MANAGING THE TENSION IN IS PROJECTS: BALANCING ALIGNMENT, ENGAGEMENT, PERSPECTIVE AND IMAGINATION

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Abstract

The differing experiences and practices of systems professionals and users cause major obstacles in the process of requirements definition. For system design projects to be successful, users and systems professionals must learn from each other. Wenger (1998) believes alignment, imagination and engagement to be the core elements for learning in a community of practice. Boland and Tenkasi (1995) believe that perspective taking and perspective making are core elements in learning across communities. We explore the value of these elements as a model for evaluating how users and IT professionals came together to work on an ERP project.

The non-profit organization we observed undertook an accelerated and iterative approach to the configuration process in order to surface relevant issues and expedite the project’s delivery. Participants were organized into teams dedicated to developing individual modules for the system. The model we propose offers theoretical insight and support for the major problems identified by management as the organization began to test the initial configurations of the system.

The case provides insights into how a high degree of active involvement in the configuration process by users, with the assistance of knowledgeable and experienced consultants, can help bridge the boundaries of knowledge across these two communities of practice. Yet, the accelerated schedule limits their ability to leverage their future system. Furthermore, the current project structure created limitations in the team’s ability to fully integrate the system modules. This research offers a new lens through which to examine systems design processes. For both practitioners and researchers, it provides insights into the importance of balancing the tensions in a design project.

1. Introduction

While the effective management of implementation efforts requires advance planning to insure that time, cost and quality targets are met, advance planning is hampered by the limited knowledge that designer have of the requirements and that users have about the capabilities of the new system. For example, ERP projects entail a process of discovery of the ways existing organizational processes and work systems can, should, or must be redesigned. Management of these projects requires surfacing existing knowledge of an organization’s work systems and practices and developing new knowledge of the possibilities and constraints of the new technology’s design. As a result, a full set of requirements is not possible a priori, but must be continually explored and developed over the course of the project. The overall goals are known but must be continually reassessed and operationalized in a process that may involve tradeoffs and balances among competing values. For these types of projects, the traditional models for system design and implementation are limited in how they handle this dynamic process.

In terms of system design, most projects face challenges with the identification, articulation and communication of needs [3]. Because of the tacit knowledge inherent in most tasks [4], it is difficult, if not impossible, for people to articulate exactly what it is that they need and know. Hence, users and developers both make assumptions and develop partial understandings of the project they are implementing together.

Successful projects engage users in such a way that they can elucidate not only what they know, but also how and why they know it. In addition, users are given the opportunity to learn how systems in general, and the current system in particular will be designed and developed. Together, both users and developers must be sufficiently engaged to share
their knowledge and learn from each other [5][6]. Furthermore, learning must continue during the course of the project as users and developers come to know the organizational and technical issues they confront in new ways.

We examine the utility of social learning theory [7][1] to explore the competing needs of complex information system implementation projects. We begin by extending Wenger’s social learning architecture, theorized to promote and sustain communities of practice, to incorporate issues that are fundamental to learning across communities [2]. Next we examine the tensions among the dimensions of the architecture as found in the requirements definition literature. Like the initial framework, we find that the components of a design process require balance in order to be effective. To elaborate on the model and explore its theoretical relationships within a specific project, we analyze data collected from an ongoing longitudinal study of an ERP implementation. We conclude with implications for research and practice.

2. An architecture for social learning

Communities of practice are a growing area of research in social learning [8][7][1]. Learning in a single community of practice occurs through apprenticeship, whereby a community regenerates itself through a process of participation and training [1][7]. Communities of practice formulate different ways of knowing [2]. In the same way that learning is facilitated in communities through common work practices, the development and refinement of a community’s perspective can also become an obstruction to participants’ ability to envision problems or to seek new solutions [9]. Strong perspectives, while necessary for a community to advance its knowledge of its specific domain, also create obstacles to inter-community communication and learning. Yet, we believe that the theoretical basis of apprenticeship holds promise for system development and implementation. We use it as the starting point of a good model to use to design a way for information systems and user communities to come together, share knowledge and learn.

Wenger believes that the degree of balance among alignment, imagination and engagement is reflective of a community’s ability to promote and sustain learning. To extend this model to inter-community learning we add perspective as a fourth dimension. We identify designers and users as distinct communities whose knowledge of systems is formulated by their experiences, giving them very different perspectives. For instance, in the implementation of an ERP system, the user community draws upon knowledge related to areas of business process and the organization’s existing legacy systems. The community of system developers relies on knowledge about the design of the future system and the process of its development. Inter-community efforts require mechanisms that provide a richer way to convey meaning [2], thereby overcoming limitations inherent in different perspectives. Choices regarding structure may enhance or limit the range and scope of the issues discussed and thus affects project ultimate success.

The challenge in employing the proposed framework is balancing the tensions inherent in alignment, engagement, imagination and perspective. We investigate each tension in turn. We believe that the tensions inherent in the architecture offers a way to tie together issues that, while interrelated, are most often isolated when examined theoretically or empirically.

2.1. Alignment and Imagination

Management of a project should benefit when clear objectives, a well-defined methodology and tight controls to monitor and evaluate progress are established. Yet, success is not always assured in an IT project, even when all three are present. In aligning the project’s efforts, the three components can be implemented in many ways. For instance, the way objectives are defined may give primacy to
problem solving over alternative rationalities [9], which may stifle innovation.

Alignment alone is not enough to support learning. A community of practice, and perhaps more importantly, the interaction between two communities must also support imagination. Imagination provides the opportunity to create new possibilities. The benefits of creativity and innovation in the development of systems are well established [10], but creativity without the appropriate information as to the possibilities and constraints of a design or an appropriate vision of the future may lead to poor implementation [11]. Therefore, a process of mutual adaptation [12] is necessary to balance the needs to develop an effective system and how those means are employed to orchestrate a successful implementation.

2.2. Alignment and Engagement

System implementation projects benefit from increased user participation and involvement by promoting acceptance of the technology [13]. Often, however, users are given relatively passive roles, despite being required to sign off on requirements [14]. Formal methods structure activities in projects, but they also impose controls that may promote behaviors in project teams that are unintended and unwanted.

As a result, patterns of user participation vary according to who controls the selection of features and the coordination of activities [15], often marginalizing users. Methodology may give primacy to designers over users in the way that it defines roles and responsibilities, stifling the engagement of users in a process [14]. It may also give primacy to one department over another, limiting the influence of organizational departments [16]. In response, the participative design movement highlights the importance of empowering users so they can influence the overall process [17].

2.3 Alignment and Perspective

Control is complicated in the requirements definition process by the fact that the coordination and communication necessary to complete the tasks spans organizational departments [18], which must be able to represent and negotiate each other’s perspectives in accomplishing coordinated efforts. Boland [19] distinguished “control over” from “control with” in order to differentiate between hierarchical, bureaucratically operated processes from those of a clan, in which shared values and beliefs serve as the basis for coordinated action. Carlile [20] notes that at the pragmatic level of boundary spanning, knowledge of one group must be transformed for the design process to succeed.

The disparity in interests across communities can result in a process becoming political as differences in power are exercised to influence interactions and decisions [21]. Political behavior in organizations can come to influence how conflict is structured and resolved [22]. Conflict is a necessary part of a requirements process, leading to resolution of issues that might otherwise go unnoticed. Yet, conflict will not emerge without active engagement by participants [23]. Effectively including users in the requirements process requires overcoming effects of authority to surface and resolve conflicts [24].

2.4. Perspective and Imagination

Perspective allows a community to decipher those ideas that are truly innovative and establish practices for exploiting existing knowledge [9]. Yet, knowledge work in organizations involves activities within and between its communities [2]. Without opportunities for understanding the perspectives of other communities, continual reinforcement of an existing paradigm can lead to resistance to new ideas. The stress and anxiety that are often associated with processes of change can have adverse impact on participants [25]. This can influence cognitive as well as social processes, disrupting learning and creating social defenses. Finding ways to overcome the boundaries that separate communities can offer a mechanism for discovery that leads the process toward greater innovation.

2.5. Perspective and Engagement

The social process in which users and developers define requirements is complicated by their differing backgrounds, cognitive styles, personalities, job characteristics, organizational circumstances, affiliations and locations, leading to differing interpretations [26]. These differences in interpretations may be a source of confrontation and sometimes misunderstandings. Through appropriate selection of members and use of appropriate training and socialization processes, individuals in a group can develop a stronger sense of identity and commitment [18]. Appropriate activities can also serve as rituals to reinforce acceptable behaviors. Participation in a project is facilitated through inter-community activities, such as boundary spanning, which may be employed to manage interactions and communications [27].
Boundary objects extend the richness of the representation and thereby offer a greater ability to share perspectives with others [2]. Boundary objects provide a mechanism for reifying existing knowledge in a community, providing opportunities for reflexivity, strengthening one’s understanding while bringing into relief one’s own perspective relative to alternative interpretations (Boland and Tenkasi 1995). Having rich representations of an alternative perspective gives a community the ability to reflect on its own knowledge, bringing about new ways of knowing.

2.6. Engagement and Imagination

Participation or engagement represents active involvement in the negotiation of meaning by participants. Design provide a mechanism for reifying existing knowledge in a community, offering opportunities for reflexivity and strengthening understanding while bringing into relief one’s own perspective relative to alternative interpretations [2]. Having rich representations of an alternative perspective gives a community the ability to reflect on its own knowledge, bringing about new ways of knowing that can unveil new possibilities, leading to innovation.

Both participative design and joint application development promote participation by involving users in activities in which they document or design the future system through scripting or prototyping, helping them draw out and refine requirements, reifying what is known and revealing what is not fully understood [28]. They offer a process of simultaneous definition, design and discovery. The resulting artifact provides a common reference point to foster mutual understanding and as a repository for existing knowledge, the model facilitates ongoing evaluation of the design, its reinvention and extension.

To further understand the issues held in tension across the components of the model, we undertook a case study. We offer the emerging themes identified in these interviews to demonstrate how the tensions pull at the related components of the project and thereby demonstrate their interdependence. Such associated effects can enable or impinge knowledge sharing and advancement of an effective development process. In the end, we offer the final model as an interpretive lens to provide theoretical explanation for how and why distinct problems have surfaced during the project.

3. Method

We undertook a case study approach in order to elicit how and why the tensions outlined in the model emerged and affected the course of a system development project. Case studies are appropriate when how and why questions form the basis for research questions [29]. For the data collection, a semi-structured interview process was used. The interview guide explored the tensions discussed above by drawing on the model shown in Figure 1. The purpose of the interviews was to elicit the project participants’ experiences and perceptions in a system development process. The interviews were designed to offer the interviewees the opportunity to reflect on their experiences and surface their insights about the project.

Participants were involved in the configuration of an ERP system at a large university in the Southeastern United States. Initially, several interviews were conducted with the project’s sponsor, the university project manager, the project’s technical leaders and consultants who were advising the project’s sponsor and manager on how to structure activities and proceed with implementation. These interviews offered insight into how the project was organized and planned. During this time, we learned that the project was organized around the functional modules of the software. The next step involved interviewing participants in these functions to elicit their experiences and insights.

Eight teams encompassed the distinct functional modules of the project. Through the help of the project manager we identified team leaders (who represented the user community at the university) and consultants (contracted through several national consulting firms) for each project. We conducted interviews with matched pairs of team leaders and consultants for four of eight projects. Interviews were recorded. The findings outlined in the analysis and discussion sections below are based on these eight interviews.

Three times during the course of the interview schedule and just after the completion of all eight, the first two authors met to discuss general themes that were emerging from the interviews. Over time, those themes were further examined and discussed in terms of their relation to the tensions between and among the components in the model. The interviews were first analyzed to develop the coding indicators that guided which interview excerpts were extracted for additional analysis. Subsequent analysis was used to...
refine those indicators and identify the emerging themes. This approach is based on thematic analysis [30]. In thematic analysis, general themes emerge from the analyst’s emersion in the data. As these themes emerge, rules are structured to qualify codable moments, which become the outline for the researcher to determine when an excerpt of an interview qualifies for inclusion in the development of a theme.

Because this analysis represents just the first of several ERP projects in this research, the development of rules and themes is presented only as a partial and developing set, and should not be considered a complete or comprehensive set for ERP projects, in any sense. Further analysis is needed to examine interactions of clients and consultants across additional projects before the testing of the codes can be considered complete. Yet, we believe from an inductive standpoint, the themes that have emerged to date provide insight into the issues with which users and developers struggle during a system development project. The themes also provide insight into the issues that play critical roles in projects as they influence the tensions and balance between the components presented in the model.

5. Analysis

Figure 2 summarizes the themes we identified. The themes are expressive of the tensions between pairs of deserving goals within the project.

5.1 Alignment and Imagination

In interviews, participants were asked to describe the goals of the project, how it was organized and who they turn to for instruction in order to understand how alignment was defined and implemented in the project. They were also asked how the project would serve the needs of the organization and if the process had explored new ways to do so in order to understand issues related to imagination. Based on the responses to these questions, comments were coded when the interviewee described aspects of alignment effecting imagination or visa versa. As the interviews were coded, schedule and scope emerged as themes that describe the tension between these competing needs in the project.

The project's schedule was originally designed with an accelerated and highly ambitious schedule. Participants described the schedule as limiting their opportunity to explore the functionality of the new system and the possibilities that it had to offer. In several cases, respondents stated their fears that functionality that existed in the current system would not be available in the new system. In other cases, implementing some parts of the new software were abandoned altogether.

Subjects also expressed their concerns that in order to meet the needs of the organization, the project would require more effort and time than originally envisioned. The perception that the schedule needed to be extended reportedly grew during the development of the requirements for the project and the configuration of the software. This perception did not, however, influenced the ongoing development of the schedule. As an indication of this theme, a continual debate persisted between the university’s project manager and the consulting firm’s project manager over whether the project was on schedule or not.

5.2 Alignment and Engagement

To understand if and how participants in the project felt they were engaged, interviewees were also asked about their role in the project and how they were able to influence it. Responses were then coded when the interviewee described how aspects of alignment were effecting participants' mode or level of engagement or how the mode or level of engagement they perceived as necessary to complete the project effected how the project was aligned. As the interviews were coded, restrictions placed on the role of participants and their ability to influence the
way the project was being defined and managed emerged as themes that describe the tension between these competing needs.

Participants expressed feelings that the way the project was managed and organized restricted their ability to effectively fulfill their desired role in shaping the outcome of the project limiting what they could accomplish. The functional leaders indicated that their influence was restricted by their limited interactions with management. They stated that this was, in part, due to the project’s structure, which relied on a single project manager overseeing eight teams dedicated to development of the functional modules. The consultants also felt restricted in their participation, but expressed this more in terms of the process. They felt that management’s disregard for their input regarding how tasks should be organized and executed was detrimental to the project’s prospects for success.

At the same time, both team leaders and consultants expressed their need and desire, as part of their role in the project, to influence the project’s definition and management. They specifically stated the need to set expectations for management regarding what was possible and to try to influence those expectations that had been defined by management. For the users, this meant trying to insure that their voices were heard. Since they felt a limited ability to engage the project manager, interviewees described their raising issues of concern during several steering committee meetings. The consultants also felt it was very important for them to stay actively engaged in setting the expectations of the project. They did so by sharing with the project’s manager their knowledge of the configuration process learned in other engagements. Again, the consultants felt that management’s expectations, as laid out in the project schedule and goals were overly ambitious. They also expressed frustration in their inability to influence them.

5.3 Alignment and Perspective

To explore issues related to perspective, participants were asked to describe the types of issues that had come up during their interactions with their functional or consulting counterpart during their work on the project. In addition, they were asked if they shared a common understanding with their counterpart and if so, how did that understanding come to be. As the interviews were coded, the management structure of the project and the need for coordination across the teams developing the functional modules emerged as important themes that describe the tension between these competing needs.

The issue of the flat organizational structure employed in the project was mentioned because of the difficulty teams were having coordinating their related efforts across the functional teams. As described above, the project was divided into eight functional teams, with a single university project manager with a single counterpart from a consulting firm who supervised the consultants. This structure enabled close work in teams but hindered cross-functional interaction, which the teams found to be ineffective when trying to design workflow changes or understand the implications that their decisions had on the design of other modules.

The need for a high degree of integration that was required in configuring ERP software, as expressed by the team leaders and consultants, has over time led to discussions regarding changes in the structure of the project. To date, the autonomy of the teams had given them an ability to focus on their particular function, but as the project progressed, the project’s requirements increasingly overlapped as the processes were defined. The technical lead on the project and several team leads expressed the need for changes to the project structure that would add additional hierarchical levels to the structure, facilitating knowledge exchange and decision making. As a result, additional experienced consulting personnel would be hired and placed in the teams so as to facilitate a greater degree of cross-functional process integration.

5.4. Engagement and Imagination

As participants in the interviews described the tasks they were involved in and the evolving configuration process, several themes emerged that reveals the tensions between engagement and imagination. As the interviews were coded, the tasks they conducted in this process and their conceptualization of the system design emerged as important themes in describing the process.

The issue repeatedly turned to the learning that took place during the development process, as the teams interacted with the software. Team leaders described their experiences in configuring the software and how this experience gave them greater insight into how they envisioned the future design of their system. The consultants also talked of their learning the new version of the system and how they saw an important part of their role as helping their teams to understand the possibilities and limitations of the software.
As the teams develop their knowledge of the software, it provided them with insight into the limitations of the scope and range of the software’s design and how they could develop the system during the project. The limitations and capabilities of the software, once understood by the team leaders and the consultants, gave them insight into how they should focus their time and energy. For instance, the team leaders are very cognizant that they should schedule completion of certain parts of the configuration while the consultants were still on the project in order to insure that they could draw on their expertise. Furthermore, the consultants felt that because of the complexity of the software, it was very important to educate the teams beyond the specific tasks that they were engaged in on a daily basis. The consultants indicated that as they came to know the organization and the software better, they were better able to engage their client in ways that helped them to understand the systems limitations and possibilities.

5.5. Perspective and Imagination

In the interviews, the consultants described the users’ lack of understanding of the software and users described the consultants’ lack of requirements’ understanding within the organization. In addition, interviewees expressed the need for the future system to account for the cross-disciplinary needs of the organization and the ability to leverage the expansive scope of the software in order to be successful. Team leaders increasingly expressed their realization that this system would significantly affect the design of workflow processes, necessitating a greater range of organizational participants to be aware of the implications, and in some cases opportunities of the impending design decisions. Yet, interviewees also indicated that tremendous limitations existed in their own knowledge of what all these changes might be.

The teams also discussed how their discovering what the system’s capabilities were, resulted in their realization of opportunities and constraints that would ultimately affect the system’s users. Several of the existing systems in the university were extensively developed to automate entire processes, while others employed extensive shadow systems. Some interviewees indicated that for those fully automated processes, the new system might not be able to automate or integrate the workflow in as efficient a way as it had been automated in the existing system. Alternatively, the replacement of shadow systems offered the ability to streamline processes. Consultants expressed the importance of their sharing their knowledge of how such processes were implemented in other installations.

5.6. Perspective and Engagement

In discussing the issues that came up during interactions with their counterpart on the teams, functional team leaders expressed concern during the interviews that this experience be an effective process of knowledge transfer. They expressed a realization that the consultant’s knowledge of the system was vital to the project’s success, but they also realized that their ability to acquire that knowledge was made difficult by their own background, which were predominantly non-technical. For this reason, the selection and retention processes used for consultants received a great deal of attention. Respondents consistently reported without provocation that only one consultant was replaced. The reason reported for the change was insufficient communication skills that inhibited effective knowledge transfer. On the other hand, the consultants expressed challenges in understanding the distinct context of the university’s systems and how they could translate their existing understanding of the new software system in ways that the users could understand.

Knowledge transfer by consultants to the users helped them to understand the software and what they need to do to complete the project. One team leader referred to this as “brain trading.” Activities and mechanisms reported to work effectively included working in small teams and engaging in close interactions while working through the actual configuration of the software. The use of an issues database has also reportedly became a useful tool in helping to draw on the insights of a larger set of participants.

6. Discussion

Six interrelated sets of themes emerged that reflect the complex nature of the knowledge work being undertaken in these projects. Within these sets of themes are reflected both the a priori and emerging characteristics of projects and the immediate and emerging problems they pose for the management of these ongoing efforts. The immediate ones can be planned a priori: the formation of a schedule, the structure of the project’s organization, the recruitment of specialists, the definition of their roles, the task they will undertake and mechanisms for communication. For each of these themes, there emerged in the interviews associated themes that
reveal issues that evolved over the course of a project. These themes include the scope of the design, the mechanisms for coordinating its delivery, the integration of specialized knowledge, the ways in which individuals could influence the process, how they reconceptualized a design as they worked on it, and how collaboration could be facilitated. These themes are presented in the table below.

<table>
<thead>
<tr>
<th>Tensions from model components</th>
<th>A priori issue defined by management</th>
<th>Emerging issue requiring additional management</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Alignment-Imagination</td>
<td>Project schedule</td>
<td>Project’s scope</td>
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<td>B Alignment-Engagement</td>
<td>Definition of individual roles</td>
<td>Participants influence on process</td>
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<td>C Alignment-Perspective</td>
<td>Organizing structure</td>
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<td>F Perspective-Engagement</td>
<td>Methods of communication</td>
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In Table 1 above, the issues that emerged from the interviews are categorized based on how participants characterized their development in the project. For instance, the schedule was always discussed as a precursor to the analysis of the existing system or the design of the future system (Item A in Table 1). As the schedule was created, the configuration tasks were defined and organized (Item D in Table 1). Similarly, the organizing structure of the project (Item C in Table 1), the need for specialized functional knowledge (E) and the roles that the functional team leaders and consultants would play in the project (B) were defined early as part of the project’s overall design. By planning for periodic meetings and establishing specific technology to be used to post issues and questions, communication was also a part of the project’s design (F). Clearly, defining these aspects of the project provide ways by which managers can improve their chances of a project’s success.

As the project unfolded, however, related sets of issues began to unfold. As the teams explored the existing system for requirements and the new software to create the future system’s design, the ambitious timeline in the schedule created constraints around what was possible. Similarly, as configuration tasks were completed, the teams developed greater knowledge of the system’s capabilities and ultimately become more competent in their ability to conceptualize how the new software could be leveraged to resolve problems.

The organizing structure of the project was intended to facilitate close interaction by the functional teams on their specific software module. Yet the modules, each being a part of the overall system, would eventually require the teams to coordinate their related activities of design. Similarly, brings expertise in from each specialized functional areas is essential, but the expertise of these team members is built around different paradigms that often inhibit their ability to envision a highly integrated system, such as an ERP. Although communication venues were well thought out, team leads and consultants reported that their interacting with each other during activities where they worked through problems was clearly the best way to transfer knowledge and learn from each other.

These emerging issues demonstrate clear tensions between the competing needs of the project. Whether defined a priori or identified and addressed over the course of the project, each of the issues is important to the successful completion of the effort. Certain issues were well defined by the project’s management going into the project, but others emerged over time. Importantly in each case, the emerging issue was born of the learning that took place during the course of the project.

The issues that were well defined for this project may not necessarily be the a priori issues in other projects, yet we believe that the relevance of the associated issues underlying each tension remains salient. For instance, depending on the nature of the project, an organization may define scope in advance and adapt its schedule accordingly over the course of the project. But clearly the learning that takes place as the project unfolds will create situations in which the a priori scope of the project will challenge the project’s ability to meet the schedule.

The other important aspect of learning explored in this research is the way in which functional personnel and consultants worked to learn from each other. This again revealed tensions in the way the project and the associated work were organized and what the teams found to be necessary and effective means for accomplishing their efforts. Meetings were scheduled and electronic communication mechanisms were put in place, but the close interaction among the participants taking place outside of the meetings was reported to be a vital activity to supporting their learning from each other. Furthermore, two issues became more prevalent as the project evolved: a) the
need to coordinate activities across the different software modules, and b) the integration of specialized knowledge required for the system design.

What the study reveals is that experience and the knowledge that it brings become vehicles for revisiting important management issues that must be addressed during a design effort. The learning process that takes place during the project is necessary to surface these issues. This learning appears to be stimulated by the recognition of emerging tensions in the project and the effort required to resolve these tensions. In the interviews, these tensions often emerged as informants sometime hesitatingly and sometime enthusiastically embarked on critiquing the way the project was currently being managed. This hesitation on the part of team members may indicate underlying challenges to the learning process in project as barriers to voicing concerns may inhibit the ability of organizations to surface these issues. Without surfacing the issues there is a limiting effect on an organization’s ability to reevaluate the issues that require management’s attention during a project. Resolution of tension could take place in two different ways. In some instances, clarifying differences and necessary tradeoffs among values enabled the resolution of the tension. In other instances, newly acquired knowledge enabled a resolution of differences through new ways of accomplishing goals.

The study also reveals that learning within the project can be inhibited when tensions are left unresolved. For instance, knowledge transfer between participants was necessary, requiring resolution to issues regarding collaboration, coordination among the functional areas and integration of the software modules. Yet, the official communication mechanisms outlined for the project, the functional structure of the project’s organization, and the specialized knowledge of the project team members each presented challenges to effective interaction across the teams and between the team leaders and the consultants within the teams. The implication is that issues left unresolved due to a lack of learning about the management of a project can inhibit the learning that takes place within the project itself.

7. Limitations and Conclusion

This paper is limited in several ways. The data are drawn from a single system implementation, although we have treated each component of the system as a separate development project. The study depends on the views and perspectives of the informants, and these views may change over time; the views in our study represent a snapshot of the informants’ perspective on the project at one point in the process.

What this research has done is place these tensions in a framework that is consistent with Wenger’s theory of apprenticeship and learning in communities and Boland and Tenkasi’s view of how learning takes place across communities. We believe this expanded model, based on these theories, provide the basis of a framework for analyzing learning in system development projects in which distinct communities must learn from one another as the project unfolds. This model is based not just on structure and process, but also on the tensions that hold the architecture together. The cases demonstrate that these tensions are both limiting and enabling in the development process and, we argue, instrumental in project success.

For practitioners, the model demonstrates the six interactive tensions of the four theoretical components of the model and suggests ways in which adjustments to these components may interact. For example, the flat organizational structure of this project had the desired effect of engaging users, thus stimulating the imagining of the possibilities of the system for changes, yet this same structure inhibited the required integration of the ERP system, and this tension was expressed in the interviews. Similarly, the accelerated schedule enhanced learning and maximized the time consultants were available, yet it made the teams feel limited in the opportunity they had to engage in exploration to realize the full potential of the ERP system.

We also believe that the model offers IT management a way to attain a greater appreciation of the product team’s needs, which in combination with their knowledge of the system’s capabilities, can bring about better designs. And the product team’s improved understanding of the system will give them greater insight into achieving their objectives without having to sidestep the integrity of the system’s design.

8. References


