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UNDERSTANDING ANTECEDENTS OF INTERPERSONAL CONFLICT IN INFORMATION SYSTEMS DEVELOPMENT: A CRITICAL ANALYSIS

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ABSTRACT

Interpersonal conflict in information systems development (ISD) projects is common and has been identified as being detrimental to project outcomes. Prior research has primarily focused on assessing the impact of interpersonal conflict on ISD project outcomes. As such, little is known about the antecedents to conflict in ISD contexts. It is proposed here that understanding the conditions that lead to the manifestation and escalation of conflict in ISD contexts is essential to improving ISD project outcomes. The goal of this study is to address the gap in the literature related to the understanding of antecedents of interpersonal conflict in ISD contexts. Specifically in this study, we integrate existing interpersonal conflict theory with current ISD theory to develop a theoretical foundation for an exploratory case study aimed at identifying antecedents of interpersonal conflict in ISD contexts. This study makes a contribution by: (1) extending the existing ISD literature to include the antecedents of interpersonal conflict in ISD contexts, (2) identifying moderating factors that can mitigate conflict in ISD contexts, and (3) offering a model for identifying both the antecedents and potential mitigation of interpersonal conflict in ISD contexts.

Keywords: antecedents of interpersonal conflict, conflict mitigation, information systems development, project management, project success factors, case study

INTRODUCTION

The negative impact of interpersonal conflict on information systems development (ISD) outcomes is well established [9][16][24][39][78][87]. To date, the literature related to interpersonal conflict in ISD contexts has focused primarily on the impact of interpersonal conflict on project outcomes. This focus has left a gap in the literature related to understanding the causes of conflict in ISD project contexts. We propose that understanding the precursors to conflict in ISD project contexts is critical to

maximizing project success. Furthermore, understanding the causes of conflict leads to the opportunity to identify mitigating factors early in the project lifecycle and as a result improve project outcomes. The goal of this research is to address this gap by exploring the question: *What are the antecedents of interpersonal conflict in ISD contexts?* To do so, we integrate existing interpersonal conflict theory, specifically Wall and Callister's [74] two-category antecedent classification scheme, with the extant ISD theory to guide an exploratory case study aimed at identifying antecedents to interpersonal conflict in ISD contexts. In addition, we identify mitigating factors that can reduce instances of conflict in ISD project settings. Finally, we offer a comprehensive conceptual model for conflict causation in ISD contexts.

The extant literature related to conflict in ISD projects has greatly improved the understanding of the negative impact of conflict on project outcomes [9][15][16][24][39][78][87]. In addition, conflict management literature has informed both research and practice on effective conflict management practices that can mitigate or minimize conflict in ISD projects [1][14][22][70][75]. However, the existing literature has not effectively identified the factors that lead to conflict in ISD project contexts in the first place. We propose that understanding the causes of conflict, and how to identify these causes, can help mitigate future conflict and result in reduced cost and time as well as improved ISD outcomes in practice. Therefore, an additional purpose of this study is to answer a second research question: *What are the moderating factors that can mitigate conflict in ISD contexts?* We address this question in an exploratory case study, conducted at a globally-branded Fortune 100 company, in which we study conflict antecedents and mitigation for a strategic ISD project. Our case study results in a set of prevention techniques that can be used to develop conflict prevention strategies and tactics with multiple practical implications.

This paper proceeds as follows: First, we orient the reader by summarizing the current ISD literature and interpersonal conflict literature. We then integrate Wall and Callister's [74] antecedent classification scheme into current ISD theory to provide a foundation for our case study. Next, we describe the methods employed in our case study. The results of our study are then offered, including a conceptual model for conflict causation and mitigation in ISD contexts. Finally in our discussion section, we offer conflict prevention techniques for ISD, and recommendations for future research.

THEORETICAL FOUNDATION

In this section, we summarize the current ISD literature as it relates to conflict. We then introduce Wall and Callister's [74] antecedent classification scheme. The integration of these two theoretical perspectives serves as the foundation from which we identify the antecedents and moderators of interpersonal conflict that guide our exploratory case study.

ISD Research

Early research related to interpersonal conflict in ISD contexts primarily focused on the impact of conflict on project outcomes and conflict management. These initial studies informed our understanding of the impact of user-developer relationships (e.g., [45][78][85]); of conflict management styles (e.g., [9][35][63]; and of conflict level or intensity (e.g., [3][8][35][63]) on project outcomes. More recent studies have investigated the impact of project management (i.e., communication, coordination, collaboration, team structure, and the social aspects of teams) on interpersonal conflict in ISD contexts [4][72][84].

Interpersonal Factors. Existing ISD studies have identified "individual characteristics" as a precursor to conflict in ISD contexts [8][61][62][63]. However, the factors identified in these studies lean more toward parameters of human social interaction (i.e., levels of participation, influence, disagreements, and beliefs about others) rather than factors that reflect individual personality characteristics (e.g., individually held values, goals, and emotions). One exception is Wong's [80] establishment of user-developer values divergence, specifically how value differences impact perceptions of software quality, resulting in individual differences specific to the evaluation of software quality.

Gobeli et al. [35] explored structural factors of conflict and illustrate the impact of context-specific variables such as company goals, group dynamics, and management support. More typically, conflict studies identify structural factors as subordinate to other organizational concepts such as the distinct organizational cultures of users versus developers [9][34][61], the contextual nature of communication issues and the role of resources, rules, and procedures [85], and systematic conflict due to goal divergence [63]. Studies illustrate that organizationally-based conflict can emerge as bargaining in disputes or complaints, bureaucratic power struggles, and systematic or working relationships conflict; each form draws differently on conflict antecedents [54][65][70]. Process factors such as requirements volatility have received some attention as well [19]. Research specific to developer-tester

conflict describes this as a type of systemic conflict that develops as a result of lateral working relationships [54]. Organizational context for developer-tester conflict has been shown to include process, individual, and organizational characteristics; schedules and task dependencies are persistent sources of conflict [16][73].

Communication. Communication has been identified as a critical ISD success factor as user-developer miscommunication results in conflict [81]. Negative effects are minimized when developers communicate consistently with users in order to clarify minor points throughout the development process, while relationship building and increasing trust defuse negativity and conflict escalation [45]. In keeping with the literature, communication is found to be a double-edged sword – when mishandled it can promote rather than prevent or resolve conflict [21][45][74].

Negative Emotion. Negative emotion has been identified as important to ISD outcomes, and has been explored in studies that investigate "task conflict" and "relationship conflict" in ISD. Barki and Hartwick [9] identify negative emotion as a characteristic of conflict, while Yeh and Tsai [85] examine two conflict potentials: user substantive dissention and user emotional hostility. These studies have illustrated that negative emotion negatively impacts ISD outcomes.

User Participation. User participation has been identified as a critical component of ISD project success [60]. Interestingly, and somewhat counter-intuitively, increased communication has also been linked to outcome-damaging conflict [78]. Kirsch and Beath [43] clarify this contradiction in their description of conflict as a dimension of coordination included in the user participation process in which the pattern of user participation – whether token, shared, or compliant – is illustrated as having more to do with the frequency and impact of conflict than the level of participation itself. Lamp et al. [45] note the importance of increased level of trust in facilitating effective communication and resolution as the project progresses. And, Wang et al. [78] weigh in regarding interaction quality: "The positive relationship between user-IS interaction quality and project performance confirms that user-IS interaction is central to the success of IS projects" (p. 280).

The extant ISD literature has enriched knowledge in both theory and practice related to the potential impact of interpersonal factors, communication, negative emotion and levels of user participation as contributing to conflict in teams on ISD project outcomes. However, identification of antecedents and effective mitigators of interpersonal conflict in ISD contexts has yet to be explored. In this study, we draw from the interpersonal conflict literature to incorporate antecedents of interpersonal conflict into existing ISD theory as a foundation for our case study.

Interpersonal Conflict Literature

Interpersonal conflict literature is robust and has longstanding history within other disciplines such as sociology, communication, psychology, and more recently organizational management. In 1995, a study by two University of Missouri faculty published in the *Journal of Management* provided a review of conflict research findings [74]. Wall and Callister's [74] work has informed numerous ISD specific conflict studies including that of Barki and Hartwick [9]. The integration of Wall and Callister's [74] antecedent classification scheme and the theoretical contributions of Barki and Hartwick [9] serve as the primary theoretical foundation for our project.

Wall and Callister [74] introduce a two-category conflict antecedent classification scheme that distinguishes individual-level characteristics from interpersonal factors. In their seminal work, they found interpersonal factors, subcategorized by facets of human relationships, including perceptual interface, observable behavior, communication, and structural or contextual characteristics to be conflict antecedents. Individual characteristics, such as personality, have received limited empirical support as direct conflict causes, while evidence mounts for the causal validity of structural and other interpersonal factors [9]. As stated above, the ISD-specific research contribution to conflict causation is modest since research has primarily focused on the impact of conflict antecedents and moderating factors on project outcomes. In the following section, the Wall and Callister [74] study is summarized and supplemented by more recent findings in the conflict literature.

Individual Characteristics. Individual characteristics that have been identified as antecedents to interpersonal conflict include personality, emotions, values, and goals. Wall and Callister [74] concluded that there is limited support for these characteristics as antecedents to conflict. For example, there is limited support for *personality* [10] or *emotions* such as stress and anger [25] as conflict antecedents. Some support exists in cross-cultural studies for individual *values* contributing to variations in individual attitudes toward conflict [7]. *Individual goals* have received some support for influencing interaction with situation-specific factors [18][57][82]. Overall, individual characteristics and personality as a conflict antecedent remains largely unsupported in research subsequent to Wall and Callister [74], while emotions such as stress, frustration, and distrust are usually understood as effects or secondary causes. An exception can be found in Jehn et al. [39] in which support for factors such as values

and visible demographic and educational differences as conflict precursors was demonstrated. From these studies, it appears that individual characteristics impact conflict causation, however they appear to be subordinate to other causes such as interpersonal factors, and structural factors.

Interpersonal Factors. Interpersonal factors as predictors of conflict are context-dependent because two parties must interact to produce conflict, therefore both interpersonal and contextual factors have been illustrated as antecedents to conflict. Wall and Callister [74] illustrate several interpersonal factors as conflict antecedents; these include perceptual interface, collaborative behavior factors, communication structures, previous interactions (history), and structural factors. *Perceptual interface* involves belief about another's intentions or motivations, regardless of accuracy [42]. Conflict increases when an individual believes another to harbor harmful intent, intent to violate norms of equity, or to hold incompatible goals [5][57][75]. In contrast, *behavioral factors* speak to actual harmful effects, for example when another individual blocks one's goals, attempts control or threaten, or actually causes loss of one's power [2][12][31]. *Collaborative behavior factors* reduce conflict, positively impacting budgets, general efficiency, and project goals and outcomes [46][55].

Wall and Callister [74] note that the impact of *communication* on conflict is a double-edged sword. They identify low levels of communication as predictors of ineffective coordination [54], and high levels of communication as producers of misunderstanding [58][71]. Critical or destructive messages promote conflict [11], illustrating that restriction of communication, in some cases, can be beneficial [44]. The ambiguous impact of communication on conflict may result from other moderating factors such as communication frequency, clarity, content, and context. For example, Dawes and Massey [20] found that communication with psychological distance promotes conflict. *Interpersonal history* can be a conflict antecedent in that previous interactions impact the present [4][74][84]. For example, repeated resolution failure can lead to negative stereotyping, prejudice, and self-fulfilling prophecies that feed and promote conflict [64][72].

Structural factors at the organizational and team levels have been identified as conflict antecedents. Structural factors are characteristics of the organizational and social environment that constrain or enable interaction; this context provides form and content to interactions [9]. Some of these effects are seemingly counter-intuitive; for example, closeness can reduce inhibitions against raising divisive issues [30], while high interdependence can highlight incompatible goals or perceptual divergence [18][67][77]. Power imbalance can promote conflict, as when a weaker party resists or seeks to use conflict to overcome a power disadvantage [6][70][76]. Structure can reduce conflict by establishing super-ordinate goals, promoting intergroup ties, establishing trust or creating collaborative incentives [52][64][72]. Additional research strongly supports organizational and team structural and contextual factors as conflict antecedents [4][84]. Shared definitions of ISD outcomes, team goals, organizational controls, reward structures, power and authority relationships, level of centralization, level of formalized roles and procedures, communication barriers, and undefined rules of behavior can all influence outcome-damaging conflict [14][38][51]. Finally, in addition to organizational culture, team culture has been demonstrated to impact conflict within project teams [41][68].

Task conflict versus relationship conflict. Wall and Callister's [74] assertion of no net positive effect from conflict may be countered by distinguishing between relationship conflict (also known as "person" or "emotional" conflict) involving identity-oriented issues such as values and beliefs [37], versus task conflict or disagreement about aspects of the work to be done. Relationship conflict is presumed to be dysfunctional while task conflict can be beneficial [23][24][26][37][66][83]. Findings are ambiguous: Janssen et al. [37] report beneficial effects for relationship conflict under some conditions; De Dreu and Weingart [24] report negative effects for both conflict types; while De Dreu [23] and Domino et al. [26] found benefits from moderate levels of task conflict. Simons and Peterson [66] assert that the types interact resulting in misattribution; trust is the key to gaining the benefits of task conflict while avoiding the costs of relationship conflict. Menon et al. [51] distinguish between the related concepts of functional (substantive or task-related) conflict versus dysfunctional conflict involving hostility, distrust, opportunistic behavior, withholding or distorting information, and the like. Strong support was found for a differential impact on outcome: functional (task) conflict had a positive effect while dysfunctional conflict negatively impacted strategy and market performance.

In summary, the general conflict literature identifies both behavioral and structural factors as potential antecedents to interpersonal conflict. Individual characteristics appear to play an important, yet secondary role in interpersonal conflict. In the following section, we integrate the existing theoretical understanding of conflict antecedents into current theory related to conflict in ISD-specific contexts. The result of this integration is the identification of conflict antecedents, moderators, and outcomes in ISD contexts which we utilize as the foundation that guides an exploratory case study.

INTERPERSONAL CONFLICT ANTECEDENTS, MODERATORS, AND OUTCOMES IN ISD CONTEXTS

Structural characteristics within an organization, such as context, formalized methods and processes, political roles, power structures, as well as the individual characteristics of the developers, and their interpersonal relationships, all impact the ISD process and outcomes [32][49]. These pre-existing organizational, team, and project structures, as well as individual level characteristics, can be considered antecedents for conflict on ISD teams [4][9]. We build on the foundation provided by Barki and Hartwick [9], utilizing these structural characteristics in our identification of pre-existing elements, or antecedents, that can result in conflict in an ISD context. By integrating current ISD and conflict literatures, we identify constructs related to conflict antecedents, moderators, and both interpersonal conflict and project outcomes in ISD contexts. We use these constructs as the foundation guiding an exploratory case study that results in an emergent theory of antecedents of conflict in ISD contexts. Later we refine these constructs and offer an emergent theory articulated in a conceptual model that proposes antecedents and moderators of conflict in ISD contexts. In this section we define conflict antecedents, moderators, and outcomes as derived from integration of the findings presented in our theoretical foundation section.

Conflict Antecedents in ISD Contexts

Organizational patterns or processes define the structure and practices of human organizations [4] and determine the outcome of ISD projects before they begin [17]. Current theory offers several preexisting or institutionalized structural, contextual, and process factors that exist within the organization, team, or individuals which function as conflict antecedents in ISD contexts [9][32].

Project Characteristics. Project characteristics such as system features and strategic importance, allocated resources, time pressures and constraints, top management support, visibility, and risk have been recognized as antecedents to conflict in ISD contexts [4][9].

Organizational and Team Characteristics. Organizational culture and climate [9], as well as power structures and power asymmetry [21] are potential influencers of conflict in ISD teams. Institutional norms that impact role definition and process coordination [43], role interdependency and goal congruency [18][67][77], organizational controls and processes such as meetings, communication pathways, and decision documentation [45] are all procedures and processes that serve as antecedents to conflict. In addition to the impact of organizational culture, team-level cultures and norms have been identified as influencing conflict [41][68], as have project-specific structural characteristics such as project requirements, resources, visibility, risk, and strategic weight. Personality diversity on teams [72], team structures [84], team characteristics such as size, heterogeneity, pre-existing team processes, as well as participation, influence, and history, are antecedents of conflict in ISD contexts [9]. These team level influences are often institutionalized and exist prior to the assignment of a project and are therefore carried forward into individual ISD efforts from inception.

Individual Characteristics. We recognize that individual characteristics have received limited support as contributors to conflict [10][25][74]; however, we accept that they do have some level of influence, even if only at a subordinate level. These factors can be an important influence on ISD success [72][84]. Therefore, we include individual characteristics (personality, perceptions, expectations, attitudes, values, demographics, education, etc.) as antecedents to conflict in ISD contexts.

Moderating Factors of Conflict in ISD Contexts

Conway's law [17] states that organizations which design systems are constrained to produce designs which are copies of the communication structure of these organizations. This law implies that a software system will be developed that naturally reflects the structure of the organization that produced it. Conway's law [17] continues to be as relevant today as it was when first introduced over 40 years ago. In the previous section, we summarized conflict antecedents as primarily institutionalized, structural, and pre-existing processes, power structures, and cultural norms that exist at the organizational, team, and individual level. If Conway's law [17] holds true then there must be effective moderators to these antecedents in order to achieve desired project and organizational outcomes. We propose that these moderating factors in ISD contexts include team structure, project management, and communication processes.

Team Structure. Personality diversity on ISD teams can impact individual perceptions of conflict; therefore, we include team structure as a moderating factor in ISD contexts which can be used to moderate conflict when assembling the team [72][84]. Developer interaction has been characterized as potentially emotionally negative, stressful, and anxiety-ridden [26][79][85] and can result in a negative impact on the effectiveness of an ISD

team [84]. Emotionally-laden conflict can self-perpetuate and carries significant outcome risk [9]. Being aware of individual and team history during team selection can mitigate interpersonal conflict in ISD efforts. Team performance is impacted by individual team members; therefore, selection of team members serves as a moderator for interpersonal conflict when assembling project teams and developing team structures [72]. Team member relationship deterioration appears to be associated with individual incompatibilities and the existence of diversity in personality, task orientation, interests, values, and goals [16][34][80]. Awareness of these factors during team assembly can mitigate conflict in ISD contexts.

Project Management. Studies related to conflict in ISD contexts have largely focused on managing conflict within project teams, and frequently identify project management techniques as the source of conflict management. Studies suggest that project management practices such as team coordination, communication, documentation, scheduling, and conflict management processes can significantly mitigate the emergence of conflict [84]. In addition, factors such as schedule, workload, technological issues, and participation patterns are likely to positively moderate conflict antecedents [16][43][45][48]. Finally, team leadership and trust are important moderators of conflict antecedents [72]. However, identification of conflict antecedents that exist as pre-existing structural components at the organizational, team and project level (as described above) has not been integrated into existing conflict management studies in the context of ISD. We agree with prior studies that identify project management tools as important mitigators of conflict in ISD teams; however, we propose that failing to identify conflict antecedents first is a significant oversight. By identifying these structural components as antecedents of conflict, adjustments can be made from the start, potentially avoiding conflict within the team that would otherwise emerge during the project. For example, by understanding the interpersonal history of potential team members, the project manager may adjust team structure accordingly. Or, if communication within the organization has caused problems in previous projects, the project manager may make changes to the communication structure of the ISD project team.

Team Communication and Coordination. ISD teams are not individual efforts; they involve teams of developers collaborating to generate a reliable software product, resulting in various communication and coordination challenges [4]. If we reflect back to Conway's law [17] again, the critical nature of communication structures becomes readily apparent as the law states that organizations are constrained to design systems that are copies of the organization's communication structure. If teams involved in software production have shortcomings in their communication and interpersonal relationships, the resulting software is destined to be flawed [4]. Therefore, effective group communication structures, communication quality, frequency, and effectiveness are critical for realizing successful outcomes [84]. We do want to note that we recognize that communication and coordination are typically considered part of project management; however, given the critical nature and significant influence of communication structures on the software resulting from ISD efforts, we felt it appropriate to separate these important constructs from project management and have them stand on their own as a moderating factor to conflict antecedents. By identifying the antecedents, or pre-existing communication structures that influence communication at the organizational, team, and project levels, necessary adjustments can be made at the inception of the project, potentially avoiding conflict and improving outcomes.

Defining Project Success Outcomes

Defining success outcomes and value for ISD projects is a historically familiar and vexing issue for both research and practice. Evidence of the complexity and illusiveness of defining success is simply illustrated by the number of references to the seminal article *Information Systems Success: The Quest for the Dependent Variable* by DeLone and McLean in 1992, which as of August 2010 had been referenced 3,329 times. The lack of conceptual standardization within the ISD conflict literature is noted by Barki and Hartwick [9], Jiang and Klein [40], and Lamp et al. [45]. Inconsistency related to a lack of definition or process for defining outcomes results in an inability to measure outcome success across studies, and has proven to be a vexing issue in practice as well [69]. ISD success has been defined in a number of ways, including market performance [35]; customer satisfaction [35][40][85]; team or management perception [9][35]; assessment of a variety of subjective success factors [9][63]; objective team performance factors such as adherence to project schedule, budget or requirements [9][35][63][85]; project management or conflict resolution quality [9][63][78][85]; or even the quality of decisions made by the team [21]. Outcome definition variability complicates findings comparison.

Given the wide array of accepted definitions for information system success, we contextualize our concept of successful ISD outcomes as including two important components: interpersonal conflict and project outcomes. We have identified antecedents of conflict as: (1) emerging from pre-existing interpersonal factors that are carried forward into future projects, and (2) emerging from pre-

existing structural components that exist at the organizational, team, and project level. We include individual characteristics within these interpersonal and structural components as playing a subordinate role in conflict causation. We then identified several moderating factors that can mitigate these conflict antecedents, these include: (1) team structure, (2) project management, and (3) team communication and coordination.

We propose that identifying conflict antecedents can result in effective moderating or mitigation of conflict in ISD contexts; therefore, we identify the level of interpersonal conflict on the ISD team an indicator of project success. If the antecedents are appropriately identified, there is potential to successfully moderate or mitigate interpersonal conflict on ISD teams, therefore the levels of interpersonal conflict should be low in frequency, intensity, and quickly resolved in successful projects. In addition, since we are looking at ISD team level conflict, our second success factor includes successful project outcomes such as meeting time, quality and budgetary constraints, as well as realizing a system that is accepted by users and meets the organization's needs.

RESEARCH APPROACH

Interpretive exploratory case studies, informed by existing theoretical constructs, are considered a highly effective theory-building research methodology [27] as they enable investigation of how phenomena unfold chronologically and in context [28][50][86]. Given the complex nature of identifying the nuances of an organization's structural and social infrastructure, earlier identified as the antecedents to interpersonal conflict in ISD contexts, and the historical nature of the evolution of these antecedents, we utilized the interpretive exploratory case study methodology for our study. In addition, we chose the single case study approach as it enables the opportunity to explore unusually revelatory, or extreme, contexts in which the researchers have unusual research access [29][86]. We utilized the constructs developed from our theoretical foundation to inform our research site selection and case study. However, in the spirit of exploratory research, we balanced utilizing the constructs that emerged from our theoretical foundation as a guide for theory building during our field work, while at the same time bringing only a limited preconception of the theory that would emerge from our study, a necessary balancing act in exploratory field work [27].

Research Site

To explore causation and mitigation of conflict in ISD contexts, we felt it was important to select a large organization that had been in existence for at least 20 years, repeatedly conducted ISD projects over the decades, and produced software that played a central role in supporting high level organizational strategy. We felt these characteristics important because an organization that has been in existence for decades had ample time to develop social structures and process infrastructures that would be reflective of the structural antecedents that we had identified from our theoretical foundation. We felt that an organization that was heavily reliant on software development projects, and had completed many projects over the decades, would have the project management experience from which we could explore conflict moderators in ISD contexts. Finally, we felt that an organization that with strong strategic reliance on the products of ISD efforts would reflect the outcomes of the interactions between conflict antecedents and moderators, and more clearly illustrate interpersonal conflict as an outcome of ISD processes. In addition, we believed that such an organization would put increased efforts into defining desired system related outcomes and successes when related to ISD projects with strong strategic importance.

We were fortunate to gain rare access to conduct case study research on a strategic ISD project at a globally branded logistics company headquartered in the United States. The organization has been in existence for over 30 years. And, as with any logistics organization, ISD projects and the software they produce are of high strategic importance. The longevity of this organization, its size, and its long history of managing and conducting ISD projects, often resulting in strategic systems, provided an exemplary or "extreme" case which provided an optimal opportunity to interpretive exploratory case study [55].

Data Collection

The researchers have had access to this organization for varying time periods. One has had extended firsthand experience for over 10 years. One has had several engagements, both professional and research related, over a time period of 5 years. And, the third researcher has had limited access, primarily related to research efforts, for a 2-year period. As a result, all three researchers had some level of prior experience working with the organization in a variety of professional and research contexts; and each had some knowledge regarding preexisting social, process, and procedural infrastructures that had emerged in the organization over time. Two of the researchers had prior knowledge of the organization's ISD processes, relationships with outsourcing organizations, and structural influences at the organizational and overall project management levels.

For this case study we focused our exploratory case study investigation on a single strategic ISD project at the research site. The project took place over a four year time period. We gained access to this project one year into the start the project's activity and continued access for the next three years. Over the period in which we conducted our field work, a wealth of information was made available. Information was provided relating to overall organizational structures (organizational structures, cultural characteristics and history, project structure characteristics, individual characteristics, etc.). In addition, the organization provided access to a strategic ISD project, as well as in-depth project-related information (team structures, project management factors, and communication structures and plans). The ISD project that we investigated was conducted over a four year time period. We had access to the project, project team members, and documentation for the greater part of the project's lifecycle. In addition we had access to historical data covering the year before our fieldwork began. The project was completed in 2009. Finally, organizational definitions and documentation of project outcome success measures, and access to information from which we could derive interpersonal conflict information, was provided.

One of the researchers had in depth firsthand knowledge of not only the organization and overall project management operations, but the ISD project that was the focus of our study. This researcher's interaction with the project, the project team members, and the organization, existed over a period of several years. This researcher had access to information related to team structure, leadership activities, project team members (e.g., prior experience, history, interactions, and roles), project updates and change documents, project-related communication practices and plans, project schedules, budgets, and definitions of desired outcomes. This level of knowledge related to the context of our case study, and specifically at the project level, provided a unique insight into our field work that resulted in thorough evaluation of the specific aspects of the organization and project as they relate to antecedents and moderators of interpersonal conflict in ISD contexts.

While the level of knowledge and familiarity with the organization and project resulted in an in-depth understanding of the phenomena, we integrated information from additional sources in order to identify trends, changes, and alterative explanations, in order to construct a coherent story [50][86], Data was gathered from interviews, observations, organizational and project documentation, project specifications, project daily log notes, meeting minutes, project status reports, change requests, schedules, internal audits, and user acceptance surveys, stakeholder emails, working documents, and draft issue summaries. A website developed for the project, developed during the first 18 months of the study, provided a wealth of information. The website included over 1,000 items at the end of this period; the data was accessible to all members of the team.

Data Analysis

The first step in analyzing the data was to develop a chronological assessment of the ISD project. Interview, project documentation, and supplemental data were coded. From this effort, we developed a timeline and divided the ISD project into four stages: (1) Start Phase: The condition of the project and project team at the start of our observation period, which was approximately one year into the project activity; (2) Phase I: Reorganization – a three-month period during which measures were taken to provide project management rigor and process improvement; (3) Phase II: Consolidation – A three-month period during which the team and project sponsors adapted to structural and procedural changes and innovations; and (4) Phase III: Team Maturity – Starting around seven months into our observations and continuing to the end of the study period (three years later), in which Phase I structure and process standards became routine and widely accepted.

Results

Preceding sections of this paper establish that conflict causation is a neglected focus of ISD research, and that strong support is found in the general literature for behavioral and structural factors as conflict precursors. Six opportunities to enhance understanding of ISD-related conflict are identified. Ideally, ISD conflict causal model development should be informed by research that identifies conflict antecedents with attention to behavioral and structural factors, emotional conflict, dynamic or cyclic aspects of conflict, and clarifying definitions of success. Care must be taken that neither methodology nor data analysis are contaminated by unwarranted preconceptions about relative valuations of user vs. developer roles, knowledge, or contributions.

The principal researcher gained access to project personnel and project documents in the second year of the project, when a pivotal project sponsor determined that project management discipline was needed to move the team forward. Documents used for this analysis date primarily from year two through year four of the project. The focus is on team interpersonal conflict, the approach taken to manage and mitigate conflict, and the effect of these measures on project outcome. Documents used in this analysis are classified according to the 4 consecutive

phases referred to above, based on date of creation (see Appendix I):

1. Start State: The condition of the project and project team at the start of the study period, after approximately one year of project activity.
2. Phase I / Reorganization: A three-month period during which measures were taken to provide project management rigor and process improvements.
3. Phase II / Consolidation: A three-month period during which the team and project sponsors adapted to structural and process innovations.
4. Phase III / Team Maturity: A period starting at about month seven and continuing to the end of the study period, in which Phase I structure and process standards became routine and widely accepted.

Team Composition. The case study focuses on a top-ranking strategic project involving development of internal-use software and interactive hardware to meet challenging return on investment (ROI) goals (see Documents 63, 64, 86 in Appendix II). It impacted multiple systems, engendered several subsidiary projects, and necessitated changes to operations-critical applications as well as established data management practices (see Documents 64, 65, 66 in Appendix II). A project team numbering well over 200 individuals crossed seven functional areas and included two vendor subteams. Three organizations formed the core cross-functional relationship (see Document 79 in Appendix II):

- Engineering: Project initiator and owner, business specifications originator, end user representative, operations research coordinator, hardware and software pre-rollout testing and product acceptance, implementation (including process revisions and field communication), and post-implementation performance reporting. This functional area provided overall project leadership through the project owning manager, Director, and VP, the corporate Project Manager (PM), an Engineering PM and project Technical Lead, and additional functional PMs and Leads.
- Business Services: Business requirements writing, system requirements review and approval, post-production user acceptance testing, second level production support, and coordination of similar activities for interdependent applications and systems. Leadership for this functional area was provided by an assigned manager, Director, and VP, as well as a Business Services PM who coordinated the activities of other functional PMs and Leads.
- Development: System requirements writing, architecture, software design and coding, pre-production testing, defect fixes, first level production support, infrastructure upgrades, and coordination of similar activities for interdependent application and system changes. Leadership for this functional area was represented by assigned managers, Directors, and VPs, as well as an IT PM who coordinated the activities of other functional PMs and Leads.

The project team was not co-located. When performing project tasks, team members typically remained within the work areas assigned to their functional workgroups. A high degree of physical separation into different corporate campuses and buildings joined with organizational and role segregation to create serious communication barriers between project team members. Although functional managers, team project managers, and technical leads met periodically or on an as-needed basis to discuss issues and make key project decisions, work coordination entered a crisis state by the end of the project's first year (see Document 67 in Appendix II). In the second year, the project owning (Engineering) VP introduced an overall Project Manager (PM) to address these issues by working with functional PMs and leads to create a cross-functionally unified process and approach to the project work (see Documents 4, 9 in Appendix II).

Case Study Data

Documentary analysis was supported by an innovation introduced in the project's second year – a team website providing single-point access to a wide variety of project documents, including software requirements and specifications, project process guides, test plans and outcome reports, meeting minutes, risks and issues, and status reports to executive management (see Document 80 in Appendix II). This wealth of material – literally hundreds of dated and categorized documents – was noted in an internal company audit of the project, which cited "thorough and effective team communication" through web-based documentation that was "available, accessible, and tailored to the individual users" (see Document 96 in Appendix II).

Ironically, ready availability of project documents poses a problem: With copious material and the time demands of a qualitative assessment, what are the best criteria for document selection and review? Our analysis and selection of documents is informed by Barki and Hartwick's [9] model of interpersonal conflict sup-

plemented by insights from Wall and Callister [74] and findings from the ISD and general conflict literature.

Barki and Hartwick [9] identify contextual factors such as team, project, and organizational characteristics as precursors to interpersonal conflict (Appendix III). Both the ISD and general conflict literature support this model, suggesting that such characteristics may determine the frequency and intensity of project team conflict. As noted above, Project Management is an increasingly salient contextual factor in today's software development projects. In keeping with the primacy of context to successful outcomes [56], we begin by describing organizational and team history and project characteristics, followed by a discussion of Project Management and a description of the diagnostic approach and findings of an analysis performed by the corporate Project Manager. Factors influencing intervention design, a high level intervention description, and implementation compliance enablers are followed by a report on outcome.

Antecedents of Conflict: Organizational History, Team and Project Characteristics. The importance of organizational and team history as an interpersonal conflict antecedent is noted in the Barki and Hartwick's [9] model which specifies "previous conflicts, management styles, tactics, and outcomes" as appropriate focal points for describing this aspect of project context. Our information about cross-functional history and other conflict factors for our case study project is derived from review and categorization of key documents listed in Appendix II, supplemented by additional documentation such as meeting minutes, status reports, and schedules. To protect confidentiality, where sensitive or identifying information was conveyed, we will make summary statements about content or make use of ellipses in direct quotes.

Organizational and Project Team History. Of the three organizations described above, one (Business Services) was relatively new. It was expected to play a moderating role in the relationship between the remaining two (Engineering, Development) which had a well-known history of conflict and distrust in working collaboratively on major software development projects. Engineering informants ascribed a variety of negative outcomes to this conflict, including delayed, incomplete, or misleading communication, task completion delays, software and hardware defects, and significant user acceptance issues. There were ad hoc sidebar discussions resulting in decisions that changed project features, without full cross-functional participation or disclosure. For example, in the first three months of the study period, an email from the Engineering PM to IT leads and managers noted that:

- "…[we have] not been in the discussions. Our understanding is that [functionality will not change], we just need that confirmed." (see Document 7 in Appendix II)

Other examples include reluctance to reveal information about task status and emergent issues or to discuss problems or progress across functional lines (see Documents 4, 5, 6 in Appendix II). Documents reveal repeated instances of IT personnel acting in the role of project owner, for example by hosting joint sessions and initiating issue discussions (see Documents 8, 10, 12, 13, 17, 19 in Appendix II), thus interfering with effective Engineering leadership on a project that was approved and funded based upon their needs analysis and ROI calculation (see Documents 9, 14, 32, 33 in Appendix II). Role appropriation threatened project success because IT lacked the expertise to independently interpret complex user requirements vis-a-vis operational constraints, and could not reliably determine when changes to scope or technical approach would unacceptably degrade product quality and usability. One outcome of incomplete substantive discussion and inappropriate role performance was preparation of an IT schedule that inaccurately depicted project scope as simple, modular, achievable within a very optimistic timeframe, and consequently not resourced to comply with mandatory corporate development process designed to support large, complex projects (see Document 11 in Appendix II).

Another indicator of cross functional distrust was the lack of unified status updates to executive project sponsors. Instead, IT prepared separate status slides without sharing advance information on content. This sometimes led to embarrassing message disconnects in which executives were presented with information from one functional area that directly contradicted a report from another area (see Documents 9, 14 in Appendix II).

Finally, there was documented evidence of conflict and hostility in the first three months of the study period. Resistance could be subtle, as in IT failure to respond to requests for information or to attend meetings called by the corporate PM or Engineering leads and managers. In addition, the IT PM openly contradicted and attempted to neutralize the corporate PM, for example in a bid to control communication and action on a PM-initiated cross-functional process task (see Document 10 in Appendix II), followed a few weeks later by this email exchange:

- *PM to Team Leads:* ". . .I need your updated status slides by noon today to prepare an agenda for the [Team Lead] meeting tomorrow. . ."
- *IT PM to Team Leads:* ". . . I don't think we need to meet or worry about providing updates. . ." (see Document 14 in Appendix II)

Not surprisingly, the start state and early portion of the study period was often characterized by distrust and in some cases, open hostility (see Documents 24, 26, 27, 28, 30a, 30b, 44 in Appendix II).

Project Characteristics. Another contextual factor in the Barki and Hartwick [9] conflict model is characteristics of the project itself. Case study documentation is clear: the project was technologically complex (see Documents 64, 65, 66, 69 in Appendix II) and strategically central to the corporation (see Documents 63, 64, 72, 74, 89, 90 in Appendix II) resulting in high visibility and risk for managers and executives in all three functional organizations (see Documents 48, 67, 68, 69, 71 in Appendix II). Quotes from a Phase I executive briefing:

- "Unusually high application complexity…"
- "One of the largest IT hardware implementations ever attempted…"
- "New technologies…which have never been implemented anywhere before…" (see Document 64 in Appendix II)

Emphasizing the difficulty and risk, a Director-level presentation included this quote from Edwin Land:

- "Don't undertake a project unless it is manifestly important and nearly impossible." (see Document 69 in Appendix II)

The phased development approach mandated by the corporation (see Document 90 in Appendix II), though rigorous, was not a perfect fit for the project, which was both innovative and specific to proprietary systems and business processes. Without internal or external precursors, benchmarking was impossible and software requirements, resource estimates, and completion dates were frequently revised (see Document 91 in Appendix II; also project schedules and change requests not included in data table).

The Barki and Hartwick [9] model includes conflict management styles as part of interpersonal conflict "process." Based on evidence (discussed above) of significant disconnects in understanding of such basics as the true scope of the project, it seems reasonable to suppose that conflict management in the first year of the case study project must have relied heavily upon avoidance of substantive cross-functional discussion.

Enabling the communication gaps, role inconsistencies, and conflict discussed in the preceding section was lack of central organization or unified project management in the first project year. Under conditions of high complexity and risk, the result was paralysis-inducing disagreement and confusion, not only regarding project ownership and final decision-making authority, but even about the project's status and what features were planned for the final product (see Documents 5, 6, 9 in Appendix II). The net result was pervasive anxiety among sponsors, stakeholders, and team members combined with low task effectiveness.

To summarize, contextual conflict antecedents for this case study include:

- The project's inherent difficulty and high risk and visibility,
- Pre-existing distrust between key functional stakeholders,
- Team size, physical dispersal, and functional segregation, and
- Lack of clarity on roles and final decision-making authority.

Project Management

Project management uses repeatable processes and techniques to achieve optimal ISD outcomes (including more effective conflict management), but should not be understood as a simplistically rules-based methodology [53]. Rather, the effective PM is a multidisciplinary soft skills expert who builds a strong team cultural identity and establishes an environment of trust, utilizing hard methodologies as supportive tools only when appropriate [53]. The ideal is to strike a balance between people and process [13]. Empirical support for a balanced approach is found in a study demonstrating that effective plans and procedures, combined with outcome-supporting behaviors, are characteristic of high-performing software development teams [36]. In contrast, technological factors had very little impact on stakeholder-rated project outcomes. The single most powerful success enabler was PM behavior.

Paralysis Analysis. With progress at a standstill one year into the project, central project management in the form of a corporate-wide project manager (PM) was introduced by the project-owning executive sponsor. In keeping with evidence that process- and behavior-based approaches are most effective in ensuring positive outcomes [13][19][36], after identifying sponsor needs and goals the newly assigned PM began with a set of assumptions about critical project success factors:

- Project success is highly dependent on individual team member behavior,
- Constructive behavior is highly dependent on correct process, and
- Process effectiveness is highly dependent on well-defined roles and responsibilities.

A further assumption determined the technique used to assess the extent and causes of project paralysis:

- Team members performing the work of the project are an ideal source of information

about the nature and causes of project dysfunction.

Care was taken to solicit input from individual contributor- or PM-level representatives of all three core functional areas. A series of one-on-one or small group dialogues served a dual purpose: Relationship building between the corporate PM and the project team, and identifying grassroots "pain points" affecting team morale and work performance. Actionable deficiencies targeted for intervention to meet sponsor-identified process deliverables and goals were:

- Scope uncertainty and undocumented scope changes,
- Communication gaps and status reporting inconsistencies,
- Lack of follow up on issues,
- Incomplete knowledge access, and
- Inconsistent or inaccessible project documentation.

Team members associated each of these factors with manifest or suppressed disagreement and uncertainty characterized by high levels of stress. Conflict appeared to have been managed by a combination of smoothing (accommodation) or avoiding strategies; no effective resolutions were reported.

Designing the Intervention. To maximize benefit, project management implementation must be context-sensitive and customized to provide good fit with organizational needs, values, and internal culture, as well as the larger regional or national culture [19][56][68]. Accordingly, intervention design for this case study project focused on contextual factors in determining optimal project structure, process, and policy to address each of the team-identified needs listed above. In order for the intervention to be successful, three challenges had to be addressed in its design. Each significantly contributed to the project team's high conflict potential:

- Process: Non-aligned organizational processes or absence of process resulted in procedural gaps that contributed to confusion about the status of the project or of necessary corrective action.
- Communication: Past conflict and incompatible organizational cultures contributed to a high level of cross-organizational distrust, impeding knowledge sharing and slowing task completion.
- Competition: The initiating organization's project ownership and lead role was repeatedly challenged by a variety of behaviors on the part of representatives of the other two core organizations, resulting in deadlock on critical issues.

Team-identified needs provided the rationale for requesting a mandate for two semi-concurrent, interdependent initiatives to address the process, communication, and competitive challenges outlined above:

1. Creation of a centralized project structure with well-defined, relational roles supported by a formal communication policy that specified standing meetings, reporting relationships, and documentation responsibilities.
2. Development of project-specific change control and issue management processes that took precedence over any competing, functionally-based processes.

Action was targeted to development of sponsor-defined high-value process documents, each explicitly associated with one or more team-identified needs:

- Communication Plan (communication gaps, status reporting inconsistencies, incomplete knowledge access, inconsistant or inaccessible project documentation)
- Change Management Plan (scope uncertainty, undocumented scope changes)
- Risk / Issue Management Plan (lack of issue follow up)
- Project Schedule and Maintenance Plan (status reporting inconsistencies)

Leadership and Implementation. As stated earlier, PM behavior is a powerful project success enabler [36]. Effective leadership is the key to cross-organizational cooperation, and simultaneously enables successful management, resolution, and prevention of conflict [13][33][53]. Integrative (confronting) behavior lowers team conflict and stress, encourages perceptions of organizational justice, and promotes future cooperative choices by team members [59]. Thus, creation of robust team culture capable of delivering high quality results is highly dependent on leadership behavior, particularly when dealing with substantive disagreements between team members.

In our case study, corrective processes were consciously designed to support full cross-functional participation, clearly establish business ownership, and quickly confront and resolve disputes to enable integrative resolutions (see Document 35 in Appendix II). For example, the issues of project ownership and cross-functional structure were resolved with the support of the project owning management chain (see Document 30c in Appendix II) and formalized by inclusion of a team structure diagram in the first executive status presentation (see Document 15 in Appendix II). With a few changes in team composition,

this structure remained stable to the end of the study period (see Document 95 in Appendix II). A standard of full cross-functional representation at any substantive discussion that could result in a change to project scope, product features, or architectural design was established as well.

The troubleshooting analysis (discussed above) indicated that cross-functional conflict often involved disagreement about project scope and product requirements. These were handled through establishment of a formal change request process outlined in a cross-functionally developed and formally approved Change Management Plan (see Documents 52, 58 in Appendix II). Initial resistance to participation in the forum was overcome within the first 3-4 months of the study period (see Documents 1, 3, 59 in Appendix II). A perusal of session minutes from the first six months of the intervention implementation reveals significant integrative activity, including project scope baseline and revision, change request disposition, and other critical issues (see Documents 45, 61 in Appendix II).

In guiding implementation of the project intervention, the PM followed a dual strategy of securing compliance through formal project structure, while simultaneously modeling and encouraging behaviors (e.g., respect, civility, impartiality) consistent with establishment of open communication and trust (see Documents 25, 30b in Appendix II). For example, following successful resolution of the incident (described above) in which the IT PM attempted to countermand a request for status updates from team members, the corporate PM sent a message to the IT PM:

- "Thank you again for your contribution toward the unified status report presented to the [executives]. . . it was a heroic effort on a tight schedule. . ." (see Document 18 in Appendix II)

Openness and knowledge sharing was also supported by establishment of communication and documentation standards for the cross-functional team, including minutes preparation for all decision-making sessions and mandatory access to critical documents through the project website (see Documents 15, 35 in Appendix II).

Because of the inherent difficulty of the project and the team's high visibility to top corporate management, risk mitigation included attention to spreading accountability and ensuring a unified team message. Trusting team relationships could develop because formal process ensured that quality-impacting decisions were always made through open, documented discussion by the full cross-functional team. Behaviorally, the PM supported process with interactive techniques that have been shown to support perceptions of interactional and organizational justice, such as active listening, cognitive analysis, perspective-taking, and latitude negotiation [1][33][47][59].

Intervention Outcome. Solution implementation coincided with a noticeable reduction in anxiety and improved cross-functional collaboration (verbal communication by Engineering VP). As noted in the preceding section, scope changes and issues responsiveness were quickly brought under control, with escalated change request disposition and issue resolution determined by a director-level team representing each of the three core functional areas. Knowledge access, document standardization, and communication issues were addressed in part by a cross-functional, single-source website for access to all critical project documents and communications. Primary implementation tools were core PM and lead-level meetings where proposed scope changes and issues were vetted for escalation, core director-level meetings where decisions were negotiated and documented, and VP-level meetings where unified status reports were delivered (source: Phase I and II meeting minutes; not listed in Appendix II).

Unified structure and process enabled role clarity, effective communication, and more egalitarian distribution of substantive input throughout all project phases. This contextual support combined with soft skills leadership by key functional PMs and managers fostered development of a team behavioral repertoire typified by respect, flexibility, and a collaborative rather than control-seeking orientation. Despite initial resistance, once cross-functional openness and substantive collaboration were mandated and acted upon, a more positive and hopeful attitude emerged. Witness the Business Services Director's brisk, upbeat summation of a Phase I cross-functional work session:

- "There is agreement that the IT-proposed solution will be acceptable…"
- "...business process flow, data requirements, and integration is well understood by all parties"
- "There is no demonstrated need for [consultants] to take over the design work…"
- "Engineering has been clear on what is required, IT has been savvy in finding a working solution, Business Services has led the design effort to everyone's satisfaction." (see Document 39 in Appendix II)

The post-intervention improvement trajectory, supported by case study documentation, is summarized below:

- Within two months, key stakeholders noticed and remarked on reduced anxiety and

improved cross-functional knowledge sharing.
- Within six months, trust was sufficient to support effective cross-functional issues surfacing and problem solving.
- By the end of the first post-centralization year, unified team ownership was expressed in documented, collaboratively-designed process, policy, and structural innovations to meet emergent project needs.

The effects of first-year conflict (and poor conflict management) on schedule and budget could not be completely reversed, but a mature team culture characterized by frank communication and equitable negotiation resulted in high team morale, excellent software quality, and enthusiastic, remarkably issue-free end user acceptance. These results were all the more striking when contrasted with those for innovative projects of similar complexity involving the same functional stakeholders.

Case Study Project Outcome

The Barki and Hartwick [9] ISD Interpersonal Conflict Framework includes multiple outcome factors, including Project Success and System Success. Measures for both are available for our case study project.

Project Process. An independent corporate audit department assessed the case study project to determine compliance with mandated development process, including careful perusal of project documentation by a multi-member team, team member interviews, and team member surveys. The project received a score of "exceptional" with no significant issues or remedial actions – a very unusual outcome for an audit of this type. In addition, the audit team commented on the exceptionally good team communication and project documentation quality and availability (see Documents 96, 97, 98 in Appendix II).

User Acceptance. A post-release user survey generated more than 300 responses about the quality and usability of business requirement-based features. Analysis indicated high user acceptance and satisfaction with the system and software, including both features and response times (see Documents 99, 100, 101, 102 in Appendix II). The survey also surfaced a single issue which was addressed by a dedicated production fix team. Survey responses included unsolicited favorable commentary such as:

- "Absolutely a fabulous system cannot imagine working without it…keep up the good work." (see Document 103 in Appendix II)

AN ISD INTERPERSONAL CONFLICT MODEL

As stated previously, studies have yet to yield a research-supported set of causal factors for ISD-specific conflict, though a model exists that is well grounded in the general conflict literature. Barki and Hartwick's [9] conceptual model includes interpersonal conflict antecedents, conflict processes, and project outcomes (Appendix III), and suggests expansion of ISD conflict studies by focusing on the antecedents of interpersonal conflict. Because such studies are rare, any set of conflict events may supply causal antecedents worthy of attention. Our case study analysis was guided by the Barki and Hartwick [9] model. Findings support modification based on Wall and Callister's [74] antecedent classifications and other sources in the conflict literature. Our ISD Interpersonal Conflict Model (see Figure 1 below) has five components: conflict antecedents, moderating factors, interpersonal conflict, and project outcome, as well as a feedback loop. The model differs from Barki and Hartwick [9] in the following ways:

1. The ISD Interpersonal Conflict Model reorganizes Barki and Hartwick [9] categories according to Wall and Callister [74] and our case study findings.
2. The "Conflict Antecedents" component is organized into project characteristics, structural characteristics, cultural characteristics, and individual characteristics.
3. "Moderating Factors" is similar in function to Barki and Hartwick's [9] "Processes of Interpersonal Conflict," intervening with conflict antecedents to produce outcomes of interest. Consistent with our case study, we include team structure, project process, team communication, and individual behavior as moderators of ISD conflict antecedents.
4. We depart from Barki and Hartwick [9] by treating "Interpersonal Conflict" as an outcome of conflict antecedents through the intervention of moderating factors. In turn, conflict influences the remaining outcome component ("Project Outcome," discussed below). We include conflict characteristics and resolution characteristics as significant interpersonal conflict factors.
5. As with Barki and Hartwick's [9] "Outcomes of Interpersonal Conflict," our "Project Outcome" component includes both project success and system success. It is influenced by the other outcome component, "Interpersonal Conflict,"

and is also influenced by both conflict antecedents and moderating factors.

6. As in the Barki and Hartwick's [9] model, ours includes a feedback loop. Both outcome components are expected to influence some of the "Conflict Antecedent" factors. Specifically, the experience of project success or failure, and the characteristics of interpersonal conflict itself, are expected to influence organizational and team culture, as well as individual perceptions, expectations, and attitudes.

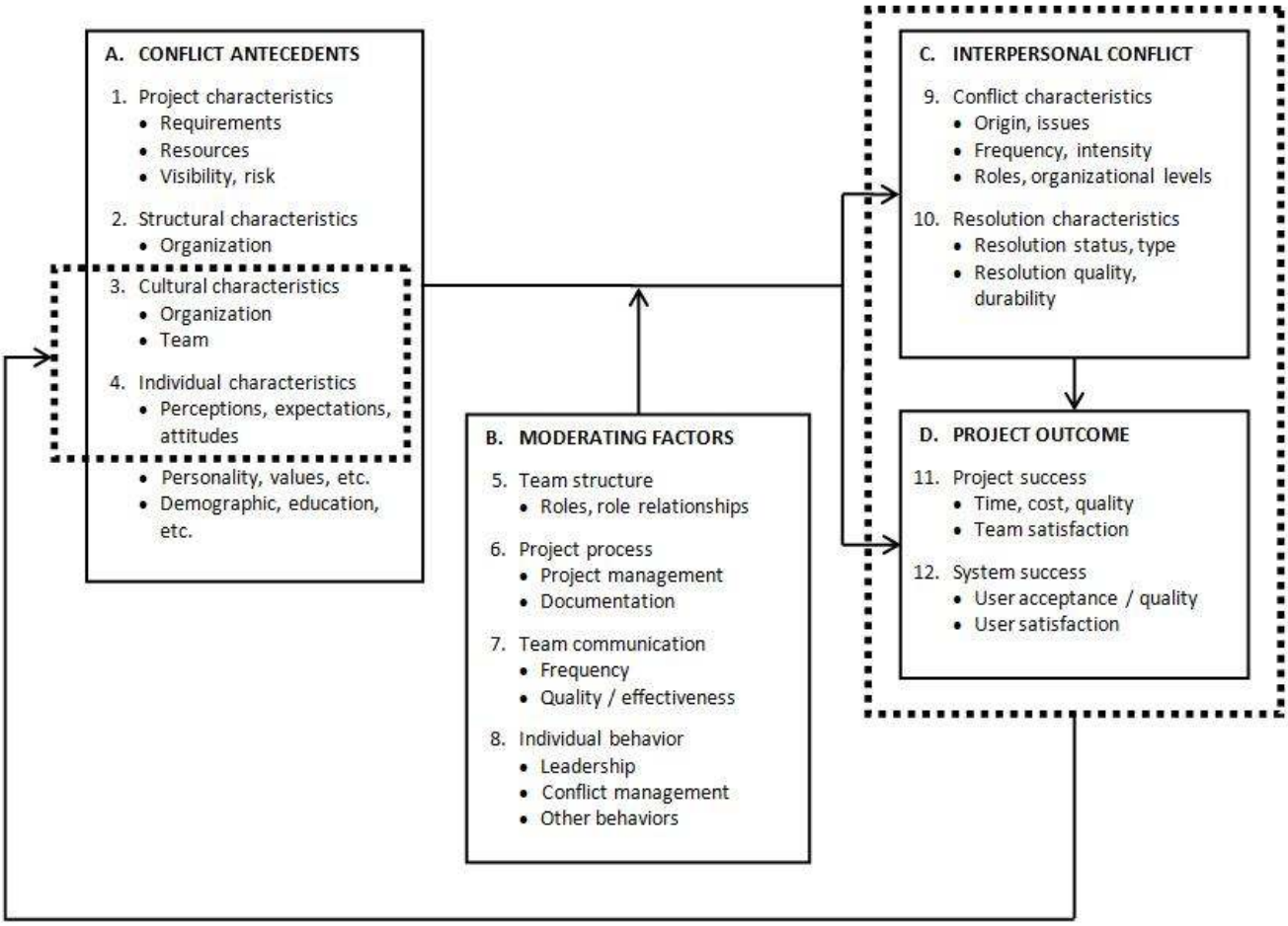

Figure 1: ISD Interpersonal Conflict Model

Components of the ISD Interpersonal Conflict Model

Conflict Antecedents. Conflict antecedents are preexisting, relatively stable contextual characteristics including social components and actors such as organizations, teams, and project team members. Following Wall and Callister [74], this model component is organized into project characteristics, interpersonal characteristics (structural and cultural), and individual characteristics. All of Barki and Hartwick's [9] categories (organizational characteristics, project characteristics, team characteristics, and individual characteristics) appear but are reorganized based on the strong influence of project characteristics in our case study and on Wall and Callister's [74] treatment of structural factors and cultural factors as primary subcategories of interpersonal conflict antecedent factors that are more influential on conflict outcomes than individual characteristics.

As noted in the Theoretical Foundation section, Gobeli et al. [35] demonstrate a strong outcome impact

for contextual factors as conflict antecedents. Other studies have acknowledged the importance of structural and cultural factors in the development of ISD conflict [9][34][61][63][85]. In contrast, individual factors such as personality and emotions are not well supported [74]. Accordingly, the contextual categories are positioned prior to individual characteristics in our model. Based on our case study findings, we have added project characteristics to our list of contextual categories.

At a high level, we break project characteristics into requirements, resources, and the visibility and risk the project entails. Visibility may be influenced by factors such as the strategic value of the project to the owning organization, but otherwise these characteristics are inherent in the nature of the undertaking itself and will not be much influenced by external factors. For example, enhancement of software or systems is usually less risky than the innovative project described in our case study, and requirements are likely to be less complex and more readily identified. Project resource needs including time, budget, and staff are linked to the work that is undertaken, and shortages in any of these areas can result in higher stress for the project team.

The second contextual category, "structure," is concerned primarily with roles and relationships within the project owning organization, including the departments, divisions, or external vendors involved. "Culture" includes both organizational and team characteristics and refers to shared history, meanings, and behavioral expectations related to prior experience with the type of project and specific partners performing the project work. Culturally, both organizations and teams may be characterized in a variety of ways, e.g. high trust with open and frequent communication, or factionalized with infrequent or guarded communication.

"Individual Characteristics" appears as a third, primarily non-contextual category of conflict antecedents. It includes internal, not directly observable qualities that are somewhat malleable such as attitudes, expectations, and perceptions, stable internal qualities such as personality and values, and externally discernible qualities such as age, gender, and ethnicity. Education or experience is external in the sense that it can be defined and known to teammates.

Moderating Factors. The moderating factors component is distinct from conflict antecedents because its elements are less stable and can be collectively or individually modified by project sponsors or team members, creating an opportunity for intervention between antecedent characteristics and both interpersonal conflict and project success. It is divided into interpersonal / contextual factors and individual factors, with team structure, project process, and team communication as contextual categories.

Team structure refers to size and diversity of professions, organizations, or functional areas represented, degree of interdependence in completing the project work, and the manner in which roles and responsibilities are defined for team members, including specification of project ownership, control of specific project tasks or components, and reporting relationships. It appears in this component rather than conflict antecedents because unlike organizational structure, it is relatively easy to modify according to the needs of the project. This is also true of project process and team communication. Even in organizations with prescribed project structures, roles, relationships, and procedural rules, it is often possible to informally negotiate alterations to accommodate project team needs.

Project process includes project management characteristics such as management of changes, issues, risks, and project documentation. As noted in our review of the general and ISD conflict literature, the remaining interpersonal category, communication, is strongly supported by the general conflict literature as a factor in both promoting and reducing interpersonal conflict.

Individual behavior refers to observable actions of individual team members and includes choices about leadership style, conflict management style, and other behaviors that affect the project team. It is expected that behavior will be related to and influenced by the other moderating factors; e.g. process compliance or noncompliance, request responsiveness and cooperation, and so on.

Interpersonal Conflict. Our model is generally consistent with Barki and Hartwick [9] but structurally, gives Interpersonal Conflict a dual role. It is both an outcome of conflict antecedents through the intervention of moderating factors, and an influencer of project outcome. Thus, we include two outcome categories and posit a causal relationship between them, with interpersonal conflict and conflict resolution characteristics influencing both system and project success.

Interpersonal conflict is characterized by the issues, actions, or other precipitating factors that result in its development, its frequency of occurrence and intensity (e.g. disagreement vs. interference, the presence or absence of negative emotion), and by the roles and responsibilities of its participants and the organizational levels they occupy. Resolution characteristics matter in terms of benefit to the team and the project. Has the conflict been resolved? What means were used to resolve it or attempt resolution? Are participants satisfied with the resolution? How durable is the resolution, that is, how much time is

likely to pass before a very similar conflict erupts once again?

Project Outcome. As stated above, project outcome is dependent on both moderating factors and interpersonal conflict. Project success is determined by sponsor and team defined success factors such as traditional time, cost, and quality measures as well as team satisfaction, which includes quality of experience and willingness to work together on future projects. As in our case study, system success is rigorously defined as based on user acceptance and satisfaction.

Feedback Loop. As with Barki and Hartwick [9] (see Appendix III), our model includes a feedback loop from the outcome components to conflict antecedents. A successful project experience with satisfactory conflict management, high team satisfaction, and enthusiastic user acceptance is expected to have a positive influence on team and organizational culture, as well as individual perceptions, attitudes, and expectations. The converse is also true.

Advantages of This Model

The chief advantage of this ISD interpersonal conflict model is a more dynamic view of project success determinants than can be found elsewhere. By adding moderating factors that are amenable to negotiation and modification in response to contextual elements, and by treating interpersonal conflict as both an intervening and an outcome variable, ISD practitioner attention is directed toward opportunities for early assessment of outcome risk as well as promising opportunities for corrective action. While system success and traditional measures of project performance cannot be accurately determined until the close of the project, both interpersonal conflict and project team satisfaction are emergent and cumulative. Long before the project work is complete, team members will form opinions about the effectiveness of project process, including conflict management and resolution. By establishing a communication path and process to capture deficits or issues as they arise, the ISD project manager can intervene to deflect contextually- and interpersonally-based threats to the quality and usability of systems and software.

DISCUSSION

Research into structural antecedents will enhance understanding of how context contributes to development and resolution of conflict, strengthening the practical value of findings by providing guidance to managers and leaders embedded within organizations that own or participate in ISD projects.

Considering the consensus that interpersonal conflict is highly damaging, a thorough understanding of conflict causation is of great practical value for preventing and managing ISD conflict. Both the general conflict literature and ISD qualitative research (including the case study above) point to structural and behavioral factors as antecedents for emotional, divisive, and damaging interpersonal conflict. The effectiveness of behaviorally-based, context-sensitive, soft skills leadership-driven structure and process interventions in our case study in ameliorating longstanding cross-functional divisiveness suggests that individual-level differences are at best secondary causes in the development and escalation of relationship conflict.

With respect to the task versus relationship conflict distinction, we might ask: Under what conditions does unavoidable task conflict (substantive disagreement) escalate into preventable interpersonal hostility (relationship, or manifest conflict)? A definitive answer awaits research that is fully focused on establishing the contextual, structural, process, behavioral, and other antecedents that transform inevitable disagreement and perceptual divergence into full-fledged, self-perpetuating, outcome-damaging ISD conflict. As a starting point, we propose a full ISD interpersonal conflict model (see Figure 1) adapted from Barki and Hartwick [9], to be populated with antecedents suggested by ISD case studies (including ours) as well as multi-disciplinary sources such as the Project Management Institute® cross-national, multi-industry study with its strong support for contextual factors as organizational value enablers [56][69].

Interpersonal conflict antecedent categories appearing in Figure 1 are ranked by structural primacy and include project, organizational, project management, team, and individual characteristics:

- Top ranking for project characteristics recognizes the super-organizational context of ISD projects, drawing upon global technical capacity that determines absolute feasibility, innovative stance, and difficulty.
- Project characteristics in turn influence an organization's decision to initiate an ISD project.
- Organizations provide environmental context, structure, and process that influence options and methods for managing the project.
- Both organizational context and the project management methodology affect project team roles, relationships, and behavior.
- Finally, the significance and impact of manifest (external) and latent (internal) individual-level characteristics and behavior is me-

diated by all of the higher-level structures and social contexts within which team members act and interact.

CONCLUSION

ISD conflict is typically associated with negative outcomes, yet empirical research has not yielded an overarching model of conflict causation that can guide practitioner decision-making. Moreover, implied assumptions regarding causality appear to focus on individual-level factors that are unsupported by general conflict research and only weakly supported by qualitative ISD studies. Structure, process, and organizational characteristics are strongly supported in the general literature, yet largely ignored in ISD empirical research. Behavior is another promising antecedent class, but ISD behavioral constructs are oddly skewed toward non-substantive user "participation" and other subordinate user roles. Researcher perceptual bias may contribute to these methodological flaws.

Without contextual information and solid empirical grounding for causation, models tested in many of the reviewed studies have little to offer in the way of credible guidance for real-world ISD projects. There is an urgent need for investigation of ISD conflict antecedents, with careful attention to alignment of theory with findings from general conflict research, particularly behavioral, structural, process, and contextual antecedents. Behavioral constructs will benefit by examining bias-informed assumptions about the content, relative valuation, and interaction of user versus developer roles.

As such, we recommend that effort be directed first to the establishment and understanding of ISD conflict antecedents, with attention to context and the general conflict literature. The effort will pay off in more robust predictive models for ISD outcomes and enhanced practitioner relevance.

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APPENDIXES

Appendix I. Document Counts by Study Phase

Year	Month	Phase	Doc #	Phs #	Phase %
Year 1		Start State	12	12	12.6%
Year 2	1 - 3	Phase I / Reorganization	52	52	54.7%
	4 - 6	Phase II / Consolidation	13	13	13.7%
	7 - 12	Phase III - Team Maturity	7		
Year 3	15 - 24	Release A	1		
Year 4	27 - 36	Release B	2	10	10.5%
Year 5	37 - 48	Release C			
		OUTCOME			
		AUDIT	3		
		User assessment	5	8	8.4%
		Total:	95		

Appendix II. Case Study Data, and Notes on Selected Documents

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
1	ORG-CLM	Conflict, process resistance	Phase 1 / Reorg.	Email, Mtg notes, Bus Svcs PM	Resistance to new forum for change control, no IT participation
2	TM-PRC	Process	Phase 2 / Consolidation	Revision history, feature list	Late changes to SW / project requirements (after 1 1/2 years). Project discipline - feature changes documented.

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
3	ORG-CLM, TM-LDR , ICP-INF	Process, resistance, risk, conflict	Phase 2 / Consolidation	Engineering (owning) VP introductory remarks for change mgt session	Second change management director session - rebaseline feature list & schedule. Resistance - 2nd session held 3 mo after 1st, VP sponsor facilitation needed
4	TM-PRC , IND-ROL , IND-STA , ICP-INT	Communication gaps	Start State	Email, Engineering (owning) Mgr sends documents for posting	Corp PM instituted repository for project documents to address lack of access, uncertainty about versions after gathering them from various sources
5	TM-PRC, TM-LDR, PRJ-SYS , IND-ROL , IND-STA	Communication gaps, ad hoc process, scope uncertainty	Phase 1 / Reorg.	Email from IT PM to Eng PM	Uncertainty about specifications for a key product feature. IT PM suggestion to "obtain consensus" for new work in a lower level meeting.
6	TM-PRC, PRJ-SUC , ICP-INT	Communication gaps	Phase 1 / Reorg.	Email from Eng PM to other Eng PM	Uncertainty about status of key agreement. Not all players in the loop.
7	TM-PRC, TM-HST	Communication gaps, distrust, culture change / role acceptance	Phase 1 / Reorg.	Email, IT PM to managers	Eng PM notes that business not included in key discussions, has to ask about status. New PM in all dist in email string (role acceptance).
8	TM-PRC, TM-LDR, TM-HST, PRJ-TME , ICP-INT	Process, competing loci of control, time constraints	Start State	Email, IT Director to cross functional team	Special meeting hosted by IT for cross-functional discussion of project issues including schedule
9	ORG-CLM, ORG-CLT, TM-PRC, TM-HST, PRJ_TME , ICP-INT	Competing loci of control, schedule risk, ad hoc process, project risk	Start State	VP level project status presentation slides	No unified status report, functional orgs present separate slides, IT does not provide an electronic copy to team. New overall project PM noted. Project divided into two phases. Next step: compile overall project plan. Requirements document realignment pending. Unknown schedule impact noted.
10	ORG-CLT, TM-PRC, TM-LDR, TM-HST , ICP-INT, ICP-INF	Competing loci of control, process gaps, communication gaps, PM role	Start State	Email, IT PM to dist	IT PM-hosted meeting includes a team task agenda item actually initiated and owned by corp PM. Information about meeting not available to all. Eng Tech lead notes need for central doc access, central process.
11	TM-PRC, TM-LDR, TM-HST, IND-ROL, ICP-INF	Competing loci of control, scope uncertainty, process noncompliance, communication gaps	Start State	Schedule, IT PM	IT prepares project schedule. Simplicity does not reflect project complexity. Not compliant with organizationally mandated project process.

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
12	TM-PRC, TM-LDR, IND-ROL, ICP-INF	Competing loci of control	Phase 1 / Re-org.	Email, IT PM minutes for cross-functional meeting	IT PM continues lead role activities after hiring of overall PM by Eng (project owners).
13	TM-PRC, TM-LDR, IND-ROL, ICP-INF	Competing loci of control	Phase 1 / Re-org.	Minutes - from mtg referenced in doc #13	Minutes verbiage makes clear that IT PM is managing the project schedule
14	TM-LDR, TM-PRC, PRJ-MGT, ICP-DIS, ICP-INF, IND-STA, ICM-ASR	Competing loci of control, conflict, resolution	Phase 1 / Re-org.	Email string - Overall PM communicates regarding next VP status session	Overall PM request countermanded by IT PM, Eng sponsor (owning Director) corrects IT PM, string ends with Month 1 VP Status session outcome to PM team, others
15	TM-LDR, TM-PRC, IND-ROL	PM role, team structure, process announced	Phase 1 / Re-org.	Month 1 unified presentation to VPs	PM coordinates preparation of first unified status presentation; however functional structure is preserved in format. Notes documentation in process that will be posted to unified project website. Project process ground rules and team structure specified.
17	TM-LDR, TM-PRC, IND-ROL, ICP-INF	Competing loci of control	Phase 1 / Re-org.	Email, IT PM to dist	IT PM cancels all component mtg, continues to perform overall lead role
18	TM-LDR, IND-ROL, ICM-ACM	Team leadership, conflict, modeling respect, resistance to team structure and roles	Phase 1 / Re-org.	Email, PM to IT PMs, fw to selected mgt	Follow up from earlier email CONFLICT (doc #14). Respect - PM thanks IT PMs & updates them on PM meetings (they have not been attending). Tactful notice of future requests for action.
19	TM-LDR, IND-ROL, ICP-INF	Competing loci of control	Phase 1 / Re-org.	Minutes, IT PM cross functional meeting	IT PM continues to act as corp lead
20	TM-PRC, TM-HST, TM-LDR, ICM-ASR	Culture change, project process, conflict outcome	Phase 1 / Re-org.	Minutes, Business / System requirements schedule discussion	A new IT PM is assigned, mandated documents to be added to schedule.
21	TM-PRC, TM-LDR, ICM-ACM	Culture change, project process, conflict outcome	Phase 1 / Re-org.	PM / IT PMO Mgr negotiation	New relationship between PM and IT; new IT PM & new IT PMO mgr. PROCESS documentation: Change Management Plan.
24	TM-PRC, TM-HST, ICM-AVD	Conflict, distrust, resistance	Phase 1 / Re-org.	Joint requirements session schedule	PM was not invited to these sessions, chose to accept exclusion.
25	TM-LDR, ICM-ACM, ICM-ASR	Modeling respect	Phase 1 / Re-org.	Email, PM to IT PM	PM using tact & indirect means to elicit needed information from IT
26	ORG-CLT, ORG-CLM, TM-HST, ICP-INF	Resistance	Phase 1 / Re-org.	Email, from IT regarding request for info system access	PM request for information system access - not denied but deflected (institutionalized resistance to info sharing)
27	ORG-CLT, ORG-CLM, , ICP-DIS, ICP-EMO	Resistance, conflict	Phase 1 / Re-org.	Email, PM / IT PMO mgr	PM accused by IT management of inappropriate calls to project team members.

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
28	ORG-CLT, ORG-CLM, TM-HST, PRJ-MGT, ICP-INF, IND-STA	Resistance, conflict, resolution	Phase 1 / Reorg.	email, Owning VP to PM, owning Mgr, Eng PM	Resistance to feature set baselining - IT resistance overruled by mandate of Eng sponsor (owning Director)
30a	ORG-CLM, TM-LDR, TM-PRC, TM-HST, IND-ROL, PRJ-MGT, ICP-INF, IND-STA	Resistance, conflict	Phase 1 / Reorg.	PM LOG ENTRIES	Discussion between PM, IT PM regarding pending change in IT PM role assignment. IT PM expresses concern about a cross functional lead session on the previous day; seems confused about current project organizational structure. Notes message sent by IT PM to PMs and managers stating there was no need for the PM's team meeting, Eng Director sent a response requesting attendance.
30b	TM-LDR, IND-ROL, ICP-INF, ICM-AVD, ICM-ASR, ICM-ACM	Resistance, project leadership, modeling respect	Phase 1 / Reorg.	PM LOG ENTRY	IT PM does not respond to requests for information on schedule issues, and cannot explain some IT slide content. IT PMO manager attended VP prep session and offered to help finalize dates. PM sent message of thanks to IT manager and PM who had offered help with preparation.
30c	TM-LDR, TM-PRC, IND-ROL, IND-STA, ICM-PRB	Project process negotiation	Phase 1 / Reorg.	PM LOG ENTRY	PM meets with Eng VP, Director, owning mgr, PMO mgr. Presented process proposal, discussed next steps to firm up project team structure and address other issues.
32	TM-PRC	Process uncertainty	Phase 1 / Reorg.	Email, Tech Lead, Eng (owning) Mgr	Eng (owning) business manager unsure of who does tasks
33	TM-PRC	Process, role uncertainty	Phase 1 / Reorg.	Email, IT PO mgr / Business Svcs mgr	IT PM mgr unsure of who does tasks. Business Services mgr clarifies.
35	TM-PRC, TM-LDR, PRJ-MGT, IND-ROL	Process establishment	Phase 1 / Reorg.	Email, PM to Eng mgr, Eng subproject PM	PM status update, shows start up emphases to establish project process: PM level meetings, Change Management, role expectations, website & doc posting, VP status prep & decision documentation.
36	TM-PRC	Process establishment	Phase 1 / Reorg.	Minutes, PM team meeting	PM, Eng PM minutes - cross functional documentation including risks and issues, change management flow diagram. IT PM, IT subproject PM in attendance.
37	TM-PRC, IND-ROL	Process establishment	Phase 1 / Reorg.	Email, conf call set up	PM sets up weekly conf call for PM team meetings.
38	TM-PRC, IND-ROL	Process establishment	Phase 1 / Reorg.	PM Status Rpt	PM Start up activities, emphasis: project website, VP status update

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
39	ORG-CLM, TM-PRC, PRJ-TME, ICM-PRB	Culture change, confronting / problem solving, project risk	Phase 1 / Reorg.	Email, Bus Svcs Dir to Bus Svcs VP, owning VP	Positive, upbeat notes from cross functional mtg to discuss "hybrid" solution. Notes indicate that after 1 year, only 1/2 of planned spec docs are complete (stmt #5). Conciliatory / supportive statement, #8.
40	PRJ-SYS, ICM-PRB	Project risk, problem solving	Phase 1 / Reorg.	Presentation, 2 slides from IT mtg	Content reflects a "split out" of functionality and the need to plan for it.
41	ORG-CLM, PRJ-SYS, PRJ-TME, ICM-PRB	Project risk, problem solving	Phase 2 / Consolidation	Presentation, 10 slides from IT status to Sr. VP, Exec VP by IT Dir & IT PMO Dir	Presentation to executive levels reflects the "split out" of functionality. Includes high level schedules for both plus more detail for 1st release.
42	PRJ-MGT, PRJ-SYS, TM-PRC, IND-STA	Project risk, problem solving	Phase 2 / Consolidation	Email string btwn owning VP, opco CEO, other VP, owning mgr	CONFIDENTIAL from owning mgr to PM, seek exec sponsor / stakeholder approval for new approach
43	TM-PRC, TM-LDR, PRJ-SYS, PRJ-TME, ICM-PRB	Project risk, problem solving	Phase 2 / Consolidation	Presentation, 6 slides, IT PM	Detail on new "split out" approach (prep by IT PMO PM)
44	TM-PRC, TM-LDR, IND-PRS, ICP-EMO	Conflict, team leadership, problem solving	Phase 2 / Consolidation	Email string	PM sends clarification request on behalf of Bus. Svcs PM (avoid damage to Bus. Svcs PM / IT relationship). IT mgr response is high in negative emotional content but does answer the concern of the Bus. Svcs. PM.
45	TM-PRC, PRJ-SUC, ICM-PRB	Scope revision, problem solving	Phase 2 / Consolidation	Excel workbook, feature changes	Revisions to features for planned first software release
46	TM-PRC, PRJ-TME, ICM-PRB	Problem solving, improved communication	Phase 3 / Team Maturity	Email, IT PM to PM team	Problem solving – PM team role. Further release delay caused by vendor. New IT development schedule.
47	ORG-CLT, TM-PRC , ICP-INF, ICM-PRB	Problem solving, communication issue, resistance	Phase 3 / Team Maturity	Email, IT PMO mgr & IT PM to PM team	Problem solving / communication issue – PM team role. IT PMO mgr countermands communication of first release schedule changes.
48	ORG-CLT, TM-PRC	Problem solving, improved trust and communication, project risk and visibility	Phase 3 / Team Maturity	Schedule (high level)	Split out / release 1 - 2 schedule, Business Svcs (confidential)
49	TM-PRC, ORG-CLT, IND-ROL	Responsibility shift to Eng	Start State	Schedule (start state) - business	Milestone schedule prepared by the owning PM.
50	ORG-CLT, TM-PRC, IND-ROL, ICP-INF	Process noncompliance, competing loci of control	Start State	Schedule (start state) - IT PMO PM	Single-release schedule prepared by IT PMO PM; does not include mandated documents, simplicity masks actual project complexity

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
51	TM-PRC, TM-LDR, PRJ-MGT, IND-ROL	PM leadership, Team / project process, team communication	Phase 1 / Re-org.	VP status session minutes	PM sent final meeting minutes to team, posted to website. First full documentation of key meeting outcome, visibility across functional team areas. First unified VP status update, includes project process, PM role, cross functional visibility, audit trail on key issues and decisions, and pending action items for team.
52	TM-PRC, ICM-PRB	Process gap	Phase 1 / Re-org.	Email from IT SDC PM	Process gap - no Change Management process. Team member (IT subproject PM) attempts to get template for change mgt.
53	TM-LDR, TM-PRC, IND-ROL	Project / team process, culture change	Phase 1 / Re-org.	Communication Plan draft	Process document - Comm. Plan cross functionally prepared / vetted at PM level. IT PMO PM takes lead to support request of PM.
54	TM-LDR, TM-PRC, IND-ROL	Project / team process, culture change	Phase 1 / Re-org.	Project Plan draft	Process document - Project. Plan cross functionally prepared / vetted at PM level, coordinated by PM.
55	TM-PRC, TM-LDR, ICM-CMP	Culture change, project process	Phase 1 / Re-org.	Change Mgt policy responses	Process development. Modeling respect. PM, IT negotiation.
56	TM-PRC, PRJ-MGT, ICM-CMP	Project process negotiation	Phase 1 / Re-org.	PM status report, IT EVP	Process development; prep for IT executive meeting.
57	TM-PRC, ICM-CMP	Project process improvement	Phase 1 / Re-org.	Email, PM, Bus. Svcs. PM, IT PM	Process development. Specs / requirements approval process. PM development.
58	TM-PRC	Project process improvement	Phase 1 / Re-org.	Change Mgt Plan	PM - level developed Change Mgt plan cross functionally approved at the VP, Director, Manager, and PM levels
59	TM-PRC	Project process improvement	Phase 1 / Re-org.	Email btwn PM & IT PMO PM	Issue: Change request needed? First use of Change Management / CR process.
61	TM-PRC	Process development	Phase 2 / Consolidation	Change Mgt - scope rebaselining summary	Process development - change visibility. Scope rebaselining; document posted to web folder.
62	TM-PRC, TM-LDR.	Process development	Phase 1 / Re-org.	PM status report	Process development. PM status, process implementation, team building, website.
63	ORG-CLM, PRJ-SUC, PRJ-MGT	Project risk / visibility	Start State	Presentation to EVPs, VPs (start state)	Outline of benefit, strategic value of project

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
64	ORG-CLM, PRJ-SYS, PRJ-TME, PRJ-RES, PRJ-SUC, PRJ-MGT	Project risk / visibility, culture change	Phase 1 / Reorg.	Executive level presentation slides (start state)	Features detail, ROI detail, overall project and features issues, dependencies, PM: team structure & process (schedule baselining, process development, key document status). Complexity, Difficulty, Subproject dependencies, schedule risk. Challenge of triple constraint noted.
65	ORG-CLM, PRJ-SYS, PRJ-TME, PRJ-RES, PRJ-SUC	Project risk / visibility, culture change	Phase 1 / Reorg.	summary write up intended to guide owning mgr-to-IT communication	Benefits explained with reference to end user environment & base business, two-release strategy, risks (hurdles), "technology challenges" and "system complexity" referenced. End user impact / culture changed referenced.
66	ORG-CLM, PRJ-SYS, PRJ-TME, PRJ-RES, PRJ-SUC	Project risk / visibility	Phase 1 / Reorg.	Document	Detailed project description, showing complexity
67	ORG-CLM	Project risk / visibility	Phase 1 / Reorg.	Email string, owning Director fw to owning mgr, PM - Bus. Svcs. string (Executive level)	Risk / visibility - EVP request for impromptu status update. Multiple, closely spaced status presentations to high level management (some quite long / detailed).
68	PRJ-TME, ICM-PRB	Project / schedule risk	Phase 1 / Reorg.	Email string CONFIDENTIAL	owning mgr, tech leads discuss IT conference call outcome - schedule slippage
69	PRJ-SUC, PRJ-MGT	Project risk / visibility	Phase 1 / Reorg.	Eng Director presentation to end user org,	30-slide presentation about project - feature detail, impacts, DIFFICULTY.
71	PRJ-SUC	Project risk / visibility	Phase 2 / Consolidation	Presentation on competitor	Detail about competitors product
72	PRJ-SUC, PRJ-SYS	Project risk, complexity	Phase 2 / Consolidation	Subproject analysis	Subproject analysis - summary write up (not public)
73	ORG-CLM	Risk / visibility	Phase 3 / Team Maturity	Presentation to EVP	Executive level strategic update - 2 slides focus specifically on the case study project, relating it to overall business mission & giving high level status
74	ORG-CLM	Risk / visibility	Phase 3 / Team Maturity	IT ownership guidelines	NOT PUBLIC - BOD approval needed for case study project
77	TM-PRC	Team process, structure	Phase 1 / Reorg.	Email, IT PMO mgr to owning Director, BusSvc & IT mgt, cc PM	Update on business specification progress - using team structure

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
78	TM-LDR, TM-PRC, IND-ROL, ICM-ACM	Communication gaps, leadership change	Phase 1 / Re-org.	Survey by PM	PM surveys cross functional meeting participants preparatory to change of leadership to determine preferences. Respondent comments indicate this forum has been the "only" cross functional general access to information & discussion
79	TM-SIZ, TM-HET, PRJ-RES	Team size and heterogeneity	Start State	Start state, team names	PM initial list of about 100 names for primary and secondary team members; part of ramp up to corp PM role. Gathered from core business team at professional, managerial level.
80	TM-PRC, IND-ROL	Project communication	Phase 1 / Re-org.	Website usage	Early usage stats on project website; show high update rate for PM, high usage (over 1,000 hits) for PM team members and core technical leads, owning & IT mgrs, specifications writers. Recent day hits: 336.
81	TM-PRC, TM-LDR, IND-ROL, ICM-ASR	Project process improvement	Phase 1 / Re-org.	Change Mgt policy announced, web links	PM announces Change Mgt policy to xf mgt
82	TM-LDR, IND-ROL, PRJ-RES	Project team composition	Phase 2 / Consolidation	Email, new IT lead	Message regarding new IT Pm member (several IT PM changes in the first two years - compared to one change in Bus Svcs and none in Eng)
83	TM-PRC, IND-ROL	Process development, culture change	Phase 2 / Consolidation	Email, Eng (owning) technical lead	Cross-functional work pattern change. Owning technical lead (Eng) recaps implementation meeting; mostly professional level (1 or 2 mgrs).
84	TM-PRC	Improved communication	Phase 3 / Team Maturity	Email, owning Director forwards	Information about an organizational change that impacts project to business side contacts; original msg from IT Director to own org + cross functional mgt
85	TM-HET, IND-STA, IND-ROL, PRJ-RES	Team composition	Phase 3 / Team Maturity	Email, owning VP	Owning VP forwards information about IT PMO mgr rotation
86	ORG-CLM, PRJ-SUC, PRJ-MGT	Project risk / visibility	Start State	Email, owning VP	BOD funding approval for project
87	ORG-CLM, PRJ-SUC, PRJ-MGT	Project risk / visibility	Start State	Email, owning mgr	BOD funding status on agenda for VP level meeting
88	ORG-CLM, PRJ-MGT, IND-STA	Culture change signalled	Start State	Email, owning Director	Rebranding the project, owning Director email
89	ORG-CLM, PRJ-SUC, PRJ-MGT	Project risk / visibility	Start State	Document	Strategic project overview document, case study project appears as first position
90	ORG-CLM, PRJ-SUC, PRJ-MGT	Project risk / visibility	Phase 1 / Re-org.	Document	Top 20 project summary, case study project appears as position 1

Doc id	Antecedents from Barki and Hartwick [9]	Other keywords	Phase	Description	Comments
91	PRJ-SUC, PRJ-SYS	Project risk, complexity	Phase 2 / Consolidation	Email, Bus Svcs PM	Feature set titles, requirement documents, known document issues
92	PRJ-RES, IND-STA	Team composition	Phase 1 / Reorg.	Email, owning Mgr	Owning mgr, PM - mgr suggests names for mgt core team
93	TM-PRC, IND-ROL, ICM-ASR	Process mandate	Phase 1 / Reorg.	Document	GDP template, mandated project process (case study not compliant at this point)
94	PRJ-SYS, PRJ-SUC	Project complexity	Phase 3 / Team Maturity	Document	IRS Research Credit document, warranted by project complexity
95	PRJ-RES, TM-SIZ	Team composition	Phase 3 / Team Maturity	Document	Project structure essentially stable since Jan 06, with some personnel changes
96	OUT-PRC	OUTCOME (project process)	OUTCOME	Document, internal audit report (draft)	Report notes exceptionally good cross-functional communication and document availability. No significant audit issues identified.
97	OUT-PRC	OUTCOME (project process)	OUTCOME	Email, Audit Mgr to PM	Thanks message for feedback about the project team. Notes Eng Director has received a report of "exceptional" with no significant issues identified.
98	OUT-TMS	OUTCOME (project team, process)	OUTCOME	Document, audit survey completed by PM	Internal audit - Post audit survey completed by project PM.
99	OUT-ATT, OUT-QLT, OUT-USE, OUT-SAT	OUTCOME (software)	OUTCOME	Email, user acceptance survey - initial findings report to dist	Overwhelmingly favorable user assessment of software functions and response time; additional unsolicited favorable responses.
100	OUT-ATT, OUT-QLT, OUT-USE, OUT-SAT	OUTCOME (software)	OUTCOME	Document, final outcome report (user assessment)	Statistical analysis of user assessment data. Cross-functional project team clearly accomplished its enhancement goals for the third release. A need for corrective action for a single issue is indicated.
101	OUT-ATT, OUT-QLT, OUT-USE, OUT-SAT	OUTCOME (software)	OUTCOME	Email from PM to Eng Director / dist, reports user assessment outcome	Report to director regarding high user satisfaction, indicates need to address issue identified in user assessment survey
102	OUT-ATT, OUT-QLT, OUT-USE, OUT-SAT	OUTCOME (software)	OUTCOME	Email from PM to end user mid-level management	Message of thanks for securing user participation in product assessment survey, high level findings report.
103	OUT-ATT, OUT-QLT, OUT-USE, OUT-SAT	OUTCOME (software)	OUTCOME	Presentation slides, PM to VPs and Directors	PM presents findings of cross-functional user assessments (focus group, survey), favorable user assessment, recommendation for single issue production fix and user assessment for future releases.

Appendix III. Barki and Hartwick [9] Conflict Framework and Coding Scheme

Coding Scheme		
Antecedents of Interpersonal Conflict		
Individual Characteristics		
	IND-PRS	Personality
	IND-DEM	*Demographics*
	IND-EXP	*Education and Experience*
	IND-STA	Organizational Status
	IND-ROL	Organizational Role and Department
	IND-GLS	*Needs, Interests, and Goals*
Team Characteristics		
	TM-SIZ	Size
	TM-HET	Heterogeneity
	TM-LDR	Leadership
	TM-PRC	Team processes including participation, influence, and communication
	TM-HST	History including previous conflicts, management styles, tactics, and outcomes
Project Characteristics		
	PRJ-SYS	System characteristics and importance
	PRJ-RES	Resources
	PRJ-TME	Time pressures and constraints
	PRJ-SUC	Success Criteria
	PRJ-MGT	Top management support
Organizational Characteristics		
	ORG-CLT	Organizational culture
	ORG-CLM	Organizational climate
Processes of Interpersonal Conflict		
Interpersonal Conflict		
	ICP-INT	Interdependence
	ICP-DIS	Disagreement
	ICP-INF	Interference
	ICP-EMO	Negative emotion
Conflict Management Styles		
	ICM-PRB	Problem solving
	ICM-CMP	Compromising
	ICM-ASR	Asserting
	ICM-ACM	Accommodating
	ICM-AVD	Avoiding
Outcomes of Interpersonal Conflict		
Project Success		
	OUT-SPC	*Specifications*
	OUT-SCH	*Schedule*
	OUT-CST	*Cost*
	OUT-PRC	Process Satisfaction
	OUT-TMS	Team Satisfaction
System Success		
	OUT-ATT	Attitudes
	OUT-QLT	Quality
	OUT-USE	Use
	OUT-SAT	Satisfaction
Individual Performance		

	OUT-JBP	*Job Performance*
	OUT-JBS	*Job Satisfaction*
Organizational Performance		
	OUT-ORG	*Effectiveness*