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Recommended Citation

Green, David and Letch, Nick, "The Impact of Organisational Structure and Practices on Collaboration between Members of Software Development Project Teams" (2007). *ACIS 2007 Proceedings*. 84.

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The Impact of Organisational Structure and Practices on Collaboration between Members of Software Development Project Teams

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Abstract

Individuals within organisations are increasingly interacting in ways that do not conform to formal hierarchies, but are aligned to informal networks of relationships alongside a growing reliance on knowledge assets. It is the organisational hierarchical structures of power and culture of control that are constraining and inhibiting the performance of these knowledge workers. This research aims to develop a deeper understanding of the impact of organisational structures on the collaborative relationships of software development project team members where these teams are operating across formal organisational boundaries.

Keywords

Collaboration, Organisational structure, Trust, Systems development

Introduction

Software development is ultimately concerned with the development and delivery of technology artefacts and these artefacts are essentially a product of social interactions. Elkjaer et al. (1991) for instance discuss software development as not so much as an abstract conception of technical design but rather a social process that must take into account the organisation's power relations that can be either barriers to, or enablers of system development projects. The social process within modern project-centric networks is characterised by constant innovation, flux and fluidity of their embedded relationships (Wastell 1996; Cross and Parker 2004). The interactions that characterise these relationships are rich in their complexity and cannot be formalised or planned and consequently, organisations need to support the natural and informal process of collaboration as it evolves around the life of the software artefact.

Software development project teams are typically comprised of members from multiple disciplines and knowledge bases who come together to address complex problems. These "interdisciplinary teams" cannot be defined by formal structures within the organisation (Haythornthwaite 2005) and can be described as being at the "crossroads of formal and informal structure" (Cummings and Cross 2003). It is these informal communication networks that cross, ignore and avoid formal boundaries which are the "primary means by which employees find information, solve complex problems and learn how to do their work" (Cross and Parker 2004). However, there are also significant challenges involved in encouraging people with dissimilar knowledge, backgrounds, work process and problem solving styles to come together to work collaboratively (Cross et al. 2005).

The research presented in this paper explores the communication networks within a software development project team operating at the crossroads of formal and informal structures and identifies organisational constraints that act to fragment effective team member collaboration. The literature examining communication factors which effect software development teams is first reviewed and a case study of the communication relationships between project team members in a large public sector organisation is then presented.

Background

This section examines the nature of knowledge sharing and communication within interdisciplinary teams, as well as the impact of organisational structures and practices on knowledge sharing within these teams. Developing an understanding of these constructs and relationships provides a foundation for the implementation of our research methods that examines these constructs with a specific focus on software development project teams operating across formal organisational structures. This research will study the impact of organisational structures on the collaborative relationships between members of these software development project teams.

Communication in Software Development Project Teams

Research into interdisciplinary Information Technology (IT) teams suggests that a greater sharing of knowledge among team members can improve alignment and the achievement of effective outcomes (Nelson and Coopridge 1996; Reich et al. 2000; Herzog 2001; Bassellier et al. 2003). While the theoretical orientations of these studies differ to some extent, they generally concur that the key constructs that support knowledge sharing in IT project teams include, IT experience, IT knowledge and deep communication. In addition to these constructs, Kendra and Taplin (2004) identify trust as a critical factor that must exist to enable the alignment of the organisational culture and the project management sub-culture – a state that they conclude must exist to successfully deliver projects. Projects need to therefore be initiated in such a way as to ensure all participants hold similar goals and objectives, and this may be particularly important across interdisciplinary teams representing different areas of expertise (Abrams et al. 2003).

Frequently however, organisational structures can interfere with the ability of project management teams to effectively share knowledge. Wastell (1996) for example, observes the propensity for organisations to build hierarchies as social defence networks, which define rigid roles and hamper collaboration through “bureaucratic ritual”. Taylor (2000) also observes that hierarchical segregation between software development and support teams is an artificial barrier that impedes software development. Although these views may be considered dated, more recently, Cross et al. (2005) warn that organisational teams and workgroups continue to be fragmented by formal structure and leadership style and highlight this as a more serious problem in knowledge intensive organisations where collaboration between employees with different types of expertise is required. They conclude “moving boxes on an organisational chart is not sufficient to ensure effective collaboration among high-end knowledge workers” (p.25).

Hierarchies may be efficient structures for the purpose of controlling information up and down a chain of command but they are ineffective where responsive lateral interaction and collaboration is required, such as between members of project teams. Whitener et al. (1998), Cross et al. (2005) and practitioners Beardsley, Johnson and Roberts (2006), all discuss the need for organisations to encourage more interaction by breaking down barriers such as hierarchies and silos which are largely ineffective in the encouragement of effective knowledge interactions.

Working from the assumption that software development is essentially a social process, communication and knowledge exchange become critical elements for understanding effective interaction in software development teams. One approach for understanding these social relationships is the social network oriented approach taken by Cross et al. (2000) who suggest that “what you know” is mostly dependant on “who you know”, and the effectiveness of work teams has less to do with the simple flow of information between these people, and more to do with the knowledge based relationships between them. From this perspective, effective communication is equated to “the effective creation and application of knowledge in an organisation”. Cross et al. (2000) identify four key dimensions as being important for knowledge acquisition and sharing, knowledge creation, learning and problem solving within teams:

1. Knowing what areas other team members are knowledgeable in;
2. Gaining timely access to team members;
3. Creating knowledge through engagement with team members; and
4. Development of interpersonal trust and learning from safe relationships with team members.

Each of these dimensions can be used to analyse network relationships between participants in project teams, noting that in the building of effective communication networks, the ones that support expansive learning require greater time and effort to develop than “weak tie” networks where the dimensions identified by Cross et al. (2000) are weaker. While weak ties imply distant communication relationships, they may be important for the diffusion of new and “novel” ideas and therefore these weak tie networks can become valuable as sources of innovation within organisations (Levin and Cross 2004).

Interpersonal Trust

A critical dimension of effective communication in organisations identified by Cross et al. (2001) is the concept of Interpersonal Trust. Trust is an important dimension related to encouraging the exchange of information and knowledge (Cross et al. 2001), when people deal with complex problems, and particularly when learning is required, the formation of trusting relationships can have a significant impact on the level of collaboration between team members (Cross and Parker 2004).

Prior research has concluded that increasing the levels of trust in project teams will lead to greater knowledge exchange as well as less costly exchanges with a greater likelihood the knowledge will be applied by the recipient (Whitener et al.1998; Abrams et al. 2003; Cross and Parker 2004). Through this line of research

Interpersonal Trust has been seen as comprising two specific dimensions of great relevance to knowledge sharing, namely: Benevolence Trust - the degree of trust one person has in another that they care about their well-being and goals, and Competence Trust - the degree of trust one person has in another that they have expert knowledge and competence in the areas they represent themselves in.

Research Summary

Prior research has concluded that increasing the effectiveness of communication relationships between members of project teams will lead to improved knowledge sharing as well as the increased likelihood of successful project delivery. A number of specific communication dimensions have been identified, in particular benevolence trust, as one dimension of interpersonal trust, is highlighted as a key indicator of the strength of collaborative relationships. It is suggested however that these collaborative relationships are constrained by organisational structures and hierarchies that impede knowledge sharing between project team members across formal organisational boundaries.

The research presented in the following sections seeks to identify specific relationships between organisational structures and communication effectiveness within software development project teams. Understanding these relationships and constructs within this context will allow us to consider the unique role IT consultants may be able to play to facilitate knowledge sharing and the development of stronger collaborative relationships across formal organisational boundaries, as suggested by Pawlowski and Robey (2004).

Research Methodology

In order to examine collaboration between members of software development project teams, a case study of the communication relationships between project team members in a large Australian public sector organisation is presented. The project team is responsible for the development and maintenance of the organisation's premier business application. This multidisciplinary team comprises members of business operational staff, specialist-trained public servants and consultants from three different consultancy organisations.

The research was conducted in two phases. The first phase of the research consisted of a survey and social network analysis based on an examination of the four dimensions of effective communication presented by Cross et al. (2000). The objectives of this research phase were to identify the relative strengths of each communication dimension, and identify any pattern between the fragmentation of communication networks within the software development project team and the formal organisational structures put in place to manage the teams. As this research was specifically focussed on effective communication across formal organisational structures, participants were selected where their role required them to coordinate project tasks between project team members across formal organisational boundaries. Participants therefore tended to hold senior management roles within their respective departments. Fifteen project team members were selected as representing members of the project team and Support department at the "intersection of formal structure and informal relationships" (Cummings and Cross 2003).

The second phase of the research applied semi-structured interviews to explore the organisational structures and conditions that influenced the fragmentation of communication networks discovered through the social network analysis performed in the previous phase. The informants for this phase of the research included participants from the social network analysis as well as additional participant who were selected from the senior management layer within the informal project team as they were identified as holding key positions in relation to formal and informal communication practices across the formal organisation boundaries. Their selection ensured the representation of public servants, business representatives and each of the three consulting organisations engaged in project delivery. The semi-structured interviews were transcribed and a process of coding and analysis of information was undertaken to identify key themes and relationships within the qualitative data. A number of relationships between organisational structure and effective communication were identified, these themes will be presented and analysed in greater detail in this section of the research.

Given the space restrictions of this conference paper and that the objective of this paper is to explore the possible role for IT consultants as boundary spanners, reporting of the research is focused on the qualitative interviews that were conducted in the second phase of the research.

Case Study: Implementation of an Enterprise Management Information System

For the purposes of ensuring clarity in the following research and discussion sections, references to the project team will be identified explicitly as either the formal support team [ST], formal project team [PT] or Informal software development project team [IPT]. A visual depiction of these teams is provided in Figure 1. Where various members of these teams are referenced in the discussion sections, the team that they belong to will be identified to ensure that their observations and comments can be placed in the correct context.

The software development project that is the focus of this study is the premier business application for a large state government public sector organisation that provides specialist services to the community. The informal software development project team that is the focus of this research consists of members of the formal support team as well as members of the formal software development project team, these teams belong to separate departments within the organisation and are depicted in Figure 1. The project has been underway for approximately five years and consists of 70 project team members [PT] and 30 support team [ST] members. The system users are operational staff spread throughout the state, however there are also dependencies on the system from other state and federal agencies.

The support team [ST] is responsible for the ongoing provision of production support services as well as production readiness activities as components of new systems are presented for migration to the production environment. As the Management Information System (MIS) application has developed over time, gradually replacing the existing mainframe functionality, so too has the involvement of the support team [ST] who now have a significant involvement in the areas of production infrastructure, networking, security services, and their associated support processes and are integral to the success of the MIS project.

A social network analysis was conducted in the first phase of the research to reveal any fragmentation within the communication networks of the informal project team [IPT]. The second phase of the research applied semi-structured interviews to identify organisational structures and conditions that influenced these conditions.

As the support team must provide production support services for existing operational systems as a priority over the project requirements for the MIS system, there is a constant need to prioritise and allocate scarce resources between the competing requirements of the support team [ST] and project team. [PT]. Historically, there have been many cases where poor communication between these teams has resulted in conflict between the two teams with respect to this prioritisation.

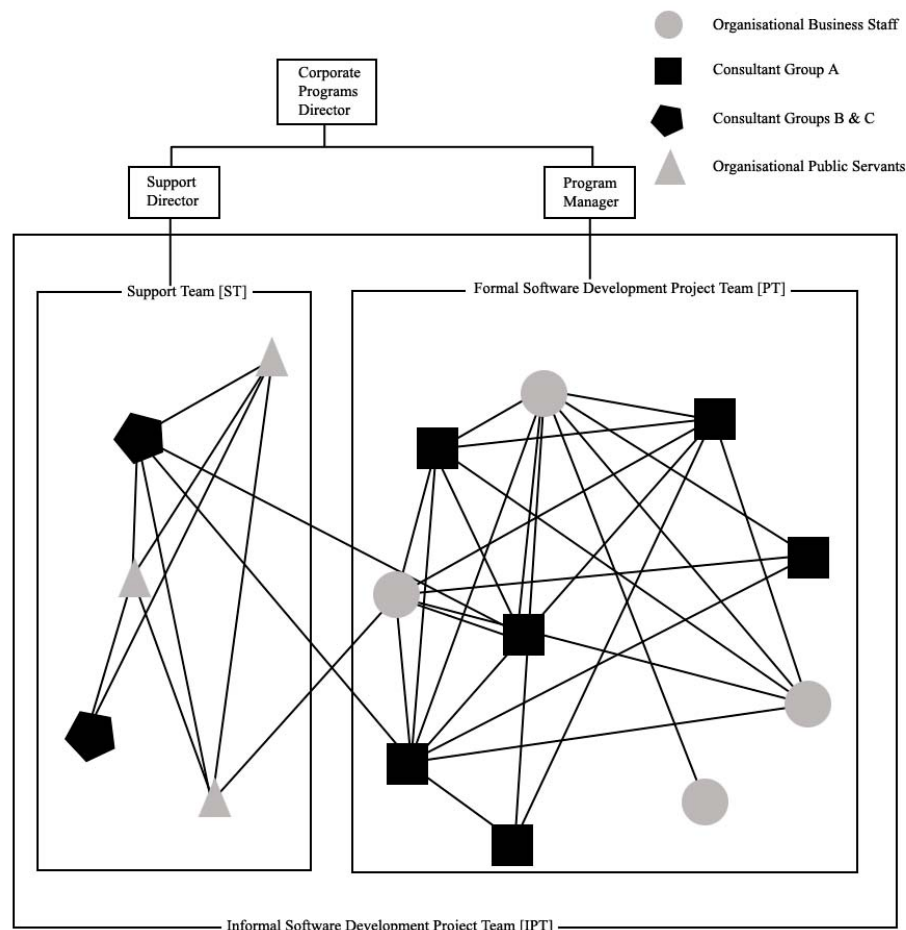


Figure 1: Fragmentation of the Networks of Benevolence Trust within the Informal Project Team

Phase One: Social Network Analysis

The survey of the sample informal project team [IPT] members examined the social networks of team members across four dimensions (knowing what others know, access to others, engagement, and trust). Of these, the social network based on trust, and in particular benevolence trust (i.e. caring about each others well being and goals) was identified as the least effective communication dimension within the informal project team [IPT]. The social network for benevolence trust is depicted diagrammatically in Figure 1. In this diagram only the strong-tie relationship connections between team members have been presented.

There is a visible clustering of team members within the support team [ST] and project team [PT]. That is, both teams appear to share similar network relations with each other characterised by a predominance of strong-tie network connections for benevolence trust. While each team appears to have a foundation on strong internal communication connections, there is a visible fragmentation of the communication network between the support team and project team [PT], where there are only a small number of connections.

Phase Two: Exploring Fragmentation of Informal Communication Networks

The social network analysis performed in the first phase of this study suggests that the informal communication networks are fragmented across formal lines. This separation was supported during the interviews conducted in the second phase as detailed by the following interview extracts.

The Project Manager [PT] expressed his frustration with the ineffective communication practices when relating a case where the support team raised an urgent piece of work that impacted the project team without warning: *“... and then all of a sudden we get the phone call from the Technical Support Manager saying you guys have to do it and you have two weeks to do it, and we are like – well this is the first we have heard about it what the hell are you talking about?... so, the upshot of all of that was we did the work but I don’t think it was handled in a good way in terms of visibility of where it came from in the first instance... and then only the other day I’m upstairs with the finance guy and presented a change request to him about how it is costing the project to do this work and he’s there going – well that’s just brilliant because the support guys put up for the budget for what they needed and hadn’t even thought about impacts on everybody else that needs to be involved.”*

The Technical Support Manager [ST] observed *“the project/support relationship is very vague at best”*, this was echoed by the Project Development Manager [PT] who stated in reference to the role of the support team: *“I would argue that I am not even sure what structure is in place for engagement, responsibility definition and ownership. There are no clear lines of who does what. Results in a lot of finger pointing.... To be quite blunt I am not sure what Support do”*.

These examples are indicative of ineffective communication and information sharing practices, and relationships, between the support and project [PT] teams. Further probing identified two major themes that appeared to have a significant influence. The first theme focused on understanding the role of organisational structure on communication, and the second examined the theme of mutual understanding and acceptance.

Organisational Structure and Culture

A weekly support meeting provides the only formal mechanism for managers and technical representatives from both the project team [PT] and support team [ST] to liaise directly with each other on a regular basis. The Project Development Manager [PT] identified these meetings as ineffective, stating, *“no-one ever attends”*. He also indicated that the informal relationships were similarly poor: *“informally I am happy to pick up the phone and call certain people, whether I think that will add any value to what’s going on – I started thinking it would and it’s deteriorated recently”*.

Informal channels were also weak from the perspective of the Technical Support Manager [ST], when questioned if he would be comfortable picking up the phone to talk directly to someone on the project team [PT] he responded by saying: *“Not to anyone, but specific people that I would talk to – I don’t know if they are the right people to tell you the truth. I don’t have a lot of visibility as to what structures are in the project team”*.

Interview informants also appeared to have a preference for escalating issues up the chain of command instead of dealing directly with their counterparts in the respective departments. The Technical Support Manager [ST] when questioned if he would try and deal with an issue directly with someone in the project team [PT], responded that he would escalate the issue through to the Support Director [ST], and he also observed that similarly, the project team [PT] would escalate up to the Program Manager [PT] and then up to the Corporate Programs Director [IPT], rather than go directly to the Support Director [ST]. This tendency to deal with issues through the chain of command can be seen as a practice that is likely to further fragment communication relationships between the two teams.

The Support Director [ST] presented a similar view, explaining the *“up and down communication tends to stifle (the cross communication)”* that is necessary in large IT environments. The Support Director [ST] explained that to manage a large scale production site, as well as bringing in large projects requires a lot of planning and these tend to be stifled in a command and control culture where there is emphasis on communication up and down the chain of command, and the tendency for directives to be made in isolation, leading to unplanned decision making and increased risks in the environment.

The Technical Support Manager [ST] identified the tendency for the technical members of the project team [PT]: *“to work in isolation and follow their own methodologies”*. The more technical team members across the support and project [PT] teams would be expected to form strong lateral communication relationships with each other as the types of information flowing between them would be far too technical for their managers to communicate effectively through more formal channels within the organisation’s hierarchy. Where the relationships between the team members [IPT] are weak at these levels, the knowledge transfer between the teams is constrained. This may be one reason why the Technical Support Manager [ST] repeatedly made the observation that the support team had no visibility as to what the project team [PT] were doing.

The Technical Support Manager [ST] expressed the view that the organisational structure generates conflicts due to the way there is *“equal power all the way to the head (Corporate Programs Director) which means that project work and support work conflict directly”* and *“the project work has overridden what would be good practice as far as support would go”*. The Technical Support Manager [ST] explained the organisation structure was partly responsible for the project side [PT] having *“far too much power in the decision making authority setting”* and the project team [PT] set their targets in isolation and *“come hell or high water they push for those dates, regardless of what other activities are going on in the environment”*.

In consideration of the impact organisational structure has on the relationships between members of the project [PT] and support teams, the Support Director [ST] described it as a *“feeling that it is us and them”*. This perception may be evidenced by the comments made by the Project Development Manager [PT]: *“I am not actually sure what (the support team) do, They certainly don’t do much for us - and they don’t seem very keen to do much for us, and most of the time they push back on things we suggest”*.

To resolve inevitable conflicts that arise, the prioritisation issues are escalated up the hierarchy to the Corporate Programs Director [IPT] to resolve. The Technical Support Manager [ST] responded on occasions these conflicts in priority were resolved by: *“my screaming up the tree to try and stop priorities being changed”*. Examples were provided where there were *“projects being run in isolation of us without having any visibility of what they were doing or trying to achieve until two or three weeks before it was due to go into production”*.

At the point that critical conflicts arose between support and project tasks, once a directive was issued to clarify priorities, the support team were able to work with the project team [PT] to deliver effective results. The Technical Support Manager [ST] suggested that when priorities are made clear, (once critical issues have been escalated to executive levels), then the work can be done effectively.

The Project Development Manager’s [PT] observation was that the strong command and control culture ingrained both in the structure and culture of the organisation meant that the project team business representatives *“don’t have the mechanisms to challenge upwardly. They can’t really question a decision if they are told you are going to do it”*. This belief was shared universally across all interview participants within the project [PT] and support teams, the command and control culture was viewed as very effective in escalating information and getting information fed up to the right person, however it was noted by the Support Director [ST], as well as other senior managers that the command culture made it very difficult to say no. *“If the approval for something comes up and they have the funds basically there is no process not to approve it”*.

The impact this command and control culture has is decisions come down the hierarchy without the implications across the entire environment being considered or fully understood, promoting an environment where decisions making is made in isolation. Decisions clearly need to be made with a more global view of the organisation setting and impacts.

One observation from the Team leader of the outsourced infrastructure provider [ST] is *“there is a disconnect between the command structure and the management of IT”*. He expressed a view that the Support Director [ST], being a professional IT manager, will have difficulty operating within a command structure where the culture expects that when you are told “no” you will accept that without arguing a case for consideration across the wider IT issues. With command and control *“someone will issue a command which means that it has to be done, but that command may have been given in isolation, not in a planned event”*.

This culture may be understood as further dividing the informal project team [IPT]. On one hand both the support and project [PT] teams are placed in direct conflict with each other in the ways that conflicts in priorities arise and are resolved, and secondly, decisions which are made at senior management and executive levels cannot be easily challenged.

Mutual Understanding and Acceptance

The research participants were asked directly to express their perception of the relationship between trust and the effectiveness of communication between members of the informal project team [IPT].

The Project Manager's [PT] view was that: *"I don't have a trust problem with (the support team) – I trust them to do what they do because that is what they are there to do.....I would hope that (the support team) trust the fact that we build a quality solution. ... I think the trust element is not the issue, its just the trust seems to be the issue because it is compounded by a lack of understanding between the two groups"*.

The Technical Support Manager [ST] responded: *"I would agree with (a low level of trust between the teams), particularly in relation to prioritisation and goal setting there is a certain amount of difference in perspective on what takes priority....There is a distinct lack of understanding of the importance of the production environment, particularly in relation to the settings of priorities for work that conflicts with project related activities. From that perspective there is a trust issue"*.

The Support Director's [ST] response was; *"I don't know if it is trust or it's really an understanding of each others focus"*. He explained that the objective with projects should be to not only getting the project over the line but to also ensure that support *"do not get slaughtered along the way"*. The view put forward was that traditionally the project would get the system across the line, and then *"lob it over the fence"* into support.

The Project Development Manager's [PT] view was *"There needs to be on both sides more of an acceptance of knowledge and skill set of the other party. Acceptance that if we ask for something there is a good reason. Going back to trust we are all second guessing each other all of the time and almost schoolyard"*.

Examining the perspectives of each of these managers, a number of important conclusions can be drawn within the context of this research and the literature discussed previously. Firstly, the concept of 'trust' is open to wide interpretation, and must be clearly understood. When the Project Manager [PT] talks about trust, he appears to be referring to two types of trust. The first is competence trust, which he does not see as an issue. The second concept is one of mutual understanding. The other managers demonstrate a similar interpretation, referring to mutual understanding and mutual acceptance of each other's knowledge, priorities and goals as key concepts of trust. The concepts of mutual understanding and acceptance are closely aligned to the concept of benevolence trust which refers to the degree of trust one person has in another that they care about their well being and goals.

The Technical Support Manager [ST] identified that an understanding of the goals and objectives of support and project [PT] teams were unclear at the organisational level, and clearly opposing at the operational level. He explained that the organisational structure needed to establish its priorities in relation to support and project work, that the *"line is blurred at best"*. When questioned on his relationship to the Project Manager [PT], the Technical Support Manager [ST] responded, *"I am not sure what (the Project Manager) role is to tell you the truth...I was wondering yesterday if I shouldn't communicate this stuff to him, but as I said I am not sure what his role is"*.

The Project Development Manager [PT] viewed the project [PT] as pursuing its own goals and *"to hell with everyone else"* responding he did not know what the goals of support are, assuming that they were the same as the projects [PT]. When questioned on whether he thought support had a good understanding of the project's [PT] goals he responded *"Probably not, I don't think that the (Technical Support Manager) has a good handle on it. We get a lot of what's in a release, what's our scope; people don't really know our structure. How we work and what we are doing"*. He expressed a view that this lack of clarity and understanding meant there needed to be clear roles and responsibilities defined, agreed and formalised. When questioned on the leadership of the support team the response was *"Who is on charge of (the support team)"* and *"I don't know what the goals of (the support team) are"*.

The Support Director [ST] reinforced these views, explaining the issue between support and project [PT] teams in this organisation was one of understanding each other's focus. He explained that from his experience, other IT environments maintained a more balanced view towards development such that projects had to ensure that support was not compromised, there was more of a common objective to maintain the long term delivery of the support environment.

These examples demonstrate perspectives of an organisational landscape where the goals between support and projects [PT] clearly diverge. The Project Manager [PT] expressed a view that what was required to resolve the communication issues was an *"integrated long term plan that is put together by both teams and agreed by both teams based on a priority that doesn't necessarily come from either team, but comes from whatever is the business needs at the highest level, and would go a long way to cementing a co-ownership of the goals and co-ownership of the achievements"*.

These comments reveal a very poor appreciation and understanding of key roles and goals between members of the informal project team [IPT] and demonstrate the fragmentation that appears to be amplified by the lack of

mutual understanding and acceptance between the teams [ST], [PT]. These views suggest that the constructs mutual understanding and acceptance between the teams mediate the relationship between hierarchical organisational structure, command and control culture and effective communication.

These findings resonate closely with Nelson and Coopridge (1996) in their research on the importance of shared organisational goals. They explain that as the realities of work groups become more distant, “lack of cooperation and inter group conflict begin to appear” which can manifest as an us against them mentality. It is identified that this absence of shared appreciation and understanding directly leads to poor overall group performances (p.412).

Discussion

The process of system development may be seen as a continuous cycle where the development and support activities represent continuous and overlapping activities within the continuum of the life of the system. This research has explored the impacts of organisational hierarchies together with a command and control leadership culture on the communication networks between team members engaged in these activities. This case study has suggested the relationship network of benevolence trust has been fragmented by a combination of organisational structure and a command and control culture constraining the development of mutual understanding and acceptance between informal project team members.

The combination of a rigid organisation hierarchy reinforced by the command and control culture of leadership presents ambiguous and conflicting power relationships and political tensions between the project team [PT] and support team [ST] which generates clashes in goals and priorities as well as inhibiting the sharing of knowledge.

Interview participants consistently expressed a view that due to the lack of clear goals in relation to the project team [PT] and support team [ST], there was an increased dependency on executive management to step in and issue directives to resolve inevitable conflicts in work priorities that arise. The relationship between organisational structure and benevolence trust is therefore reinforcing and circular in nature, as the communication networks are fragmented, this also encourages a dependency on the command and control leadership culture to intervene and issue overriding directives to focus operational priorities. These relationships are depicted in Figure 2, below.



Figure 2: Reinforcing Relationship between Organisational Structure and Benevolence Trust

This research has revealed the fragmented nature of communication within the informal project team [IPT], as well as identifying the constructs that appear to have had a significant influence on the fragmentation.

Independent Communication Broker

During semi-structured interviews with senior members of the organisation, the concept of an independent communication broker, operating across the informal project team, emerged. The Support Director [ST] proposed what is needed is an IT ‘partner’ who would work alongside the business representative at senior levels in the organisation. The IT partner would balance the command and control culture by instilling a longer term planning view to both project and support teams. The IT consultant acting as a communication broker could fulfil this role by working alongside business representatives to provide both IT expertise to compliment the economic management focus as well as “allow the cross communication as well as the command and control (directives to exist)”.

When questioned on his communication links to the project team, the Support Director [ST] identified that one of his most important communication links was through an IT consultant who although a member of the support team [ST], had maintained strong informal communication networks with the project team who were all members of the same consulting organisation. Senior members of both the support team [ST] and the project team [PT] indicated that they relied on this consultant as a key communication broker across the formal organisation structures.

Conclusions

This paper set out to research collaboration within informal software development project teams and thereby develop a deeper understanding of the constructs and relationships that are impacted by organisational structure and practices. This research highlights that organisations need to acknowledge the potential impact of their organisational structures and leadership culture of command and control on their software development projects. These structures may fragment communication networks by constraining lateral communication and generating conflicts in work prioritisation. Deeper analysis reveals that underlying issues of a lack of mutual understanding and acceptance between informal team members are the basis of weak networks of shared perspectives of organisational goals, or benevolence trust, between team members.

Organisations therefore need to develop specific strategies to support the development of strong communication networks between members of project teams that cross the boundaries between formal organisational structures. These relationships are too complex or fluid to be planned or formalised, therefore a flexible approach, one that can exist within the firmly established tradition of organisational hierarchies of power, is necessary.

Previous research highlights the role of IT consultants as central players in systems development projects in terms of developing cooperative relationship and shared understanding. Pawlowski and Robey (2004) have previously identified the role of IT consultants as 'boundary spanners' in terms of transmitting information across formalised organisational boundaries as well as diffusing ideas throughout the organisation. The existence of IT consultants operating as 'boundary spanners' appears to be consistent with the perceptions of senior organisational members interviewed as part of this research with regard to the emerging theme of the independent communication broker. A pathway for an extension to the research presented in this paper would be to undertake a deeper investigation into the potential role of IT consultants to be instrumental in aligning goals across formal organisational boundaries thereby promoting more effective collaboration and knowledge sharing across informal project teams. Research findings in this area may highlight the unique opportunities for IT consultants to act as effective communication brokers and thereby act as central collaboration connectors between fragmented software development teams.

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