixes mistakes because the system won't know that it's a mistake. The data is only as good as the live
system or the claims system is good. So I guess we're always going to have to live with the claims system being inaccurate to some degree. *There's always going to be some percentage of inaccuracy in the claims data.*

My philosophy was, okay, the data isn't going to be perfect, but if we don't use it, it's never going to get to be perfect. Ultimately, it will never be perfect. *Data is never perfect.*

System constituents were experienced in dealing with poor quality data. Analysts were used to listing "caveats" about known data problems in their reports, and their hope for a new system was that there would be fewer "caveats." Given their expectation that computerized data would contain errors, they used various methods to gain confidence in the accuracy of reports they produced from databases [emphasis added]:

If I see something wrong, *I'll know it's wrong.* Probably just *from looking at this clinical data over and over and over* and getting to know what it means and seeing things.

That's what I'll try to do with INFOSYS, is try to choose projects that are, *where there's going to be a natural data validation.*

Ultimately it's impossible to do 100% data quality check. But, you can ... *pull up some of the individual cases* that came out based on your constraints and *see that they make sense.*

*It gives you a nice, warm fuzzy feeling when they go out to actually pull these charts* and it's there and it makes sense.

Sales managers similarly described their frustrations, trying to figure out "what happened" based on information provided by computer systems:

We may come into the month of May. *We may have an account retroactively cancelled back to March.* At that point, if we went back and evaluated March, the numbers would be different as of June or vice versa. We may come into May and there may be an account that was sold in May that didn't show up until June but they were effective, they retroactively set up in May. So if we went back and reevaluated May and June we'd see the larger number.

Those numbers off the system are an incredibly powerful management tool ... if you don't have that and if your systems can't tell you that, you can't set strategy ... All the numbers [from MSIS] just started popping out of nowhere and they were all wrong. For the next six months, everything we did in strategies completely went awry because you had no benchmark to know what was happening.

Yeah, well what we spend a huge amount of time on is *matching these up, who's numbers are right,* who's got the right information. So, there's a lot of time spent verifying, justifying, matching the numbers.
Because the sales representatives were paid an incentive based on enrollment figures, they kept data on paper about the accounts they had sold or lost. Thus, they had a more tangible way to test the validity of data from the MSIS system.

In addition to their knowledge of and experience with data quality issues, system constituents' frames around information and data included assumptions about the meaning and legitimacy of data. System constituents knew that data could be, and was, interpreted in different ways throughout the organization, particularly from information systems which attempted to model the complexity of the real world through data models and data files. One manager used the example of determining in-patient admission counts to illustrate the difficulties inherent in construing reality from data processed through information systems [emphasis added]:

In something like claims health costs reporting, loss and utilization reporting, there are so many variations and different ways that you can cut data, define things, things as simple as patient admission. *It's pretty easy in the real world to define it, I think.* Walk in the hospital door, they put you on a bed, you stay there all night. That's admitted to a hospital. That an in-patient admission. But you're dealing with numbers and a computer that are structured in any of a number of different ways, and you want to put all those numbers together in some way that equates to what happens in the real world, *there's a lot of different ways you can do that.* People don't agree on the best way to do it.

Other managers concurred, noting that there were not agreed-upon indices and methods for various types of analysis:

There isn't a definition for case mix, and there isn't a definition for severity of illness adjustments, but sort of the methodologies for doing it. *There is a lot of different ways to do it.*

A big problem in this company is that you've got different people working from different perspectives, *calculating the same thing different ways.*

System constituents disagreed about the prospects for solving information interpretation problems through the use of information systems. Some felt that by defining indices in a system and providing standard reports, that it would be more feasible to have agreed-up definitions, as the comments of a data analyst illustrate:

*[With INFOSYS]* If we all want to look at the same thing, we're all getting the same thing, definitions are the same. If I want the top three hundred providers, and somebody else wants the top three hundred providers, we're going to get the same report and that on the bottom of that report is the selection criteria ... there's going to be a lot more standardization and I think that's a nice piece of it.

Others were less sure that problems would be reduced by providing a new system. A manager commented on his concerns [emphasis added]:

Chapter IV (98)
In a system like INFOSYS which trades off flexibility in exchange for ease of access and simplicity, basically, you end up choosing a way to define something there, that, some people may not agree is the way to do it. Therefore they're basically going to continue to do things their own way, because they perceive it as better. As long as they have other ways of getting information the way they choose to view it, it's going to be very hard to get them to buy into using a tool like INFOSYS.

System constituents who were experienced data analysts expected that, given data quality problems and multiple interpretations of the meaning of data, users needed deep knowledge of both the computer system and the business environment to interpret reports and data:

If you don't use it frequently, you're not going to understand what's in the database ... to understand the caveats ... You have to be involved in a database. You have to be participating.

In order for anyone to use the system with any degree of certainty, they are going to need to understand what's in that system, how that data interacts.

To use an information system, you have to know the history of the company.

Category 4: Project Context

The fourth category of assumptions and expectations that project participants drew on during requirements definition activities reflected their knowledge about and interpretation of the culture and climate of GHI, as it related to developing and implementing information technology applications, about the relationship between the IS department (i.e., the outsource company, Information Systems, Inc.) and GHI, and about IS development policies, practices, and procedures. In the following sections, I discuss the two sub-categories related to the Essence of the Project Context.

4(a) Organizational context: core team members

In analyzing requirements for the IT application, core team members drew on various assumptions about the GHI organization, its culture, and its employees. There was some variance in the salience of frames among core team members due to individuals' experience with GHI and to project differences. In the BIS project, for example, there were underlying themes related to "creating a sales culture." BIS Executive Sponsor, Sales EVP Brady, expressed his assumptions about how GHI had historically addressed sales:

We're not a company totally focused on selling ... it's farming the existing customer base but not necessarily growing a new one. And so there wasn't a lot of focus on the revenue side of business.
Members of the BIS core team agreed with Brady's ideas about sales, as this team member's comments illustrate:

Now that it's more cutthroat and there's more competition and sales reps really have to go out there and pound the pavement, they don't. You know, it's like they are not hungry enough.

Part of Leslie Thomas's job responsibility was to "foster the sales culture:")

I am chartered, in working for Sam to build the sales culture and the sales strategy ... GHI historically refers to sales as marketing ... They rarely use the word 'sales' organization.

These team members assumed both that culture change at GHI was needed and that IT use could facilitate such change.

There was no analogous theme of the need for culture change among members of the INFOSYS project. This team worked primarily with actuarial and accounting functions, and, unlike the sales organizations, these areas appeared to be little affected by restructuring and change occurring in the organization during the time of my study.

I also found difference in salience of frames among individuals related to the individual's organizational experience. Some core team members had a long employment history with GHI. They drew on their experiences with project coordination and cooperation to interpret events in their projects and to anticipate issues. Two long-term GHI employees commented on their expectation that business areas might not be willing to cooperate in IS development [emphasis added]:

I can cite examples ... when areas were pursuing their own initiatives and these camps had, through their own decision, decided not to participate in new development, in things that were aimed at corporate good, because it wasn't necessarily something that they had initiated and sponsored and through their lack of participation, were then able to play the devil's advocate after implementation to say, 'Yes, but you're not doing this and you're not doing that,' so again, it's the lack of cooperation and it's working from the perspective of 'How am I going to benefit? What's in it for me to participate in this initiative?'

Internal sabotage ... there are people here that have their own agendas. That no matter what, whether the project is good, better, or indifferent, if it can not make them look successful, they're not going to buy into it.

The political aspects of GHI's organization made particularly strong impressions on team members who joined GHI after a merger with HMO-2. Two informants commented on the differences in the two organizations:
The way people get treated sometimes at GHI, we're not used to that because they just would never get away with it here [at HMO-2]. I mean here you weren't allowed to write CYA memos. You get in more trouble for trying to write one than you would if you didn't. It just wasn't that kind of environment.

I found that politics and personalities have played a larger role ... than they ever did in any of my experience before... Everything is political, but there's political and then there's counterproductive. I think that's what's going on, at least in the small piece of GHI that I've seen.

Several BIS informants, recently hired from consulting organizations, perceived a lack of individual initiative and an ethic for hard work at GHI:

I always make the analogy of working here is like working at the Department of Motor Vehicles. You know, because it's a big company and it's an old company and people have been doing the same thing for twenty years because they could. You know, they didn't have to be progressive because they were really order takers ... They are not resourceful ... they are slow, you know, to change.

In this organization, it's sort of a, "I can do it tomorrow, or I can do it the next day, or I can do it six months from now" attitude.

The INFOSYS core team included GHI employees who were long-term employees. I noted that these individuals worked long hours themselves. They may not have agreed with the new employees' assessment of GHI personnel, or they may have thought it applicable to some areas of the company. However, they did not articulate similar assumptions in my contacts with them.

Thus, team members drew on various assumptions to interpret events that affected their projects and to understand why it was difficult to accomplish IS development activities. On the other hand, core team members held similar assumptions about the importance and priority of IS development in the GHI organization. Core team members assumed that, to gain acceptance of their project, the project had to demonstrate relevance to GHI's overall priorities and goals. These assumptions were espoused in project documents. The BIS Project Business Case, for example, listed GHI's seven annual operating goals and detailed how the project related to each one. Documents describing INFOSYS project benefits similarly refer to "improved customer service," "increased productivity and effectiveness of staff," "assistance in the attainment of the goal of being a market leader," and so on.

Acting on their assumption that their project was vital to GHI, core team members then focused on prioritizing project activities or priorities among IS projects. BIS team members frequently recalled a planning session held several months before my study, in
which new IS initiatives were defined and prioritized, to demonstrate the importance of the BIS project. For example, Leslie Thomas expressed confidence about the prospects for funding the BIS project, based on its priority rating in this planning session:

It's almost a no brainer. There's nine IS initiatives ... This is number two. So we will get the funding.

INFOSYS core team members similarly assumed that their project was a top organizational priority, as Heather Johnson commented:

The biggest issue is handling the demand for what to do next. Everyone wants new things from INFOSYS ... it's supposed to solve world hunger.

4(a) Organizational context: system constituents

GHI, Inc.'s annual statement for 1993 described the company's strategy as one of transforming itself from an insurance company to a "health care services" organization. The company's strategy entailed growing from the traditional health insurance market by developing or buying Health Maintenance Organizations (HMOs) and even purchasing or merging with physician groups, hospitals, and other providers. Some system constituents interpreted this shift in strategy as supporting (and being supported by) the development of improved information sources:

Basically what's happening in medical management is we are just focusing on being more client oriented. And by doing that we are focusing on putting together an organization with a structure that's aimed at being able to provide the quality improvement information.

I think we've made progress in the company towards information being recognized as a much more highly valuable resource than it was in the past, and that's why you have these large-scale initiatives going on that are at least a pseudo-corporate level.

Other system constituents questioned this, maintaining that little had changed in regard to the organization's need for and support of managerial information systems:8

Our primary product is, we pay claims and we provide health care, and that's the core business ... And then these other things -- reporting to accounts, reporting to doctors are kind of like add-on services, but they're not considered the essentials, therefore they get much less attention.

There are slogans to say be customer-focused and sales-focused, but we're just not sales-focused. Because if you were then time and effort would be put there [developing sales information systems].

8It is important to note that the IT applications I studied were managerial information and analysis systems and that system constituents may have had different frames around core transaction processing systems.
For most system constituents, developing, implementing, and learning to use a new management information system was one of many priorities in the organization, and frequently not always a top priority, as comments by various users illustrate [emphasis added]:

In this company everyone goes in a million directions ... They are just so busy. *They have got a million things on their plate,* that learning to use a new system kind of falls to the bottom of the list.

A lot of time wasn't put in [to BIS project] because *the priority was to get the ISI systems in.*

There's some restructuring happening ... some right sizing going on ... *So, there's 'Is my job safe?' and stuff like that going on here* ... I would say a project like this [BIS] ... I think that that's going to be sort of out there as an initiative but *nothing else will be done.*

I would certainly support anything that would bring this project further along but I think that right now, with the competitive nature of the market, with some of the other higher level projects that are going on and budgets already sort of maxed out and what have you, I would be shocked to see major sort of development in this area [BIS].

System constituents also assumed that political processes and conflicts within GHI influenced project activities:

We always have people who, when they don't feel that they've had the level of input to a project that they feel they should have, then it's going to be very hard to get them to buy into using it.

Underwriting and Actuarial almost dictate what's going to happen with any system in the company ... it's the nature of this company ... the power of all decision making, all systems, everything, comes from actuarial and it's slowly changing now only because the company is changing to a customer service.

To summarize, although a few system constituents believed that developing management information systems was becoming more important to GHI, most saw this as a side-line and thus not a priority for the organization.

4(b) IS development context: core team members

During the time of my field study, a dominant characteristic of the IS development context was the level of antagonism and suspicion that existed between members of the core team

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9 Although implementing the INFOSYS and BIS applications were not a high priority to system constituents, implementing core transactional systems were. GHI had been engaged in the conversion of all their key transactional systems to an integrated packaged provided by ISI, Inc. before and during my field study. Problems associated with this conversion demanded attention and priority in areas of the business affected by the process.
who were employees of GHI and those core team members who worked for the outsourcing company, ISI. ISI and GHI were just beginning to conduct new development projects jointly, and policies and procedures, methods, and experience working together was lacking. Thus, in discussions, interviews, and observations, core team members' discussion centered on general aspects of the "relationship" between ISI and GHI. In practice, the relationship at the project leadership level between GHI and ISI employees were particularly strained. Technical developers appeared to have more mutual respect based on each others' technical knowledge and experience. In addition, relationships among INFOSYS team members had improved through months of working together, by the time I became involved with the project, but tension among BIS team members remained high throughout the year of my study, at times paralyzing the project.

Although there were many circumstances that contributed to the antagonism between GHI and ISI core team members, differences in expectations and assumptions about the nature of the relationship between the two organizations appear to contribute significantly to the situation. The official rhetoric of GHI executives who had negotiated and implemented the outsourcing agreement was that GHI and ISI were "partners."\textsuperscript{10} ISI core team members assumed that, as partners, their role was to bring ideas about IT use and to enforce financial control and discipline in IS development, as the comments of several ISI employees illustrate [emphasis added]:

From the outsourcing prospective ... we are going to be a partner, so we are not going to walk into a room and have them say, 'I want you to do X, Y, and Z.' We take the piece of paper and we walk out of the room and go do it. That is not what we are here for. It is not what they are paying us money to do. We are here to work with them and try and figure out the best solution, give them alternatives.

With outsourcing, discipline is enforced on you ... ISI's success depends on service levels and target dates. We are a for-profit company, so we won't just expand the scope of a project ... With an inhouse shop, as scope expands, you hire more programmers, delay the dates, find excuses ... Discipline is difficult to teach here because they are used to 'I ask, I get.'

\textit{ISI got a bad reputation for enforcing discipline, but ISI has saved GHI $35 million a year, bringing the annual budget down from $100 million to $65 million, and you don't do that by just doing things better.}

Having a good communications plan is critical in outsourcing, and it was not communicated that \textit{ISI had been tasked with enforcing discipline, and priority on IS expenditures.}

\footnote{Lacity and Hirschheim (1993) note that the partnership metaphor is frequently evoked to describe outsourcing relationships but comment that profit motives make a real partnership difficult to enact.}
GHI core team members on both teams did not share these assumptions. Although they realized that they must work with or through ISI, they thought of ISI as a vendor and themselves as the customer [emphasis added]:

I'd like them to treat us as a customer ... if they would behave better, and to treat us as if we were the customer and they were a consulting firm coming in and doing it for us.

ISI, as the vendor, is there to provide IT, provide the tools and the work.

One of the reasons why we contracted with them was because they're, you know, a world-class organization in a sense that if there was something going on and we need bodies, they could get us bodies in.

I think my complaints have to do with the overall organization, the way they consider, what they consider customer service to be, what I consider customer service to be ... The overall relationship was horrible.

Differences in the way core team members understood the relationship between GHI and ISI made it difficult for core team members from these two organizations to work together. GHI team members tended to view ISI team members with suspicion [emphasis added]:

What's happened with the ISI relationship on this project, you can't sort of push that aside and say, 'Okay, we're moving on and everything's okay now,' because it really isn't ... you can't forget that there's a trust factor now.

I don't think my standards are that high. I don't see them [ISI] coming to the plate ... I haven't had one good experience.

What happened is that we could not, we, GHI and ISI, could not come to an agreement as to what we wanted to do. And ISI, they didn't really show, you know, desire to do the work. And they did not want to come up to the plate and take ownership over some stuff.

I think there's always an adversarial relationship [between ISI and INFOSYS, Inc.] ... I still think ISI would like to see the INFOSYS project fail.

Whenever you get to the point where you can put your finger on [a problem] and say "Wait a minute, you know, you really screwed up this project" they reorganize. And everybody's roles change. They play musical chairs.

An ISI technical consultant commented on the relationship issue from the ISI perspective:

We had the terminology of partnership, but the actual performance is not one of a partnership. It's one of a client/vendor relationship ... ISI has often been treated as a vendor, not as a partner ... I have witnessed GHI groups holding and conducting meetings with respect to INFOSYS, internally, and intentionally excluding ISI from those discussions ... an action that shows 'We are in control. We are going to tell you how you are to operate.'
Thus, in their interactions with each other as they planned ISD activities, GHI and ISI core team members' incongruent interpretations of the "relationship" and of each others' responsibility and authority inhibited their ability to work cooperatively.

4(b) IS development context: system constituents

System constituents did not articulate expectations or assumptions about the details or the mechanics of IS development. They did, however, assume that obtaining approval and support for large, wide-scale IS development initiatives would be difficult at GHI, given the diffused organizational structure, the myriad of priorities in the organization, and the ongoing reorganizations and staff changes. For example, when I asked system constituents why they thought the BIS project apparently could not progress into implementation, several sales managers commented [emphasis added]:

*Decision making is fairly diffused,* who is going to pay for it [BIS project] and who really wants it, and you have got a whole bunch of different division VP's that are all going to have to pay for it and have to see some value in it and that group has been in flux. I have been here for two and a half years and there's been three reorgs. It hasn't left us clear ownership for that project.

I think you have a number of advocates around the company that were very interested in this, but as far as where, *what's on the priority list for each person,* it differed, and the fact that we broke out into this CBU, Customer Business Unit structure, has *watered down some of those projects that are important to everybody* but, again, *at different priority levels* for each person.

In a large company like this one, there are many users of information with different needs ... *you need to get so many people involved,* and people have so many different data needs and different ways of looking at things, and also, *a different level of priority.*

So, *in a large organization like this one it's not surprising to me that it gets put off forever.* Of course, in this case we have had a couple of *organizational changes* that also made it get delayed. But I don't have naive expectations that this is simple.

Category 5: Project Identity

The fifth category of assumptions and expectations that project participants drew on during in requirements definition activities reflected a synthesis of their assumptions and expectations about IS development, the IT application, organizational processes, and contextual issues and their knowledge of and experience with the project, its history, goals, and desired outcomes. In Chapter VI, I use a social cognitive process model to describe how participants' interpretation of the project identity changed and evolved in response to changes in the project context. Here, I focus on the kinds of assumptions and expectations
that project participants drew on to understand the project identity in discussion of the two sub-categories of the major analytic category, *Project Identity*.

5(a) Project definition / scope: core team members

As they negotiated the requirements for the IS application, core team members debated specific goals, objectives, and tasks for the IS development project. Lists of goals and objectives were spelled out in project planning documents that defined the project and set its scope. However, core team members often talked about the project in abbreviated terms that encapsulated multiple assumptions and expectations about the project and emphasized its central purpose. Fred Davis gave this brief summary of the INFOSYS project when I asked him if he thought perceptions of the project had changed over time [emphasis added]:

> I think the perception is still what it was originally, and that *INFOSYS was to be a way to access information so that the end users don't have to depend on the programmers to get at most of their data* and the system would also provide additional functionality in that *it is not only a data access tool, it will also provide some additional business functionality*.

Most INFOSYS core team members associated the goal of providing end-user access with the RBC, Inc. story, and the majority of my informants mentioned RBC, Inc. to explain the rationale for the project. For instance, the INFOSYS, Inc. account representative to GHI, Inc. gave a typical version of this story:

> The key use is for reporting to their large employer customers. In fact, I think it was RBC, Inc., one of their large, they call them key accounts, had some discussions with either the marketing or customer business units to -- I don't want to say put some pressure on necessarily -- but to express some interest that GHI purchase INFOSYS and be able to use that as a reporting and analysis tool, specifically for RBC, Inc.

BIS core team members similarly had summary notions of the project's goals and scope, which typically focused on replacing the existing MSIS system with a new, improved system. For example, two technical project leaders cited this rationale for the project:

> As to why the project was initiated, I've only come through sort of third-hand knowledge to understand that MSIS needed to be replaced.

> What BIS is ... is an information warehouse for the sales and marketing data, that they don't have today ... MSIS was not built to support the sales staff.

5(a) Project definition / scope: system constituents

System constituents thought about the IS development project in terms of a few key goals or objectives. For example, many of the potential BIS users thought of the BIS project as
replacing the existing marketing system (MSIS), as these comments illustrate:

It was my impression that it was going to replace MSIS ... We would input data once, or maybe we would have somebody else do it when we sold the group and that would be it.

Well, basically I thought it was intended to replace MSIS, which we have today ... but actually enhance and be everything that MSIS wasn't, and never was intended to be. I mean, basically, a marketing database.

A sales manager had a more general understanding of the project, focusing on "providing tools" for the sales force:

We were really trying to jump start and energize the sales activity within the company and we quickly realized that we hadn't invested an awful lot of money, skill or effort into the tools that the sales folks really need ... Therefore, we were at a couple of off-site meetings to talk about what is it that the sales force really needs ... And out of that came the birth of the BIS project.

Others in the organization understood the BIS project only in terms of providing "tools" to the sales force, such as the notebook computers and lead tracking software package. In fact, near the end of my field study, Sam Brady commented in an interview:

Some people don't understand what BIS is ... I don't think you could get a random twenty people in the company who will tell you the same story about what it is.

Among system constituents of the INFOSYS application, there were two main interpretations of what the project was about. A number of the system constituents I interviewed told me some version of the RBC, Inc. story, that is, that GHI first acquired the INFOSYS software to satisfy its major customer, as described in this manager's account:

The INFOSYS project, as it was originally proposed and conceived, was in direct response to a client, a large account desire for easier, more flexible access to their claims experience, specifically I think the RBC, Inc. account.

This story explained the project's origins in terms of satisfying an important customer's demand, and later, of satisfying the more general requirement for customer account reporting.

System constituents also understood the project goals in terms of providing them with tools for direct access to data, as this analyst described his interpretation of the project's goals [emphasis added]:

*Ultimately I don't know why* INFOSYS was brought up. *As far as I can see*, they were looking for a really professionally done system ... they were looking
to get something that was *more menu driven* and could really support the goal of being able to provide *quick ad-hoc* type information and to be able to as well import normative data and combine different elements rather easily.

5(b) Project outcomes: core team members

Related to their assumptions about the project definition and scope, core team members had expectations regarding what the project would accomplish, that is, what would be different in the organization as a result of completing the project. Core team members' assumptions centered on several related themes:

- *End-users will have direct access to data; this will improve their jobs* -- Core team members on both team shared this assumption, although the theme was particularly strong among the INFOSYS team members, as these comments by various informants illustrate [emphasis added]:

  I see analysts *that are much happier* because they are able to get what they want themselves.

  INFOSYS offers them *independence* to generate and get at information themselves.

  You can get your *hands on information relatively quickly, relatively easily* and try to put it more in the hands of the user in terms of meeting business needs.

  Well, it's never going to be all things to all people ... [but] it should *improve life*. You'll be able to analyze your data a lot *quicker*.

  I think that users would have a system to go to find specific information .... right now it's not all consolidated in one place ... [and] be able to *log on and do it themselves*.

  The main benefit I see is to bring *more power into the sales force's hands*.

Some core team members expected programmers to benefit as well, as Heather Johnson remarked:

  I see programmers *that are much happier* because they are able to concentrate *on the big things*, the challenging things, the core-plus things rather than going in and producing the same report fifteen different ways....and still having people be unhappy with it."

- *There will be new and improved information* -- In addition to improving users' access to information, core team members expected the projects to enhance the information that was available [emphasis added]:

  If anything, the system, I think, will provide a *more centralized ... a more reliable data source* for sales and marketing information than they currently have.
The thing that would be very different is that anybody could dial in or sign on and be able to understand where we are at any point in time, enrollment-wise ... We would also have a lot of data out there that we don't have today.

You're going to take and see a single repository of information .. You'll see a set of standardized reports ... taking advantage of some of the new coding structures that are arising in the industry today.

- Through better access and better information, business personnel will make better decisions -- Core team members expected that, by using these systems, organization members would be more effective analyzing business issues and making decisions:

  Provide users with meaningful, useful information and I think we will see just a tremendous change in the organization itself in terms of the level that people will go to to do their job.

  They'll be able to judge whether a new product has a good chance of succeeding ... they would also be able to grade a product, as it were, to see whether it is succeeding

- Implementation of the system will require ongoing development and support -- Core team members responsible for ongoing system operation and support expected that their jobs would also change with system implementation. That is, they assumed their work would shift to supporting the system as system use expanded and operational problems arose. Several commented to this effect:

  For my environment it would become busier because there's going to be a lot more end users actually using it, coming up with, 'why is it working this way? Why doesn't it do that? Can we have it do this?'

  Some of the questions that will be asked and will be answered are, how does this impact the current back end reporting systems? What does it replace?

  I think we're going to be busy going out there and spending time with people ... If you look at it as going to client server applications where you're going to put the application on somebody's desktop, where does the support go to? Somebody's desktop.

5(b) Project outcomes
System constituents of the BIS and INFOSYS projects had similar ideas about what might result from implementation of the IT application. Their expectations and assumptions about project outcomes centered on three themes:

- Improved data access -- Drawing on their understanding of the technology as a user friendly data access tool, system constituents of both systems expected they would be able to access data more easily [emphasis added]:

Chapter IV
I think a lot of people would have a lot more information at their fingertips .... It would be more user friendly, that different departments could go in and actually access data and access reports, I should say, for themselves.

The main point is I hope I can get data quicker and easier and more accurate than the present system allows. That pretty much sums it up. The access to the information, I just need the access to be more efficient.

I think a lot of people are looking at INFOSYS as a way to open up access to the data systems, because right now there is limited access to the data systems we have in place, by design.

I think the difference would be, you know, we wouldn't have to wait for limited resources of the programmers to get the data we need ... We had the data, but it's just the fact of getting it that was complex, so that will give us a little bit easier access to that.

- Enhanced information and information flows -- System constituents also expected that there would be more and better information in the new systems [emphasis added]:

  I developed a perspective that it's going to make the information flow for the sales force and sales managers much more accurate and timely and available.

  I think there would be a lot greater clarity about how we were doing. Do we have enough of a pipeline? ... We'd know what we sold.

  It would allow each sales representative really to transition from a paper world to a computer world, but more importantly than that, they would be able to record every single thing that happened with that account.

  It's probably going to provide similar information as to what I can now get but maybe, hopefully in a lot more detail.

- Improved productivity and effectiveness -- Most system constituents expected incremental improvements to result from use of these technologies. They expected the system could make them more productive in their jobs, by eliminating mundane tasks and allowing them time to focus on more vital activities, as many commented [emphasis added]:

  I guess just to eliminate a lot of paperwork and manual crunching of numbers ... that we have to take time out of our day to put together.

  I was looking at the BIS project as the vehicle to really eliminate a lot of the administrative burden from the sales force.

  So our target is kind of making us much more efficient, keeping the sales people in the marketplace, bringing them up to do the jobs they were intended to do, but then also giving them additional tools to do it with.

  I think it would free up some of the more mundane requests that the systems people get and allow us to do more ... It may mean more meaningful studies.
Right now I spend a lot more time getting access to the data rather than analyzing it, so I think it's going to help me do my job a little bit better.

So it was the idea to make our jobs easier as a marketing person but also to make it easier for management to get the reports and the information they need without chasing around a hundred different market sales people across the state.

We will become a little bit more proactive in working with all our customers to prove that we are a high quality and efficient health services administrator.

C. Congruence and Incongruence in Frames: Consequences and Implications for ISD outcomes

In the preceding section, I examined the technological frames of reference of two groups of ISD participants (core team members, system constituents) using the analytical categories listed in Exhibit IV-1 and described in Table IV-3. I now assess similarities and differences in frames of these two groups using these analytic categories and consider how congruence or incongruence in frames, arising from similarities or differences in frame content or structure in each of the sub-categories, may have influenced ISD outcomes in the projects studied.

As I compared the knowledge, assumptions, and expectations common to members of each group within each analytical sub-categories, I found that technological frames of core team members and system constituents differed in two ways. In some sub-categories, the content, that is, the assumptions, expectations, or knowledge, was different. In other sub-categories, there were structural differences in breath (number of aspects or topics) and complexity (inter-relatedness of assumptions and expectations.) Table IV-4 summarizes these findings in terms of congruence and incongruence within sub-categories and Figures IV-2 and IV-3 give a high-level summary of key aspects of the technological frames of reference of the two groups to emphasize differences in content.

C.1. Sub-categories congruent in content and structure

5(b) Project outcomes: In this sub-category, core team members' and system constituents' frames were similar in content and structure. Members of both groups had similar expectations about what would result from implementation of the ISD project, i.e., that end-users would have improved access to data, that databases would be expanded and enhanced, and that, as a result, individuals would be more productive and effective in their jobs. It is interesting to note that, for both groups, their expectations about project outcomes suggested limited, incremental change and improvements as a result of implementing the multi-million dollar ISD projects. Since members of both groups had
similar frames, there were few challenges to routine thinking about IT use, with the exception of EVP Sam Brady. In Chapter V, I discuss Brady's expectations for radical change through IT use and core team members' interpretation of Brady's ideas as incremental change.

<table>
<thead>
<tr>
<th>Congruence/Incongruence</th>
<th>Frame Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent content and structure</td>
<td>5(b) Project outcomes</td>
</tr>
</tbody>
</table>
| Incongruent content and structure | 4(a) Organizational context  
|  | 4(b) IS Development Context |
| Incongruent structure (salient primarily to core team members) | 1(b) ISD participants  
|  | 1(e) Inter-project coordination  
|  | 2(d) Systems landscape |
| Congruent content, incongruent structure (more elaborate for core team members) | 1(a) Users' role in ISD  
|  | 1(c) ISD strategy  
|  | 2(a) IT application  
|  | 2(c) IT stages / evolution  
|  | 3(a) External environment  
|  | 3(b) Business practices and processes  
|  | 5(a) Project definition and scope |
| Partially aligned (similar in some, but not all content and structure) | 1(e) Transition-to-use  
|  | 2(b) IT-in-use  
|  | 3(d) Information and data |

Table IV-4: Congruence and Incongruence in Technological Frames

C.2. Sub-categories incongruent in content and structure

In two sub-categories, core team members' and system constituents' frames differed in terms of the topics or focus of assumptions, and where there was overlap, differed in content. Drawing on incongruent frames, core team members and system constituents interpreted events in the project differently but, because frame incongruence was not acknowledged, core team members did not benefit from the alternative perspective system constituents could have provided.

4(a) Organizational context: Core team members' major job responsibilities were to develop, implement, or manage information technology, and their experiences in the organization centered around their role in ISD projects. Their expectations for and assumptions about the organizational context reflected this perspective. System
constituents, on the other hand, were part-time, casual ISD participants with job responsibilities in various areas of the business, and their assumptions and expectations about the organization reflected this perspective. Frame incongruence around organizational support for the project may have influenced outcomes in the BIS project. Whereas sales managers saw the BIS project as just one of many things to be done, and not necessarily the most important one, BIS core team members assumed that the BIS project was a top
organizational priority which was sure to be funded with the support of EVP Brady. When the BIS project lost this executive champion due to an organizational change, they continued to assume that the BIS project was a top organizational priority and that system constituents were anxiously awaiting its completion. As a result, they give little attention to building or gaining support for the project among the sales divisions, and the project drifted along without approval or support.

4(b) IS Development context: Core team members understood the IS development context as insiders, and their assumptions and expectations about the IS development context focused on the "relationship" between GHI, Inc. and the outsourcing company, ISI, Inc. System constituents, on the other hand, looked at IS development from the outside. assumptions related to how the organization as a whole dealt with IS development. Drawing on their frames, core team members interpreted project slow downs and delays differently than did system constituents. Members of the core teams who were GHI employees were suspicious of ISI and blamed "them" for slow progress in the projects. System constituents knew little about the problems between GHI and ISI team members. Instead, they attributed project delays to the inherent difficulty of gaining support for large projects in an organization like GHI, in which decision-making authority was diffused and priorities differed. Again, this frame incongruence had consequences for ISD outcomes in the BIS project. Both core team members and system constituents had insights on what contributed to delays in the project. A senior ISI manager confirmed to me that ISI had withheld support from the BIS project, as team members had suspected. He maintained, however, that this was because system constituents were not pressing for the system and, given ISI's responsibility to hold down IT spending, he felt justified in his actions. The BIS core team, had they acknowledged the perspective of system constituents, might have recognized the need to build support for the project with sales managers and, in this way, convinced ISI managers to support development of the system.

C.3. Sub-categories incongruent in structure (salient primarily to core team members)

There were three sub-categories in which technological frames were incongruent in structure. That is, only core team members had salient frames in these sub-categories. This structural difference in frames may have resulted from the division of labor for IS development between core team members and system constituents. To the extent that core team members could work without support or cooperation from system constituents, such frame incongruence was not problematic.
1(b) ISD participants: System constituents had little knowledge of, experience with, or exposure to the issues and problems which core team members, drawing on their frames, dealt with in the project. For example, finding technical personnel with experience in client-server technology was an issue for the BIS core team and a major point of conflict with ISI, Inc. System constituents were not aware of this issue nor involved in its resolution.

1(e) Inter-project coordination: Finding out about and keeping track of other IS projects or organizational initiatives that might influence a project was a core team member task. It was primarily through their participation on various IS planning or coordination committees that they became aware of potentially conflicting projects. System constituents had little exposure to such committees or knowledge of IS project activities that they were not directly involved in. Thus, they expressed no salient frames in this area.

2(d) Systems landscape: Members of both core teams drew on a variety of assumptions and knowledge as they considered how the IT application under development would fit into the overall systems environment of transaction processing systems and the IT infrastructure. Although system constituents had exposure to transaction processing systems and the IT infrastructure as users, they apparently did not draw on their knowledge or experience in relation to IT requirements for the project, and thus expressed no salient frames in this area.

C.4. Sub-categories congruent in content, incongruent in structure (more elaborate for core team members)

In seven analytic sub-categories, system constituents and core team members shared some assumptions or expectations. However, core team members also had assumptions and expectations which system constituents were not aware of and thus could not question or challenge. In several instances, frame incongruence arising from structural differences had undesirable consequences for ISD outcomes.

1(a) Users' role in ISD: Most systems constituents assumed they would have limited involvement in ISD activities. This assumption complemented core team members' more complex set of assumptions, i.e., that users should be involved in ISD activities in order to utilize their business knowledge and to gain their support for the project, but that users' role in the project should be limited and controlled by the core team. As a result, core team
members, who planned and controlled project activities, involved system constituents in IT requirements definition activities in a limited way, and system constituents for the most part accepted their limited role. This had unintended consequences in the BIS project. With little user involvement evident, EVP Sam Brady found an early requirements study unsatisfactory, as he commented:

People kind of delegated their responsibility and authority to people who were essentially IS people, not business people. So the salespeople weren't driving the statement of needs. People who use the marketing aspects of MSIS weren't very involved in driving it either and so you're leaving needs definitions to IS people who don't have a lot of exposure in their history of sales and marketing applications.

Brady requested a new requirements study be done, which took an additional six to eight months. Brady's own ambivalence about system constituents' role in ISD was evident, however, in his decision to hire consultants to lead the new requirements study, rather than relying on sales managers to specify requirements. System constituents continued to accept a passive, limited role in the project (i.e., being interviewed) during this project phase. With little involvement, system constituents remained apathetic about the project, as Brady later noted:

Ideally, the front for this program should be in the sales organization. And nobody's sucking up to that particular responsibility. I don't know why. I'd think one of those people would say, you know, 'I want to take that ball and run with it, because if I had that, it would help me sell better.' And maybe that's our problem. Maybe they don't believe in it. Maybe we haven't sold them on the idea enough yet ... Maybe nobody's convinced yet that having this kind of stuff with help them sell better.

CIO Tony Foley described how this contributed to the project's outcome [emphasis added]:

The one thing that I saw missing and the reason why I think it's just dragged on and hasn't been started is, I don't think there was ever truly a user sponsor, someone that wanted it. Who wanted BIS? Sam wanted it and Leslie wanted it, but none of the people that were going to use the technology were involved in the process so this thing was defined almost, from what I could see, in the vacuum with a set of consultants and ISI and Leslie ... but the people that were going to be responsible for using and administering it, I don't think were bought into it.

1(c) ISD strategy: Many core team members and system constituents shared the assumption that it was preferable to buy a software package versus building IT applications "from scratch." Core team members shared this assumption about using software

11 See Chapter V, Sections A.4 and B.4 for a detailed discussion of the influence of these assumptions on interactions between core team members and system constituents.
packages, but they also drew on a broader set of assumptions about ISD strategy, i.e., the importance of phasing projects and of planning for intermediate goals. Acting on these assumptions, they planned and carried out various ISD activities with short-term and long-term goals. System constituents, drawing on limited knowledge of and assumptions about ISD strategy, were sometimes confused by the core team members' action and plans.

This frame difference lead to confusion in the BIS project about the project identity, goals, and outcomes. Core team members, concerned about structuring the project into "quick hits," implemented a pilot program in which some sales people received notebook computers. They believed this would increase system constituents' interest in IT use and gain support for the larger BIS project. Instead, systems constituents, drawing on their more limited understanding of ISD strategy, were confused about the project's goals and scope. Those who had been part of the notebook pilot project thought the BIS project was basically done, as a sales manager commented:

My need for a BIS system really was more pertaining to prospect tracking and information tracking on account specific or prospect specific situations. So I guess from that perspective it has given me what I want ... and it has worked fairly well.

System constituents who had not participated in this pilot thought that nothing had been accomplished. A senior manager in one area commented on his confusion about the project:

What happened with the BIS project is really somewhat unknown to me ... It just seemed like it went off into a black hole in terms of, it started, but with a goal without any real good definition as far as what it's going to accomplish and then little follow through.

Sam Brady similarly assessed managers' understanding of the project at the time my field study was ending:

Some people don't understand what BIS is. They think, unfortunately because some of the early work was related to the notebooks for the sales force, they view it as just the technology to help the sales force ... So, I think a lot of the people who aren't supporting it at all think that what they are not supporting is a notebook based sales system and, in an overall priority of things, they don't think that's way up there.

2(a) IT application: System constituents' expectations about key features and functions of the proposed IT application were similar to but more superficial than those of core team members. System constituents' expectations reflected what they had seen in training sessions or demonstrations and their limited exposure to pilot phases. Core team members had a deeper knowledge and understanding of the technology underlying visible features.
This difference in depth of understanding and knowledge contributed to a misunderstanding in the INFOSYS project. System constituents and core team members shared assumptions about key features of the IS application, i.e., that it was a "user friendly interface" to a database and that end-users could create reports interactively which utilized analytic modeling techniques ("case mix adjustments," "completion factors," and so on). Core team members, however, understood the difference between the workstation-based GUI interface, which contained the program code to apply analytic models, and the database, which contained only raw data. They realized that reports utilizing the analytic models could only be accessed through the interactive interface. They also understood the batch reporting feature would not be available until later releases of the software package. System constituents, on the other hand, assumed that analytic reports available through the interface could be accessed via batch processes to produce large volume reports (or that these features would be easy to duplicate), and they scheduled production of a key set of reports involving over 5000 reports on individual providers. The core team eventually realized what system constituents expected and knew it would be infeasible to generate this volume of reports interactively through the INFOSYS interface. However, the reports were needed to pursue a major business initiative with providers. At the time my field study ended, the team was thus faced with a project crisis, i.e., how to plan project activities in order to produce the reports by the publicized deadline.

2(c) IT stages / evolution: System constituents expected that an IT application would evolve over time, particularly as business conditions changes, but they had little knowledge of how or when changes would occur. Core team members were engaged in planning for and outlining major implementation phases as they carried out requirements definition activities. They could visualize the system as it was and as it would be in multiple future states. A potential problem this difference in frames can engender is that system constituents, expecting the "end state," are disillusioned with intermediate deliverables. A project leader articulated his concern regarding the phasing of the INFOSYS application:

The most important thing is the people not jump the gun -- and not assume that INFOSYS is full blown from the forehead of Zeus right now as we roll it out. It is not. It is still an infantile system that needs more data. It needs careful nurturing. It needs to be raised. Just because it is implemented doesn't mean that it is by any means mature. It will be a mature system given enough time.

However, there was little system use in the pilot areas. System constituents were reluctant to spend time learning about and trying to use the system while it contained partial data and thus found the intermediate stages of the application of limited value.
At the other extreme, system constituents might view a temporary stage or the "quick hit" as the final IT solution and thus not support additional development work. This occurred in the BIS project among sales personnel who had received the notebook computers and software. Given these tools to address their most pressing problems, they were less interested in the next stages of the BIS application.

3(a) **External environment**: Both core team members and system constituents expected that, through the company's use of information technology, they could impress customers. Core team members, however, assumed that IT could influence GHI's competitive position in other ways. This was particularly true in the BIS project, in which core team members were influenced by EVP Brady's wide-ranging ideas about how IT use could transform sales processes at GHI. The sales organization did not share his perspective and envisioned only limited improvements from the use of IT and, given other organizational priorities, their enthusiasm for the project was low.

3(b) **Business practices and processes**: Core team members and system constituents shared some assumptions about how IT would influence business processes, i.e., that end-users would do some of their own ad-hoc reporting without technical assistance and that IT would reduce administrative task time, freeing up time to do the job (e.g., face-to-face selling versus generating status reports; analyzing data versus collecting data). Core team members, however, expected that using IT had the potential to significantly change business processes and practices.

In the INFOSYS project, core team members envisioned various scenarios for business process change. Early in the project, they expected that GHI data analysts' role in doing ad-hoc reports for customers could be significantly reduced by giving major customers direct access to their own data via INFOSYS. Later, they focused on eliminating the need for technical programmers to create ad-hoc reports by having analysts do ad-hoc reports themselves through INFOSYS. As is discussed in Chapter V, switching from existing systems to the INFOSYS package also entailed tacit assumptions about changes in authority over and responsibility for deciding how to interpret data. That is, INFOSYS had built-in metrics and reports which, if accepted, might standardize data interpretations and reporting. System constituents, focusing on how INFOSYS would affect their personal productivity, anticipated only incremental changes in their tasks, i.e., going to a different data source or doing an ad-hoc inquiry themselves. They did not expect significant business process change. When these assumptions came to light in early system use, some system constituents were reluctant to use the system because they were...
resistant to relinquishing their authority over data interpretation. In addition, without changes in their other job responsibilities, other analysts found no time to learn the system and to ad-hoc reports, and therefore continued to rely on the technical programmers.

5(a) Project definition and scope: Core team members' assumptions about project definition and scope were derived from their frames about IS development, the IT application, the business environment, and the project context. Thus, their specific assumptions and expectations about the project definition and scope represented a complex understanding of how various factors that had influenced the project had been addressed. In addition, their frames sometimes shifted as they encountered changes or issues in the project context. Changes were apparent in their description of the project history, in which they explained how the project had shifted and adjusted to various "fits and starts" or "mishaps." System constituents, on the other hand, derived their expectations and assumptions about the project definition and scope from what they heard from core team members. While in both projects they shared the general idea of the project's definition and scope with core team members, they did not have detailed knowledge of what decisions had been made or why decisions had been made. Their frames were both more superficial and fixed in time, depending on when they had last heard about the project. In the BIS project, when organizational support was failing, system constituents were not sure what project they were being asked to support, as this sales executive noted:

I think there was very little communication on it. It kind of went off and we heard nothing about it and it wasn't really on the radar screen ... It was just something that every once it a while we'd hear it was still going on but we didn't challenge it.

Not surprisingly, they were reluctant to endorse or support the project in this situation.

C.5 Partially aligned sub-categories (similar in some but not all content and structure)

In three sub-categories, core team members and system constituents shared some key assumptions and perspectives. However, they also held different assumptions and expectations. These categories related to adoption, assimilation and use of an IT application by the user groups. Although frames in these sub-categories were partially aligned, there were undesirable consequences for ISD outcomes resulting from the partial incongruence. In the following discussion, I rely primarily on data from the INFOSYS

12Chapter VI will address in detail the evolving nature of the project identity.
project. The core team had implemented two phases of the application at the time of my study, and therefore issues around usage were more apparent.13

1(d) Transition-to-use: Core team members understood transitioning IT from development to use primarily in terms of technical, project management tasks. They assumed that users would be enthusiastic about the new system, and, once trained, they would automatically begin to use it. System constituents' expectations for transition-to-use, on the other hand, centered on how they would integrate the new tool into their work activities. Members of both groups shared the assumption that training was important, but they disagreed on the extent and type of training needed. They also had different perspectives on the level of support system constituents would need beyond training. System constituents needed time to learn how to apply the system but found it hard to find time to learn on their own, when they were under pressure to continue to produce. They were frustrated with the level of support they perceived from the core team, as these analysts commented [emphasis added]:

 Adults don't learn in the classroom. They learn by doing. When I try to use INFOSYS, I need Joyce Harris or Tim Crane by my side. I forget where I'm going, what's happening in the system. The documentation is not any better. If I had this [intensive help] for a week, I would know the system.

It [training] really left me wondering where were the, you know, what were the definitions and the formulas of the field and the data that was available and how should it be used ... What they were doing was just leaving people in the lurch, I think, on how to practically use it.

What I would suggest is at the very least that they could do is educate the users on what the heck they're looking at in data ... I think it's ridiculous that they're doing this training on how to use the tool without giving any insight as to the data.

Some core team members interpreted requests for in-depth support as "wanting to be spoon fed." It was not apparent if project team members would recognize and respond to system constituents' desire for more extensive support, and while this frame difference was unresolved, system constituents make little use of the INFOSYS pilot applications.

2(b) IT-in-use: INFOSYS team members assumed that end-users would access the INFOSYS application using the interactive interface for ad-hoc reporting. System constituents shared this expectation, however, they also expected that high-volume, standard reports would be produced through batch processes on a regular basis. Core team

13I believe that similar issues could have arisen in the BIS project, but due to the development stages of the project at the time of my field study, I do not have data on this topic.
members did not become aware of system constituents' assumptions until about six months after the first phase had been implemented. As noted above, late recognition of one group of system constituents' expectations around batch reporting capabilities caused major project planning difficulties. Core team members' frames about how INFOSYS would be used began to change as they realized that batch reporting was in fact a major required feature. A technical project leader commented on the team's assumptions about the IT-in-use eventually changed [emphasis added]:

I think that we have come to the conclusion that -- the understanding that there does need to be some sort of batch type reports, standard type reports that come out ... And that maybe the interactive portion of INFOSYS really does become something to respond to real ad-hoc questions from accounts or providers, something like that.

In the meantime, system constituents had found few occasions to use the new system for ad-hoc reporting and were instead working to define batch reports to be programmed and run against the database.

3(d) Information and data legitimacy: System constituents and core team members shared assumptions and expectations related to data quality and accuracy. However, system constituents also had expectations about data legitimacy which differed subtly from team members' ideas about data quality. While core team members' understanding of information and data centered on data as it existed in computerized information systems, system constituents' understanding focused on the relationship of data in computer systems and the "real world," for example, how to interpret data to represent actual events and outcomes, and the meaning of data from different sources, for example, how new data definitions or sources compared to existing data definitions and old data sources.

Perhaps because these frame differences were subtle, and because both groups used similar terms like data quality, differences were not acknowledged. When I interviewed system constituents, I found some were hesitant to rely on the new data from INFOSYS. They understood their current data sources, and if reports from INFOSYS weren't consistent, they wanted to know why. One analyst told me how she had tried using INFOSYS for a rush report for a customer. The customer compared the report to earlier reports and found discrepancies which the analyst was at a loss to explain. System constituents wanted the core team to help them understand the data, before they would have the confidence to use it. Core team members, assuming they had done all they could to enhance data quality when loading the database, didn't acknowledge that data legitimacy

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14See Chapter V, Section B.1 for a further discussion of this issue.
was an important issue separate from data *quality* that might require action to educate system constituents and to increase their confidence in the system. An INFOSYS project leader's comments illustrates this point [emphasis added]:

Well, most certainly it is entirely conceivable to run similar type of reports in all three of those systems you just described. You will probably come up with different answers. Are there going to be huge differences? *There shouldn't be huge differences, and, in fact, really we should be able to explain why the numbers are different* ... Now certainly people are going to run around with a piece of paper saying, 'I've got this one here, this is the number and this is the number I believe.'

His comment when I asked him who could actually explain differences, however, suggested that data legitimacy issues were not trivial:

There are not a whole lot of people even within this whole company that could sit down and explain the differences ... I'm not sure there is anyone that could do that.

D. Chapter Summary

In Chapter IV, I developed a framework of analytic categories of technological frames salient to IT requirements definition activities (Figure IV-1). I used this framework to examine the frames of ISD participants and to assess similarities and differences in frames between individuals. In this analysis, I identified two groups of participants -- core team members and system constituents -- with similar frames (Tables IV-1 and IV-2). I examined frames for each group in all analytic sub-categories, noting variations within groups (Table IV-3). I then considered congruence and incongruence in frames between these two groups (Figures VI-1 and IV-2). I found that, in some sub-categories, frames differed in content and in structure. In other sub-categories, frames were partially aligned. Surprisingly, there were unintended consequences for ISD outcomes not only when frames were incongruent in content or structure, but also when frames were partially aligned or even congruent (Table IV-4).

While there were frame differences attributable to functional specialization and organization level of individuals, data from this study suggests that similarities among individuals' frames corresponded with informants' relationships to IS development project. System constituents, who held positions in a variety of business areas, had a casual, limited role in the IS development project. Core team members occupied a variety of organizational positions, but all had a significant role in the one or both of the projects I studied. This relationship between project experience and frame similarity is confounded
by the fact that, at GHI, all of the core team members also had some background in IS development. Thus, similarities in their frames could be attributed to their shared professional experience. However, it is also possible that core team members, as they worked together in requirements definition activities, shared their assumptions and expectations and negotiated common frames. In Chapter V, I consider this question as I examine how frames influenced actions and interactions in requirements definition activities, how ISD participants communicated and shared frames, and how, in some instances, frame change occurred.
Chapter V
Technological Frames in Action and Interaction

In Chapter IV, I developed a framework of categories to analyze the technological frames of reference which were salient to two stakeholder groups (core team members and system constituents) as they engaged in IT requirements definition activities. Using this framework, I examined congruence and incongruence in frames within and between the two groups and considered possible consequences for ISD outcomes. In Chapter V, I extend this analysis by examining the influence technological frames had on key ISD participants' actions and interactions in requirements definition activities and thus on decisions about the nature and design of the information technology application and the IS development initiative.

Analyzing the influence of frames on actions and interactions was a difficult analytic task, because project participants drew on a variety of assumptions, expectations, and knowledge to interpret events, and in each instance, multiple frames influenced their actions, interactions, and decisions about IT requirements. I found that trying to assess the influence of frames according to each category identified in Chapter IV was duplicative, because multiple categories (or sub-categories) related to the same event or situation. As I analyzed the data, however, I identified four recurring themes in project participants' sensemaking, interpretation, and negotiations during IT requirements definition activities. Although participants drew on many frames in negotiations related to each theme, subsets of frames were particularly influential (See Table V-1):

- **What's it all about?** In both the BIS and INFOSYS projects, ISD participants drew on their frames around the external environment, business practices and processes, the IT application design, and the project identity to interpret a variety of information -- directives from executives, demands from customers, requests from system constituents, their own experiences with information technology, etc. -- to make sense of their project, its potential influence on organizational processes and outcomes, and the potential for using IT to realize this potential. Their interpretations provided the broad context within which detailed requirements definition actions and plans took place.

- **How does it relate?** The projects I studied were undertaken in a complex organizational and systems environment, in which many projects -- some competing, some overlapping, some supporting -- were also underway. Project participants therefore had to interpret how their project and the IT application they were developing related to other organizational
initiatives, application systems, and the information technology infrastructure. In these negotiations, their assumptions and expectations about inter-project coordination, the systems landscape, and the project context were particularly influential.

- **What to do?** Project participants' experience with and knowledge of ISD strategy and the IT application design influenced many of their actions and interactions and their decisions about requirements for the IT application. Drawing on assumptions and expectations related to these sub-categories, as well as the sub-categories transition-to-use and IT-in-use, they planned and undertook activities to design or implementation the IT application.

- **How to work with system constituents?** Core team members and system constituents (See Table IV-1 and IV-2) both participated in IT requirements activities. However, core team members controlled such activities. They drew on their expectations for users' role in ISD and interpretation of the IT application to plan activities that included system constituents and to structure interactions with them.

<table>
<thead>
<tr>
<th>Theme</th>
<th><strong>BIS Project</strong></th>
<th><strong>INFOSYS Project</strong></th>
</tr>
</thead>
</table>
| What's it all about? | (1c) ISD strategy  
(2a) IT application design  
(2d) Systems landscape  
(3a) External environment  
(3b) Business practices and processes  
(4a) Organizational context  
(5a) Project definition / scope | (2a) IT application design  
(2b) IT-in-use  
(3a) Business practices and processes  
(5a) Project definition / scope  
(5b) Project outcomes |
| How does it relate? | (1c) ISD strategy  
(1e) Inter-project coordination  
(2d) Systems landscape  
(4b) IS development context  
(5a) Project definition / scope | (1e) Inter-project coordination  
(2a) IT application design  
(2d) Systems landscape  
(3c) Information and data legitimacy  
(4a) IS development context |
| What to do? | (1c) ISD strategy  
(2a) IT application design  
(2b) IT-in-use | (1c) ISD strategy  
(1d) Transition-to-use  
(2a) IT application design  
(2c) IT stages |
| How to work with system constituents? | (1a) Users' role in ISD  
(1c) ISD strategy  
(2a) IT application design  
(4a) Organizational Context | (1a) Users' role in ISD  
(1c) ISD strategy  
(1d) Transition-to-use  
(2a) IT application design  
(4a) Organizational context |

**Table V-1:** Technological Frames which were particularly influential in negotiations in each thematic area
These four themes were apparent in negotiations in both the INFOSYS and BIS project. Project participants dealt with different events and circumstances, however, and the subsets of assumptions and expectations that were most salient to or influential in negotiations thus varied between the projects and within each project, among the topics of negotiations. To preserve this detail and variety in the detailed presentation of findings, I present data on key issues or episodes of negotiations in these four thematic area for each project. Chapter V is therefore structured as follows. In Section A I examine data from the BIS project in the four areas. Section B discusses similar data from the INFOSYS project. In this analysis I focus on how project participants drew on their technological frames to plan and undertake ISD activities, to guide and direct their interactions with each other, and to negotiate key aspects of the project and of IT requirements. I also consider how participants communicated frames and, in some instances, how they arrived at shared interpretations or changed frames through their project experience. In Section C I discuss general patterns evident in these findings: i) types of influence technological frames had on actions and interactions; ii) use of artifacts to communicate frames and negotiate understanding of the technology; iii) mechanisms for communicating and sharing frames in interactions; and iv) extent and types of frame change observed. I then summarize the chapter in Section D.

A. The influence of technological frames in the BIS project

During the year that I observed the BIS project, core team members went through several episodes in which they considered how the BIS project should be defined and carried out, what business changes the project should engender, how IT could be used to enable such change, how the project related to other organizational initiatives, who were key system constituents and how should they be involved in the project, and so on. As I researched the project history, I learned that this kind of questioning and project re-definition had been going on throughout the project. In Chapter VI, I analyze this process longitudinally in terms of the social cognitive model for framing requirements, focusing on changes in the project identity that resulted from participants' interpretation of changes in the organization and in the discourse around requirements. One sub-process identified in the framing model is participants' negotiations around requirements. Here, I consider this sub-process in detail to highlight the influence of participants' technological frames on their actions and interactions by examining incidents and episodes of sensemaking, interpretation, and negotiations in each of four thematic areas.
A.1. What's it all about?

One of the most notable aspects of the BIS project was the influence that Sam Brady, an executive at GHI, Inc., had on the ways in which BIS core team members thought about and conceived of the project and of the potential for using IT in sales processes at GHI. Brady's frames around IT use in sales -- his vision -- involved using IT to enable aggressive sales strategies and revolved around for his ideas about Sales Force Automation (SFA) and creation of a marketing repository. In a variety of ways, Brady communicated his ideas to other core team members, who then tried to make sense of them and to interpret the implications for IT requirements. Examining Brady's frames around IT use in sales and assessing how core team members interpreted and acted on his frames provide insights into the social cognitive processes through which frames are communicated and negotiated. In the following discussion, I examine these issues in three contexts: i) Sales Force Automation (SFA); ii) evolving ideas of a marketing repository; and iii) attempted frame-setting through consultants.

(i) Sales Force Automation (SFA)

Sam Brady was the Executive Vice President for Sales at GHI during most of the time the BIS project was ongoing. He expected that, through use of IT, sales processes at GHI could be changed significantly, for example, by focusing on telemarketing to generate leads, by having sales personnel work from their homes, and by using IT to facilitate managerial control at a distance [emphasis added]:

We would use, for example, telemarketing to generate leads. We could put the leads up on a lead database. A sales rep could get up in the morning, turn the PC on and dial into home plate, and while they're in taking a shower, their leads for the day would get downloaded to a file. And so they could load it into their appointment calendar, and at the same time they could upload time and expense reports, sales win/lost reports and call reports and stuff so that the sales management could get a clear understanding of how they were spending their time.

Brady drew on his knowledge of how other organizations had used IT to change sales processes as he considered how IT might be applied in GHI's sales organization. In an interview, he gave this example [emphasis added]:

In the past I had looked at companies like Hewlitt Packard who had, I think Hewlitt was one of the first companies to provide significant automation to their sales force, and they had used technology to fundamentally change the way sales people did their job, including where they resided to do their jobs. They took them out of being in the office, allowed them to work out of their house.
Brady's vision for IT use in sales entailed radical change to the social nature of sales personnel's work, for example, replacing face-to-face interactions among sales personnel with electronic interactions [emphasis added]:

I assume that they do some idea exchange in the office -- 'Gee I have this problem with the customer and you've already solved it. How did you solve it?' You do it by face-to-face verbal interaction rather than electronic medium like e-mail, or having autopsies on file where you could say, 'I had this kind of a problem. How did other people solve it?' and pull it down to a notebook and look at it. What we do today is fairly labor intensive. Mostly face-to-face and mostly conversational.

In Brady's scenarios, such changes, enabled by information technology, would have business value by increasing sales personnel's face-to-face time with customers and by reducing real-estate costs:

It would be an all electronic office environment. We might have bullpens in couple of buildings if people needed to come in and use the phone or use the fax machine ... or have conference rooms where they could get together after hours and do sales meetings and stuff. The electronic environment would allow us to essentially say, 'We are going to let you work out of your house. We want to close down all this expensive office space that you shouldn't be being used anyway. If you're really selling, you ought to be out in the field selling.'

Brady acted on his frames around IT use in sales in a number of ways. His vision was part of a larger plan for "creating a sales culture" at GHI, for changing the organization from one of "order takers" or "farmers" who "harvested" their existing customer base to one of "hunters" who would actively seek out new business. In one of several sales function reorganizations, Brady reorganized the sales function into separate "new sales" and "retention" groups. He also created the Sales Processes Support group (SPS), headed by Leslie Thomas, giving her responsibility for "fostering a sales culture," for sales force automation activities, and for the BIS project. Thus, he ensured that the project would be managed by employees in his own organizational domain. He intervened directly in the BIS project several times, redirecting the team to actions consistent with his ideas. For example, he rejected a requirements study which he found lacking and instead sponsored a brainstorming session for BIS core team members and key sales organization members in which industry consultants presented ideas about sales force automation. Brady later funded a "quick hit" pilot project to provide sales personnel with notebook computers and software.

Brady illustrated and communicated his frames around sales force automation through stories, IT-in-use scenarios, and metaphors such as those quoted above. On numerous occasions, I heard core team members echo Brady's frames in their
conversations and language use. For example, in my first meeting with Jane Flynn, she mentioned eliminating expensive real estate as a rationale for IT investments such as the BIS project. Mark Smith similarly echoed Sam Brady's assumptions about the potential for sales force automation in an interview [emphasis added]:

_They want the sales execs out of the office._ They don't want then to have to come back to the office to do much of anything. They want them out and they want them on the road. Be out on the road more, like have a portable office.

The team's actions, such as proposing and implementing the notebook computer program and their decisions about IT features (e.g., including features such as FAX modems for remote communication with "homeplate") reflected their understanding of Brady's frames.

Having communicated his ideas, Brady left it to the project team to work out the details of implementing his vision. When requirements documents were prepared and presented to him, he then examined the proposal in terms of his vision. Note how, in this interaction in a project presentation, Brady apparently wanted assurance that the proposed IT application (hardware and software) would support his key expectations for Sales Force Automation:¹

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**Brady:** When we noodled this before, we talked about reducing sales administration time for sales people. Does this have things like sales expenses and call tracking?

**Thomas:** Yes. It has calendering, scheduling, all of that. We could easily do expenses.

**Brady:** I know the sales people don't like to hear this, but we need the capability to not go into the office.

**Thomas:** Yes. We have planned on built-in fax modems.

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Although core team members espoused Brady's frames around SFA and in some instances acted on these frames, they interpreted Brady's vision for Sales Force Automation and the implications for IT requirements in the BIS project differently than did Brady. Whereas Brady envisioned radical change in the social organization of sales representatives' jobs, core team members appeared to understand SFA in terms of incremental improvements or enhancements to existing practice. Here, Leslie Thomas's explanation to me of sales force automation and its relationship to the BIS project suggests such incremental changes [emphasis added]:

_The [BIS] system will have eventually another component hooked up to it, which is true salesforce automation. So they will have the ability... to fax things to customers from their PCs. We will have the ability to drop_ ¹

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¹In this presentation, it appeared to me that Brady was less interested in the business case proposal which the team had labored over for weeks than in verbal assurances that his key expectations would be met by the proposed hardware and software functionality. Possibly, he studied the document at length outside the meeting.
information down from BIS into the word processors so they have all the correct information. They will be able to know where an account stands, you know, everything about it, account history, all their paper today, all their files today, will be housed on the PC ... We need to look at what other things [software, technology features] that we need to hook on ... And, I'm not quite sure what all that is going to encompass, but it's going to be a notebook that basically, you know, basically is their desk.

Note in particular that Brady used the metaphor of an electronic office in his description of how the social nature of sales jobs would change (i.e., asynchronous electronic communication among sales representatives working from home replacing "face-to-face" interactions in an office). Thomas's metaphor of the notebook computer as desk suggests improvements in task performance and data availability, but it does not imply the same degree or extent of change in the social organization of work. For example, Thomas's metaphor was consistent with continuing existing practices (working from the sales office) but in somewhat different manner ("fax things to customers from their PCs"). The notion that sales managers would monitor and manage sales personnel through electronically transmitted status reports was a common assumption for Brady, Thomas, and other core team members. However, Brady envisioned electronic communication at a distance replacing or supplementing face-to-face interactions, whereas team members focused on the advantages of computerizing manual reporting functions to increase managers' ability to monitor sales representatives while reducing the time required to generate reports.

Core team members actions were consistent with their more limited interpretation of Brady's SFA vision. They focused on providing personal productivity tools to sales personnel in the notebook project (e.g., Microsoft Office). The sales lead tracking software -- SELL -- was primarily a way to computerize existing activity reports which sales representatives produced manually. Training sessions focused on these basic functions. Although core team members had purchased the notebook computers with fax modems installed, I saw no evidence that they trained sales representatives to use the modems, for example, to directly fax materials to customers.

System constituents -- sales managers and representatives -- similarly interpreted Brady's vision in terms of incremental productivity improvement. Those who had been involved with the brainstorming sessions or the pilot notebook computer project discussed BIS in terms of incremental change such as providing tools to sales personnel to reduce administration time and free up time for direct sales activities. In fact, one of their major criterion for using the pilot notebook technology was that, through its use, they would spend less time producing sales reports by hand. Sales representatives reiterated this point to the BIS core team in a project presentation, as this representatives comment illustrates:
If we can put information in once, and not get requests for paper reports from management, it will work. If we don't, then the system will go away.

In the pilot notebook computer program, system constituents used the technology in ways that were consistent with their interpretation of the technology as a tool to improve their personal productivity, i.e., to do word processing, to create presentation slides, to report on and track sales representatives' customer contacts and sales process activity, and so on.

To summarize, Brady's articulation of his vision and his actions to communicate this vision engendered shared espoused frames around Sales Force Automation, and this had some influence on the IT requirements core team members defined and the IT features they planned to implement. However, core team members and system constituents interpreted Brady's vision in terms of incremental change and improvements to existing practice. Thus, team members, in their actions around ISD, and system constituents, in their use of the technology, enacted a limited version of Brady's vision. Brady himself noted this outcome to me in an interview held about a year after the brainstorming session:

I was hoping that we would kind of get to behavioral issues and we didn't. We have a long way to go in talking about how are we going to re-engineer the sales process itself and then apply effective automation to it. From the sales side, we were skimming surface, solutions that get at calendaring and time and expense reporting and lead management. We're not getting at the root issues ... so my thinking started out kind of grandiose that we would re-engineer and automate, and that's where we are.

(ii) Evolving ideas around the marketing repository
Brady also had expectations for how IT could be used to change the way GHI sales and marketing personnel understood the current and potential customer base, a concept he referred to as "understanding the life cycle of a customer" through a "customer information file." He illustrated this concept with a scenario [emphasis added]:

Let's say if somebody came out of college, if we sold them a product that supplemented their needs during the gap between college and employment and then we sold them a fairly inexpensive catastrophic product while they were young when they think they're indestructible and then we sold them a little more comprehensive one when they get a little older and had kids and stuff. And by the time they're moving into retirement age, we likely can ease them into the world of Medicare and Medicare extension insurance. We could do essentially cradle to grave kind of insurance by understanding the life cycle of our customer and how, through employment quirks, they might come and go with us during their life. That's kind of what a bank does, you know, CIF, Customer Information File, over the life of the customer or over the life of the customer with GHI.
Brady illustrated his assumptions as to why such a marketing repository was needed at GHI with this personal story:

I always use myself as an example. I think you might have heard me do it. I've been out of the Navy since 1972. I've been with eight companies and I've always been with GHI [for health insurance]. And the only one who knows that is me. GHI doesn't know that.

Brady's interpretation of potential changes in the regulatory environment also emphasized for him the importance of such an approach:

National Health Care Reform has only strengthened my feeling that we need to do that because National Health is going to force us into the retail market ... to understand today how to collect data and market to consumers. And so that customer information file concept, I think it's even more important now than it was.

Initially, Brady and key project participants espoused similar assumptions about how this concept would be realized through the BIS application. Core team members echoed Sam's ideas in their conversations and discussions about requirements. For example, Mark Smith paraphrased Sam's story in an interview with me to describe why the database proposed in the BIS project was necessary:

If I had GHI ten years ago, and then I didn't have GHI and I'll have GHI again, there's no way to know that I did have GHI ten years ago.

In another instance, I noted that Mary Kelly, who had only recently met Sam, tell his "I've always been with GHI" story (cited above) to explain the need for the new BIS database. Leslie Thomas and others frequently made references to consumer-based marketing and National Health Care Reform as a rationale for the database, in conversations and meetings.

Team members communicated these assumptions to new team members who joined the BIS core team. At a meeting between Jane Flynn, Tony Foley, Mary Kelly, and Alan Thomas, Flynn drew on these assumptions to create scenarios to illustrate why the proposed BIS database had been designed to included detailed (member level) data:

Thompson: We're moving towards end-consumer marketing.
Foley: Why is member important [in the data model]? You won't be marketing to my 11 year old daughter, will you?
Flynn: Yes, we might.
Foley: Having member information doesn't seem that important.
Flynn: Right now, we don't even know her name. Only her sex and date of birth. At Mid-West Insurance, they do market to kids ... If the husband and wife work and gets health care for free, they may just buy a policy for the child.
Kelly: I never thought about that.
Flynn: Me either, but if the mother and father get health care for free, the child's policy might just be $50/ month ... Think about students. Your daughter graduates from high school. We want to get to her before anyone else does.

BIS core team members acted on these frames as they proposed development of a relational database, defined major categories of data that would be needed, and drafted a data entity model reflective of this. Thus, a major requirements document stated:

Internal information requirements and external competitive pressures necessitate that the company develop a relational database which carries whole business relationship information down to the account and member level.

This idea was reiterated in the business case document:

The Business Information System (BIS) project will provide GHI, Inc. with a single repository of sales, marketing, and strategic information ... The goal of BIS is to develop a corporate knowledge base that will capture information resulting in a Customer Information File (CIF).

Although Brady and key project participants initially espoused similar assumptions, differences between Brady's expectations for the customer information file / marketing repository concept and the core team members' assumptions later came to light. In a meeting, Brady presented a new vision for BIS, introducing the metaphor of BIS as a front end driver to enrollment rather than a back end repository of enrollment data. This indicated new assumptions about the nature of the IT application and its position in the flow of transactional and information systems at GHI. Brady explained his rationale to me in an interview after this meeting [emphasis added]:

When people in the company think of a marketing repository, we think about it as a back end system. Historically it's been a repository of redundant data that is driven out of enrollment systems ... To the degree the upstream systems were wrong, MSIS would be wrong. And that was part of the reason people didn't believe in the data, because they could always find instances where something upstream caused something to be wrong.

He drew the front-end driver metaphor from his knowledge of how consumer-marketing industries handled marketing systems [emphasis added]:

What I was suggesting was the Mutual Fund industry, especially, and in some of the banking industries, banking worlds, they flip that ... [they] essentially drive the transaction systems from the marketing systems rather than flip it and let the transactions systems drive the marketing systems.

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2See Chapter VI, Episode 5 in the framing process for the BIS project, for an extended discussion.
Brady expected that, to implement this approach, business processes and individuals' responsibilities would change substantially:

The whole business of who acquires information and verifies it and puts it into the system would radically change with the marketing system as a driver ... Let's assume that we were using notebook systems while we were marketing. While we were out in the field we would be gathering all of the data through account interview and Dun and Bradstreet materials and maybe buying mail lists and feeding the systems automatically ... It would also mean that at the time that the sale occurred we could automatically enroll the business.

Brady charged the BIS project team and several IS managers from HMO-2 to consider the feasibility of his vision. Over the next several weeks, this group held a series of meetings in which they tried to make sense of Brady's ideas and to interpret the implications for IT requirements and implementation of the BIS project. In an initial meeting held to familiarize Tony Foley and Mary Kelly with the project, individuals' attempts at making sense of Brady's ideas and to arrive at a shared interpretation were evident, as this exchange illustrates:

Thompson: That hour meeting with Sam Brady last week was a lot to digest.
Flynn: Did you manage to do it? [laughter]
Thompson: Yes ... I've also been talking to Leslie about it. I'll be up-front. I'm interested in your (Foley's) opinion. Maybe you've heard this from Sam somewhere else. To me, this is a big change of pace where he wants us to go. I'm interested in how you heard and perceived what Sam said.
Kelly: It looks like it's [BIS] solving the problems of the world.

As they discussed Brady's ideas, team members shared their understanding and perspective on the project's history and drew on each others' knowledge to make sense of Brady's ideas and to negotiate a common interpretation of them [emphasis added]:

Thompson: *It's important that you (Tony, Mary) understand how the project has evolved* ... The project is still evolving, and there will be a lot of expectations to manage ... To sum up, at the start of the project, the direction was to start a customer information file and to turn off MSIS. The project evolved so that it was then going to capture everything, the whole business relationship of customers ...

Foley: Looking at the documents, it looks like the project was narrowed to two little projects, alternatives five and six.

Thompson: Yes, there was the throwaway database. *Did you ever have the impression that BIS would be the front end of the enrollment systems?* Had you heard this before last week?

Foley: I'd heard this from Sam Brady. And I'd talked to Jane about the project. I was familiar with the intention to build a repository. I though that CIS would be used for that. It was just a question of having the right data ... *I've talked to Sam about it, and I understood the flow as prospects moving to transactional systems,*
which is enrollment, then to historical systems for reporting, which is CIS.

Thompson: I have to tell you, it was news to us ... Sam has been evolving in his thinking about the project.

As the group continued to negotiate a common interpretation of Brady's vision in subsequent meetings, they examined their assumptions and expectations about the project identity. Leslie sought to re-frame the project identity around Brady's ideas in a positive manner, in one of the first meeting:

It's very exciting. It can help us to clean up our act in information technology. It's not the little BIS project anymore. That's a little thing that we get as part of the bigger project.

An interesting aspect of the process through which team members interpreted Brady's ideas was Leslie Thomas's selection of her own metaphor to interpret Brady's ideas. Brady had used the metaphor of BIS as a front-end driver to characterize this idea. However, Leslie Thomas soon introduced a different metaphor, i.e., BIS as an order entry system. At the first planning meeting, she used this metaphor in her introductory comments to explain to the group how she had made sense of Brady's ideas:

I spoke with Sam the other day and said, I think, what 'it' is, is a big order entry system. He stepped back and said, 'Yes. With a CIF [customer information file] on top, but yes.'

Using this metaphor, Thomas drew on her experience with order entry applications to help her understand and communicate to the team what issues might arise and what to expect in the project (i.e., that it would be more critical and risky). In this meeting, she outlined her expectations for the team [emphasis added]:

So, step one is to scope as much with respect to the order entry system as we can. I think it's much larger that what we understand today. It's big. There are a lot of associated costs which what 'it' encompasses, doing it, and doing it right. Twenty years ago, I worked on an order entry system in support of manufacturing, and I know, it has the potential to bring a company to its knees. We have to be careful.

In an interview, I asked Thomas to explain what the order entry metaphor meant to her:

I have worked on order entry systems before. I worked in a manufacturing environment, twenty years ago actually, in building an MRP system which to me is similar ... Because the order comes in from a sales organization, if you will, it builds the bill of materials. What do I need to get into the factory? It builds all the components ... In order for us to do business with a customer, they have to have an ID card. It also does all the setting up of the claims information, billing and all that. So it's the first entry point into this
organization... It has the order and it should shoot out all over the place and ensures that it feeds into the enrollment system, and the claims system. And so it will *drive* the entire process. It will become the driver. And so that's why I sort of thought of it as, you know, an order entry system.

Both Brady and Thomas interpreted new ideas in light of past experience (a common cognitive phenomenon), and thus selected metaphors that reflected their own past experience (Thomas in manufacturing, Brady in Mutual Funds). During my observation of team meetings and activities, I saw little indication that team members consciously examined these metaphors to consider their implications or possible inconsistencies. For example, in this interchange, team members' tacitly used both metaphors to characterize Brady's ideas for business process changes [emphasis added]:

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Kelly: I'm confused. Is this the *front-end of an order-entry system* or the *driving force* for re-engineering the enrollment process?
[all sigh]
Thompson: I think Mr. Brady is leaning towards the second.
Thomas: No.
Foley: No.
Thomas: He's looking for a *front-end driver that drives the paperwork* into the enrollment system and enrolls subscribers. He's not saying it will solve the problems with enrollment.
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The team drew on both metaphors during the next weeks of team meetings, as they considered how changing the position of the BIS system in the systems landscape (i.e., "front-end driver" of transactional enrollment system versus "back-end repository" system) affected their assumptions about the nature of the BIS application (extensive data entry versus simple data querying), the strategy for implementing BIS (building a major operational system versus implementing a "throwaway" reporting system), the goals, objectives, and outcomes of the project (substantial process change and organizational impact versus improving an information system), the business processes impacted by the technology change (enrollment as well as sales processes), and so on.

Team members drew on various technological frames as they examined their earlier assumptions and planned future actions. For example, they realized they would have to learn more about how enrollment processes occurred and how the enrollment system operated, to define requirements for the BIS application to "drive" that system. This, in turn, engendered discussions about what additional technical, business, or systems knowledge they might need on the team. Although there were substantial business process implications in the "front-end driver" concept, team members, drawing on their assumptions about users role in ISD, assumed that they did not need to talk further to system constituents to assess the feasibility of Brady's ideas. When it was proposed that
more interviews might be needed, Flynn commented that user involvement had already been extensive enough and Thompson insisted that no more studies would be done. Instead, team members assumed that they needed more knowledge of the computerized enrollment system and therefore they needed a technical person [emphasis added]:

Deutch: We need to get some one from the enrollment system to find out what it takes to drive it, what is minimal to run the business. What do we need to manage, to drive the process versus the informational use? The front end is a superset of what goes into the enrollment system.

Thomas: Getting someone from the enrollment system is a no brainer.

Deutch: Tom Jones is the guy [a GHI employee in enrollment].

Thomas: We'll have to go to ISI.

Thompson: I know who to go to.

Thomas: We need someone who knows the bowels of the enrollment system ... I'm not downplaying Tom's knowledge [but] I'd like to get some of the people from ISI headquarters who know how [the enrollment system] works. A senior level person out of ISI who knows it. Senior, with expertise.

Team members' knowledge of and assumptions about ISD strategy had a major influence on how they interpreted Brady's ideas and negotiated their response to his directive to consider the feasibility of making BIS a "front end driver" for enrollment processes. At the first meeting, Tony Foley stated his perspective on the team's approach versus Brady's [emphasis added]:

Sam is a level 2. It's his job to think about what's way out there ... We're level 3, 4's. It's our job to implement. We put together a plan, this is what we're going to do, we will deliver these things ... We have to focus ... Sam wants to build a strategic, whatever, system to meet national health care reform. But we have some problems -- or do we? -- and we need to build some systems to address them. What are the building blocks, what the systems we need today? ... We can't worry about what Clinton might pass in '96 ... What are the critical needs today?

In this meeting, Leslie Thomas focused on the danger in undertaking a major development initiative, drawing on an organizational story about a major IS development failure:

If we bit off too big a piece, we'd have, pardon my analogy, an MIS Fiasco, Part 2, here. I have a gut-wrenching feeling, it would be monstrous, and we'd never fund it. We won't go down the $100 million road again.

With these concerns in mind, the team soon began to focus on the advantages of implementing a first "chunk" (the replacement for the MSIS system which had already been proposed), as this exchange illustrates:
Thomas: Our question is, should we fast burn BIS, then get another core group together for the bigger issue, and have the two joined at the hip?
Foley: Yes.
Deutch: I agree.
Thompson: (At board, writes "Disjoint BIS and 'it' [i.e., larger project].")

Core team members soon agreed on a phased approach to development, focusing first on replacing the existing MSIS system with an enhanced, "back-end" marketing repository, then addressing the "front-end driver" concept in a second phase. The rationale for this ISD strategy was described in the business case proposal:

By taking a two-phase approach, the BIS project is able to solve problems attributed to MSIS quickly. Phase I inter-departmental dependencies are minor and manageable. Phase II will have major change management implications and inter-departmental dependencies. The design and planning process of Phase II will be lengthy to eliminate the risk of business interruption upon implementation. As Phase I is developed... the BIS team will begin the business case and design process for the Phase II solution.

The document made reference to "scoping out" the second, order entry phase and depicted the strategy in diagrams showing various stages in the BIS application. Team members then focused attention to planning for and estimating the first phase.

In an interview held after the task force had completed its work, I asked Leslie if she thought the team and Brady were in agreement about the BIS project. Her comment illustrates how the team, interpreting Brady's ideas in light of their assumptions about ISD strategy, had, in effect, put off consideration of Brady's ideas while pursuing their original proposal, and in this way had negotiated an agreement with Brady and among team members:

I think we are very much in alignment with him. I think we steered it the way it needed to be steered, in essence, of getting MSIS replaced in the first go-around and then taking the opportunity to scope out what the order entry system would look like.

Again, Brady appeared to be reconciled to this result, as he commented to me in an interview after this episode had occurred [emphasis added]:

I think it's evolutionary ... I think on the marketing side of the house we've got to get the core data about our current customers and prospects so we can start to understand who they are and what their value to us is in economic terms ... But I don't think we're going to be in the system as driver mode for two or three years, you know. That's a much bigger effort. But I think we need a repository up a year ... We can do that.
To summarize, BIS core team members initially espoused frames around the marketing repository that were similar to Brady's. They acted on these frames in their design of the database and their approach to the project. When Brady introduced new assumptions about using BIS as a "front-end driver," team members, drawing on assumptions and knowledge of ISD strategy in an interpretive negotiation process, reassessed their assumptions and expectations about the project, and arrived at a shared interpretation of how to respond. Their response focused on the short-term problem of replacing the MSIS system, while delaying consideration of Brady's more far-reaching ideas about business process changes.

(iii) Attempted frame-setting through consultants
In addition to his attempts to directly influence the ways in which core team members thought about the potential uses of IT in sales processes, Brady employed consultants to do a requirements study. He explained his rationale to me in an interview:

I wanted to have somebody else come back in take a crack at it, and see if we could make it a richer definition of what we were looking for ... So I thought Ideas, Inc. would do it because they were working on the sales force process redesign program, essentially studying our sales environment anyway and [they] have a particular flair, if you will, for getting out the fundamental questions of why people do business in the way that they do.

For eight months, consultants from Ideas, Inc., primarily Alan Thompson, planned, managed, and lead requirements definition activities. Because the consultants were overtly attempting to re-frame the project, the influence of their technological frames on negotiations around requirements was clearly evident. For example, the consultants attempted to influence the ways in which GHI organization members thought about IT use, increasing their awareness of how to use information strategically. They renamed the system the Strategic Business Information System (SBIS) and entitling all documents and presentations Leveraging Information for Strategic Marketing Advantage. Their first report promised to change the way managers at GHI thought about using information:

A strategic marketing information plan ... will result in establishing an ongoing process for managers to think strategically about their use of marketing information ... This plan will be owned by the key managers who participate in its development, and they will be responsible for is ongoing refinement through implementation and beyond.

Thompson planned and carried out IT requirements activities that were consistent with his emphasis on strategy. He interviewed GHI executives starting with the CEO and
President, then worked down two to three levels of management in the organization. He arranged team visits to other companies to see presentations on sales and marketing systems and arranged workshops with an academic consultant to stimulate discussion on sharing information informally and rapidly. In an interview, Thompson commented on how, through these activities, he attempted to influence how other team members understood the nature of sales information and the potential uses of IT in sales processes [emphasis added]:

It helped us to get to the point to say, 'You know, team, you may want a lot of things in here but, there might be a big piece of this, meaning the most dynamic part of the information, which is the hardest to capture and the most important to maintain. We might just want to take that [whoosh sound] and turn up the informal gain on it, and use informal networks, and maybe the telecommunication capabilities of morning calls, or whatever it might be, to turn around [information].'

One tangible outcome of this work was establishment of the FAX competitor line, that is, a FAX number sales representatives could use to pass on information about competitors they might come across in their customer contacts.

Alan Thompson introduced key assumptions and expectations into negotiations around requirements through his use of analytic models. He defined sequential stages of the business process in a "sales value chain" model and attempted to structure GHI personnel's thinking about the sales process and the role of information using this model [emphasis added]:

There were many people who fundamentally did not understand that business, O.K.? And so, we realized we might as well set the structure within which we want them to understand it. You know, they should understand how the activities that they perform generate value ... [sales value chains were] used to bring the thought process of everyone in a presentation to a similar point, you know, kind of a similar starting point, [where] you say, 'That's where we're going. We understand.'

In the "information strategy" model, Thompson visually depicted assumptions that information strategy was "driven" by "competitive environment drivers" (market, customer, GHI strategy) and "delivery design" (operational drivers, resource priorities, technical capabilities) and that managers' marketing or selling decisions could be translated into "queries" to be answered with specific information made available through implementation of the information strategy. He applied the "drivers" concept to each step

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3This was in marked contrast with the approach Jane Flynn and Mark Smith had taken in an earlier study, in which they interviewed managers, sales representatives, administrative assistants, word processors, and so on. Thompson, on the other hand, focused largely on interviewing executives and senior managers.
in the "sales value chain" to define components of the "information strategy." He also used an "organizational / technological complexity" model to assess whether a particular solution would likely be complex or difficult to implement in terms of the technology or the organization and then compared alternative recommendations and proposals using this model. This model reflected the consultants' assumptions about defining simple solutions, which they articulated in their first formal report [emphasis added]:

Sales and marketing information requirements are very simple ... and to satisfy these requirements, we must find simple, easy-to-use solutions ... The breadth and variety of available information lead to a very complex set of requirements, and an even more complex system solution. GHI must avoid this trap.

Through his use of these analytic models and his dominant role in planning and carrying out requirements activities, Thompson directed what the project team discussed and how they assessed information about requirements. For example, he used the analytic models to structure information and recommendations in all project documentation. He organized presentations to executives and system constituents according to the sales value chain and other models. Thompson used these analytic models, and the assumptions and expectations underlying the models, to decide what IT requirements should be built into the BIS application, and he used the models to justify decisions about which requirements were in scope or out of scope for the BIS project, as the final report for this phase stated [emphasis added]:

To develop a plan for GHI to effectuate a strategic marketing information plan, we utilized the company's sales value chain as an 'acid test' as to the relevancy of the information requirements. The information requirements of activities which directly support the sales value chain were deemed to be within the scope of the project.

In addition to ruling requirements in or out of scope, the consultants drew on their frames to fill in requirements. For example, they assumed IT could be used strategically in sales and thus emphasized the importance of having information on competitors. Thompson sought comments on the importance of information on competitors in interviews with GHI managers, as these questions he posed to GHI managers suggest4 [emphasis added]:

Thompson: What information do you need to do that job best right now ... [after interviewee responds without mentioning competitor information] Anything on competitor positioning? Do you need to be aware of that? On an account specific basis?

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4 These and following excerpts come from transcriptions of interviews the consultants conducted with GHI employees during a requirements study.
Thompson: When you do these bids, how do you position against competitors, and I am assuming that part of it is that you have to know what competitors are doing. So I am asking, were to you get that information to do that?

Thompson: Is there another important source of competitor information that you may like to get now and you can't or that you have now and you use frequently?

In the first study document, Thompson noted the requirement for two types of competitive data: 1) general information about competitors, and 2) specific information about who were the competitors and what were their bids on specific accounts:

Business Issues -- Sales Information: Lack of competitor information on an account, regional, and product basis.
Implications for BIS: A competitor library will need to be developed within the system on an account, product, and regional basis. External data sources will be needed."

These requirements also appeared in the next version of the requirements document:

Information Strategy:
• Analyze competitor product offerings and circulate this knowledge.
• Capture and analyze competitor positioning within the account.

Information requirements:
• Capture specific competitor account information.
• Capture competitor product and service developments.

Interestingly, when EVP Brady instructed the team to develop a scaled-back proposal for the SBIS application, requirements for general information about competitor products and services were dropped. However, account specific competitor data, which sales representatives had been collecting through manual procedures, was still considered a priority requirement. This suggested that it was primarily the consultants, drawing on their frames about strategic uses of IT, who assumed there was a requirement for enhanced, automated methods of collecting general information on competitors.

The consultants' frames clearly had an influence on the BIS team's activities, on espoused decisions on IT requirements, and on project artifacts (i.e., requirements documents) during the time period they were actively involved in the project. Leslie Thomas commented on her perception of the consultants' influence on other team members' thinking about the BIS project [emphasis added]:

Ideas, Inc. and Company brought to the table sales and marketing knowledge ... They built a lot of value chains around certain things and they brought in, um, actually a professor ... To help us think, you know, outside the dots. To help us think of some quick hit solutions and some other things. So we had

Chapter V (145)
some very broad brush thinking on this thing ... what you should be thinking that you may never have even thought of.

However, their influence on other team members' frames was less clear. This team member's comments suggest that the consultants were less than successful in influencing other team members' thinking about the project [emphasis added]:

They produced the [requirements] document. I didn't agree with everything that was in there. I mean they put in a lot charts and graphs, you know, like a MBA school presentation kind of thing, it reminded me of ... A lot of the stuff they put in from outside research, like the process for developing information strategies or all these charts and graphs and how important everything is. I mean, they didn't come to us and say 'What do you feel,' or 'Do you feel the sales reps and sales managers go on here?' [indicated drawing in document] You know, they decided to do that ... I think that if they went into another company and did the same thing, they would use the same stuff, you know, the same format, the same thing. Because I think it's just a blanket for the industry, you know, information technology and sales and marketing systems.

Another team member's comment about the requirements documents in which Ideas, Inc. had detailed their analysis similarly suggests that the consultants' frames had little long-term influence on other team members' frames or their understanding of requirements [emphasis added]:

It [Ideas Inc. report] didn't have a lot of substance to it. You can look at the books and you can read through them but you really truly don't draw any major conclusions from it ... It just seemed like it was fluff ... I haven't gained anything from it.

To summarize, Alan Thompson, the primary Ideas, Inc. consultant, played an important role in requirements definition activities for a time. Because he controlled project activities and artifacts, he could mold them according to his frames. However, his influence and the influence of his frames on others depended largely on the authority he derived from EVP Brady. When he had Brady's endorsement and support, his ideas carried weight with other team members. When Brady asked other personnel to join the BIS team and his support for Ideas, Inc., was less apparent, Thompson's influence was diminished. Eventually, Ideas, Inc. was dropped from the project. Without their active participation in the project, the influence of their frames on negotiations around requirements quickly eroded. Terminology such as the Strategic BIS and information strategy dropped from use, and the system became simply BIS again. Documents he produced, while kept on file, were seldom referenced. Only the most concrete requirements items -- the data entity model diagrams and lists of reports -- were extracted from requirements documents and incorporated in later requirements and project documents.
A.2. How does it relate?

For members of the BIS core team, understanding what other projects were going on at GHI and how they might influence the project definition, IT application, or business functions being addressed by the BIS project was an ongoing interpretive task. As discussed in Chapter IV, team members drew on their frames around inter-project coordination as they considered the implications of other projects for the BIS project and as they envisioned how the BIS application would relate to the overall systems landscape. In the following two sections, I examine how team members drew on their frames around inter-project coordination and the systems landscape to understand the influence of and to plan actions around other projects in two contexts: i) "critical success factor" projects; and ii) overlapping projects.

(i) "Critical success factor" projects

BIS core team members assumed that they should coordinate their project with other IS development projects to eliminate duplication of effort and to produce stream-lined IT applications. For example, when Mary Kelly joined the BIS team, and Flynn learned that Kelly's IS organization was implementing a first release of a customer enrollment database reporting system (Corporate Information System [CIS]), the two spent many hours reviewing database field and table definitions to determine if some types of data needed in BIS should and could be provided through the CIS. Having determined that the CIS application was using similar data as would be needed in BIS, they expected that the BIS project would "piggyback" on the CIS project, thus reducing development cost while reducing or limiting redundant storage of data. In the following dialogue excerpt from a team meeting, team members' attempt to "draw the picture" correctly suggest such assumptions [emphasis added]:

Kelly: Well, no, you're missing a piece. On your line coming up, put a block in between that and BIS called CIS.
ISI designer: Okay. So you're planning on grabbing the information for BIS from CIS?
Kelly: For customers.
ISI designer: Ok.
Kelly: And right now, you're almost showing it as a physical view, it's probably more of a logical view.
ISI designer: Help me out with that.
Kelly: Well, we're not going to transfer, actually transfer data, I would imagine, that we're not going to transfer data into BIS. We're going to want to view it so we're pointing at that data.

[later]
Thompson: Did we, can I ask Mary and Jane, did we, did we confirm, just refresh my memory, that BIS would be fed by the CIS? Or were we just going to hit the enrollment system?

Flynn: ...I don't think the word is feed. I think what we're looking for is there is any way that we can benefit [from work already done], share the tables that we were creating in CIS.

Although the team agreed to coordinate data flows between these two applications to reduce redundant data storage (i.e., "pointing at that data"), they also realized that the BIS project would become dependent on progress of the CIS project. They handled this by defining CIS as a "critical success factor" project and noting it as such in project presentations and documents. For example, the business case proposal states the dependency:

The strategy for achieving the BIS initiative is to build upon the CIS initiative. BIS will have views into CIS for current group, subscriber, and member information

And, the "critical success factors" section notes:

The following items must happen to ensure the success of BIS: Implementation of CIS with full book of business...

The BIS team also considered the influence of plans to upgrade the IT architecture and infrastructure (communication networks, workstations) on their project. In discussions around the technological infrastructure required to implement the BIS project, team members debated whether they should count on the IT infrastructure planning project to put local area networks (LANs), wide area networks (WANs), and workstations in place in time for the BIS project. Although in the first IT requirements proposal, ISI team members had included costs for building the infrastructure needed for the BIS project, GHI team members assumed that building the IT infrastructure was not part of the BIS project and therefore should not be included in project costs, as this discussion about project costs in a team meeting illustrates:

Flynn: Will the support people in the field still need connectivity?
Kelly: That's their problem ... We need to develop what the hardware requirements are. It's up to the departments to get connectivity. We'll help them to get the connectivity ... The cost will be astronomical for the project if we provide technology to all the users.

Team members continued to assume the technology infrastructure needed for their project was not their responsibility and began to talk about the infrastructure as a "critical success factor." In this discussion several months later, the team continued to argue that building the infrastructure was necessary for but not a responsibility of the BIS project:
Flynn: It's an architecture problem.
Kelly: We shouldn't burden the project with network costs. Vanessa [new VP] says she wants networks, backbones, connectivity.
Thomas: That's not a cost to the project. We'll note a critical success factor for the servers, backbone being there, but we're not paying for it.
Kelly: Why should BIS, as the first client server application, pay for the network? [GHI] needs to do this [build the network].

The team acted on these assumptions, listing the IT infrastructure as a critical success factor in the business case but taking no other actions. However, concerns about the possibility that the infrastructure would not be available continued to arise as the team worked on their implementation work plan:

Thomas: We need to have the network in place, but it's not a relevant problem [to this team's effort].
Schwartz: I think that's first on the list ... We need the PCs, the network in place. to do it.
Thomas: It's not relevant. If we put an SLA [Service Level agreement] on it, ISI will get it done. I don't think its a question it can't be done ... There's no logical reason it's not done now ... We put the network down as a critical success factor. If it's not approved, BIS will fail.

Mary Kelly explained her concerns in an interview with me:

We're not supposed to worry about the telecommunications. Well that's just fine but when none of these users can get to the system that we're building, then it will become a major issue ... If they're sitting there with a dumb terminal on their desk, or IBM terminal, it's not going to do us any good.

Kelly's concern arose in part from her experience with the New Life program, an IT development project completed around this time. On several occasions, she drew on the story of this project to make her point, as in this excerpt from a team working session:

I've asked one of my employees to look at what the actual hardware is now to see how big the problem is. That's what happened in the New Life program. We did it in client-server, and the people said they needed PCs. We had to redo it in character-based, because they didn't have the PCs.

In summary, BIS team members, drawing on their assumptions and expectations about inter-project coordination and the systems landscape, attempted to coordinate their efforts with projects they thought they could benefit from. Their interpretation of the relationship between the projects (BIS as the dependent project but with no responsibility) was technology-based. The team's assumptions were reflected in their actions, such as labeling projects "critical success factors," documenting their dependency in project proposals, presentations, and team meetings, but undertaking no IS development activity or other negotiation tactics to bring these projects to fruition. During the period of my field study,
the BIS project had not moved into implementation, so the team did not actually encounter difficulties or delays from these projects. Had the project moved into implementation, they might have tried a more active approach to control their dependency.

(ii) Overlapping projects

When the goals of two or more projects overlapped, team members assumptions about the desirability of coordinating efforts conflicted with their self-interest in controlling project activities. Such issues arose in the BIS project when the team became aware of a re-engineering initiative in the Total Quality Management program, the New Business and Renewal (NBR) project. According to Sam Brady, this project was directed at an ongoing problem at GHI, Inc.:

We've had too many instances where what we underwrote and then went with didn't match what we sold the customer. In fact, it didn't even match the benefits booklet that we gave to their employees because somebody mis-communicated. Usually verbally or on paper.

In an interview, he described his concept of capturing the "essence of the deal," that is, the negotiated agreement between GHI and its customers, to solve this problem:

If I can capture the essence of the deal and then print it off for you and you could review it, right before I left your office and you could sign it and say, 'Yep, that's exactly what I bought. Now if you underwrite and enroll me under that product, that's what I wanted.'

As the BIS project team was considering Brady's notions of making BIS a "front-end driver," Brady began to think about the benefits of combining the NBR effort (a re-engineering project) and the BIS project (a technology project). Brady expected that the NBR project would not only influence the ways in which the BIS as front-end-driver concept would be implemented, but that hardware technology platform and purchases should be coordinated if technology were used to automate collection of the "essence of the deal." Thus, he instructed Leslie Thomas to work things out with the NBR project manager, Bill Maynard, and the BIS team took on the task of figuring out how these projects fit together. In a team meeting held after Thomas's meeting with Maynard, she explained her understanding of the need to coordinate the projects to the team:

In projects, sometimes things crop up all of a sudden and have to be taken into account. Fortunately, this cropped up before the fact ... I don't want to go to Sam with BIS and have Sam ask if the proposal is integrated with this [NBR] effort, without having an answer ready.
Thomas conceived of both projects as parts of a larger effort to change sales processes through re-engineering and automation, a vaguely defined idea that the team referred to as "it" or "the big." She articulated her assumptions about the relationship of the NBR and BIS projects to the group in a working sessions:

It's [NBR] not part and parcel of BIS. It's part and parcel of a bigger project ... It's part of the big ... The teams need to look at the global standpoint, to look at in a cohesive manner, not five things going on separately. If this group finds out that it's not part of it, fine ... but, I do think it's an integral part of it.

Coordinating the NBR and the BIS projects to "capture the essence of the deal," as envisioned by Sam Brady, had substantial change implications for sales and enrollment processes. Leslie Thomas's understanding was similar to Brady's [emphasis added]:

There's two components to enrollment, the group paperwork which is, if you will, RBC as a corporation or an entity gets signed up [NBR focus]. And then the individual members get signed up [BIS as front-end driver focus]. But I can't sign up individual members until I get the group paperwork ... So, if you will, if the paperwork coming in from the field isn't correct, none of this can get done ... There would also be an enormous amount of change just around the sales rep, getting the essence of the deal right the first time, understanding today we don't sit down with the customer and say, "Here's what you bought. Here's what I understand is what we've sold you. Do you agree? Let's sign on the dotted line and away we go.'

However, instead of tackling the business process issues, BIS team members, working with the two ISI consultants from the NBR project, focused instead on technological issues of how data would flow among the NBR application, the BIS application, enrollment systems, etc., how different "chunks" of IT features and functions could be bundled together in "phases" for automation, and whether a consistent technology platform should be prescribed to avoid future technical compatibility. In fact, negotiations focused almost exclusively on how to coordinate the projects technically through phasing the development efforts while maintaining a consistent approach to the technological platform, as Thomas commented to the team:

Bill has thought about developing the NBR process manually, then we could add in the automation later ... But there is a potential that it may not technically later, if we don't consider it now. We can do it in parallel, if we talk to each other.

The ISI technical consultant agreed with Thomas's focus on technological coordination as the major issue, as she commented in a team meeting:

It's a question of how to automate that portion of it. Through BIS? Sales force automation? Do it separately and link it up later? Or, is it part of the big?
Thus, team members' frames knowledge of and assumptions about ISD strategy again had a major influence on how they interpreted events in the project context, in this case, the need to coordinate the NBR and BIS projects, and how they planned to coordinate their efforts. However, in this instance, control as well as coordination, was an issue. In the following dialogue excerpt, the discussion of how to define project phases to coordinate the NBR and BIS projects has undertones of conflicts over project control. Note how Thomas and Flynn reject the ISI consultant's notion of a Phase II for NBR automation independent of the big [project] under their control [emphasis added]:

**ISI consultant:** So Phase 1 was just simply MSIS replacement.
**Thomas:** Correct.
**ISI consultant:** And Phase 2 is saying we're now going to start the automation of NBR, and we don't know how it's going to fit with BIS yet, but we know that they can go somewhat parallel as long as they keep some things in mind.
**Thomas:** The only comment that I'm saying is, what I'm saying is I agree 100% on Phase 1, and we agree that we did not want to get messy with NBR at this point. But what I'm saying is this ... how we automate it and where it goes in should be our part of automating the whole thing.
**Flynn:** Oh, I see what you're saying.
**Thomas:** So therefore, if you will, this piece, Phase 2 goes away, and it becomes, this [indicates the Phase i box on diagram] becomes Phase 2, because we show that automation piece in Phase 3. That's what I'm saying.

Team members negotiated over schematic diagrams of project phases, using color coded lines to signify different phases and debating the position and color of the lines, as they challenged each others' phasing assumptions. After several meetings, the BIS team adopted the idea of focusing the first phase of the big on replacing the MSIS system (their own project goal) while the NBR project worked on a sales process redesign effort implemented without automation. In Phase II, the BIS project would then automate NBR functions as part of the BIS-as-front-end-driver concept. The team incorporated diagrams illustrating this approach in their project documents and presentations, with little review or input from Bill Maynard, the NBR project manager. Thus, through this phasing approach, they expected to continue with their primary goal (replacing MSIS), while reserving the right to control future automation efforts related to the NBR project.

The team's assumptions remained unchanged until they became aware, several months later, that the re-engineering consultants Maynard had been working with (BTC, Inc.) had proceeded independently to prepare a proposal to implement an automated system for NBR functions. This proposal specified the business process flow, recommended
several phased pilots to be developed for the fall enrollment period, and identified substantial cost savings. As they tried to make sense of the situation, the BIS team at first maintained their earlier interpretation and their right to control NBR automation:

Thomas: As far as I'm concerned, nothing has changed.
Kelly: I attended a meeting for Tony in which Bill Maynard and the BTC people were there. Vanessa (VP of Administration) asked if they were in sync with Leslie Thomas and BIS. They said yes, they had met with them. I introduced myself as the BIS [technical] project manager and said that I hadn't met with anyone.
Thomas: We haven't heard anything about this for three months. Then, in one meeting which Mark attended, they presented a project proposal. As far as I'm concerned, we still have it. If not, someone else has the August date. Phase I was to prototype it -- or us or them -- and to work together. Then, in Phase II, to automate NBR.

However, the team soon realized that there was organizational support for the NBR project, which was being marketed by the BTC consultants as having sizable cost benefits. The BIS project, by comparison, had smaller, less tangible benefits. With organizational change ongoing on at GHI and Bill Maynard in a new position, the BIS team realized that no one at GHI was currently in control of the NBR project, and that, rather than sticking with their coordination-through-phasing approach, they should consider how to take control of the NBR project and integrate it with the BIS project immediately, and in this way, appropriate its perceived benefits. Alternative strategies for integrating the projects became the major focus of discussions in team meetings for several weeks, as the team considered the advantages of taking control over NBR [emphasis added]:

Flynn: BIS benefits are nice, but not really nice. NBR benefits are really nice, you can touch, feel them. They might say, put BIS aside and make this happen.
Galvin: The same team should do NBR and BIS. We'd have it better, and sooner. Using JAD [Joint Application Design] will speed it up, and give us a better product. I don't want to see us give up doing a project. It's a nice project.
Flynn: We have to be careful what we say to Foley. We don't just say, we can do it, if someone else says they can do it.
Galvin: Right, and I wouldn't put it that way. It's a question of doing it right.
Flynn: What is doing it right?
Galvin: Doing one project, learning from both, integrating them.

Over the next several days, the team held several working sessions to brainstorm alternatives for coordinating the projects and to articulate a clear definition of what should be accomplished, in total, from both projects. In these sessions, they attempted to negotiate a common understanding of what would be both feasible and desirable, as this dialogue excerpt illustrates:
Thomas: I want to talk about the NBR. Talk to me about NBR. I want to see if you came up with the same conclusions I did.
Flynn: What are your conclusions? You want to share them with me?
Thomas: No. I want to see what you think.
Schwartz: There are three options. One, integrate the projects, use the same teams. Two, delay BIS and do NBR. Three, separate development teams, parallel, concurrent development.
Thomas: Is August still the date? Is August real? Tim? Realistically, is August real?
Schwartz: Could it be real? I'm not warm and fuzzy about it.

At a presentation to Tony Foley, the recently appointed CIO, the BIS team's desire to take control over the NBR project was evident in their proposal that NBR be integrated with BIS. Foley, drawing on his "where does it hurt" assumptions about ISD strategy, began to focus on automating one portion of the NBR process. Joe Galvin, the BIS / ISI technical manager explained what happened:

What happened at that meeting was, first quarter of '95 was unacceptable [for implementation]. And then Tony got up and said "This is where we're really hurting." And he proceeded to draw out the, the what do you call it, the account renewal system ... And he said, 'If you can help us here, you're going to save a lot of time.' So I've nicknamed this thing the 'Son of NBR' ... it is not the NBR and BIS system as we know it.

As a result of Foley's intervention, the BIS team took on the NBR project, but put the BIS project on hold. In spite of this outcome, Leslie Thomas continued to view BIS as the overriding project, maintaining that the team's efforts with NBR were merely a short-term solution to an immediate problem [emphasis added]:

What we're doing for NBR right now is a quick hit, got to get it in by August, and it potentially could be 75% throw-away. What we probably will salvage from it is the database design and the structure and all that. Then I'm seeing BIS coming up and ... the terminology NBR will go away because it will be inherent in BIS. It'll be a redo.

In summary, as the team reacted to an overlapping project (the NBR project), their assumptions that coordination between projects was necessary at times conflicted with their self interest in maintaining control over their own project efforts or even to take control of another attractive project. As they negotiated how to coordinate projects, they drew to a large extent on shared assumptions about ISD strategy, that is, phasing delivery of IT functionality.
A.3. What to do?

Team members' knowledge of and assumptions about ISD strategy influenced their actions and decisions around IT requirements throughout the BIS project. As discussed above, these aspects of their technological frames had a strong influence on how they negotiated a shared interpretation of and response to Brady's "front-end driver" notion and to the NBR project and therefore on the actions they undertook and the kinds of IT requirements they focused on. Although there were minor differences in assumptions about ISD strategies evident in the terminology various team members used to describe ISD strategies (e.g., "plug and play," "incremental implementation," "throwaway solutions," "quick hits," and so on), all core team members shared basic assumptions, that is, that rapid delivery of IT solutions was critical, that projects should be broken into pieces to increase control, and that packaged software could be purchased and "plugged in" or modified (especially if it were built in client-server technology) quickly to satisfy most requirements. In the following section (i), I examine how team members conceived of the need for and planned to implement a pilot IT application by drawing on these assumptions about ISD strategy.

(i) Creating IT requirements from ISD strategies: the Group SELL pilot

As discussed above in relation to Sales Force Automation, the BIS team had defined a pilot project which involved purchasing notebook computers and packaged software for distribution to a pilot group of sales representatives. The team understood this project as a "quick hit," that is, as a rapid implementation of an IT application expected to deliver immediate and obvious benefits, and in this way gaining system acceptance and project legitimacy with users.5 During my observation of the BIS project, I observed how team members, drawing on their frames around "quick hits" and "plug and play" strategies, conceived of the need for another pilot project, the Group SELL pilot, and how their reliance on such frames influenced their actions around requirements definition activities.

This incident began during the time period when team members were considering Brady's BIS-as-front-end-driver notion. The idea of looking for software packages to satisfy requirements quickly arose in team meetings. In the following dialogue excerpt from a team meeting, it is interesting to note that team members decided to look at software packages and vendors, assuming this would help them devise a response to Brady's ideas and would ultimately speed up the project, even though they were not sure what business functionality they were expecting to fulfill with a package [emphasis added]:

5See Chapter VI, Episode 4b of framing process in BIS project for more detailed description of this pilot.
Thompson: We should be looking for software in the market to jump start the project. We can't get back from them if we lose them.

Deuch: We need to look at these things from forty thousand feet, to know what their capabilities are.

Thomas: Right. Don't tell us you can fix the problem. Tell us, what can you do? ... I don't want to have anyone else in to study the problem.

Thompson: [At board] So high level reviews of vendor products can continue. Do we want to deadline that?

Foley: We want to be done with vendor reviews by the end of October.

Thomas: We have about a two week window in the schedule.

Flynn: Mary and I will create a format of how to compare vendors, to bring information back to the group on our findings, a standard chart.

Thomas: *Excuse me, are we just looking at the BIS piece?*

Thompson: *It's also the order entry piece.*

Thomas: *Why are we looking at vendors again?*

Foley: *For the prospecting piece.*

Thomas: That's done. We have SELL.

Flynn: But it's not pulled together.

Kelly: It's for individual sales people to track their work. It's not pooling the information.

Thomas: *If we build BIS, that will do it. We need to look at the order entry and MSIS replacement.*

Mary Kelly, an IS manager at HMO-2 who had been recently assigned to the BIS team, had already contacted a software vendor about PC-based sales and marketing systems. Kelly, an advocate of the "plug-and-play" strategy, took this action even before her initial meeting with other team members to learn about the project. Other team members applauded her action and agreed that looking at available packaged software was a priority task. Kelly and Flynn met with the vendor and reported their findings at the team meeting described above. In spite of the team's uncertainty over what business functionality a package should provide, a requirement began to gain legitimacy as a result of Kelly's initial meeting with the vendor, the team's determination to pursue packaged software solutions, and their desire to deliver "quick hits." Mary Kelly had contacted the vendor because she thought the company had a sales and marketing package that worked with the lead tracking software (SELL) that Jane Flynn had earlier distributed with the notebook computers. Although they soon learned that the vendor was selling "integration skills" rather than an actual package, the idea of developing an automated linkage between the individual notebooks (dubbed "islands of automation" by the vendor) and a central database, took root as a requirement and the idea of developing a pilot application with the vendor to automate the linkage quickly evolved into the Group SELL pilot. This pilot project was described in the business case justification document presented to Sam Brady, even though the team's
understanding of what the pilot would accomplish was fuzzy at best. The business case, for example, simply noted:

Not all components will be built. The sales representatives are using SELL, a lead management and prospecting system. The BIS team is reviewing a product called Group SELL which allows the sales representatives to transmit their prospect information into a relational database to provided integrated sales management reporting. District One will pilot test this software.

In an interview, Mark Smith described his conception of the application to me:

SELL and Group SELL are just about the prospects ... it's going to be a Windows-like interface ... We have SELL, which is the software that the sales representatives use on their stand alone notebooks. And if they want to combine any of the information they need to download it to a disk and then on someone else's PC or their Sales Leader's PC ... What Group SELL does is, it does that. You know, there's a server that all these machines are hooked up to. So when the notebooks get hooked in, it will upload information that they've changed and would download other information.

Leslie Thomas's understanding of the pilot project requirements were similarly high level [emphasis added]:

It's like a six month pilot or something, so the cost risk is very low ... I think it's middleware. I think it's an Oracle database though ... It has the ability to bring all of the Notebook information up together. And so Jeff can review it at a divisional level or the business leaders, the people who work for Jeff, can report it at their own individual level. So we can get a look at the whole division at once as opposed to having each sales rep hand in a report ... So we can do management reporting for them. That's as little as I know about it.

Mary Kelly primarily understood this pilot project in terms of the automated integration of data from the notebook databases:

Group SELL itself really allows the sales force to centralize into a customer information file all their information that they're gathering on their individual PC's very easily.

Although the pilot was a "quick hit," the team expected to integrate this application later with the broader BIS system, in a two-way passing of data, as Leslie explained:

That's the driver. Prospects, lead management, all that goes in there first, and then it's going to feed BIS. And then, so the prospect, once it becomes a

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6Sales representatives had their own discrete databases on their individual notebook computers. Jane Flynn and Mark Smith had written a manual procedure for representatives to copy their database onto a diskette, and for sales managers to combine diskettes into one database on their notebook computers, a "sneakernet" solution according to Smith. Since the team had done little follow-up on actual usage of the SELL software throughout the organization, they had no data to indicate that this manual process was problematic or that automating the linkage would be beneficial.
customer will go into BIS. Now, we will also have prospects on BIS so it will also go out the other way. We will be able to download from BIS into the PC, you know, into the notebook lead tracking software.

As the team later began to define the pilot project in more detail, differences in their assumptions about the SELL and Group SELL applications and about the pilot project emerged in a project team meeting:

Kelly: Well, we know that SELL and Group SELL might not be right for the account executives. They want summary, not the details, at least, that's what I've always assumed from Jane.

Thomas: Where did that come from?

Kelly: I've always worked under the assumption that SELL may not be right for the account executives.

Smith: They'd be using it for tracking the details of their sales calls, the letters they've sent, things like that.

Thomas: There's money in the budget for the SELL software, the notebooks and all, for the account executives. I can't believe that Jane would have told me to put it in there if she didn't expect they'd use it.

Kelly: I thought it was put in as a place holder for whatever we end up using.

Thomas: We've never talked about it. I'll ask Jane. I'm assuming that, yes, the account executives would use it. I'm not going to have two different packages for the sales force ... SELL either works, or not, for both the sales execs and account reps.

As the meeting continued, it became evident that team members, while agreeing at a high level about the Group SELL concept, had different expectations about how this application would fit into the larger BIS application and how (and for what) it would actually be used:

Thomas: We'll be downloading into SELL ... Won't SELL be linked to BIS? We'll bring information from BIS into SELL, and it will go the other way also.

Kelly: You're saying from CIS?

Thomas: No.

Schwartz: What information do you mean?

Thomas: Account information, the number of subscribers ...

Smith: The information in SELL is on things like phone calls, letter, forecasts.

Schwartz: SELL has a limited number of user-defined fields. We'll soon run out of them.

Thomas: Let's assume the best case for a minute, that there's all the same fields for both sides ...

Kelly: [interrupts] If not, there's a problem with Group SELL.

Thomas: ... and it meets their needs. If we reorganize, and assign new territories, we need to run queries against the data ... and bring it into SELL.

Schwartz: My perception is different. My thought was that the sales execs view BIS only through SELL.

Thomas: To manage their territory, it's only through SELL. But for sales incentives, or to see distribution of various products, things like
that, is through BIS. SELL for the sales executives, who should be in the field, not in their office, is the driver, the feed into BIS. The sales leader manages their territory with SELL. We don't need this data in BIS. Is it the right tool? If not, we need to start looking for something else.

The team had done no requirements studies to verify the need for the pilot, its actual use, how the SELL software was being used with the pilot group, how other sales representatives might use the software, and so on. However, instead of addressing these business process issues, they reconsidered their ISD strategy, moving towards the idea that, using GUI-based application tools, they could quickly build their own application. Ironically, the team had developed this requirement in large part based on assumptions that they should and could buy packaged software, and had now reached the conclusion they could custom-build a more satisfactory tool.

In summary, the team, focusing on "quick hits" and "plug and play" development strategies, identified IT requirements and planned to implement a pilot. In doing so, they had failed to recognize that they didn't understand the business requirements and had not agreed on basic functionality for the pilot. When the team learned the vendor's proposal price was much higher than expected, and that the vendor was having financial difficulty, the whole idea was dropped, with these questions left unresolved.

A.4. How to work with system constituents?

Staff personnel at GHI who were liaisons between the IS department and business functional areas, ISI, Inc. personnel, and IS personnel at HMO-2 constituted the BIS project team, and, as such, they were responsible for planning and carrying out ISD activities (See Table IV-1). As a result of this division of labor in ISD, they played a dominant role in IT requirements definition activities compared to system constituents. In addition, core team members, drawing on their assumptions about the role of users' in ISD, further limited users' role and influence in requirements definition activities. In Chapter IV, I noted that core team members had inconsistent assumptions about users' roles (see Sub-category 1a). That is, while they assumed that users had to be involved in ISD activities to increase the chances of success, they also believed that users "don't know what they want" and that core team members needed to control their participation. These assumptions were evident in the kinds of activities core team members planned for system constituents, the ways they interacted during IT requirements activities, and in the ways

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7In this instance, there was some divergence in team members' assumptions about user involvement. Kelly asked Thomas to authorize her to give demonstrations to sales representatives in order to get their opinion. Thomas quashed this idea.
they filtered and processed information about requirements from them. In the following sections, I examine the influence of core team members' frames around users' role in ISD on interactions between core team members and user sponsors (i), and between core team members and system constituents (ii).

(i) Who's the boss? Working with the project sponsor

Although Leslie Thomas, the BIS project sponsor, and Jane Flynn, the BIS project manager, held staff support positions in Sam Brady's Sales and Services organization, both had backgrounds in IS development rather than sales and marketing. In addition, though Thomas had responsibility for "sales development" and "creating a sales culture," she had no line authority over sales personnel. Her ability to promote use of the system in the sales organization was a function of her personal influence and the legitimacy she derived as a direct report to EVP Sam Brady. She assumed, however, that, in her role as project sponsor, she was also the business sponsor for the project. Her assumption was questioned at a meeting in December, 1993, in which the team presented the project business case proposal to Brady for approval. Thomas's disagreement with Brady over the need for a strong user role came to light in this meeting [emphasis added]:

Brady: Nobody owns this thing.
Thomas: What do you mean?
Brady: Who in the business owns this?
Thomas: Who will take the bullet? I will.
Brady: That's not the right answer. We have a history in this organization, where we build good systems, then all the users duck when it's ready to use. That's the MIS fiasco syndrome.
Kelly: Jeff Green [District Sales VP] says he'll do anything [we] ask.
Brady: I'll discuss this with him. I'll ask him about it. We need an executive sponsor, a proof of concept. Someone has to own it, to get user acceptance.
Thomas: Sales has more important things to do.
Brady: I'm talking about Jeff specifically, not about sales.

In an interview with me shortly after this meeting, Thomas articulated her concerns about controlling the influence of a business project sponsor [emphasis added]:

I said to Sam yesterday, I said, 'Help me understand your thinking on that, because I think your perception and my perception and Jeff's are three different ways, maybe.' And he said, basically, Jeff's the executive champion of the project, and he is the acceptance testing, design, requirements sign off, and he'll sign off on a work plan. But when it comes to technology, as to whether we should use Informix or Oracle, how the screens should ultimately look and how the edits should be there, that's here. He's the user, he's the owner on the user's side, which is going to be interesting because Jeff tends to, I think Jeff thinks I work for him on the project. Jeff thinks that he owns the project in total.
Her concerns that Green, as executive / user project sponsor, would exercise too much control, particularly over technology decisions, suggested underlying assumptions that users are not competent to participate in such decisions, as Thomas's later comments indicate [emphasis added]

Jeff's a great person to work with and I couldn't ask for a better champion. However he's one of those dangerous people where he knows a little about technology, has done a little work in Paradox so he thinks he knows the world. So that's the hard part for me, is managing that effort.

She drew on a personal story to illustrate why Green would have to be controlled:

For example he sat in a meeting yesterday and told Karen Jones who is the Vice President of Product Management that the system was going in next week ... That's the kind of stuff we've got to be careful of. I can't have him out there telling people that it will be ready, starting next, you know, next week.

Thomas planned to manage Green's participation in the project by having him, along with all the team members, sign off on the project work plan and requirements documents, which the team could later reference if Green wanted additional work to be done. Thomas also attempted to control Green by limiting his interactions with other core team members and restricting his participation in IT requirements activities. For instance, at one project meeting, Mary Kelly suggested giving Green a demonstration of the Group SELL software, which the team planned to pilot in Green's sales district. Thomas refused to allow this. In a later interview, Kelly described to me her frustration with Thomas's approach [emphasis added]:

I think Jeff will be really terrific on the project and give us all the support we need and work through it. And he may come up with some technological ideas that we haven't thought of. But there's going to be a struggle with him and Leslie. Like, an example, with Group SELL. I want to show Jeff it. I want him to see what it is we're working on so that from an end user's perspective he can say, 'Yeah that makes sense,' or 'No it doesn't.' The only end users' perspective I'm getting is from Leslie and Jane and Mark. How well do they understand what it's like to be a Divisional Sales VP or a salesperson?

After Jeff Green was reassigned in a reorganization at GHI, and Leslie Thomas's organization became part of the IS function, the core team again examined their assumptions about the need for a user project sponsor. In the following exchange in a team meeting, the team's frames around users' roles in ISD and their ambivalence to having a user project sponsor were evident as they debated how to handle this issue [emphasis added]:

Chapter V (161)
Thomas: I want to throw out the idea of a user group versus a project sponsor. Sam wanted Jeff Green to be the sponsor. Right now, we don't have the right person.

Kelly: At HMO-2, we never did an IS project without a corporate sponsor. Prior to the recent organizational change, Leslie would be that person. I've talked to Tony Foley [recently appointed CIO]. We're viewed as IS, and that would weaken acceptance of the system.

Thomas: [Reviews potential candidates for role in sales organization, concluding that none would give the project sufficient attention.] I'll talk to Tony about it.

Galvin: Do we have to have someone? What about a user group?

Thomas: Yes, there will be a user group. We'll pull them together to look at the tables that they might use.

Flynn: We'll ask the VPs to recommend people.

Thomas: That's detail. Sam was interested in someone high level. That was Jeff Green. With the reorganizations, we'll need a user group.

Kelly: It would be good to have both a user group and a project sponsor.

Thomas: I know the people. I've worked with them for a year, and it's dragging them versus them pushing forward. I'll talk to Tony. If we need a sponsor, we'll get one.

The team later tried to recruit Rick Forrest, who had replaced Jeff Green as District Sales VP, for the role of user sponsor. The team prepared a presentation for Forrest, including their definition of the sponsor's responsibilities, and scheduled a meeting with him. The meeting began with Jane presenting the team's assumptions about the user sponsor's role as project champion and facilitator:

Forrest: Why was I invited to this party? To talk about being the project sponsor?

Flynn: Yes, but don't worry, the list [of duties] is short ... OK ... It's been proven that IS can't do it alone, they need users to work with them ... [Begins reading from sponsor duty list] So, selecting appropriate users for the user group ... The sponsor ensures that people make the meetings, they keep the schedule ... The sponsor reviews major issues ... The sponsor is thinking of the user community first ... Who should be the sponsor?[reading still from sheet]. Someone who really believes in the project, that it's a good initiative ...

The team was taken aback when Forrest, rather than accepting their idea of user sponsor as project champion and facilitator, instead challenged several of their basic assumptions about the project. For example, core team members had assumed that sales representatives would input data into the system. Forrest, an experienced and successful sales executive, immediately questioned the feasibility of this approach [emphasis added]:

Forrest: Is this where the competitive information is?

Thomas: Yes, in BIS.

Forrest: Who will be the systems administrator?

Thomas: The systems administrator? Describe what you mean by that.
Forrest: The people who define the data elements, who do the maintenance, who watch for the integrity, who define the rules and procedures.

Thomas: That's the user group.

Forrest: This group [pointing to the icon entitled 'sales force' on the charts] is totally incapable of maintaining the data. Positions will have to be funded, maybe in two locations, not just for the definition, but ongoing. Otherwise the data will be garbage.

Thomas: If that's the case, we might as well close the book on this. We're expecting to take time away [reduce administrative time from sales].

The team tried to convince Forrest that his experience was not relevant, given IT capabilities, and thus his concerns were not valid [emphasis added]:

Thomas: With client-server, that won't be a problem.

Forrest: It's my experience that you need administrative people to do that.

Schwartz: What's the issue here?

Forrest: Important information, like competitor information, is entered freehand. It's not consistent. Freehand is worthless for analysis.

Schwartz: I think I can alleviate some of your concerns. Each competitor will be defined on the screen, so that the name won't be handwritten out in different ways, or abbreviated differently. It will be picked from a list. The same with products.

Forrest: There's still an issue of completeness, or lack thereof, of accuracy.

Thomas: Isn't that part of the salesperson's job?

Forrest: Their job is to sell.

Thomas: This system will help them to sell.

Forrest: Sales is today, it's immediate. In my experience, sales people find the administrative burden is disenchancing ... In my experience, buying a sales and marketing package, after a year, you could have taken the thing and blown it up because of the lack of data administration. It was left in the sales people's hands.

Forrest's assertions raised other issues for the team. Acting on their own assumptions that administrative time and costs would be reduced and with little verification from sales personnel,\(^8\) they had estimated cost benefits for the BIS project. Forrest's assertion that additional staff would be needed for data administration challenged their assumption that the BIS project could be justified based on cost savings and raised concerns about the possibility of obtaining project funding. Again, differences between team members' frames and Forrest's frames were evident:

Thomas: We're being pressured to cut administrative costs. If you're saying as sponsor we need to add people, it's back to the drawing board.

Forrest: When we say automation is going to produce great manpower savings, I don't think that it usually does. That's not its purpose. Its purpose is to give information to make us more effective, and it

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\(^8\) I observed the team as they worked on the cost / benefit analysis, "guessimating" savings in time and translating these savings into increased sales revenues. Although they reviewed these figures with a financial analyst, to my knowledge, they never presented the figures to sales managers for verification.
may actually add resources. Maybe, after it becomes routine, not so much.

Thomas: Well, to get this project through the approval process, we must show a cost savings. I agree with you to begin with, it might take more time. But we're not going to spend two million dollars if there are no savings.

To the team's further surprise, Forrest challenged another of the core team's assumptions later in the meeting, i.e., that the BIS application could be implemented on an existing hardware platform (HMO-2's Unix computer):

Thomas: There are no communications cost, no Unix box costs, that's part of the corporate funds.
Forrest: This is going on the Unix box? Do we have the capacity to do that? ... I'm getting the impression that that machine is maxed out, both the machine and the people.
Schwartz: We've run this by Mary Kelly. BIS is about one quarter gigabyte compared to the tens of millions of gigabytes we've got. It won't take a significant part of the machine capacity.
Forrest: I just came out of a meeting with Mary Kelly this morning. She said the Unix box is at capacity. We can't get DSDB reports out ... I know the DSDB users are not happy.
Thomas: This is news to us.
Forrest: It's not just the hardware. It's the ongoing support for people to do reports. That gobbles up resources.

The meeting ended with the questions Forrest had raised unanswered and with no commitment from him to act as project sponsor. Having expected Forrest to acquiesce to their request that he sponsor the project, the team then had to make sense of this encounter and plan their next step. Note in this exchange following the meeting, how Thomas interpreted Forrest's comments by drawing on her assumptions about users' proper role in ISD and thus discounted the possible validity of Forrest's concerns [emphasis added]:

Schwartz: Rick's concerned about the performance of the system, and the people to support it.
Thomas: He's one of the people with a fleck of knowledge, applying experience that's not relevant!
Schwartz: He's concerned about performance of the Unix box because he had a system working perfectly before CIS, when it was just HMO-2. Now it's not good.
Thomas: Still, he doesn't have any development experience.

In a subsequent interview, Thomas again drew on these assumptions in her interpretation of Forrest's criticisms of the project [emphasis added]:

Back in our days when we were programming in the 70's, no one knew anything about computers and it was like, 'Can you make me this report? And you just make it. I'm not going to tell you how to do it or how to do it in what
language or what product or anything' ... *Now, our users are telling us what technology to use, what they think is the best technology in their limited experience* ... So, what's happened is, we all of a sudden get the somewhat educated consumer; however, they're not really. They're educated in their limited way. And I [pause], there's a fundamental problem that I have, and I mentioned this to Tony on Friday. *I have a problem that the user should be dictating the technology.*

I asked other BIS team members what they thought had happened. Jane Flynn commented that the team should have listened to Forrest's concerns so that they could later have come back with answers to show him that his concerns were unfounded or could be addressed through IT design. Several team members cited political problems they believed Thomas was having with Forrest as the underlying reason for Forrest's negative reaction. I realized that these organization members had insights into the dynamics of the political climate at GHI that I, as an outsider, was unaware of. However, I was intrigued to note that few team members considered the possibility that Forrest's objections may have reflected valid concerns about the BIS application that should be taken seriously and investigated. Instead, the team decided to look for a different, more agreeable user sponsor, and in this way discounted Forrest's influence in decisions about IT application requirements.9

To summarize, BIS team members, drawing on their assumptions about users' role in ISD activities, were ambivalent about the necessity and desirability of working with a user project sponsor. While they wanted someone to champion and promote the project and to facilitate access to business personnel, they thought that users might interfere in technological decisions. As a result, they worked with a sponsor (or potential sponsor) only when directed to by those in authority (i.e., Brady and Foley), and, even then, acted so as to minimize the sponsor's influence on requirements definition activities.

(ii) Eliciting "requirements" from system constituents

The influence of core team members' assumptions about users' role in ISD and their interpretation of the BIS application as a data warehouse / repository was evident in the kinds of actions core team members planned and carried out to involve system constituents in IT requirements activities, on the ways they interacted with constituents in these activities, and in how they processed and dealt with information constituents provided on requirements:

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9Had the BIS Project continued and Forrest remained in his position as District Sales VP, Forrest could have influenced IS outcomes in other ways, i.e., by lobbying against funding approval or by refusing to implement the system in his sales district.
• **Planning and acting to involve system constituents**: Core team members assumed system constituents would provide information about business processes and information needs. Thus, they carried out requirements definition interviews, in which core team members asked questions to learn about system constituents' jobs, information use, and information sources. The team planned to involve selected system constituents in detailed design activities when the project proceeded into implementation. The following description Mark Smith gave of how and why system constituents would be involved indicates his assumptions that they would primarily provide information to developers, that they would be involved so that they felt committed to the application, but that ultimate decision-making authority would rest with the team [emphasis added]:

The users definitely need to be involved in scrubbing MSIS data that we're going to convert ... and it's also going to be important that they're going to be involved in the tables, in the information that we capture. What we are going to do is, we're going to be meeting with different groups of people and say, 'O.K., this is what our subscribers table looks like. What do you think?' And then they'll say, 'Oh I think we really need this information to capture,' and we'll either say, 'That's a great idea,' or 'It's out of our scope.' ... I really want to have them involved in the screens, you know, have them feel they have some input, you know, just 'What do you guys think? ...When you talk to an account or when you're writing down information, what do you use first?' And not everyone's going to be the same but we really need them to feel that it's their system too ... I think they should be involved in the reports, you know, and designing them. We'll kind of have a user group.

It is interesting to note that the team planned to structure user groups around data tables, that is, to involve system constituents according to the team's conception of the database model, as Flynn once commented, "get users who belong to a table.

Assuming that system constituents needed to feel committed to and interested in the project, the team presented project results and updates to selected groups. At one point, the team developed a "quick hit" project to provide notebook computers and software to sales representatives, to "spark their interest" in using IT tools generally and in the BIS project specifically. System constituents appeared to be more actively involved in this aspect of the project. Team members demonstrated several kinds of notebook computers and software packages in field sales offices and had sales representatives vote on which technology they wanted. However, core team members did not care greatly which technology constituents selected,¹⁰ as they had already made the major decisions, i.e., identifying the "quick hit" and the intended use of the technology, deciding to execute the pilot project, acquiring the funding, scheduling the roll-out, customizing the SELL software, and so on.

¹⁰Team members did negotiate with constituents and with the ISI organization to ensure that corporate standards for personal computer software were not violated.
• Interacting with system constituents to elicit IT requirements: Acting on their assumption that system constituents' role was to contribute information on requirements, core team members relied on their own interpretation of the project identity, the IT application, and business processes to structure their interactions with system constituents. For example, Alan Thompson, the Ideas, Inc. consultant who managed one of the major requirements studies, developed an interview protocol to use in requirements interviews which reflected the analytic models he drew on in his work. That is, the protocol listed questions about "external strategic drivers" and "internal drivers" and about marketing "decisions, inquiries, and information" for each step in the "sales value chain." The protocol outlined under each business area (marketing, sales, account management) questions such as:

What decisions do you need to make to effectively perform these processes? What inquiries are required to make these decisions? What information is required to make these queries?

Team members used this protocol to guide their interview discussions, as evidenced by the following questions asked in interviews\(^\text{11}\) [emphasis added; INT is team interviewer]:

[Sales value chain model]

INT: When we talk about, just say the sales prospects for the company, we said there's a sales planning side, the actual sales execution, and the account management. At this point, before I ask any real fine-tuned questions, do you interface at all with the sales process in any way?

INT: So the way we look at this, is that, if we take the sales process overall, it can be pretty confusing. But, we can break it into three parts: there is the sales planning side, the sales execution, and the account management side of it. We will walk through those...

[information strategy model]

INT: What are the critical pieces of information that [the manager] looks at?

INT: I guess we could start with, even if it's a little bigger than what sales gives you, or the sales process has to acquire for you in terms of information, what information do you need to do that job best right now?

INT: What do you need to know to position you for your new business?

INT: I think there's a few things people would like to look at. It's just a question of how much everybody can handle right now. If from what you've seen, in your perspective over the last couple of years, if you could design one report that said, 'This is going to help people sell business,' what would you put on that?

\(^{11}\)As in most interviews, core team members were not able to read questions per se. Instead, they used the protocol as a guide, sometimes skipping questions that had already been answered in earlier responses and paraphrasing in the course of the dialogue.
In the following exchange, note how the interviewer acknowledges but does not pursue the system constituent's comment about "being in the loop" as the real issue, and, as a result, the system constituent returns to the interviewer's question about information needs:

**INT:** What would you say if we said, 'What are your three biggest information needs ... From the sales and marketing side, what are they?'

**SC:** One is not so much the information needed as much as making sure that the implementation specialist is in the information loop. That's a different question, I know, but that's the key.

**INT:** That's legitimate.

**SC:** Because any other way, I can't do sales, if I think I'm taking a chance of not using them in the best way possible. But information needs? One would be forecasting ...

In many instances, team members could not channel constituents' discussion and comments into these questions. Instead, system constituents brought up a variety of concerns, issues, and information, as the following exchange illustrate:

**INT:** Could we start with maybe the *Reader's Digest*¹² version on your role now...?

**SC:** [Tells extensive story (1300 words) about preparing a request for proposal (RFP) for a major account that GHI had lost five years earlier, stating at one point, "You need that background to understand where we are going."]

When such information did not fit into the categories that team members expected, they attempted to steer the interview back towards the interview protocol. For example, the interviewer attempted to steer the system constituent cited above back into the interview protocol [emphasis added]:

**INT:** Can I ask you a question here? When you are, this is a pretty intricate bid, *how did you do the sales planning* for this type of proposal?

**SC:** [continues story details (400 words)]

**INT:** Can I ask you a question there? In the bid itself, what were the big entities or issues that this company has to go out and find information about? In the RFP, for example, what are the primary points of questions they are asked ...

In these interviews, team members sometimes restated system constituents' statements, re-framing them on the spot. For example, note how in these excerpts from interview transcripts, core team members suggested terminology or restated comments from system

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¹²*Reader's Digest* is a US magazine that specializes in taking longer articles or stories and condensing them. This interviewer tended to use the metaphor of "a *Reader's Digest*" to indicate he would give a summary or he wanted a summary of key points.
constituents using their own terminology, which reflected their interpretation of IT features and uses [emphasis added]:

INT: Those are some of the formal materials. Is a significant amount of your competitor information gathered informally?
SC: Yes, it.
INT: Phone calls, friends.
SC: Exactly ... I have a lot of friends out there who are in the insurance industry in some form. And I pick up a lot of information that way.
INT: There is a very refined informal network here.

SC: And the pipeline is very much just raw data with no backbone to it. Not a lot of backup to it.
INT: Right. Okay, so they're both flat files?

INT: And do you gather that information -- you said part of it's anecdotal ...
SC: Yes.
INT: You see articles. Are you fed it?
SC: Well, one of the things I do, and actually, I think the organization ought to do it -- I use CompuServe, for example. I have CompuServe, so they have an executive news service. You just, you pay them, but you can [get] anything that says GE on the AP will come down to you.
INT: You have an electronic news clip.
SC: Yes.

In some instances, system constituents adopted the terminology core team members had introduced as the dialogue continued. For example, the last system constituent quoted shifted the terminology he used in a statement later in the interview [emphasis added].

SC: In my model of information systems, this news clipping [service], strategic planning would be the owner of that.

• Structuring and filtering information on requirements. Core team members tended to filter and structure information on requirements through the kinds of requirements gathering activities they planned and through on-the-spot interpretation of system constituents' comments. They further filtered and structured requirements informations as they created the requirements definition documents. This process was clearly evident in the Ideas, Inc. requirements study. Thompson structured all such information (including voluminous interview transcripts) in requirements documents and presentation materials according to the analytic models. The team then drew on these project artifacts (rather than the detailed information from constituents) as they considered requirements at later points in the project. For example, they used the data entity model diagram and lists of report types in later project artifacts to outline requirements. In this way, core team members' frames influenced what requirements were identified, legitimized, and acted upon.
Having processed information on requirements in this way, team members' frames became a filter for new or conflicting information from system constituents. As discussed above, team members discounted conflicting viewpoints from Rick Forrest. Their filtering of issues was evident in one of the first presentations I observed during my field study. The team, lead by Thompson, presented requirements study findings to a select group of system constituents in what they termed a "sanity check" project review. Thompson structured his presentation using Ideas, Inc.'s analytic models, presenting findings and requirements in terms of the "sales value chain." Note how Thompson rejected the system constituent's perspective on the sales value chain in this dialogue excerpt, asserting that his interpretation, derived from the model, was better [emphasis added]:

Constituent: Why was enrollment eliminated from the managed care value chain? 
Enrollment, that's critical. I'm thinking of how we fell down on HMO-1, how people didn't get membership cards for months. That's a piece of customer service.

Thompson: That's why this is a sales value chain ... Our people spent a significant amount of time with your people, and in the sales effectiveness project, with your customers ... You find, for your customers, those things seem to come together, in a broad customer experience ... People are either happy about the whole thing, or unhappy about the whole thing.

Constituent: The customer says, either, 'I have the card,' or 'I don't have the card.'

Thompson: We find, when you're dealing with managed care customers, they see customer service as much broader than enrollment.

Interestingly, several weeks later, VP Sam Brady redirected the team to consider how to integrate enrollment processes with the BIS project, to the surprise of Thompson and other team members.

To summarize, core team members, drawing on their frames around users' role in ISD activities and around the BIS application as a database of marketing and sales information planned their interactions with system constituents and filtered and structured system constituents' ideas about requirements in terms of their own analytic models. Because these models reflected core team members' frames, and because core team members dominated IT requirements definition activities, decisions about the project and the IT application reflected their frames to a large degree.

A.5. Summary of key aspects of the influence of technological frames on actions and interactions in the BIS project

Before proceeding to the discussion of the INFOSYS project, a brief review of key findings in the BIS project highlights interesting aspects of the influence of technological
frames in negotiations around requirements. One of the most notable aspects of the BIS project was the influence that EVP Sam Brady's "visions" for IT use had on the ways in which BIS core team members thought about and conceived of the project. Core team members took Brady's ideas seriously and, when he introduced new ideas, reassessed their assumptions and expectations about the project identity. They drew heavily on their own assumptions about ISD strategies as they negotiated a shared interpretation of Brady's ideas, however, and thus tended to focus on solving short-term problems while delaying consideration of Brady's more far-reaching ideas about business process changes. Their assumptions about ISD strategy also had a major influence on how core team members interpreted the relationship between their own project and an overlapping project (the NBR project). By focusing on defining project phases in which the IT application would be built in stages, team members sought to maintain their control over technology development initiatives in sales areas while delaying consideration of and involvement in significant business process change. Team members on many occasions reminded themselves of the importance of adopting such a strategy by telling or referring to an organizational story in which a large-scale development project had failed (the MIS Fiasco). Thus, although the BIS team engaged in many episodes of negotiations around IT requirements and for a time espoused new, more radical ideas for organizational change through IT use based on Brady's ideas, their earlier assumptions and expectations for incremental change re-emerged.

Technological frames also had a notable influence in how core team members approached IT requirements definition tasks and how they interacted with system constituents. Drawing on their frames around users' role in ISD activities, they were ambivalent about the necessity and desirability of working with a user project sponsor and, with the exception of EVP Brady, did not work closely with sales executives to plan the project. Their interactions with system constituents and the sense they made of information about requirements from system constituents reflected their assumptions about users' role in ISD and their interpretation of the BIS technology in terms of data models. Thus, decisions about the project's scope and direction and the IT application reflected primarily reflected core team members' frames.

B. The influence of technological frames in the INFOSYS project

During its three year history, participants in the INFOSYS project experienced many changes in the GHI organization and in the information technology infrastructure. As they interpreted the meaning and implications of change, they not only revised technical work but also reconsidered the project's goals and objectives and the potential uses of the IT
application. In Chapter VI, I analyze this process longitudinally in terms of the framing model. In this section, I consider participants' actions and interactions in detail to highlight the influence of technological frames by examining incidents and episodes of sensemaking, interpretation, and negotiations in each of four thematic areas.

B.1. What's it all about?

Although the INFOSYS project team's understanding of the business applications of the technology changed as circumstances in GHI, Inc. changed, their interpretation of the INFOSYS technology as a user-friendly data access tool that would enable end-users to directly access data changed little. In the following section (i) I discuss how this interpretation of the INFOSYS technology shaped their understanding of the project, its goals and objectives, and its desired outcomes.

(i) Solving the end-user data access problem with a user-friendly interface:

Even before the INFOSYS project actually began, the need for GHI's customers to access medical claims data themselves had been identified. In her explanation of the project's history, Heather Johnson, the INFOSYS project manager, described the rationale for giving customers direct access to data [emphasis added]:

The problem that we saw was ... that they [an account] would submit a complicated request. It would go through the marketing area, and the marketing area would come to the analyst. The analyst would be interpreting this request and then put in a data request to the programmers. And the programmer would program something, give it back to the analyst and the analyst would write something up and then it would go back to marketing and then finally back to the account. What the account really requested and what they received in the end, most of the time either wasn't exactly the same or they realized that yes, this is what they requested but it really wasn't what they wanted underneath. So there was a need identified to be able provide accounts with some access to their own data.

The "need" identified was to eliminate the lengthy process of communicating and translating ad-hoc report requirements by having customers do their own reports, and therefore the perceived solution was an IT system that end-users could access without analytical and technical assistance. Team members initially became interested in the INFOSYS package, because it included both a graphical user interface (GUI) and analytic reports and metrics, as Heather Johnson commented:

We had interviewed several different companies. One of the companies was INFOSYS ... INFOSYS has the, you know, user-friendly, quote, unquote, front-end, which allows analysts to go and do reporting.
Team members saw these features as essential to having end-users access data without assistance, and they came to understand the INFOSYS application in this way, as Fred Davis, INFOSYS Project Sponsor, explained [emphasis added]:

I think the perception is still what it was originally, and that was, it was a way to access information so that the end users don't have to depend on the programmers to get at most of their data. And the system would also provide additional functionality in that it is not only a data access tool, it will also provide some additional business functionality, and it has had algorithms built into it to do things like case mix adjusting or severity adjusting the data, co-pay deductible models. It had some additional reporting capabilities other than just access to the data.

This user interface was the dominant aspect of the technology, as is evident in the comments of Tim Crane, an IS analyst [emphasis added]:

_The big upside of the INFOSYS system is the front end._ And not just the fancy graphical point and click and pull down menus and that kind of stuff, but a lot of the additional functionality that's built into the INFOSYS application, like modeling, like a wide collection of standard reports, trend reports, cost reports, utilization reports ... The flexibility is tremendous as to how many different ways you can get information out of it.

An INFOSYS business analyst, Joyce Harris, commented on the impact the GUI interface had had on those involved in decision to purchase the INFOSYS software:

I think a lot of people were initially sold on the idea of INFOSYS being this interactive, GUI-front-end type of thing that's going to solve all your data problems.

The team did not consider using a system being built in-house in part because it did not have such an interface. Heather Johnson explained:

There were few of us that went around and looked at a couple of different alternative ways of doing this ... the build or buy option, whatever. You know, we had been building our own data repository, but it didn't, you know, have the friendly front-end type thing.

In addition to influencing their decision to buy the INFOSYS package, core team members' focus on the interface influenced their actions in IT requirements activities in other ways. Since an INFOSYS user could theoretically generate pre-designed ("canned") reports or totally custom, ad-hoc reports through the interface, team members spent little time considering what kinds of reports end-users would produce, except to consider what data fields to include in the database for reporting. They apparently assumed that the INFOSYS interface was an all-purpose, flexible reporting tool that required no further elaboration, and that end users could figure out how to apply this tool to business practices and processes.
themselves. These assumptions were evident in the team's approach to training, which focused on the mechanics of accessing the system and navigating various report request screens, rather than elaborating the meaning of the reports or the data. For example, a team member interpreted system constituents' questions about reporting features as ignorance about their job [emphasis added]:

At this point, dealing with accounts, users, you know, marketing people, they've all come to us asking us to do their work for them ... They want to be spoon fed. That's been my impression which I have been very surprised at. Not that they have come to me and said, 'I know that this is what I need, what reports can INFOSYS, where can I get that, which reports?' They've asked me, basically, the other way around: 'I need to generate a report for an account. What do I do? What data do I select?' Like, 'You don't know? I mean, you need to know these things. I can't tell you these things.'

Team members' focus on the interactive nature of the GUI interface for ad-hoc reporting also impeded their recognition of other report requirements, notably standardized reports which could be generated through batch processes. As is discussed in Chapter VI, the INFOSYS technology had originally been intended for use by personnel in customers' benefits departments for ad-hoc reporting. When the project identity shifted to use of the INFOSYS technology by in-house analysts, team members apparently did not re-examine assumptions about the kind of reporting capabilities the new system constituents would expect. Although team members knew that this group issued periodic, standard reports, they continued to focus on the interactive uses of the system for ad hoc reports. However, as they began implementing the system, the team learned that system constituents had different assumptions, as a team member observed:

We've had to meet with the account reporting department, because they didn't, they were interested in the system from a way that it's not designed to be used, as a batch reporting system versus an interactive reporting system, which is what the system I think, at this point in time is most capable of.

The team came to understand that in-house analysts needed to produce large volume, standard reports, and that it was not feasible for an analyst to sit at a workstation, producing reports interactively, even if the computer system could process the report queries efficiently (which technical personnel doubted). A team member noted that INFOSYS, Inc., had come to similar conclusions and was planning to modify the system as a result:

This interactive reporting batch system is coming up in the future, because INFOSYS, as a company, after installing this product in a number of locations, found that there are really [requirements], in the health insurance world, [that] batch reporting is an important product to have.
Joyce Harris commented on how team members' understanding of how the INFOSYS technology would be used was beginning to change as a result:

Other clients [of INFOSYS] are finding for the most part, they were, they are relying on batch-type reporting, using the INFOSYS tables as their source, and then using the interactive stuff as, as a drill-down, follow-up type of tool.

Given this change, team members began to envision different methods of accessing the data, as Harris continued:

That's, you know, in effect, the direction that we're sort of migrating to. We're slowly coming to that realization that, even with 20 or 30 million rows [of data in the relational database], we're probably better off with some sort of batch-type reporting, with drill-down capabilities there.

Interestingly, in the same interview with me in which Fred Davis first asserted that there had been no change in thinking about the INFOSYS technology, he later described how he thought assumptions about its use had in fact changed [emphasis added]:

You've probably got the two components, the INFOSYS database itself ... then you've got the query tool. You can go against the database directly with a COBOL production program or go with SAS directly. It's just a regular DB2 file. But I think there's going to be a lot of that. *I say that's probably one perception that has changed about INFOSYS*. I guess, earlier, is that, I think, people initially always perceived it, as, you do the reporting through the tool INFOSYS provides, all the time. And it has become clearer, the better use of the system is to have, if you have got a lot of reports that you need to run routinely, you don't use the INFOSYS query tool. *You write batch programs against the database and then you use the query tool to do special analysis which might be totally different*. The kinds of reports on it might be analysis to drill down into what is in the batch reports, answer questions about why things look like they do.

In summary, the core team's understanding of the INFOSYS project centered on providing a system with an interactive, GUI interface to enable end-users to access data directly, and therefore to reduce the number of steps, and individuals, involved in producing ad-hoc analytic reports. As will be elaborated in Chapter VI in terms of the framing model, the team focused on the capabilities of the INFOSYS interface and thus did not question their assumption that the system constituents would access the system interactively, even when the project identify shifted from customer use to in-house use of the technology. This inhibited their recognition of other requirements for batch reports. However, the team's frames about how the technology would be accessed and used did change as they began to implement pilot programs and as system constituents challenged these assumptions.
B.2. How does it relate?

Core team members assumed that the INFOSYS system would be a "back-end" database of claims data obtained from transactional processing systems. Therefore, much of the team's routine analysis and design work focused on locating data sources from myriad transaction processing systems. This was a frustrating analytic task, because there were a number of claims processing systems and, during the project, existing systems were converted to ISI, Inc.'s system. This was, however, a clearly defined analytic task. What was less clear for the project team was how the INFOSYS application related to other reporting systems and how the project related to other ISD projects that were creating reporting systems. In this section, I examine how team members drew on their technological frames to interpreted such issues in two contexts: i) INFOSYS's relation to existing account reporting procedures and processes; and ii) INFOSYS's relation to the DSDB project.

(i) INFOSYS's relation to existing account reporting procedures and processes

The INFOSYS project began several years before my field study in response to a large customer's (RBC, Inc.) request that GHI acquire the system for the customer to use to analyze its own claims data.\(^\text{13}\) Although some project participants expected and planned for more extensive use of the system, the team focused it efforts and attention on the RBC pilot for almost two years. They understood the INFOSYS technology as a stand-alone ad-hoc query tool for direct end-user access to data. When RBC, Inc. decided not to use the system directly, and account reporting analysts at GHI became the team's anticipated user group, the team apparently did not consider how INFOSYS would relate to existing account reporting systems, procedures, or processes. A technical analyst commented in an interview that the team, focusing on making INFOSYS work, had not yet thought about what system changes might, or should, result from its implementation:

> One of the things that has not been decided yet, because the concern, as far as I know, has been, 'Can we get this thing up and running? Can we get full book on it? Will it work at that point?' and so forth. Some of the questions that will be asked and will be answered are, how does this impact the current back end reporting systems? What does it replace? And we might see some of the older systems completely replaced, others modified because a lot of their function is taken out. Now that's from pretty much a technical point of view.

Changing application systems had implications for business practices and processes in the account reporting area. Focusing on the INFOSYS interface, team members assumed that analysts would access INFOSYS directly to do ad-hoc reports, rather than relying on

\(^{13}\)See Chapter VI, Episode 1 in the framing process for INFOSYS for a detailed description.
technical programmers in the group to produce reports. However, account reporting analysts already had a data source available, the Actuarial Information System (AIS), from which they obtained both ad-hoc reports and periodic, standard reports for customers. The INFOSYS team may not have initially planned to replace the AIS with the new INFOSYS application, but they did assume that INFOSYS was superior to the AIS and they expected analysts would gladly use it to do ad-hoc reports themselves rather than wait for programmers to produce reports from the AIS. These assumptions are evident in Fred Davis's explanation of how things would be improved with INFOSYS [emphasis added]:

*The level of detail in the data that we will be able to access [with INFOSYS] is much more, is much broader than the old statistical files [AIS] that we're reporting from now. We'll be able to do more sophisticated reporting ... Right, now we do some of these ... within the limitation of the data we have today but it takes a programmer, usually somebody on my staff has to go to do it.*

The existing account reporting system (AIS), however, had embedded interpretative schemes for understanding and reporting on health insurance claims data. Analysts had developed analytic algorithms over the years, which their technical staff (i.e., programmers) had built into a variety of reporting tools. Account reporting analysts and technical staff drew on these tools in their work. The INFOSYS software embedded different assumptions and data interpretations, for example, different algorithms for piecing together claims data in order to count the number of hospital admissions.14 When the INFOSYS core team decided that the software could be used internally by account reporting personnel rather than by customers, they challenged, intentionally or not, the institutionalized definitions embedded in the AIS, in historical reports produced from the AIS, in analysts' procedures, in programmers' "proven code" for reporting from the system, and so on. A staff member from account reporting described his reaction to the team's actions:

*Built admissions* was different by definition, than the *built admissions* that we had put together ... The people who were bringing INFOSYS into the company knew that there were differences in the definitions, and they hadn't kept the standards that the company had.

Analysts were concerned that reports produced from INFOSYS would be different than standard, periodic reports and ad-hoc reports which had been produced from the AIS using existing procedures, algorithms, and data files, as these analysts commented:

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14Insurance carriers commonly use the number of hospital admissions in calculations of metrics for effectiveness of health care utilization management and cost control. Using different algorithms, INFOSYS and AIS could calculated different admission counts and thus different metrics from the same set of data.
There's a reluctance to kind of not have reports matching up any more.

There's some issues with balancing ... We need to really look at many of the processes that INFOSYS goes through versus what we do on the AIS system, so that we do come to some agreement.

Analysts had been tracking trends in claims utilization for some time using the AIS, and they were concerned that the INFOSYS data would be insufficient to continue with this practice or would produce incompatible results, as these comments illustrate:

The problem with INFOSYS is that *the data isn't stable*. They do admission rebuilds every month. I do reports from files with time parameters, to get the exact same records. *I can't do that in INFOSYS.*

It's difficult too, *to have that rolling thirty months to be able to produce two years*, because [customers] are not all looking for calendar year reporting periods. They're looking for anniversary dates for the most part ... So instead of breaking it up -- I mean it just doesn't make sense to break it up, use some AIS data and some INFOSYS or whatever.

INFOSYS also has *only two years of data. I need at least four years.* Ten years is best. I don't know what is a hiccup, what is a trend, with less.

Core team members did not acknowledge analysts' concerns about how reports produced from INFOSYS would relate to historical reports or existing procedures. In selecting the INFOSYS package, team members accepted limitations in the INFOSYS technology (such as the 30-month limit) and regarded the built-in analytic metrics and algorithms as a valuable feature rather than a potential problem. The team interpreted system constituents' concerns about the comparability of reports more narrowly in terms of data quality, as Heather Johnson commented:

People who are using the data will not understand that this particular record looks crazy because of something that happened at claims processing ... That's like my big public relation kind of thing ... I think that's going to be a big challenge.

Another team member, while anticipating that users would find differences among systems, expected that INFOSYS could simply become the new baseline:

I think with the way I'm trying to promote this to users is that, you know, you have a baseline that probably wasn't a reliable one ... Make this your baseline ... make this the new standard.

To summarize, INFOSYS project team members interpreted the INFOSYS technology as a stand-alone query tool for end-users and initially focused on one pilot project. Although they shifted their emphasis to in-house use of the technology, they did not re-examine
assumptions about how the technology would fit into the existing technical and business environment of back-end reporting, and they appeared to be unaware of the concerns and questions systems constituents had about the system related to existing reporting practices and their reluctance to use INFOSYS for ad hoc reporting.

(ii) INFOSYS's relation to the DSDB project
Although the INFOSYS project had begun as a stand-alone pilot project, by 1993 the project identity had expanded as new business applications for the technology came to light. Responding to these requirements, the project team expanded the database to include claims data from one of GHI's HMO product lines. In a separate project, business analysts and IS developers from other GHI organizations (HMO-1 and HMO-2) were developing an extensive database (termed a "data warehouse") containing similar data. Executives at GHI, Inc. realized that these "back-end reporting" projects were apparently redundant, as an ISI consultant commented [emphasis added]:

Senior management within GHI were aware of three major development efforts. One was the INFOSYS development. Another was the DSDB development and I can't recall what the third was... Senior management wanted to know if it made good business sense to do all three, to select one, to abandon those three and come up with a long term strategy ... The recommendation [from consultants] was that the three efforts should continue but that they were to be only short term solutions, and that at some point, no later than 1994, we needed to start discussing and planning a long term solution.

Executives assigned several IS managers (Tony Foley, CIO; Peter Deutch, Business Systems Manager; and Fred Davis, Accounting MIS Director) to the MIS Team to coordinate these projects and to allocate IT development funds. As a result, INFOSYS and DSDB became competing projects, vying for organizational resources and legitimacy as the claims data warehouse.

Although team members began to see the DSDB project as a competing project, their reactions to and actions towards that project varied. Technical team members and business analysts from both teams, drawing on their assumptions about inter-project coordination and the desirability of a rationally designed systems architecture, worked cooperatively to reduce duplication of effort. For example, business analysts on the DSDB project shared their knowledge of HMO data and of ISI's systems as well as documents they had developed (e.g., a data dictionary) with INFOSYS team members. Although team members preferred their own application, they acknowledged that the projects were

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15 The third project involved corporate-wide profit and loss reporting by product line and did not actually duplicate the detailed databases and analysis expected from either the DSDB or INFOSYS projects.
redundant and assumed that the situation would have to be resolved. Heather Johnson commented:

You don't want to have open redundancy ... a decision has to be made.

An INFOSYS analyst articulated his assumptions about why redundancy must be corrected:

We're sort of wasting, we're spending our money twice ... and from a business point of view it doesn't seem to make sense to me why they're doing that. Whereas if we focused on one or the other, we might be better off.

Managers, on the other hand, interpreted the situation politically, as is evident in Fred Davis's (INFOSYS project sponsor) description of the situation [emphasis added]:

*We had essentially competing projects and there were basically two camps.* There were the people that were familiar with it, they built DSDB. They saw it as the right solution. And there was the camp of people that were working on INFOSYS and saw it as the right solution. *I was in that camp.*

Given limited IS development funds and resources, the advantages of winning the conflict were obvious to Davis:

I would much rather have those people working on the INFOSYS database and getting that up and running faster.

Conflict between sponsors of the two projects emerged as a debate over technological issues, i.e., which had a better technical architecture. The INFOSYS proprietary software ran on IBM mainframes and the OS2 workstation operating system. INFOSYS project team members were familiar with IBM's technology and, at the time the purchase decision had been made, neither ISI nor HMO-2 were part of GHI, Inc. Other than their interest in a design based on workstations / GUI interfaces and a relational database, INFOSYS team members did not appear to be concerned with the IT platform of the application or with using client-server technology per se. Competition with the DSDB project brought these issues to the fore on the team.16 Sponsors of the DSDB technology, which ran on HMO-2's Unix computer, were advocates of client-server / open system technology, and the technical staff in the HMO-2 IS department were the only in-house personnel with experience using this technology.17 Arguments between these "camps" involved the superiority of an open systems (Unix) platform versus the proprietary IBM operating systems, as is evident in Fred Davis's comments:

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16 In interviews, few used the term "client server." When they did, it was in discussions about the DSDB projects.
17 HMO-2 IS personnel, who were to be transferred to ISI, Inc. ("outsourced") were anxious about their careers and
My feeling is that the size of the databases we needed to build for GHI were not going to be able to run on the platform of the Unix machine ... I felt we needed to continue on with the INFOSYS platform and right now we need a mainframe solution ... The IS people from HMO2 who were biased against a mainframe solution, were biased against this, were also biased against a mainframe solution because of cost, and it is not an open systems solution, but I think, well, right now it is the only solution for the size of the database.

Antagonism between these project teams was also evident in this INFOSYS project leader's references to critics of the INFOSYS project [emphasis added]:

Client-server means nothing unless you have an application to put on it. Neither does mainframe. It can't deliver something to a user who doesn't care about what the method of delivery is. And that to me is the bottom line. That's what I've learned in my 20 years in this business. I don't give a hell if it is by dog sled. But if you can deliver it, that's who the heroes are. The people who want to deliver the new, fancy, improved, cutting edge [technology], but it won't fit on the dog sled, I question their vision and indeed their motives.

Disagreement and antagonism at the project management / sponsor level persisted even after the DSDB system was discredited due to operational problems and INFOSYS gained organizational support. For example, this DSDB supporter expressed his skepticism about the future of INFOSYS [emphasis added]:

If you were to put the full book of business on any of these platforms, I'm not sure any of them could do it. I think it would go tilt. And I'm thinking that INFOSYS may just be a placeholder for a longer term solution.

In summary, some team members, drawing on their frames around inter-project coordination, worked cooperatively to coordinate project activities. However, conflicting goals and interests over resource control and project legitimacy were evident in the apparently technology-based debate over client-server and IT architecture.

B.3. What to do?

INFOSYS core team members drew on their frames about the INFOSYS application and its utility and likely use, and on their experience with phasing ISD projects, to plan ISD activities. Their frames around the IT application design were particularly influential in their planning for IT requirements activities. In deciding to purchase and implement the INFOSYS application package, core team members adopted the framework provided by the designers of the package, as this project leader's comments illustrate:

apparently hoped that having experience with client-server and Unix technology would be an advantage to them.
It is generally easier to implement a vendor package vision. It has four walls. Now within the confines of those four walls we have done a lot to customize it. You know, you put up drapes. You define what your kitchen looks like. You put in your own flooring and your light fixtures and all sorts of stuff, but somebody else built the superstructure. And that's the metaphor.

While team members interpreted uses of the INFOSYS application in terms of its interactive, end-user interface, their understanding of the technology involved two technical components, as Tim Crane, an IS analyst, explained:

And the INFOSYS system is really kind of made up of two pieces. There's the piece that runs on the mainframe, the big database, the DB2 database, processing that update to the database. And then there's the component that sits on the PC ... where you have the graphic user interface, where you have the point-and-click and all that stuff.

As noted earlier, team members did not focus attention on defining requirements related to the GUI interface / analytical reports, having accepted them as given in the package. The database, however, could be customized, and team members' actions in IT requirements definition activities focused on defining data fields to include in the database, on determining how to source data from existing claims systems, and on planning how to expand the database to include the "full book of business" (i.e., all data on all products and accounts). In the following discussion, I examine how team members' understanding of INFOSYS as a database / data warehouse guided their plans and actions for requirements definition activities in two contexts: i) building the database as script for action; and ii) planning for future phases of the INFOSYS technology.

(i) Building the database as script for action
Informants' descriptions of project activities and the fact that documents in the project files relate almost exclusively to data-related issues, suggest that core team members' actions, their interaction with system constituents (discussed in Section B.4), and their decisions about IT requirements were greatly influenced by their interpretation of the INFOSYS technology as a database/warehouse and their acceptance of the INFOSYS technology as the "superstructure" for the technology design. For example, the team accepted definitions of many data fields as defined in the INFOSYS technology, as Heather Johnson explained:

There were many standard data fields, core fields, that you had to fill in. You had to fill them in the way they say you have to, because you're going to want to do normative analysis and you want every carrier that has the data in there, you know, [to define data similarly], and if it says paid, to mean paid. And, in place-of-service there are specific codes for place-of-service, and everybody knows what they are.
The INFOSYS technology allowed for supplementing "core field" items with "customer defined fields," and the team identified such items to satisfy GHI-specific requirements. However, they tended to accept existing limitations of the INFOSYS technology, for example, accepting the limitation of a rolling thirty months of historical data specified in the package.\(^{18}\)

While it might seem that negotiations around requirements would be routine in this situation, the team actually faced the complex task of interpreting data representations of complicated business processes and practices in multiple systems and then mapping data fields across multiple systems, some of which were under development simultaneously. This entailed understanding the whole landscape of claims processing systems and the flow of claims data at GHI, Inc., a daunting task, because GHI had many such systems throughout the company. The team initially decided to coordinate their efforts with a project under way, as Heather explained:

"We were building our own new, as a corporation, our own new claims processing system (NCS) ... and RBC, Inc. was going to be one of the first accounts going to NCS. So we took the NCS claims record and designed that to be the equal to the INFOSYS processing."

The decision to outsource GHI's IS operations and to transfer claims systems to ISI's packaged system changed the systems landscape, as Heather again described:

"Within a couple of months of implementing RBC, Inc. data on to INFOSYS, under the NCS-based record, the ISI outsourcing decision was announced. Along with that decision, the disruption was not just that there would no longer be a big IS organization ... but also that efforts to build this new claims processing system would be scrapped, and we would go with the existing ISI systems ... Everything we did with RBC, Inc., in essence, was wasted. We had to start all over."

Project files are replete with memos from various task forces (in which team members participated), defining data issues and tracking their resolution as new transaction processing systems replaced existing systems. For example, documents such as the "ISI to AIS Open Issues Log" and the "INFOSYS / ISI Feed Issues Log" contain lists of data-related issues which were identified and resolved as part of GHI's adoption of the ISI systems. Excerpts from these logs illustrate the detailed knowledge of both computer systems and business processes needed to interpret and specify computerized data:

"What will be the cutoff date for month-end processing? Check date? If so, what about zero-paid claims?"

\(^{18}\)As noted earlier, some account reporting analysts believed this was insufficient. Project files indicate there was some discussion early in the project with INFOSYS, Inc. to extend this limit, but the idea was dropped.
How is a voided claim identified? Does a void come through looking like a zero-paid adjustment (with a positive qualifier)? Is there an identifier on the reversal (negative) record?

How is patient liability amount set in the ISI system? Of the following amounts, which ones does it contain: deductible amount, co-insurance amount, co-payment amount ....

The ISI system identifies the member's group and benefits at the line level. Will a single claim contain lines from different benefit periods, that is, if the member changes coverage or group, will the ISI system split the claim so that only one coverage period is on a single claim?

An ISI analyst explained how the team, using such information, attempted to translate requirements into systems terms:

From our perspective, we were looking at a set of claim payments, claims payment files, to see if data was accurate, to see if data was really representative of what it was supposed to be, whether the data fields which we were directed towards satisfied [users'] need, actually performed the function that they expected them to. Sometimes you can look at the name of a data element, and you think it's doing one thing, when in fact it's not or it may not be used.

Negotiations around data requirements thus required compromises between perceived needs and the perceived availability of data.

In addition to tracking down and tracing claims processing systems, team members had to understand the intended meaning of the data fields in the INFOSYS database. They worked with INFOSYS, Inc. personnel to understand the intended meaning of data fields in the INFOSYS database, exchanging correspondence to clarify INFOSYS definitions and GHI definitions of data fields. For example, in this excerpt from correspondence between the GHI analyst and the INFOSYS contact, the analyst's explanation of data fields ("account" and "group") suggests the complexity of the business practice embedded in the data fields and their relationships to each other [emphasis added]:

In your response to our questions you raised some issues about the client specific population fields ... It may help to envision the rating and membership fields we are adding to the database as a pyramidal structure, with account number at the top at the highest level, most unifying element. In some cases, the account number is the group number. However, any time an account needs to differentiate segments of its members, group numbers are assigned within the account number unit ...

To summarize, INFOSYS team members' frames around the IT application served as a script for their actions in IT requirements definition activities. Drawing on their interpretation of the INFOSYS technology as a database / data warehouse, they planned
and carried out analytic activities focused almost exclusively on identifying and defining data fields to be included in the database and determining how to source data from transactions processing systems.

(ii) Planning for future phases of the INFOSYS technology

In 1994, when I began to study the INFOSYS project, team members had begun to think of the INFOSYS technology as a data warehouse which might contain a broad range of data for use in a variety of business activities. As they outlined future phases of the project and thus planned their own activities, they drew on their interpretation of the IT application, as well as assumptions about ISD strategy and transitioning the technology from development into use:

• Phasing by data availability: Team members, drawing on their assumptions about the necessity to phase development and delivery of IT features, defined a series of project stages or steps, leading to implementation of the "full book of business" and upgrading software to the most current releases from INFOSYS, Inc. The team based its recommendations for phases on technological or systems criteria, as a project leader explained [emphasis added]:

   Availability of data. Pure and simple at this point ... For example, we might like to do mental health now, but nobody can tell us when the data will be available. We might like to do encounters next, but nobody will tell us when it will be available. We might as well go after what is available and keep moving.

The team presented its proposed set of phases to executive management, and management had endorsed their recommendation. In a discussion with me, however, Heather Johnson expressed her concern that the team's apparently rational approach would be superseded by political considerations. She noted that the agreement reached just weeks earlier with executive management had dissolved and, with INFOSYS being viewed as the "answer to world hunger," she was concerned that individuals might find someone with sufficient authority to demand that their particular project need be given priority. As my field study ended, the team was unsure what should, could, or would be their next project phase.

• Setting technical boundaries -- The INFOSYS technology design was based on analysis of insurance claims data. Recently, INFOSYS, Inc. had incorporated a technical feature called foreign tables.\footnote{The INFOSYS package had a defined set of data fields that were used in various packaged reports. A customer could also add data fields to the database, up to the record length limit. "Foreign tables" were simply additional} As the team planned for future developmental stages of the

Chapter V (185)
INFOSYS technology, their understanding of the foreign table feature influenced their thinking about how they could customize the technology, as Tim Crane explained:

> With version 2, they've opened up their system a little ... Now you can link in these foreign tables. One of the things we're thinking about right now is, on drug claims, is creating a foreign table of drug data, which you could define to the INFOSYS system and access it through the interactive interface. We have complete control over what we decide to put on that foreign table. It's our table. It has nothing to do with INFOSYS.

The team realized that they would be able to add virtually any kind of data to the database, thus increasing the perceived utility of the technology beyond analysis of claims-based data. This, however, raised issues about project and application scope, and the team did not believe it would be feasible to add any and all data to the INFOSYS database. Tim Crane again commented [emphasis added]:

> *I keep bringing up this not all things to all people.* Too many times I hear people talking about the system and it frustrates them to a degree that, gee, 'It's still not one-stop shopping. I have to go elsewhere. I can't do everything from this one machine, this one workstation or system.' *Unfortunately, not too many people think the day will ever come when they can do that.*

Joyce Harris commented similarly:

> A database to meet everyone's needs would have to be so big and so complex that it would be hard to use.

The team thus began to examine assumptions about what was in- or out-of-scope for the project. Customer survey data, for example, could be added as in a foreign table. Heather Johnson had "drawn the line" on this, however, stating that she would not get involved in data collection, entry, or loading into an IBM format, and that survey data could not be included in the INFOSYS project until it available in this form.

- **Delivering versus supporting:** Core team members viewed their primary responsibility as continuing to develop the data warehouse, rather than working to ensure integration and use of the installed portions of the system. This assumption is evident in this project leader's comments [emphasis added]:

> In a project like this, any down time in your mind, any lack of sense of urgency is deadly. You've always got to be thinking about what there is to do tomorrow ... *We are still in a constant implementation mode,* so for us to become very project oriented in terms of helping people right now, is very much of a desire, but we are a small group, and we are often torn between our desire to go out

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DB2 relational files that could be viewed through the interface.
and help use the product on a production basis and *our need to continue to implement data so that more and more business units can use it.*

Thus, core team members focused on future development phases rather than supporting those system constituents who might be able to use data that had already been loaded in pilot phases. Assuming that INFOSYS was a user-friendly tool, they apparently did not anticipate that system constituents would be reluctant or have difficulty using the system on their own, although a full-time INFOSYS trainer had recently been hired and there was some discussion of forming user groups. I noted, however, that the pilot databases had been installed for several months yet system constituents were not utilizing the system, in part because they wanted more assistance and support from the team.

To summarize, team members' interpretation of INFOSYS as a data warehouse and their assumption that the team's responsibility was to expand and continue to build the warehouse served as a kind of meta-level script for planning their actions. Thus, they outlined development activities based largely on technical arguments (i.e., data availability) rather than business priority or users expectations for support.

**B.4. How to work with system constituents?**

Similar to the BIS project, staff personnel in GHI's IS department, liaisons in business functional areas, and ISI technical developers constituted the core team of the INFOSYS project (See Table IV-1). These individuals were responsible for ISD activities in the project, and they planned and carried out activities which involved system constituents in requirements planning activities. In the following discussion, I examine the influence of core team members' frames on (i) interactions between core team members and user sponsors; and (ii) between core team members and system constituents.

**(i) Who's the boss? Working with the project sponsor**

Data from retrospective interviews with various INFOSYS team members indicate that Fred Davis, director of Actuarial MIS, and other managers in the Finance and Actuarial areas, sponsored and controlled the INFOSYS project during most of its history. Before the outsourcing to ISI, Inc., Davis worked with an IS manager in GHI's IS department. After the outsourcing, control of the project apparently rested with Davis and his IS group (which included Heather Johnson, the project manager). Sponsorship and control over the project began to shift in 1993, when Dr. Jolene Fisher, director of the Provider, Outcome, and Quality Analysis (POQA) department recommended that INFOSYS be used for Provider Analysis Reporting (PAR). Fisher, as head of one of GHI's strategic areas, was
a kind of rising star at GHI and, as an enthusiastic champion of the INFOSYS project, her support for the technology lent it legitimacy. Most INFOSYS core team members saw this as fortuitous. Fred Davis, INFOSYS project sponsor commented:

When Jolene [PAR Sponsor] selected INFOSYS as the profiler solution, I think it solidified the future for INFOSYS. I think, without that, we could have probably been in less of a clear direction on what to do with INFOSYS when the license runs out next year.

When I asked the CIO in an interview, why the INFOSYS project, after several years of languishing was now progressing rapidly, he concurred:

They got some ownership .. Jolene Fisher's area that said 'Yes, I'm willing to wait for INFOSYS. That's the product that I want' ... It's got high visibility.

In this way, Fisher fulfilled team members' expectations for a project champion or executive sponsor. However, while the INFOSYS core team, in Davis's area, worked to load HMO data for PAR reporting, Dr. Fisher and Amy Grant, the PAR project manager, began meeting independently with the software vendor, scheduling demonstrations, and investigating other software packages INFOSYS, Inc. had to offer. In these actions, Fisher and Grant violated the assumption that system constituents would participate in ISD activities under the team's control. In fact, some team members viewed Fisher's and Grant's actions as trying to take over control of the project. Tension around project control and recognition for project success is evident in these team members' comments [emphasis added]:

And I think as with any implementation there will be those who want to share in its success who probably did very little to effectuate that ... I see certain efforts by the PAR team at times which seems like they are running amuck. And we have to do course corrections that take valuable time away.

People trumpet that Jolene Fisher and POQA are doing the marketing for us, but I find that to be a bunch of crap. I really do.

Amy Grant was demonstrating this product to physicians, and setting up meetings with physicians and she and Jolene Fisher would project themselves as the INFOSYS people ... There started to be a bit of confusion as far as INFOSYS was concerned as to who was owning this product, and this project. And that's when Jeff came in and took the baseball bat and whacked everybody at INFOSYS back into shape... because POQA was going around Heather and starting up their own little sub-projects with INFOSYS, Inc., the vender. Which is just totally wrong.

A number of times... we've had to wrestle the control back from POQA, from other departments, who are trying to again usurp us and take the glory away from Heather.
One team member explained how he was trying to reassert the core team's authority over the project:

It's so political, and one way of combatting this is that I'm producing a newsletter stating 'We are the players. This is who you come to.' I'm trying to reign in the control of training. How do you access the system? How do you get a work station? How do you get INFOSYS access to get into the system?

His later comment suggests that conflict between these groups was not only about control of the IS development, but reflective of a strategic shift at GHI towards being a health services provider and the status derived from being in charge of projects supportive of this goal [emphasis added]:

POQA, they're a really interesting group, is all I can say ... They don't have any political etiquette. And, what I mean by that is that we, Heather Johnson, has been working on this project for two years. But you'd never know it because POQA, for example, because they work with physicians, physicians are really strong forces within this organization ... Amy Grant was demonstrating this product to physicians, and setting up meetings with physicians and she and Jolene Fisher would project themselves as the INFOSYS people. No mention of Heather Johnson, and we're the people doing all of the work.

To summarize: Team members recognized the advantages of having a visible champion for the project. However, when this individual appeared to be exerting control over ISD activities, some team members interpreted her actions as inappropriate and threatening to team members' authority in the project.

(ii) Eliciting requirements from system constituents
Core team members' interpretation of the INFOSYS technology as a data warehouse and user-friendly data access method guided their own actions in IT requirements definition activities. It also guided and structured their interactions with system constituents. Although the team conducted extensive user interviews at one point in the project, their goal was to determine data requirements from general comments about desirable system capabilities that systems constituents made, in order to redesign the INFOSYS database. An IS analyst, describing IT requirements definition activities at this time, emphasized the team's focus on defining data elements in their interactions with system constituents:

We began with user interviews, that is, the end-user interviews. They were telling INFOSYS, this is what they want out of the system. From that INFOSYS determined what they needed to be provided with, and we were in those meetings also to be able to say, 'This is how we can support your needs.' So that the process began at the record that ISI supplies to the INFOSYS
Incorporated software ... When the end user said they wanted a certain amount of data, a certain kind of report, INFOSYS responded with, 'Okay, this is the type of information we would need' ... we all three got together and we started talking about what elements were needed and could they be found.

The interview protocol used in these sessions covered very general questions focused on information or data requirements, for example:

- What are key questions that your area needs to answer?
- What are the strengths / limitations of your current reporting mechanisms?
- What are your anticipated future reporting needs?
- How would you like to use the INFOSYS product?

Team members' notes from the sessions were similarly vague and general, e.g.:

- She does health care analysis to support management decision making.
- Uses standard as well as ad hoc reports.
- Global level utilization -- compares physicians to like physicians only.
- Would like to do quarterly reports.
- Would like to do age / sex and case mix adjustments.
- Expressed concern over data quality issues.

The team interpreted these general comments in terms of requirements for specific data elements, developing a list of data fields to be included in the redesigned database.

Team members also looked to system constituents to provide information on data quality in various source systems. Tim Crane explained how the team drew on the knowledge of key system constituents to do this [emphasis added]:

The first step is an interview process with end users when they start asking for elements. *I mean they possess a vast knowledge about the data because they work with a lot of this data themselves on a day-to-day basis from other sources.* That's the first step. When somebody says they need an element or something, the first thing we say to them, I think, is, 'Well, are there any oddities associated with this element?'

Having structured their interactions with system constituents around identification and definition of data fields for the redesigned database, team members further structured system constituents' participation in requirements definition activities around data field definition by creating a list of data elements and sending it to system constituents as a survey in which they were asked to prioritize the need for each element. Team members accepted technological limitations of the DB2 database as the guideline for requirements, as Tim Crane explained:

Last fall for HMO-1, INFOSYS was telling us, you know, there's a record size that we really don't want you to go over for performance reasons ... So we had that kind of constraint that we worked on.
Heather Johnson found this restriction a useful way to manage system constituents' requests for data. Several system constituents met with team members to negotiate which elements to maintain, and which to drop, in order to keep within the overall record length.

Although a number of users participated in these activities (interviews, survey, meetings) several commented to me that they felt they were not able to participate effectively. One health care analyst remarked:

Not knowing what INFOSYS would provide, I wasn't quite sure what to tell them that we needed ... Apparently these are INFOSYS standard fields and custom fields that we would need and some of these things I have no clue as to what they even are. Without definitions to some of these fields, how am I supposed to know whether they're going to be useful or not?

A manager gave this critical evaluation of the process:

They interviewed a lot of people, people who don't understand data. They asked these open ended questions about what you need, and people couldn't answer ... With open-ended interviews, you're interpreting their needs. Then they came up with a list of data elements, and sent that around to ask people to rate them. They can't do that. They don't have the expertise to understand how it would be used, how the data would be combined, how the software works. And give them only an eight character name, with no definition. You have to guess what it is, how it is defined.

In summary, INFOSYS core team members structured their interactions with system constituents during requirements definition activities around design of the database. They looked to system constituents as a source of knowledge about data -- what was needed, what might be available, where data might be found -- and further structured and filtered information from them in terms of the database design.

B.5. **Summary of key aspects of the influence of technological frames on actions and interactions in the INFOSYS project**

Before proceeding to the discussion and implications section, it is valuable to review key findings in the INFOSYS project to highlight the influence of technological frames had in negotiations around requirements. Core team members' actions and their interactions with system constituents reflected to a large degree their interpretation of the INFOSYS technology and its uses. They understood the INFOSYS application as a stand-alone, ad-hoc query tool with a user-friendly interface to enable end-users to access data directly and as a warehouse of high quality claims data. This focus inhibited their recognition of other requirements such as standard, batch reporting capabilities and of potential issues related to how INFOSYS would fit into the existing technical and business environment of back-end
reporting systems. The team's frames about how the technology would be accessed and used did change, however, as they began to implement pilot programs and as system constituents challenged assumptions when they began to experiment with the pilots.

Core team members also structured their interactions with system constituents around their understanding of the INFOSYS technology as a database/warehouse and focused their own activities on building the warehouse. As a result, they sought little information from system constituents about requirements for the technology design beyond specification of data fields. Tony Foley, CIO at GHI, characterized this approach to defining requirements in his description of INFOSYS and other data warehouse projects:

These projects were started as, 'Build it and they will come.' Let's build this wonderful database that reflects our organization. So they went through data modeling exercise. They assigned attributes to the entities and built this wonderful model ... We haven't gone out and done business requirements ... What kind of information are people looking for? Are they looking for standard reports? Are they looking for ad-hoc inquiry? If they are looking for ad-hoc inquiry, what are our expectations on response time? What are the skill levels of the people that are going to be requesting information from this database? How many people are we going, do we have to, can we expect are going to need access to this database when doing a request? What kind of requests are they going to be doing? How current does the information have to be? How much information do we have to have?

While Foley's assessment must be taken in context (i.e., he was known to be a DSDB supporter), his comments are consistent with my interpretation of the influence team members' frames around the INFOSYS technology had on their actions, interactions, and decisions during IT requirements definition activities.

C. Discussion and Implications

In Sections A and B, I assessed the influence of technological frames in IT requirements definition activities by examining, in detail, project participants' actions, interactions and negotiations around requirements. In this section, I discuss these influences more generally by first characterizing the influence frames had on participants actions and interactions. I then consider how project participants used artifacts to facilitate negotiations around requirements and how artifacts reflected participants' frames. I also discuss the sensemaking devises through which frames were communicated and shared and through which common interpretations were negotiated. Finally, I assess how and to what extent frame change occurred through participation in IT requirements activities.
C.1. Characterizing the influence of technological frames on actions and interactions

Social cognitive theory posits that frames are both enabling and constraining. They enable human beings to process the overwhelming variety and volume of information present in each organizational context, in each event, and therefore, to plan and take action. Coordinated action is also facilitated when organization members share frames. By focusing attention on some aspects of a situation while masking or distorting other aspects, frames also constrain human action. In the ISD projects I studied, both the enabling and constraining aspects of technical frames were evident.

i) Frames as a guide to sensemaking and interpretation: ISD participants in these projects were faced with a complex organizational task: determining what could be done to improve business processes using IT, agreeing on what they should do in their project, deciding how to proceed with the project, convincing others that their project was worthwhile and deserving of funding, and so on. This endeavor occurred in a constantly changing, politicized environment, in which organizational units were reorganized or even outsourced and key participants lost or gained status and authority as a result -- in other words, a fairly typical U.S. corporate environment in the 1990s. Faced with the complex social cognitive task of collectively defining and agreeing on IT requirements, team members drew on their technological frames to make sense of information and to negotiate shared interpretations of ISD strategy, technology, business applications, and so on. Sections A and B provide numerous examples of this sensemaking and interpretive function.

ii) Frames as scripts for action and interaction: ISD participants drew on their technological frames as a guide in planning and carrying out actions. In this sense, frames served as a kind of script for planning project tasks. In the BIS project, core team members frequently drew on their frames around ISD strategy to plan and carry out activities such as "quick hits" pilot project. In the INFOSYS project, team members relied on their interpretation of the INFOSYS technology as as a user-friendly interface and data warehouse to organize their own activities and to plan future development phases. In both projects, core team members' frames around users' role in ISD and their understanding of the technology as a database / warehouse functioned as a master script for interactions with system constituents, that is, indicating when to talk to system constituents, how, in what contexts, and on what topics. When system constituents violated the role core team members expected them to play, conflicts arose and team members acted to retain their control over ISD activities.
iii) Frames as structures and filters for processing information on requirements: Core team members relied on system constituents' knowledge of GHI's business practices and processes, as well as their own knowledge for information on IT requirements. However, core team members drew on their technological frames to extract requirements from the wealth of data available and digest it in the analytic models they used in requirements definition analysis. In both teams, core team members centered their analysis on requirements for the database, data fields and data models. In one of the requirements studies in the BIS project, consultants also employed a variety of analytic models as a structure and filter for information on requirements. Requirements that could be expressed in terms of these models were identified, legitimized, and acted upon. Core team members' understanding of IT requirements as a data model facilitated their own actions and simplified their dealings with other project teams or IS developers. On the other hand, system constituents' influence on requirements definition activities was limited by their ability to envision and articulate requirements in terms of data fields.

C.2. Artifacts as a medium and outcome of frame negotiations

Another area of interest in this research related to how ISD participants use artifacts to communicate and share frames, to negotiate requirements, to document decisions about requirements, and therefore to facilitate collective understanding of requirements within and between groups. Participants in the projects I studied primarily used four types of artifacts for these purposes.

i) Data models: By relying on data models to identify and define IT requirements, core team members tacitly accepted the assumption that identifying and defining data is the central task in defining an information system (Martin 1982). Developing data models was the focus of the core team's analytical activities in the projects I studied. Team members also relied on data models to coordinate their efforts with other project teams. For example, in the BIS project, Jane Flynn and Mary Kelly used the data model to define the relationship between the BIS application and the CIS application. They then specified their dependency on the CIS project in terms of the the implementation of the data model. The INFOSYS team used a data model both to coordinate changes in the technology with INFOSYS, Inc. and to coordinate work with teams developing transactional data source systems.
Core team members thus used data models as a medium to facilitate negotiations (i.e., deciding what was to be developed) and coordinate action (i.e., allocating responsibilities for building the model) in requirements definition activities. The data model was also an outcome of their negotiations which embedded both discursive knowledge and tacit assumptions about information and data. As they researched business practices, transaction processing systems, conversion history files, and so on, they built knowledge of how data fields were used into the data model. They assumed that complex business practices and the variety of circumstances encountered in practice could be adequately represented in terms of relationships between data fields in the model, and that failure of the data model to perform as expected was a data quality problem, not a problem with the data modeling method.

As noted earlier, both teams structured their interactions with system constituents around definition of the data model. Although core team members were familiar and comfortable with the use of data models, system constituents found these models less useful for articulating requirements or for assessing whether a particular proposal would fulfill requirements. Although they shared to some degree core team members' assumption that data in the IT application was information, they also assumed that this information needed to be interpreted and put into a larger context (e.g., of existing or historical reports) in order to be legitimate.²⁰

iii) Existing information technology: Participants in both projects used existing technology as an artifact to communicate assumptions and expectations and to define requirements. In the BIS team, the existing MSIS system was their starting point to decide what would be different about the new BIS system and to list necessary features in the new system. When new team members joined the core team, they were given a demonstration of the MSIS system to familiarize them with the business application. Team members referred to the BIS project as the "MSIS replacement" to clarify the project identity and to explain the BIS application to system constituents, who were familiar with the MSIS system.

In the INFOSYS project, team members' interpretation of the technology influenced the way they planned and coordinated their own work. The INFOSYS software package and documentation was an artifact team members used to learn about features and limitations of the technology. Team members could experiment and test assumptions about how it worked. The technology could also be demonstrated to system constituents, giving them a tangible idea of what the system's features and capabilities were.

²⁰I discuss frame differences around information and data legitimacy in Chapter IV, Sub-category 3(c). Also see Boland (1987) for a thought-provoking critique of commonly held "myths" about information and data.
In the INFOSYS project, the IT application under development was also an outcome of negotiation processes which embedded team members' assumptions and knowledge.\textsuperscript{21} Because the INFOSYS technology is a purchased software package, it embeds knowledge and assumptions of the developers at INFOSYS, Inc. The core team's knowledge and assumptions were also embedded in the technology, however, because they adopted many of its features without change (and thus accepted the designers' decisions) and specified ways in which it should be customized, such as adding data fields in the database. In addition, their decisions about how to implement and operate the technology -- what data to load on what schedule, what features to activate -- affected the technology available to the end-user.

\textit{iii) Work plans:} BIS and INFOSYS team members spent many hours developing and maintaining project work plans to guide their activities and to communicate with IS management. A work plan is a plan of work to be done and thus a potential coordination aid within the team. In addition, I noted that, through their negotiations around the work plan, team members surfaced assumptions and expectations about the project identity, the technology, the IT application, the project context, etc., and thus in developing work plans, project participants communicated and shared frames and negotiated agreements about requirements. In the BIS project, for example, I observed team members discussing which tasks to include in the plan and in this way surfacing assumptions about the nature of work to be done, the scope of the project, expectations for technical developers' and users' roles in the work, and so on. (See Chapter VI, Episode 6 in the BIS Project for illustrations of frame communications, sharing, and negotiation in work planning sessions.) I did not have the opportunity to observe work planning activities in the INFOSYS project. I did note, however, that project files were filled with work plans of various types and styles, which suggested to me both that team members focused much attention on such activities and that the work plans may have served a similar frame-communicating function among core team members.

Work plans embedded core team members' knowledge about work to be done and negotiated agreements for the allocation and scheduling of work. These plans also embedded underlying assumptions about IT development work (e.g., it can be definitively described, defined, assigned, and measured), as is evident in Leslie Thomas's description of the role that she expected the work plan to play in crystallizing assumptions:

\textsuperscript{21}The BIS project did not progress to implementation during my field study, thus there was no new technology artifact developed. The existing MSIS system was an artifact of earlier design and development efforts that influenced negotiations in the BIS project.
We need to get approval from these people and there will be a written contract that we will be judged on ... I truly believe once we get through the work plan effort, we'll have a clear understanding of how we all work together and we'll just fly right through it.

Underlying assumptions about reward and recognition structures (e.g., completing the work plan on time and budget as a measure of success) were evident in an INFOSYS project leader's explanation of why the INFOSYS project had achieved a degree of success:

Our ability to deliver milestones on time through micro-management of the project schedule has also influenced people's perception of our ability.

iv) Project and system documentation: According to ISD methodologies, specification of IT requirements proceeds through creation of a planned series of documents such as narrative or graphic depiction of requirements, technical specifications, and so on. These documents are to function as a means of communicating, verifying, and documenting requirements. In the projects I studied, there was no such orderly progression of documents although the teams spent much time and effort creating documents. However, the act of producing documents apparently helped team members articulate assumptions and expectations. During the time Ideas, Inc. consultants managed the BIS project, for example, they developed extensive requirements study documents containing lists of recommended, data models developed, and so on. Core team members reviewed and critiqued the documents in team meetings. At a later point, core team members spent several weeks preparing a business case proposal, and, in the process of negotiating the contents, wording of statements, depiction of system interactions in graphics, and so on, they surfaced assumptions and clarified, to some extent, their understanding of requirements and of the project identity.22 I noted, however, that as the project progressed, team members made little reference to earlier documents. At least two different requirements specification documents had been produced. Only the data model and the list of system features derived from the existing MSIS system were extracted and used in multiple documents such as the Ideas, Inc. study and the business case proposal. This suggests that project and systems documents, while serving to focus negotiations and document decisions at a point in time, were of limited value in communicating understanding of requirements over time.

I was unable to determine to what extent the INFOSYS team actually used project or system documentation (beyond the data model and file descriptions). When I asked to

22I discuss this negotiation process in more detail in Chapter VI, Episode 6 of the framing process in the BIS project.
review project files, Heather Johnson, the project manager, told me that there were no valuable requirements studies that she could recall. My search of the project files turned up no such documents, although I discovered myriad memos, charts, and correspondence relating to data field definition and data problems. A technical team member maintained that a technical design document had been produced, apparently for technical team members who were designing programs to extract data from transactional systems. When I asked to see a copy, no one could readily produce the document, and Heather advised me "not to bother" looking at it because it contained only program-level specifications. This suggested to me that the team's use of project or systems documents as a medium for communicating or sharing understanding of requirements was limited.

Frames of the authors of project and systems documents were embedded in the documents themselves. As I have noted throughout the discussion in Chapter IV and V, frames were evident in the language used, the topics addressed, the method of presentation, and in the recommendations for IT development. Evidence of embedded frames was clearly evident in the requirements documents produced by the Ideas, Inc. consultants in the BIS project. As I noted in Section B.4, the consultants drew extensively on analytic models in their activities. The documents they produced not only contained the models but analysis and recommendations were structured and presented in terms of the models. The same models were used in the preliminary proposal, interim report, and final report, containing increasing amounts of data and recommendations.

C.3. Sensemaking devices which facilitated communicating and sharing frames

As I analyzed data from the field study, I was faced with the problem of interpreting informants' frames from the variety of data available -- comments in interviews, dialogues in interactions, statements in project documents, and so on. As I discuss in Chapter III, I soon realized that informants frequently did not state assumptions, expectations, and knowledge explicitly. Particularly in their day-to-day interactions, they communicated their assumptions and expectations and attempted to negotiate shared interpretations through a variety of sensemaking devices.

i) Building and maintaining the project history narrative: Project participants built and maintained their understanding of the project -- how and why it started, how decisions had been made, what changes or "mishaps" had been encountered, why it was, or was not, progressing well -- in their construction of the project history narrative. Project history narratives were clearly evident in interviews I conducted with informants as an artifact of
the interview process. That is, I elicited project history narratives with questions such as, "Tell me how the project got started." I found evidence in observational data, however, that project participants frequently shared perspectives on the project's history among themselves as they interpreted events (e.g., "It's important that you [Tony, Mary] understand how the project has evolved ..."). Constructing the project's narrative history in team meetings, informal interactions, and formal IT requirements definition activities was central to how they made sense of changes and events in the project. Embedded in these project narratives were team members' assumptions about the project identity, the outcomes expected from IT implementation, ISD strategy decisions, and so on. Narratives also identified or highlighted who were the influential participants in decisions and actions.

Although negotiating a shared interpretation of the project's history was an important sensemaking device, not all team members agreed on the interpretation. I noted, for example, that GHI team members tended to depict themselves as struggling to overcoming obstacles caused by ISI, Inc.'s "sabotage" or recalcitrance. ISI, Inc. personnel interpreted these situations differently, attributing problems to GHI team members. During my observation of the BIS project, I witnessed a number of acrimonious exchanges among GHI and ISI personnel as they debated who was responsible for various problems in the project. In these instances, differences in the project history narratives revealed different interpretations of events, changes, others motivation for actions, and so on, which in turn suggested differences in frames of reference.

Although project history narratives were clearly an important sensemaking device for team members, they were used only in oral, face-to-face interactions. Artifacts such as project or systems documents provided only a point-in-time, sanitized version of the project's history in abstracted terms of goals, objectives, tasks completed, and so on. Looking only at the business case document that BIS team members prepared during my field study, for example, one would have had few clues that the project had been going on for two years, that multiple earlier studies had been done, that relations between GHI and ISI, personnel were strained, or that EVP Brady was the project champion whose changing ideas for IT use in sales had been debated at great length and influenced the project's direction. Yet each of these aspects of the project's history had had a great influence on the decisions and recommendations contained in the business case document.

ii) Citing organizational stories: Through their recounting of organizational stories, ISD participants drew on their own or others' experiences with ISD and applied lessons learned to new situations. For example, Mary Kelly on several occasions recounted her experiences with the New Life project to illustrate her concerns about relying on the IT
infrastructure to be available when needed by the BIS project. Tony Foley and Peter Deutch offered stories of successful projects they had managed as exemplars of successful ISL strategy when the BIS team was struggling to interpret EVP Brady's BIS-as-front-end-driver ideas.

Some stories were symbols of assumptions and expectations that had become institutionalized at GHI. After several months on site, I realized that the MIS Fiasco story had become such an organizational symbol. This story related to a multi-million dollar project GHI had undertaken a few years before my field study. The project failed, resulting in financial losses and bad publicity for GHI and contributing to the decision to outsource GHI's IS operation. Members of the BIS team who had no personal experience with this project frequently cited it as a reason why decisions had been made (e.g., "After the MIS fiasco, no one wanted to commit to a major development style"), as a script for what not to do (e.g., "If we bit off too big a piece, we'd have, pardon my analogy, an MIS Fiasco, Part 2, here..."), as a way to characterize the organizational context (e.g., "We have a history in this organization, where we build good systems, then all the users duck when it's ready to use. That's the MIS fiasco syndrome."). and so on. Thus, ISD participants did not have to list their expectations or assumptions about why large-scale, long term projects were a bad idea, they simply mentioned the MIS Fiasco. Not surprisingly, this story -- a value-laden organizational symbol -- did not appear in artifacts such as project or system documentation. Yet it had a powerful influence on the actions and interactions of team members, on their interpretation of events, and on their decisions about how and when to address IT requirements.

iii) Telling personal stories: Project participants used personal stories to illustrate or emphasize their ideas. Executive VP Sam Brady used a story ("I've been with GHI for 20 years, and nobody knows but me...") to illustrate his vision for how the BIS marketing repository could be used to change marketing approaches, in an easy-to-understand and memorable way. Team members, in turn, appropriated his story, re-telling it among themselves as they discussed requirements as a rationale for features and functions. Such stories were not documented in project or system descriptions. Instead, the end-points in the analysis, that is, the decisions about requirements, were documented in the specification language of analytic models or in brief, abstract narrative descriptions.

iv) Creating scenarios-of-use: ISD participants used scenarios-of-use, or vignettes, to quickly and simply illustrate how they thought IT applications or features could be, should be, or were being used. Core team members and system constituents created scenarios-of-
use or vignettes in face-to-face interactions as issues or questions arose, to describe assumptions about how the IT application could or would be used, about data usage or problems to illustrate the rationale of the data model, and so on. These scenarios were seldom documented, however.\textsuperscript{23} In fact, I found scenarios-of-use in multiple discourse contexts (interviews with me, interactions between core team members and system constituents, interactions among core team members) but not in formal, written project documents and requirements descriptions. Thus, valuable information about assumptions, expectations and knowledge of IT functions and use generated in interactions between core team members or in their interactions with system constituents was maintained only in the memories of the participants in these interactions and not captured in requirements artifacts.\textsuperscript{24}

Although scenarios and vignettes apparently facilitated communication of ideas about IT use in face-to-face interactions, I noted that project participants often did not stop to reflect on underlying, embedded assumptions and expectations. Sam Brady's vignettes for Sales Force Automation, for example, were based on his assumptions about radical change in the social organization of sales representatives' jobs through IT use. While team members espoused his ideas, even using his scenarios at times, they did not always share his assumptions and expectations about the extent or nature of organizational change through IT implementation. In these instances, using scenarios-of-use did not help ISD participants to surface different assumptions and expectations.

\textit{v) Changing metaphors:} Project participants routinely used metaphors to express or illustrate their assumptions and expectations about IT applications and IT use. For example, \textit{IT as tool} was a common metaphor used by both core team members and system constituents, while the data or information \textit{warehouse} metaphor was used primarily by core team members. Project participants sometimes changed their use of metaphors when they changed assumptions about the IT application. This happened in the BIS project when Sam Brady asked the team to consider making BIS a \textit{front-end driver} rather than a \textit{back end repository} and when Leslie Thomas introduced her own metaphor of BIS as an \textit{order entry system}. In the INFOSYS project, team members began to use the metaphor of INFOSYS as an \textit{information warehouse} to communicate their expanded understanding of the project identity. Having introduced a new metaphor to label the technology, the metaphor then began to shape team members' assumptions and expectations as they used the metaphor to

\textsuperscript{23}The limited specification language of data modeling provides no facility for recording such information.
\textsuperscript{24}INFOSYS project files did contain many memos identifying data issues arising from system conversions and documenting their solution or resolution. This information was not, however, included in documents such as the data dictionary and thus users of the data had no access to this information.
interpret events and plan actions (e.g., "Twenty years ago, I worked on an order entry system in support of manufacturing, and I know, it has the potential to bring a company to its knees. We have to be careful.").

While they used metaphors extensively, project participants used them tacitly, that is, they seldom consciously examined the implications of the metaphor or possible contradictions between metaphors. For example, I never heard anyone examine the implications of the data warehouse metaphor by asking specifically what this metaphor implied. They never contrasted it with different metaphors, for example, with the notion of a department store or boutique, to surface assumptions about who the users were, what kind of services they would expect, what services such as support during use would be available, and so on.

Metaphors were used in project and system documentation, for example, to characterize the IT application, its use, or outcomes (e.g., "The BIS database will be the organizational memory"). Similar to their use in face-to-face interactions, however, metaphors were used tacitly, and thus the meaning and implications of the metaphors were not explored.

vi) Using analytic models and methods: Core team members relied on various analytic models to elicit information on requirements and to structure, filter, and fill in information. These models had embedded assumptions and expectations that team members took for granted when they applied the models. For example, in their application of data modeling methods, team members assumed that complex, even arbitrary business practices and processes could be succinctly described in terms of relationships between data fields. Analytic models were the only frame sharing and communication mechanisms that were thoroughly integrated in requirements artifacts. Graphic depictions of analytic models such as data entity diagrams and IT context charts were included in systems documentation, were referred to in project communications and memos, and their development was accounted for in work plans.

C.4. Assessing how and to what extent frame change occurred

In the above discussion, I noted how technological frames influenced project participants' actions and interactions, how they were negotiated through and embedded in artifacts, and how they were communicated and shared through various sensemaking devices. Another question addressed in this research was whether, through their actions and interactions, ISD participants' frames changed, and if so, in what ways and to what extent. Did they become more similar and thus more aligned? Did they diverge and thus become
misaligned? Or, did they change at all? I found evidence of a variety of outcomes in the BIS and INFOSYS projects (See Table V-2 for examples).

i) Unchanging frames: I found individuals' general assumptions and expectations related to the ISD initiative, the IT application, and the organizational context changed very little if at all during the year of my study.\textsuperscript{25} Informants drew on these tacit expectations and assumptions with little apparent reflection. Even individuals' assumptions and expectations specific to the project, for example, about the potential to change business processes through IT use, the relationship between the project and other initiatives, the project identity, and so on, were quite stable in light of changes in the organization. In the BIS project, team members' frames appeared to change on several occasions as they espoused EVP Sam Brady's visions for IT use. Over time, team members' interpreted Brady's ideas to be more consistent with their own frames and while they espoused his ideas, they acted in ways that were consistent with their earlier assumptions. Temporary change was also evident in the ways the Ideas, Inc. consultants influenced other participants' thinking about BIS. Although they were effective in changing the discourse around requirements during their active participation in the project, the influence of the consultants' frames on others' assumptions and expectations dwindled and disappeared when the consultants were no longer involved.

ii) Aligning frames: In the INFOSYS project, core team members' and system constituents' assumptions and expectations about the IT application and its likely uses were only partly aligned. Core team members interpreted the INFOSYS application as a user-friendly interface to a comprehensive claims database that would allow end-users to access data directly. Analysts, while acknowledging the appeal of the user-friendly interface, interpreted INFOSYS as one of several tools available to them, one which must fit into their existing practices and procedures to be truly useful. Relying on their own interpretations of INFOSYS, core team members initially did not acknowledge or recognize the requirement to generate INFOSYS reports through batch access methods. As they worked with INFOSYS, Inc. and with system constituents to implement pilot databases, core team members broadened their interpretation of the INFOSYS technology and its possible uses, seeing it as a data warehouse to be accessed in a variety of ways. They began to understand the importance of standard, batch reporting features and to anticipate

\textsuperscript{25}As discussed in Chapter III, I drew primarily on data from BIS core team members in this analysis.
Table V-2: Examples of Frame Change and Lack of Change over Time

that such usage would relieve potential operational problems. Their frames changed to be more aligned with system constituents in this process.

iii) Polarizing frames: GHI and ISI team members' frames around the IS development environment, that is, their assumptions and expectations for ISI's role in ISD activities, became more misaligned through their interactions in the BIS and INFOSYS projects.26 When my study began, GHI team members had already formed negative impressions of individual ISI personnel, of ISI as an organization, and of the outsourcing "relationship" in their experiences over the prior year. Once formed, individuals' frames became more

26 Relations between GHI and ISI team members are discussed in Chapter IV, Section B, Sub-category 4(b) and throughout Chapter VI in descriptions of negotiations around the project context and structurational processes in framing requirements.
negative, as GHI team members interpreted new experiences with ISI in light of these frames. For example, GHI members of the BIS team treated each new ISI team member with hostility and suspicion, regaling him or her with stories of problems caused by his predecessors. Experiences with ISI which might contradict negative expectations were interpreted to be consistent with existing frames. One informant told me in an interview at the end of my field study that ISI had hired a new employee specifically for the BIS project who she found to be "nice" and "eager and enthusiastic." She reconciled this information with her expectations about ISI personnel by commenting, "He's not really ISI yet." Individuals frames in these two subgroups thus became more polarized, more misaligned, as tension, conflict, distrust, and suspicion pervaded their interactions.

D. Chapter Summary

In this chapter, I assessed the influence of technological frames on the actions and interactions of ISD participants and on their decisions about IT requirements in the BIS and INFOSYS projects. I found that project participants (primarily core team members who dominated ISD activities) drew on shared frames as they tried to make sense of changes in the organizational environment and interpreted the implications for IT requirements. Over the time frame of both projects, team members encountered many such circumstances. These are discussed in detail in Sections A and B in terms of four recurring sensemaking themes. In these instances, project participants drew on various aspects of their technological frames as different assumptions, expectations, and knowledge were salient in each situation. There were, however, several notable and interesting aspects of the influence of technological frames. In the BIS project, core team members drew heavily on their assumptions about and knowledge of ISD strategy as they made sense of changes in the project context and negotiated shared interpretations of the implications for requirements. As a result, they tended to focus on solving short-term problems while delaying consideration of more far-reaching ideas about business process changes. In the INFOSYS project, core team members' actions and their interactions with system constituents centered around their interpretation of the INFOSYS technology as a database / warehouse that end users would access through a user-friendly interface. This focus inhibited their recognition of other reporting requirements and of system constituents' concerns about legitimacy of data obtained from the INFOSYS. Team members' frames became more aligned with system constituents as users challenged these assumptions in their initial use of the technology. Overall, however, ISD participants' frames changed very little or only temporarily.
In Chapter VI, I continue this analysis by integrating the findings on the influence of frames on actions and interactions into a longitudinal analysis of negotiations around requirements at the project level. I highlight the influence of change triggers and changes in the discourse around requirements on the project identity in a social cognitive process model for framing IT requirements. In this way, I assess how assumptions and expectations central to the project identity formed, changed, or remained static as project participants interpreted changes in the project context.
Chapter VI

Framing: Social Cognitive Processes in IT Requirements Definition

In Chapter IV, I examined technological frames of reference salient to ISD participants during IT requirements definition activities, assessed congruence in frames of two groups of ISD participants, and considered the consequences of frame incongruence for ISD outcomes. In Chapter V, I examined how frames influenced actions and interactions of ISD participants and thus how they influenced decisions about requirements for the IT applications. In this chapter, I interpret and extend the findings presented in Chapters IV and V by examining the influence of technological frames on negotiations around IT requirements over time. I develop a social cognitive process model for framing of IT requirements and consider consequences of the framing processes on ISD outcomes.

Chapter VI is organized as follows. In Section A, I introduce and explain the social cognitive process model. In Sections B.1 and B.2, I illustrate the process model using data from the two ISD development projects studied. In Section C, I compare project outcomes and examine how the process of framing IT requirements influenced ISD outcomes.

A. Framing IT requirements: a social cognitive process model

I use the term framing to describe the social cognitive processes through which organization members involved in IS development activities negotiate requirements for an IT application. I chose this term because its various shades of meaning suggest characteristics of the social cognitive process I wish to highlight. The verb "to frame" can mean "to devise, invent, fabricate (a rule, story, theory)."¹ This meaning directs attention to the notion that IT requirements are constructed by human actors. "To frame" can also mean "to put together, compose; to put into words, express."² This sense of the word points out that it is through discourse among ISD participants that requirements are articulated and become "real." The verb "to frame" may also imply "to form or construct in the mind; to conceive, imagine."³ This meaning emphasizes the notion that ISD participants' technological frames shape how requirements are identified and defined. Finally, "to frame" can mean "to direct (one's steps); to set out upon (a journey)."⁴ This meaning has the connotation that negotiating requirements is a kind of "mental journey" for

²Ibid., pg. 508.
³Ibid., pg. 509.
⁴Ibid., pg. 508.
ISD participants during which their understanding of requirements may change or evolve.\(^5\)

I have defined *framing* as a social cognitive process through which IT requirements are negotiated for several reasons. First, IS development in an organizational context is a *social* process, involving numerous individuals and groups working together. Second, it is a *cognitive* process in which ISD participants draw on their knowledge, experience, and assumptions about IT and about the organization to define requirements. Third, it is a *negotiation* process. In the literal sense, ISD participants bargain over requirements, usually with the goal of reaching an agreement among key stakeholders. In the more figurative sense, ISD participants may be traversing a difficult course with various obstacles as they try to reach agreements. Finally, framing is the *process* of communicating ideas, sharing assumptions, negotiating interpretations, and perhaps reaching agreements, not an outcome.

I am distinguishing the *framing* of IT requirements from those development tasks and activities specified in IS methodologies. Framing occurs both in formal ISD activities and in informal interactions among organization members, such as a chance discussion in a hallway. The social cognitive process of framing does not relate to specific IS development activities or phases. Although IS development projects often contain a phase in which participants focus on requirements definition activities (e.g., user interviews), requirements are negotiated throughout a development project (Curtis, Krasner, and Iscoe 1988). In fact, key decisions about requirements may be made before a project is formed, such as the decision to look for a software package, or after a technology is developed, for example, a decision not to implement technology features. The social cognitive process of framing similarly continues throughout a project, as ISD participants negotiate, consider, reconsider, and perhaps change their understanding of IT requirements.

In this research, I am focusing on the social cognitive aspects of requirements definition. Obviously, there are other processes which influence how ISD participants identify and define IT requirements, for example, institutional inertia (Kling and Iacono 1984), exercises of power in ISD (Robey and Markus 1984; Franz and Robey 1984; Markus and Bjørn-Andersen 1987), and goal conflicts (Markus 1983; Newman and Noble 1990; Robey, Farrow, and Franz 1989). I have drawn on structualtional theory (Giddens 1984) as it has been applied in IT research (Orlikowski 1992; Orlikowski and Robey 1991) as a meta-theoretic framework for the *framing* model so that I may focus on social cognitive processes while accounting for other processes that influence IT requirements definition.

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\(^5\)Kendall and Kendall (1993) found that users involved in ISD sometimes used the metaphor of a journey to characterize ISD processes. I found that technical developers tacitly used this metaphor, for example, describing a requirements study as "embarking" on a project.
A.1. Components of the framing model

The framing model is depicted in Figure VI-1. It includes the following components: (i) ISD participants, i.e., technology designers, users, and managers who engage in negotiations around IT requirements; (ii) their technological frames; (iii) the project identity, i.e., the espoused goals, objectives, and anticipated outcome of the project; (iv) one or more episodes, or periods of time during which key aspects of IT requirements are negotiated; (v) change triggers, or critical events such as structural reorganization, executive actions, technology change, environmental change, etc., that influence a project; and (vi) organizational structures, including business strategies, culture, control mechanisms, standard operating procedures, communication patterns, professional norms, IS development methodologies, and so on.

An episode in the framing process consists of actions and interactions through which ISD participants negotiate requirements for an IT application and is set apart from other episodes by the assumptions and expectations which form the project identity and which ISD participants draw on in their negotiations around requirements. An episode may also be characterized by distinctive themes in the discourse around requirements. As ISD participants recognize and respond to change triggers, negotiations around requirements may transition into a new episode, with a different project identity. Episodes in the framing process may not correspond with IS development tasks, phases, or activities. For example, there may be several episodes within a project phase, if the project identity is highly unstable or if there are frequent change triggers, or one episode may span the entire development life cycle, if ideas, assumptions, and expectations do not change significantly during the project. ISD participants, who typically focus on project phases defined by IS methodologies, would not necessarily recognize framing episodes. They might, however, identify critical events that changed the course of a project or recognize undesirable outcomes of the framing process such as "scope creep" or "project drift."\(^6\)

The following discussion makes reference to the relationships depicted in Figure VI-1 and describes the framing process in more detail.

\(a\) Negotiating requirements: ISD participants negotiate requirements for an IT application in a variety of contexts: formal IS tasks such as user interviews, JAD sessions, data modeling exercises, team meetings; informal interactions such as working sessions,

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\(^6\)See Chapter III for a description of the methodology used to define and describe episodes in the framing processes of the BIS and INFOSYS projects.
Figure VI-1
Framing: A Social Cognitive Process in Requirements Definition

(a) **Negotiating requirements**: ISD participants draw on their technological frames as they negotiate requirements for an IT application through discourse in a variety of settings.

(b) **Clarifying the project identity**: Participants may clarify their interpretation of the project identity through negotiations around requirements. At the same time, their interpretation of the project identity influences what requirements are identified and acted upon.

(c) **Producing and reproducing social structures**: When ISD participants draw on technological frames to enact routine social practices for requirements definition, they instantiate the structural properties embodied in these practices. However, structural influences are not deterministic, and ISD participants may act in nonroutine ways.

(d) **Recognizing and responding to change**: ISD participants draw on their technological frames to interpret change triggers, that may then alter the discourse around IT requirements and lead to new episodes.

(e) **Changing the discourse**: The discourse around requirements may change to reflect new ideas, metaphors, narratives about the project, etc., leading to new episodes in the framing process.
casual meetings, phone conversations; through oral communication, i.e., presentations, discussions, conversations, etc.; and written communication, such as the exchange of documents, memos, charts and drawings. These interactions constitute the discourse around IT requirements, that is, the communication and exchange of ideas, knowledge, assumptions, and expectations about the IT application being considered.

As they act and interact in these contexts, ISD participants draw on their technological frames to make sense of the discourse and to interpret the implications for IT requirements. In Chapter IV, two groups with similar frames were identified: core team members and system constituents. Individuals within these groups had similar frames and thus shared shared assumptions, expectations, and knowledge regarding the IT application, the ISD initiative, the organizational environment, and the project context. Drawing on these frames, they tended to interpret the implications for requirements for the IT application similarly. At times, frame differences between the groups contributed to misaligned assumptions and expectations for IT requirements.

Some individuals and groups are more influential than others in the framing process. Their technological frames have a stronger influence on the discourse around IT requirements and, thus, their frames are reflected in the requirements that are identified, defined, and legitimized. As discussed in Chapter V, core team members were the dominant participants in ISD activities. Their frames carried more weight in the framing process than did system constituents' frames. Chapter V also illustrated how an influential individual's frames (the executive sponsor) influenced BIS core team members' interpretation of IT requirements.

(b) Clarifying the project identity: IT development is frequently organized and controlled through project structures: projects are identified in IT planning; personnel are assigned to work on projects; costs and benefits are estimated in terms of projects; funding is authorized for projects; and so on. Most importantly for this model, IT requirements are associated with projects or project phases: projects tend to be understood in terms of the IT functions and features that will be implemented; potential IT requirements may be judged in-scope or out-of-scope depending on project objectives, goals, or boundaries; within a project, IT requirements may be assigned to phases to better control development activities and costs. Thus, project is a key social cognitive construct in IS development. In Chapter IV, I identified project identity as the category of assumptions and expectations related to the project scope, objectives, anticipated benefits and outcomes of IT implementation which

7 Other control structures (division of labor, accounting mechanisms such as budgets, etc.) are also important to management of IS development but are not the focus of this model.
synthesized and summarized underlying assumptions, expectation, and knowledge of the ISD initiative, the IT application, the organizational environment, and the project context.

Participants' frames around the project identity influence negotiations around requirements. At the same time, ISD participants clarify their understanding and develop an espoused project identity through their negotiations. Chapter V illustrated how ISD participants at times negotiated a common espoused project identity through their actions and interactions. This shared understanding then influenced how they interpreted requirements for the technology.

**(c) Producing and reproducing social structures:** Technological frames are interpretive schemes, or mutual stocks of knowledge that ISD participants draw on in requirements definition activities to interpret actions and events, to communicate meaning, and to plan actions. They embody the rules and resources which define and organize social practices for requirements definition and which bind together social practices into social systems. When ISD participants draw on frames routinely to enact established social practices, they reproduce social systems and instantiate structure. For example, in Chapter IV I discussed how core team members and system constituents both assumed that users would take a passive, information-provider role in ISD. This aspect of their technological frames reflected structural properties such as the division of labor in ISD between technical developers and users, developers' authoritative power derived from their knowledge and understanding of IT and development methods, and normative controls that legitimized developers' domination of ISD activities. When participants in the BIS and INFOSYS projects drew on their technological frames routinely to plan and take action, they instantiated these structural properties. ISD participants may chose not to enact a established social practice, but rather to act differently. In Chapter V, I described incidents in which system constituents at GHI attempted to participate more actively in ISD activities and core team members resisted these attempts.

Technological frames provide ISD participants a sanctioned basis for collaborative ISD work and thus are enabling. For example, by drawing on their mutual knowledge of development methodologies and a shared vocabulary related to requirements definition, ISD participants may plan and organize requirements activities. Technological frames are also constraining, because they limit how ISD participants make sense of actions and events and communicate meaning. Thus, core team members' technological frames may limit their interpretation of requirements or hinder collaborative work with users who do not share their vocabulary and knowledge of information technology and development methods.
(d) *Recognizing and responding to change:* Changes in technology, in organizational structure, in personnel, in economic conditions, in governmental regulations, and so on, are the nemesis of IS developers, in large part because change thwarts their goal of "freezing requirements" long enough to develop and implement an IT application. Many kinds of change affect ISD processes and outcomes. I am focusing in this model on changes that alter the discourse around IT requirements, that is, changes that affect how ISD participants think about, talk about, and perceive the project identity, and therefore how they interpret requirements for an IT application. A technological change may require substantial system re-design yet have little influence on the project identity. A corporate reorganization, on the other hand, may have few technological implications but may significantly change how key stakeholders interpret IT requirements.

I have used the term *change triggers* to indicate events or circumstances which affect the ideas, assumptions, expectations, or knowledge evident in the discourse around requirements. For example, key individuals may leave a project, due to reorganizations or individual career decisions. Without their active participation in ISD activities, their ideas may lose influence and drop out of the discourse around requirements. Alternatively, new individuals may gain influence in the organization, and, as their ideas enter the discourse and gain legitimacy with other ISD participants, new requirements may become apparent or desirable. Influential individual may take actions which influence the framing process, for example, redirecting a project toward new ideas and thus changing the discourse by fiat. Because change triggers influence the project identity by changing the discourse around requirements, ISD participants may not anticipate their effects or may recognize effects only in retrospect.

ISD participants draw on their technological frames to interpret change triggers and assess their implications for IT requirements. For example, in Chapter V, I described a number of instances in which ISD participants drew on their assumptions and expectations about inter-project coordination and ISD strategy to make sense of competing or overlapping projects, to interpret the implications for their project, and to plan a response.

(e) *Changing the discourse:*\(^8\) Participants negotiate requirements through discourse, that is, through the communication and exchange of ideas, knowledge, assumptions, and

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\(^8\) I am addressing discourse in the broad sense of communication and exchange of ideas through oral and written media in multiple settings. Others have suggested that analysis of discourse in face-to-face interactions is revealing of underlying social cognitive schema (Donnollon 1986, Moch and Fields 1985) and that styles of discourse in developer / user face-to-face interactions influences the types of requirements identified and thus the kinds of systems designed (Boland 1978; Salaway 1987). Such findings are relevant to the current research but detailed conversational analysis is beyond the current scope of work.
expectations about the IT application being considered. As they recognize and respond to change, the discourse around requirements may change. New or different ideas, themes, issues, and so on, may enter into participants' discussions, conversations, presentations, as well as into written project documents, correspondence, and so on. For example, participants may update or alter their narratives about the project history to make sense of changes. In Chapter V, I noted how ISD participants changed metaphors to describe new assumptions about the IT application. Changes in the discourse around IT requirements may lead to new episodes in the framing process, as participants draw on different frames to interpret changed circumstances or as they alter existing frames to incorporate new information. However, previously negotiated understanding of the project identity may continue to dominate the discourse around requirements and may persist in new episodes.

To summarize these introductory comments, the framing model depicts the social cognitive process of requirements definition in terms of episodes consisting of actions and interactions during which ISD participants, drawing on their technological frames, negotiate requirements for an IT application. Each episode is characterized by key assumptions and expectations about the project identity which both shapes and is shaped by detailed negotiations around requirements. An episode may also be marked by distinctive themes in the discourse around requirements. During an episode, key participants may arrive at a shared interpretation of the project identity and of requirements. Alternatively, negotiations may continue with no resulting agreement or consensus. New episodes in the framing process arise as participants respond to changes in the project context which change the discourse around requirements and trigger new rounds of negotiations.

A.2 Limitations of the framing model

The social cognitive model for framing IT requirements is a process model. Its purpose is to facilitate explanation of human actions and events. The framing model does not predict the sequence of episodes through which ISD participants negotiate requirements nor the outcomes of the process. ISD participants may never reach a common understanding or agreement about IT requirements, or, espoused agreements may not be sustainable. On the other hand, participants may negotiate agreements on requirements which are resilient to change. The framing model does not directly address ISD outcomes and thus cannot predict these outcomes. However, by using the model to analyze actions and events over time and in multiple contexts, the circumstances which contribute to particular ISD outcomes may become apparent (Newman and Robey 1992). For example, if ISD participants are unable to reach a threshold level of agreement among key stakeholders
about IT requirements, or if ISD participants are continually redefining the project in response to change, a project may not proceed through IS development phases into implementation. Alternatively, if ISD participants' frames about a project remain "fixed" and unresponsive to change, the resulting technology may be inappropriate when it is implemented. I found evidence of both situations in the two ISD projects that I studied. In the following section, I discuss the framing model using data from these projects. I first describe the framing episodes that occurred in the BIS project. I then consider the framing episodes in the INFOSYS project. In the final section of this chapter, I compare and contrast the framing process in these projects and discuss the implications for ISD outcomes in each circumstance.

B. Framing in action

During my field study at GHI, I studied two IS development projects: i) the Business Information System (BIS) project, and ii) the INFOSYS project. I supplemented data collected during my on-site observation period with document reviews and interviews covering two years of history of each project (See Appendix B for event histories.) I analyzed the data longitudinally, examining critical events and changes that had occurred, assumptions and expectations about the project and IT requirements evident in informants' narrative history of the project, in project files and documents, and, during the time of my onsite observation, in dialogues and interactions. My analysis focused on data from core team members, who played more active and influential roles in defining requirements than did system constituents.

In the following sections, I use data from these projects to illustrate the framing model. The BIS project illustrates how core team members, responding to change triggers, went through multiple episodes of negotiating requirements and defining the project which contributed to project delays and resulted in little progress toward implementation of the IT application. Data from this project also illustrates how influential individuals shaped, or even dominated, the discourse around IT requirements. The INFOSYS project illustrates how core team members responded to change by integrating new assumptions and expectations into existing frames about the project, lending this project stability through turbulent times in the organization. It also illustrates how the team's reliance on old assumptions about the project identity inhibited their recognition of new IT requirements. Comparison of the outcomes of the framing process in these two projects suggests circumstances which may contribute to various IS development outcomes and is discussed in Section C.
B.1 Framing requirements in the Business Information System (BIS) project

I identified eight episodes of framing in the BIS project in which core team members engaged in negotiations around IT requirements, reassessed project goals and objectives, considered desirable business process changes from IT implementation, and so on. Figure VI-2 depicts the chronological flow of episodes and Table VI-1 briefly summarizes the eight episodes. Framing episodes did not correspond to specific IS development phases or activities but were instead identified based on the prevailing assumptions about the project identity and themes in the discourse. During each episode, critical events and change triggers led to changes in the discourse around requirements and to a new episode of negotiations around the project identity. As a result, the BIS project, despite executive sponsorship and a committed project team, seemed to suffer from what might be called a failure-to-thrive syndrome, never making it past planning and requirements definition activities to development and implementation. In the following sections, I describe each episode in detail to illustrate the framing process.

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<th>1992</th>
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<td>Q1</td>
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<td>Q1</td>
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<td></td>
<td>(1) MSIS Re-Write</td>
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<td>(2) Thinking Outside the Dots</td>
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Figure VI-2: BIS Project Episodes

9See Chapter III for a more extensive description of my method of identifying episodes.
<table>
<thead>
<tr>
<th>Episode Summary</th>
<th>Major IS Development Activities</th>
</tr>
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| **Episode 1: MSIS Re-write**  
Q1, Q2, Q3 1992 | • Interviews with users in sales offices  
• Systems analysis exercises  
• Requirements document published 6/92 |

The project was mainly focused on defining requirements for a new marketing and sales system to replace an existing system (MSIS). No significant changes in technology, functionality, or scope were envisioned.

| **Episode 2: Thinking Outside the Dots**  
Q4, 1992 | • 2 day workshop with cross-section of personnel from sales and BIS team  
• Follow-up meetings with user groups  
• Subsequent technical study by ISI, Inc. |

The project was focused on identifying new and innovative uses of information technology to support the new sales organization in its focus on revenue generation. Industry speakers introduced terms such as "sales force automation" (SFA) into the discourse.

| **Episode 3: Thinking Strategically about Information**  
late-Dec, 1992 - June, 1993 | • Interviews with GHI executives, managers, some sales personnel  
• Site visits to see software packages  
• Business process and data modeling  
• Two requirements documents published (Phase I, II of SBIS) |

The project was concerned with identifying strategic uses of information in marketing and sales activities, developing a plan for obtaining such information, and determining if there was a "constituency" in the organization for the project. Core team members assumed they would use a client-server technology platform.

| **Episode 4(a): Quick Hit**  
June - October, 1993 | • Software / hardware demonstrations with field sales  
• Selection of packaged software  
• Preparation of business case justification  
• Funding approval  
• Purchase of equipment; planning for roll out. |

This pilot project focused on providing notebook PCs and lead tracking software to a group of sales personnel to assist them in calendar management, prospect tracking, and administrative reporting. The project was defined as a "quick hit" which would later be incorporated into BIS.

| **Episode 4(b): Throwaway System**  
June - September, 1993 | • Attempts to develop a work plan and estimates with ISI personnel  
• Attempts to negotiate costs with ISI  
• Review of project costs with other IS groups in GHI |

The project was focused on providing a "bare bones" relational data base which would allow replacement of the MSIS system but also add new information on customers, subscribers, and members. The system definition included a "user friendly interface" and query tools for end-users to do their own reporting.

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Table VI-1: Episodes of framing in the BIS project
<table>
<thead>
<tr>
<th>Episode Summary</th>
<th>Major IS Development Activities</th>
</tr>
</thead>
</table>
| **Episode 5: Front-End Driver**  
September 1993 - October, 1993  
The project focused on the idea that the BIS system could be the entry point of information into transaction processing systems, capturing the "essence of the deal" and account / subscriber information at the point of sales person contact with accounts. This approach flipped the previous definition of the system from a "back end reporting system" to the "front-end driver" of data into transactional systems. |  
• Series of task force meetings held to consider Sam Brady's ideas and to develop a recommendation  
• Meetings with NBR project team to assess relationship between projects  
• Meetings with a vendor to look at package options |
| **Episode 6: Phase I / Phase II**  
Phase I of BIS was to focus on replacing the MSIS system with the "bare bones" relational data base, piloting software to tie together the notebook PCs, and scoping Phase II. Phase II was to include making BIS the "front end driver" for information into transactional systems by automating NBR functions and links to other systems. |  
• Business justification prepared  
• Presentation to Sam Brady and tacit approval to proceed  
• Negotiations with vendors to provide pilot software  
• Negotiations with vendor to provide client-server programmers  
• Attempts to define and formalize a work plan  
• Costs estimated for Phase I |
| **Episode 7: "The Big"**  
April, 1994 - June, 1994  
Project team was concerned with reconciling the re-engineering (NBR) and BIS projects by combining the goals, objectives, and thus the benefits of both. Ideas about how to combine and phase activities was driven by the published NBR deadline of August 1. The team recommended this approach but it was not implemented. |  
• BIS costs and benefits detailed  
• Attempts to get new project sponsor  
• Proposal for merging BIS and NBR projects prepared, presented to Tony Foley |
| **Episode 8: Umbrella for Quick Hits**  
July, 1994 through present  
The project was concerned with identifying "quick hit" solutions that would be easy to implement in a short time frame and would deliver benefits rapidly. Providing notebook computers to all sales personnel became the first "quick hit." |  
• Steering committee organized and several meetings held to define project objectives  
• Planning to acquire notebooks for all sales personnel |

**Table VI-1: Episodes of framing in the BIS project**
Figure VI-3: Episode 1 in the framing process of the BIS project

**Negotiating Requirements:** The BIS project began in early 1992, when Jane Flynn and Mark Smith, at the request of the marketing department's business system analyst, began a requirements study for a new sales and marketing system to replace the existing system, MSIS. The new system was intended to address several acknowledged problems. According to Sam Brady, data integrity and data legitimacy were major concerns:

When I first came here in '91 ... we recognized that the data that we were using to manage the business around selling and selling results ... didn't have a lot of integrity ... And we were finding discrepancies in the data between our Marketing Information System called MSIS and our other data sources in the company. So the problem became one of people not trusting the data, keeping PC files, or handwritten logs, or nothing at all.
The MSIS system was perceived to be technologically and functionally obsolete, as well as difficult to change or maintain, as Leslie Thomas commented:

The current system that we have, MSIS, is not meeting our needs, was never built to meet the current needs, or the market place needs ... MSIS is also written in FOCUS, mainframe, and it's very cumbersome at best to work with.

In their requirements study, Flynn and Smith conducted typical IS requirements activities, e.g., interviewing individuals in the sales organization, from the VP of Marketing to administrative support staff and completing standard IS analytic exercises such as developing data flow diagrams, context diagrams, and data entity models.

_Clarifying the project identity:_ Flynn and Smith published a requirements study document in June, 1992, describing the requirement to replace the MSIS with a new and more functionally complete system. The document asserted that a new system would help sales people sell more effectively, be more efficient, and would reduce paperwork.

_Producing and reproducing social structures:_ GHI, Inc. had outsourced its IS department, including operations, support, and development, to ISI, Inc. shortly before Flynn and Smith began the MSIS replacement requirements study. Although this change later had a substantial influence on the BIS project and in the framing process, its influence was minimal during this episode. Flynn, who held a position in the residual internal IS department, and Smith, who worked in a sales support area, conducted the study independently of ISI, Inc. They utilized typical requirements definition approaches such as user interviews and analytic modeling techniques, such as data flow and context diagrams, to analyze and present the data.

_Recognizing and responding to change:_ Before the project was approved for further IS development, GHI reorganized its sales and services function, created the Sales and Services Organization (SSO) and promoted Sam Brady to Executive Vice President of SSO. Brady wanted to change the focus of the GHI's sales organization and expected that IT support would be critical. Sam became the executive sponsor of BIS and, in this role, exerted considerable influence in the BIS project. He thought that the project was too narrowly focused and had not addressed "creative" uses of IT in sales processes. His ideas in turn influenced other core team members' interpretations of the project. Mark Smith described his understanding of changing expectations about the project at that time [emphasis added]:
And Sam saw it [requirements study], and I guess the decision was ... it was, like, don't build a system of what everyone just wants, you know. *Let's go out and see what they should be doing, instead of building a system on what they want to be doing.*

Jane Flynn gave this retrospective assessment of the requirements study [emphasis added]:

I don't think it was aggressive. *I don't think it was leading edge at any time.* And, in a way, it was what people told me, that's what I assumed was a requirement.

Leslie Thomas, who had recently assumed a position in Brady's organization, similarly assumed that the earlier definition of requirements lacked creativity [emphasis added]:

*We basically documented what we did today.* We didn't look at the future. *We didn't look outside the dots.* We didn't look at things we weren't doing, that we should be doing ... we really didn't look way out.

Brady did not approve the requirements study and directed Jane Flynn to organize a workshop to reconsider requirements, which initiated a new episode in the framing process.

*Changing the discourse:* Brady's articulation of his expectations and assumptions about how IT could be used in the sales organization began to change the discourse around IT requirements for the system.\(^{10}\) For example, one of his first actions was to rename the project in order to redefine its objectives [emphasis added]:

*So the project originally got called the 'MSIS Rewrite' which by it's very nature was a limiting definition of the project.* Which suggested that we were just taking the functionality of MSIS and redesign it so that is had integrity. But that really wasn't the intention of the program. *So then we decided to call it the Business Information System.*

The discourse around requirements reflected this shift away from discussions about replacing the MSIS system to a focus on providing automation tools to sales representatives. Concepts and terms such as "Sales Force Automation" entered the discourse as Brady articulated his ideas through stories, scenarios-of-use, and metaphors such as IT as an *electronic office* and as he initiated actions to introduce core team members and key system constituents to these ideas.

\(^{10}\)See Chapter V, Section A.1.a and A.1.b. for detailed discussion of Brady's influence on core team members' frames around Sales Force Automation and the Marketing Repository.
Episode 2: Thinking Outside the dots  
(October, 1992 - December, 1992):

Figure VI-2: Episode 2 in the framing process of the BIS project

**Negotiating requirements:** At Brady's direction, Jane Flynn organized an off-site "brainstorming" session to address requirements. Mark Smith described this event:

We got a lot of people together from all the different areas and we had this speaker come talk about Sales Force Automation and give people ideas about how they should be using the system. Instead of building a new system around the processes that they do today, they wanted to build a new system on how things should be done.

A senior sales manager who attended the meeting similarly noted the perceived need for "tools" for the sales force as a focus of discussion [emphasis added]:

We quickly realized that we hadn't invested an awful lot of money, skill or effort into the tools that the sales folks really need. Not only had we not invested in these sales folks in terms of their skills and bringing them up to speed and even continuing to get new skills, but we hadn't invested anything in
the tools that they use as well. Therefore, we were at a couple of off-site meetings to talk about what is it that the sales force really needs. What's their need and then what is the best way of getting it to them? And out of that came the birth of the BIS project.

After the session, Flynn and Smith held several meetings with sales personnel to continue discussions about requirements. ISI, Inc. apparently then developed a proposal for implementing the requirements identified (see comments below).

**Clarifying the project identity:** There is no evidence that ISD participants clarified the project identity or requirements, beyond the general idea that they be "outside the dots." I could find no copies of proposals or other documents related to these meetings in Flynn's project files, and none were mentioned other than in passing in interviews with key informants. This suggested to me that no substantive agreement had been reached about the project identity or requirements in this framing episode.

**Producing and reproducing social structures:** Brady drew on his organizational authority as EVP of the Sales and Services Organization to intervene in the BIS project and to override the definition of requirements that members of the existing sales organization had articulated. Team members enacted this organizational structure as they complied with his wishes and espoused his ideas about "creative" uses of IT in sales. Their use of brainstorming sessions, in which sales executives, managers, and representatives participated, suggests that they attempted to use nonroutine ISD methods to identify and define "creative" requirements for IT use. These attempts were apparently not successful, however, because Brady again dismissed the findings on requirements. During this time, uncertainty about rules and resources for IS development in the new outsourced IS development context began to affect working relationships between GHI and ISI participants at this time.

**Recognizing and responding to change:** When the proposal was again presented to Brady, he was still unsatisfied with what had been done, as he commented in an interview:

> And when we got through with iteration number two of the definition of need for BIS, it seemed to me to be so simplistic.

Although a number of sales department members had attended the brainstorming sessions, he attributed this result to lack of involvement by people with sales and marketing expertise. Leslie Thomas echoed Brady's interpretation, though she focused on ISI, Inc. as the problem [emphasis added]:

Chapter VI (223)
ISI... sort of plunged right into the technical design, and didn't really get a handle on the business requirements from a sales and marketing standpoint, because, what they didn't do is bring the right people to the table that knew sales and marketing.

Rather than authorize continuation of the project, Brady hired a consulting firm, Ideas, Inc., to conduct a new requirements study. This marked the beginning of a new episode in the framing process.

*Changing the discourse:* When Ideas, Inc. consultants assumed project management responsibilities for the BIS project, they shifted the discourse around requirements toward discussion of ideas and concepts they valued. The consultants intended to redefine the BIS project and to influence GHI organization members' ways of thinking about IT use, increasing their awareness of how to use information "strategically." They renamed the system the *Strategic Business Information System (SBIS)* and titled all documents and presentations *Leveraging Information for Strategic Marketing Advantage*. They also changed the discourse around requirements through their introduction and use of analytic models. For example, Alan Thompson, the chief consultant to the project, used used models as a basis for user interview protocols, as a structure for requirements analysis, as the outline for project documentation, in project presentations, and so on.

**Episode 3: Thinking Strategically about Information (late-December, 1992 - June, 1993):**

*Negotiating requirements:* During the next six months, the consultants from Ideas, Inc., primarily Alan Thompson, planned, managed, and led requirements definition activities. Because the consultants were overtly attempting to re-frame the project, the influence of their technological frames on negotiations around requirements was clearly evident. In Chapter V, Sections A.1.and A.4, I discuss in detail how Thompson drew on analytic models such as the sales value chain and the information strategy model to plan team activities and to structure interactions between team members and system constituents. Thompson hoped to influence the ways in which other core team member thought about the potential to use IT in sales processes through his use of these models. Drawing on assumptions embedded in these models, he made decisions about IT requirements, for example, what was in-scope or out-of-scope based on the sales value chain.
Figure VI-5: Episode 3 in the framing process of the BIS project

After conducting a number of interviews and analyzing the data in terms of the models, Thompson identified and documented business requirements and turned them over to the ISI members of the core team. The technical manager identified five alternatives, as Mark Smith explained:

They came up with five alternative ... it was everyone to have a LAN, everything to be hooked up, every person could do everything that they every wanted and it was a lot of money. That was like alternative one. Down to alternative five, you know, a new system but, one machine to every office, you know, no LANS, no hook ups, you know, kind of sneakernet or whatever ... Alternative one was like seven million dollars. It fit all of the requirements.

In this proposal, the team assumed that the new SBIS system would be implemented on the Unix platform which a subsidiary, HMO-2, owned and operated, and would utilize personal computer work stations in a client-server implementation of the system. From the data available to me at the time of my study, it was unclear how the assumption that SBIS
would be implemented using a client-server technology approach arose, although there were several likely sources. GHI, a "mainframe shop," had recently acquired a subsidiary, HMO-2, which had a more technologically sophisticated IT platform. GHI planned to include this IS operation in its outsourcing arrangement with ISI, Inc. Sam Brady was enthusiastic about using this new technology, and had requested that ISI consultants develop a strategy for implementing client-server IT technology as part of an IT infrastructure planning process. Regardless of its source, this assumption was never challenged, nor even examined closely by other members of the SBIS team.\footnote{For example, I later learned that no one had discussed using the hardware with the HMO-2 IS director to determine if there was sufficient capacity to handle a new application until much later in the project.}

**Clarifying the project identity:** In this episode, Thompson integrated key ideas from the first two framing episodes, that is, Sales Force Automation (SFA) and replacing the MSIS system. In their initial report, these and other key themes were presented [emphasis added]:

> The objective of this project was to determine marketing information requirements of primary functions which impact the sales process ... to identify the key constituents for the use of marketing information ... to design new approaches for the use of information to enhance sales ... to define alternatives for approaching implementation, including the use of pilot programs and the roll-out of information and applications ... to ensure that the proposed alternatives allow for the discontinuation of the existing MSIS system.

The consultants' Phase II report detailed and documented recommendations and requirements for the "Strategic Business Information System," utilizing Ideas, Inc.'s analytic models to structure and organize the information. This document clearly reflected their assumptions about the project identity and requirements for the system, that is, that a new data base and reporting system should be built to replace the existing MSIS system and to increase the amount and type of information available to sales managers and sales representatives on customers, subscribers, members, and competitors and that the project would be the beginning of a new strategy for using information in sales processes. Although they worked with GHI and ISI team members and claimed in project documents that the study had been a "solid team effort," it is not clear to what extent the consultants' interpretation represented a shared understanding of the requirements versus an imposed agreement, as Mark Smith commented:

> You know, but it was funny because, yeah, we worked together but it wasn't really a team, because it was, like, three different corners, you know, like we really didn't get together that well because there was ISI who had one agenda
and all they wanted to do was to get the contract and get the money ... and then it was Ideas, Inc., and I don't know how well Ideas, Inc. and ISI people got along, you know. And then there was Jane and I ... it wasn't really a team that was, you know, tight.

Producing and reproducing social structures Throughout this episode, the team viewed Brady as the key authority figure and gave much attention to his interests and desires for the SBIS project. The Ideas, Inc. consultants derived their authority through Sam Brady's support and endorsement. They planned and controlled project activities and produced project artifacts such as interview summaries and requirements reports. In these ways, their frames had a dominant influence on the discourse around IT requirements and shaped the interpretation of the BIS project identity and decisions about requirements. In their actions and plans to involve users in ISD through interviews, they enacted the hierarchy of authority at GHI, Inc. That is, they began with interviews of executives and proceeded to interview vice presidents and senior managers. Of the over fifty interviews they conducted, less than 30% were interviews with personnel whose jobs might be directly affected as a result of implementing the new technology, i.e., the sales representatives.

During this framing episode, the lack of social practices that embodied rules and resources for IS development in the outsourced IS context was problematic in the BIS project. For example, ISI consultants had conducted a strategic planning session with executives and managers in which the BIS project was ranked the number two strategic ISD initiative, and team members frequently referred to this ranking when expressing their expectation that the project would be funded from the "development pool" referenced in the outsourcing contract. However, there was no policy in place to actually tap these funds. There were also ambiguity about what ISI activities and services should be considered new development and thus be funded separately rather than considered as support to be provided within the contractual cost.

Recognizing and responding to change: The BIS team did an interim presentation of the proposal to EVP Sam Brady near the end of the requirements study phase. This presentation proved to be a critical (and memorable) event in the project, as Leslie Thomas described:

We did a presentation to Sam. There was a very big faux pas there, and that was, the numbers of what they [ISI] were recommending were not finalized until the Nth moment, and they were very big numbers. Millions, millions of dollars to develop this ... And Sam just said, 'There's no way.'
Alan Thompson cited two primary reasons for Brady's reaction [emphasis added]:

Part-way into the project, we went in, and senior management decided the development time was out. ... One [reason] was, that, period, after the MIS fiasco, no one wanted to commit to a major development style, ok. So, there is an organizational mindset that was, at the high level, we're not ever doing that again. So, 15 to 20 month development projects are out. Two was ... the uncertainty created in the health care environment overall, due to national health reform. Which made everyone start to look at [whistles] maybe a bridge is a better idea than trying to get us there in.

Mark Smith gave a similar interpretation of the reason for Brady's reaction [emphasis added]:

In the presentation of the second phase ... it was for this whole huge blown system ... Sam had a bird because it was so much money ... All I could think of was the MIS fiasco which was a system they tried to implement and they lost like ten million dollars on it a long time ago ... And the other thing, that we didn't think of and it was a big point too, we [later] put it in the document, about health care reform. Why go spend seven million dollars on a new system or even a million dollars or half a million dollars, what ever it is, if GHI isn't going to be in the same business as it's going to be in five years?

Team members varied in their assessment of how radical a departure Brady's ideas were from those of other members of the core team. Mark Smith thought that all of the the team members had missed Sam's point [emphasis added]:

I guess the bottom line was, we went through all this stuff and ISI's only alternative was to build something, ok, and why don't we buy? ... It kind of like never came up. No one ever said, 'Well what's the alternatives for buying instead of building?' You know, there were three of us, I mean the three areas were really wrong, you know, and we just didn't think of that.

Leslie Thompson attributed the "faux pas" primarily to ISI, Inc.:

Understand that their original estimate, before we brought Ideas, Inc. in, was three to five million dollars. So it was in line with where they were before.

Alan Thompson contrasted the approach advocated by Ideas, Inc. with the approach advocated by ISI, Inc.:

Was it a shock to us? No ... We were actually asking as alternatives for some throwaway solutions ... It was a big surprise to ISI. They're a mainframe shop. They want to do the development project. So they were always very reluctant to address throwaway solutions. So that's how the surprise came.

Jane Flynn conjectured that the Ideas, Inc. consultants may have staged the event to promote their perspective:
I honestly to God don't know if that is what Ideas, Inc. wanted to happen ... I don't know if Ideas, Inc. made it happen like that. It was just too much money. It was too big of a project.

The outcome of this event was that the project identity (goals, objectives, outcomes) was split between two sub-projects, and two concurrent episodes in the framing process began: the quick hit episode (4a) and the throwaway system episode (4b).

**Changing the discourse:** After this meeting, the discourse around requirements for BIS shifted again. It was at this time that Brady apparently first articulated his assumptions about the implication of National Health Care Reform (NHCR)\(^{12}\) for the BIS project. Subsequent to this meeting, team members brought up NHCR in informal discussions, team meetings, presentations, etc., and it was always mentioned in project documents. The team interpreted Brady's concern about NHCR as the need for a solution that could be implemented quickly and cheaply to solve immediate needs. Alan Thompson described how the term, and the concept of a "throwaway solution," entered the discourse:

That option was defined by Sam Brady. That was clearly a management imperative, and it's certainly his prerogative ... So what it brought to bear, to the forefront is that throwaway solutions were valid.

Thereafter, the term "throwaway" frequently appeared in conversations, presentations, and documents as an indicator of other assumptions, i.e., that the IT solution could be developed quickly and cheaply.

This event (the meeting with Brady and his redirection of the project) was incorporated into team members' understanding of the project history primarily in terms of the criticality of impending change in the market due to National Health Care Reform, the need to avoid another "MIS fiasco," and the legitimacy of throwaway solution strategies. As noted above, some team members (Thomas, Flynn, Smith, Thompson) attributed difficulties with project approval to ISI, Inc.

Another change in the discourse around requirements was the emergence of the idea of going forward with a "quick hit" pilot project to implement IT applications on notebook computers for sales representatives. Jane Flynn attributed this idea to Alan Thompson:

We sat down to talk about alternatives one afternoon with Alan and he said, 'We do this. It's going to be like six million dollars, or we can start with you just doing this.' Which is a need which everybody had expressed, and the fact that they do need some automation tools and stuff like that.

12 At that time, health care reform was a major focus of President Clinton's administration and many health care industry watchers anticipated substantial changes in the market.
The idea gained legitimacy in the meeting with Sam Brady, when Sam brought up short-term approaches. Leslie Thomas explained how this occurred [emphasis added]:

It spawned, I believe, when we were reviewing with Sam on the, for the SBIS, a quick hit solution that we could get out there immediately. And, we don't do a very good job of prospecting and lead management. So what we wanted to do was get a tool out there on the notebooks that would then interface with the ultimate system. So if you will, it was quick hit, but it was a little bigger than a quick hit.

The team thereafter used the term "quick hit" as both a description of and a rationale for this pilot project, and the concept and terminology of quick hits as an ISD strategy frequently arose in negotiations around requirements in subsequent episodes of framing.

Episode 4(a): Quick Hit  
(June - October, 1993)

Negotiating requirements: After the project presentation to EVP Brady, Jane Flynn and Mark Smith began work on a pilot project, the Lead Tracking / Notebook pilot. As discussed in Chapter IV, core team members had complex assumptions and expectations related to ISD strategy. In this episode, some of their key assumptions were that they could get "buy in" from sales personnel for the SBIS project by implementing a pilot program, that the pilot project would assure the sales force that the project was making progress after 18 months of studies, that the GHI organization could realize some tangible benefits quickly from doing this pilot project, and that the pilot implementation could later be integrated with the main BIS project. Mark Smith described his assumptions about how implementing pilot could result in these kinds of benefits, using the underlying metaphor of IT as the "organizational memory" for information about sales processes and focusing on increased productivity of sales personnel [emphasis added]:

Keeping track all their accounts and all the calls and notes and meetings. Now they have everything on paper and in their heads. When they leave the company it all goes with them and the new reps start from scratch ... You know, they spend a lot of time doing five different reports with the same information that just look five different ways.

Flynn and Smith took a selection of notebook computers and software packages on a "road show" to the district sales offices for demonstrations, and later, the sales representatives voted on the package they wanted. After this, Flynn and Smith worked independently of users to plan and carry out the project. They worked with ISI, Inc. to order the software,
purchase the hardware, install the packaged software, extract information from the MSIS system to create data bases of prospective customers for each sales representative, and customize the lead tracking software. Flynn and Smith prepared training materials themselves and then delivered the equipment at the first "hands on" training session. Although they emphasized in discussions with me the importance of giving users sufficient training and support, I noted that the half-day sessions covered a wide range of subjects from how to use the Windows operating system with a mouse to how to produce reports from the lead tracking system at a hight level. (Smith and another employee were available for a follow-up session and ongoing support.)

**Clarifying the project identity:** For the core team, the objectives of this pilot project were clearly defined as providing notebook computers with a software package (SELL) for tracking sales leads, managing customer contacts, reporting status of the sales process to
sales management, and so on. In discussions, presentations, and documentation, they referred to the pilot project in these terms, i.e., as "the notebook project" or the "SELL project."

The core team understood this sub-project to be a part of the larger BIS project, not only because they assumed it would build support for the SBIS among system constituents, but because it was a first step in installing the technology infrastructure they expected to use in the SBIS project, as Leslie Thomas commented:

The notebooks will obviously be used for BIS. So, buy them now or buy them later.

In addition to these technological goals, the team understood the project identity in terms of their quick hit ISD strategy, that is, as a way to gain support from and build interest with the sales force for further technological development. Leslie Thomas articulated this interpretation in an interview:

*We viewed it as, if we can get them bought in at this level, with these machines ... it will spark their interest for more.* And their interest for more is the SBIS project. They're very excited about it. Um, they're, um, I think they're very enthusiastic to see that we're moving forward in that right direction. So, if you will, we met the goal that we were sort of after with that.

**Producing and reproducing social structures:** Project participants tended to enact routine social practices related to requirements definition and IT implementation and in this way, they instantiated the structural properties underlying these practices. For example, funding for the IT equipment was provided centrally, under project sponsor Leslie Thomas's control, giving the team allocative authority over IT resources and enabling them to control distribution of the equipment. Jane Flynn and Mark Smith had knowledge of and experience with IT implementation and their job responsibilities included acting as the liaison between sales department personnel and ISI, Inc. This authoritative power enabled them to plan and direct the project, for example, attending software training classes themselves rather than having sales personnel attend, deciding how to customize the lead tracking software package while disregarding one system constituents' prior experience using the package, designing and delivering a training program, and so on. Although core team members involved system constituents in requirements definition activities by soliciting their opinion about which hardware and software package to buy, team members had already make key decisions about requirements such as which individuals and groups would participate in the pilot project, what business process changes to target, when and how to provide training and support, and so on.
Collaborative work between GHI and ISI personnel on this pilot project proceeded in a straightforward, though ponderous manner during this episode of framing. This may have happened for two reasons. First, Jane Flynn and Mark Smith actually carried out the project with only routine assistance from ISI personnel. ISI personnel's tasks related to hardware and software purchasing and support were specified in the outsourcing agreement. Although Flynn had complaints about the speed and efficiency with which ISI personnel responded, the tasks were completed. Second, the project identity during this episode of framing was clearly articulated and apparently agreed to by key participants.

**Episode 4(b): Throwaway System**  
*(June - September, 1993)*

**Negotiating requirements:** After the critical meeting with Brady, the BIS team reviewed requirements to identify those that would be part of the throwaway system. The revised requirements document identified "parameters" for making decisions about IT requirements that reflected the shift in the discourse around requirements and the team's emphasis on their assumptions about ISD strategy [emphasis added]:

In our working session on May 26, 1993, senior management set the following parameters. *Speed to market is paramount.* Therefore we buy and modify, not build. *Getting 80% of the information requirements,* in addition to the previously mentioned two new requirements, is a target for the immediate future. *An interim 'bare bones' throw-away solution,* that facilitates member level information and the discontinued use of MSIS, is wholly acceptable.

The team eliminated eight of sixteen categories of information from the requirements list, including several categories Ideas, Inc. consultants had probed for in interviews (e.g., competitor product and service developments). Two categories of interest to EVP Brady were added. The assumption that the throwaway system would be implemented using the Unix machine at HMO-2 remained unchallenged, however. The team then prepared a sixth alternative which reflected these constraints. Leslie Thomas described this alternative:

So what we chose to do was to go with an alternative that said, 'We will build a basic information warehouse with its capabilities of expanding if necessary, but we won't build something that will meet all of our needs today'... That's when we came back with the sixth alternative, we presented it again, we went through the deliverables, and everyone bought into it, that's the route we should go.

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13 Jane Flynn had told me about an earlier incident in which she ordered equipment without going through ISI, Inc. She suggested that, because the project had been successful and the technology well received, she suffered no real sanctions from management. However, she had a difficult time getting the equipment into ISI's inventory and obtaining operational support from ISI. Through this personnel experience with attempting to circumvent the outsourcing contract's procedures for hardware and software purchases, Flynn apparently learned that ISI intended to enforce this policy, and that she should comply with it.
Changes in the discourse around requirements and in the team's interpretation of the project identify from the third framing episode were evident in the final report issued by Ideas, Inc. consultants. In the following statement, the consultants maintained that key requirements could be provided within the parameters set by Brady [emphasis added]:

The challenge to fulfilling all of the organization's information requirements revolves around the present and future 'member.' *To develop / build a fully integrated relational database which includes all member level information runs counter to the organization's financial interests and / or patience.* In addition, the time span of such a project does not yield any benefits in the area of speed to market and potentially locks in an information strategy which health reform may negate. However, *all constituencies agree that a member level system is imperative to insure the flexibility necessary to be competitive in a reformed health care environment.*

Note how this formal project artifact states only that a large scale project would run "counter to the organization's financial interests and / or patience," apparently an oblique
reference to the MIS Fiasco story which a number of informants referred to in face-to-face interactions as the rationale for avoiding large-scale development efforts.

**Clarifying the project identity:** In this framing episode, the espoused project identity reverted from the *strategic* focus that Ideas, Inc. had advocated to a definition that was similar to the first episode of the framing process, i.e., replacing the existing MSIS system. Jane Flynn began to work with an ISI project leader to prepare the plans for the next phase of IS development, that is, a detailed design and implementation plan for the throwaway system. Despite Leslie Thomas's comment that "everyone bought into" this approach, different interpretations of the project identity and its implications for IT requirements began to surface between Thomas, Flynn, and Thompson, on one side, and the ISI team members on the other side. For Thomas, this was now a different project:

> The charter of this project is to replace the MSIS system with its current functionality, and some added things we've added on to it, but not much ... replace it, in a new technology.

Thomas and Flynn thought that ISI did not understand or accept the re-definition of the project as a throwaway (a.k.a. cheap) solution. Thomas, for example, thought that ISI's new estimates were excessive for the throwaway solution now defined, and she attributed this to ISI not accepting a scaled-back project [emphasis added]:

> This is not like building a general ledger system or an accounts payable system ... It's not that complex and my theory is that I could build a general ledger system from scratch in 9.3 man-years... I think the rub is that originally the system, when we first embarked on it, was a major undertaking. Huge. Millions of dollars of development work.

ISI developers, on the other hand, reportedly believed that the project team had not yet defined requirements in sufficient detail, and thus included in their work plans time to do requirements analysis tasks.\(^{14}\) An ISI technical manager later commented about the project:

> The customer didn't know what they wanted ... They did the requirements definitions four times!

Leslie agreed that this was a point of contention between the two groups:

> So we're in a little tug-of-war right here, now, with it ... We're sort of at a standstill right now ... ISI feels that we don't have the business requirements to the level [needed] ... So, we're in a little disagreement about that.

\(^{14}\) I had difficulty contacting ISI personnel at this time. Leslie Thomas had demanded a change in ISI personnel assigned to the project just as my study began, and in the following weeks, working relations between GHI and ISI personnel deteriorated so that ISI staff had little involvement in the project.
When this episode in the framing process ended through another intervention by EVP Brady, the project was at a stalemate, with GHI team members convinced the project identity (scope, objectives, etc.) was clear and that ISI was stonewalling the project.

Producing and reproducing social structures: The BIS project was one of the first new development projects that GHI and ISI were undertaking as outsourcing "partners,"15 and both GHI and ISI team members were uncertain about how the outsourcing "relationship" between GHI and ISI would work for new development. Existing social practices for IS development had been replaced by an outsourcing contract that was ambiguous on this subject. There were few formal policies in place, and personnel had no experience working together and thus had not developed informal social practices. As discussed in Chapter IV (Sub-category 4(b)), ISI and GHI team members drew on their own frames to interpret the intended role of ISI in the outsourcing relationship. ISI managers viewed their role as a "partner" who controlled and limited expenses. GHI team members thought of ISI as "vendor" who should listen to GHI, the "customer." These differences in interpretation of the outsourcing relationship further impeded team members' ability to work cooperatively.

As they attempted to work together in the BIS project, team members from ISI, Inc. and GHI, Inc. began to disagree on numerous issue. For example, in the story Leslie Thomas cited of a dispute over the personnel costs ISI could legitimately charge to GHI, unclear rules about resource allocation, as well as contested authority to hire consultants and assign personnel to the project, are evident:

Once we brought in Ideas, Inc., and we got over the hurdle that ISI was very upset that we did that, a gentleman that works for them said, 'Well, I would like to have someone with you while you're doing that, from ISI.' I said, 'That's great.' He said it would be a learning experience for them. I said, 'That's fine ... I have two issues with it. One is, as long as they don't impede the work, impede the progress of the work. And, number two, we have no funding to pay them. To pay you, ISI, for that.' And he said, 'Fine, I understand.' They've now come back and said, 'This is what it's going to cost, because we did do some work on that project.' We're not going to pay that.

Drawing on their own interpretation of the situation, GHI team members became frustrated, hostile and suspicious towards ISI. Again, Thomas commented [emphasis added]:

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15 During the first two years of the outsourcing agreement, ISI had been concentrating on converting GHI systems to the ISI platform. Thus, no significant new development work had been undertaken.
I keep saying to them, I can't pay you ... I have no funding to pay it, until we go to the spending council and get authorization to move forward ... [First] I need to know how big the ballpark is, and that's were we're trying to get at. And, all they want to do is, for me to pay the bills.

Jane Flynn shared Thomas's suspicions of ISI's motives and their willingness to participate in the BIS project [emphasis added]:

GHI and ISI could not come to an agreement as to what we wanted to do. And ISI, they didn't really show, you know, desire to do the work. And they did not want to come up to the plate and take ownership over some stuff. And we felt that we were being exposed. I don't think that they really demonstrated any knowledge or skill or desire to do the work. And they put people on the team, you know, who were not qualified.

With unclear rules and resources for new development and with rising hostility and suspicion, Thomas began to question whether she had to work with ISI, or whether she could "go outside" to hire contractors. In her description of the situation, Thomas explained her dilemma [emphasis added]:

So, where we're up against, is, what do we do? We have to move forward, and so we need to have that discussion as to how we move forward. And, ideally, I very much want to move forward with ISI, you know, working with us ... They would have to support it, regardless, because it would be on their machine. We do have the option of going outside. If they can't meet our needs, then we can go outside. I would rather not do that.

In spite of her assertion that she wanted to work with ISI, Thomas and others on the team frequently disparaged ISI, and Thomas several times demanded that new ISI personnel be assigned to the team. An ISI technical manager described to me how the situation affected the ISI team members:

History-wise, it's burnt out a lot of people or has ruined a lot of people. I mean, there's been some people on this project that will not come back to this ISI office ... It has destroyed them. And in some cases, Leslie will tell you that ISI put the wrong people on it. And that may be so in some cases. But in some cases, I know for a fact that they put some very good people on ... When the customer, when the user doesn't know what they want, it's very difficult to build something.

Recognizing and responding to change: During this time, there were changes occurring at GHI in other IS projects. Notably, Sam Brady appointed several individuals to the Management Information Systems (MIS) Team to coordinate "back end reporting" projects such as the Corporate Information System (CIS), INFOSYS, and the Data Support Data Base (DSDB) projects. The MIS team included Peter Deutch from HMO-1 and Tony Foley, IS director at HMO-2. Foley and Deutch had worked together at HMO-2 and thus
had experience with the Unix platform which Brady and others assumed would be used to implement BIS. When Thomas told Brady about her issues with ISI, he referred her to Deutch and Foley to get their opinion on ISI's estimates. In this way, Deutch and Foley began to participate in the BIS project and to influence the framing process.

The event which resulted in a new episode in the framing process occurred at a particular meeting the team held with Brady. Leslie Thomas had already met several times with Sam Brady to discuss the problems she was having with ISI, Inc. She had scheduled a meeting in late September in which, according to Jane Flynn, a decision would be reached about how to obtain funding and technical developers to proceed with the project. Alan Thompson, Tony Foley, and Peter Deutch attended with Sam Brady, Leslie Thomas, and Jane Flynn. Instead of addressing the ISI issue, Brady told the group that he wanted them to rethink requirements, to do a "sanity check" on where the BIS system would sit in the architecture, how it overlapped with the Corporate Information System (CIS) project, and whether it was feasible to make BIS the "driver" for enrollment systems to support consumer-based marketing. Brady later explained his rationale to me in an interview:

My thinking all along was that we needed to have a marketing repository, for not only prospects, but for clients ... that allowed us to begin to understand the lifetime value of a customer ... And so that customer information file concept, I think it's even more important now than it was. And when it didn't turn out to be in the solution, that's when I kind of intervened at the end.

I had been working on-site at GHI for several months at this time, and it was clear to me that team members were surprised by Brady's action in this meeting. When I asked Leslie Thomas what she thought had happened, she speculated that Brady may have been reacting to problems in other areas of the company:

I think he was trying to get at, how do we fix the service problem through information technology ... I believe that it has become a little more transparent that we may not be able to fix it without technology ... I also think maybe he was testing the water to see, you know, the feasibility of doing something like this, and was it logical and was it appropriate and so forth.

Thomas commented that, although she thought the consultants from Ideas, Inc. were caught off guard at the meeting, she had interpreted Brady's action as simply changing his mind:

I'm never surprised at what comes out of his mouth ... I think Ideas, Inc. was surprised at the standpoint of, 'Where did we go wrong? Did we not read it right? And so did we fail?' And we confronted him with that. And we did not misread it. We did not get misdirection. He just changed direction.

In fact, Brady indicated that part of his rationale was to shake the team out of complacency:
Frankly, what it is I worry about is, people get into routine thinking here, you
know, because we always did it this way we ought to keep doing that way. I'm
not sure that that's the goal here.

Thomas also noted that Tony Foley's and Peter Deutch's activities in coordinating efforts
such as the CIS project may have influenced Brady's thinking at this time:

I also think that Sam started to think more globally around the CIS project and
when we brought in Foley and Deutch, that made it much clearer. So I think it
was timing.

Jane Flynn agreed that Brady may have taken the opportunity to redirect the project, given
the stalemate and lack of progress at that time:

I think that he knew there was a problem with ISI and maybe he thought it
would be like a good opportunity to, you know, like, give some ideas of some
of the things he'd thought should be happening as far as the requirements of the
system and try to make sure that nobody moved forward until they considered
this. Since we were already going to stop. So for him, I think it was like, it
was like a good timing.

*Changing the discourse:* Brady again influenced the discourse around IT requirements
for BIS. He introduced a new metaphor, *BIS as front-end driver* for enrollment, and
illustrated his ideas with personal stories and scenarios of use. As a result, the term and the
concept of BIS as the "front-end driver" for transactional systems entered the discourse
around requirements, in conversations, team meetings, documentation, and so on, as team
members interpreted Brady's ideas and negotiated requirements for the IT application.

Brady also influenced the discourse around requirements indirectly. In earlier
episodes, the consultants from Ideas, Inc. had dominated the discourse through their
control of the project, drawing on Sam's authority and support for legitimacy. When
Brady brought Foley and Deutch into the BIS project, he demonstrated his support for and
interest in them. As they began to participate in the project, their ideas entered the collective
fund of assumptions and expectations with added legitimacy. At the same time, the
influence of Ideas, Inc.'s concepts declined.

**Episode 5: Front-End Driver**
* (September - October, 1993):

In episode 4 of the framing process, GHI and ISI core team members drew on different
assumptions about the status of the ISD initiative (i.e., requirements were sufficiently
defined versus requirements were not sufficiently defined) and about ISI's role in
development (as a "vendor" versus as a "partner") and, as a result, could reach no
agreements on how to proceed. The team remained at a stalemate until Sam Brady again
Figure VI-8: Episode 5 in the framing process of the BIS project

intervened to redirect the project, and a new episode of framing, focused on Brady's notion of the BIS system as a "front-end driver" for enrollment systems, began.

**Negotiating requirements:** In the meeting with Brady, a task force comprised of Leslie Thomas, Jane Flynn, Tony Foley, Peter Deutch, and Alan Thompson was formed to consider Brady's ideas about the feasibility of using BIS as a "front-end driver" for transaction processing systems. Foley volunteered his MIS manager, Mary Kelly, to serve as technical project manager for the project, and she also joined in the activities. During this time period, members of the task force performed no formal IT requirements definition activities, per se. Instead, they held a series of two to three hour sessions to discuss Brady's ideas. In Chapter V, Section A.1, I discuss in detail core team members' actions and interactions as they negotiated an interpretation of Brady's ideas and fashioned their response. Here, I summarize key topics of negotiation in each frame area.
• **Essence of the IT application:** With his metaphor of BIS as a front-end driver for enrollment systems, Brady suggested changing the position of the BIS application in the systems landscape. Earlier, the team had assumed BIS would be a back-end repository. Leslie Thomas quickly introduced her own metaphor of BIS as an order entry system. She drew on this metaphor to predict issues that might arise. The team considered the implications for requirements for the BIS application, focusing on whether different data would be required and whether there were existing applications or software packages which might provide some of the functions or at least a structure to build on.

• **Essence of the organizational environment:** If BIS were a front-end-driver, the team realized that the impact of the application on business processes would be more extensive. They discussed problems in enrollment processes and considered how this expanded project might influence other programs.

• **Essence of the ISD initiative:** As discussed in Chapter V, core team members' frames related to ISD strategy had a strong influence on how they made sense of Brady's ideas and how they negotiated a shared interpretation of the revised project. They soon focused on the idea of "fast burning" the MSIS replacement, that is, of rapidly developing an application to replace the existing system, and of delaying consideration of Brady's ideas.

• **Project context:** With many unanswered questions about how "the relationship" between ISI and GHI would work, the idea of using HMO-2 personnel to do development of the BIS system, rather than ISI personnel, began to crystallize. Foley, who was losing staff due to uncertainty about the impending transfer to ISI, Inc., was looking for career opportunities for key members of his remaining staff. Mary Kelly had already assumed the role of technical project manager. Thomas, who was frustrated with ISI and distrusted them, thought Foley's development staff might be an answer to her dilemma about going "outside" the contract for technical resources. Thus, no ISI personnel participated in the project at this time, while Mary Kelly was expected to fulfill the dual organizational role of HMO-2 employee and stand-in for ISI.

**Clarifying the project identity:** When Brady told the BIS project team to consider making BIS a front-end driver for enrollment systems, team members reconsidered their interpretation of the project identity in terms of the throwaway system to replace the MSIS reporting system. Their nebulous understanding of the project identity during this framing
episode was evident in their references to the project merely as "it" or "the big." Team members who had been involved in the project earlier communicated their understanding of the project identity with new participants through their descriptions of the project's history and sought to discover what new participants knew and understood about the project. Drawing on their assumptions about ISD strategy, the team soon decided the project should be "chunked," with the first step being the MSIS replacement and "the big" deferred for later consideration.

**Producing and reproducing social structures:** As in earlier episodes, Sam Brady drew on his organizational authority to redirect the team. Team members enacted his authority when they accepted Brady's "right" to do so without question. For example, when I asked Thomas how she interpreted Sam's ideas, she commented:

> I never sat down and asked him why he changed his mind but, I'm not sure I would ... Sometimes you don't question.

In a team meeting, Alan Thompson commented on Brady's action:

> Sam has been evolving in his thinking about the project. That's OK. It's his right. He's the boss.

In informal discussions with me, Jane Flynn similarly commented that Brady was "the boss" and therefore could tell the team to do whatever he wanted.

New members of the task force, on the other hand, were less willing to acquiesce to Brady's authority to redirect the project. Tony Foley, who reported to a different executive vice president, while mindful of Brady's authority, was less inclined to accept his ideas without question. At the first meeting of the task force, he commented:

> Sam floats balloons. If someone doesn't poke a needle in them, they gain a life of their own.

Similarly, Mary Kelly, who worked for Foley, expressed her assumption that Brady's ideas should at least be questioned:

> I think sometimes Sam will make a statement and it sends people scattering off into directions that he never intended them to scatter off into ... Sam's very technical and a lot of the people that are reporting to him aren't extremely technical. So when he does say something, there's an extreme tendency not to question him enough to truly understand what he means. And he may not even know.

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16 Team members would use tonal inflection as they spoke to suggest quotation marks, as in "whatever 'it' is," to indicate their nebulous understanding of the implications of Brady's ideas for the project. See Chapter V, Section A.1 (ii) for detailed discussion of negotiations around the project identity during this framing episode.
Although some members of the task force were not ready to acquiesce to Brady's re-direction without questioning it, all acknowledged his organizational authority and the legitimacy that could be derived from his support and endorsement. In the early task force sessions, team members' efforts to establish personal legitimacy and influence by drawing on Brady's authority were evident. In previous episodes of the framing process, the Ideas, Inc. consultants had laid claim to Brady's endorsement, and their ideas had dominated the discourse around requirements. With the appointment of Foley and Deutch to the MIS team and the BIS task force, Brady's interest in them was apparent, and it was less clear whom Brady would support. In the first meetings, Foley and Thompson both attempted to draw on Brady's authority by referring to meetings they'd had with Brady or times they had had informal hallway discussions. For example, in the first meeting with Tony Foley, Alan Thompson suggested that Ideas, Inc. had frequent access to Brady [emphasis added]:

I have to tell you, it was news to us ...Fred (President of Ideas, Inc.) was also surprised, and *he talks to Sam a lot.*

At a later meeting, Tony Foley hinted at his standing with Brady:

I work for HMO-2. HMO-2 is using technology that Sam wants to use.

EVP Brady's interest and support for Foley did appear to contribute to Foley's influence on negotiations around requirements during this framing episode, and Foley's control over the HMO-2 programming staff also added to his authority.

**Recognizing and responding to change:** Enrollment processes had been a chronic problem at GHI, and, as noted earlier, Thomas had speculated that Brady's idea about using BIS as a "front-end driver for enrollment" had stemmed from the current crisis in fall enrollments.¹⁷ Concurrent with the BIS project, a business process re-engineering initiative was underway at GHI, the New Business and Renewal (NBR) project, to streamline and standardize enrollment policies and procedures. Bill Maynard, head of the Total Quality Management (TQM) program was leading the NBR project with the assistance of a consulting company, BTC, Inc. Apparently, when Sam Brady began to think of BIS as a "front end driver," he realized the BIS and NBR projects might overlap, and he sent Bill Maynard to Leslie Thomas to figure out how the projects related to each

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¹⁷ GHI experienced peaks and valleys in the workload around enrollment processes, because customers tended to renew at a few critical dates during the year, e.g., January 1, July 1, October 1. During the time period of this episode, there had recently been a peak in the enrollment process that was rumored to have gone very badly, with high levels of customer dissatisfaction.
other. Leslie, in turn, recognized that the projects needed to be coordinated, at least in terms of the information technology provided to sales personnel, and perhaps in terms of database and systems design. Thus, the BIS as "front-end driver" episode in the framing process transitioned quickly into the next episode as the BIS team began to think about how these projects should be coordinated.

Changing the discourse: The discourse around requirements for the BIS application began to change as BIS team members became aware of the NBR project. For example, Sam Brady used the terminology "capturing the essence of the deal" to describe how IT could be used in redesigning the enrollment process. Team members began to use the term NBR and terminology in team meetings and in documentation for the BIS project.

Another change in the discourse occurred around requirements to integrate data from the notebook computers earlier distributed to sales representatives with a central BIS database. Team members met with a software integration vendor, who described the notebook computers in terms of the metaphor islands of automation in a presentation. I had never heard anyone on the BIS team use this term in relation to the lead tracking/notebook project. However, after this meeting, Jane Flynn and Mary Kelly routinely referred to the notebooks as islands and the idea of linking them through automated database updating procedures quickly grew into a requirement for the pilot project.

As the framing process transitioned from Episode 5 into Episode 6, the Ideas, Inc. consultants' influence waned and they eventually ceased participation in project activities. The consultants' assumptions and ideas similarly lost influence and dropped out of discussions. For example, Mary Kelly at one point revised the business case document to ensure all references to the application specified the Strategic Business Information System, as had earlier documents produced by Ideas, Inc. When she reviewed the document, Leslie Thomas told Kelly to change the name back to the Business Information System. This change in system name reflected the shift in the framing process away from the Ideas, Inc. consultants' interpretation of the project identity.

As the framing process transitioned into Episode 6, team members began to focus their requirements definition activities on what it would take to implement the IT

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18 Although GHI offered only about a dozen generic types of health insurance coverage, it frequently customized coverage arrangements with larger customers, by adding "riders" (additional coverage) or specifying coverages to suit the customer's interest. Thus, knowing exactly what had been promised was vital to processing claims.

19 For example, the NBR consultants had coined the terms Tier I, Tier II, and Tier III to describe the level of customization in the products. A small employer buying standard products without riders was a Tier I, where as RBC, Inc. (GHI's largest customer) was a Tier III, because the account and the products were customized to this company. Members of the BIS team used this kind of categorization to describe what segments of the business they expected to address with the BIS project.
application, rather than on what were desired features and functions of the application. The discourse around requirements similarly began to reflect implementation concerns such as how to acquire the required technical personnel to develop the system and how to work with system constituents and the user project sponsor in future IS development activities. The discourse around system features and functions remained relatively static, as the team extracted lists of information and data base requirements specified in the Ideas, Inc. study to include in the business case document.

**Episode 6: Phase I / Phase II**  
(November, 1993 - March, 1994)

**Negotiating requirements:** Over the course of several meetings, task force members (including ISI consultants to the NBR project) debated how the BIS and NBR projects might be coordinated, how data should flow among the NBR, BIS, and enrollment systems, etc., and how different "chunks" could be bundled together in phases for automation. Chapter V, Section A.2 provides an in-depth discussion of how the team negotiated inter-project coordination issues. Here, I summarize key topics of negotiations.

- **Essence of the ISD initiative:** The task force's discussions and negotiations focused almost exclusively around how the NBR and BIS projects should be coordinated through phasing implementation efforts. The only documentation that the task force produced during this time were schematic charts indicating how the projects would be phased and coordinated over time. Drawing on their assumptions about ISD strategy, the group quickly integrated the NBR project into their thinking about "the big" and continued to focus on a phased ISD approach, in which the first phase would be replacing the MSIS system. They assumed that the NBR re-engineering effort would be limited to redesigning manual procedures, and later, in Phase II, "the big," which would cover the various notions of the marketing repository, a customer information file, BIS as front-end driver, and NBR, would be "scoped." Although ISI consultants participated in these discussions, NBR project manager Bill Maynard did not.

Leslie Thomas explained her rationale for adopting this strategy to me in an interview, using her favorite metaphor of BIS as an order entry system [emphasis added]:

"BIS now becomes very small and the order entry becomes this huge piece. But I feel more comfortable in doing things like this if we can break it down into small chunks, because I don't want to go in there saying it's going to cost us, if you will, five or six million dollars...and hang my hat on a five or six million dollar project. I'd rather hang it on chunks of it. So we do BIS, and we get that done, and it's successful, and we're scoping out the second phase and we break it down into workable pieces so it doesn't become a runaway project."
Figure VI-9: Episode 6 in the framing process of the BIS project

Frames around the role of users in the next phases of IS development, particularly that of a user sponsor, became salient as the team began to think about moving into development and implementation of the system (See Chapter V, Section A.4(i)).

- **Essence of the IT application**: In spite of the espoused changes in scope of the BIS project, team members did not expect changes to basic features and functions required in the BIS application. This assumption reflected team members' understanding of the BIS application in terms of its relational database, as Leslie Thomas's comment suggests [emphasis added]:

  *In essence it hasn't changed*, we just have to ensure that all the hooks are there, to support Phase II. But the essence of the data hasn't changed. It should be proven, but my gut is the essence of the data hasn't changed.
Core team members used definitions of the relational data base and lists of reports documented in the earlier Ideas, Inc. study to describe the system in the business case proposal, which was the next major project artifact produced for the project. They spent little time discussing additional or changed requirements which might result from the business process changes implied in the BIS as order entry or BIS as front-end driver metaphors. They did, however, identify the requirement to automatically update data bases on the notebook computers distributed to sales representatives and defined a pilot program to do so. In these actions, team members were influenced by their assumptions about ISD strategy (i.e., do quick hits) and inspired by the islands of automation metaphor for the notebook computers.20

During this episode of framing, team members began to debate whether the IT infrastructure needed to implement the BIS application would be available when needed. Drawing on their expectations for inter-project coordination, they interpreted requirements related to the technology infrastructure as a "critical success factor" that was outside the scope of the BIS project and thus not their responsibility.21

• **Essence of the Organizational Environment:** During the previous framing episode, as the BIS core team discussed Sam Brady's notion of BIS as a front-end driver for enrollment systems, they began to think more broadly about the potential for using IT in the process of selling health insurance products. In this framing episode, as they debated how to coordinate the BIS and NBR projects, the team considered the business process for enrollment and the linkages between enrollment and sales. Realizing that "the big" project would entail substantial changes in these business processes, they decided to focus on the MSIS replacement phase and to scope out "the big" as a second phase, in this way delaying substantial organizational change.

• **Project Context:** After the team agreed to a Phase I / Phase II approach, their negotiations around requirements centered on issues related to the project context. Core team members spent a considerable amount of time preparing plans and estimates of resources needed to complete the projects (development personnel, hardware and software, training, etc.), negotiating access to resources, and preparing presentations on the project for funding approval. The project work plan became the primary artifact in which ideas, agreements, and commitments about specific tasks and activities were specified as the team met numerous times over to negotiate tasks and responsibilities. Leslie Thomas's comments

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20 See Chapter V, Section A.3 for a detailed description of negotiations around this pilot program.  
21 See Chapter V, Section A.2 for a detailed description of negotiations around the infrastructure.
about the function of the work plan revealed, for example, her expectations for the User Project Sponsor's (Jeff Green at this time) role in the project [emphasis added]:

Scope creep is always a problem. So once Jeff signs off on a plan and Jeff signs off on requirements ... we will have frozen stuff. And once we decide this is the way it's going to be, it's frozen and it's not going to change. So we're not going to have a moving target all over the place.

Through these work planning activities, other expectations and assumptions about detailed requirements emerged. For example, Mary Kelly identified the task of "setting GUI standards." The following dialogue excerpt of team members' debate over whether this should be a BIS team responsibility revealed assumptions and expectations about the project context, as well as their expectations for their own role in ISD activities [emphasis added]:

Thomas: What is setting GUI standards? Won't Mark, Kim, and Eric do that? Explain it to me.
Kelly: It's like deciding which key is the cancel button.
... 
Galvin: Is this setting standards for the system, or beyond? We don't want the system to be unique.
... 
Thomas: Shouldn't someone in the IS group do corporate standards for client server, so all the applications have the same look and feel?
Kelly: Well, suggest some names to me.
Thomas: I don't think it should be done here. It should be done by the standards group ... We're not technical people.
... 
Kelly: This is the first real client-server application to be done here at GHI. It will set the tone. Some of the standards will be for all applications, some will be specific to BIS.

A key negotiation point was the estimated development cost. ISI's earlier estimate for developing the throwaway MSIS replacement system had became a straw man statistic for the team. Leslie Thomas and others had maintained it was excessively high, and it was important to prove their point by coming up with a lower estimate for Phase I (MSIS Replacement) of the project. Thomas told Mary Kelly in a team meeting:

I want to understand that this project is not 14 thousand man hours, 9.3 man years."22

Not surprisingly, the estimate presented in the business case was a lower figure. Leslie saw this as a major outcome of the team's activities over the preceding months:

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22This was the ISI estimate given months earlier.
Understanding, you know, what it would take time-wise compared to what we had, you know, six months ago, compared with 9.3 man years, what it would take this go-around, in getting it down to some workable number.

Another negotiation point was how and where to source the technical developers. As discussed earlier, the GHI members of the BIS team had been highly critical of the ISI team members in earlier phases of the project, and Thomas's assumptions about ISI had not changed. In an interview with me, she commented:

We were dealing primarily with mainframe people that really didn't understand. Not only did they not understand the current technology they also didn't understand the sales and marketing environment.

Jane Flynn agreed, and commented to me that a major outcome of the previous months of work had been finding the HMO-2 MIS staff and figuring out that they could fill in for ISI in technical development:

I think what has come out of it is that, that the people from HMO-2 are going to take ownership over it. Not ownership, I mean, we're going to share ownership with them and then they are going to deal with the ISI situation. They're going to be ISI people ... I think that we have better skilled people now with better technical background than we ever had before.

However, there were not enough HMO-2 programmers available to do the project, and the team continued to debate where to source technical developers with experience in client-server technology. Mary Kelly, in the project presentation to Sam Brady, mentioned her expectation that she could hire vender programmers to do the BIS project. Brady's reaction revealed different assumptions:

Brady: We need to talk about that.
Thomas: Can we do that, use outside vendors?
Brady: No.
Kelly: Steve [head of ISI, Inc] said yes. We just need to go through ISI.
Brady: Are we mortgaging the future? Will we need these skills in ISI to do other work?
Kelly: Are there enough initiatives to support that?
Brady: Yes ... We're reassessing the skills mix, reassessing where we're going. We're going to have a steady state of 80 programmers ... I don't want to have 80 mainframe programmers and subcontract the good work to the local body shop.

In an interview shortly after this presentation, Mary voiced her frustration with trying to plan the project in an IS development context with unclear rules and policies for working with ISI:
All through this project, they have said they don't like what ISI does and we're not going to necessarily use ISI. I mean, that was so clear in every meeting, and then in the meeting [with Brady] when I'm talking about using the client server contractor, she [Thomas] says to Sam, 'Can we [sub-contract]?' He says, 'No.'

During this episode, the team had developed a "business case" and presented it to Sam Brady for approval. Leslie Thomas had on many occasions said that getting funding approval for the BIS project would be a "no brainer," and stated her belief that funding was readily available in the "development pool" set aside in the outsourcing contract with ISI, Inc. She reiterated these assumptions in an interview with me, shortly after the team had presented the business case to Brady and he had given his informal approval to go ahead:

The rubber will meet the road when we have to ask for money. But my feelings are this. If we're shooting down the straight line and everything's going well, it'll become a no-brainer ... There's a development pool set aside and this will come out of that development pool ... There were nine initiatives set forth about a year ago. CIS was number one and BIS was number two. But they still needed to have a business case written about them.

Despite this belief, the team was uncertain about what formal steps might be needed. While new policies were under development for funding approval of major development projects, no one on the team knew exactly what would be needed.

To summarize these various aspects of negotiations around requirements during this framing episode, the BIS team first focused on how to coordinate their efforts with the NBR project and agreed on a phased implementation approach. They then focused on issues related to the next development stage, i.e., implementation of the MSIS replacement system. As they negotiated how they would carry out the project, they were hampered by unclear rules and policies for doing IS development with ISI, Inc. as "partners."

**Clarifying the project identity:** Early in this episode of the framing process, the BIS core team, though the task force meetings, settled on a phased approach to implementing "the big" which reflected earlier conceptualizations of the project as an MSIS replacement effort. The complex, perplexing organizational issues were deferred to Phase II with the promise that this effort would be "scoped" while Phase I was being implemented.

After this basic agreement was reached, the team confirmed their assumptions and expectations about the project as they prepared a "business case proposal" document. Flynn assumed that the business case document would specify the project identity and clarify all important questions about it, as she explained:
First of all, you want to set up a frame that if anybody is to pick it up, they would know exactly what it is you're selling or you're trying to buy ... It stands in a good case for whether the corporation should spend the money ... and also to make sure the company, that whoever is going to make the decision, understands what could go wrong with the project, to know, what are the critical success factors ... what is the time line and the milestones and the deliverable that will be met. You know, the buy price. So anybody at any time can ask and they know where we are on the project and who will be involved in the project.

Using an outline supplied by ISI, Inc., Mary Kelly articulated assumptions about the project definition, scope, critical success factors, risks, costs, etc., in writing. Kelly, Flynn, Thomas and Smith discussed these assumptions as they reviewed Kelly's draft. The first section of the document specified key points that had been negotiated over the preceding months, however detailed requirements for the application remained sketchy.

Although the team had settled on a high level interpretation of the project identity, they were unable to complete the workplan or to obtain funding approval to continue. As time passed with little progress, team members began to re-examine their assumptions about the project identity in light of the August deadline which they had earlier specified for completing Phase I. The following excerpt from a team meeting shows the team's discussions centering on "how real" (i.e., essential) the August date is and what IT development could be feasibly accomplished during this time period. I include this data here, because it illustrates how project deadlines can become triggers that change the project identity. Note also how Thomas's views varied in the course of minutes from the perspective that "MSIS replacement" is an insufficient project deliverable to "MSIS replacement in client-server" would be an substantial accomplishment [emphasis added]:

Thomas: Now, to my favorite topic, the dates. I need to understand from Jane and Joe, what can be accomplished by the end of August? Can we do the MSIS replacement? We need that by August.

Galvin: Why?
Flynn: Why?
Thomas: We've been out on the limb three times. In the meeting with Tony, Sam, and me, I said we won't slip the dates. They have slipped. I said to Tony, our credibility is on the line ... If there is a business reason to delay August, we'll do that, but I need to know if August is real.

Galvin: Is this more than a MSIS replacement? Is that a milestone?
Thomas: We have to look at the options of this. It's not just a MSIS replacement. That's not enough.
Galvin: It's a whole different architecture.
Kelly: That will seem different to the users.
Thomas: Ok, yes.
Kelly: What's just 'MSIS replacement'?
Flynn: That's hard to say now. [Gives examples of what functionality could be delayed.]
Kelly: So, we could do BIS Release 1 by August 30, Release 2 by ...
Thomas: I'd prefer to do it all but if we delay it, I need to know the reasons.
Galvin: What is the customer's benefit of August? We need to decide how to package it. Just replacing MSIS won't sell.
Thomas: Yes, it will. MSIS is so user unfriendly. If we just turned off MSIS and turned it on in client-server, people would be happy.
Galvin: You didn't say the same thing four minutes ago.

Producing and reproducing social structures: In earlier episodes of the framing process, the BIS core team had responded to Sam Brady's authority when he had intervened in the project and overruled or redirected the team's recommended approaches. In this episode, however, the team responded somewhat differently. Although they were still very concerned with (and frequently discussed) what they thought Brady would want or think, they had circled back, midway through this episode, to the point they were before Sam Brady's Episode 5 intervention. That is, by pushing all of Brady's issues into "Phase II," with the promise to "scope it out" later, the team could focus on the MSIS replacement project. In Leslie Thomas's words, they had "steered it the way it needed to be steered."

In addition, by involving HMO-2 personnel, the GHI team members thought they had solved the problem they had asked Brady to solve in September, i.e., what to do with ISI, Inc. Thus, the team espoused Brady's ideas about BIS as a front-end driver for enrollment systems but they enacted their own interpretation of the project as an MSIS replacement effort.

Lack of routine social practices for IS development continued to impede cooperative work among GHI and ISI team members. This was of particular concern to Mary Kelly, the designated technical project manager and liaison with ISI, Inc.:

The number one thing that would make this project successful is if Sam Brady and ISI would come to some agreement on what's considered new development ... actually just get the ISI contract straightened out as to what the rules are so that we know what kind of game we're playing. So you don't have to worry about when you're trying to do something, who's doing what behind the scenes.

In fact, Leslie commented to me that one outcome of the BIS project might be establishing procedures for doing new development work with ISI, Inc.:

I think the water will be tested on a development project. Just in general, because we haven't done one yet in the new environment -- the new environment is two years old. In the ISI environment, we really haven't done any development work.

Without such routine social practices, team members could not draw on rules and resources for ISD. For example, Leslie Thomas frequently reiterated that BIS was the number two
priority for IS development and it would be funded from the "development pool." However, there was no definite policy, procedure, or even practice for accessing these funds. In this context, the BIS team relied on Sam Brady's organizational authority and power to secure funding approval and resources for the BIS project. They assumed that Brady could authorize funds needed through informal channels. And, in the project presentation to Brady, he had told the team to "go ahead" and that he would "talk to" GHI's CEO and other executive vice presidents. However, shortly after that presentation, GHI reorganized top management positions, and Brady moved to a different position in the company, leaving the BIS project unfunded and without an executive champion to informally secure the funding.

Recognizing and responding to change: Episode 6 of the framing process continued until the BIS team learned that Bill Maynard had proceeded with plans to develop an automated version of the NBR project. The BIS core team had assumed that concurrent work on NBR would deal only with re-engineering enrollment processes manually. They had outlined the plan to "integrate" NBR with BIS in the future (Phase II) and thus made few attempts to talk with Maynard or include him in BIS project presentations or team meetings. During the final weeks of Episode 6, Mary Kelly learned that Maynard had commissioned a consulting company, BTC, Inc., to propose an automated application. Leslie Thomas described her interpretation of what had happened:

NBR was always an issue ... And the way it evolved was, it was always going to be a part of Phase I and Phase II. But all of a sudden out of nowhere came, 'It needs to be done by August' ... And it sort of took on a life of its own real quickly ... It was almost like a little end run.

The BIS team members, who had earlier interpreted NBR as an overlapping, but supportive initiative, now interpreted it as competitive project and began to re-examine their assumptions about how to deal with it. This reassessment was a catalyst for the transition to Episode 7 of the framing process.

During this time, a corporate restructuring had also "changed the players" in the BIS project. EVP Sam Brady moved into a new position. The designated business project sponsor, Jeff Green, also changed positions in the reorganization. Tony Foley, the MIS manager at HMO-2 who had acted as a "consultant" to the BIS project, was appointed Chief Information Officer, and, as restructuring continued, Leslie Thomas's organization and the BIS project was reassigned to the CIO department. In his new position of authority, Foley began to intervene directly in the BIS project, questioning user support and insisting the team find a user sponsor from the sales area. Given these circumstances
and Foley's insistence on the project having a user project sponsor, the core team had to reconsider their assumptions about the type and extent of user involvement in the BIS project.

*Changing the discourse:* Subtle changes in the discourse became evident as the framing process transitioned from Episode 6 into Episode 7. In earlier episodes, the team frequently discussed what Sam Brady expected in the project. After Brady moved to a new position in the company, core team members caught themselves speculating about what he would want in BIS and reminded themselves that Brady was no longer the person who had to be satisfied. Instead, Tony Foley's name replaced Brady's in the team's discussions. Given Foley's insistence on the project having a user sponsor, team members began to talk at length about the need for a user sponsor, the role and responsibilities of the sponsor, and likely candidates.

With Brady's move from sales, I asked core team members whether his idea of making BIS a "front end driver" was still under consideration. Leslie Thomas maintained that it was, though the feasibility of the concept still had to be demonstrated. I noted that as the team focused on taking over the NBR project and integrating its functionality with BIS, their discussions focused almost exclusively on the MSIS-replacement aspects of the BIS project. They did, however, continue to use the business case proposal as their chief reference and in this document, the Phase II / Order Entry concept was described.

**Episode 7: "The Big"
(April, 1994 - June, 1994)**

During Episode 6, team members had addressed both EVP Brady's ideas about the BIS project and inter-project coordination issues related to the NBR project by developing a Phase I / Phase II approach. The project identity had reverted to the earlier MSIS-replacement concept (for Phase I) and the team's negotiations around requirements focused on detailed issues of implementation tasks and resources, as the team struggled with, argued over, yet made little progress on, the work plan. As opposed to the abrupt transition between earlier episodes in the framing process, Episode 6 evolved into Episode 7 as the team made sense of and reacted to changes, most importantly the ongoing reorganizations and the emergence of the NBR automation proposal.
**Figure VI-10: Episode 7 in the framing process of the BIS project**

*Negotiating requirements:* In the previous episode of framing, the BIS team had established a work plan for the project. They relied on earlier specifications for the data model and reports as the IT requirements. During this stage, they did not reassess specific requirements. Instead, negotiations centered around three issues: i) how to integrate the BIS and NBR projects; ii) how to get the required user sponsorship for the BIS project; and iii) how to work in the project context. The first two issues are discussed in detail in Chapter V, Sections A.2 and A.4 and are summarized below. I then discuss issues around the project context in detail.

(i) *Inter-project coordination, i.e., how to integrate the BIS and NBR projects:* Team members reacted to competition from the NBR project by developing alternatives for taking over that project. They drew both on assumptions that the systems flow should be coordinated and expectations that the NBR project, with its tangible benefits of cost
reductions, would add legitimacy to the BIS project. In a series of meetings, team members considered alternative strategies for coordinating these two efforts, eventually agreeing to recommend that the projects be completely integrated. Having arrived at a recommended strategy, they did not detail requirements for business functions or features of the technology. They did, however, spend considerable time debating the technical hardware platform they should use.

• **User's role in ISD**: Having lost Jeff Green as their user project sponsor in the reorganization, the team approached Green's replacement, Sales VP Rick Forrest. Forrest, however, challenged many of their assumptions about the BIS project, i.e., that it would reduce administrative costs, that it could be implemented on the existing Unix computer, and that there was no acceptable packaged software. The team was taken aback by Forrest's reaction to the project and, rather than addressing the issues he brought up, they dismissed his concerns as uninformed or politically based. Thomas decided to look for a different user sponsor for the project.

• **Project context**: Underlying the BIS team's negotiations around their project's relationship to the NBR project and the user sponsor issues was the need for them to make sense of and to plan action within the changed project context. They were "negotiating," in this instance, around all the obstacles now in the project's path. Leslie Thomas, for example, commented on how the organizational changes had affected the BIS project:

> The reason that it's stalled right now, and I think the only reason it's stalled right now, is the organizational changes going on in the company. The champion of this project, not the sponsor but the champion, was Sam ... Along with the organizational changes, there's some budget problems ... You also have a brand new CIO, who, even though he was involved in the project before, now has a different hat on, and you also have a relationship going on with ISI that's vulnerable.

Jane Flynn agreed with Thomas's comments on the effects of the reorganization:

> I think it's because of the reorganization and the players have changed and we're more like educating everybody again ... Nobody is telling us not to do it ... It's just that it has cascaded down. The fact of the reorg has cascaded down to us to a point that, you know, we are caught up in a lot of stuff.

In fact, Thomas still assumed that users were anxiously awaiting delivery of the BIS system, as she commented in a team meeting:
So I don't think there's anybody in the corporation that would not agree that we need this ... Everyone agrees that we need it ... Norm (a sales vp) calls me up on a very frequent basis, asks me where we stand with it and what's going on.

However, Jane commented in an interview that the systems environment had changed during the two years of work on BIS, and, as a result, system constituents' enthusiasm and interest in a new system had waned:

A lot of the reasons why the [existing] system was a problem was because of the all the other systems that fed the MSIS. Those systems are gone ... So MSIS is not that bad ... A lot of things are happening around that have improved the situation. So people are not complaining anymore.

She also acknowledged that fear of job loss took priority over system constituents' interest in new IT applications:

I think that the sales force, which are the users, are in a position now that they are so worried about what they sell ... there's so much going on around them that the last thing they have to worry about is where is the system.

**Clarifying Project Identity:** During this episode, there was no commonly espoused project identity. Team members still expected to replace the MSIS system, but they also wanted to incorporate the NBR project. They spent a considerable amount of time in working sessions, and meetings, discussing the relationship of the BIS and NBR projects and trying to articulate a definition of what should be accomplished, in total, from both projects. The team finally agreed to present a proposal to Tony Foley, CIO, for merging the two projects but delaying implementation of both as a result. Joe Galvin described the outcome of this presentation:

What happened at that meeting was, first quarter of '95 was unacceptable [for implementation]. And then Tony got up and said 'This is where we're really hurting.' And he proceeded to draw out the, the what do you call it, the account renewal system ... And he said, 'If you can help us here, you're going to save a lot of time.' So I've nicknamed this thing the 'son of NBR' ... it is not the NBR and BIS system as we know it.

Tim Schwartz had a slightly different interpretation of what had happened to the BIS project. He instead focused on users' preference for the NBR project:

When I came into it, there were two phases that were going to be approached with BIS, Phase I and Phase II. Phase I didn't even incorporate any of the new business and renewal ... And the feeling was that, 'Let's get the nuts and bolts down now and then we'll move on and worry about really streamlining this process to group enrollment ... What I think happened, though, was that, again, the users saw a much more glaring need for streamlining that process than they did for the whole of the business information system.
Jeff Green, who in his new position had become the user sponsor for the NBR, agreed with Tim's assessment [emphasis added]:

*In my view, the NBR, in terms of a business requirement, has superseded BIS, because it is critical to the business ... BIS, or a piece of BIS, let's put it that way, only touched one segment of the corporation, which was primarily the sales side and the people who needed competitive marketplace information. Where this touches almost every functionality within the company ... And, when you consider the fact that 90% of our business is renewals, 10% is basically new business, the logical progression was, how can we make NBR an integral part, if not the larger part, of the BIS process ... It almost, in a sense seems like BIS is the tail and NBR is the dog.*

Leslie Thomas continued to view BIS as the overarching project, however, and that the team's efforts with NBR merely as a short-term solution [emphasis added]:

*What we're doing for NBR right now is a quick hit, got to get it in by August, and it potentially could be 75% throw-away. What we probably will salvage from it is the database design and the structure and all that. Then I'm seeing BIS coming up and ... the terminology NBR will go away because it will be inherent in BIS. It'll be a redo.*

Thus, in this episode of the framing process, key ISD participants reached no shared understanding or agreement on the project identity.

*Producing and reproducing social structures:* The team had earlier drawn on Sam Brady's organizational authority to legitimize the BIS project, and Leslie, in her position as VP reporting to Brady, had acted with assurance about the project. However, the team had lost its executive champion when Brady changed positions during Episode 6. During this episode of the framing process, Leslie Thomas's department was reassigned, "falling" through several levels of the organizational hierarchy. Thomas and Jane Flynn both lost organizational authority, status, and influence as a result. Thomas not only lost organizational authority and legitimacy to promote the BIS project, she became vulnerable to political attacks from others who might not have challenged her earlier. Since she was a central figure in the BIS project, the project similarly lost status.

Without this authority and status for the project, it became more critical for the BIS team to legitimize the project in other ways. Although Thomas and Flynn maintained that they had strong user demand for the BIS application, Foley and others questioned this. When Rick Forrest challenged Thomas's and Flynn's assertions that the project could be justified through cost savings, he undermined the team's assumption that they could demonstrate the administrative cost savings needed to gain project approval. The team then
tried to benefit from the legitimacy of the NBR project by asserting that the projects needed to be coordinated and integrated and in this way laying claim to the associated cost-savings. CIO Foley challenged this assumption and directed the team to focus on the NBR project while looking for a sponsor for the BIS project.

During previous framing episodes, the lack of routine social practices which embodied the rules and resources for new IS development in the outsourced ISD context had hampered BIS team members' ability to plan and carry out the project. Tony Foley, as chairperson of the MIS Team, had already established project planning, review, and control procedures for various back-end reporting projects. In the reorganization that occurred during Episode 6, Foley was promoted to CIO reporting to a newly appointed VP of Administration. He began to tackle unresolved and open issues of the ISI, Inc. contract such as negotiating and clarifying the ISI staffing level, delimiting what was new development versus support work, and identifying and prioritizing all project work "on the table" with ISI. Through these actions, Foley began to formalize policies and procedures for new development. In this context, BIS was just another project. Foley had became the key person in authority to approve its continuation, and although he had participated earlier in some aspects of the project, he was not the project champion EVP Brady had been. Lacking executive and business management sponsorship and with its cost-justification in question, the BIS project was suspended during this episode.

**Recognizing and responding to change:** Given the situation during Episode 7, it would not have been surprising if the BIS project had ended at that time. Leslie Thomas, pressured by the reorganization at GHI, left the company. Tim Schwartz left for another job. Jane Flynn, while working on the NBR project, was looking for a new job. There were no active supporters nor participants, and the BIS project persisted primarily as an identified initiative in IS planning documents. Instead of ending, however, the BIS project appeared on the new, official list of strategic initiatives to be funded out of the "development pool." In an interview, Tony Foley related this account of how the BIS project had been revived:

I went before the Strategic Technology Committee ...at the end of May and ... I said, 'BIS is a strategic project but I can't find anyone that wants it, so I am recommending you put it on hold.' Well, luckily Sam and Baily [CEO] disagreed. 'No, if this is a strategic project, we will find you a sponsor.' So Karen Jones, the marketing VP, was given the responsibility of being the project manager.

Apparently, Sam Brady, though organizationally removed from the BIS project, was still exerting his influence to keep the project alive, as he explained to me in an interview:
When the company reorganized and the ownership of the project kind of moved around, I think the receiving organization didn't consider it to be a big deal... It was part of this year's spending discussion around how to spend the four million we had set aside for strategic projects, and it came back on the table at that time. That's because it got a different audience. It got the audience of Baily and myself.

In addition, Sales VP Rick Forrest left the company. His replacement decided to provide notebook computers to all of the sales people in his organization, and he contacted Jane Flynn, whom he associated with the earlier notebook project (during Episode 4a) to ask her to organize this effort.

**Changing the discourse:** I observed the BIS project during the first weeks in which the framing process transitioned from Episode 7 into Episode 8. During this time, I noted only one substantive change in the discourse around requirements. Team members began using the term "umbrella project" to suggest that no integrated, large scale initiative should be undertaken. Instead, a series of smaller projects or quick hits to be coordinated under the title BIS. Issues and topics discussed, terminology, stories, and so on, carried over from earlier framing episodes.

**Episode 8: Umbrella for Quick Hits (July, 1994 and beyond)**

**Negotiating requirements:** In the first weeks of this episode, there was no detailed discussion of requirements. Instead, team members communicated their knowledge of the project's history and utilized earlier project artifacts such as the business case proposal to familiarize the newly formed steering committee with earlier work on the project. Jane Flynn and the newly assigned ISI project manager had outlined a number of possible smaller projects that might be undertaken and coordinated under the "umbrella" of the BIS project. However, until the group decided on the project identity, they realized they could not address specific requirements. Interestingly, one assumption about requirements which persisted without questioning was the desirability of implementing IT solutions using client-server hardware and software.

**Clarifying the project identity:** Shortly before leaving GHI, Leslie Thomas learned that the BIS project had been put on the list of strategic projects slated for funding, and a business project sponsor (Marketing VP Karen Jones) assigned. At a team meeting, Thomas cautioned the team:
Figure VI-11: Episode 8 in the framing process of the BIS project

BIS is at ground zero now, as far as selling it ... If we position it right, it will be a no-brainer. We just didn't know our audience. We must be careful how it goes now. This project has had eighty-five lives, and everyone is confused. We have to position and posture it right.

Sam Brady assessed the situation similarly. His description of the varying perspectives on the project's goals, objectives, and intended outcomes illustrates the confusion that had developed about the project identity [emphasis added]:

Some people don't understand what BIS is. They think, unfortunately because some of the early work was related to the notebooks for the sales force, they view it as just the technology to help the sales force do things like prospect and keep track of time and expenses and stuff like that. When, in fact, as I think you know, one of the major benefits is to redo the central data base, the repository ... So, I think a lot of the people who maybe aren't supporting it at all think that what they are not supporting is a notebook-based sales system and, in an overall priority of things, they don't think that's way up there. Of
the people who think it is important, some of them think it is important to 
enhance sales and still haven't focused on the repository, and then a very few 
people have focused on the repository issue. So, I don't think you could get a 
random twenty people in the company who will tell you the same story about 
what it is.

In an interview, Tony Foley commented on his own confusion about the evolving project 
identity:

It was initially, from what history I can gather, it was initially envisioned as a 
replacement for MSIS and then grew into a sales force automation and then it 
grew into consumer based marketing and that was in the short period of time I 
was involved with it.

The new user project sponsor, Marketing VP Karen Jones, formed a steering committee to 
tackle the task of defining the BIS project, and in the first weeks of this framing episode, 
this group began to negotiate a shared interpretation of the project identity to guide further 
action. In the first steering committee meeting, Jones gave the committee this charge 
[emphasis added]:

This has been the project that was going to eat New York. It's been huge. It's 
not clear how to get there, and it's expensive. We're here to decide what is the 
project about. How can we help in both the sales and marketing sides? How 
do we get it going? ... I don't want to sit for the next three, four, five 
months scoping out the big cloud. We need to get tools and solutions out.

Jane Flynn, who was still acting as the GHI project manager / liaison, seconded this 
opinion, stating her assumptions about ISD strategy to the committee:

The project has been too big ... we need to take the project in pieces, get things 
done, show success, prove we can be successful.

CIO Foley's speculation about how the project's goals and objectives might change 
suggests the influence that influential project participants (the user sponsor) could have on 
the project identity [emphasis added]:

[What] could happen is that we might redefine BIS again to be a more narrow 
product, to be simply a replacement for MSIS. If you think about who the 
sponsor is, this sponsor is the person that's in charge of marketing and 
products, not responsible for sales ... So, the product could end up being 
redefined again to say, 'No, we just want a marketing information system and 
let's redefine BIS to take care of those needs.' So, depending on how she 
structures the team on this, could very much change the direction of the project.

As I concluded my field study, the project identity that team members seemed to be 
focusing on was that BIS would be an "umbrella" for implementing a number of quick hits
or small applications, beginning with an effort to supply all sales force members with a notebook computer and providing a basic set of personal productivity tools (word processing software, calender management software, etc.).

**Producing and reproducing social structures:** As part of his efforts to structure the outsourcing relationship between GHI and ISI relative to new systems development and ongoing maintenance support, CIO Foley had directed a planning process to develop a prioritized list of development projects. The list not only identified projects but specified how project priorities had been and should be evaluated and development resources allocated. GHI executives (including EVP Brady) reviewed the project list and turned it over the plan to ISI, Inc. to implement. This formal agreement between GHI, Inc. and ISI, Inc., as well as Foley's active management of the "relationship," suggested that social practices for ISD in the outsourcing context were becoming routine.

These structural change at GHI influenced the BIS project in several ways. First, through the project review process, Sam Brady regained a measure of authority over the BIS project and overrode Foley's action to table it. Second, by including it on the strategic project list, executives signaled ISI management that they sanctioned the project. The strategic planning and prioritizing procedure, by establishing rules for managing resources such as the "development pool" of funds and ISI programming personnel, enabled managers to allocate these resources. ISI assigned a new technical project manager, who in turn contacted Jane Flynn about restarting the BIS project. In Flynn's terms, ISI "finally [was] stepping up to the plate."

**B.2 Framing requirements in the INFOSYS project**

I identified four overlapping episodes of framing in the INFOSYS project in which core team members engaged in negotiations around IT requirements, reassessed project goals and objectives, considered desirable business process changes from IT implementation, and so on. Critical events and change triggers led to changes in the discourse around requirements and a gradual transition into a new episode of framing requirements. The project identity changed incrementally from one episode to the next as team members interpreted changes and assimilated new assumptions into the project identity. Figure VI-12 depicts the chronological flow of the framing process and Table VI-2 briefly summarizes the four episodes. I identified episodes based on the prevailing assumptions
about the project identity and themes in the discourse. A variety of IS development activities occurred in each episode, from requirements interviews to software implementation, however, episodes did not correspond with specific ISD activities. In the following discussion, I describe each episode in detail to illustrate the framing process in the INFOSY project.

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<td>(1) Customer access to data / RBC Pilot</td>
<td>(2) Ad-hoc Account Reporting / RBC Pilot</td>
<td>(3) Provider Analysis Reporting</td>
<td>(4) Information Warehouse</td>
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Figure VI-12: INFOSYS Project Episodes

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23 See Chapter III for an extended discussion of methodology.
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<th>Episode Summary</th>
<th>Major IS Development Activities</th>
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<td><strong>Episode 1: Customer Access to Data (RBC Pilot)</strong>&lt;br&gt;1991 - Q2, 1992</td>
<td>• Informal vendor evaluations&lt;br&gt;• Analysis of data requirements&lt;br&gt;• Mapping of data required to data sources in transactional systems&lt;br&gt;• Program development, coding, and testing.</td>
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<td>The project focused on two related issues: 1) simplifying the process of fulfilling customer requests for non-standard (&quot;ad-hoc&quot;) analytic requests; and 2) giving the largest customer (RBC, Inc.) direct access to claims data. With its &quot;user friendly interface,&quot; INFOSYS was seen as the tool that enabled end-users to access data without programmer assistance. Some managers saw the INFOSYS solution specific to RBC, Inc.; others saw it as a general solution for end-user reporting.</td>
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<td><strong>Episode 2: Ad-hoc Account Reporting</strong>&lt;br&gt;Q2, 1992 - Q4, 1993</td>
<td>• Analysis of data requirements&lt;br&gt;• Mapping of data required to data sources in transactional systems&lt;br&gt;• Program development, coding, and testing&lt;br&gt;• Team and user training classes held.</td>
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<td>The project team continued to focus on simplifying the ad-hoc reporting process by giving end-users direct access to data through a &quot;user friendly interface.&quot; Their assumption was now that account reporting personnel would use INFOSYS for customers. Their focus continued to be on RBC data for the first implementation phase; later, other &quot;key accounts&quot; were identified and implemented.</td>
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<td><strong>Episode 3: Provider Analysis Reporting (PAR)</strong>&lt;br&gt;Q3, 1993 - Q2, 1994</td>
<td>• User interviews to determine reporting requirements&lt;br&gt;• Analysis of data requirements&lt;br&gt;• Mapping of data required to data sources in transactional systems&lt;br&gt;• Program development, coding, and testing&lt;br&gt;• Initial training</td>
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<td>The project team focused on redesigning the data base to accommodate HMO-1 data, in order to support the provider analysis reporting (PAR) effort. The project team continued to assume that the system would be used by end-users to do ad-hoc reporting through the &quot;user friendly interface.&quot; Their assumption was now that, in addition to account reporting personnel, various health care analysts and manager would use INFOSYS.</td>
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<td><strong>Episode 4: Information Warehouse</strong>&lt;br&gt;Q1, 1994 - present</td>
<td>• Planning to identify phases in the project, including which data sources to load and when to install new versions of the software package.&lt;br&gt;• User interviews for the next phase of database expansion&lt;br&gt;• Ongoing, inhouse training sessions&lt;br&gt;• Product demonstrations for customers and marketing personnel</td>
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<td>INFOSYS started to become the &quot;answer to world hunger,&quot; as many groups expected it might be useful:&lt;br&gt;• The idea of putting work stations onsite with customers as again considered;&lt;br&gt;• Account Reporting planned to use the system to generate all standard reports as well as to do ad-hoc reports;&lt;br&gt;• POQA defined a portfolio of PAR reports to be produced through the system.&lt;br&gt;• Other GHI groups indicated they wanted data put in the system for analytic reporting. Team members and managers began to think of INFOSYS as an &quot;information warehouse,&quot; emphasizing the database as well as the user interface.</td>
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Figure VI-13: Episode 1 in the framing process for the INFOSYS project

Recognizing and responding to change: The INFOSYS project originated in the Account Reporting Department of GHI in 1991. This department provided customers with standard reports on health care utilization as well as some customized reports. Supporting the ad-hoc reporting requests of a few large customers was a vexing problem for department members, who hoped to solve the problem by giving customers direct access to their claims data through "user friendly" IT tools. The manager of account reporting learned that INFOSYS, Inc., a leading vendor of health care claims analysis software, planned to release a version of their software for use by health insurance companies. Tim Crane, a long-term team member described what happened [emphasis added]:

I think it was the spring of '91, there was a memo that I saw that was from the head of account reporting ... She was trying to make a case where GHI should consider buying and installing this INFOSYS Decision Support System.
There was an informal investigation of the INFOSYS package but no action was taken until GHI's largest customer, RBC, Inc. became interested in the INFOSYS product and asked GHI to consider purchasing a license, then to sub-license the PC-based version of the software to RBC, Inc.

VP Tom Dole's interest in INFOSYS was another factor in the decision to purchase the software. Dole, who at the time held an executive position in the IS area, considered the strategic advantages that a project such as INFOSYS might offer [emphasis added]:

> When I first came here back in '91, we had just completed some work with the Harris poll people. They do a survey every year and they look at the seventeen major factors that drive corporation's decisions around who to purchase health care from ... One of them was, especially for the self insured customers, was account reporting, access to the information so that they know, on a fairly frequent basis, how well their health care provider is performing on their behalf ... The other data point was that there was nobody in the marketplace that did it well. Nobody. Obviously, an opportunity for somebody to do it well.

Although the majority of my informants cited the RBC story as the origin of and motivation for the INFOSYS project, only Dole mentioned the Harris poll and other information about competitive use of INFOSYS. It is possible that earlier participants in the INFOSYS project, who had left GHI by the time my field study began, shared Dole's knowledge. However, other long-term project participants did not mention this information, instead focusing on the RBC, Inc. story as the project rationale.

**Changing the discourse:** Informants' descriptions of and stories about this period in the project suggest three key themes in the discourse around requirements: 1) RBC, Inc.'s interest in INFOSYS as the rationale for the project (See Table 2 in Appendix C for various versions of the RBC, Inc. story); 2) the perceived need to give customers direct access to claims data to simplify the process of generating ad-hoc reports; and, 3) the importance of a user-friendly interface (i.e., menu-driven, "point-and-click") in such tools. Terminology around client-server technology design did not appear to be important to the team at this time. The technology used in the INFOSYS application (IBM mainframe, DB2 relational database, OS-2 operating system for workstation interface) was familiar to the technical developers, who accepted the INFOSYS technology as specified.

**Clarifying the project identity:** The informal review of software packages available on the market crystallized into a project with a clear identity and objectives. Heather Johnson, the INFOSYS project manager and long-term team member, explained how the transition from vague effort to defined project occurred [emphasis added]:

Chapter VI (267)
So it kind of came down to, well, INFOSYS is the best thing out there at this point. *You know, maybe, they [RBC] really like it. They’ve seen it, and they really like it, and maybe we should look into INFOSYS.* So at that point, a team was put together of people from actuarial, underwriting, account reporting, and IS to sort of look at this and negotiate a contract, and, you know, build a system and an interface to INFOSYS and all that. And I was a part of that effort. *At the point that happened, we were focusing on RBC.*

At this time, then, the project identity was clearly defined around acquiring the INFOSYS package and loading the database with RBC, Inc. data for their direct use. Although all project participants agreed on this *initial* focus, Fred Davis, Manager of the Actuarial IS group and Heather Johnson’s manager, also had broader, longer range assumptions about INFOSYS [emphasis added]:

> We had been talking for years about a data warehouse, an MIS system for, probably going on a decade pretty soon ... I, and the IS people I was working with back at the time saw it as a ... quicker solution to the RBC issue and also a quick way to jump us into having a management information system. Although it wouldn’t satisfy all of our needs, it would satisfy the biggest area of demands, which were claims, cost utilization reporting, enrollment reporting. *So we saw it as, although an expensive way, a fast way to jump start us into a management information situation.*

**Negotiating requirements:** In Chapter V, Sections B.1 and B.3, I discuss how INFOSYS project participants drew on various frames of reference in their actions and interactions in IT requirements definition activities. Here, I summarize key aspects related to this framing episode.

During this episode in the framing process, project participants drew on their assumption that end-users at RBC, Inc. would use the user friendly interface of INFOSYS to analyze their own data, and they focused their attention on the narrowly defined, though interpretatively difficult, task of defining data fields for the INFOSYS database. Core team members' negotiations around requirements were greatly influenced by their understanding and interpretation of the INFOSYS technology as a user friendly data access tool. Because INFOSYS is a software package, it has a pre-designed user interface, analytic reports, algorithms for interpreting data, and technology platform. The core team accepted these facets of the technology, as designed by INFOSYS, Inc. There was apparently little debate or discussion around IS development strategy, how the technology would be used, how business processes might be changed, and so on. Informants' descriptions of this period in the project, and the fact that documents in the project files reflect primarily data-related issues, suggested that negotiations around requirements focused almost exclusively on how to locate and supply data for the INFOSYS database. Even in these activities, the team's negotiations were structured by the INFOSYS technology. For example, the INFOSYS
database was structured to hold only thirty months of data. Although analysts often used longer time frames to do trend analysis, the project team accepted this technical limitation of the package. The team also accepted definitions of "core" data fields as specified in the technology, adding GHI-specific data fields to these standard items.

**Producing and reproducing social structures:** One view of the IS development environment during the timeframe of this episode in the framing process (i.e., 1991) is offered by VP Tom Dole, who had recently joined GHI as an IS executive [emphasis added]:

The development environment here was essentially, was *largely vendor driven.* We had a seven hundred person IS shop, but fundamentally it didn't do much around new development ... *outsourced, if you will, development on a project by project basis to third parties* ... Generally, we didn't go with our own products, and we generally ... *did it on mainframes* ... It was kind of a backwards IS environment, I guess, is the best way to say that. The tool set here was old, antiquated. There were no CASE tools, for example. There was *no development methodology in place* or anything like that. The place was kind of like a big IS utility rather than a development shop.

During this episode in the framing process it is apparent that participants in the INFOSYS project were enacting their established patterns for IS development. For example, the INFOSYS team's informal approach to evaluating and selecting a software vendor was consistent with the lack of a development methodology. Similarly, their decision to look for a package rather than utilize a claims-based IS system under development in-house was consistent with their established practice of using third party packages. Further, project responsibility was located in Fred Davis's area, as per established protocol, as Tim Crane explained:

Fred Davis's area, Actuarial Systems, they're known throughout the company as people who have been dealing for years with back-end reporting, working with claims experience after it's been processed by the various claims systems.

**Recognizing and responding to change:** Two changes occurred which had an influence on negotiations around requirements for the INFOSYS project. The first change concerned RBC, Inc. and led to a shift in the project identity. The second change was GHI executives' decision to outsource IS operations and systems to ISI, Inc. This latter change, had a profound effect on the technical work but little effect on the project identity.

The INFOSYS technology was initially interpreted as a tool for direct data access by customers (specifically, RBC, Inc.) through a PC-based product. In early 1992, RBC, Inc. decided on a different course, as Tim Crane commented:
We found out, gee, RBC doesn't necessarily want a workstation at their home office. RBC kind of turned around and said, 'Now that you've got it installed, GHI, we want you to generate all of the INFOSYS reports here and to provide information to us. We want you to do that.' I think to some degree they had a layoff at RBC so their Benefits Department was smaller now. I don't think they had the resources to actually actively use the system ... So, we said, 'Okay.'

During the next 18 months, the project team assumed that the account reporting analysts at GHI would utilize INFOSYS to provide reports for customers (again, initially for RBC, Inc.), and the idea of putting INFOSYS workstations in customer's offices was set aside.

In early 1992, the decision to outsource IS operations and systems to ISI, Inc. was announced. As a result, the claims processing system that the INFOSYS team planned to use as a data source (NCS) was scrapped, and work to convert numerous claims systems to the ISI claims processing system began. This conversion would take some time to complete, however, and since RBC claims data had already been implemented in the NCS system, the team's work proceeded with little change initially, as Tim Crane explained:

Because of those dates being far off, management decided, 'We want to show, RBC wants to see this installed and functional here. Yes, down the road, a new [ISI] claims system will be needed, but let's keep going.' So, as of April of '92, we had an RBC database built on INFOSYS.

The INFOSYS team later began the IS development tasks necessary to obtain data from the new ISI source systems, requiring considerable analytic work and re-programming of data extraction software, however this change had little influence on the ways in which team members thought about the INFOSYS technology and its uses.

**Changing the discourse:** Informants' descriptions of this period, as well as the documentation available from project files, suggest two key themes in the discourse around requirements during this episode of framing. First, the INFOSYS team had to learn about the new ISI claims system, thus concepts and terminology drawn from this new system became a focus of discussions and negotiations around requirements. Heather Johnson described the difficulties the team experienced in this regard:

I think the biggest stumbling block we had at that point was that the ISI claims system was brand new to everyone in this company. Nobody in this company knew anything about it. ISI had this book called *Basic Values* which tells you what the values in all the fields were, and, you know, we couldn't get copies of that... We struggled for a long time to get knowledge of that system enough to design this product.

This change in the discourse reflected the detail analytic work involved with defining and
understanding the meaning and use of data fields, however, it had only a minor influence on team members' understanding of the technology per se.

The second theme -- suspicion of ISI's motives relative to the INFOSYS project -- became part of the discourse around requirements at this time. This theme was evident, for example, in a team member's interpretation of why the team had difficulty getting information on the new ISI claims processing system:

ISI really was not thrilled about us wanting INFOSYS. They sort of see them as a competitor and every dollar we spend at INFOSYS is a dollar we're not spending at ISI ... So it became kind of a real political nightmare.

Distrust of ISI, Inc.'s motives and suspicion that they wanted to derail the INFOSYS project were also evident in informants' stories about project events. Several informants, for example, described how the INFOSYS software was de-installed during a nondisclosure dispute between ISI, Inc., INFOSYS, Inc., and GHI, Inc. This informant's description of the incident suggests both the ISI-as-sabotuer theme and his personal discomfort caused by the situation [emphasis added]:

And we were within a few months of implementing, and all of a sudden the license agreement ... was going to expire ... So, all of sudden ... somebody said, 'Deinstall INFOSYS because we don't want to outside of the agreement' ... So literally people from ISI, Inc. and the IS department came over and you know, they deinstalled everything from the mainframe, backed it up on tapes, took everything off the PC's, took all the manuals, had us pack up boxes of everything associated with INFOSYS and seal those boxes up. All of a sudden everything we had been working on was just dead! ... We didn't know if it ever was going come back to life again or not. So then the big contention ended up being a nondisclosure agreement between ISI and INFOSYS ... We had no idea what was going on. And finally we got some notification at a certain point in time that, that had all been resolved. And they reinstalled INFOSYS, and we started to go forward from there, again.

**Episode 2: Ad-hoc Account Reporting**
**(Q2, 1992 - Q4, 1994)**

In the transition from Episode 1 to Episode 2 of framing, the project identity shifted incrementally as core team members integrated new assumptions about who would use the technology (account reporting analysts rather than customers) with prior assumptions. Their understanding of the INFOSYS technology as providing user-friendly, ad-hoc access to a relational data base was unchanged, however, and negotiations around requirements

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24This story is a good example of the way GHI, Inc. personnel constructed a narrative interpretation of the project history in the INFOSYS and BIS projects, portraying GHI personnel as heroically overcoming obstacles created by ISI, Inc.
continued to center on the details of defining and loading the INFOSYS database. Key system constituents, on the other hand, did not at this time view themselves as the appropriate users for the technology and remained outside the development process.

Figure VI-14: Episode 2 in the framing process for the INFOSYS project

Clarifying the project identity: During this episode in the framing process, team members' understanding of the project identity changed incrementally in response to the changes noted above. Their expectation that the INFOSYS technology would be used directly by customers like RBC, Inc., shifted to the assumption that INFOSYS would be used by GHI employees, in the same ad-hoc manner they had expected RBC, Inc. would have used INFOSYS. However, team members still understood the project's key objective as providing end-users with access to claims data through "user friendly" tools to simplify the ad-hoc reporting process. Tim Crane's description was typical of this interpretation of the project identity [emphasis added]:

Chapter VI (272)
At this point, prior to INFOSYS ... people had to rely on this AIS system, among others, to get at data. It was very cumbersome. It was very batch-oriented. Not on-line, point, click, select, generate. To some degree, it required programming expertise to get at the information ... It was very labor intensive ... You could not turn around these requests quick enough ... So the idea of INFOSYS was that you'd be able to get a report in a reasonable amount of time, next day, that week, without having to wait, without having to assign significant resources to get a report.

It is interesting to note that Heather Johnson's description of the ad-hoc reporting procedure (quoted in Section B.1. of Chapter V) included customers, marketing personnel, account reporting analysts, and programmers and suggested interpretive problems as well as time delays. Giving customers direct access to data through INFOSYS -- the project's goal in Episode 1 -- could potentially have eliminated three steps in that process. Having GHI analysts use INFOSYS to do these reports eliminated only one step -- the programmers -- and seemed targeted primarily to time delays rather than problems with interpretation of report requests. Apparently, reducing the need for programmers was seen as a significant improvement in the ad-hoc reporting procedure that warranted continuation of the project.

The incremental change in project identity from providing a tool for ad-hoc access to data to RBC, Inc. personnel to providing a tool for in-house analysts to use was consistent with Fred Davis's goal of creating an MIS environment for end-user computing at GHI. Tim Crane commented:

It started out account reporting. That was the focus. Then people said, 'Well, internally, yes. We have to service accounts. We have to provide them with information, of course. But internally, the underwriting function, the actuarial function isn't always focused on an account because analysis has to be done across accounts, across our book of business.' So that was another use. As we got more data out there, more accounts, more types of claims, the use of the INFOSYS system would be greater.

With their modified understanding of the project identity, team members defined a project phase to add additional data for other large accounts and began planning phases to load the "full book of business," that is, data from all product lines and all accounts, after the RBC, Inc. pilot was completed.

Although core team members' assumptions about the project identity changed incrementally, system constituents' understanding of the project identity was relatively unchanged. Two years after team members had changed their assumptions, an account reporting analyst revealed confusion about the project identity [emphasis added]:

Yeah, the original idea, what I heard it was -- I didn't know how much we were going to get involved in the INFOSYS system ... I thought it was going to be
more out to a client ... A few of our bigger clients would actually have a live terminal and be able to use it and access what they want. Then I heard talk about that some reporting people would be using it as a tool, instead of putting it out to the account ... I'm not totally up on everything I'm saying here, too, I just need to get more input on it.

**Negotiating requirements:** Negotiations around requirements during this episode in the framing process proceeded similarly to the preceding episode, i.e., with tacit acceptance of the INFOSYS technology as the structure for requirements and with a focus on data definition and sourcing issues.

With the change in assumptions about the project identity, i.e., from providing a customer tool to building an in-house reporting mechanism, the INFOSYS team might have reconsidered their underlying assumptions about how the technology should be developed, transitioned to use, and applied. Instead, team members apparently assumed that their new targeted user group, the account reporting analysts, would utilize INFOSYS primarily for ad-hoc reporting, as they had assumed RBC, Inc. personnel would. Team members continued to draw on their assumptions about the inherent value of the user friendly interface to enable analysts to access data without programmers and the superiority of the INFOSYS application over an existing reporting system, the Actuarial Information System (AIS). Some account reporting analysts, on the other hand, resisted the idea that INFOSYS was necessarily an improvement over their current data source (AIS system), as these comments illustrate:

> It will be a nightmare. What will I do? Change my reports? These are not simple reports. I do them over days, weeks, months.

> The more I learned about INFOSYS and about the data that was on it, the less I felt comfortable ... because we had a formula that we would [use to] put the claims together and roll them up, you know, with a common denominator ... and apparently INFOSYS's definition is different because the numbers don't come out the same.

Core team members, because they controlled IT requirements definition activities, could proceed on their own assumptions. With a limited role in the IS development project, account reporting analysts could not effectively challenge assumptions nor express concerns during requirements definition, as this analyst complained:

> The culture on use of data, on how technical people and users communicate, is that they are in their own boxes and don't talk ... User involvement is nonexistent ... I have been blocked off from participation in the INFOSYS project. You can't be handed a piece of paper at the end of a year's work and be expected to respond to it.
While lacking influence in requirements definition activities, data analysts could act on their assumptions at the point of use by adopting or rejecting the INFOSYS technology. When the RBC pilot and later the key accounts pilot data bases were made available, account reporting analysts took few steps to learn about or use INFOSYS.

**Producing and reproducing social structures:** The first episode of the framing process for the INFOSYS project was characterized by enactment of routine social practices for IS development. Implementation of the outsourcing agreement with ISI, Inc. disrupted existing practices for IS developments as well as long-standing relationships between IS and business personnel at GHI, as Heather Johnson remarked:

> In the old days with [GHI's internal] IS, there were places where you could go and people you could talk with. At this point, it's like, there really isn't.

The outsourcing contract between GHI and ISI was ambiguous in regard to new IS development issues. Tim Crane commented how these ambiguities influenced the INFOSYS project:

> Our relationship with ISI, our relationship with other vendors that we had contracts with prior to ISI, of which INFOSYS was one, was still being kind of being ironed out.

This "ironing out" process involved the nondisclosure dispute between ISI, GHI, and INFOSYS mentioned above, which led to several months suspension of the project. Ambiguities in the contract also resulted in disputes about the ISI staffing level on the INFOSYS project. An ISI manager explained how he had understood the project:

> INFOSYS was a thought about to materialize at the time of the outsource... It was a pilot for RBC, Inc., not putting 1.2 million subscribers on it ... There was a couple of million dollars gap in the understanding that needed to be worked out before moving with the project ... The language in the contract didn't identify it [the project] specifically.

Fred Davis offered a different interpretation in an interview with me:

> IS negotiated probably about a one-third discount in the normal [license] rates by guaranteeing [INFOSYS, Inc.] that we would pay for whole book of business being up on the database ... If you knew about the license arrangement, you'd have to know it was the plan, to put the whole book of business up there.

This difference in interpretation became a point of formal negotiations between GHI and ISI over responsibility for funding programming costs for the project.
Similarly to the BIS project, ambiguous rules and resources for new development had undesirable consequences in the INFOSYS project. Antagonism and suspicion toward ISI, Inc. permeated team members' interpretations of ISI's actions, as is evident in this comment:

The other thing that they are famous for doing is ...whenever you get to the point where you can put your finger on it and say, 'Wait a minute, you know, you really screwed up this project,' they reorganize. And everybody's roles change. They play musical chairs ... I mean I've probably dealt with fifteen different ISI people. ... who were the project leaders.

During the extended time period of this framing episode, managers from ISI and GHI began to clarify the outsourcing contract, to negotiate the details of how the outsourcing "relationship" would work, and to gain experience working together. In this way, new social practices for ISD began to become routinized. With experience, GHI members of the INFOSYS core team learned how to work more effectively with ISI team members as the project proceeded.

In Chapter V, Section B.1, I described how the INFOSYS project team challenged prevailing practices for interpreting claims data by attempting to substitute the INFOSYS technology for the existing system (AIS). Some account reporting analysts interpreted the IT systems change as a challenge to their assigned responsibilities and areas of expertise. These analysts expected they would have less control over how data was interpreted, because key definitions and metrics were coded in the INFOSYS software, although they could have more control over how reports were formatted. They realized they would also be responsible for generating their own ad-hoc reports using the INFOSYS interface, rather than relying on a programmer to write a procedure. While some account reporting analysts were enthusiastic about having direct access to the data, others resisted the perceived encroachment on their autonomy by not using the system, even as data became available.

**Recognizing and responding to change:** During the two years that the INFOSYS project had been underway, GHI was changing its strategic focus from providing health care insurance to being a "health services provider." A key aspect of this strategy was shifting health insurance products (and subscribers) away from indemnity products to Health Maintenance Organization (HMO) products.\(^{25}\) As the organization moved into the HMO arena, GHI executives became more concerned about how to manage and monitor its service providers (physicians, hospitals, testing laboratories, clinics, etc.) and how to assess not only costs but quality of service and subscriber satisfaction. GHI lacked

\(^{25}\)See Chapter III for an explanation of the GHI organization and product lines.
effective information systems and analytic capabilities to address these issues, particularly for its major new project line (HMO-1), a condition a number of informants described as being "information starved." Therefore, projects aimed at developing or acquiring such reporting systems had strong executive support.

The INFOSYS project team, concentrating on the RBC pilot and building a database of indemnity product claims data for customer reporting applications, did not react to these strategic changes until they encountered the Provider Analysis Reporting (PAR) project. Dr. Jolene Fisher, medical director in charge of Provider, Outcome, and Quality Analysis (POQA), had formed a task force to define GHI's needs for PAR reporting and to evaluate software packages. One package which they considered was INFOSYS. Heather Johnson learned about the task force and their interest in INFOSYS, Inc. through a co-worker. With INFOSYS, Inc., she promoted the idea that this package could be used for provider analysis as well as customer reporting. The task force eventually decided to recommend INFOSYS, citing the fact that INFOSYS was already in-house at GHI, that it was "about as good" as any other vendor package, and that, given the rapidly evolving area of provider and outcomes analysis, it was important to "partner with a vendor" who would keep up with trends.

Changes in the discourse: Until this episode in the framing process, the INFOSYS project team had focused on GHI's indemnity insurance products. Team members, all of whom were long-term GHI employees, were familiar with the kinds of indemnity claims data available from transactional processing systems and had some knowledge of the business processes and terminology around indemnity insurance. They had little knowledge of HMO business processes, terminology, or data. Therefore, they had to work with individuals from the HMO organizations and their IS support groups to learn about and understand the data. Discourse around requirements, particularly the detailed analytical work of data field identification and mapping, reflected the shift from indemnity terminology to HMO terminology.

A second theme which emerged in the discourse involved the debate over client-server approaches and technology strategy, discussed in Chapter V, Section B.2. These issues resulted from political and cultural clashes occurring at GHI between the HMO-2 organization and GHI, competition between the INFOSYS and DSDB project, and individual frame differences.
Episode 3: Provider Analysis Reporting (PAR)  
(Q3, 1993 - Q2, 1994)

Figure VI-15: Episode 3 in the framing process for the INFOSYS project

The framing process transitioned from Episode 2 into Episode 3, as core team became aware of another internal constituency for the INFOSYS technology. Team members responded to the PAR team's endorsement of INFOSYS for their project in several ways: they began to think about INFOSYS as a product for reporting on health services providers in addition to customer reporting; they began to focus on the POQA Department as key system constituents, rather than the Account Reporting Department; and, they altered project plans, deciding to load HMO-1 data onto the INFOSYS database as their next step, rather than continuing to add indemnity data for account reporting use.
Clarifying the project identity: In earlier episodes of the framing process, the INFOSYS core team's understanding of the project centered on improving the process of producing ad-hoc reports for customers on their claims experience. When Jolene Fisher's task force recommended INFOSYS for the PAR project, the INFOSYS project team's interpretation of the project identity changed incrementally to envision a broader base of business uses and system constituents. The team apparently saw little or no conflict between the requirements and priorities of the PAR project and the account reporting users, and they acted on this assumption. For example, the team decided to load HMO-1 data into the INFOSYS database in their next project phase, rather than continuing to add indemnity data for the account reporting group. Heather Johnson explained this decision by noting that the account reporting group had the AIS system to use for indemnity data, and they would eventually want to look at HMO-1 data in any case. Team members' basic interpretation of the project as creating an end-user computing environment through a user-friendly interface to a relational claims data base did not change.

System constituents in the POQA area became active and enthusiastic participants in the project and they interpreted the project as only, or primarily, a PAR project. System constituents in the account reporting area, on the other hand, were unsure who the intended users were and what the primary business applications for the technology would be. They were hesitant to move ahead with using INFOSYS. Their actions reinforced INFOSYS team members' new focus on PAR applications and requirements, as Joyce Harris's comment suggests [emphasis added]:

Initially, my impression was that I saw this as a back end reporting tool to do account reporting type applications. I think now that, that INFOSYS has sort of evolved into that function and, I think, [is] more of a provider analysis type application.

The PAR project team's endorsement of INFOSYS also affected the project identity by lending legitimacy to the project. There were competing warehouse projects underway, and the consultants, hired by GHI executives to recommend which project should get support, had proposed that all projects continue in the short term. According to Fred Davis, Jolene Fisher's support for INFOSYS was critical in establishing INFOSYS as the preferred solution for PAR reporting, which in turn solidified the future of the project:

We would have still been arguing about the merits of open systems versus mainframe, not tying ourselves to a vendor ... The decision [that] it was the best solution for the provider analysis reporting needs ... solidified it as something that had to be around here at least for the near future until we come up with a better solution.
Thus, the project took on a kind of dual-identity for the core team members, with the PAR requirements assuming priority in the current IS development phase.

**Negotiating requirements:** As in the preceding episode in the framing process, the INFOSYS team did not re-examine their assumptions about how the INFOSYS technology would be implemented and used in light of the PAR project requirements, although they did conduct a number of interviews with over twenty potential system constituents, including medical directors, health care analysts, provider relations managers, as well as several account reporting analysts. It is unclear to me what influence these interviews had on negotiations around requirements. Several team members commented that they learned a lot about the HMO side of the business, therefore they increased their general knowledge of the business and business processes. However, the team's goal relative to user interviews was to "extract" data requirements from interviewees' comments about "requirements." As in the earlier framing episodes, negotiations around requirements therefore centered on identifying data elements and locating sources for data in transaction processing systems, and the resulting requirements artifact was a list of data elements to be added to the database.\(^{26}\) Other features of the technology -- the hardware / software platform, the interface, the standard reports, the analytic metrics, and so on, were already "decided" by the INFOSYS package. Also consistent with earlier episodes, the project team did not re-examine its assumptions about how the technology would be used (i.e., primarily as an ad-hoc reporting mechanism) or how it would be transitioned into use, beyond the need to train users in the mechanics of using the system interface.

**Producing and reproducing social structures:** During this episode in the framing process, Tony Foley became chairperson of the MIS Team, a group of IS and business managers responsible for coordinating several "back end reporting" projects such as INFOSYS. The MIS team began to create new social practices and systems for planning and control of IS development resources. For example, Foley required Heather Johnson (as well as other project managers) to develop budget requests, define system benefits, develop plans for future project phases, and so on. A budget for the INFOSYS project was approved, a full-time project manager from ISI, Inc. was assigned, and issues over ISI staffing support were addressed. As these issues were resolved, working relationships between GHI and ISI team members, which had been characterized by suspicion and distrust, began to improve.

\(^{26}\)See Chapter V, Sections B.3(i) and B.4(ii) for discussion of negotiations centered on data requirements.
Although many IS development practices and patterns had been disrupted by the IS outsourcing arrangement, patterns around limited user involvement apparently had not changed. The INFOSYS team enacted traditional roles with technical developers and liaison personnel in charge of planning and carrying out IS development and requirements definition activities. Some system constituents believed they had had little effective involvement in IS development or influence on decisions, although they had had nominal participation through activities such as interviews. During this episode, however, members of the POQA department challenged these traditional roles by actively participating in interviews, attending team meetings, etc. Team members welcomed this participation to a limited degree, but when system constituents began to act independently of the core team, several team members viewed such actions as attempts to usurp control of the project and took action to reassert their own authority (see Chapter V, Section B.4(i)).

**Recognizing and responding to change:** During the time that Episode 3 occurred, there were many changes underway at GHI which influenced how team members and others at GHI understood the INFOSYS project:

- **Changes in the business environment:** Changes in the US market for health care and health care insurance had been going on for some time. Key stakeholders -- insurance providers, health services providers, employers -- were interested in analytical reporting related to health care delivery and health insurance cost. A number of large employers had organized a multi-insurance company project as a pilot to produce standard reports on HMOs, to facilitate the employers' ability to compare and select the best provider. GHI participated in this project during Episodes 3 and 4 of the framing process. Executives and managers at GHI were anxious to demonstrate their reporting capabilities and looked to the INFOSYS technology to satisfy similar requirements in the future.

- **Changes in business processes:** GHI decided to change its method of contracting with providers in its HMO-1 product line to promote "risk sharing." To implement such a change, GHI would have to give reports to providers on their "performance" on a regular basis. This PAR requirement took on added urgency and legitimacy.

- **Management changes:** The same reorganization that disrupted the BIS project brought both supporters and critics to the INFOSYS project. Tom Dole, who had played a key role in the initial acquisition of INFOSYS, again became interested in the system. In his new position, he revived the idea of using the PC workstation version of the package on-site with large customers and began to "market" the product to customers by scheduling demonstrations. On the other hand, Tony Foley, recently promoted to Chief Information Officer, was an advocate of open systems solutions and the DSDB project.
• **Project outcomes:** The DSDB had been used in a multi-company HMO reporting project. This project, and a high volume of ad-hoc reporting queries, "brought the DSDB system to its knees" (in IT vernacular). This outcome for the DSDB system strengthened the argument that a mainframe solution was required to handle the high volume database, lending legitimacy to the INFOSYS application.

• **Technology change:** INFOSYS, Inc. had earlier announced a new version of their software package which would allow licensees to customize the package to a greater extent. In the new release, INFOSYS users would be able to develop their own DB2 tables and reference them through the GUI interface, apparently integrating them with standard INFOSYS tables. Core team members thought such a feature would allow them to add a variety of data to the INFOSYS database (e.g., drug claim / pharmacy data), and in this way expand the utility of the system and the scope of the project.

The cumulative effect of these changes was that the demand for reporting such as the INFOSYS technology could provide was very high and, according to Heather Johnson, executives and managers throughout GHI were beginning to look at INFOSYS as "the solution to world hunger."

**Changes in the discourse:** A new metaphor for INFOSYS became part of the discourse around requirements. In earlier episodes, when the team focused on problems in the ad-hoc reporting process and the user-friendly GUI interface as the solution, they described the technology as a *tool* "facilitate end-user access to data. When the team began to focus on expanding the database to full book of business and non-claims data, to be accessed both interactively and through batch reports for a variety of business applications, they began to use the metaphor, *information warehouse* or *data warehouse*. Competition between the INFOSYS and DSDB project teams may have contributed to the use of the warehouse metaphor, because the DSDB system had been described using this term. The warehouse metaphor was not inconsistent with the end-user tool metaphor but it emphasized the expanded project identity of creating a comprehensive data source for multiple uses and users and it focused attention on building and expanding the database rather than on supporting system constituents' use of the tool.

**Episode 4: Information Warehouse**  
(Q1, 1994 - present)

During the period of time I was on-site studying the INFOSYS project and interviewing ISD participants, the project appeared to be transitioning into a new episode in the framing
process, one in which team members began to view the INFOSYS application as the solution to a number of reporting and analytical "needs." This episode overlapped the preceding episode and represented an evolution and expansion of the project identity, rather than a radical departure from past episodes.

Figure VI-16: Episode 4 in the framing process for the INFOSYS project

**Clarifying the project identity:** In the three years that the INFOSYS project had been underway, the project team had maintained core assumptions about the INFOSYS technology and the goals of the IS development project. These assumptions are evident in this comment by Fred Davis, who had been with the project since its inception:

I think the perception is still what it was originally, and that was to be a way to access information so that the end users don't have to depend on the programmers to get at most of their data and the system would also provide additional [analytical] functionality.
System constituents, whose knowledge of the project history was sketchy, shared the core assumption that the INFOSYS was about improving end-user access to data, as these comments from several system constituents illustrate [emphasis added]

I think the difference would be, you know, we wouldn't have to wait for limited resources of the programmers to get the data we need, and I think we would be able to do a little bit more ... detailed type of reporting.

Ultimately I don't know why INFOSYS was brought up. As far as I can see... they were looking to get something that was more menu-driven and could really support the goal of being able to provide quick ad-hoc type information.

I think a lot of people are looking at INFOSYS as a way to open up access to the data system.

During this framing episode, the project identity began to expand rapidly beyond the assumptions and expectations characteristic of earlier episodes. Core team members' assumptions about who the "end users" were had changed and expanded, from initial assumptions that customers (primarily in RBC, Inc.) would be the users, to account reporting analysts, then health care analysts, and finally, virtually any data analyst or manager in any business function interested in claims experience data. Core team members also began to shift their focus from the user-friendly interface to the value of the relational database they had created, and therefore from INFOSYS as a data access tool to INFOSYS as a data or information warehouse which would be used by a broad range of users, as these comments from various core team members suggest [emphasis added]

I would like to see it become the center of some sort of information warehouse, some sort of data warehouse, that everyone comes to for claims data. ... I looked at INFOSYS as, here's a solution where we're going to have, ideally all the claims data, enrollment data in the company centralized in one source. 

You're going to take and see a single repository of information that will be used to meet reporting needs.

INFOSYS will be a viable corporate reporting tool to various business units of the company, that will transcend other reporting systems in terms of its utility ... You have a system that if utilized properly and well, can spread itself across the enterprise and be used across the enterprise by various business users.

With high demand for analytical reporting capabilities and the assumption that INFOSYS was capable of supporting much of this demand, the core team became concerned that the project identity might expand beyond reasonable boundaries, as Fred Davis remarked:

I think people probably had some misunderstandings and probably some people still do about some limitations that it has, in other words, that it doesn't solve everybody's' every single reporting need, and that's something to work on.
Negotiating requirements: In the preceding episodes of the framing process, the INFOSYS core team had consistently drawn on assumptions around the project identity, the purpose and utility of the INFOSYS technology (i.e., an end-user data access tool with added analytical algorithms) and its likely method of use (primarily as an ad-hoc query tool.) Negotiations around requirements had therefore focused almost exclusively around definition and sourcing of data fields to be loaded and maintained on the database. As noted above and discussed in Chapter V, Section B.3, during this episode in the framing process, the project team began to examine, reconsider, and in some cases, change assumptions they had earlier taken for granted. In the following discussion, I summarize the kinds of negotiations around requirements that were underway in key areas as my field study ended.

• Essence of the ISD initiative: Although INFOSYS team members were encouraged that many areas of the company wanted to utilize INFOSYS for a variety of applications, the high level of demand brought with it the problem of prioritizing development phases. The project team had mapped out a series of incremental development steps which would lead eventually to loading the full "book of business" onto the database and upgrading to the newest version of the INFOSYS package. Team members were concerned, however, that their approach to phasing implementation according to data availability might be subverted if influential system constituents demanded higher priority for implementation of particular features or data sources. Core team members continued to view their primary responsibility as continuing to develop and load new data, rather than working to ensure integration and use of the installed portions of the system. They approached transition of the system into use primarily as a training task, and they provided half-day training sessions on using the INFOSYS interface. System constituents found this training inadequate and limiting to their use of the system.

• Essence of the IT application -- The team came to understand that key user groups (account reporting and PAR users) needed to produce large volume, standard reports, and that it was not feasible for an analyst to sit at a workstation, producing such reports interactively, even if the computer system could process the report queries efficiently (which technical developers doubted). Team members and PAR users had also realized that the analytic metrics available through the interface reports could not be easily duplicated in batch reporting. As they worked through these issues, team members' understanding of the INFOSYS technology was clarified and became more aligned with system constituents'.

• Essence of the organizational environment: The team had viewed INFOSYS as a kind of
stand-alone, ad-hoc query tool. This assumption apparently carried over from the first framing episode, in which the team expected the INFOSYS application to be used by their customers rather than by GHI personnel. As a result, they gave little consideration to how this tool would relate to the existing account reporting environment, in which analysts used existing systems to produce standard reports as well as ad-hoc reports. Team members did not appear to have recognized and addressed system constituents' concerns related to data legitimacy and possible inconsistencies with existing data sources.27

**Producing and reproducing social structures:** Throughout this and earlier episodes in the framing process, GHI and ISI managers had been working to explicate the outsourcing agreement and to define how IS development would be conducted in this context. For example, Tony Foley initiated a project planning and prioritizing process to identify all development activity underway in the corporation and to decide which efforts ISI would support. Through these kinds of actions, social practices and patterns for IS development were becoming routinized. This facilitated cooperative work between GHI and ISI team members and benefited the INFOSYS project.

On the other hand, ownership of the INFOSYS project, that is, managerial control of the project from the business areas, appeared to be a potential source of problems. As noted earlier, personnel in Fred Davis's department had been conducting the development project as part of their long-established responsibility and authority for "back end reporting" from claims data. There had already been some tension over project control between these individuals and members of the POQA department. In this episode of the framing process, VP Tom Dole had also begun to exert a claim on the INFOSYS application, for example, scheduling demonstrations of the on-site PC version of the software with key customers. Given this level of interest in INFOSYS from various constituencies, Heather Johnson became concerned about how project priorities would be determined and enforced.

**C. Comparing the Framing of IT Requirements in the INFOSYS and BIS projects**

As I analyzed the INFOSYS and BIS projects, I was intrigued by the differences in ISD outcomes of these two projects. The BIS project had an enthusiastic executive sponsor who appeared to have sufficient organizational authority to facilitate funding of the IS development work as well as to champion the technology's adoption in the sales divisions.

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27 See Chapter V, Section B.2 for further discussion of these negotiations and related issues.
The project team was experienced with IS development and committed to the effort. Substantial resources had been committed to requirements analysis studies and skilled consultants employed in these efforts. However, in nearly 30 months of ISD activities, and with the exception of the quick hit notebook pilot, the project never proceeded beyond requirements definition activities into development and implementation. It seemed to suffer from what I began to think of as a "failure to thrive" syndrome -- not quite dying but not gaining and progressing.

The INFOSYS project team, on the other hand, experienced changes in the technical landscape of systems with the ISI outsourcing that required complete technical redesign and reprogramming. Disputes between ISI, Inc., GHI, Inc., and INFOSYS, Inc., further delayed the project, and at one time the software was taken off the computer and "boxed up" and the project appeared to some team members to be "dead." New, competing systems cropped up, with support from stakeholders who were gaining authority in the organization. Despite these obstacles, the project persisted for nearly three years until the first pilot phase was implemented, and, in the next eight months, began to thrive as many business managers in GHI became interested in the INFOSYS application.

One might argue that such differences in ISD outcomes were merely a matter of luck, or of circumstance. However, the circumstances in which these two projects were undertaken were quite similar, for example:

- The projects took place at GHI during approximately the same time period (1992 through 1994), and both project teams experienced the same major change events occurring in their company (e.g., ISI outsourcing decision, GHI reorganizations, strategy re-alignment).
- GHI team members described similar problems working with ISI, Inc. on new IS development projects following the outsourcing.
- The IT applications were similar, that is, both concerned building a relational database to "warehouse" large quantities of data, providing a user-friendly graphical user interface (GUI) for end-user, ad-hoc queries, and providing standard reporting from the data.
- Patterns for core team and system constituent involvement in IS development activities were similar. A core team, composed of business area staff managers and analysts with IS development experience, led development activities as liaisons between business users and technical IS staff. Technical developers from the IS group (primarily ISI, Inc.) served as technical consultants and implementors. System constituents were involved primarily through interviews, document
reviews, and presentations. As I discussed in Chapter IV, core team members from both projects had similar technological frames, as did system constituents.

- Both projects had a long history of interruptions which slowed progress through IS development stages; both project teams had to coordinate their efforts with other major projects or initiatives at GHI that overlapped or competed for funding; both projects were dependent on progress in other IS development projects.

There were, of course, contextual differences between the BIS and INFOSYS projects, and these will have contributed to the differences in ISD outcomes. For example, key members of the BIS team were relatively new to GHI, Inc., whereas key INFOSYS team members were long-term employees and therefore may have been more experienced and effective working in the turbulent, politicized organizational context. The reorganizations at GHI, Inc., particularly Sam Brady's reassignment, had a direct impact on the BIS project. The INFOSYS project gained, rather than lost, executive endorsement through this reorganization. Such contextual differences do suggest possible explanations for some of the observed differences in ISD outcomes. However, analyzing the social cognitive process of framing requirements in each of these projects, as I have done in sections B.1 and B.2, provides a theoretical framework in which to consider contextual differences. In addition, assessing the similarities and differences in the framing processes of these projects provides additional insights into ISD outcomes in each project and suggests circumstances that may contribute to the differences in ISD outcomes.

Table VI-3 summarizes similarities and differences in the framing processes in the BIS and INFOSYS projects. Similarities in the processes are notable. For example, core team members had similar technological frames both within and across the projects. In both processes, the project identity shifted in response to negotiations around inter-project coordination. Both project teams encountered similar difficulties and issues between GHI and ISI.

The framing process in the INFOSYS project, however, differed from that in the BIS project in several ways: i) The influence of the BIS project champion's (EVP Brady) ideas on the discourse around requirements was strong, and his interventions in the project served as change triggers which precipitated several episodes in the framing process; ii) the INFOSYS project involved implementing a packaged software system, and core team members' actions were structured by their interpretation and appropriation of the package; iii) the project identity of the INFOSYS project was largely stable in light of changes in the organizational context, whereas the project identity of the BIS project shifted radically.
<table>
<thead>
<tr>
<th><strong>Negotiating Requirements</strong></th>
<th><strong>Clarifying Project Identity</strong></th>
<th><strong>Recognizing and Responding to Change</strong></th>
<th><strong>Changing the Discourse</strong></th>
<th><strong>Producing and reproducing social structure</strong></th>
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<tr>
<td><strong>Similarities:</strong></td>
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<td>• Members of both core teams had similar frames.</td>
<td>• Core ideas persisted across episodes (e.g., providing tools for end-user ad-hoc reporting: replacing MSIS system).</td>
<td>• Project context was similar for both projects, i.e., ISI outsourcing and relationship issues, reorganizations at GHI, organizational culture, etc. Several key individuals had influential roles in both projects.</td>
<td>• Through inter-project coordination, new participants became part of the core team; the discourse changed as their concepts, ideas, assumptions came under consideration.</td>
<td>• Both project teams experienced problems working in the ambiguous ISD environment resulting from the ISI outsourcing decision.</td>
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<td>• Frame incongruence between core team and system constituents were similar in both projects.</td>
<td>• Core team members frames were dominant during negotiations, as they controlled and conducted requirements definition activities.</td>
<td>• Both BIS and INFOSYS projects had to coordinate efforts with other initiatives, resulting in changes to project identity and new episodes in the framing process.</td>
<td>• Suspicion of ISI motives and intentions was part of the discourse in both projects.</td>
<td>• Liaison personnel lead both project teams.</td>
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<td>• Core team members frames were dominant during negotiations, as they controlled and conducted requirements definition activities.</td>
<td></td>
<td>• The executive sponsor intervened directly in BIS project several times. There was no one executive who played such a prominent role in the INFOSYS project.</td>
<td>• EVP Brady’s ideas had a strong shaping influence on the discourse around requirements for BIS project. There was no such single influence in the INFOSYS project.</td>
<td>• The extent and type of user involvement were similar; core teams expected to maintain control over IS development activities.</td>
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<td><strong>Differences:</strong></td>
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<td>• Negotiations around requirements were structured around the INFOSYS package structure. There was no clear definition of the application or technology in the BIS project.</td>
<td>• The project identity for INFOSYS project was relatively stable, as changes were incrementally integrated. Shifts in the BIS project identity between episodes were extreme.</td>
<td>• Though two goals reappeared (MSIS replacement, tools for sales reps), the BIS project identity tended to change abruptly.</td>
<td>• EVP Brady’s ideas had a strong shaping influence on the discourse around requirements for BIS project. There was no such single influence in the INFOSYS project.</td>
<td>• BIS project was for the sales area (lower status, authority at GHI); INFOSYS project was conducted from the accounting and actuarial areas (more powerful and influential in GHI).</td>
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<tr>
<td></td>
<td>• Though two goals reappeared (MSIS replacement, tools for sales reps), the BIS project identity tended to change abruptly.</td>
<td>• Both BIS and INFOSYS projects had to coordinate efforts with other initiatives, resulting in changes to project identity and new episodes in the framing process.</td>
<td>• EVP Brady’s ideas had a strong shaping influence on the discourse around requirements for BIS project. There was no such single influence in the INFOSYS project.</td>
<td>• INFOSYS became part of the MIS team budget and thus part of its resource control practice; the BIS core team relied on the authority of the executive sponsor for funding approval.</td>
</tr>
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</table>

Table VI-3: Comparison of the Framing Process for BIS and INFOSYS Projects
during several framing episodes; and, iv) routinization of new social practices for ISD under outsourcing benefited the INFOSYS project by facilitating the project team's access to development resources and enabling cooperative work between GHI and ISI on the project. Each of these aspects is discussed below:

i) Influence of the executive sponsor: Popular wisdom in the IS profession is that an executive champion who articulates a vision for IT use can be vitally important to a project's success, particularly if radical change in business processes through IT implementation are desired. Executive VP Sam Brady fulfilled such a role in the BIS project. He spread his ideas about Sales Force Automation and creating a marketing repository to enable consumer-based marketing through colorful stories, metaphors, scenarios-of-use, and so on. As the executive vice president for sales, he had the organizational authority in the business area to facilitate business process changes that would have to accompany IT implementation.

In terms of the framing process, Brady's frames around using IT in sales activities carried substantial weight in core team member's negotiations around requirements, and through his influence on core team members' interpretations and through his interventions in the BIS project, Brady precipitated several framing episodes. Brady was successful at communicating his ideas to the BIS project team, and when he intervened to redirect the project team, they responded to his authority. In one informant's words, he "floated balloons" which team members accepted with few questions, although they tended to interpret his ideas for radical change in terms of incremental improvements. They did, however, espouse his ideas, and some of their actions around IT requirements definition reflected Brady's notions (e.g., the notebook computer pilot program).

I had no opportunity to observe Brady at work with the members of the business organization, and therefore cannot speak about the influence Brady's ideas had with them. In an interview I held with Brady after the GHI reorganization, however, he commented that he had less success inspiring GHI executives or senior sales managers with his visions for business process change enabled by IT use. He characterized his efforts to do so as "trying to push a marble up a mountain with your nose," and commented that there had been only intellectual agreement on the need for the project, but no "visceral attachment" to it. He attributed this to the company's culture, which he perceived as focused on "harvesting" the existing customer base rather than on increasing revenue through aggressive sales strategies. Thus, Brady's expectations and assumptions about use of IT in sales were apparently not widely shared by other executives and senior sales managers. Team members, apparently in the belief that Brady's ideas were representative of others in
sales or that his views would prevail given his position of authority in that organization, resisted working closely with a user project sponsor. Brady, on the other hand, recognized the need to have a line manager in sales act as user project sponsor to endorse and promote the BIS project and in this way to influence the thinking of other sales managers about the project. Team members instead focused on Brady's ideas, identifying requirements and planning actions which they though would satisfy him. Thus the frames which core team members drew on in their negotiations around requirements, while similar to Brady's, were not congruent with system constituents. When Brady changed jobs within GHI, Inc., the BIS project had limited support from or appeal to other sales managers and executives.

In the INFOSYS project, there was no one executive who played such an influential role in their negotiations around requirements. In addition, several core team members were long-term GHI employees with work experience in one of the user areas (account reporting), and their assumptions and expectations about the need for and interest in the INFOSYS technology were similar to those of the system constituents. While there was some incongruence in frames around how the IT application would be used and how it related to the existing reporting environment, there was a high degree of congruence in core team members' and system constituents' interpretation about the project identity. That is, both groups anticipated incremental improvements in business processes and personal productivity from use of the user-friendly interface to an improved claims data warehouse. While this project did not undergo the kinds of radical shifts in project identity that Brady's interventions precipitated in the BIS project, neither did the project team consider the more radical and substantive business process changes that might have been realized through use of the technology.

ii) Installing packages versus building software: A notable feature of the framing process in the INFOSYS project was the degree to which core team members structured their negotiations around the framework provided by the INFOSYS technology. One team member compared this with decorating a house rather than building one -- the superstructure is provided and requires only customization. This had several consequences for the framing process. Team members' negotiations around requirements focused on the narrow, though analytically difficult, task of identifying and sourcing data for the database. Questions about the interface design, definition of analytic metrics, design of reports, and even the hardware and software platform were answered by the INFOSYS technology. Not only did this reduce the analytic work required to deliver such an application system, it deferred potential conflicts about definition of analytic metrics and interpretation of data, and in this way, facilitated requirements definition activities, though not system adoption
and use. Perhaps most importantly, the INFOSYS software was itself a visible, tangible artifact with which core team members could experiment and learn. Their interactions with the GUI-interface in their analysis, testing, training sessions, and so on, may have reinforced their interpretations of the technology as an user-friendly end-user access tool. And, by demonstrating the system to system constituents, they could communicate its features and suggest its potential uses and usefulness in a more compelling and effective manner than through paper documents and narrative descriptions of requirements.

A similar phenomenon occurred in the notebook computer pilot in the BIS project. In this instance, the team selected a software package, made minor changes to it, and distributed it, along with the notebook computers, to a selected group of sales personnel. Completing this project was relatively easy for the team, and they expressed personal satisfaction with the results they had achieved. The computers and packaged software were tangible artifacts that system constituents could see and speculate about, and, through experimentation and use, actually determine the utility. Although the BIS team talked at length about finding a package to satisfy the MSIS-replacement requirements of the BIS project, they did not find a package they considered satisfactory, and, beyond the pilot, the BIS application remained a nebulous "cloud" of potential features, functions and business applications.

**iii) Stability versus instability in the project identity:** In the INFOSYS project, the framing process was characterized by incremental change and adjustment in the project identity as new assumptions and expectations were absorbed into the espoused project identity. Framing episodes overlapped, as one episode transitioned gradually into the next and with core assumptions about the project identity carrying over into new episodes. Although changes in the project context had dramatic effects on the nature and course of IS development activities (e.g., occasioning database redesigns or technical re-work), these changes did not greatly influence the espoused project identity. Both core team members and the system constituents continued to interpret the INFOSYS project as providing a new and improved source of claims data with a user friendly interface to facilitate end-user access to the data. Within this general project identity, team members integrated new assumptions about business applications for the technology (account reporting, then provider analysis reporting, then open-ended use) and system constituent groups (customers, account reporting analysts, health care analysts, then virtually anyone). In the first three framing episodes, negotiations around requirements were therefore focused on relatively narrow issues such as the database content and design.
With this stability in the espoused project identity, the INFOSYS project team withstood high levels of organizational turbulence and change at GHI and persisted in their development work despite what the project manager termed "mishaps" and "fits and starts" in the project. However, the rigidity in the team's interpretation of the project identity as supplying a tool for ad-hoc, end-user data access, may have blindsided the team to important, new requirements resulting from incremental shifts in their assumptions. For example, in the transition from Episode 1 to Episode 2, team members assumed that account reporting analysts would use INFOSYS in essentially the same way they had expected RBC, Inc. to use it -- as an ad-hoc query tool. They did not take into account other account reporting activities, such as the standard package of reports produced through batch processes. They also gave little consideration to data legitimacy issues that might arise from conflicting results from the existing AIS reports and the INFOSYS reports. Team members similarly focused on ad-hoc use of the technology for the PAR reports, paying little attention to the need to produce large volumes of these reports through batch processes. Eventually, the team's interpretation of INFOSYS changed as they acknowledged the need to access the database in different ways. However, this did not happen until critical deadlines were at risk.

The framing process in the BIS project, on the other hand, was characterized by abrupt transitions between framing episodes in which the project identity changed substantially. When a new episode began, core team members re-examined many of their assumptions and expectations about the application design and the potential to change business processes by drawing on new metaphors, stories, and scenarios. They undertook new requirements studies or months of team meetings, delaying the project and adding to their own and system constituents' confusion and disillusionment over lack of progress. Although the project identity changed dramatically to accommodate Brady's ideas in the transitions between episodes, earlier interpretations of the project identity re-emerged as core team members interpreted Brady's "visions." With little stability in the project identity, the team could not maintain their own understanding of what they were to do, much less communicate an understanding of the project identity to system constituents. Constituents' interest in the project dwindled and, when the project lost its executive sponsor, there was little support for continuing the project.

iv) *Enabling aspects of organizational structures:* Although the BIS and INFOSYS projects took place in the same organization at approximately the same time, differences in structuration processes were evident in the framing process for these projects. One difference related to institutionalized patterns of access to and control over IT resources.
The INFOSYS project was conducted by personnel in the Actuarial, Underwriting, and Accounting (AUA) department. The BIS project was conducted in the Sales and Marketing areas. Unlike many organizations, sales was a relatively weak and unempowered function at GHI. AUA was a strong area, particularly in regard to control of IT resources, as this informant, who had worked in both areas, observed:

Underwriting and Actuarial almost dictate what's going to happen with any system in the company ... it's the nature of this company ... I think the data has always been controlled by actuarial and actuarial systems.

The INFOSYS project may have benefited from AUA's institutionalized access to and control over IS resources during the period of uncertainty and confusion following the outsourcing of IS development to ISI, Inc. by having more secure access to funds and development personnel. The BIS team, on the other hand, may have suffered from established patterns of not funding IT programs in the sales organization.

In addition, the re-establishment of routine social practices for ISD in the outsourced IS context had a different influence in the framing process in the INFOSYS project than in the BIS framing process. While ISI personnel focused on converting transaction processing systems, there was little support for new development projects such as BIS and INFOSYS. In spite of this, business liaison staff members had begun several projects to develop management reporting systems. The MIS team was established to coordinate these "back end reporting" initiatives. Both the BIS (as MSIS-replacement) and INFOSYS systems were considered to be "back end systems," and both related to another corporate reporting project (the CIS project) managed by the MIS Team. The INFOSYS project budget was integrated into the MIS team's budget months before the company-wide planning process was established. This group developed and implemented project planning and budgeting procedures to secure funds for INFOSYS and other projects under their supervisions, thus gaining access to ISI resources for the projects. For example, through the formal channels of authority established by the MIS team, the INFOSYS project team secured funding approval for its next steps and resolved issues such as the need for a full time ISI project manager. This occurred in spite of the fact that two of the three members of the MIS team were DSDB supporters rather than INFOSYS supporters. Overseeing the BIS project was not included in the MIS team's responsibility, however, under the assumption that its approval was a "no brainer" and that the project should not be delayed by a review and planning process. During the first five framing episodes in the BIS project, ambiguity in the "relationship" between GHI and ISI impeded resolution of problems related to ISI's support and authorization of funding for the project. The BIS project team continued to rely on Brady's executive authority, exercised through informal
channels, to gain access to development funds and ISI resources. When Brady changed positions in the reorganization that occurred during Episode 6 of the framing process, the team's informal channel to resources evaporated and the project was temporarily put on hold. Later, GHI executives authorized the project's inclusion on a list of strategic projects, as part of a formal project identification, prioritization and review process. This was a signal to ISI to support the project which enabled team members to restart the project.

D. Chapter Summary

In this chapter, I developed a social cognitive process model for framing IT requirements based on the theoretical foundations of social cognitive theory and structuration theory discussed in Chapter II and the research findings presented in Chapters IV and V. This model describes the framing process in terms of episodes in which ISD participants draw on their technical frames to negotiate requirements. Episodes are characterized by distinct themes in the discourse around requirements and by the existing or emerging project identity. I presented the model in general terms then illustrated the framing process through multiple episodes in the BIS and INFOSYS projects. I assessed similarities and differences in the framing processes of the projects to gain insight into differences in ISD outcomes. I do not intend to suggest by this discussion that either project was a success or a failure. Although the INFOSYS project was viewed very positively at the time my field study ended, I had personal doubts about its long-term success. System constituents in key areas were hesitant to use the system, and the project team, focusing on expanding the database rather than supporting users, seemed unaware of system constituents' doubts about the data and their desire for support. The team was unsure what to develop as the next phase, as various areas exerted pressure for their requirements to be addressed. On the other hand, the BIS project had been revived with the assignment of a new business sponsor and with support from ISI, Inc. It is possible that, after my field study ended, this project would begin to thrive and to be successful at implementing valuable IT solutions for sales and marketing personnel.

In the next chapter, I conclude the analysis of findings and implications of the framing model, assess the contributions to existing research, and discuss limitations of the research and interesting areas for further study.

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28 I have made no attempt to measure project or system "success." Traditional measures in the IS literature relate to system use or user satisfaction. Since these projects were in the development and implementation stages of ISD, it was not feasible to assess these.
Chapter VII
Discussion and Conclusions

In this research project, I examined IT requirements definition through the theoretical lens of social cognitive theory and structuration theory. Drawing on the concept of technological frames of reference developed by Orlikowski and Gash (1994), I outlined four areas of research interest and investigated them in a longitudinal field study of two ongoing, ISD projects in one organization. I presented the findings from this field study in Chapters IV, V, and VI. In this chapter I discuss the implications and conclusions to be drawn from this research. The chapter is organized as follows: In Section A I highlight results related to each area of research interest in a brief summary of findings. In Section B I explore implications of these findings. I then discuss contributions and limitations of the study, contributions and areas of future research, and managerial implications in Section C.

A. Summary of key findings in each research area

My first research question concerned the identification of technological frames of reference which influence ISD participants as they define IT requirements, and an assessment of the extent to which frames are shared among key individuals or key groups. In Chapter IV I developed an analytical framework of five major categories and sixteen sub-categories to examine the technological frames salient to the participants in the two ISD projects studied. I identified two groups of project participants who had similar frames: i) core team members, who were individuals for whom ISD activities were a major job responsibility; and ii) system constituents, who were potential system users in various business functions who participated in requirements definition activities. These groups were similar to the technologists/users groups identified by Orlikowski and Gash (1994) and consistent with Dougherty's (1992) and Sackmann's (1992) findings of differences based on functional expertise. I assessed similarities and differences in the frames of these groups and identified categories of congruent, incongruent, and partially-aligned frames. I found that difficulties in defining IT requirements and implementing the IT application arose both when there was frame incongruence and when there was only surface-level congruence.

My second research question focused on how technological frames guide the interpretations, actions and interactions of key ISD participants during requirements definition activities, whether frames of reference of individuals or groups change as a result of their interactions, and if so, in what ways, to what extent, and through what kinds of mechanisms. In Chapter V, I examined how project participants drew on various aspects of their technological frames to negotiate shared interpretations of what the ISD initiative
was about and how it related to other organizational initiatives. I found that core team members' assumptions and expectations about ISD strategy and the IT application design had a particularly strong influence on how they reacted to changes in the organization and interpreted the implications for IT requirements. Technological frames served as scripts for the actions they planned and for their interactions with system constituents. Core team members, who dominated IT requirements definition activities, drew on their technological frames to structure and filter information about requirements, and thus their frames shaped decisions about IT features and functions. These findings are consistent with social cognitive research, i.e., that frames, or schema, serve as interpretative guides in sense making (Bartunek 1984; Daft and Weick 1984; Isabella 1990), as scripts for action (Abelson 1981; Gioia 1986; Gioia and Manz 1985; Gioia and Pool 1984; Poole, Gioia and Grey 1989), and as filters for information processing (Fiske and Taylor 1984; Lord and Foti 1986; Markus and Zajonc 1985; Porac and Thomas 1990; Schneider 1991).

I found little change apparent in project participants' technological frames during the time of my field study despite many events in the organizational and project context which triggered episodes of negotiations around IT requirements. In these interactions core team members utilized artifacts such as data models, existing information technology, work plans, and system and project documentation, drawing on the assumptions underlying these artifacts to negotiate agreements about requirements and embedding their assumptions, expectations, and knowledge in the artifacts created. I also identified a variety of sensemaking devices through which project participants communicated frames and negotiated shared interpretations of requirements: i) project history narratives which incorporated their interpretations of events and circumstances into the project identity; ii) organizational stories used as scripts and symbols for ISD strategies; iii) personal stories which conveyed ideas about the IT application; iv) scenarios-of-use used to describe IT features and IT-in-use; v) metaphors that described IT applications or features; and vi) analytic models used to structure and filter information about requirements. These sensemaking devices, with the exception of analytic models, were largely absent from the artifacts team members used to negotiate and document agreements about requirements.

My third research question addressed the social cognitive processes through which IT requirements are negotiated and which influence the evolution of an ISD project and the IT artifacts produced. In Chapter VI, I developed a social cognitive process model for framing IT requirements focused on the role of technological frames and situated within the theoretical framework of structuration theory (Giddens 1984; Cohen 1989). The framing model depicts the IT requirements definition process in terms of episodes in which ISD participants, drawing on their technological frames, negotiate requirements for an IT
application. Each episode is characterized by key assumptions about the project identity and themes in the discourse around requirements. New episodes in the framing process arise as participants respond to change triggers which alter the discourse around requirements and precipitate new rounds of negotiations. I illustrated the framing model with empirical data from the two ISD projects studied, describing eight framing episodes in the BIS project and four framing episodes in the INFOSYS project. In this discussion, I highlighted events and circumstances that changed the discourse around requirements, described how project participants, drawing on their technological frames, interpreted changes, and demonstrated how, as a result of these negotiations, the espoused project identity evolved. I compared the framing process in the two projects to assess what circumstances contributed to ISD outcomes in the projects. The BIS project was characterized by several episodes in which the project identity changed abruptly, resulting in confusion and little support for the project. The project identity in the INFOSYS project shifted incrementally in response to changes in the organization, contributing to the project's stability in light of significant organizational and technological change. However, core team members' focus on one aspect of the project identity inhibited their recognition of other critical requirements until late in the INFOSYS project.

My last research question addressed how technological frames of reference, through their influence on the actions and interactions of ISD participants, affect ISD outcomes. Throughout the analysis in the first three research areas, I considered consequences for ISD outcomes. Because social cognitive processes are tightly interwoven with other organizational processes, their influence on outcomes are difficult to isolate (Meindl, Stubbart, and Porac 1994). There were several areas, however, in which analysis of social cognitive processes and of technological frames suggested new explanations for actions around IT requirements definition and for ISD outcomes. In the following section, I discuss these implications.

B. Implications of Findings

In Section B.1, I argue that congruence or incongruence in the technological frames of key stakeholder groups can have varying consequences for ISD outcomes, depending on how ISD participants act on or react to frame similarities and differences. In Section B.2, I discuss how ISD participants, by acting on their assumptions about the dominant role of core team members in ISD and the passive role of system constituents, minimized the potential to reconcile and thus benefit from differences in their frames. I then consider how limitations in the sensemaking devices and artifacts ISD participants used to communicate and share frames and structural properties related to ISD at GHI, Inc. also contributed to
this outcome. In Section B.3, I focus on how dominant frames changed and evolved during framing episodes and the potential consequences of such changes for ISD outcomes. I then discuss more generally the social cognitive implications of change triggers in Section B.5.

B.1 Consequences of frame congruence and incongruence for ISD outcomes

One rationale for studying technological frames was to understand how frames of key stakeholder groups differed and to determine if incongruence in frames was problematic in requirements definition activities. Researchers have associated incongruence in frames of reference with various organizational outcomes. In this study, I found evidence to support Orlikowski and Gash's (1994) contention that differences in technological frames of key stakeholder groups contribute to the difficulties and conflicts experienced in developing, implementing, and using IT in an organizational context. In the BIS project, for example, core team members' and system constituents' assumptions and expectations about the project context differed. Team members did not draw on system constituents' knowledge about and interpretation of competing organizational priorities and issues which were obstacles to project approval. Instead, they acted on their own assumptions about the project's high priority, their expectation that system constituents were enthusiastic supporters, and their interpretation that ISI, Inc. was primarily to blame for project delays. As a result, their effectiveness in gaining organizational support and funding for the project was limited. Incongruence in core team members' and system constituents' assumptions and expectations about transitioning the technology into use, how the IT application would be used, and information legitimacy contributed to low usage of the INFOSYS application in pilot phases. Core team members, acting on their assumptions that the technology was easy to use and that it was obviously superior to an existing system, devoted little time to user support, focusing instead on continued expansion of the database. System constituents, with questions about information legitimacy and with little time to experiment with and learn about INFOSYS on their own, were hesitant to utilize the system. Orlikowski and Gash (1994) found similar differences in technical developers' and users' frames around training, support, IT usage, information legitimacy, security, and so on, and also found that these differences contributed to limited adoption and use of the IT application.

Fiol (1994), on the other hand, has suggested that both consensus and diversity in frames can facilitate collective learning and that unified diversity can be achieved when there is diverse content within a unifying structure or framing of communications. In my
field study, I found that lack of diversity, that is, frame congruence between stakeholder groups, was in several instances dysfunctional in terms of ISD outcomes. When frames of core team members and system constituents were congruent in both content and structure or congruent in content and incongruent in structure (i.e., core team members' frames were more elaborate than system constituents' frames), system constituents did not challenge core team members' assumptions or expectations. This was problematic when critical issues were not surfaced or examined and difficulties were not resolved. For example, most system constituents shared core team members' expectation that users would play a passive, information-provider role in ISD activities. Thus, they did not challenge the limited role core team members' planned for them. With little user involvement or support evident in the BIS project, an executive demanded additional studies which delayed the project and IS executives withheld resources needed to continue the project. In the INFOSYS project, system constituents shared core team members' expectations that the system would be used by end-users to directly access data, but they apparently were unaware of or insensitive to the underlying changes in roles, responsibilities, and work organization that implementation of the INFOSYS application implied. System constituents became aware of these implications when pilot applications were implemented and were then reluctant to adopt the system.

Table VII-1 summarizes the implications for ISD outcomes of frame congruence and incongruence evident in this study. This analysis suggests apparently contradictory implications about the potential consequences of differences in technological frames among groups: congruence in frames can be dysfunctional as well as functional, and incongruence in frames has the potential to be beneficial as well as problematic. Frame incongruence may even be inconsequential in some cases.

These apparently contradictory implications of frame congruence and incongruence on ISD outcomes can be understood in relation to varying needs for and benefits of collective learning between core team members (or technical developers) and system constituents (or users) in requirements definition activities and their respective roles and influence in ISD activities (see Table VII-2).

Congruent frames are widely held to facilitate collaborative work (Fiol 1994). When the shared frames of participants in collaborative efforts are adequate to understand and interpret issues and problems, frame congruence is likely to be beneficial. The possibility of dysfunctional congruence arises when members of various groups share frames but these frames are not sufficiently complex for identifying and interpreting important issues (Bartunek, Gordon, and Weathersby 1983; Walsh, Henderson, and Deighton 1988). Dysfunctional congruence might also result when stakeholder groups
<table>
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<th>Congruence/Incongruence</th>
<th>Analytic Category</th>
<th>Consequences for ISD outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similar in content and structure</td>
<td>Project outcomes</td>
<td>Dysfunctional congruence led to routine thinking about IT-enabled change</td>
</tr>
<tr>
<td>Different in content</td>
<td>Organizational context</td>
<td>Dysfunctional incongruence resulted in lost opportunities for collective learning and decreased participants' effectiveness in ISD activities.</td>
</tr>
<tr>
<td>IS development context</td>
<td>The division of ISD responsibilities required little collective learning; thus incongruence was inconsequential.</td>
<td></td>
</tr>
<tr>
<td>Different in structure: salient primarily to core team members</td>
<td>ISD participants Inter-project coordination Systems landscape</td>
<td>Functional congruence resulted in little conflict between core team and system constituents. Dysfunctional congruence led to problematic assumptions not being challenged and lost opportunities for collective learning.</td>
</tr>
<tr>
<td>Similar in content but different in structure: more complex for core team members</td>
<td>Users' role in ISD ISD strategy IT application IT stages / evolution External environment Business processes Project definition and scope</td>
<td></td>
</tr>
<tr>
<td>Similar in some, but not all content, similar in structure</td>
<td>Transition-to-use IT-in-use Information and data</td>
<td>Dysfunctional incongruence resulted when differences were not surfaced or addressed which contributed to low levels of IT adoption.</td>
</tr>
</tbody>
</table>

Table VII-1: Findings on Consequences of Frame Congruence and Incongruence

share limited frame content but frame structure is incongruent, masking differences in critical but tacitly-held assumptions and expectations of some groups.

When members of stakeholder groups with incongruent frames work collaboratively in problem identification or problem setting tasks, the group potentially has a broader, more diverse fund of knowledge and perspectives to draw on and thus may be more effective when identifying problems or interpreting issues (Walsh, Henderson, and Deighton 1988). If they learn collectively by surfacing or challenging assumptions and negotiating shared perspectives, a common structure of frames may evolve, facilitating consideration of diverse frame content and eventual frame alignment (Fiol 1994). In such circumstances, diversity, or incongruence in frames, has the potential to be beneficial. When one stakeholder group (e.g., technical developers) unilaterally undertakes such tasks or dominates problem setting and decision-making in collaborative efforts, frame differences between groups are not likely to be surfaced or addressed. Frame incongruence may then be problematic, particularly when decisions reached by the dominant stakeholder group are to be implemented by others. In some circumstances, problems may be
adequately interpreted through one group's frames, and drawing on diverse perspectives or spending time negotiating shared frames may not improve performance (Walsh, Henderson, and Deighton 1988). In such cases, frame incongruence can be inconsequential.

<table>
<thead>
<tr>
<th>Incongruent frames</th>
<th>Functional incongruence: Collective learning would result in improved understanding / interpretation of issues and problems; and, frames of stakeholder groups have similar influence in analysis and decision-making, facilitating members' acknowledgment and resolution of differences.</th>
<th>Dysfunctional incongruence: Collective learning would be beneficial but one stakeholder group's frame are dominant in analysis and decision-making, and frame differences are not acknowledged or resolved.</th>
<th>Inconsequential incongruence: The division of labor is such that collective learning and collaboration would not improve ISD outcomes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent frames</td>
<td>Functional congruence: Shared frames are adequate to understand and interpret issues and problems, and collaborative work is facilitated by consensus.</td>
<td>Dysfunctional congruence: Stakeholder groups share frame content and structure which is insufficiently complex to interpret issues and problems; or, sharing some frame content masks incongruence in structure between stakeholder groups. Problematic assumptions are not recognized or challenged.</td>
<td>n/a</td>
</tr>
</tbody>
</table>

| Functional / Beneficial consequences | Dysfunctional / Problematic consequences | Inconsequential |

Table VII-2
Consequences of Frame Congruence and Incongruence in Varying Contexts

What, then, are the likely consequences for ISD outcomes of congruence or incongruence in the frames of key stakeholder groups relative to IT requirements definition? The answer will vary by context, depending on the potential benefits of collective learning and collaboration between technical developers and users and their degree of participation and relative influence in ISD activities. Similarities in the findings of this study and of Orlikowski and Gash's (1994) study of a work group technology suggest that assumptions and expectations related to technology implementation, adoption and use are critical aspects of technological frames in which alignment could have improved ISD outcomes. In the projects studied, core team members might have planned and carried out implementation, training, and support tasks that would have encouraged system constituents' adoption of the technology, had they understood users' perspective on issues. System constituents might have more effectively appropriated IT features had they shared team members' understanding and appreciation of the technology.
B.2 Constraints on frame change and alignment

Underlying the argument that incongruence in the frames of key stakeholder groups could have beneficial consequences for ISD outcomes is the assumption that frame differences can be surfaced, acknowledged, and acted upon through collaborative interactions in ISD. One rationale for studying technological frames in requirements definition activities was to determine whether participants' frames changed through their experiences and interactions, particularly whether incongruent frames became more aligned through such experiences. As discussed in Chapter V, there was little change apparent in individuals' frames in this study, despite many episodes of negotiations around requirements. These findings are consistent with predictions of the social cognitive literature, i.e., that frames, or schema, once formed, are resistant to change (Fiske and Taylor 1984; Lord and Foti 1986; Markus and Zajonc 1985; Schneider 1991) Further consideration of these findings provides insight on why little frame change was observed in this study.

Core team members in each projects had similar assumptions, expectation, and knowledge about ISD approaches, the IT application, the business environment, the project context, and the project identity. Drawing on this homogeneous fund of technological frames, they tended to understand and interpret events and circumstances similarly and to reinforce each others' frames rather than to surface tacit assumptions or challenge expectations. For example, I observed this tendency to reinforce each others' frames in the BIS team meetings held to consider EVP Brady's re-direction of the project (Episode 5 in the framing process). Team members, drawing on shared assumptions about ISD strategy, quickly agreed that "the big" must be "chunked" into phases and that "quick hits" should be implemented with purchased software packages. They then interpreted Brady's ideas in technical terms such as what system capabilities would be needed and what existing software was available, and they focused on how to "chunk" the project. Core team members decided not to include system constituents in their discussions of Brady's ideas for radical change in business processes. Instead, they delayed consideration of the business and organizational feasibility of Brady's ideas, topics with which system constituents would likely have been concerned. By excluding system constituents from negotiations and discussions, team members not only enacted shared expectations about users' limited role in ISD processes but also maintained homogeneity in the fund of frames they drew on in negotiations and discussions. As a result, they reinforced each others' frames and confirmed their shared interpretation of the project identity as an MSIS-replacement project rather than the more radical change Brady had sought. If, on the other
hand, core team members had worked collaboratively with system constituents, taking into account their perspective, they might have arrived at a broader, more comprehensive understanding of issues and problems (Fiol 1994).

Frame change through collaborative work did occur to a limited degree in the INFOSYS project. Core team members' broadened their assumptions about how the IT application would be used when they took system constituents' expectations into account. This occurred when INFOSYS core team members worked closely with several system constituents in requirements definition tasks and implementation planning. However, collective learning and frame change through collaborative work between core team members and system constituents was not typical in these projects. Although both core teams solicited information from system constituents in interviews, presentations, IT demonstrations, and surveys, team members planned, structured, and carried out requirements analysis activities themselves. In their interactions with system constituents, core team members had already defined the project and the problem, and they filtered and structured information obtained according to their own understanding of the IT application as a data warehouse / database. System constituents' frames thus had little effective influence in core team members' negotiations around requirements.

Under such circumstances, it is not surprising that little frame change occurred. Opportunities to align system constituents' expectations with core team members' and thus to increase their satisfaction with the technology implemented (Ginzberg 1981; Szajna and Scamell 1993) were lost. Opportunities to expand core team members' frames and in this way to align them with system constituents' frames, particularly in critical areas related to IS support during implementation and adoption of the technology, were similarly lost. This occurred despite ISD participants' espoused belief in user participation and core team members' actions to solicit requirements from system constituents. In the following discussions, I consider how limitations in the sensemaking devices and artifacts ISD participants' used and structural properties at GHI, Inc. which limited opportunities for truly collaborative work between core team members and system constituents contributed to this outcome.

B.2.a. Limitations of sensemaking devices and requirements artifacts for frame sharing

As I analyzed data on interactions among project participants, I was intrigued to note their tacit reliance on metaphors, stories, and scenarios-of-use to articulate and share frames, to make sense of change, and to negotiate shared interpretations of the implications of change. Other researchers have similarly noted the importance of such sensemaking devices, for
example, use of metaphors (Boland and Greenberg 1988, 1992; Kendall and Kendall 1993; Mason 1991), stories (Boje 1991; Brown and Duguid 1991; Hirschheim and Newman 1991), narrative constructions (Tenkasi and Boland 1993); and scenarios-of-use (Walz, Elam, and Curtis 1993). Project participants employed these sensemaking devices primarily in face-to-face interactions, limiting mutual learning and shared understanding to the participants in these interactions. Understanding was shared with others in more face-to-face encounters, for example, when stories were retold to new participants or scenarios-of-use repeated in team meetings. Knowledge and understanding acquired in this manner were frequently lost, however, because sensemaking devices, used spontaneously in face-to-face interactions, appeared infrequently, and then only tacitly, in the artifacts core team members used to communicate ideas to others and to document decisions about requirements. In their study of a software development team, Walz, Elam, and Curtis (1993) similarly found that knowledge and understanding of requirements generated in face-to-face interactions through scenarios-of-use was seldom recorded or documented in official project or system materials and therefore frequently lost to the team. The parsimonious structure of data models, work plans, analytical charts, systems documentation, and so on, did not accommodate the unstructured narrative form of sensemaking devices used orally in face-to-face communications. This limited the effectiveness of both sensemaking devices and requirements artifacts for frame communication and sharing among individuals and groups over time.

Requirements artifacts did serve as a focal point in core team members’ negotiations around requirements, particularly in their face-to-face interactions. Team members drew on a shared understanding of the assumptions underlying artifacts such as data models, workplans, and system and project documentation to facilitate communication, surface assumptions and expectations, and negotiate agreements about requirements. Data models, for example, symbolized a set of shared assumptions about IS development approaches, IT systems, and data which core team members applied to the work at hand. As they discussed the data model, their assumptions and expectations about the project, the application, IT strategy, and so on, were surfaced through spontaneous production of scenarios-of-use, stories, and so on, and embedded in the data model produced through these interactions.

Requirements artifacts did not serve the same role in interactions between core team members and system constituents, however, and lack of effective artifacts to facilitate frame sharing and collective learning between core team members and system constituents during requirements definition activities was a second notable limitation to frame communication and sharing. Although core team members relied heavily on their understanding of data
models (either tacitly or explicitly) to structure requirements gathering activities, system constituents found this kind of analytic model less useful. Several expressed skepticism about their ability to communicate requirements in terms of data models. In interviews, both core team members and system constituents told stories or created scenarios-of-use to described their assumptions about what would be needed or their expectations about how IT would be used, which core team members later interpreted in data modeling terms. Davidson (1993) similarly found that users often believed they could not communicate requirements effectively nor relate to the structure of data models, although technical developers assumed they could. The existing technology served as an artifact which helped core team members communicate a common, surface-level understanding of the IT application to system constituents. Observation of IT features in demonstrations or training sessions, however, did little to surface critical differences in assumptions and expectations about how the IT application would be integrated with existing work practices, and thus issues related to transition-to-use, information legitimacy, and the IT-in-use did not arise during requirements definition activities. It was only in their experimentation and initial use of the technology, that is, after decisions about requirements had been made and IT artifacts implemented, that system constituents became aware of implications for work practices and raised issues and questions. As they jointly developed work plans (often in face-to-face meetings), core team members examined their assumptions and expectations about the nature and scope of work to be done. System constituents did not participate in work planning activities and the work plans, which focused on core team tasks, were not meaningful to them. Similarly, system constituents found little value in system and project documentation. These requirements artifacts, which core team members relied on in their own interactions, thus did little to facilitate frames communication or sharing between core team members and system constituents during requirements definition activities.

B.2.b. Structural constraints on frame change

Change or lack of change in technological frames can be examined not only in individual-level, social cognitive terms such as the proposition that individuals' frames or schemas are resistant to change (Fiske and Taylor 1984; Lord and Foti 1986), or in group-level, interaction terms, for example that frame change occurs through collective learning and communication (Fiol 1994), but also in terms of structurational processes. By situating the social cognitive analysis within the framework of structuration theory, technological frames can be understood as organization members' interpretive schemes for IT development, implementation, or use in an organizational context. As discussed in Chapter II, these mutual stocks of knowledge reflect the unobservable rules and resources that constitute
organizational structures of signification, domination, and legitimization related to IS development when enacted by ISD participants. Examination of structural properties implicit in technological frames and of structurational processes underlying ISD participants' enactment of social practices for requirements definition provides insight into how structural properties can enable or constrain changes in technological frames.

ISD participants' technological frames suggested underlying structural properties at GHI. Structures of signification were evident in the terminology, language and analytical method ISD participants used in requirements definition and IT design activities. Structures of domination were evident in core team members' authoritative power, exercised through their use of terminology, language, and methods, and their allocative power, realized through their access to ISD resources (e.g., technical personnel, funds, equipment, etc.). Structures of legitimization were evident in recognition and reward systems which sanctioned use of such methods and resources for IS development. Core team members reproduced these structural properties by enacting social practices which centered on technical aspects of requirements definition, specified limited participation by system constituents, and sanctioned team members' domination of requirements activities. System constituents enacted structural properties by their compliance with and acceptance of these arrangements for requirements definition.

Consider, for example, those aspects of core team members' and system constituents' frames related to users' role in ISD at GHI, Inc. Members of both groups assumed that liaison staff and IS (and ISI, Inc.) personnel would direct and carry out requirements definition activities. System constituents expected to participate for short periods of time in activities such as interviews that core team members planned and structured according to their knowledge of database design and analytical techniques. Core team members, interacting primarily with each other during requirements definition activities, reinforced their shared frames, not only about users' role in ISD, but also their shared assumptions about IT strategy, the IT application, desirable business process changes, and so on. Enactment of the structural properties underlying their frames facilitated coordinated work among core team members. On the other hand, enactment of these structural properties constrained system constituents' effective participation in requirements definition activities, limiting collaborative work between core team members and system constituents, and minimizing the weight system constituents' frames had in negotiations around requirements.

As noted above, it is not surprising that little frame change occurred in such a context. This does not imply that structural effects were deterministic, however, because ISD participants could have chosen not to enact these structural properties. For example,
utilizing requirements definition approaches in which system constituents could have more effectively participated, freeing up time for system constituents to participate in analysis and implementation planning activities, or distributing critical decision-making authority between core team members and system constituents, could have facilitated collaborative work between members of these groups, and, as a result, collective learning and more substantial frame change may have occurred. However, enactment of existing structures is typical, and structures tend to persist. Thus, sustained changes in technological frames are not likely unless they are accompanied by structural change in the organization. Lasting frame change related to users' role in ISD, for example, would entail not only individuals thinking differently about users' role, but also changes in IS development approaches, the division of labor for ISD, and reward and recognition systems.

Thus far in my discussion, I have emphasized the implications of findings on the lack of change in technological frames. However, this research also highlighted the extent of change that occurred during the course of the ISD projects studied and the effects that changes had on requirements definition outcomes as ISD participants made sense of and interpreted changes. In the remaining discussion, I now turn to the implications of these findings. I first discuss the evolving nature of dominant technological frames and their implications for ISD outcomes in Section B.3. I then consider more generally the social cognitive influences that change triggers can have in the framing process in Section B.4.

B.3 Change and evolution in dominant frames

Although individuals' frames and the shared frames of key stakeholder groups changed very little, the assumptions, expectations, and knowledge that had the strongest influence on participants' actions, interactions, and decisions about requirements did change from one episode of the framing process to the next. Dominant technological frames -- those assumptions, expectations and knowledge within the collective fund of frames which most strongly influence ISD participants' negotiations and decisions -- changed when influential individuals intervened in the project or joined the team, bringing different assumptions and expectations, or when individuals left the project or lost influence. In such cases, the weight that individuals' (or groups') frames carried in negotiations also changed, increasing when they gained influence or decreasing when they lost legitimacy.

Changes in dominant frames were evident in the projects studied, for example, when EVP Brady intervened in the BIS project. BIS team members, responding to EVP Brady's authority and the legitimacy of his frames, accommodated his assumptions and expectations during framing episodes 2, 4, and 5 of the BIS project. During these episodes, their interpretation of Brady's ideas and visions greatly influenced how they
understood the project identity and therefore what IT requirements they considered. The influence of his frames was evident in the discourse around requirements, in the stories, metaphors, issues and topics discussed. When Brady changed positions during Episode 6, and CIO Foley gained authority over the BIS project, Foley's frames gained considerable influence, and BIS team members' negotiations began to focus around the issues and concerns Foley considered important rather than Brady's ideas.

Analysis of the effects that frames of influential individuals such as Brady and Foley had on the actions and interactions in Chapter V and the longitudinal analysis of episodes of negotiations in Chapter VI suggest that, to better understand their influence on decisions about IT requirements and on ISD outcomes, technological frames could be considered as a kind of evolving or changing negotiated belief structure (Walsh, Henderson, and Deighton 1988). Technological frames of key individuals or groups could be examined and their relative influence in negotiations and on decisions about requirements assessed at different times or stages of IS development. Because dominant technological frames reflect group membership, participation, and influence, they relate more closely to decisions made and enacted about IT requirements (Walsh, Henderson, and Deighton 1988). Change or evolution in these frames could be identified through changes in ISD participation and influence and through changes in the labels, symbols, metaphors, and stories ISD participants use or in the breadth or focus of issues they consider in their negotiations.

The changing influence of Ideas, Inc. consultants' frames during the BIS project illustrates how changes in dominant frames affected decisions about requirements. When they joined the BIS team in Episode 3, consultants had influence and legitimacy which they derived from EVP Brady's endorsement. Their ideas about strategic uses for information and their analytic procedures and models altered the discourse around requirements, structured ISD participants' actions and interactions, and influenced team members' decisions about what IT requirements to recommend for implementation. Although these individuals continued to participate during later framing episodes, their influence diminished and the influence of their frames similarly diminished. Requirements which they deemed important were eliminated from the "throwaway" system in Episode 4. In Episode 5, the consultant's conception of a "throwaway" system was replaced by Foley, Kelly, and Deutch's notion of a "plug and play" strategy to incrementally build the system, as these new participants gained influence in the project. Changes in dominant frames were evident in the discourse around requirements, as team members gradually stopped using the

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1See Chapter II, Section B.3 for a discussion of Walsh, Henderson, and Deighton's (1988) construct of negotiated belief structures.
consultants' terminology, models, ideas about IT requirements, and even requirements artifacts they had created.

Examining dominant frames at different IS development stages could provide insight into other ISD outcomes. For instance, comparing frames which are dominant in requirements and design decisions to frames which are most influential in IT appropriation and use decisions may provide insights into users' appropriation and use of IT applications. IT requirements and design often reflects technical developers' frames (Bostrom and Heinen 1977; Boland 1979; Hirschheim 1986; Markus and Björn-Anderson 1987). If these frames are incongruent with frames which are dominant at the time of use, typically business managers' and users' frames, users may appropriate the IT application in unintended ways or even reject it (Markus 1983; Orlikowski 1992; Orlikowski and Gash 1994). In the INFOSYS project, core team members, drawing on their frames, made the decision to purchase the INFOSYS technology, as well as how to customize it. System constituents' frames differed from core team members, particularly those aspects of their frames related to information legitimacy, transition-to-use, and IT-in-use. Given their concerns about the INFOSYS application and their desire for additional support, system constituents were making little use of the pilot systems. Incongruence in dominant frames at different points in the ISD life cycle could also occur if the business area personnel whose frames are influential in requirements decisions do not have influence during implementation and use. In the BIS project, EVP Brady was influential during several framing episodes, and core team members heavily weighted his assumptions and expectations about how IT could and should be used in sales processes in their negotiations and decisions about requirements. Brady left the sales organization before the BIS project was completed, however, and other sales executives did not share his vision for using IT in sales. They were reluctant to endorse or support funding for the project, which had been structured around Brady's ideas.

In this discussion, I have emphasized the effect that change triggers (e.g., executive's intervention in project, reorganizations which change organizational authority, and addition or removal of ISD participants from a project) can have on the relative influence of individuals' or groups' technological frames in negotiations and decision-making about IT requirements. In the following section, I consider more generally the implications of change triggers for the framing process.
B.4 Social cognitive implications of change triggers in the *framing* process

As is typical in long-term IS development projects, there were a variety of changes at GHI, Inc. during the course of the INFOSYS and BIS projects. During my year on-site, I witnessed the substantive influence that some of these changes had on the requirements ISD participants identified and acted upon, and on the outcomes of the IS development effort. In the *framing* model, I conceptualized the social cognitive process underlying requirements definition in terms of ISD participants' ongoing negotiations through which they attempted to make sense of change and to interpret the implications for IT requirements through the filter of their technological frames. This model then highlighted how change triggers influenced the social cognitive process of framing IT requirements.

*Effects on the project identity:* Change triggers affected ISD participants' understanding of the project identity, by focusing their attention on different business uses for the IT application, new groups of system constituents and their requirements, different strategies for achieving project goals and objectives, and so on. Since key participants' interpretation of the project identity shaped and structured their negotiations around requirements, a change in their understanding of the project identity often resulted in new requirements being identified and legitimized or old requirements being put aside. In the BIS project, frequent changes resulted in multiple framing episodes and contributed to the team's inability to agree on and maintain an understanding of the project identity. In the INFOSYS project, team members maintained core assumptions about the project identity in spite of substantial change and organizational turmoil, integrating new assumptions into the existing project identity. While this had a stabilizing effect, it also inhibited their recognition of new requirements.

*Effects on the discourse around requirements:* Change triggers altered the discourse around requirements in two ways. New ideas, concepts, stories, metaphors, symbols, scenarios, and so on, entered the discourse as a result of changes. In some instances, ISD participants' became aware of events, other ISD projects, business initiatives, etc., that brought new issues to their attention. The effect that a change in the discourse had on participants' negotiations depended, however, on how participants, drawing on their technological frames, interpreted its relevance for the project. Consistent with social cognitive research on organizational change, executives' and managers' frames had a strong influence on how environmental change and organizational events were interpreted by others in the organization (Bartunek 1984; Daft and Weick 1984; Gioia 1986).
Change triggers also altered the discourse around requirements by changing the relative weight of ideas or concepts, as key proponents of ideas gained or lost legitimacy. For example, the addition of new "players" in negotiations and the removal of old "players" tended to change the topics and issues ISD participants discussed and to change the importance they placed on various ideas and concerns.

• *Structural effects:* Structural changes also affected the course of the requirements definition activities. Reorganizations in the company, for example, shifted power and authority to different executives and different business functions, adding or taking away from a project's support and access to resources. GHI's outsourcing of IS influenced the course of the INFOSYS and BIS projects by disrupting routine social practices for ISD. With rules and resources for IS development unclear, members of both development teams had difficulty conducting ISD activities. The lack of change in structural properties at GHI related to core team members' and system constituents' relative participation and influence in ISD activities limited the degree of frame change that was likely to occur (see Section B.2.b). However, in other contexts, structural changes that enable collaborative work among ISD participants from diverse functional areas might lead to more significant frame change and alignment and thus have a desirable effect on the framing process.

Table VII-3 lists the kinds of change triggers that were evident in the BIS and INFOSYS projects and gives examples of changes triggers which influenced the *framing* process.

C. **Conclusions**

In Section B, I explored various implications of the findings and analysis developed in this study. In Section C, I conclude with a discussion of how this research has contributed to research focused on the social aspects of ISD by examining IT requirements definition through the theoretical lens of social cognitive theory and structuration theory. I also consider limitations of the research and managerial implications.

C.1 **Contributions and areas for future research**

In this study, I applied Orlikowski and Gash's (1994) notion of technological frames to the study of requirements definition, developed a framework of categories to analyze technological frames of reference salient in these activities, and identified areas of frame congruence and incongruence among key stakeholder groups. My findings support Orlikowski and Gash's (1994) findings that incongruence in frames contributed to
<table>
<thead>
<tr>
<th>Change trigger</th>
<th>Examples</th>
<th>Influence on the framing process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Changes in the organization's environment</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Technology changes | INFOSYS, Inc.'s release of their proprietary package for purchase (INFOSYS project) | **Effects on the project identity:** Managers saw this technology change as an opportunity to quickly establish an up-to-date MIS environment.  
**Effects on the discourse:** Team members' discussions focused on the technology features and functions of the INFOSYS package.  
**Structural effects:** Utilizing a third party software package was consistent with routine social practices for ISD at GHI, Inc. | |
| Customer actions / expectations | RBC, Inc.'s request to GHI, Inc (INFOSYS project) | **Effects on the project identity:** Managers interpreted the customer's request to purchase the INFOSYS package as an opportunity to change the business process for providing RBC with ad-hoc reports.  
**Effects on the discourse:** The RBC, Inc. story expressed the expected value and use of the INFOSYS technology.  
**Structural effects:** RBC's request legitimized the project. | |
| Market changes (competitors, regulatory changes, etc.) | National Health Care Reform (NHCR) debate in the U.S. (BIS project) | **Effects on the project identity:** EVP Brady interpreted this impending regulatory change as a rational for limiting ISD spending in the BIS project, changing the project identity from "strategic" to "throwaway."  
**Effects on the discourse:** References to NHCR symbolized assumptions about why a "throwaway" ISD strategy was appropriate.  
**Structural effects:** References to NHCR legitimized this ISD strategy. | |
| **Organizational change** | | |
| Appointment of new executives | EVP Brady's interventions (BIS project) | **Effects on the project identity:** Brady's ideas and visions temporarily changed the project identity, leading to new framing episodes.  
**Effects on the discourse:** Brady's stories, scenarios, and metaphors influenced team members' discussions.  
**Structural effects:** With his new authority, Brady overruled managers' and team members' recommendations. | |
| Strategy changes | Service provider strategy (INFOSYS project) | **Effects on the project identity:** Organization members broadened their assumptions about the INFOSYS project identity; some felt it was becoming the "answer to world hunger."  
**Effects on the discourse:** New individuals, with different ideas, concerns, etc., contributed to the discourse around requirements.  
**Structural effects:** By associating the INFOSYS project with this strategy, the project gained legitimacy and support. | |
| Changes in organizational structure | Reorganizations at GHI (BIS, INFOSYS projects) | **Effects on the project identity:** In both projects, new "players" had different interpretations of the project identity which precipitated new episodes of framing.  
**Effects on the discourse:** Some individuals gained authority and influence, lending their ideas and concerns weight in discussions. The legitimacy of others' ideas declined.  
**Structural effects:** As authority shifted, access to ISD resources also shifted, sometimes benefiting and sometimes constraining project activities. | |

Table VII-3: Examples of the Influence of Change Triggers on the Framing Process
<table>
<thead>
<tr>
<th>Change trigger</th>
<th>Examples</th>
<th>Influence on the framing process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in the project context</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other ISD or project initiatives</td>
<td>NBR, DSDB, PAR projects (BIS, INFOSYS projects)</td>
<td>Effects on the project identity: When team members realized there were similar projects with overlapping or competing goals, they broadened their interpretation of the project identity to incorporate these goals. Effects on the discourse: Terminology, stories, and metaphors from these projects became part of team members' discussions and focused their attention on new IT requirements. Structural effect: Conflict and power struggles over access to limited ISD resources sometimes occurred.</td>
</tr>
<tr>
<td>Changes in organizational policies, procedures, practices</td>
<td>IT strategic planning process (BIS project)</td>
<td>Effects on the project identity: The project identity remained unclear, with little agreement about various assumptions associated with the project's name. Effects on the discourse: Through this process, the BIS project again became part of discussions about what was &quot;strategic&quot;. Structural effects: Inclusion on the strategic project list conferred legitimacy on the BIS project, enabling team members to gain access to ISI resources.</td>
</tr>
<tr>
<td>Project development</td>
<td>Approaching deadlines (BIS project)</td>
<td>Effects on the project identity: Team members debated what goals could be accomplished within the deadlines specified earlier and what business value could be derived from accomplishing these goals. Effects on the discourse: Targeted deadlines were symbols of project success or failure. Structural effects: Team members, concerned about consequences of missing deadlines on their careers, focused on how to create the appearance of progress.</td>
</tr>
</tbody>
</table>

Table VII-3: Examples of the Influence of Change Triggers on the Framing Process
difficulties in IT development, adoption, and use. Further empirical research will be needed to determine relevance of these analytic categories in other contexts and to other technologies and to identify categories in which congruence or incongruence in the frames of key stakeholder groups may influence ISD outcomes across contexts. Similar findings in these two studies of such frame incongruence related to IT-in-use, training and support, and information legitimacy, and of the consequences of frame incongruence for IT adoption and use, suggest that aspects of technical developers' and users' frames related to support during IT implementation and adoption may be problematic in a variety of contexts.

An unexpected finding of this research was that frame congruence between core team members and system constituents was at times dysfunctional for ISD outcomes. This occurred when system constituents shared some assumptions with core team members but did not recognize or effectively challenge other problematic assumptions. The finding that system constituents and core team members both assumed that system constituents should play a passive, information-provider role in ISD activities was especially interesting. Further research will be needed to determine if this finding is typical of other contexts. The fact that popular ISD methodologies (Beath and Orlowskki 1994; Bansler and Bødker 1993) specify passive roles for users suggests that such assumptions about users' role in ISD may be widespread, and investigation of the effects of frame congruence or incongruence in this category could provide insights into long-standing IT research interest in the consequences of user involvement in ISD (Ives and Olson 1984).

This research demonstrated that ISD participants tacitly relied on sensemaking devices (metaphors, stories, scenarios-of-use, etc.) to facilitate frame communication and sharing. Research findings also suggest that commonly used requirements artifacts had limited value for sharing an understanding of requirements across time, because sensemaking devices were absent from or used only tacitly in artifacts, and that artifacts were of little value in facilitating frame sharing or understanding of requirements between technical developers and users. Researchers have illustrated the value of actively employing sensemaking devices in requirements definition techniques through experiments (Boland and Greenberg 1992; Zmud, Anthony, and Stair 1993). Developing techniques to integrate sensemaking devices into requirements definition methods and artifacts and developing artifacts to enhance frame sharing between technical developers and users would contribute to the stream of IT research dedicated to methodology development.

The framing model developed in this research posits that there is a social cognitive process through which ISD participants negotiate requirements underlying normative IT requirements tasks and activities. This model focuses attention on several aspects of ISD which have been given little attention in IT research to-date: i) the influence of
technological frames of reference on participants' negotiations around requirements; ii) the influence of the discourse around requirements and changes in the organization context on evolving IT requirements; and iii) structurational processes in IT development. Further development of methodological techniques will be necessary to determine how various aspects of the framing process can be studied efficiently. For example, changes in the project identity and in dominant frames at various points in time might be tracked through a genealogy of the discourse around requirements (Preston 1991), based on participants' project history narratives and changes in their use of sensemaking devices such as metaphors, stories, and scenarios. This analysis could be used to identify episodes of framing and to assess how the framing process may contribute to various ISD outcomes.

User involvement in ISD has been studied primarily as a variable through variance models, rather than as a process. Recently IT researchers have begun to examine user involvement as a process (Newman and Robey 1992; Newman and Nobel 1991; Robey, Franz, and Farrow 1989). The framing model proposed in this research could be used in such investigations to examine user involvement as a social cognitive process. For example, dominant frames could be examined in different episodes of framing or at different points in an ISD process to assess the influence users' frames have on decisions about requirements. Empirical research in contexts in which technical developers and users have more equitable influence in IT requirements definition activities (such as case studies in organizations known for best practices in user involvement) will be needed to determine if collective learning and frame alignment could occur in such circumstances. Future research on the social cognitive processes underlying user involvement might also focus on detailed discourse analysis between technical developers and users to identity how frames are instantiated in face-to-face interactions, thus extending the work begun by Boland (1978) and Salaway (1987).

C.2 Assumptions and Limitations

I conducted this research at one research site using data from two IS development projects. The empirical data collected reflected the specific organizational context and historical events at that site. Since this organization was not representative of all or even most IS organizations, the specific findings are limited to this context. The projects studied in this research concerned building data warehouses for end-user access through user-friendly interfaces. The technological frames salient to participants in these projects are most relevant to this type of discretionary, end-user access technology and may not be salient in other IT contexts, for example, development of transactional processing systems. However, analysis of these findings may provide insights for research in other contexts.
which share notable characteristics of GHI, Inc. For example, outsourcing of IS development and operations, a critical contextual aspect of the research site that influenced both projects studied, is a growing phenomenon among US corporations (Lacity and Hirschheim 1993). Frame incongruence, evident in metaphors for the outsourcing relationship (i.e., a partnership versus a vendor / customer relationship), and problems in carrying out ISD activities due to disruption of routine social practices for ISD may be evident in other organizations. Further, IT research suggests that effective user involvement in ISD is problematic in many organizations (Davidson 1993; Holtzblatt and Berger 1995), and thus the issues raised here about the extent and effectiveness of user involvement as barriers to collaboration between developers and users may be evident in other contexts.

Finally, the data interpretation and analysis presented in this research reflects my research interests and biases. There are many stories to be told from any data set, particularly from an in-depth field study of complex organizational phenomena such as ISD projects. To address this limitation, I have been explicit about my research interests and methods throughout the analysis and writing, to enable the reader to draw his or her own conclusions as to the validity of the interpretation.

C.3 Management implications

Defining IT requirements is a process that is typically "confused, puzzling, troubling, characterized by uncertainty and conflicting frames and views" (Lanzara 1983, p.33). A key implication of this research for managers and practitioners is that this process entails not only the tasks and activities commonly associated with requirements definition activities, but also an ongoing social cognitive process of framing requirements which must be managed as well. In fact, problems such as project drift or scope creep may be symptoms of a framing process gone awry. In this final section, I consider how this research provides managers and IS practitioners with insights into requirements definition processes and suggestions for how to better manage them.

i) Paying attention to frames: ISD participants tacitly draw on their technological frames to plan and conduct requirements definition activities, to make sense of and interpret opportunities for using IT in business processes, and to structure their interactions during requirement activities. Because technological frames are seldom consciously acknowledged or examined, their influence on actions and decisions is not readily apparent, and differences in frames are not identified or acknowledged until problems and issues arise.
Although frames are tacit, they can be surfaced and examined. This research illustrated that sensemaking devices such as organizational stories, personal stories, scenarios for IT use, and metaphors are powerful mechanisms through which ISD participants articulate their assumptions, expectation, and knowledge. Identifying and documenting these sensemaking devices as they occur in interactions and examining their underlying assumptions is one way in which frames could be surfaced and differences in the assumptions of key individuals or stakeholder groups identified.

- **Executive "visions" for IT:** Practitioners have long acknowledged the power of an executive's visions for changing business practice through IT use. Because their view of the organization is broader and longer range, they may envision more radical change than lower-level managers or technical developers. Because they have authority that crosses organizational boundaries, their support can facilitate successful IS development and implementation efforts. However, because an executive does have high levels of authority and legitimacy in an organization, ISD participants may not question his or her ideas, even if his or her ideas ought to be examined and challenged or the executive expects him or her ideas to be challenged. Findings from the BIS project illustrated both these effects. EVP Brady's ideas about how IT could be used in sales processes inspired core team members to consider new and radical ideas for business process change through IT use. However, his interventions in the project also precipitated a flurry of activities, as project team members attempted to make sense of his ideas and to determine their implications for requirements. To paraphrase one informant, Brady "floated balloons" in the forms of metaphors, stories, and scenarios for IT use, and these balloons "took on a life of their own," because team members hesitated to "poke holes" in them. Their attention to his ideas not only delayed continuation of the project but apparently added little value, since team members tended to return to their earlier assumptions about incremental changes through IT use, leaving Brady's ideas unaddressed. At the same time, team members, focusing on Brady's ideas, failed to see the gap between his visions and the assumptions and expectations of other managers. When Brady changed jobs at GHI, Inc., the BIS project, structured around his interests and concerns, had little support from other sales managers. This example highlights the dilemma and the challenge executives interested in IT-enabled change face in their management of the framing process, that is, how to control the impact that their ideas may have on others while still inspiring and challenging ISD participants with their visions for IT use.
• **Stability versus flexibility in the project identity:** Examination of the ISD outcomes in the two projects studied suggests that a compromise between stability and flexibility in a project’s identity is needed, that “freezing” thinking about a project may be as problematic as failing to stabilize and maintain an agreement about its goals, objectives, and scope. In the BIS project, the project identity was highly unstable, leading to project delays, confusion, and lack of support for the project. In the INFOSYS project, key assumptions about the project identity endured, while the project identity shifted incrementally as new ideas for uses of the system were integrated. Stability in the project identity apparently helped the project team to weather disruptions and turmoil at GHI. However, the team’s focus on certain aspects of the project limited their ability to envision more than incremental improvements in ad-hoc reporting processes as the outcome of this multi-million dollar project, and it blindsided them to other important reporting requirements that were implied by the incremental shifts in the project identity.

A first step in managing a project’s identity would be to acknowledge assumptions and expectations of all key stakeholder groups and to document them in artifacts that are understandable and meaningful to technical developers, business users, and executives. This could be accomplished by examining metaphors, stories, scenarios of use, etc., and by critically examining key participants’ narrative descriptions of the project history. Assumptions about the project identity could then be reviewed throughout the project as changes occur. Changes in the project identity could then be negotiated explicitly, with consideration given to the consequences for IT requirements, and differences in various stakeholders’ interpretation and understanding identified and resolved through such negotiations. While this suggestion may sound similar to IS practitioners’ desire to "manage users' expectations," there is a critical difference. That is, the perspective of technical developers, users, and executives would all be managed through the process suggested here, rather than the privileging of one group’s perspective as the baseline against which others' assumptions and expectations are "managed."

• **Software packages as a sensemaking device with embodied assumptions:** Because software packages provide tangible artifacts, both technical developers and business users can more easily understand and visualize their features and potential uses. However, all packages embed the designers’ assumptions and expectations about IT design and use in business processes, and because commercial software developers work in different institutional and organizational contexts, their assumptions may not be congruent with those of members of the using organization. Such assumptions may not be readily evident in the tangible artifacts of software, interfaces, or documentation, however.
The INFOSYS team's use of a packaged software application illustrates this issue. Because it was a tangible artifact that team members could work with and that system constituents could view in demonstrations and training sessions, the INFOSYS system functioned as a sensemaking device that enabled ISD participants to communicate and share their assumptions and expectations. However, the visible aspects of the technology, particularly the attractive GUI interface, tended to mask other assumptions. For example, the fact that analytic procedures and reports could be accessed only through the user interface suggested that designers had initially expected just interactive use of the system. Team members became so enamored with the features and functions of the GUI interface that they did not recognize this assumption for some time, and they did not acknowledge issues and concerns of some system constituents related to the legitimacy of the built-in analytic metrics, the possible discrepancies between the new data source and existing data sources, and the feasibility of always using the application in an ad-hoc interactive manner.

Obviously, it is important to examine assumptions that underlie the design of a software package before purchasing it and to include system constituents in these evaluation activities. However, it is unlikely that all the implications and potential problems with a software package can be identified and addressed up front. Instead, it is important that core team members recognize the need to share the knowledge and experience they gain during implementation of a package with system constituents, to plan for and provide a high level of ongoing support during initial use of the package, and in this way to communicate and share their frames with system constituents. Such support is critical to successful adoption and appropriation of software packages in business functions.

- *Achieving true collaboration between technical developers and users:* In IS development, developers are typically expected to provide technical expertise and users to provide business knowledge. This division of labor is evident not only in the technological frames of members of these groups but in the underlying structural properties of many organizations. An important implication of this research on frames is that this intellectual division of labor puts users at a significant disadvantage in requirements definition activities. Because technical developers' assumptions, expectations, and knowledge about how to conduct ISD activities and about features and functions of IT applications are so heavily weighted in decisions about IT requirements, business personnel tend to have little influence in the social cognitive processes of sense-making, interpretation, and negotiation around requirements. Regardless of their apparent
participation in requirements definition tasks and activities, business personnel are rarely allowed the time nor given the responsibility to participate equally with technical developers. Even when technical developers espouse the value of user participation and plan activities that apparently include users, it is not unusual for them to dominate the requirements definition process, for their frames to most strongly influence decisions about requirements, and for "collaboration" to become a technique for manipulating users to "buy into" their decisions. Overcoming the disproportionate influence of technical developers' frames in requirements definition processes will not be a simple task, however, and it will likely involve restructuring ISD resources and reorienting development methodologies. It is through such changes that collective learning between technical developers and users and frame expansion and alignment that will enhance ISD outcomes may be possible.

*   *   *

I hope that this research, which draws on social cognition and structuration theory to examine, analyze, and interpret requirements definition activities in an organizational context, contributes to our theoretical understanding of this complex social phenomenon and provides insights that can improved requirements definition practice.
References


Gray, B., Bougon, M., and Donnellon, A., 1985, "Organizations as Constructions and Destruc

Guindon, R., 1990, "Designing the design process: exploiting opportunistic thoughts," 


the Dynamics of Corporate Relationships," Human Relations, 46:12, 1391-1409.

Harris, Stanley G., 1994, "Organizational Culture and Individual Sensemaking: A 

Henderson, K., 1991, "Flexible Sketches and Inflexible Data Bases: Visual Communi
cation, Conscription Devices, and Boundary Objects in Design Engineering," 
Science, Technology, and Human Values, 16:4, 448-473.

Hirschheim, R., 1986, "The Effect of a priori Views on the Social Implications of 

Communications of the ACM, 32:10, 1199-1216.

Development: Myth, Metaphor and Magic," Information Systems Research, 2:1, 
26-62.


Howard. G., "Culture Tales: A Narrative Approach to Thinking, Cross-Cultural 

Isabella, L., 1988, "The effect of career stage on the meaning of key organizatinal events," 
Journal of Organizational Behavior, 9, 345-358.

Construe Key Organizational Events," Academy of Management Journal, 33:1, 7-41.

Managerial Action," in The Thinking Organization, H. Sims, Jr., D. Gioia, and 

Investigation of Attitudes Related to Systems Development", Academy of 

Kendall, J. and Kendall, K., 1993, "Metaphors and Methodologies: Living Beyond the 

References (327)


References (333)


Appendix A
Interview Protocol
Interview Protocol

1. From your perspective, how and why did this project get started?
   - What was the purpose / goal?
   - How does it fit with other programs or activities at the organization?
   - What has your role been in the project?

2. Thinking over the last 12 months, what three events or circumstances, in your opinion, most influenced the current understanding of the INFOSYS / BIS system and the development project, for example, system goals, scope, functions, use, and so on?
   - description of event / circumstance
   - why it was important or influential
   - in what ways the project / thinking about the system were influenced
   - influence on your thinking about the project
   will this continue to influence the project / system development?

3. If INFOSYS / BIS, as you understand it today, were implemented and operational, what three things at GHI would be different?
   - what would be different and how it would be different.
   - who would be affected and how
   - when changes would occur, or be evident
   - who would be aware of these changes
   - in what ways INFOSYS / BIS would influence these changes
   - generally, impact on your own work [or work of people using the system]

4. What do you personally hope for / expect from the INFOSYS / BIS project?
   - What would you like to see happen?
   - How do your personal goals for the project compare to the goals and expectations of others involved in this project?

5. What do you expect will happen with the project / system?
   - Will the project / system development continue on the same course?
   - What might change thinking about project, outcomes?
   - Will the project be successful?

6. Imagine the INFOSYS / BIS project were granted an additional $100,000 in discretionary funds and you can decide how these funds will be spent. (A "magic genie" can fulfill any recommendation you make, so don't discount recommendations that may seem infeasible.)
   - What would you recommend doing?
   - What would you hope to accomplish by implementing these recommendations?
   - Why do you think this would be effective?
Appendix B
Event Tables
<table>
<thead>
<tr>
<th>Year</th>
<th>Event / Change</th>
<th>Effects on projects studied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>IS operations and staff outsourced to ISI, Inc.; transactional systems conversions were begun. Existing procedures for funding new development were replaced by a development &quot;pool&quot; specified in the outsource contract but without a clear policy for accessing funds.</td>
<td>Source systems for INFOSYS, BIS data changed. Conversion eventually improved data quality but short-term, projects consumed IS funds, personnel. This fact, combined with ambiguous policy for accessing development pool, led to funding issues in the BIS and INFOSYS projects.</td>
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<td></td>
<td>GHI launched a comprehensive HMO product (HMO-1). Analysts and managers at HMO-1 were reportedly &quot;information starved,&quot; i.e., they had no analytic reports to assess how the new product line was performing.</td>
<td>This situation led to initiation of several management information system projects, including the DSDB project and the PAR phase of the INFOSYS project.</td>
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<td></td>
<td>The Sales and Services Organization (SSO) with EVP Sam Brady in charge was created.</td>
<td>Brady became the executive sponsor for the BIS project.</td>
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<tr>
<td></td>
<td>GHI acquired HMO-2, which had a Unix operating environment. The IS staff, who were experienced with the technology, became GHI employees.</td>
<td>The BIS project team expected to utilize HMO-2's hardware/software platform. HMO-2 personnel later became influential in the BIS project and in IS at GHI overall.</td>
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<tr>
<td>1993</td>
<td>ISI conducted an IS Strategy Planning session with GHI executives to identify strategic initiatives to be developed from the development &quot;pool.&quot;</td>
<td>The BIS project was ranked #2 of nine major initiatives.</td>
</tr>
<tr>
<td></td>
<td>Ongoing conversion of transactional systems to the ISI, Inc. platform continued throughout the year. Multiple problems with conversion arose. Conversion continued to consume funds and ISI personnel.</td>
<td>Quality of current data began to improve slowly as multiple transactional processing systems were eliminated, thus influencing data quality in the BIS and INFOSYS applications.</td>
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<tr>
<td></td>
<td>The DBDS project to build a warehouse of HMO-1 data was begun.</td>
<td>This project later became a competitor to the INFOSYS project. However, business analysts on the two projects worked cooperatively.</td>
</tr>
<tr>
<td></td>
<td>The MIS Team was formed to coordinate projects and manage the budget for &quot;backend&quot; reporting systems.</td>
<td>Redundancies between INFOSYS and DBDS became apparent. Through the efforts of this group, however, a budget for the project was developed and approved.</td>
</tr>
</tbody>
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Table B-1: Key Events at Research Site during Time Period Studied
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<tr>
<th>Year</th>
<th>Event / Change</th>
<th>Effects on projects studied</th>
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<tbody>
<tr>
<td>1993 (cont)</td>
<td>GHI planned to refine its contractual relationships with providers in the HMO-1 network, but needed improved management information systems to do so.</td>
<td>The Provider Analysis Reporting (PAR) task force completed a study of packaged software and recommended the INFOSYS package. The INFOSYS project team changed plans to accommodate these requirements.</td>
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<tr>
<td>1994</td>
<td>In a reorganization, EVP Brady changed position and a new CIO was appointed. A new IS planning and strategic initiative review process was implemented.</td>
<td>The BIS project lost its executive champion and user project sponsor. The project was temporarily halted. The BIS project was re-instated as a strategic initiative and work was re-started.</td>
</tr>
</tbody>
</table>

Table B-1: Key Events at Research Site during Time Period Studied

Appendix B (340)
<table>
<thead>
<tr>
<th>Time</th>
<th>Summary of Major Events in BIS Project</th>
<th>Events in Project</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 92</td>
<td>Jane Flynn, a business analyst in GHI's internal IS group, began a requirements analysis study for a new system to replace the existing Marketing and Sales system (MSIS).</td>
<td>GHI outsourced its IS function to ISI, Inc.</td>
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<tr>
<td>Q2 92</td>
<td>Mark Smith, an business analyst in the marketing reporting area, joined Flynn. Flynn and Smith interviewed many people in the sales and marketing organization as part of the study, from the VP of Marketing to administrative assistants in the field sales offices. They published a requirements study containing systems context, data flow, and data model diagrams.</td>
<td>ISI, Inc. began to plan conversion of GHI's main transaction processing systems to ISI's package of systems.</td>
<td></td>
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<tr>
<td>Jul 92</td>
<td>VP Sam Brady asked Flynn to do more work on the study which he thought was too focused as an &quot;MSIS-rewrite.&quot;</td>
<td>Sam Brady was promoted to VP of the Sales and Services Organization (SSO).</td>
<td></td>
</tr>
<tr>
<td>Aug 92</td>
<td>Brady asked ISI to look at the sales and marketing area and propose a solution. ISI did a short study which most felt was too technically oriented.</td>
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<tr>
<td>Sep 92</td>
<td>Brady reviewed these documents but was not satisfied because the analysis had only &quot;scratched the surface of technology.&quot; He directed Flynn to organize an off-site workshop to &quot;brainstorm&quot; requirements.</td>
<td>Brady created a department of Sales Process Support (SPS) with Leslie Thomas as VP to foster a &quot;sales culture&quot; at GHI.</td>
<td></td>
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<tr>
<td>Oct 92</td>
<td>An off-site workshop was held to talk about using IT in sales processes. Attendees included Brady, Flynn, Thomas, Smith, and selected senior managers, line managers, and sales representatives.</td>
<td>ISI had begun conversion of GHI's &quot;legacy&quot; systems to ISI's package, one business line at a time.</td>
<td></td>
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<tr>
<td>Nov 92</td>
<td>Flynn and Smith met with representatives from sales a few times, to talk more about requirements but little was accomplished.</td>
<td>Brady reorganized SSO and managers jobs shifted. Sales was split into new sales and retention sales.</td>
<td></td>
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<tr>
<td>Dec 92</td>
<td>Sam hired consultants from Ideas, Inc. to lead a requirements study of BIS, in order to get a &quot;richer&quot; definition. Consultants presented their project proposal 12/21/92 and Brady accepted it.</td>
<td></td>
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<tr>
<td>Jan 93</td>
<td>Alan Thompson, Ideas Inc. consultant, began the requirements study, working with Thomas, Flynn, and Smith.</td>
<td>ISI's system conversion was underway, requiring much organizational and IS resource.</td>
<td></td>
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<tr>
<td>Feb 93</td>
<td>The team conducted interviews with top GHI executives to determine if there was a &quot;constituency&quot; for the system and visited a field site to see a marketing information system. The Phase I report was presented to Brady 2/28.</td>
<td>Ideas, Inc. began a study of the sales organization to recommend reorganizations and job changes.</td>
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Table B-2: Summary of Major Events in the BIS Project
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<tr>
<th>Time</th>
<th>Summary of Major Events in BIS Project</th>
<th>Events in Project Context</th>
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</thead>
<tbody>
<tr>
<td>Mar 93</td>
<td>Phase II of the requirements study continued with more interviews of executives and high-level managers; ISI, Inc. asked that a technical consultant be assigned to the project, at no cost to the project. Jill Scharfman began to participate in the project.</td>
<td>ISI, Inc. organized an IS planning session with GHI executives to prioritize all IS initiatives; BIS was ranked #2 priority.</td>
</tr>
<tr>
<td>Apr 93</td>
<td>Interviews and analysis tasks continued. Some team members visited another field site to see the marketing information system. Workshops were held with academic consultants to generate new ideas for the project. The team began more detailed analysis including a data model. Thompson did the higher level analysis of issues and needs, which Thomas and Flynn reviewed.</td>
<td></td>
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<tr>
<td>May 93</td>
<td>The team prepared its preliminary Phase II analysis. Several alternatives were identified, with varying business functions and IT infrastructure. Costs range from $7MM to $4MM. When the team presented alternatives to Brady in late May, he &quot;blew up,&quot; citing impending market changes due to National Health Care Reform and GHI's history of project failures. In the meeting, the group identified a &quot;quick hit&quot; pilot, i.e., to buy notebook computers and lead tracking software for new sales representatives. Brady directed the group to sketch out a &quot;bare bones&quot; data base that would enable replacement of the MSIS system. Thompson called this the &quot;throwaway&quot; solution.</td>
<td>Ideas, Inc. presented their recommendations for reorganization and restructuring of SSO, including recommendation to eliminate the &quot;bottom 40%&quot; of staff.</td>
</tr>
<tr>
<td>Jun 93</td>
<td>The BIS team revised the Phase II requirements document, adding an alternative for the &quot;quick hit&quot; notebook project and the &quot;scaled down&quot; MSIS replacement. Brady accepted this approach but asked the group to ensure the data model was sufficient for all business conditions. The team presented the project, with these recommendations, to groups of representatives from SSO who had attended the 10/92 workshop. Flynn and Smith visited each sales office to demonstrate a variety of notebook PCs and lead tracking software. They asked the representatives who would be in the pilot group to vote on which one they wanted.</td>
<td>ISI's conversion of GHI systems continued. Many problems came up and spring enrollment processes for the new GHI product (HMO-1) did not go smoothly.</td>
</tr>
<tr>
<td>Jul 93</td>
<td>Thomas, Flynn, and Thompson planned two &quot;sanity check&quot; presentations (7/13 and 7/14) to groups of about 12 representing various areas in the company. Thompson presented the Phase II study document with little interaction with participants. Sales representatives were most interested in the notebook pilot. Flynn worked with a new person from ISI to plan the detailed design phase of the project. An August 8th &quot;kick off&quot; was planned. Flynn began work with ISI to get hardware and software costs and prepared a business justification for the notebook pilot project, which was approved.</td>
<td>Sam Brady became aware of the fact that the #1 new development priority, the MIS project, had made little progress beyond developing a high level data model for the corporation.</td>
</tr>
</tbody>
</table>

Table B-2: Summary of Major Events in the BIS Project
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</thead>
<tbody>
<tr>
<td>Aug 93</td>
<td>ISI prepared a workplan and estimate for the next phase of development. The cost was $500K and over $2MM to complete. Thomson and Flynn believed the cost was excessive. They canceled the kickoff meeting. Thompson complained to Brady, who directed them to Tony Foley and Peter Deutch for a reasonableness check. After meeting with them, Thomas and Flynn were more convinced that costs were too high. Thomas continued to work through ISI to buy the notebooks and software, but she was frustrated at several points by delays. Hardware began to arrive, and she and Smith began experimenting with the software package (SELL).</td>
<td>Brady created the MIS Team, comprised of Tony Foley, MIS director from HMO-2, Peter Deutch, MIS director for HMO-1, and Fred Davis, manager of systems support for Actuarial and Accounting. Their charge was to organize efforts around management information reporting, prepare a budget, and recommend what projects to fund.</td>
</tr>
<tr>
<td>Sep 93</td>
<td>The dispute with ISI over costs continued. Thomas talked with Brady on several occasions and had confrontations with ISI as well. On Sept 20th, a meeting was scheduled with Brady, which included Flynn, Thomas, Deutch, and Foley. Brady surprised the group when he ignored the ISI issues and instead directed them to look into making BIS a &quot;front-end driver&quot; for enrollment systems. Foley volunteered his technical manager, Mary Kelly, as technical project manager for the project. Kelly and Foley met with Flynn and Thompson on 9/27 to talk about the project. Kelly met with Smith on 9/29 for an MSIS demonstration. Flynn and Smith worked on modifying the lead tracking software and developed training materials. Flynn worked with ISI to get the notebooks loaded with software. She continued to be frustrated with the perceived slow response from ISI.</td>
<td>Sam Brady and other executives became aware of the extent of problems in enrollments, due in part to system conversions.</td>
</tr>
<tr>
<td>Oct 93</td>
<td>A task force, comprised of Thompson, Thomas, Flynn, Kelly, Foley, and Deutch began meeting to consider Brady's idea of a &quot;front end driver.&quot; Thomas began to call this &quot;making BIS the order entry system.&quot; Bill Maynard, a quality manager who has been leading a reengineering project (NBR), talked to Thomas about this project and apparent overlaps in goals and data needs. The BIS team held joint sessions with NBR team members to determine how these two projects related. The BIS team concluded that initially, NBR would redefine manual processes and that later automation would be part of the BIS project. Thompson was still involved in sessions, but by the end of the series of meetings, Thomas had decided she did not need his involvement any longer and Ideas, Inc. left the project. Kelly contacted a vendor who she thought might have a notebook based sales and marketing package. The team drafted a 4-5 page document with their recommendations for Brady. They recommended that Phase I focus on replacing MSIS. Concurrently, they would scope out the &quot;order entry&quot; approach to be implemented with NBR re-engineering in Phase II.</td>
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Table B-2: Summary of Major Events in the BIS Project
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<tr>
<th>Time</th>
<th>Summary of Major Events in BIS Project</th>
<th>Relevant Events in Project Context</th>
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<tr>
<td>Oct 93 cont.</td>
<td>Flynn and Smith began bringing the notebook computers to each district office and conducting a 1/2 day training session. Follow-up sessions were scheduled.</td>
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<tr>
<td>Nov 93</td>
<td>Thomas decided that the next step was to do the &quot;business case&quot; for funding approval. Kelly assumed the lead in preparing this document. She worked with ISI to get formats for project justification. Kelly, Flynn, and Thomas met to review the document. Later Smith joined the group. Kelly asked the vendor to prepare a proposal for integrating the sales representatives individual notebooks / data bases into a central data base.</td>
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<tr>
<td>Dec 93</td>
<td>The team completed the business case document and presented it to Brady on Dec. 16th. The proposal included the Phase I MSIS replacement with a pilot to link the notebooks together electronically. Brady indicated that the project needed a business sponsor and said Jeff Green was interested. Thomas maintained that she was the sponsor. When Kelly indicated that she intended to use a vendor to do the client-server programming, Brady questioned this, because he wanted ISI to develop a client server skill base to support GHI. The group discussed how to work with or through ISI to get technical resources. Finally, Sam informally said, &quot;go ahead&quot; and that he would take care of funding by talking to the other executives. Flynn left at the end of the month on medical leave. Smith filled in as the project manager in her absence.</td>
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<tr>
<td>Jan 94</td>
<td>Thomas, Kelly, and Smith began regular project planning and status meetings but little progress was made because the programming leader, Tim Schwartz, was not available. Kelly received the vendor's proposal to do the notebook integration pilot but the cost was much higher than expected, and the vendor seemed to be in a shaky financial position. The pilot was dropped. Kelly tries to negotiate with the vendors who would supply client-server programmers, but she must work through ISI on contracts and pricing for using these consultants. Little progress was made.</td>
<td>Executives were beginning to talk about the &quot;information highway&quot; for medical claims data. A big initiative seemed about to begin.</td>
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<tr>
<td>Feb 94</td>
<td>There was no progress on the project. Thomas was waiting for a completed workplan so that project costs could be prepared and funding requested. She complained to Foley about Kelly's and Schwartz's availability. She also complained to ISI, who then assigned Joe Galvin as its project representative. Kelly learned that consultants were now proposing to implement an automated solution for NBR.</td>
<td>A reorganizations at GHI was announced. Brady moved to a new division. Jeff Green was replaced as Sales VP by Rick Forrest. Tony Foley was promoted to CIO. Thomas's SPS group moves to an administrative area.</td>
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<tr>
<td>Mar 94</td>
<td>The relationship between Thomas and Kelly deteriorated, and Kelly asked to be removed from the project due to health problems and other job responsibilities. Flynn returned from her medical leave and resumed project responsibilities. Schwartz was now available to the project, and work to define the work plan continued. Thomas brought up the issue of whether a project sponsor would be needed. Thomas, Flynn, Galvin, and Schwartz completed a draft of the workplan and developed a cost/benefit analysis for the project.</td>
<td>Reorganizations continued, and Thomas's group was reassigned to work for the CIO. The NBR project became highly visible as consultants worked with the new quality manager. Foley and others began meeting with ISI to determine what were the issues between GHI and ISI. Many ambiguities in the partnership agreement were identified.</td>
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<tr>
<td>Apr 94</td>
<td>Foley told Thomas there must be a business sponsor and that Rick Forrest was interested. Thomas scheduled a presentation to Rick, and the team tried to define what they thought a project sponsor should do. At the presentation, Rick challenged assumptions of the project team and clearly was not in favor of the project, leaving the team without a project sponsor. The team saw the potential to integrate the NBR project into BIS, and brainstormed how these two initiatives might be joined. They presented alternatives for to Foley, who advised them that they should focus on &quot;where it hurts.&quot; He then directed them to move forward with the NBR effort independently. He also advised that they should work on convincing Rick to be project sponsor for BIS or find another sponsor.</td>
<td>As CIO, Tony began to structure internal IS activities. He assigned Peter Deutch to lead a project planning and prioritizing effort. Deutch required all support groups, including Thomas and Flynn's, to document all projects.</td>
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<tr>
<td>May 94</td>
<td>Schwartz, Flynn, and Joe worked with Jeff Forrest (now in a new position) on the NBR implementation. Work on BIS was suspended as Thomas considered who she might get as a business sponsor. Schwartz left the company and Thomas announced her intention to leave. Flynn and the BIS / NBR project remained in Foley's IS organization, under Peter Deutch. At a planning meeting with executives, Foley noted that BIS was suspended until a project sponsor could be found. Brady and other executives maintained that the project should be on the strategic initiative list and assigned the new VP of Marketing, Karen Jones, as project sponsor.</td>
<td>Deutch completed the planning project. Foley negotiated resource levels with ISI and recommended which projects to fund. This plan was presented to senior executives, including Sam Brady (in his new position) in late May. GHI purchased a small company which had alternative sales channels (through brokers and agents).</td>
</tr>
<tr>
<td>Jun 94</td>
<td>The BIS team were working on implementing the NBR project when Karen Jones asked Flynn to prepare an update for her on the BIS project. As a result of the meeting, Karen agreed to get other executives to appoint representatives to a BIS steering committee, and a meeting was planned for the following month. The new Sales VP in one district asked Flynn to prepare a cost estimate of supplying notebook computers to all sales personnel in his territory.</td>
<td>HMO-2 technical staff were &quot;outsourced&quot; to ISI. Tony moved his office to the ISI floor at GHI headquarters to be close to the ISI group. Reorganizations continued in the sales group. Rick Forrest left the company. Given the company's purchase of the brokerage firm, sales managers questioned the need to support internal sales groups.</td>
</tr>
<tr>
<td>Q3 94</td>
<td>Flynn worked with the new ISI representative to BIS to prepare for the first BIS steering committee meeting. Her goal was to have the steering committee prepare a prioritized list of &quot;quick hits&quot; to implement under the umbrella of the BIS project. At the steering committee meeting, people were confused and unfamiliar with the project. Karen directed Flynn to educate the people offline before the next meeting. At the next meeting, Jeff Green presented an overview of NBR and its relationship to BIS. Flynn reviewed the ideas around Sales Force Automation, the pilot done the previous year, and the plans to provide notebook computers to more sales people. Karen instructed Flynn to expand this plan to include all sales personnel. Flynn subsequently prepared the request and obtained the signatures for the purchase order.</td>
<td>Reorganizations continued. Several BIS supporters in the sales area left GHI. Eventually, Flynn also left GHI.</td>
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Table B-2: Summary of Major Events in the BIS Project
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<th>Qtr</th>
<th>Summary of Major Events in INFOSYS Project</th>
<th>Events in Project Context</th>
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<tr>
<td>pre-Q2 91</td>
<td>Managers in the underwriting and accounting considered how to facilitate &quot;back-end&quot; reporting through IT tools that would increase end-users' access to data. There were some early investigations of INFOSYS,Inc., which provided a data analysis service to several GHI customers.</td>
<td>Industry surveys suggested that large customers place high value on account reporting services from their health insurance carriers, but that no carrier was viewed as doing an exceptionally good job. GHI executive Tom Dole saw this as an opportunity to gain competitive advantage.</td>
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<tr>
<td>Q2 91</td>
<td>The Manager of Account Reporting learned that INFOSYS had a version of their software for insurance carriers. In a memo to IS (Susan Parks) and Actuarial MIS (Fred Davis), she suggested investigating the system. However, no decision was made to move forward. GHI's biggest customer, RBC, asked GHI to buy the package and sub-licence the PC-based version to RBC, so that RBC could analyze data directly. GHI executives decided to buy the package.</td>
<td>A major GHI customer became the first company to purchase the new version of INFOSYS.</td>
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<tr>
<td>Q3 91</td>
<td>A team from INFOSYS, Inc. and GHI began detailed analysis of the INFOSYS product. Heather Johnson, from Accounting and Actuarial MIS and Ted Crane, from IS, worked on detailed data analysis. Fred Davis was the project sponsor. Initially, INFOSYS would be used for RBC, though Fred Davis and others expected to put data for other accounts on the INFOSYS data base eventually. Susan Parks, manager of IS support, negotiated a license agreement which covered this plan.</td>
<td>Two GHI competitors bought a licence for the new version of INFOSYS. A project was underway at GHI to build a new claims processing system (NCS) and was nearing completion. The RBC account would be one of the first implemented.</td>
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<tr>
<td>Q4 91</td>
<td>Work proceeded from high-level analysis to detailed mapping of data element fields from the INFOSYS software through the GHI claims systems. The team designed software to extract claims data from the new claims system (NCS).</td>
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<tr>
<td>Q1 92</td>
<td>Detailed analysis and program development to create the software to extract RBC claims data from the NCS system continued.</td>
<td>GHI outsourced most of IS to ISI, Inc. Susan Park's area (which included Ted Crane) did not change. GHI decided to convert all claims processing systems to the ISI package which included a claims processing system (CPS). Work on NCS was halted.</td>
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Table B-3: Summary of Major Events in the INFOSYS Project
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<tr>
<td>Q2 92</td>
<td>An initial load of RBC claims data from NCS was completed, and some testing was conducted. This version included pharmacy data. Joyce Harris joined the team to lead user acceptance testing. Heather Johnson and Ted Crane realized they would need new data extract software to access the ISI systems. They requested information on CPS data fields from ISI, in order to redo the field mapping. The team was still focusing on RBC data but would not include pharmacy data in the next pilot data base. RBC decided they did not want to have the PC version on site, but they still expected GHI to use INFOSYS on their behalf to do account reporting.</td>
<td>Conversion to ISI systems began. As part of the conversion from existing GHI systems to ISI platform systems, data transfer files (&quot;feeds&quot;) to existing back-end reporting data base were defined.</td>
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<tr>
<td>Q3 92</td>
<td>The INFOSYS project team now included technical developers from ISI, technical business analysts from GHI (primarily Ted Crane), business analysts from Actuarial and Accounting MIS support (Heather Johnson and her staff). The team worked on mapping data elements from ISI's claims processing systems (CPS) to INFOSYS's data base definitions. As the first year licence with INFOSYS came up for review and renewal, INFOSYS was concerned about nondisclosure, because they viewed ISI as a competitor in health care claims analysis.</td>
<td>ISI and GHI worked on details of the outsourcing agreement.</td>
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<tr>
<td>Q4 92</td>
<td>Work on the project was abruptly halted when the license expired because ISI, GHI, and INFOSYS had not reached an agreement on nondisclosure. The team was instructed to de-install software and box up the documentation. Key team members were reassigned to other projects. Eventually, an agreement was reached and the project resumed.</td>
<td>Conversion to ISI systems continued, one business line at a time. Decisions were made about how much historical data to convert into the &quot;feed&quot; format for use in reporting.</td>
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<tr>
<td>Q1 93</td>
<td>The team was reassembled and software was reinstalled. Work resumed to create a data base of RBC claims data for use in account reporting. The team focused on mapping data, data availability, data quality, etc.</td>
<td>Jolene Fisher, recently hired as medical director of the Provider, Outcomes, and Quality Analysis area (POQA), headed up a task force to look for software for provider analysis reporting (PAR). The PAR task force developed a request for proposal and evaluated a variety of vendors, including INFOSYS.</td>
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<td>Q2 93</td>
<td>Software development, testing and database creation for RBC data continue. Johnson became aware of the PAR task force and asked to represent Accounting and Actuarial. She brought information to the PAR task force about the INFOSYS project. The PAR team decided to recommend INFOSYS for their reporting needs.</td>
<td>Peter Deutch's development group developed a prototype reporting system containing HMO-1 data (DMDB). This system operated on a UNIX machine. Users were given training in SQL.</td>
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<tr>
<td>Q3 93</td>
<td>RBC data was finally loaded and the system was put &quot;into production&quot; at the end of September. A three-day-training session for several team members and users was held. A training room was set up with terminals for training and production use. Johnson and Harris began the next phase of the project, to identify other major customers whose claims data could be loaded into the INFOSYS data bases. Sales and Services personnel identified a dozen additional accounts. Amy Grant began working with the INFOSYS team to define what data will be needed for PAR reporting. A project kickoff meeting was held. Over twenty GHI personnel were interviewed. Amy Grant translated interview comments into data requirements and circulates the list to interviewees as a survey. The team worked with developers of the DMDB system to understand HMO-1 data availability. Johnson hired a full-time project manager to work on this effort, and ISI assigned a full-time programming manager to the ISI project.</td>
<td>The MIS Team was formed to coordinate &quot;back end reporting&quot; projects. The team included Fred Davis, Tony Foley, and Peter Deutch. Johnson attended meetings to represent the INFOSYS project. At their request, she defined future project phases, estimated development resource requirements, and described project benefits. The DMDB project team began to implement a second, expanded prototype system containing HMO-1 data.</td>
</tr>
<tr>
<td>Q4 93</td>
<td>Harris continued to work on adding data for the major accounts onto the data base. At the end of the year, the enlarged data base was available &quot;in production&quot; with data from approximately 15 accounts. A second, 3-day in-house training session was held, which included personnel from POQA as well as technical developers and health care analysts. The team worked with health care analysts to prioritize data elements for the expanded HMO-1 data base. Using the optimal length for DB2 records as their upper limit, they negotiated which fields should be included. Data elements were mapped from source systems to INFOSYS, and technical specifications were developed for the extract software.</td>
<td>The MIS team consolidated budget requests for all back end reporting projects. A reduced budget was approved. Although redundancy between INFOSYS and DMDB was apparent, the decision was made to proceed with both projects. Fisher's selection of INFOSYS for PAR was critical in this decision. GHI agreed to participate in a multi-company project to produce &quot;HMO report cards.&quot; This initiative was driven by large employers who wanted standard reports to compare HMOs.</td>
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<tr>
<td>Q4 93 (cont)</td>
<td>GHI requested modifications to the software to accept their data base format, and to perform additional statistical tests. INFOSYS agreed to add these modifications into the upcoming release.</td>
<td>Major reorganizations at GHI supported the corporate strategy to be a &quot;health services provider.&quot; Davis's group was not affected. Jeff Green assumed a position in Accounting, focused on reporting to facilitate customer relations.</td>
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<td>Q1 94</td>
<td>A trainer joined the INFOSYS team to develop an in-house course, support users, and facilitate communication. Jeff Green became an advocate for INFOSYS and began to promote it with customer accounts. Others raised questions about the technical architecture of the INFOSYS software, which did not conform to GHI standards. The Actuarial MIS team continued to manage the INFOSYS project phase to load HMO-1 data into the newly designed data base. Program development and testing proceeded on schedule. Team members and several analysts went to INFOSYS headquarters to conduct intensive testing. The RBC account reporting staff was moved to the sales and services group. Account reporting analysts continued to use the old system and made little use of the INFOSYS data. Amy Grant led a user group's definition of PAR reports. She assumed that reports similar to those in the INFOSYS interface could be created in batch production runs. She told managers the first production batch would be in October.</td>
<td>Tony Foley was promoted to CIO. He initiated a planning and prioritizing project and worked with ISI to clarify the outsourcing agreement. The first &quot;HMO Report Cards&quot; were produced using the DMDB system. With user demand, the system exceeded capacity and operational problems mounted.</td>
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<tr>
<td>Q2 94</td>
<td>Half-day, inhouse training sessions were held for small groups of employees. Demonstrations were given to account service teams from the sales and services area. Through Jeff Green, several large customer organizations were invited to see a demonstration of the INFOSYS software as part of an effort to market the PC version of INFOSYS to GHI customers (the original RBC strategy). Testing for the HMO-1 data base phase was completed and the data base was installed on schedule. A planning session was held with the CEO and other executives. Heather Johnson, Fred Davis, and others made recommendations on next phases, based on the anticipated availability of data from source systems. The phases outlined the plan to load the &quot;full book of business&quot; into the data base and to upgrade to the newest release of INFOSYS. Heather Johnson realized that Amy Grant had mistakenly assumed certain analytic functions would be available through batch processes. She consulted with INFOSYS, Inc. on alternatives while other phases were put on hold.</td>
<td>The account reporting department began to define a new portfolio of reports for customers. There was some question whether the reports would utilize the INFOSYS data base. Analysts still made little use of the existing data base. The project planning project was completed. ISI programming and maintenance resources were resolved in the process. Access to DMDB was curtailed due to operational problems. INFOSYS supporters now described it as a &quot;corporate-wide reporting system&quot; better able to handle the large volumes of data.</td>
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Table B-3: Summary of Major Events in the INFOSYS Project
Appendix C
Story Examples
The MIS Fiasco Story: An Organizational Saga

**Story summary:** Over several years, the GHI IS department worked on a major ISD initiative to replace and upgrade core processing systems and to create a management information system (MIS) environment. Tens of millions of dollars were spent before major flaws in the system design, delays, and budget overruns led to negative publicity and financial problems for GHI. The project was abandoned. One outcome of the project failure was the decision to outsource key transaction processing systems, IS operations, and IS development to a Information System, Inc.

**Story characteristics:** This organizational "saga" was shared by members throughout GHI and known to vendors, consultants, customers, and so on. New members of the organization drew on the story the MIS fiasco as well as members who had been there during the time of this project.

**Overall influence:** A number of informants suggested that the organization was hesitant to commit to any large-scale new development because of this experience (i.e., a kind of "No more Vietnams" mentality) and cited the story as the explanation for executives' decisions to reduce the scope, development time, and cost of the BIS project.

<table>
<thead>
<tr>
<th>Examples of story occurrences</th>
<th>Interpretations and uses</th>
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<tr>
<td><strong>BIS Project Manager in a team meeting:</strong></td>
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<td>&quot;If we bit off too big a piece, we'd have, pardon my analogy, an MIS Fiasco, Part II here. I have a gut-wrenching feeling, it would be monstrous, and we'd never fund it. We won't go down the $100 million road again.&quot;</td>
<td>The project manager used this story as a symbol of sanctions against large development projects and the likelihood of failure.</td>
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<td><strong>BIS Consultant in interview:</strong></td>
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<td>&quot;I'm sure you've read about the MIS project ... That was just a massive development effort, and I think that they learned that they have to do it faster ... After the MIS fiasco, no one wanted to commit to a major development style, OK. So, there is an organizational mindset, that is at the high level, 'We're not ever doing that again.'&quot;</td>
<td>The consultant used the story to explain why executives had rejected the BIS project proposal.</td>
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<td><strong>Dialogue in team meeting:</strong></td>
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<tr>
<td>P1: What was wrong with alternative one?</td>
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<td>P2: Time to market, cost ... I think Sam was seeing the MIS Fiasco again.</td>
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<td><strong>EVP Brady in project presentation:</strong></td>
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<td>&quot;We have a history in this organization, where we build good systems, then all the users duck when it's ready to use. That's the MIS fiasco syndrome.&quot;</td>
<td>One team member used the story to interpret EVP Brady's actions to a new team member.</td>
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Table C.1: Example of a Story's Influence in Multiple Contexts
RBC. Inc. had already contacted INFOSYS, had in the past, to see if they wanted to be part of INFOSYS's employer side of the house, where RBC. Inc. would supply their claim experience to send it out to their headquarters and be loaded up on that system. It turns out that RBC. Inc. thought that was too expensive. It was too costly for them. So RBC. Inc. turned around to us, GHI, the keeper of their, their insurance carrier, and said, 'You should buy, we have seen INFOSYS's product, we like the functionality, we think it's very useful. We don't want to pay for it. We think GHI should look into buying it, installing it, and providing that type of functionality to RBC. Inc.' And RBC. Inc. was even talking about having an INFOSYS workstation out at their home office in their benefits area. So that's how it started.

"What was driving it actually was RBC. Inc. .... I believe it was RBC. Inc. that was looking at specific requirements for us to report on and so they were in -- I think what they wanted - I'm not sure they actually have a terminal, but they wanted to have access to their actual data, and I think that might be what was driving them. I'm not sure that - actually to be honest with you. I'm not sure that they actually have a terminal, but I think that they wanted to have some kind of access to their data.

"I mean it has been around for awhile, too. RBC. Inc. and all that, I think, originally had proposed it for possibly working there.

"Actually what happened was, INFOSYS was originally viewed not as the reporting system for GHI. It was brought up because of a need to support one of their accounts, RBC. Inc. and initially that was the implementation effort, was to provide INFOSYS reporting to RBC, Inc.

"We were, we had been talking for years about a data warehouse, an MIS system for, probably going on a decade pretty soon and we were talking about it two and a half years ago and some new people had been brought on and MIS, before they were outsourced and INFOSYS was one of the, was something that was looked at, but not looked at seriously, and then, RBC. Inc. came along and said, 'we have looked at this. We want to access our own data. We want you to give that to us, and oh, by the way, we looked at this product on our own but it is too expensive for us to buy, but we would like you to give it to us.'

"And, at that point we heard from RBC. Inc., which is our major local account, that they were interested in having this kind of capability in order to look at their own data and do some analysis themselves and that sort of thing. And the marketing reps who were RBC. Inc.'s, started contacting different people in the actual area and the IS area at that point; there's no IS at this point in time, and saying 'Well gee, we should look at a few vendors out there, but they really seem to like INFOSYS' .... So it kind of came down to well, INFOSYS is the best thing out there um...at this point. You know, maybe, they [RBC] really like it. They've seen it and they really like it and maybe we should look into INFOSYS. So at that point, a team was put together of people from actuarial, underwriting, account reporting, and IS to sort of, you know, look at this and negotiate a contract and you know, build a system and an interface to INFOSYS and all that.

"One of our biggest accounts, XYZ and then RBC. Inc., had expressed an interest in INFOSYS ... RBC. Inc. went out and looked at it and they wanted to acquire it but the acquisition cost, they couldn't justify it. It was something like three hundred thousand for the license and they couldn't justify it and they asked us if we would be interested in acquiring it and letting them be the guinea pig. So, we took a look at it

"My impression of why it got started was really GHI tried to satisfy the reporting requirements of their customers and, in this particular case, RBC. Inc. and I think they decided that, to keep RBC, Inc. happy, they needed to have this product.

"The INFOSYS project as it was originally proposed and conceived was in direct response to client, a large account desire for easier, more flexible access to their claims experience, specifically I think the RBC, Inc. account.

"As I recall, but the reason we got into it was that several of our large accounts wanted to have the ability to have their own data and manipulate it in their own site. So that's why we initially talked about it. Especially RBC, Inc. I think was one of the focuses of that.

Table C.2: Examples of the RBC, Inc. Story as Told by Various Informants