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Challenges in Applying Scrum Methodology on Culturally Distributed Teams

By

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Abstract

Unlike traditional upfront-documented, plan-driven software development methods, Scrum methodology requires tight and close collaboration of all team members within the team. With the wide popularity of Scrum, it has being well adapted by offshore software industry such that team members from different cultures intimately collaborate to deliver a shared goal. Close team collaboration in a cross cultural team requires understanding and accommodation of different cultural behaviors within a single team. Purpose of this research is to identify possible cultural impacts on Scrum methodology when practiced in a cross cultural team. This research has studied and analyzed relevant sections of more than 75 secondary sources such as research papers, journal articles and books. In addition there are considerable number of other material studied but excluded after the initial study as inappropriate for the research context. Cultural aspects and Scrum best practices extracted from these secondary sources are then modeled and critically evaluated against one another to derive possible impacting areas. This research in its outcome, produces a set of hypothesis that identify cultural behaviors that can have a probable impact on the Scrum practices when practiced within a culturally distributed team. The research work demonstrates that, unless properly managed cross cultural behavior differences may have a significant impact on effectiveness of Scrum practices.

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Terminology and Definitions

Agile

Agile development is a philosophy that encourage light weight processes over heavyweight document/plan driven methodologies (e.g. waterfall). It is commonly assumed that agile methodologies allow better business alignment of operations and better in responding to changing requirements (Oosterhout, Waarts, Heck, & Hillegersberg, 2006).

"Manifesto for Agile Software Development" originally signed by 17 signatories, provided a broadly accepted definition for agile while signaling a wide industry acceptance for the same (Manifesto for Agile Software Development, 2001). According to the agile manifesto, agile core principles value:

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

Culture

The word 'culture' is being used in a very broad means in different contexts. What all of these concepts have in common is the implication that culture is an abstract entity which involves a number of usually man-made, collective and shared artifacts, behavioral patterns, values and other concepts (Dahl, 2004).

When comparing cross cultural behaviors, following definition by Spencer-Oatey holds a comparatively clear description. She describes the culture as a fuzzy set of attitudes, beliefs, behavioral norms, and basic assumptions and values that are shared by a group of people, and that influence each member's behavior and his/her interpretations of the "meaning" of other people's behavior (Spencer-Oatey, 2000).

Offshore Outsourcing

Offshore outsourcing is defined in many different ways in different literature due to interchanging use of the words 'offshore' and 'outsourcing' to mean similar operation models. These confusing definitions are further discussed by Bhagwati et al. in their literature 'The Muddles over Outsourcing'. They define outsourcing explicitly as the 'services trade at arm's length that does not require geographical proximity of the buyer and the seller' (Bhagwati, Panagariya, & Srinivasan, 2004).

Offshore essentially mean involvement of multiple countries. According to Criscuolo & Leaver, offshore outsourcing is the 'purchase of services abroad with the supplier and buyer remaining in their respective locations' (Criscuolo & Leaver, 2006). Similar but simpler definition is presented in the Wikipedia.org as 'Offshore outsourcing is the practice of hiring an external organization to perform some business functions in a country other than the one where the products or services are actually developed or manufactured' (Offshore Outsourcing, 2010).

1 Introduction

IT industry is no more a green field. Due to the ever increasing globalization and increasing maturity of the industry, knowledge and technology has become a commodity, enabling new competition for organizations to easily emerge. For example on a technological note, increasing standardization and interoperability allows competitors to offer compatible programs, such that users do not have to face vendor lock-in when adopting a new piece of software (SÁNCHEZ).

To keep ahead the competition in this highly dynamic industry, organizations have to continuously optimize their processes, reduce cost and increase quality of work delivering better customer satisfaction. Over the time, it has been seen that some organizations turning in to offshoring to gain an edge over competition. But eventually as the offshore industry get established, more and more companies adapted offshoring as a key business strategy. This made the 'strategy of offshoring' to shrink its reputation as a competitive measure requiring organizations to look for innovative operational model.

In the search for new competitive measures, many organizations in the IT Industry leaned towards reducing overheads of their business processes. Accordingly, adapting business processes to be agile, simple and light weight is a recent trend observed in the industry. Due to wide spread success stories, more and more organizations adapted agile methodologies that allows them to be more competitive by better aligning work with the overall business goals (Murphy & Rooney, 2006).

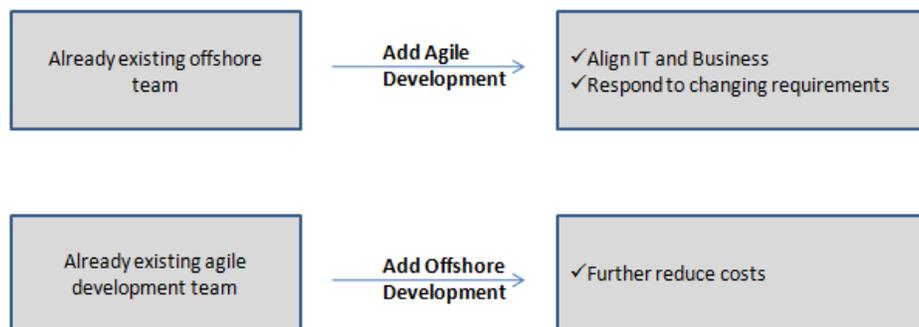


Figure 1.1: Incremental benefits of agile and offshore (Moore & Bernett, 2004)

However a latest trend seen in many organizations is to merge agile operations with offshore practices. It is believed that these companies that merge agile with offshore development would be able to experience the best of both worlds by further reducing costs and better meeting the customer needs (Moore & Bernett, 2004).

Essentially in such a global offshore setup, members of different cultures are to work together to achieve a common business goal. Different cultures define own value system that probably can raise new challenges in collaboration (Dahl, 2004). For example, Edward T. Hall a cross-cultural researcher, in his work discuss insight information on the cultural differences that can be expected in performing geographically distributed operations. In order to model the differences, he has classified world cultures in to two broad categories in his books as 'low context' and 'high context' (Hall E. T., *Beyond Culture*, 1989). Asian and eastern Europe countries are commonly considered 'high context' where as most of their offshore partners countries such as North America and Western Europe can be considered 'low context' (Binh, 2005).

According to a research done by 'vantage partners', such cultural differences are considered the top most challenge for offshoring relationships. As this interesting research indicates, other aspects such as language, physical distance, infrastructure, time difference, etc have a comparatively lower impact on the offshoring contracts. Further the study clearly shows that if cultural differences not managed effectively that can substantially impact the value of offshore contracts. In the survey, 64% of respondents said that the impact of cultural differences is greater than 10% of annual contract value, and 33% said the impact is more than 20%. Following chart depicts the % of projects against % of annual contract value impacted by culture-related challenges (Ertel, Enlow, & Bubman, 2010).

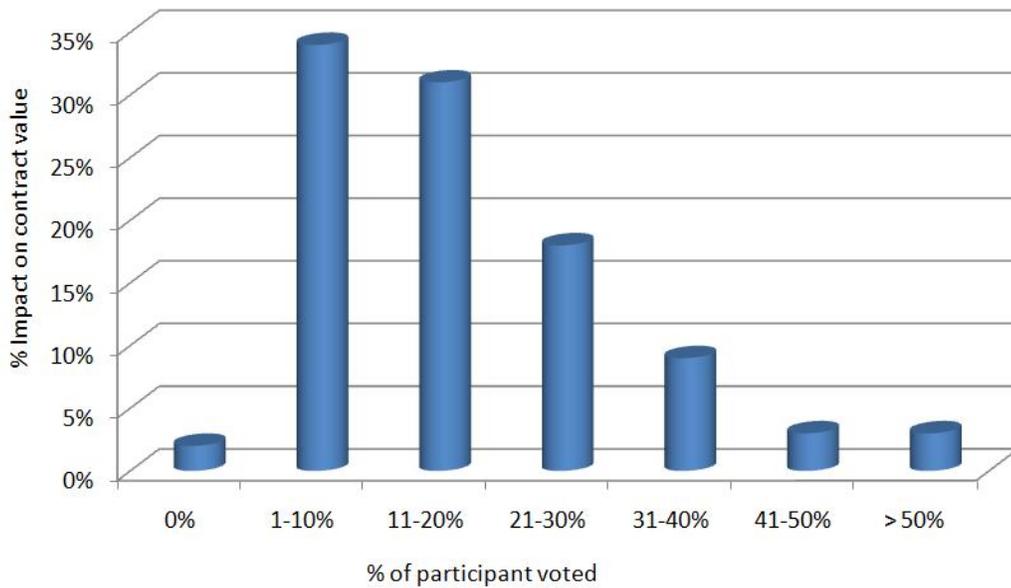


Figure 1.2: % of annual contract value impacted by culture-related challenges (Ertel, Enlow, & Bubman, 2010)

Practicing agile in offshore context commonly require teams to comprise of members from different countries. For example it is common to have the business experts from the onsite organization whereas the technical members are from a offsite partner. For a large portion of the offshore industry, the onsite-offsite partners are culturally distributed. For example it is a general setup to have the onsite organization located in West whereas the offshore partner is from a Eastern country (West meets East, 2008).

Compared to traditional methodologies, agile methodologies encourage rich collaboration among team members. As collaboration between different cultures gets richer, managing the impacts of cultural differences becomes more significant for smooth operation of the business. For the same reason, combining agile with off shoring brings new challenges to the industry. Practicing agile across multicultural teams could spawn issues that are not evident when running agile projects within a single cultural context.

1.1 Research Objective

In less than a decade Scrum methodology gained acceptance in the software industry as the most used agile methodology. In addition, researchers suggest that more than half of these agile projects are geographically distributed (State of Agile Survey 2010, 2010). Due to the wide use of distributed Scrum, it is important to identify how cultural factors in different parts of the world could impact Scrum as a team management methodology.

The primary aim of this research work is ***'to identify the key issues resulted by the influences of cultural differences when practicing Scrum based software development within a culturally distributed team'***.

There has been considerable research work already done in analyzing cultural differences of different parts of the world. Eastern and western cultures are observed as the two major cultural contexts and are broadly discussed in the researches. As a large part of the offshoring business involves western and eastern countries, similar cultural classification is appropriate in evaluating a large segment of the offshore software development projects. Since significant differences exist between eastern-western cultural differences and considerable portion of offshore contracts are from west to east, this research primarily focuses on distributed offshore Scrum projects that consist western and eastern counterparts in a single team.

This research paper analyze and discuss how cultural differences can affect culturally distributed Scrum teams. Outcome of this report hypothesizes possible cultural impacts on Scrum best practices when practiced in a cross cultural team. This research deeply uses secondary resources to identify related cultural differences as well as Scrum practices. Information obtained is then critically reviewed and modeled in approaching towards research goals. Any possible linkage between the Scrum practices and cultural differences are discovered by exploring within this research model. When possible this dissertation further states how, why and under what cultural contexts a particular Scrum practice can be impacted by cultural differences of team members.

2 Cultural Classifications

In analyzing cross cultural impacts on Scrum, it is important to have a clear categorization and discussion on the human behavior under different cultural contexts. Following sub sections of this literature sensibly classify cross cultural behavioral patterns and argue significant differences as observed in different cultural contexts.

2.1 Communication

A cross cultural researcher, Dr. Edward T. Hall has coined the term 'high and low context cultures' in his broad categorization of world cultures. Context is one of the most popular dimension used in cross-cultural studies and probably the most important categorization as well. Hall defines context as 'the information that surrounds an event; it is inextricably bound up with the meaning of that event' (Hall & Hall, *Understanding Cultural Differences, Germans, French and Americans*, 1990).

The most notable difference in different culture contexts is the dependency on contextual variables (environmental) to process the meaning of an explicit message event. For example, without the context information, the explicit message event has less or no meaning in high context cultures. These contextual dependencies in high context societies may include history, traditions, individuals status, relationship level, etc. In contrast, in low context communication, an explicit message event (e.g. verbal) includes significant amount of information that is required to understand the communicated meaning. Lower context cultures depends less on the contextual variables in processing the meaning of a communicated message (Nishimura, Nevgi, & Tella).

As per Hall, in high context cultures, tradition and history changes comparatively less over time and therefore people are very homogeneous with regard to stimuli of the environment events. Due to this homogeneity, in high context cultures, consistent events tend to produce consistent responses. These consistent responses are familiar to individuals and accepted as norms in the society. Hall stated, 'for most normal transactions in daily life they do not require, nor do they expect, much in-depth, background information'. Further meaning of a message is not necessarily contained in words but may be provided through gestures, the use of space and even silence (Hall & Hall, *Understanding Cultural Differences, Germans, French and Americans*, 1990).

In contrast, low context people are less homogeneous with regards to environment events such as interactions and experiences. According to Hall this lack of a large pool of common experiences means that 'each time they interact with others they need detailed background information'. For example in these cultures, a verbal message needs to contain most of the information to possess the meaning and very little is conveyed in the context of the participants (Hall E. T., *Understanding Cultural Differences, Germans, French and Americans*, 1990).

Following diagram depicts some countries along with their relative positions in the high/low context scale.



Figure 2.1: Cultures Arranged Along High-Context and Low-Context Dimension (Hall E. T., Beyond Culture, 1989)

As depicted in the above graph, mostly Eastern countries are considered high-context cultures whereas Western cultures demonstrate low context behavior. Further studies show that there are cross-cultural challenges in individuals moving from one culture to another. An individual from a higher context culture will need to adapt when shifting to a low context culture. Lower context cultures demand more independence, and expect

many relationships, but fewer close personal ones. In contrast, the high context individual moved to a low context culture is more likely to ask questions rather than attempt to work out a solution independently. Further it is probable that the questions are asked from the same few people whom he knows better. Eventually the high context person may be frustrated by people appearing to not want to develop a relationship and not continuing to help them ongoing basis (High context culture, 2010).

Similarly an individual from a low context culture needs to be accommodated when shifting to a higher context culture. Higher context cultures expect small but closely related groups, with high individual reliance on that group. Group members can be relied upon to support each other, but it may be difficult to get support outside the group. Also it can be seen that the professional and personal lives often intertwine in such cultures. The lower context individual moved to high context is more likely to try working individually and feel there is a lack of self-service support or information. He is probably to be frustrates on the need to ask questions and take time to develop the relationships to accomplish the things that need to be done (High context culture, 2010).

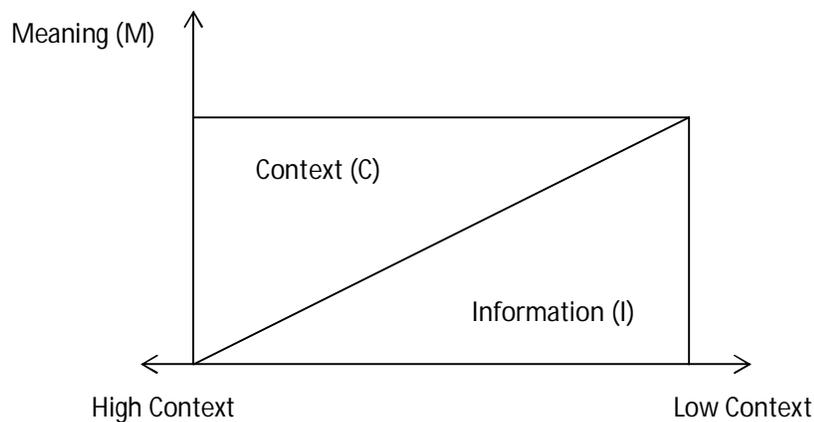
Explicitness

Communication styles can be considerably different between high versus low context cultures, primarily due to the differences in required explicit amount of information in communication. As stated above, in high context cultures, considerable part of the message in communication is transmitted indirectly via context and therefore not much of explicit information may be used in day-to-day communication. In low context cultures, for the communication to be meaningful, much of the message has to be transmitted explicitly, for example verbally (Storti, Bennhold-Samaan, & Corps, 1997). Hall states, 'a high context communication or message is one in which most of the information is already in the person, while very little is needed in the coded, explicitly transmitted as a part of the verbal message' (Hall E. T., Beyond Culture, 1989). A low context communication is just the opposite; i.e., the mass of the information is vested in the explicit code (Hall E. T., Beyond Culture, 1989).

The idea of context can be represented as a function (Hall & Landis, *The Paradox of Culture*, 1971). The meaning (M) of a communicated message is a function of Information (I) within the Context in which the message event occurs (C).

$$M = f(I, C)$$

Information and Context has a positive relationship to Meaning and hence, more information in the message or more contextual understanding helps to enhance the meaning of a message.



*Figure 2.2: Meaning as a function of Information and Context (Hall & Landis, *The Paradox of Culture*, 1971)*

This helps us to model the differences between the Eastern and Western communication styles. For instance, the Asian mode of communication is often said to be indirect and implicit, but a person in the same context can understand another quite well because they share common background information. On the other hand, Western communication tends to be direct and explicit, everything needs to be stated, possibly because individuals are less aware of others surroundings and environment. In these cultures, more information is transmitted explicitly and verbal communication is used as the main information channel (Qingxue, 2003).

Harris and Moran summarize this dimension as follows. Unless global leaders are aware of the subtle differences in cultural contexts, communication misunderstanding between

low- and high-context communicators can be resulted. For example, Japanese communicate with each other by not stating things directly by via many other means, while Americans usually do the opposite by spelling it out (Harris, Moran, & Moran, 2004).

Tendency of Saving Face

Another prominent reason for individuals from high context cultures to prefer indirect communication styles is to avoid dealing directly with conflicts. Issues arising within the group are dealt privately, mostly with one-on-one discussions, or through a third party, or even through passive resistance. In high context cultures, status is often inherited and present in the interaction context. High context conflict resolution tends to take the approach of 'saving face' of individuals such that dealing with an issue or concern in a manner that does not publicly embarrass anyone or cause them to lose respect. Therefore, in many instances the blame is not directly placed on anyone but is usually alluded to (Gupta, 2010).

On the other hand low-context cultures are not concerned with 'saving face' or group shame. Conflicts are considered as personal responsibility and expectation mismatch and acknowledgement is made via a apology followed by any corrective actions by the group. In low context cultures status is not inherited but directly related to commitment to hard work within the group assignment.

Emphasis on Group Harmony

An important aspect of high context communication is that, its overriding goal of a communication being maintaining the group harmony (Storti, Bennhold-Samaan, & Corps, 1997). Whereas low context communication considers getting or giving information as the sole goal of communication. Therefore low context cultures are less concerned on maintaining the group harmony but communicating necessary information is kept as the overriding goal of the conversation.

Use of Pauses

Use of silence in conversations is another important aspect in understanding cross cultural communication patterns. Hall (Hall E. T., *The Dance of Life: The Other Dimension of Time*, 1983) claims that silence may serve as a critical communication device in some Eastern cultural communication patterns. Pauses reflect the thoughts of the speaker and can contain strong contextual meaning whereas In Europeans often consider silence and pauses in conversations as unpleasant (Ting-Toomey, 1999) .

2.2 Individualism

Another widely discussed cross cultural measure is the level of individualism of different countries. As opposed to individualism, collectivism refers to the degree to which individuals are integrated in to the group values. Following behavioral patterns are identified as the measurement dimensions for collectivistic and individualistic culture studies by Wagner (Wagner, 1995):

- Self-reliance
- Emphasis on group goals
- Competitiveness
- Preference for group work
- Supremacy of individual interests

In an interesting worldwide study of 116,000 employees of IBM, it was observed that the people from different cultures value and possess individualism vs. collectivity differently. The research involved collecting data from IBM offices worldwide that are essentially within societies of different culture contexts. This research found out that the most fiercely independent people were from the individualistic western cultures such as US, Australia, Great Britain, Canada, Netherlands. People from Eastern collectivistic cultures such as Venezuela, Colombia, Pakistan, Peru, and Taiwan were more interdependent on others in the group (Bond, 1997).

Self-Reliance

On individualistic societies, ties between individuals are loose and every individual is expected to look after him/herself and the immediate family. On collectivistic societies, people are integrated in to extended groups that demonstrate characteristics of an extended family. These groups are strongly cohesive and aim to protect the group members from external interferences (Hofstede, *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations* - 2nd edition, 2001).

Preference for Group Work

In some other research work, it was also observed that acceptance for 'group work' is comparatively higher in collectivistic cultures. In fact people demonstrate tendency to work harder in groups than when they are in to individual assignments. On the other hand, individualistic cultures prefer and gain more productivity while working individually (Samovar, Porter, & McDa, 2009).

Emphasis on Group Goals

Individualist cultures demonstrate high emphasize to personal achievement over group goals. Whereas in collectivist cultures, emphasize is more on group goals over personal goals. Regarding the level of group commitment across different cultures Hall states, 'The degree to which one is committed to complete an action chain is one of the many ways in which cultures vary. In general, high-context culture, because of the high involvement people have with each other and their highly interricular, cohesive nature, tend toward high commitment to complete action chains' (Hall E. T., *Beyond Culture*, 1989). As a result, compared to high-context societies, members from low-context society are less likely to put extra effort in completing an action in the chain unless properly motivated (DeKinder).

Out-group Integration

A related important aspect in the review of the individualism and collectivism dimension is how people in different cultures interact with people within the group (in-group) and out of their group (out-group). Collectivists pay more attention to members in the group and behave considerably differently toward members outside the group. In contrast to the emphasis collectivists place on in-group relations, individualists are more likely to trust and accommodate strangers and outsiders and show more attribution confidence regarding strangers comparatively. In other words, members of individualistic cultures

experience less social penetration with in-group people than members of collectivistic cultures (Triandis, Cross-cultural differences in assertiveness/competition vs. Group loyalty/cooperation, 1991).

Supremacy of Individual Interests

This aspect is closely related to emphasis on group goals in several means. In individualist cultures, conflicts between in-group goals and individual goals tend to resolve in favor of the latter whereas In collectivist cultures, such conflicts tend to resolve in favor of group goals (Triandis, Cross-cultural studies of Individualism and Collectivism, 1990). In collectivistic cultures, group norms have a stronger impact on both individual and group behavior. In individualistic cultures, individual likes and dislikes are tend to be governed by individual behavior and therefore attitudes are pivotal in such cultures (Kapoor, Comadena, & Blue, 1996).

Competitiveness

Competitiveness may take different forms, such as pure competitiveness towards each other and competitiveness in status seeking. Both forms are relative to other persons such that one trying to succeed over another (Goncalo & Staw, 2004).

Self-esteem in collectivistic cultures is less resultant by evaluating one's own unique abilities compared to others in the group. Therefore collectivistic cultures have a less stimulus to standout from the group abilities and be competitive with own group mates. It is common for collectivists to gain status and self-esteem by well behaving to the group norms and helping the group to achieve group goals (Wink, 1997)

In contract to collectivists, members of individualistic cultures attempt to achieve recognition over the others in the same group by performing beyond the norms of the group. This behavior can make individualistic members of a cross-cultural group to be high competitive over the others in the same group (Goncalo & Staw, 2004).

2.3 Time Orientations

The concept of polychronic/monochronic time orientation describes how individuals in different cultures perceive time. It is common for high context cultures to demonstrate polychronic behaviors whereas low context cultures demonstrate mostly monochronic behaviors (Hall E. T., *The Dance of Life: The Other Dimension of Time*, 1983). Among monochronic cultures time is considered a strong entity which is spent comparable to money, whereas polychronic cultures share more leisurely view on time (Lindquist & Kaufman-Scarborough, 1999).

Value for Time

Polychronic individuals perceive time continuously flowing like a river, never ending from past to future. Time is less structured and the individuals regularly switch activities from among a group of activities. For monochrons, time is structured and divided into discrete units, such as days, hours, minutes, etc. which can be organized across activities (Kaufman-Scarborough & Lindquist, 1999).

Multitasking

When it comes to performing work, people in monochronic cultures prefer doing single thing at a time. They tend to take work sequentially one after completing another. In polychronic cultures it is common and accepted that multiple tasks are being handled at same time by a person. When work involved multitasking, polychronic s are less concerned whereas monochronic may get stressed due to task switching (Kaufman-Scarborough & Lindquist, 1999). In some research work it has been observed that members in polychronic cultures prefer and even perform better doing multiple tasks simultaneously compared to monochronic counterparts (Solomon & Schell, 2009).

Punctuality

Monochronic societies pay high attention to the clock. Whereas polychronic cultures are more relaxed about time and scheduling, instead focusing on the people around them. This has caused strong perception differences toward punctuality in different cultures. For example in some countries, people are very concerned of being on time, especially when it comes to business meetings. To be late is considered poor business practice and rude. While some other cultures may consider being late as an indication of person being busy (Bowie).

Interruptions

When it comes to management of changes and interruptions, polychrons generally excel in changing from one activity to another with ease than their monochronic peers. Further, they are more likely to indicate that such polychronic behaviors contribute positively toward reaching daily goals of the group. Person who is monochronic is likely to get upset by unplanned changes and prefer strict and organized allocations (Kaufman-Scarborough & Lindquist, 1999).

Further when it come to changes, polychrons appear to initiate unplanned changes during their work day. In contrast when monochrons are asked to change tasks each day more than they would like, that can cause a sense of mismatch and considerably distress monochrons. Monochrons appear to prefer a planned, deliberate control over their time and they like to identify time periods when certain activities to be done. Some researchers suggest that monochrons are well-suited for workplaces which require the well-planned schedules while polychrons would thrive in less organized dynamic work schedules (Kaufman-Scarborough & Lindquist, 1999).

3 Scrum Methodology

Scrum is a light weight agile management approach which is widely adapted in software development projects. Originally conceptualized by Jeff Sutherland and Ken Schwaber during 1993, today Scrum is commonly applied in bespoke projects as well as in product development projects worldwide. Scrum methodology and practices is well documented in considerable amount literature available in public domain and specific trainings are available for different roles of a Scrum team. In order to manage Scrum training and certification an organization called Scrum Alliance was also formed in 2004 (Scrum Alliance - Transforming the World of Work, 2010).

3.1 Scrum Process Overview

Scrum follows an iterative development approach with each iteration is typically being 2-4 weeks long. These iterations are called sprints and are governed by simple rules which encourage self management of the team. Requirements often called stories in scrum are

implemented incrementally where each selected story is expected to be fully implemented and functional at the end of the included sprint. Scrum is commonly accepted as a suitable methodology for projects with rapidly changing and emerging requirements due to its agile and accommodative nature.

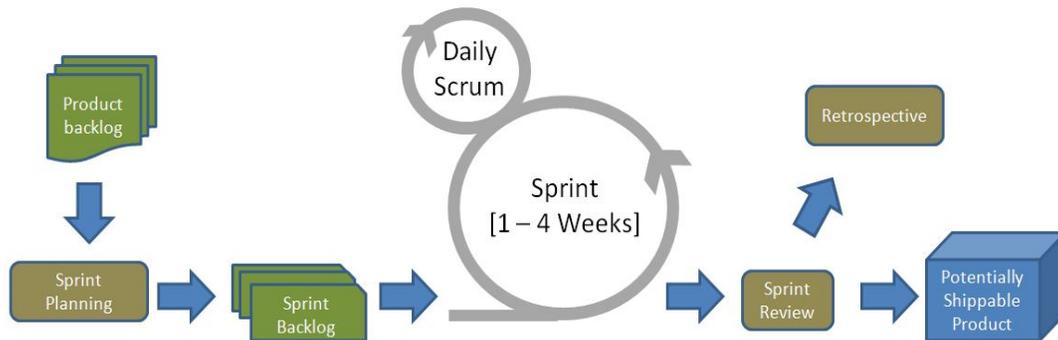


Figure 3.1: Overview of Scrum Development (Deemer, Benefield, Larman, & Vodde, *The Scrum Primer Version 1.2, 2010*)

Scrum team maintains a product backlog, which is an inventory of all the stories that are known at the time. Product backlog is been prioritized by the product owner and is groomed/ estimated by the team. Each sprint starts with sprint planning where team selects stories to be done for the sprint from the product backlog in the priority order. Selected stories are referred as the sprint backlog and team commits to complete sprint backlog at the end of the sprint. In deciding the amount of work for sprint, team may use 'team velocity' that reflects the amount of work that was completed by the team historically. During the planning meeting, each story is discussed in brief and tasks may be created with further elaborated estimates.

During the sprint, everyday team synchronize themselves in a meeting called daily Scrum. This is a short, to the point meeting held daily to coordinate among the team members in the team. During the daily scrum, each team member provides answers to the following three questions:

- What did you do yesterday?
- What will you do today?
- Are there any impediments in your way?

Primary objective of the meeting is the share information and stay committed to dependencies within the team members, but not towards the customer or any external party. ScrumMaster is responsible of helping the team members to resolve any impediment arising during the implementation. When the impediment cannot be resolved within the team, ScrumMaster takes responsibility for ensuring team receive necessary resources/assistance from the related external parties (The Daily Scrum Meeting, 2010).

Team carries out cross-functional activities such as elaboration, design, development, and testing continuously on the product within the sprint. Scrum recommends to maintain a potentially shippable product with incrementally added features available at the end of each sprint. Scrum encourage to have all committed stories (after any inclusion/exclusion done within the sprint) are 'done' at the end of the sprint. A completely 'done' story includes all of the analysis, design, refactoring, programming, documentation, internationalization as well as proper testing for the new development (increment) and existed items (regression). Testing includes unit, system, user and regression testing, as well as non-functional tests such as performance, stability, security and integration (Scrum Guide, 2010).

At the end of the sprint, there is a review meeting where team demonstrate that they have 'done' within the sprint. This meeting can be attended by any stakeholder together with the team. Everyone is allowed to ask questions and provide suggestions. Following the review, retrospective of the sprint is also carried out as a informal to discuss what they did right and what needs improvements and agree on the changes to try. Unlike review, retrospective is an internal reflection and only attended by the team members (Deemer, Benefield, & Larman, The Scrum Primer, 2007).

3.2 Defined Roles in a Scrum

ScrumMaster

The ScrumMaster is the coach for the team helping the team to achieve their highest level of performance. ScrumMaster does not provide day-to-day direction to the team and does not assign tasks to individuals. This makes ScrumMaster to be considerably different from a traditional project manager. The ScrumMaster allows team members to be focused during the sprint on the goal they have agreed and responsible of neutralizing disturbances from external interferences (Introduction to Scrum - An Agile Process, 2011).

Product Owner

Product owner is the navigator to the team who directs the team towards the right direction. Product owner is responsible in creating a convincing vision to the product and then conveying that vision to the team through the product backlog. Product owner ensures that the product backlog remains prioritized as the project progresses and more is learnt (Introduction to Scrum - An Agile Process, 2011).

Team

Each team member needs to contribute at their best in whatever ways to complete the work of the sprint. Their job titles or designations are immaterial once they are assigned to a Scrum team as members are expected to be cross functional. This does not mean that a tester will be expected to re-architect the system. Individuals will be spending most of their time working in own specialized disciplines they come from, but individuals are expected to work beyond their preferred disciplines whenever required to achieve common group goals (Introduction to Scrum - An Agile Process, 2011). It is observed that the stable, long-term teams are associated with higher productivity, so Scrum recommends to avoid changing team members rapidly (Deemer, Benefield, Larman, & Vodde, The Scrum Primer Version 1.2, 2010).

3.3 Wide Adoption of Scrum

According to a recent research done by Forrester, Scrum is the most widely adapted agile methodologies today with 10% of the surveyed developers saying they use Scrum (West & Grant, 2010).

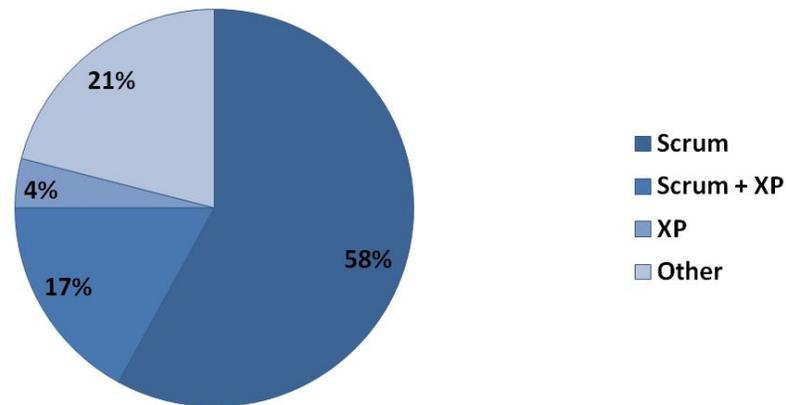


Figure 3.2: Most closely followed Agile methodology (State of Agile Survey 2010, 2010)

As shown above this is further confirmed by another recent survey conducted (State of Agile Survey 2010, 2010). From the 4770 participants in 91 countries, 58% use Scrum as a methodology where as the closest counterpart XP methodology is being practiced by only 4% of participant.

3.4 Distributed Scrum Teams

As organizations adapt offshoring as a key business strategy, distributed agile teams are becoming more popular and common. Some recent studies suggest that more than 50% of the agile projects today run with geographically distributed team members (State of Agile Survey 2010, 2010).

Fully distributed Scrum teams commonly contains cross-functional individuals that are working in different geographies, resulting a single team to have members coming from different cultural backgrounds. For example, a team might have four developers onshore in US whereas four more developers offshore located in Sri Lanka. In Scrum these team members share a single sprint backlog, sprint goal and share same level of code ownership and responsibility to the project (Sutherland, Schoonheim, Kumar, Pandey, & Vishal, 2009).

There are several models of distributed Scrum teams that are emerged over time (Woodward, Surdek, & Ganis, A Practical Guide to Distributed Scrum, 2010).

- Distributed with overlapping work hours

- Distributed with no overlapping work hours

Effective distributed Scrum utilize an overlapping time to communicate closely with counterparts in different geographies. Shared time during the workday helps in creating a sense of a single team and also eases collaboration. However, a large parts of the offshore industry do not have overlapping work hours and requires some meetings to be outside of the work hours (e.g. India and US). Distributed agile teams generally use close conferencing techniques, most commonly instant messaging and audio conferences. Video conferencing is also used when sufficient resources are available to support the technology. Face to face meeting and interaction from members in different cultures is limited mostly due to the cost (financial, time, effort) of traveling.

4 Research Method

Due to the cross-cultural/global involvement of the topic, empirical methods requires access to significant amount of international project data from different parts of the world. Due to the constraint of this research, a worldwide data collection is less viable in reality. Conducting an imperial research within a limited context and collecting data for testing hypothesis is also considered less accurate as the limited sample data cannot be accurately generalized in to the global population. Due to these limitations, this research is designed as an exploratory research that identifies cultural challenges through a critical analysis of information acquired from trustworthy secondary resources. Therefore this research can be considered as a secondary research which depends on results of relevant primary researches carried out worldwide. Outcome of this research produces general propositions that themselves can be identified as hypotheses.

During the first phase of the research, cross cultural behavior differences are identified through a literature review of related primary research material. Identified differences are categorized in a sensible way for further analysis. Categorized content is then analyzed and synthesized in the aim of making a comparison between the different cultures. Scrum core concepts and best practices are identified and discussed during the second phase of the research through further literature reviews. In order to identify possible cultural impacts on cross cultural Scrum teams, a set of behavioral requirements

for each of the identified Scrum practice is also extracted. These behavioral requirements are then critically evaluated against the behavioral patterns of different cultural contexts to identify possible affects of cross cultural differences on Scrum practices. Analysis process will use relevant content from secondary sources in either supporting or refuting the hypothesized impacts.

Artifacts generated through the research delivers findings on effectively of traditional Scrum practices on cross cultural teams. Further this research paper discuss the conclusions for the research question through the results deducted. In addition, the research outcomes states the circumstances under the derived challenges are materialized.

5 Discussion: Cultural Impact on Scrum Practices

In summary ,this research work is conducted by critically evaluating Scrum methodology practices against Eastern and Western cultural differences to identify conflicting areas. As studied under section 2, different cultures will behave differently and as members from different cultures are gathered in to a single team these differences can spawn conflicts impacting performance of the Scrum team.

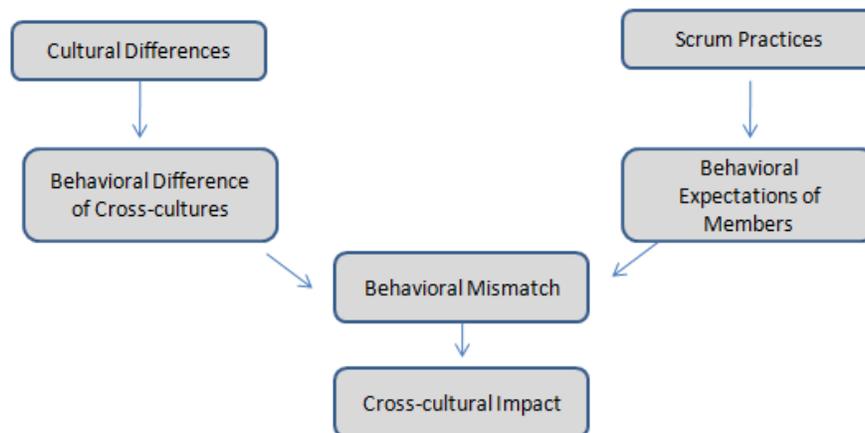


Figure 5.1: Approach of identifying cultural impact on Scrum Practices

In this section, selected Scrum practices are described in details and behavioral expectations of those practices are reviled. These behavioral expectations are then

compared to the behavioral differences of different cultures to deduct possible impacting areas. Above diagram summarizes the impact identification approach briefly.

5.1 Time boxed activities

Scrum advises every activity to be time boxed. This allows team members to get feedback of the activities they do in a predictable time period. Even for single tasks, this guaranteed feedback makes developers to understand priorities and focus better (Bossuyt, 2010). For example, base recommendations are defined in Scrum literature for different activities such as sprints (2-4 weeks), daily Scrum (15 minutes), planning (4-8 hours), retro (2-3 hours), etc (Bar-Nahor, 2008).

As discussed in section 2.3, time and punctuality is valued differently in different cultures. In monochronic perception, activities fit nicely into the time blocks, therefore monochrons desire to plan, schedules, and keep track of activities with respect to time. (Kaufman-Scarborough & Lindquist, 1999). But for polychrons perceive time as an entity that is flexible and adjustable as per the demands of the other activities in hand.

In order for a team to be time boxed in executing the activities, all team members need to be alarmed of the time they spend with the activities. Punctuality of the team members is also important in executing the activities as scheduled. When the Scrum team consists of members from monochronic and polychronic cultures, it is much possible to have a sense of mismatch in the perception towards time boxing.

Monochronics will have the desire of conducting the activities such as meetings within the scheduled timeframe, whereas polychrons will approach the same activities more leisurely. Polychrons may even accommodate interruptions caused by different other commitments and overlook the importance of scheduled activities. Conflicts and team tension may arise because some monochronics may regard this polychronic behavior as lazy and undisciplined while the polychronic may regard the monochronic as arrogant and too materialistic (Gesteland, 1999).

5.2 Cross-functionality

Scrum proposes the team to contain multi-skilled workers. Team members shouldn't be working on job titles such as 'architect' or 'tester' who only perform specialized form of work. Team members should look for any type of work pending on the project and help out to achieve sprint goals. For example, if application needs more testing, any member in the team should be able to wear the 'tester' hat and help in testing. In achieving this, Scrum team members need to be cross-functional across disciplines (design, development, documentation, testing, elaborations, etc), as well as cross-functional across technologies (frontend, business tier, database tier, etc.). To keep a balance in tasks assignments, it is not recommended that team members reserving or volunteering for the tasks during the planning meeting that are 'best done' by them. Instead it is a Scrum best practice that members on purpose pick tasks that involves some learning when carrying out the work. This allows the knowledge to be disseminated among team members, further increasing cross-functional ability of the team (Deemer, Benefield, & Larman, *The Scrum Primer*, 2007).

As described, to have cross functional behavior within team, it is important that all members of the team appreciating different types of work and roles. Further the cross functionality can result in changing the responsibilities and job functions multiple times during a work day.

Polychrons, are expected to thrive in jobs which have high uncertainty and changes within the environment. Careers with great juggling of tasks expect that the individual will be consistently adjusting to incoming new jobs and responsibilities, simultaneously integrating such activities with the other related commitments. These careers are more suitable for polychrons as they are less likely to be disturbed by interruptions (Kaufman-Scarborough & Lindquist, 1999). Therefore polychronic members of a Scrum team are more likely to move easily between the roles (developer, tester, document writer) regularly within a sprint. Also they may enjoy working across the different modules of the system in completing a task.

Monochronic members on the other hand, may resist the implicit internal disruptions caused by Scrum practices. In task assignments, this may cause the monochronics being attached to the same type of work throughout the Sprint. For example monochronics member might avoid picking work from areas such as documentation or testing but always picking Database related work. This certainly can create some tension around the polychronic members who need better collaboration in task assignments.

5.3 Openness/Transparency

Scrum strongly encourages openness making activities to have high level of transparency. Every member should know necessary and adequate information about the sprint work in a genuine and authentic Scrum implementation (Mezick, 2010). Openness helps bringing out opinions freely during retrospectives and also lowers communication barriers within the team. Also the culture of openness allows team members to understand and each other better, enhancing the performance as a single group (Sutherland, Schoonheim, Kumar, Pandey, & Vishal, 2009)

Openness can greatly be influenced by the cultural context. As discussed in section 2.1, cultures that regard group harmony as a primary goal of communication, may primarily use indirect communication styles in solving conflicts. But in lower context cultures such as in Europe, the intension of preserving the group harmony does not play a bigger roles. Therefore people in Western cultures are likely to express themselves more openly. In contract Eastern cultures such as Japanese express feelings and opinions mildly and indirectly, partly to avoid possible confrontations, arguments and breaking up the group harmony (Haataine).

Further, the tendency of high context cultures to 'save the face' of team members can further complicate the matter as their low context counterparts are less concerned of 'group shame' and can be more direct in communicating at conflicts. A case study done by Sutherland et al. (2009) reveals that Indian and Dutch team members have a significant different approaches in communication. Dutch team members are often loud

and direct, while Indian team members can be careful and cautious in their expressions (Sutherland, Schoonheim, Kumar, Pandey, & Vishal, 2009).

Scrum is heavily dependent of the transparency of activities. It requires team members to feel openness in discussing issues/improvements of the team or the process. For example, during the sprint retrospective, it is important to raise any improvements team should have in delivering better in the future. Another example would be that, during the daily Scrum, stating out the issue of a long waiting dependency on some other team member. The level of directness in raising these concerns will depend on the culture context in which the speaker is groomed.

Due to the differences in cultural openness in a cross cultural Scrum team, members from low context culture may perceive the high context culture counterparts to be less trust worthy, whereas high context members perceiving their counterparts to be rude, disturbing and to have less team spirit. If not managed and educated properly differences of openness can lead to a splits in the team across cultural boundaries.

5.4 Commitment

Scrum as a methodology heavily depends on commitment of team members to deliver on the promises. In executing the project work, teams need to ensure that everyone has come to an agreement on the commitments they bare as a team and as individuals.

For example at the end of the planning meeting, a Scrum team commits to complete the story items added to the sprint backlog. Also during the Daily Scrum meeting each team member makes a verbal commitments to the team. When a member states what they are going to do within the day, they are making a verbal commitment to the rest of the team. Commitment is primarily tool used by the Scrum process to create peer pressure on individuals to deliver on responsibilities. As per Woodward et al. commitments during daily Scrum acts as a catalyst in creating peer pressure in two ways (Woodward, Surdek, & Ganis, A Practical Guide to Distributed Scrum, 2010):

- To complete work that is blocking the progress of another team member
- To create a sense of accountability in delivering the work in hand

As discussed in section 2.2, high context-collectivistic cultures demonstrate high commitment towards group goals. They are more likely to complete tasks with passion and extra effort when there are dependent tasks owned by others in the group. On the other hand individualistic members on the team may not be extra motivated to complete the actions although dependencies exist. They are less likely to compromise their personal needs in achieving group goals. These individualistic members may require different means to keep motivated, for example a sense of competition to perform above group norms.

Further the preference and ability of polychrons to perform multitasking will help them to assist other team members regularly when impediments occur. In contrast monochrons are less likely to step-up and get disturbed by the impediments of others as they pay higher priority in completing the planned activities assigned for themselves.

In a cross cultural Scrum team, lack of commitment from individualistic members specially on completing the action chains may be seen as sluggish and irresponsible behavior by the collectivistic members in the same team. For example in a tight delivery situation, less extra commitment from individualistic members in meeting the sprint goal may cause unease among collectivistic counterparts.

5.5 Team Communication

As stated throughout, increased communication and collaboration is one of the main success criteria of a Scrum team. In order to be more effective, Scrum suggests smooth communication within the team and towards the customers. Scrum proposes that higher amounts of close conversations works better than any other means of communication using paper or computers (Sheriff, 2010).

Face-to-face Scrum meetings such as co-located daily Scrum provides rich non-verbal communication opportunities to the team members. But when the Scrum team is distributed, verbal communication plays a major role in collaboration, making clarity of

the exchanged messages to receive a greater significance. Most of the time, within a distributed Scrum team, verbal communication becomes the primary medium of the team on close regular collaboration. As other means such as body language is not commonly available, verbal cues such as silence take on more significant meaning in communication.

As seen in section 2, level of verbal information needed for a message to be understood differ in high and low context cultures. Similarly expectations from low context and high context cultures can be significantly different in message exchanges during scrum meetings. High context team members tend to implicitly share context information from other team members so that required verbal information in a message is minimal. On the other hand, Westerners who are mostly from low-context cultures expect messages to be detailed, clear-cut, and definite. Low context members are less likely to be dependent on the context to process meanings of a message. If the message is not to the point or there is no enough data Westerners may ask blunt questions during Scrum meetings as they feel uncomfortable with the vagueness and ambiguity associated with limited data (Qingxue, 2003).

In contrast low context members tend to verbally provide more information during meeting that may be seen as unnecessary by the High context team members. In relation, Halls says: "High-context people are apt to become impatient and irritated when low-context people insist on giving them information they don't need" (Hall & Hall, *Understanding Cultural Differences, Germans, French and Americans*, 1990). This particularly can be an issue in the daily Scrum as it is expected to be short meeting where only the absolute necessary information is conveyed. Also the team members of high-context cultures may perceive low-context members, who rely primarily on verbal messages for information, as less credible (Qingxue, 2003).

For example, when it comes to context sensitive content low context members in the same team will struggle to grab the meaning of some of the high context messages due to implicit context information. This can cause misunderstanding within the team that can greatly diminish the team performance. An straight forward example where context

information may be extensively used is the use of humor. Culturally distributed Scrum team should particularly be careful in discussing context sensitive information during common meetings to avoid confusions.

In addition, disturbances can be more prominent in distributed Scrum meetings due to the restricted amount of communication methods. For example, a daily sync up meeting getting disturbed by click sounds of particular member typing an email can be quite annoying to the others in the team. As discussed low context cultures are less tolerant towards disturbances and therefore members from such cultures can have considerable disappointments towards their counterparts.

5.6 Team self organization

Responsibility of a Scrum team is to self organize itself within the given boundaries and deliver at its best performance. Scrum suggests that less explicit controls put on a team, the better. For example, Scrum propose to use minimal explicit control over the team members and to use indirect mechanisms such as 'peer pressure' in guiding and motivating team members. Further the management need to take special caution not to overly restrict the team behavior. For instance, if management overly constrain how a team should solve a particular challenge, the Scrum team will become follower of orders rather than taking initiatives in solving problems. In such an environment self-organization is less likely to occur and for any further actions, team may get used to wait for instructions from leaders (Cohn, 2010).

In s cross-cultural study that looked at agile practitioners from New Zealand and India found out the New Zealand culture, despite being individualistic, did not negatively affect self organization. On the other hand, the Indian culture is found to be hierarchical with a low individualism where managers are expected to make most of the decisions. Having a strict hierarchy is characteristic that runs contrary to the philosophy of self-organizing teams (Hoda, Noble, & Marshall, 2010). Members in hierarchical cultures such as Asians could organize around a leader to govern the team decisions. In contrast members from individualistic cultures are less like to adhere to the hierarchy suggested by the counterparts. Any such formation of sub hierarchies within the team is possibly be

discouraging for the individualistic members in a cross cultural Scrum team, whereas collectivistic members may perceive such behavior as disturbing to teamwork.

5.7 Team cohesion

Scrum teams running in 2 weeks iterations generally have over 15 collaborative meetings with colleagues within a single sprint. Scrum's interpersonal engagements are focused on collaborative production and therefore new opportunities for engagement increases team cohesion and trust. Close collaboration of Scrum provides team members the opportunity for continuous recognition of colleagues' competencies, capabilities, and integrity and therefore the process itself is an vehicle for the development of cohesion in team relations. The development of these implicit processes may account for Scrum users' great enthusiasm for the method, especially in cross-cultural virtual teamwork (Miller, 2008).

It is common that a cross cultural Scrum team to contain multiple members from a particular culture co-located. It is inevitable that co-located members to experience strong collaboration compared to among distributed members, forming a sense of a sub-team within the larger Scrum team. In addition, having the same cultural context within the sub-team will help them to understand each other better and have a strong personal relationships. Cultural factors such as collectivism may affect the behavior of such a sub-team towards other members in the same Scrum team. As described in section 2.2, although members of individualistic cultures are more open and cohesive towards out-group members, collectivistic cultural members on the other hand will take time to integrate and build confidence towards the 'culturally out-group' members though they are in the same Scrum team.

Due to the cultural aspects of out-group integration, such differences can arise between collectivistic and individualistic members of the same Scrum team. Individualistic members may experience a left-out sense specially when a large portion of the Scrum team consists of a co-located collectivistic members.

Further, as discussed under section 2.2, some cultures prefer group work over individual assignments where as other cultures are more individualistic in approaching towards work. Cultures that are collectivistic may approach more positively towards the sprint tasks that require higher group collaboration while individualistic may get stressed with such tasks. Additionally this can also contribute to some level of unease within the sprint on task assignments affecting team cohesion.

In addition individualistic members may demonstrate high competitive nature within the team where as collectivistic members prefer adhering to group norms. Competitiveness of individualistic members will probably be observed as disturbing to the group cohesion by the collectivistic counterparts in the same team.

5.8 Downplayed Documentation

The agile philosophy stresses communication over documentation. Agile proponents argue that 'documentation should be just barely good enough' and that the 'comprehensive documentation does not ensure project success but increases your chance of failure' (Ambler). When documentation is downplayed, there is less explicit medium for knowledge transferring causing important knowledge to reside mostly within team members heads as implicit knowledge.

High context members who are efficient in managing knowledge implicitly may be successful in dealing with implicit project knowledge that is within the team members. They will effectively use informal mechanisms to disseminating knowledge, resulting desire to explicitly document the knowledge being even lesser. In contrast the low context members of the same team will find it inconvenient to operate with implicit project knowledge. It is likely that lower context members demanding more documentation that could be seen as a waste by the high context cultural members. This conflict of interest on the required level of documentation can also cause some level of discomfort within a cross cultural team.

5.9 Embrace Change

Scrum teams approach changes courageously. Though most of the commitments are fixed within the running sprint, Scrum process embraces rapid changes across sprints. Agile processes pay considerable respect on embracing change, such that even the agile manifesto takes an explicit note on it (Manifesto for Agile Software Development, 2001).

Scrum welcomes changing requirements, even late in development via reprioritization process of backlogs. Embracing change helps Scrum process to better respond to market needs, increasing customer's competitive advantage. Code of Ethics for Scrum Alliance states, 'we acknowledge that change is inevitable, that change leads to growth, and that growth guides us toward improvement' (Scrum Alliance Code of Ethics, 2011).

Embracing change can make a team to face considerable challenges. A requirement change may cause technical design changes in the code base. As a related practice, Scrum promote the team to be courageous towards technical refactoring of the codebase too. Though operations within sprints are shielded from external interruptions, throughout multiple sprints, team will face significant changes of requirements and technology. For example, implementations of a particular sprint could be reverted during the next sprint due to a change in the requirements. Another example is team members deciding to go for a sudden design change to better accommodate stories in hand.

Polychronic cultures that are more accommodative for changes and prefer multitasking, may show more courage toward dynamic changes. As discussed in section 2.3 they are more likely to initiate changes during the sprints and support radical changes. Frequent changes introduced by the polychrons may probably result uneasiness within monochrons who prefer more organized and predictable operations.

6 Conclusion

The primary aim of this research work is to identify impacts of cultural differences when practicing Scrum based software development within a culturally distributed team. This literature also examines the circumstances at which such impacts may be materialized. Following is a summarization of the possible impacting areas as identified during the analysis and discussion of this literature.

		Scrum Practices and Recommendations								
		Time boxed activities	Cross-functionality	Openness/Transparency	Commitment	Team communication	Team self organization	Team cohesion	Downplayed documentation	Embrace change
Communication	Explicitness					x			x	
	Tendency of Saving Face			x						
	Emphasis on group harmony			x						
	Use of pauses					x				
Collectivism	Self-reliance						x			
	Preference for group work							x	x	
	Emphasis on group goals				x					
	Out-group integration							x		
	Supremacy of individual interests				x					
Competitiveness							x			
Time Orientation	Valuation of time	x								
	Multitasking				x					x
	Interruptions	x	x			x				x
	Punctuality	x								

Figure 6.1: Impact summary of Scrum practices against cultural attributes

As it can be seen above, the outcome of the research suggests probable existence of considerable cultural impacts on the Scrum practices. Further the results indicate a possible need of appropriate adjustments when Scrum is practiced across different cultures. Therefore it is probable that additional research in the area is needed to identify such possible improvements to the Scrum practices when running in a culturally distributed environment. Similarly carrying out empirical researches for specific cultures (E.g. Scrum team including across Sri Lankan and Norwegian cultures) will allow specialization and confirmation of the general hypothesis deduced in this research.

The research methodology is heavily dependent on secondary sources and primary researches for information gathering. The accuracy of this research findings is inevitably depends on the accuracy and applicability of those secondary sources in the context of the research problem. This research not gathering primary data, spawns some limitations as described below:

- Scrum and agile methodologies evolve rapidly. Also due to fast globalization, cultural differences are diminishing as cultures continuously experience close collaboration. Some of the research work referred by this research may present outdated information in current business context limiting the accuracy of the research carried out.
- This research clearly focuses on team behavior in software industry. Some referred research work, specially on cultural aspects are carried out on general populations to analyze general behavior of societies. It could be inappropriate to apply those findings to a specific subset of the population.

As discussed, Scrum is heavily depends on collaboration of individuals, and requires all team members to have strong interpersonal relationships. It is important that the Scrum Masters of a cross-cultural team having thorough and strong understanding on cultural differences. Further providing necessary awareness on cultural differences to all members of a Scrum team will allow the team to understand each other better and to appreciate differences. Findings of this research provides a solid base of information for further studying cultural impacts on Scrum methodology.

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