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RESEARCH ARTICLES

The Effect of Team Dynamics on Software Development Process Improvement

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ABSTRACT

This article identifies the effect of team dynamics in the context of software development teams and its impact on software process improvement (SPI) activities in very small companies, in order to understand the relationship between these two variables. Most software development work is done by teams of software engineers working together in a collaborative manner to execute a software development process. Although there is much literature examining software process and how to improve it, less attention has been paid to the issues of team-working and specifically the impact of team dynamics on the software development process. Team dynamics is the term used to define how people work and interact together in teams. Teamwork is more effective with the existence of positive team dynamic, as it encourages a better working environment with satisfied, fulfilled employees who will in turn be more productive. This paper presents the results of a research study of team dynamics in very small software development companies and its impact on the software development process and software process improvement activities.

Keywords: *Software Engineering, Software Process, Software Process Improvement, Team Dynamics, Teamwork*

1. INTRODUCTION

A team is a collection of individuals who are inter-dependent in their tasks, who share responsibility for outcomes, who see themselves and who are see by others as an intact social entity embedded in one or more larger social systems (for example, a business unit or company), and who manage their relationships across organizational boundaries (Cohen & Bailey, 1997).

The basis of every software development organization is a team, be it a management team, a development team, a trouble-shooting team or a testing team. Software/IT organizations are under more pressure than ever before to become more productive and more cost effective. The use of teams has been shown by Barnum (2000) to increase speed, productivity, problem-solving ability and organizational learning. Levi (2001) stated that a team is more than just a collection of people.

The foundations of the team and team dynamics are laid down during team-building. To

remain competitive, organizations must focus on forming and maintaining high-performing, successful teams. Beaver and Schiavone (2006) found that teams undergo the same four stages of evolution as follows:

- Forming - Where members get to know each other.
- Storming - Conflict and disagreement about rules and procedures.
- Norming - Establishment of rules and social relationships.
- Performing - Work, completion of task.

According to Rusher (1997) a team should not be viewed as the end product of a team-building activity. Instead she found that a team should be viewed as a dynamic entity, always changing in response to its circumstances and environment. She found that the team-building activity should be viewed merely as kicking off a process that should be continued when the team returns to its real-life work environment, otherwise the team would regress to its original state.

1.1. Team Dynamics

Social facilitation is the term used by Triplett (1898) to describe the fact that when people are working in the presence of others, this leads to an increase in productivity. Participation in a team should be of benefit to team members on both a personal and professional level. Katzenbach and Smith (1993) found that being a member of a team should help develop an individual's social and interpersonal skills. Levi (2001) found that working on a team with individuals with different levels of expertise and skills should also help broaden an employee's skills. When a team member feels that the task they have been assigned is compatible with their expertise and that the task is a worthwhile contribution to the team, this will lead to increased levels of self-worth and motivation. It is also important that each member of the team knows and understands their role and knows what the team expects from them.

Team dynamics is the term used to define how people work and interact together in teams. Team dynamics are the hidden strengths and weakness that operate in a team between different peoples or groups and they affect how a team reacts, behaves or performs and the effects of team dynamics are often very complex (Scarnati, 2001). There are various forces which could influence team dynamics including the nature of the task, the organizational context and team composition. The main team dynamics include:

- Personal Development - being a member of a team has a positive influence on personal learning and development, as most of us have the potential to learn the new skills required for a team because our sense of accountability to the team (Katzenbach & Smith, 1993).
- Motivation - Our level of motivation depends on how driven we are to achieve. For example, Ram (2003) found that having enthusiasm and motivation to work and learn new skills are just as important as having the required talents and skills. He found that this enthusiasm would inspire motivation in other team members.
- Morale/Self-Worth - Being a member of a team is beneficial to most people. Rushmer (1997) found that being a member of a team leads to a rise in self-awareness, self-appreciation, self-worth and self-confidence.
- Empowerment - Team members will feel empowered when they feel they have control over their work, their performance appraisal and their career path. Howard & Foster (1999) found that empowerment consists of a sense of self-determination, personal meaning, competence and perceived impact.
- Commitment - Teamwork cannot succeed without the commitment of every member of the team, commitment to both the team and the goals of the team. Jurison (1999) found that team members display commitment to the team by their sense of loyalty and dedication to the team as committed team members are willing to devote their

time and energy and make personal sacrifices for the project.

- Trust - is a vital factor for effective teamwork, trust between team members themselves and trust between team members and management.
- Stress - High levels of stress can lead to an inability to cope, and health problems, leading to an increase in the level of absenteeism, which is detrimental to productivity.

Teamwork is more effective with the existence of positive team dynamics. This will encourage a better working environment with satisfied, fulfilled employees, who will in turn be more productive. High performing teams are teams that organize themselves to perform their tasks, develop social relations and have leaders who provide direction. Positive team dynamics are those that enable and contribute to high performing successful teams. Negative team dynamics are the dynamics that create barriers preventing teams from achieving their full potential.

The absence of positive dynamics outlined above will lead to a decrease in performance, preventing teams from achieving their full potential. If team members feel that being part of the team is not meeting their personal development needs or that their contribution to the team's success is not relevant, this will lead to a decrease in their level of motivation and commitment, which will in turn lead to a reduction in their level of productivity. When the individual roles of the team have not been clearly defined, this will lead to confusion and a sense of aimlessness.

From a management point of view, in software development organizations people have three types of needs that they require to be fulfilled and satisfied; social, self esteem and self-realization needs. Internal team dynamics are referring to the forces that exist within the team itself. Team member will not cooperate if they do not feel that they are a part of the team (Furumo & Pearson, 2006). Ayman (2000) argues that within a team, roles and norms must be clear. Littlepage et al. (1989) adds

that cohesiveness is essential for an effective team performance and will enhance team close working relationships. A cohesive team will freely challenge each other's and will easily share new knowledge with other team members. External team dynamics are referring to the presence of external forces that are beyond the teams control and could impact the team performance. The intrinsic and extrinsic factors in projects may motivate team. Intrinsic factors are the internal factors that consist in the task and team activity itself (Kirkman et al., 2004). Extrinsic factors are external factors that influence the team from the outside such as reward and recognition, feedback from the organization and customer, team member pressure and the working environments.

1.2. Software Teams

A software process essentially describes the way an organisation develops its software products and supporting services, such as documentation. Processes define what steps the development organisations should take at each stage of production and provide assistance in making estimates, developing plans, and measuring quality. All companies follow a software process and a number of standard process models have been designed to help companies manage their software development activity.

The dynamic performance of a software project involved many processes and always depends on the team, especially the quality of communication within the team. Moreover, communication may take many forms, both verbal and non-verbal (Hall et al., 2008). Previous research shows that the level of communication in software process depends on the size of the software project (Phongpaibul & Boehm, 2005) where they authors claim that for a small project the interaction between team members is adequate but for a larger project a mixed interaction between team member and specification are required. Communication is also impacted by the team's physical proximity, in that an increased distance between team can affect the team dynamics, resulting in in-

terrupted team communication, coordination, mutual support, effort and cohesion (Hoegl & Proserpio, 2004). Hence the link between team members also becoming more difficult with the increase in the number of team member and this will impact the team dynamics (Furumo & Pearson, 2006).

1.3. Software Process and Improvement

There is a widely held belief that a better software process results in a better software product, which has led to a focus on SPI to help companies realize the potential benefits. In the software process, human factors are not the only important factor to be considering in the process but they are also a determiner in project success (Rosen, 2005). Software development is not just creating an effective programming and tools, but also depends on people, organization and procedure. People involvement in improvement activities is important because employees must adopt process innovation in their day-to-day activities. The lack of involvement will disturb the improvement process because if employee did not commit themselves to all the propose change activities, the aim of process improvement will be fail (O'Connor & Basri, 2010). Moreover, the strengths and weaknesses of the current process are inside the staff hands and knowledge (Basri & O'Connor, 2010). Hence people can be seen as the main factor in software process improvement that needs to be encouraged and support in an organization. Moreover, Beaver and Schiavone (2006) state that the effect of software development team on the software product quality claimed that even though people are the main driver for software quality but the processes have been given more attention. Therefore the involvement and full commitment from teams in process improvement is critical.

Research in very small teams found that monthly cost and benefits have shown a positive impact of their monthly value (Batisha & de Figueiredo, 2000). The people factors that are related to SPI have been much discussed in literature. The success of software project and process is determined by the interest of software team on the project and process itself (Komiyama et al., 2000). In small software organization the influence of key individuals is a major influence (Knauber et al., 2000). However staff participation also is essential in improvement activities as they have detailed knowledge and experiences of the current process (Stelzer et al., 2006).

1.4. Very Small Entities

All software companies are not the same. They vary according to factors including size, market sector, time in business, management style, product range and geographical location. The fact that all companies are not the same raises important matters for those who develop both software process and process improvement models and for those who conduct research into software development teams. However, to date most research into team and other factors affecting the software development process has been conducted in the context of large and very large organizations, with very little research into very small companies.

Furthermore there is ambiguity in the meaning of small and very small in terms of company size. To take a legalistic perspective the European Commission defines three levels of small to medium-sized enterprise (SME) as being: Small to medium - "employ fewer than 250 persons and which have an annual turnover not exceeding 50 million Euro, and/or an annual balance sheet total not exceeding 43 million Euro.

Clearly such a definition of SME covers a huge possible range in terms of company size, with a very large implication for the research context. As noted above, much research to date in the domain under consideration has been in the context of large companies and the larger type of SME's, with very little research into very small companies. However, even the term 'very small company' is ambiguous. In this paper we use the term "Very Small Entity" (VSE), which has been defined in ISO/IEC 29110 as being

"*an entity (enterprise, organization, department or project) having up to 25 people*" (LaPorte et al., 2008).

Such micro enterprises typically have limited resources, particularly in financial and human resources, are basically practicing unique processes in managing their business. These unique characteristics and unique situations have influenced VSEs in their business style compare to large companies (Mtigwe, 2005). In addition, these limitation and characteristics have given a big impact to companies' process infrastructures (Sapovadia & Rajlal, 206). Moreover most of the management processes are performed through an informal way which most of decision-making, communication and problem solving been discussed orally and less documented. This indicates that people-oriented and communication factors are very important and significant in VSEs (Valtanen & Sihvonen, 2008).

1.5. Research Goals

The software development team is a key factor in software projects, however, achieving and maintaining positive team dynamics in software development projects especially when the software companies have fewer resources in term of people, money and time, is a remarkable challenge. This paper explores the dynamics of software development teams (structure, process, communication, learning and sharing) and its impact on Software Process Improvement (SPI) in very small software organizations, in order to understand the relationship between these two variables.

2. APPROACH

The study was divided into three phases: The first phase consists of a series of detailed Structured Interviews with senior management staff within the chosen organizations; whilst phase 2 entailed conducting a Focus Group with software development staff from the phase 1 companies, in order to get an understanding of the issues from a non-management perspective;

Finally, phase 3 involved the distribution of a survey questionnaire to a wider set of companies than were involved in phases 1 and 2, in order to get more broad supporting data from a wider set of companies and to provide a partial validation of phase 1 and 2 findings.

The individual interview approach was used in this study in order to discuss the topics in depth, to get respondents' candid discussion on the topic and to be able to get the depth of information of the study situation for the research context (Kvale, 2007). These Structured Interviews included both open-ended and specific questions and allowed the researchers to gather not only the information anticipated, but also unexpected types of data (Li, 2006). The respondents for the individual interview session are all software development managers / CTO / owner-directors and the focus group was with software development staff. The focus group interview approach was also used in this study and aimed at collective groups of team members who are the developer of the software. An advantage of focus groups of this manner is that it allows individual team members to discuss issues in a collaborative manner with fellow team members, thus allowing a consensus to emerge which facilitates detailed data gather by researchers. Focus group interviews were also chosen because it was the most appropriate method to study attitudes and experiences; to explore how opinion was constructed (Kitzinger, 1995) and to understand behaviors, values and feelings (Patton, 2002). In order to gain more input and also to validate the above qualitative data for this study, we have developed and distributed a survey questionnaire to several Irish software VSEs. These companies were selected using personal contacts and were all directly involved in software product development, for a variety of business domains.

To ensure the participation of software development professionals who would be familiar with the considerations involved in using both software process and process improvement models, it was decided to limit the scope to software product companies whose primary business is software development.

In addition, given the geographical location of the researchers, it was decided to confine the study to Irish software product companies, which has the added advantage of restricting the study to within the same economic and regulatory regime. Furthermore, restricting the study to indigenous Irish software product companies significantly increased the prospects of obtaining the historical information required to understand process foundation and evolution which would not be the case with non- Irish multinationals operating in the country, as their process would likely have been initially developed and used within the parent company prior to being devolved to the Irish subsidiary. The companies and the participants from the 3 phases are listed in Table 1. Overall, the data collection process took 8 months, which included identifying suitable companies, contacting and confirming potential respondents' process, conducting individual and focus group interviews process and distributing and receiving questionnaires process.

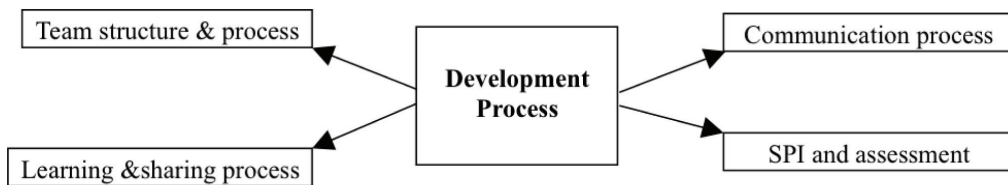The study data analysis process was divided into 2 main stages. In stage 1, all qualitative data gathered from individual interviews and focus groups (phases 1 and 2) was analyzed and in stage 2, the qualitative and quantitative data from the received questionnaire (phase 3) was tabulated and analyzed, with the results from this stage used to validate the analyzed results from phases 1 and 2. These 3 phases of data analysis were conducted over a four-month period.

The analysis of the qualitative data (interview and focus groups) was completed utilizing the coding mechanisms of grounded theory (Kitzinger, 1995; Elo & Kyngäs, 2008). The Grounded Theory analytical process involves a series of coding strategies, which is the process of breaking down interviews, observations and other forms of appropriate data into distinct units of meaning, which are labeled to generate concepts. These concepts are initially clustered into descriptive categories. The concepts are then re-evaluated for their interrelationships and, through a series of analytical steps, are gradually subsumed into higher-order categories, or one underlying core category, which suggests an emergent theory. Closely follow-

Table 1. Study participants

VSE	Phase 1 & 3 participant title	Interview	Focus group	Questionnaire
A	CEO	X	X	
B	Development manager	X	X	
C	Joint CEO	X	X	
D	Chief Architect	X	X	
D	Senior software developer	X	X	
E	Owner / COO			X
F	Managing director			X
G	CEO			X
H	CEO			X
H	Development manager			X
I	Practice director			X
J	CEO			X
K	CEO/CTO			X
L	Senior project manager			X
L	Team leader			X

Figure 1. Main category diagram

ing the tenets of grounded theory meant that, after initial open coding, the interviews were then re-analyzed and coded axially across the higher-level categories that had emerged from earlier interviews. Any memos or propositions that emerged through the coding process were recorded for further analysis and inclusion as questions in subsequent interviews. A consequence of this was that the interview guide was constantly updated.
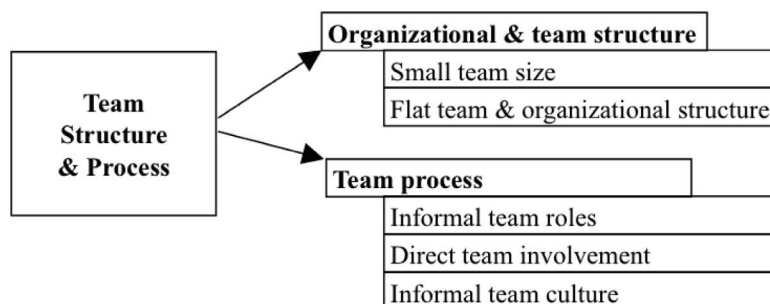
3. FINDINGS

As stated, by following the coding mechanisms of grounded theory the researcher can formally document data concepts, which are clustered into descriptive categories surrounding a central core category. The finding for this study are illustrated in Figure 1 and are represented by the core category of Development Process and four supporting categories, each of which is discussed in detail in the following four sub-sections.

3.1. Team Structure and Process

Our analysis shows that the team environment in VSEs can be divided into 2 categories: the organization and team structure category and the team process category and 5 further themes, as illustrated in Figure 2. The organizational and team structure category indicates that due to the small number of people working in the VSE, the team size is also small, which leads to a flat team and organizational structure. The interview analysis indicates that all interviewees explained that the companies have no formal team structure or on occasion a team structure only exists occasionally as maybe required for a particular project.

Our analysis uncovered that due to issues such as the small number of employees, flat organization and team structure and informal working environment, the interviewees perceive that all people in the company are at the same level. Furthermore the analysis show that they have the similar level of working experience, skills and very much depends on each other in

Figure 2. Team structure and process category diagram

performing their task. In addition findings such as the close physical working environment, the high frequency and informal nature communication also influence this perception. Such a combination of factors has led VSE's to a more informal environment with a small gap between management and team members. The following extracts from interviews/focus groups clearly depict this situation:

"There are really 2 levels; the level above me is IT manager and General management. But its such a small company almost like family here, so that not really a divide here."

"The management and staff relationship is very close… It is probably because we are in the similar age and similar interest. Nobody works in this company that not interested what we do."

Another important factor that of team process indicates the team role, team involvement and team culture issues are significant issues. The analysis shows that the staff role, which includes the role in team and the task they perform in development process, is conducted in a very informal manner. This implies that the development staff can work or be assigned a different role at any time in development project. In addition they can also work with others or different people and different position as and when they are required. These situations have explained that team involvement process in

VSEs is direct and informal in development activities. The following extract from an interview with a CEO clearly describes these issues:
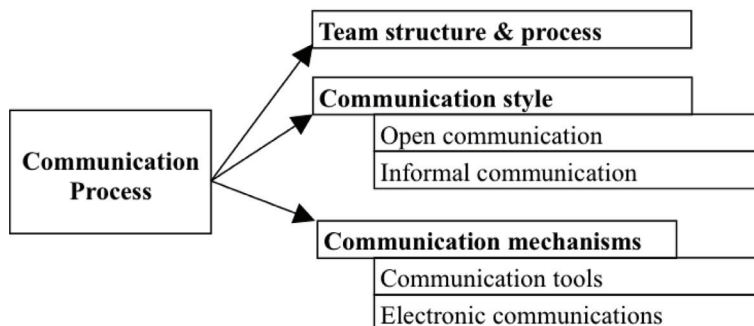
"As a CEO, I am not sure how others see me and brother [who is the CTO] either same as others or not… We have done a lot of development work, so they should see us as one of the programmers… One staff member probably see's himself as the head of new staff due to his experience in company. But actually they is no real title and rank in our company."

3.2. Communication Process

Based on our analysis of the communication process in VSEs, it can be seen that communications can separated into two major categories, namely communications style and communications mechanisms, both of which are highly influenced by the VSEs team structure and process, and the working and management style, as illustrated in Figure 3.

In terms of communication style, the open and informal nature or style of communications was a significant issue. This can be seen in the ways meetings are conducted, which are mostly in an informal manner, on an ad-hoc basis and often one-to-one fashion. In addition, the data reveals that in VSEs day-to-day communication between team members is always direct and autonomous, due to the nature of the working environment in the VSE. This situation

Figure 3. Communication process category diagram

was confirmed by many study participants who cited small team size, working style and culture of VSEs as being conducive toward this style of communications. The following interview extracts are representative of this situation:

"It is informal when we discuss development stuff like over the coffee… We have informal meeting for a few minutes just to inform others regarding process before we start our tasks."

"We have a daily stand up meeting and we have an iteration planning meetings but very fairly loose. Generally communication is very informal on daily basis."

Our data analysis also shows that the relationship between team members in the company also has a significant influence on the communication process in VSEs. The nature of the relationships (friends and family), the flexible environment and the frequent social interaction between teams members, coupled with the flat organization structure has a major impact on communication process in VSEs. In addition the physical proximity of working space and high frequency of sharing activities contribute to the communication process in VSEs. Two examples from the data supporting this are:

"We work very close, meet for morning coffee. We always mix together and are very dynamic because we are small and easy to communicate each other."
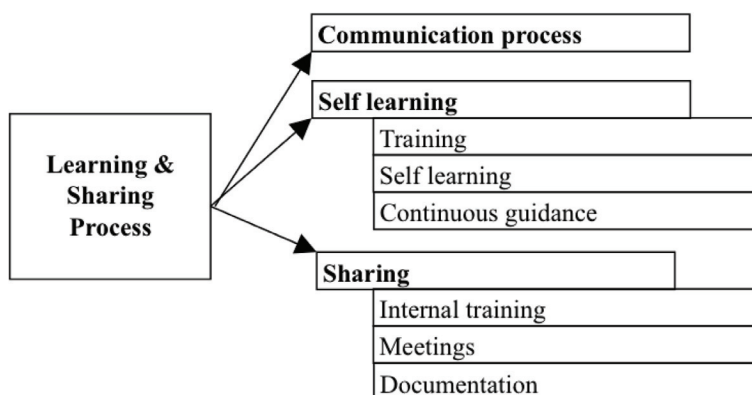
"Programmers are friendly and they socialize each other. They get on pretty well each and can easily exchange ideas""

Another major influence on the communication process is the actual communications mechanisms used. The data shows a heavy usage of communication tools such as email, phone, blog, Skype and other Internet are tools very high in VSEs. In several VSEs where team members were in separate geographical locations, such communication tools were vital for communications between team members. In addition, the data indicated that the use of communication tools allowed team members to share and document work related information and knowledge in informal way.

3.3. Learning and Sharing Process

Our data analysis elaborates how the learning and sharing process occurs in VSEs, with two main categories namely self-learning category and sharing category, which are also influenced by the communications process, as illustrated in Figure 4.

Figure 4. Learning and sharing process category diagram

The category of self-learning in VSEs shows that there is little or more often no formal training provided to employees to establish and/or enhance their knowledge and skills. VSE management explain that informal (often internal) training, sharing and self-learning and they indicate that staff in VSEs are more dependent on self-learning in mastering the technology or process that is used in the organization. In addition on the job training, self-exploring and continuous guidance from an expert (mentoring) within the companies are the main processes that are frequently practiced in enhanced staff knowledge and skills. For example, these interview/focus group extracts demonstrate this point:

"They have to do on the job training; they have to educate themselves on the job by doing it."

"Once you get started you could find out, who to do certain things, someone have experience can show you the way of the main resources or he can read article with your interest you want to carried out certain task."

In VSEs the knowledge sharing process happens in 3 ways: informal training, informal meetings and document sharing. Informal training happened through informal and guidance from experts (mentoring), peer to peer programming guidance sessions, shared books and others material, internal training, frequent open and direct discussion between team member and online sharing with others. The data analysis indicates that the learning and sharing process in VSEs is been influenced and shaped by 3 main factors which are VSEs team size and process which are small team size and flat organization structure; working and management style which are more toward autonomous work and macro management process and, communication process which are indirect and informal process. In addition from the interviews data analysis shows that in general knowledge sharing activities either via electronic or personal means

are important in maintaining and evolving the current VSEs software development process. The data extracts below are representative of the learning and sharing process.

"Knowledge also shares sometime in peer programming activities. It doesn't happen a lot but it can happen when problem arise and we sit down to explain and discuss."

"We usually share our code especially with peter and he will look at it and share the idea. Later we will introduce to others and ask for feedback."

3.4. Software Process Improvements and Assessment

Data was also collected to explore the issues of software development process activities in VSEs. The questions were more specific towards the method, improvement, practical and assessment of their software development process activities. In the case of the questionnaire, much of this data was established on a Likert Scale (1-5) and some extracts are provided for illustrative purposes.

As can be seen from Table 2, the results from the survey questionnaires have indicated that in general respondents are agreed that their software development processes are rapidly changing and evolve over time. They also claim that their development process is regularly assessed and team members always follow/apply the latest development process method, as decided by VSE management. Moreover the analysis also shown that 90% of respondents felt that their development process evolves overtime. They stated that following the best practice, client requirement, team size growth, new idea and keep up with the technology change are the reasons for the improvement and evolution of development process. The following two interview extracts give an indication as to how the development process has been improved and evolved with a VSE:

Table 2. SPI- Process improvement and assessment

	Change & Evolution	Regular Assessment	Following Updated Process	Agile Type Environment
Mean	3.90	3.50	3.20	4.20
Var	0.568	0.707	0.789	0.919

"Our software process will evolve as we grow in size and get more applications in production environment"

"Software process change is due to growth of the organization. We started out as 2 people 4 years ago and now have 11, so things had to change along the way."

The data also indicates that the respondents agreed that the level of development team involvement in software development process and planning are very significant. The data also clarified that even though the software development team members are working autonomously, they are also actively involved in setting goals, planning and procedures in the company's software development process. Indeed one CEO put it thus:

"I welcome input from developers on what we are doing and how to make it better."

3.5. Team Dynamics and Structure

The researchers explored respondents' opinions on VSEs software development team status and the working relationship and team environment in the companies. As can be seen from Table 3, the respondents agree that the team development in their companies has a high level of team dy-

namics. The results show that the teams have a good working and social relationships, willing to share opinion and idea, having a good interpersonal skill and working closely each other.

All respondents claimed that their development teams are efficient and effective. They claim that their development teams have important characteristics such as high skill levels, strong motivation, dynamic approach, good teamwork, open communication, able to meet project deadline and budget, active in sharing and involved in strategic planning. As one software development manager expressed it:

"They [the team members] are highly skilled and motivated, great team atmosphere."

4. CONCLUSION AND FUTURE WORK

This research sought to identify the effect of team dynamics in the context of software development teams and its impact on software process and process improvement activities in the context of VSEs. This investigation was achieved through a set of structured interviews and focus groups with VSEs and also a series of questionnaires. The data was rigorously analyzed using the coding mechanism of grounded theory and a framework produced.

Table 3. Team dynamics

	Good working relationship	Regular information sharing	Good social relationship	Good inter personal skills	Close location
Mean	4.60	4.40	4.40	4.30	4.70
Var	0.516	0.516	0.516	0.483	0.949

The findings of this research indicate that VSEs unanimously agree that the software development process used within their company is constantly evolving over time. Furthermore, they also state that they regularly assess and update their development processes. In addition the findings show that these processes are informal, indirect, highly reactive, and are dependent on/linked to customer requirements, developers' initiatives and technology changes. From a team perspective, the data also indicates VSEs operating processes were highly influenced by the team structure and process, which is very flat and informal. These issues have determined the level of formality in the software process improvement activities undertaken within VSEs. Furthermore the data indicates that these issues also affect the other main categories, which are related to VSEs software development process.

The close working relationships described by VSEs between the software development team members and frequent informal communications helps to create a high level of positive team dynamics and knowledge sharing activities in software development activities, as shown in both the communication, learning and sharing category. In addition, the external environment such as macro management style; autonomous working style active feedback from peers and management and direct involvement of management in software activities has also contributed to the formation of a conducive environment for the software development team in VSEs.

Additionally this study has shown that all respondents believe that there exists a high level of positive team dynamics within the software development. This could be identified from how the communication, relationship and learning and sharing environment is operating in the VSEs who partook in this study. The results also indicate that the smaller the team in VSEs, the higher level of team dynamics will be presents in the organization. In addition, the analysis also has indicated that VSEs staff have all the important criteria such as high skills, high motivation, active in sharing, direct involvement and open communication, which are important in the software development process.

From the analysis of team development issues, it can be seen that VSEs, which employ a very small number of staff, operate a very flat team structure and operates in an informal manner. The analysis showed that due to the small team size and an open working environment, the team dynamics in VSEs are very high. Even though some of the employees are working remotely (separate geographical location) the results show that the team relationship, socializing, information/knowledge sharing and interpersonal skill level are high.

4.1. Future Work

There are a number of potential avenues of further research related to this study. Of primary interest to the researchers is to widen the current research spectrum. Specifically, to test current research findings and also to produce and provide more valid findings and results, a similar study could be deployed in other geographical locations. This could help to create more generalizable research findings and assist with validation of the present research. In addition, the involvement of non-IT companies having a small IT department could assist future researchers to compare and produce a pattern of research results which could also add to the present research.

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