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The Factors Affecting Distributed and Collocated Teams in Agile Development

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ABSTRACT: Although Agile processes are being used increasingly in many software development environments, some enterprises still haven't adopted Agile because of various concerns, especially about using it with distributed teams.

Effectiveness of distributed Agile development is about minimizing the impact of distribution of various tasks while using Agile methodology in distributed teams. As now a days software development projects are carried out at many locations, there is need to find out the factors that are responsible because of the location of the team such as collocated or distributed teams for the same project carried out with agile development methodology.

Many researchers have put different factors which are affecting the project development. Communication, team related factors, extrinsic, intrinsic factors are quite a few factors which are noted. The matrix shown in the paper displays the factors that are given importance by all these researchers.

KEYWORDS: Co-Located Teams, Agile Methodology, Success Factors, Distributed Team, Domain Expertise, Motivation, Distributed Teams, Agile Teams, Distributed Agile Teams.

I. INTRODUCTION

Globalization wave became inevitable part of their sustainable businesses. Constant need to deliver innovative product solutions in shorter development cycle focused on customer centric solutions is today's need.

Agile has been a buzzword for years, but everybody uses it as methodology of choice for developing software today. The main reason companies and teams prefer agile is that the twelve principles of Agile Manifesto which have proven to be more successful than traditional waterfall methodologies, as per The Standish Group. [12]

The framework for agile development empowers the diverse environments of modern business. While in some project teams can be collocated, many projects are undertaken by teams which are distributed geographically or organizationally. The agile manifesto focuses on the 12 principles, one of the main principles is: "Collocation of team members". This means that the project team members should be at the same location. But because of globalization, many companies having their project teams distributed geographically at different areas. [2]

II. BACKGROUND

Today the Software development projects are carried out at many locations, with multicultural environment, and globally distributed. More organizations are working on their software development projects worldwide concurrently at different locations to achieve higher profits, productivity, quality and lower cost. [1] This change has thoughtful impact not only on marketing and distribution but also on the way products are conceived, designed, constructed, tested and delivered to customers.

This paper aims to throw light on some of the factors involved around the location of teams working on the software projects. These locations can be either at same location or distant. Depending on nature of the project,



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expertise and resources available for execution, location of the client, requirements of client the team location can be decided. Here we will try to analyze some of the issues relate to it and factors responsible for it.

III. RELATED TERMS

A. TEAM

A team is defined here as “a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable” (Katzenbach and Smith, 1993, p.45). [7]

B. COLLOCATED TEAMS & RADICAL CO-LOCATION

Radical collocation means the members of the development team are located in the same room for the duration of the project. This is an effort to further improve the time, cost and quality of software development projects. [6] Teams collocate as it makes best use of their ability to communicate in person. Agile methodologies have collocated teams as core principle including scrum.

C. DISTRIBUTED TEAMS

Distributed teams mean team members at distinct locations, geography & countries with different time zones working on the same project with shared or different tasks.

As Ken Schwaber, author of The Enterprise and Scrum, said, “The best communication is face to face, with communications occurring through facial expression, body language, intonation and words. When a white board is thrown in and the teams work out design as a group, the communication bandwidth absolutely sizzles.” [5]

In case of agile projects, collocated teams and face-to-face communication enable high level of collaboration. Collocated teams can have face-to face meetings and discussions to iron out the base architecture, design guidelines and understand critical milestones.

IV. FACTORS INFLUENCING PROJECT COMPLETION FOR COLLOCATED AND DISTRIBUTED TEAM

According to Alessandro Bianchi [1] from University of Bari- Italy, various factors were considered while defining the success of project. Actual and estimated duration of projects measured on the basis of size of sub project, reliability matrix, team size, number of meetings and reports generated within given time frame.

The analysis further shows the gap between actual efforts and estimated efforts for sub project completion. Research paper further mentions that the size required in case of distributed team is bigger than the co-located team.

Analysis of data on communication within the team show that distributed work requires more reports and meetings than work carried out in a single site, because the informal discussions that enable information sharing among the various participants are lacking. This causes an increase in cost overheads for distributed projects.

New techniques and methods for software engineering need to be studied to meet the new requirements created by global software development. Simply transposing traditional technologies does not enable the best exploitation of the potential of distributed work projects and indeed, causes these to appear less efficient than centralized work projects of similar nature.

As per Liva, Team motivation in software engineering is reported to have the largest impact on productivity, software quality and project overall success.[2]

Human aspects are of high importance and which among other potential reasons of failure are often neglected since they are not easy definable and quantifiable. Simply having more resources put on the project doesn't not it will be



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delivered in short time effectively and efficiently. Research paper further separates two types of factors namely Extrinsic and Intrinsic.

Intrinsic factors address the work itself and the goals and aspirations of the individual, such as achievement, possibility for growth, social relationships, security, etc. Extrinsic factors are concerned with the surrounding environment brought by the organization to the individual, such as praise, communication, office space, responsibility, money etc. [9]

Project size – Very large scale projects spread across different offices within and even outside the country.

Duration – Project under very short turnaround time and resource requirement is fulfilled by leveraging availability of team from different locations and different time zones.

Product or project Scope – Product solutions addressing needs of its customers spread over entire world. Project which addressing local needs due to different legal, cultural and social needs.

The geographic boundaries and global solution: As per top five challenges in Agile environment by Velu, [2] communication is key. Daily Standup meetings in co-located teams has its own advantages however is a challenge in distributed teams since it needs to establish the key spokesperson as mediator to communicate between teams considering different time zones formal, verbal and other modes of communication plays crucial role.

Velu suggests use of visualization tools to further improve individual performance and collaboration as well. Communication is heavily dependent on nonverbal cues, the research shows that providing collaboration software such as Microsoft Lync, WhatsApp or Google Hangouts increases collaboration. These tools are not only cost-effective and relatively easy to deploy across platforms but also eliminates need to travel and saves project costs to great extent. Access to team members as well as access to communication tools plays important role in improving effectiveness of team. Establishing core hours of communication in teams having time differences of 10-12 hours becomes very important when the teams are effectively working 24 hours mode.

Velu also suggests the workspace design and layout suitable for team members as they are involved in various tasks at the same time. Use of technology to further improve using Audio Visual tools for communication has high importance. Communication is required at one on one level as well as group level. Providing meeting rooms with sufficient infrastructure such as Projector screens and interactive tools viz. one space, remote screen share plays vital role.

Product delivery issues at the execution level can be handled by continuous integration. User experience group designing product solutions at remote location needs to be in constant touch with the developer's teams to track and understand the context of design features and elements during early stage of product development. It plays important role as the framework or architecture of entire product solution is based on these User experience teams outcome.

A simple solution is to parse the requirements into scenarios and send the requirements/ designs out as scenarios. Storyboards, which are sketches that illustrate a narrative of the interactions between people and a product, can be rich in detail but allow for greater engagement while still being focused on the feature or story.

Personalities and mind set to work collaboratively is an important factor and building suitable organizational culture and bringing the ownership to projects become important.

Mike Eccles, Joanne Smith explains the thinking behind co location. [8] The collocation of software development teams increases the ease, frequency and interaction of communication within the team. It also reduces the time taken to complete a project, and improve the productivity and performance of the Teams. Radically co locating of teams improves the communication, work place design also plays important role and the layout of the work places should be made to facilitate the easy movement of team members and spaces for short and standing meetings.

All team members present in a team room have a common goal; regardless of whether they are working on individual tasks which remains visible at all times. By collocating team members in a team room, the productivity of



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the team and thus the timeliness of a project can be improved (Teasley et al, 2002) [13]. However, the limitation of such activity leads to a bit nosy workplace and some time it is difficult to concentrate on allocated tasks to few individuals. This also need to be addressed.

Space planning in agile environment play very important role a right mix of individual workspaces or silent zones and chill-out zones or break areas. Privacy of individual workers and constant monitoring sometimes distract the members. This can be addressed by building the Agile culture in the organization.

In conclusion Mikes observations about teams do not see the need to be radically collocation, separate team rooms as this might not necessarily improve team effectiveness any more. Additionally, noise and interruptions do not have a significant influence on the effectiveness of teams. Feeling of connectivity and involvement that is shared within the environment by collocation with other teams in an open plan environment.

Maria Yang and Yan Jin [7] strongly believes that that distributed teams in the classroom tend to have task orientation in the way they function, while co-located teams tend to have a social orientation. They have considered total 8 factors – Goals and objectives, trust & conflict, utilization of resources, communication problem solving & evaluation, cohesion experimentation. 7 of them remains same except control and productivity which is higher in co-located team.

V. CONCLUSION AND FUTURE WORK

Based on literature reviewed above it was found that the distant located and collocated teams have many factors that affect the project completion. Some factors are responsible for project success as well. The factors mentioned in these papers can be divided as team, project, communication related. They are further divided into sub factors. Liva has categorized into intrinsic and extrinsic factors.

Consider the matrix shown below.

Table 1: Matrix of the factors suggested by different authors.

Author Factors	Bi an ch i	Liv a	Vel u	Eccl es	Mari a Yang
Communication		√	√	√	√
Duration of the project	√	√			
Team size	√	√			
No. of meetings	√				
Efforts taken	√			√	√
Team motivation		√			
Project scope		√			
Visualization Tools			√		
Work layout				√	√
Performance	√			√	√
Intrinsic			√		
Extrinsic			√		

The matrix shows that the communication is the most important factor from project coordination view. The factors related to team are also differentiating the team work based on size, motivation and activities for motivation. Collaboration in terms of stand-up meetings and reports generated as part of documentation of the project are also



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affecting the working of the team and its location. After this rigorous review of these research papers it is found that distributed teams is the future of software development projects and more research needs to be carried out to study the effect of these factors and to decide the priority of these factors on the success of the projects.

With organizations going global, distributed teams are becoming the norm. With additional efforts and some modifications, Agile, can work well with distributed teams. If the factors responsible for distributed agile teams are given proper attention, can turn out to be positive with multi-cultural environment and expertise from different areas. [3]

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BIOGRAPHY

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