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Using Scrum in offshore software projects

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Abstract

Due to its growth at exponential rate offshore software development has become a common way of producing software by software organizations from highly industrialized countries in Europe and North America. Previous studies have revealed that some of these organizations use agile project management frameworks in managing and running their offshore software projects. Blending agile principles and offshore software development appears to raise a contradiction as the two notions have opposite characteristics. This research focuses the implementation of agile project management frameworks such as Scrum in offshore software projects. The research project was performed by reviewing relevant literature and analyzing the results obtained from the interviews conducted to Cambio Healthcare Systems AB, a Swedish software company that offshore its software projects with Creative Technologies Pty Ltd located in Sri Lanka. The interviews were conducted to Swedish based staff involved in offshore software projects with their Sri Lankan partners. The research findings indicate that offshore software development is a challenging business and requires close monitoring to minimize its challenges. Some of the challenges include dispersion, loss of communication richness and cultural differences between the parties involved. Moreover even though the agile project management frameworks and offshore software development principles differ in nature, the findings have revealed that software organizations such as Cambio make use of these differences to minimize the challenges they face in their respective offshore software projects. The main conclusions drawn from this research is that there is not much evidence that the application of agile project management frameworks such as Scrum is feasible enough to combat the challenges. This research suggests for further research studies to collect information from staff in both offshore and onshore sites in order to formulate enough evidence on whether to apply these strategies or not.

Keywords: offshore software development, Scrum, Cambio Healthcare Systems AB
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1. Introduction and Background

Offshore software development has become a leading approach of developing software. Many software organizations in North America and West Europe have shifted to a globalized software environment because it offers a high reduction in software development costs. B. Rameshi, et al. (2006) stated that, the current dynamic business environment requires software companies to develop and evolve software systems at internet speed. They believe that the dynamic business environment would somehow force the software companies to neglect in-house development so as to fit in the race to produce high quality software against their respective competitors. This implies that software companies are now dealing with various issues such as different:
1. Individuals from different cultures and backgrounds.
2. Different time zones with different geographic locations.
3. Laws, rules and regulations imposed by different countries where these development teams reside.

These issues introduce challenges that can be faced by these software companies as they strive to successfully complete their respective offshore software projects.

To deal with such challenges software engineering experts such as Carmel (1999) has suggested on “the six centripetal forces for successful global software teams”. On the other hand some software organizations have imposed an alternative approach by applying agile software development methodologies such as Scrum and XP in their respective offshore software development projects. However this approach seems to be a contradiction since the agile principles appear to be the opposite of the so called centripetal forces for successful global software teams suggested by Carmel (1999). Therefore this study will:
1. Investigate and analyze how agile principles can practically be applied to offshore software development.
2. Explore the major challenges software companies face when they offshore their software development and see how they apply the agile methods such as Scrum to successfully manage and run these their respective offshore software development projects.

1.1 Research focus

The crux of this study is the application of agile project management frameworks such as Scrum in offshore software projects. This study also goes through an overview of offshore software development.

On the other hand there has been misperception concerning whether software companies should continue to practice offshore software development or turn back to in-house development. Various questions have been raised on whether offshore software outsourcing is an economic worthwhile business alternative. This is because the previously cheap and low-wage countries such as India, Sri Lanka, China and countries in East Europe are raising the costs of providing their products/services to their clients. However it is clear that the offshore software development has become a huge role player in the software development industry and it is still expanding at an exponential rate.

Nevertheless it is still not clear on what works in terms of minimizing the challenges which have to be faced by the software companies. Some software experts such as Erran Carmel (1999) have strongly insisted on software companies to invest in fast and reliable telecommunication infrastructure. Carmel strongly believes that once the telecommunication infrastructure is stable, the rest of the challenges such as communication richness, collaborative tools, etc. can be easily minimized. But other experts such as Steve Mezak (2006) only insist on software companies handing over the whole project to an offshore software vendor. This is strongly criticized by other software experts such as Steven Frank (2005) who thinks it can lead to intellectual property being threatened.
1.2 Research Aim

The aim of this research is to compare the current theory on applying agile project management frameworks to offshore software development with how companies engaging in offshore software development support these frameworks in practice.

In order to understand the overall initiative of applying these frameworks to offshore software development it is important to:

1. Know the characteristics of offshore software development.
2. Identify the drivers that lead software companies into offshore software development.
3. Understand the challenges that exist when outsourcing software development with international partners.
4. Point out the readily available best practices in order to address these challenges.
5. Explore and understand the agile project management frameworks, the Scrum method in particular and its main principles. It is further important to critically evaluate why experts claim that Scrum can be used to address the challenges that exist when practicing offshore software development.

1.3 Research Objectives

Explicitly within the setting of applying agile project management frameworks to offshore software development projects, the following are the objectives of this research:

1. To identify the drivers of offshore software outsourcing.
2. To identify the challenges of offshore software development.
3. To identify the readily available best practices in order to address the challenges of offshore software development.
4. To investigate a company that offshore its software development projects apply agile project management frameworks.
5. To identify the challenges of applying agile project management frameworks such in offshore software development.

1.4 Motivation

First of all this study will contribute to the existing development towards the discipline of applying agile software development processes in global software teams by:

1. Reviewing the issues relevant to the initiation and execution of traditional distributed offshore software development i.e. what is driving offshore software development and what can act as a barrier.
2. Examining the existing models and frameworks to support software companies conducting offshore software development by obtaining the views of staff stakeholders on existing software companies in offshore outsourcing.
3. Providing a meaningful comparison between theory and practice.

1.5 Method of study

The study was conducted by first reviewing two books namely Global software teams and Agile Software Development with Scrum. The first book focuses on the underlying principles and traditions in managing and running global software teams. The latter focuses on the underlying principles and traditions in managing and running software projects using Scrum. Moreover relevant articles related to this work were reviewed in order to understand in detail how the previous researchers carried out their work in this area.

I conducted a comprehensive study on offshore software development with international partners by reading articles and books on global software teams and IT project management. I then studied documents from Cambio Healthcare Systems in order to know in detail about their operations and obtain a general overview of their products.
I was offered to interview Marie Odbom and Eva Senneryd, project managers currently involved with offshore software development at Cambio. The meeting took place at Cambio offices in Linköping. Tomas Mora Morrison, the director and founder of this company participated as a guest and a backup interviewee for questions which involved high management levels. After collecting this set of data I reviewed it and found that a second interview was needed as there were some potholes to the information presented from the two project managers. Consequently I requested for another interview session and was offered another interview in May 2010. On the second interview no instructions were given with regard to the questions to be asked and I therefore conducted an open interview with the same two project managers that I previously interviewed. All interview questions can be found in “Appendix A” on section 7.1 towards the end of this report. Both interviews were tape recorded in order to obtain correct documentation. This was followed by reviewing the documents from Cambio, listening to the recorded interview sessions and finally analyzing the collected data.

1.6 Thesis structure

The thesis is divided into four sections numbered 2 up to 5. Section 2 describes what theory says about the application of agile principles in offshore software development i.e. the related literature and the theoretical focus. Thus, in this section the review of the selected relevant books and journals on both areas, traditional offshore software outsourcing methods and the agile methodologies towards offshore outsourcing is presented. This is followed by section 3 which brings about the research findings from the interviews to the company stakeholders while section 4 analyses the study results and hence advances or contrasts what the theory said earlier on.
2. Literature Review

The literature review is divided into four parts. The first part, subsection 2.1 covers an overview of offshore software development, the drivers that lead to offshore software development followed by the challenges of practicing offshore software development. The second part, subsection 2.2 covers agile project management frameworks in particular the Scrum method. This includes an overview of Scrum, an explanation of why Scrum work, a description of how Scrum can be applied in offshore software development projects and the challenges that exist when using Scrum in offshore software development. The third and fourth parts lay down some background information on Cambio Healthcare Systems AB and Sri Lanka respectively.

2.1 Offshore software development

According to Carmel (1999) offshore software development is the process of relocating an organization’s or company’s business processes to an overseas location and this location usually offers its services at a lower cost. During the past ten years many high-wage and rich countries have been moving their software development projects to low-wage Asian countries such as India, China and other eastern European countries.

2.1.1 Drivers of offshore software development

Previous studies have indicated that this phenomenon has been driven by the high availability talented and top quality software developers in the low-wage countries William. Aspray, et al. (2006) conducted a survey on Globalization and Offshoring Software. In their report published by the ACM Job Migration Task Force, they stated that the major factors that led software organizations towards offshoring their software development projects include the following:

1. The Internet up rise in recent years which led to the affordability of broadband networks which created a room for easier and faster communication between countries.
2. The rapid improvement in relevant technology which made software investment not a priority because companies decided to rather outsource information technology.
3. The majority of high skilled and trained IT individuals who previously resided in US and other major European economies began to return to their native lands. This caused a scarcity of trained and skilled IT individuals.

However Carmel (1999) stated that there are 15 factors to why we are seeing more global software teams and he divides these factors into four categories:

1. Catalyst factors.
2. Sustaining factors.

In the context of this paper, only the catalyst factors will be focused because they provide the most prominent reasons as to why these software companies decided to outsource their software development. The remaining factors (sustaining factors, size factors and vision factors) are beyond the scope of this study.

According to Carmel (1999), catalyst factors are the core drivers that make the software companies’ executives desire to start offshore software development. These executives:

1. Search for specific talented software developers no matter where they are located.
2. Aim at producing high quality software at the lowest and reasonable price.
3. Want to enjoy the benefit high production rate offered by the different time zones i.e. short time-to-market.
4. Want their companies to be seen as global software players.
2.1.2 Challenges of offshore software development

Carmel (1999: 40) believes that offshore software development is hard and can be challenging to successfully execute a complete offshore software development project since the developers are located in different locations from the management team. He adds that the main drivers to these challenges include the following:

1. Dispersion.
2. Breakdown of traditional control and coordination mechanisms.
3. Loss of communication richness.
4. Loss of team spirit.
5. Cultural differences.

He thinks that many software professionals prefer to perform various software process tasks via face to face communication due to its efficiency. He continues by saying that when teams are located far apart in different areas the communication becomes weakened because it is channeled into electronic forms i.e. e-mail, video conferencing, online chat, telephone, etc. Moreover he thinks that multi-cultural diversity created by offshore software development might cause slower processes as the trust in the team takes longer to appear.

On the other hand, Thomas Philip, ET al. (2009) think that the challenges in offshore software development are:

1. Deficiency in business related knowledge in some of the offshore team members.
2. Anomalies and poor documentation of project requirements.

They also pointed out that this can lead to poor project management, project supervision, project control and lack of accountability.

Steve Mezak (2006), the author of the book Software without borders, believes that the greatest reason for the failure of most offshore software development projects is the lack of a clear definition of success. He continues by stressing that no matter how good an offshore software project is managed it is still certain to fail if a clear definition of the project success is not set. This implies that software companies should completely outsource by handing over the whole project to an offshore software vendor which on the other hand poses a risk of full ownership and lack of accountability.

Similar thoughts are shared by Steven Frank (2005) as he mentioned that “offshore software development can put intellectual property at risk”. He believes that software companies involved in offshore software development must strongly consider intellectual property problems; otherwise they will be left out on their own in case of contract breach.

These challenges can be minimized by several best practices which follow in the next subsection.

2.1.3 Minimizing the challenges of offshore software development

The challenges described above can be minimized if the software company that is offshoring its development with an international partner take careful measurements when investing in these kinds of projects. Carmel (1999:82) suggested the measurements to these challenges as follows:

1. Invest on telecommunication infrastructure.
2. Make use of collaborative technology.
3. Impose a core software development methodology.
4. Implement product architecture and task allocation.
5. Concentrate on team building.
6. Train their staff on specialized management techniques.

These measurements are called the six centripetal forces for successful global software teams. They are so called centripetal forces because they reflect what should be done to seek the center i.e. to bring together or pull together the challenges.

Telecommunication infrastructure is regarded as the main ingredient among the listed best practices since it is the root of the rest of the best practices. Software companies are therefore advised to invest in high and reliable bandwidth connections supported with consistent hardware and software platforms (Carmel (1999):89).
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With collaborative technology, software companies are advised to:

1. Standardize their collaborative technology tools as it might be difficult for non-competent
team members to use them.
2. Introduce and use a wide variety of strong and reliable collaborative technologies.
3. Use software configuration management packages to avoid unpredictable project delays.
4. Be sensitive to cultural differences in use of collaborative technologies.

For example it is an advantage to have met some team members face to face before conducting a
video conference with them. In this way the projects managers will be aware of how comfortable
the team members are before exposing them on a video conference full of clients and customers.

The next section examines Scrum by taking a closer look at its principles, and then goes further by
identifying the success factors of Scrum.

2.2 Agile project management methods

This section is going to explore the area of agile project management methods and within the context
of this study much emphasis is on Scrum, one of the existing agile project management methods in
managing and running software projects.

2.2.1 Overview of Scrum

According to Michael James (2009), “Scrum is a simple management framework for incremental
product development using one or more cross-functional, self-organizing teams of about seven
people each”. This project management framework whose roots emerge from Agile software
development methodology provides an approach which is incremental and iterative. Michael
James (2009) insists that the nature of Scrum being incremental and iterative is what “trades the
traditional phases of “waterfall” development for the ability to develop a subset of high-business
value features first, incorporating user feedback sooner”.

On the other hand Elizabeth Woodward et al. (2010) think that the stakeholders’ needs and changing
business requirements that arise from time to time may cause unproductive disruptions to the
workflow of the software development team. They continue by stating that Scrum can help
software organizations to adapt to these changes demanded by stakeholders and simultaneously
protect the team from the unproductive disruptions in their workflow.

2.2.2 Scrum roles

Scrum has three fundamental roles namely the **Product Owner**, the **ScrumMaster** and the **Team**
(Michael James (2009)). The product owner is a single individual responsible for return on
investment (ROI) of the product development effort (Michael James (2009)). This individual is the
most influential role in the project as he/she is the one who carries the vision of the product and
represents the stakeholder’s requirements. Thus generally the Product Owner is the person
responsible in case the project goes off-centre he/she is the sole owner of what is known as the
**Product Backlog** which is basically a list of all needs requested by the customer.

On the other hand the ScrumMaster acts as the bridge between the Product owner and the Team. The
ScrumMaster enforces Scrum practices and helps the Team to make decisions and acquire
resources as needed. This person facilitates the **Daily Scrum** meetings and is the master mind that
comes into rescue when the Team faces a **Blocker** i.e. when the sprint goals are at stake. When a
Blocker appears the Scrum Master comes in hand. In such situations the ScrumMaster is expected
to:

1. Bring back the motivation, rise up the fallen spirits and enthusiasm.
2. Keep the Team focused, constructive and creative.

The final role is the Team. This is a cross-functional, right sized, self-organized group of individuals such
as requirement analysts, software developers and testers respectively. These individuals are
therefore responsible for completing the work or implementing the work then report the demo of
the product to the Product Owner.
2.2.3 Scrum artifacts

Scrum has three artifacts namely Product Backlog, Sprint Backlog, and Burn down Chart. A Sprint is an iteration of work which usually lasts in a period of 30 days and in this period an increment of product functionality is implemented (Victor Szalvay (2007)). According to Ken Schwaber et al. (2009), Scrum is often used during the early steps of the systems development project where by a Product Backlog is constructed. As shown in the figure below, the Product Backlog is never finalized because it emerges and evolves along with the product (Schwaber (2009)). Almost all members of the project are involved in the process of adding contents to the Product Backlog. However only the items with high priority are considered first and the only person responsible in prioritizing the Product Backlog is the Product Owner. She/he is the one to decide which set of requirements should be implemented. After the Product Backlog is prioritized, the Team takes on as much Product Backlog as they think they can turn into a Sprint. Moreover the team maintains the following documentations during the sprint:

1. A Sprint Backlog – this is a list of tasks to perform during each Sprint.
2. A Burn Down Chart – a chart showing the cumulative work remaining in a Sprint.

![SCrum Framework Diagram](image)

**Figure 1** - Scrum: agile project management framework ([Sfp 101, Stress-Free Productivity (2010)])

At the beginning of each Sprint, usually the first day of the Sprint, the Team meets with the Product Owner to discuss about the Sprint. During this meeting effective communication is very important within all the participants. This is because the Team needs to understand the Product Owner’s vision and also to understand the stakeholders’ expectations for the product. This is followed by the Team going through the Product Backlog in order to identify the User Stories. These User Stories are important because they help the Team to stay focused to the values they will deliver to the stakeholders (Elizabeth Woodward et al. (2010)). After going through the User Stories the Team then decides which items are going to be committed to and implemented during the current Sprint. The remaining days of the Sprint begin with a Daily Scrum meeting and in every meeting each Team member is required to state their status and report if they are facing any difficulties i.e. any Blockers.

A cross-functional Team is responsible for sizing the effort needed to deliver each requirement in the Product Backlog. They emphasize that the Team is also responsible for implementing and
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delivering the User Stories and the act of estimating as a team helps building Team Ownership. Team Ownership is the foundation idea of Scrum and the key to team’s success with Scrum. (Elizabeth Woodward et al. (2010)).

2.2.4 Distributed Scrum(Background)
Up to this point, the subject of Scrum has focused strictly on local software development projects i.e. applying Scrum in in-house software development projects. This section reviews the application of Scrum in offshore software development projects. According to the drivers of offshore software development reviewed earlier on it is safe to say that the offshore software development offers the following benefits:
1. Availability of specialized talent.
2. High quality software at a lower cost.
4. Global software player role.

Moreover as Elizabeth et al. (2010) stated earlier, the agile principles and methodologies such as Scrum can help software organizations adapt to the changing business requirements by stakeholders and simultaneously protect the team from the unproductive disruptions in their workflow. In addition to this Sutherland and Schoonheim (2008) believe that when a software organization combines the benefits of offshoring with this they can have a powerful tool use in any offshore software project.

But Liz Barnett et al. (2005) think that even though companies that still use the traditional software development methodologies in their offshore projects appear to be successful there should be concern users of the developed software. They think that if these companies are not using agile methods such as Scrum the developers might never know if the users of the software are unhappy that software does not meet their needs. They continue by arguing that there is a need to use methods such as Scrum and XP so that the developers will get to know if the users are satisfied or not. This is strongly criticized by Ron Hitchens (2003) who says that the agile approaches towards offshore software development are not feasible and therefore companies should turn back to the in house software development as he claims that in house development is becoming cheaper.

2.2.5 Distributed Scrum(Distribution models)
According to Elizabeth Woodward et al. (2010) there are four types of distribution of teams:
1. Collocated teams – in this model the team members are stationed in the same physical location either sharing an office, a large room or have their own offices. The team members must have a frequent face-to-face communication.
2. Collocated Part-Time teams – this model resembles the collocated teams model but in this model some team members may sometime work off-site. The use of collaborative tools is highly recommended for this kind of setup.
3. Distributed with Overlapping Work Hours teams – in this model the team members can interact with each other during their working hours but some sort of compromise has be done. For example when it is the beginning of workday in Linköping, Sweden (8.am.) it is 12.30 p.m. in Colombo, Sri Lanka In this kind of setup the team members have at least a few hours during each normal working day in which they interact with each other. The scheduling of Daily Scrum meetings and Sprint Planning meetings can be difficult in this case. Participants can easily handle this situation by negotiating what time fits both parties.
4. Distributed with No Overlapping Work Hours teams – in this model the team members have a zero chance of interacting during each other’s normal working hours. For example when it is the beginning of workday in Texas, United States (8 a.m.) it is 9 p.m. in Beijing, China. In this situation it is almost impossible to execute Daily Scrum and Sprint Planning meetings.
2.2.6 Challenges of distributed Scrum

Inefficient communication usually lacks the nonverbal part, the most important part of communication (Elizabeth Woodward et al. (2010)). If the communication is missing this part then it is safe to claim that the communication is inefficient. The distribution models reviewed above clearly have big challenges when it comes to efficient communication. The fact that the distributed teams whether being on the same time zones or different time zones need to conduct these meetings makes this even more challenging. It has been recommended that the distributed teams make use of collaborative technology to conduct these meetings. However it is clear that this lowers the richness of communication as one cannot tell the body language of the other party. So one cannot tell how the other reacts to different messages or issues being transmitted via these tools. The following section reviews some of the recommendations made by Scrum pioneers in order to handle the structure of distributed Scrum teams.

2.2.7 Minimizing the challenges of distributed Scrum

Sutherland and Schoonheim (2008) suggest three models in which software organizations can consider when using Scrum with distributed teams. These models are:

1. **Isolated Scrum Model** – an ideal setup because the teams are either collocated or collocated part-time with each location having a cross-functional and independent Scrum Team.
2. **Distributed Scrum of Scrums Model** – has separate cross-functional Scrum Team at each location and they use a regular Scrum of Scrums meeting to coordinate efforts between them.
3. **Totally Integrated Scrum Model** – each Scrum Team has members in multiple locations. This kind of setup is a typical fully distributed Scrum setup.

The table below illustrates the overall Distributed Scrum setup in details.

<table>
<thead>
<tr>
<th>Team Type</th>
<th>Possible Approaches</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collocated Team</td>
<td>Face-to-Face Meeting</td>
<td>Face-to-Face meeting is recommended because it increases the communication, commitment, and collaboration between team members.</td>
</tr>
<tr>
<td></td>
<td>Teleconference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Videoconference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Instant Messaging</td>
<td></td>
</tr>
<tr>
<td>Collocated Part-Time</td>
<td>Face-to-Face Meeting</td>
<td>Face-to-Face meeting for the collocated team members with a teleconference line open for remote team members.</td>
</tr>
<tr>
<td></td>
<td>Teleconference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Videoconference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Instant Messaging</td>
<td></td>
</tr>
<tr>
<td>Distributed with Overlapping Work Hours</td>
<td>Face-to-Face Meeting</td>
<td>Team members should find a time where the work hours overlap and members in the same location meet face-to-face with a teleconference line open to talk with remote team members. If members in the different locations are unable to hear each other, they should consider having everyone dial in. When verbal language is a problem, you can use an instant messaging session at the time for clarity.</td>
</tr>
<tr>
<td></td>
<td>Teleconference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Videoconference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Instant Messaging</td>
<td></td>
</tr>
<tr>
<td>Distributed without Overlapping Work Hours</td>
<td>Share the Pain</td>
<td>Share the pain by selecting a standard meeting time when everyone will attend because it respects the spirit of Scrum and agile the best. Alternating meeting times also works well by allowing the team to switch off on times that are most comfortable.</td>
</tr>
<tr>
<td></td>
<td>Alternating Meeting Times</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using a Liaison</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Documentation</td>
<td></td>
</tr>
</tbody>
</table>

*Table 1 – Summary of Different Daily Scrum approaches and recommendations (Elizabeth Woodward et al. (2010) Pg. 119*
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So far it is clear that scrum principles are rooted and built under strong communication among the practitioners. This implies that there is a challenge in seeking for a strong communication bandwidth in order to execute the software projects processes when applying or using scrum. Steve Berzuk (2007) suggests a way to tackle this challenge by pointing out that “Any team is best served by following the rules of the agile method with as few adjustments as possible. Distribution increases the damage that non-compliance can cause. If the team feels like it owns the process and the tools it is more likely to be able to overcome obstacles and be successful”

Moreover the agile manifesto states that “The most efficient and effective method of conveying information to and within a development team is face-to-face conversation” and this implies that since the development team and management teams are geographically dispersed there is a challenge of achieving this manifesto. Martin Fowler (2006) suggests that there should be an exchange of staff (who he calls ambassadors) from both offshore and onshore sites from time to time, in order to facilitate the communication. He continues by saying that “One of the benefits of a business-oriented ambassador on the offshore team is that it helps provide business context to the offshore team. Building software off just a list of requirements misses out a lot business context - developers are told what to do without being told why it's important. The why often makes a big difference in doing what properly? An important part of the ambassador's job is to communicate gossip. On any project there's a lot of informal communication. While much of this isn't important, some of it is - and the trouble is that you can't tell which is which. So part of an ambassador’s job is to communicate lots of tidbits which don't seem important enough for more formal communication channels.”

He continues by pointing out that “The biggest consequence is the effect on communication. Offshore makes communication harder both due to the distance, which makes it difficult to meet face to face, and the time zone offset. Both of these increases the likelihood of building the wrong functionality as miscommunications occur over requirements. While techniques such as using ambassadors try to reduce it, there's still going to be some effect. Also the distance between development and business also reduces the motivation of the development team, since they have no personal relationship to build on.”

2.3 Cambio Healthcare Systems AB (Background)

Cambio Healthcare Systems AB, a Swedish software company, started in 1993 in Linköping, Sweden developing and implementing healthcare administration systems for the some European countries. With about 50,000 users in general and university hospitals, primary care clinics and special units, Cambio is one of Sweden’s largest companies in this field and has expanded its services to United Kingdom and Denmark. Its offices are located in Stockholm and Linköping (both in Sweden) and in Reading in the United Kingdom. Cambio’s main software product is Cambio COSMIC which is a patient-centered electronic record system that covers care in health organizations of all sizes. Cambio Healthcare Systems AB offshore story began in 2004 with an initiative from its board of directors. With three alternative offshore destinations to choose from i.e. India, Sri Lanka and Baltic countries they picked Creative Technology Solutions located in Colombo, Sri Lanka due to its good business portfolio.

2.4 Sri Lanka – country profile (Background)

Located at about 31 kilometers (19.3 miles) off the southern cost of India, Sri Lanka is an island country with a total area of 65,610 square kilometers (25,332 square miles) and has a population of about 20 million inhabitants. Its capital city and center of trade and industry is called Colombo. Sri Lanka has been known to have high education standards and is believed to have the highest literacy rate in South Asia with a large portion of its population fluent in English. The information technology sector in Sri Lanka is very strong due to the fact that there is a strong government support in enhancing the development of telecommunication infrastructure and a high local demand for telecommunication products and services (Wikipedia (2010).

Moreover according to Nishanthi Mendis (1996) the government of Sri Lanka imposed flexible trading policies for import and export of high technology equipment and this has created a room for exposure of the majority of people, leading to an enormous amount of low cost talented labor for both high skilled software developers and unskilled individuals such as data entry employees.
However Sri Lanka has also been known as one of the countries that suffered conflict war in many years, a conflict between the government and the Tamil Tiger rebel group. From the year 2006 there has been a mounting violence across the country until the year 2009 when the government forces claimed victory over the Tamil Tiger rebels. Recently there has been a concern within the international community about the alleged human trafficking activities between Sri Lanka and Europe.
3. **Research Findings**

This chapter reveals the results of the interviews described in the method of study section back in chapter 1 of this report.

The research findings will firstly show what made Cambio move its development activities to Sri Lanka followed by how they apply Scrum in their offshore software projects. In the final part of these results I will describe the challenges Cambio face in the overall offshore software development processes and how they actually address these challenges.

### 3.1 Factors that drove Cambio towards offshore software development

According to Tomas Mora Morrison, two qualities attracted Cambio executives to offshore their software development in Sri Lanka:

1. The ability of their offshore partner, Creative Technologies Ltd to attract the highly skilled software engineers in Sri Lanka.
2. The low attrition rates offered by this partner.

He added that these two qualities gave an answer of one of the most disturbing questions software executives often ponder to answer when looking for offshore sites and partners – where and who should we offshore with?

Moreover he mentioned four main driving factors that led to his company deciding to offshore its software development to Sri Lanka. These drivers are listed as follow:

1. The need to lower development costs since it cost less (170SEK/hour) to hire a software engineer in Sri Lanka compared to hiring a software engineer here in Sweden (1000SEK/hour).
2. The non-Swedish employees have lower demands on compensation for relocation.
3. The lack of computer specialists in Sweden,
4. The Swedish work law reduces the flexibility of employers to find, keep and dismiss special competences.
5. There was a desire to be involved in the international market field as many software companies were seeking to be part of the global software business. Morrison believes that in order to be successful in offshore software development business with an international partner you must have a solid foundation or a base structure i.e. “to win you must be there”. He added that this was a proven strategy in the Swedish car industry – “innovation and prototyping in Sweden then mass production abroad”.

### 3.2 How Cambio operates its offshore software projects

Cambio Healthcare Systems AB decided to work with Creative Technology Pty from Sri Lanka and set up a development team in Colombo, Sri Lanka. Due to the challenges of offshore software development and the high demands with constant changes in requirements from the Cambio’s clients in Sweden, application of agile principles in developing these products offshore was seen as a promising solution.
A set up of applying one of the significant agile principles, the Scrum method to Cambio’s offshore software development projects can be observed in the figure below which describes a typical offshore project team structure that was implemented by Creative Technology Solutions when they started working with Cambio.

![Offshore Project Team Structure Diagram]

**Figure 3** – The offshore project team structure ([Creative Technology Pty (2009)])

In the figure above “Your Location” describes the client location which in this case is Cambio Healthcare Systems AB in Sweden.

The core team was formulated at project start up whereby the project manager, team leaders, and lead software engineers were selected with each product line having an overall team leader. The team leaders received training. One of the training ways was the team members exchange program between the offshore site in Colombo and the onshore sites in Sweden. According to Eva Senneryd, Cambio’s offshore software development methodology is built up on Agile principles specifically Scrum. This set up allows her and other project managers at Cambio to monitor project progress via frequent iterative deliveries provided by offshore team. This design makes it easy to monitor quality from the beginning until the end of the project which helps the company to minimize putting too much effort and time on quality control during the final stages of the project.

### 3.3 Challenges faced by Cambio in offshore software development

Tomas Morrison pointed out that one of the risks that his company is still facing is the security issue of both the company human resources and company hardware and software resources. This is due to the political unrest that was mentioned in the background chapter of literature review.

On the technical side the project managers I interviewed commented on the difficulties in communication with the offshore sites, due to the slow internet connection and bad phone lines. This makes it difficult for the project managers in Sweden to communicate whenever they need to with the offshore teams. They also added that cultural differences between Sweden and Sri Lanka have been a challenge and it took some time for things to improve. For example it was difficult to harmonize the terms and language when localizing the software and documentation. Another example they mentioned was the testing challenges. It was difficult to test software in languages not spoken by the actual tester. This is because of the missing vocabulary in some languages for
example Försäkringskassa. This might introduce a risk that the tester might prefer to skip certain tests.

3.4 Cambio’s Efforts towards minimizing these challenges

The interviewed project managers pointed out that to minimize the conflict war zone challenge the company keeps a close contact with the Swedish embassy in Sri Lanka and they make daily backups on the company’s code repositories. To address the issue of communication the company uses collaborative tools and systems such as keeping in touch between the onshore and offshore site members. They use the following collaborative tools:

1. **Skype** for chatting, calls and teleconferencing.
2. **Projects place** for online meetings and project documentation.
3. **Atlassian confluence**, a wiki engine that enables them create and share pages, documents and rich content with each team.
4. **Subversion** for daily source code updates and backup across the entire project.
5. **Jira** for bug tracking, issue tracking and project management.

To address the issue of language and cultural differences the company has different exchange programmes whereby team members from both onshore and offshore visit each other to learn different ways of interacting in a multicultural environment. Cambio also treated the issue of language differences in a special way by adopting a language dialect namely Cambio English which is basically English spoken as if it was to be pronounced by a native from Sweden (Swenglish), Sri Lanka (Sri-Lankish) and Britain (British). The staff admitted that it took quite some time to get used to all the dialects but it works in the process of easing the communication among the staff in different sites.
4. Discussion

Cambio Healthcare Systems AB was the subject under investigation and this study investigated how Cambio operates on offshore software development.

Let us begin to analyze this study by taking a closer look at how Cambio Healthcare Systems did up with Sri Lanka as a chosen offshore destination. According to the founder of this company, they decided to offshore in Sri Lanka because of mainly development costs and acquiring specialized software engineers. This revelation is in concurrence with what the literature says about the drivers of global software teams, that they go offshore due the reduction in development costs and seeking for talented programmers or developers. Moreover the literature states that these executives want their companies to be seen as a global player in the global software business. Similar thoughts were revealed by Mr. Morrison when he gave an example of proven strategy in the Swedish car industry – “innovation and prototyping in Sweden then mass production abroad”. This appears to be a common desire among many software companies that are involved in global software business. This might be one of the factors that make the global software business very strong with a growth at an exponential rate.

On the issue of challenges associated with offshore software development the interviewed project managers critically pointed out that the cultural differences and communication breakdown were the biggest challenges. This is in agreement with what the literature says about global software teams because the business nature involves different people from all walks of life. Therefore it is crucial to observe the notion of culture differences. Communication breakdown is a common issue in global software business due to the fact that most of the offshore sites are geographically dispersed. Therefore if the offshore sites reside in a location with poor telecommunication infrastructure there will be communication breakdown at times due to bad telephone lines or slow internet connection speed.

To address the challenges of offshore software development, the literature suggests that companies should invest more on telecommunication infrastructure by setting up high quality hardware and software or even telecommunication lines. Moreover the literature also suggests that companies should make use of collaborative technologies to enhance communication between offshore sites and onshore sites. This study has revealed that Cambio has strongly invested in five different commercial collaborative technologies so as to enhance its communication channel between its teams. This shows how communication status plays an important role in executing successful offshore software development projects. The cultural difference among team members is also a pondering issue to be addressed by many global software companies. The literature suggest that companies should concentrate on team building, implement product architecture and task allocation as well as train the staff on specialized management techniques. This study reveals that Cambio has a very unique way of dealing with cultural differences. They have addressed the cultural difference problem by imposing some kind of their own dialect i.e. Swenglish, Sri-Lankish, etc. This appears to be a very unique and efficient because it somehow creates a rapid comfortable zone across the entire network of team members. Moreover the company has a staff exchange program between the two site countries so that different individuals can learn quickly about each countries customs, norms, culture and ways of working. On the other hand the literature also suggests that companies should impose a core software development methodology in order to successfully execute their respective projects. They are also advised to train their staff on managerial techniques.

The theory goes on by suggesting that companies can apply agile principles such as Scrum to reduce the challenges in offshore software development. Cambio has been applying Scrum as their core development methodology in executing its offshore projects for many years now. The interviewed project managers said that Scrum works very well in their offshore software projects due to the fact that it allows them to communicate frequently hence enriching the communication channels between the sites. They added that applying Scrum has addressed not only the communication
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issues but also cultural differences. However the project managers did not reveal on the challenges
that they have when applying Scrum to their respective offshore development projects. They only
pointed out that Cambio has a certified Scrum master who is responsible for training the team
members on each project start. This appears to be the not so efficient way when applying Scrum in
offshore projects unless the Scrum master is explicitly involved in each and every single step of
each of the projects. So I cannot provide a detailed opinion on this issue because I could not access
additional information.

On the issue of the risk of having a development team with a development office in Sri Lanka, Cambio
relies only on the daily backups made in each and every project. As mentioned earlier on Sri Lanka
is a conflict war zone and having a station in such a location can be a potential security risk. This
appears to be an issue to be addressed because daily backups is not enough – this takes care of
source code and documents, what about staff safety? Surely one must consider that because the
human capital is also vital in any business.

The chosen method of study was to review the current and available literature about offshore
software development, a very wide area in the field of software engineering. This implies that the
pre scheduled amount of time I had for conducting my study was prolonged as careful
consideration was taken when reviewing the huge amount of information and ongoing research
about offshore software development.

The covered literature suggests that offshore software development requires a lot of dedication and
commitment whereby careful measurements and considerations must be taken before even the
project is initiated. This is due to the fact that it involves people from all walks of life and
therefore, professionalism is required when dealing with daily procedures during the product
development cycle. Carmel (1999) presents feasible recommendations and best practices when
managing and running offshore software development projects as opposed to other publications
and papers that promote the blending of agile methodologies and the traditional software
development methodologies. Yes, we can argue that agile methodologies such as Scrum and XP
offer lightweight processes but the question remains - are these lightweight processes feasible
enough to handle large offshore software development projects? The findings of this study show
that the blending of agile and the traditional methodologies can be very effective and as
feasible as the best practices presented by Carmel, but only if these agile methodologies are tuned
in such a way that they sing in the same pitch with the nature of the project and size of the
project. Cambio decided to set up a permanent development center in Colombo, Sri-Lanka, in
order to build a strong and feasible bond within its staff both onshore and offshore. This forced the
top level management at Cambio to invest a lot in the center and therefore, establishing a highly
resourced development center with skilled software engineering professionals who are committed
to their organization. This provided a tool for blending two software development methodologies
which are completely opposed in nature. The tool has contributed to the solutions to the
challenges of applying agile methodologies in offshore software development projects.

Due to the nature of the study which was to investigate the use of agile principles in offshore software
projects there was a need to interview team members from the offshore site which is located in Sri
Lanka. The data collected from the interviews has revealed that the project managers were not
certified Scrum masters and they relied on trainings during the beginning of each and every
project. Moreover up to now Cambio relies on its backup system in case a conflict arises in Sri
Lanka (since it is still a conflict war zone). I believe that it might be cost effective in the long run if
Cambio sets up a development unit in Sweden equipped with developers from Sri Lanka.

4.1 Study Limitations

The chosen study methodology had several limitations. Firstly, the main method of using one to
one interviews with company staff did not provide optimal results during the first interview
therefore a second interview had to be carried out. Moreover, the interviews were limited to 30
minutes on both occasions and therefore I was forced to skip some of the less relevant questions.
The other limitation is that I was not able to obtain certain information and documentation due to the company’s regulations and principles.
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5. Conclusion

This study has revealed that offshore software development is growing at an exponential rate and the use of agile project management frameworks such as Scrum may come into rescue to address some of the challenges in offshore software development. Conducting research with Cambio Healthcare Systems AB, a company involved in offshore software development should be able to create a room for improvement in this kind of research. This implies that a researcher should be able to get real taste and feeling on how many software organizations that are into offshore software development actually execute their daily software development activities.

However within the context of this study and the limitations that have emerged during the study the some of the research objectives are not accomplished. On the other hand the results from this research will add value and will contribute to towards future work with regard to offshore software development in the sense that this study can be counted as practical results i.e. how things are practically done in offshore software development. Therefore future researchers can make use of these results in order to have a deep practical understanding of offshore software development. So in general whether applying agile principles can be a feasible solution in combating the challenges of offshore software development remains a puzzle.

By looking into previous research work with regard to offshore software development, this research is in concurrence with previous studies because the results have revealed that offshore software development is a risky business and software organizations rely on collaborative tools in order to minimize the challenges of communication problems. Moreover issues such as blending agile methods together with traditional software development have been discussed in previous researches with some of the studies claiming that applying agile methods in offshore software projects might tackle the challenges. However, this study has not provided enough evidence on what works and what does not work.

5.1 Suggestions for further work

One of the objectives of this research was to point out the readily available best practices that can be used to address the challenges of applying agile project management frameworks in offshore software development projects. This objective was not fulfilled due to the fact that the interviewees were reluctant to give details on their organization’s best practices in addressing the challenges of applying agile methods in offshore software development. Moreover the interviewees could not give further clarifications on this issue and they only pointed out that they have a ScrumMaster who they refer to when there is a crisis. Therefore there is a need for further interviews possibly to a ScrumMaster at Cambio in order to get a view on Cambio’s best practices in addressing such issues.

In order to get a clear picture on applying agile principles in offshore software development, further investigation needs to be done by conducting interviews to the staff in both locations i.e. onshore site and offshore site. This is because of the wide gap of important issues such as cultural differences and government rules and regulations that exists between Sweden and Sri Lanka.
6. Works Cited

- Steve Mezak: Why outsourcing fails, even with good project management http://www.projectsmart.co.uk/why-outsourcing-fails-even-with-good-project-management.html (Accessed 2010-05)
7. Appendix

7.1 Appendix A: Sample interview questions to Cambio Healthcare Systems AB

1. How did you end up with Sri Lanka as a chosen country and partner for offshore software outsourcing?
2. How do you stay actively collaborated on a common software/systems project?
3. How are the Swedish norms of doing business different from Sri Lankan norms of doing business and how do you react and plan strategies to deal with this issue?
4. It is important to check whether you get the people and services that you paid for. How do you ensure that the people involved in your projects have the relevant experience and qualifications?
5. How do you check that the working environment and equipment is as expected?
6. How much effort did you put to set up a communication structure?
7. To what extent do you document your communication with your offshore developers?
8. How do you set milestones and how frequent does your partner deliver progress?
9. Sometimes offshore partners employ arms and legs rather than brains i.e. you find a team with few qualified developers surrounded with many inexperienced staff. The developer then spends much more time coaching the inexperienced staffs that are unable to make sound technical decisions. If this has happened to your projects how it did affect the product quality?
10. Are you in total control in this partnership? How do you deal with lack of accountability in the offshore site?
11. How many points of contacts (that can make fast decisions and get you what you need in time) do you have in your offshore site?
12. What kinds of measurements are taken to ensure that the gains in cost and time are not lost in over-managing the overall outsourcing process?
13. How did you educate your partner on your organization’s business rules and nuances?
14. How often do you involve your partner in brainstorming sessions?
15. Do you give your partner any soft skills training in business etiquette and communication?
16. Do you use visual aids, screenshots, charts, and diagrams during requirements review with your developers?
17. How do you deal with frustrations and misunderstandings if the requirements are not clearly communicated?
18. Do you plan delivery schedules ahead to allow room for the observance of religious/public holidays and celebrations?
19. How do you motivate or keep your partner passionate about providing you with top quality service?
20. Sri Lanka is one of the famous conflict war zone areas in the world. This might pose a political risk for your projects. What measurements do you take to mitigate such a risk to your projects?
21. Did you have to go on training as project managers?
22. What actions are carried out when there is big changes in requirements from the users of COSMIC?