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A Case Study Report on

Agile Software Development at Deerwalk Inc.

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1. INTRODUCTION

Deerwalk is a healthcare analytics and custom software development company. It is based in Lexington, Massachusetts. The Company is located at Tamreshwore Mahadevsthan, Jayabageshwori, and Kathmandu, Nepal. Deerwalk Service Pvt. Ltd. was founded in 2009 by Rudra Pandey in 2009. It is focused on delivering big data solutions to the healthcare industry. Deerwalk is led by MR. Rudra Pandey and Mr. Jeff Gasser who were also a part of founding team at D2Hawkeye(currently Verisk Technology). The senior team at Deerwalk has more than 50 years of healthcare IT experience and more than 100 years of management experience.

The name "Deerwalk" means walking pattern of deer and is a refereed to the agile and graceful movement. Deer changes their brisk walking pattern only when needed based on the circumstances around them, similarly they believe they change the product and service offering if the customer want them to change. Their working motto is "Result. Reflect. Repeat.". Deerwalk headquarter is located in Bedford street, Lexington, MA, USA. They outsource the software and health care solutions to the clients in USA and other countries from Nepal.

Vision of the company

Deerwalk Incorporation is driven by five trends of software development. They are:

- On Demand Software Development
- Using Open Source Technology
- Virtualization
- Offshore Development
- Vendor Consolidation

2. PRODUCTS AND SERVICES OF DEERWALK

Deerwalk is an IT company that outsources various IT solutions and products. They have a workforce that is adept with various technologies. Thy generally provide healthcare and custom analytics solutions. So they have primarily 3 areas of focus:

Product development Services

Web Application Development

They develop various web application. The product development moves according to the customer need. They build various web applications for both large and small business enterprises. Their products (Makalu, Everest and Yala) are all complex and scalable web applications with data processing back-ends. Their web application development methodology consists of following steps:

- Requirements gathering
- Designers create several variations of Static Mockups
- Designers make iterative changes to mockups with client feedback to create a final version of mockup
- Designers create clickable mockups to simulate a functioning product
- Web application development following a Model View Controller (Services) approach begins
- Quality Assurance Testing begins and progresses in parallel with development
- Frequent User Acceptance Testing (UAT) releases for client feedback along the way with regular status and progress updates
- Final UAT release
- Hosting on Deerwalk's servers or Delivery of final site for the client's own hosting solution
- The client end of the web application features a combination of HTML, CSS and Javascript. Their development model is based on the MVC development model.

Mobile Application Development

Deerwalk also builds iPhone/iPad applications as well as Android applications for mobile devices. Cross compatible applications are also developed by them. They apply tried and tested methodologies for mobile application development.

Data Conversion Services

Deerwalk works on all kind of Data Conversion process. They have extensive experience in handling data of all types for different customer. Deerwalk's Data conversion workflow has following components:

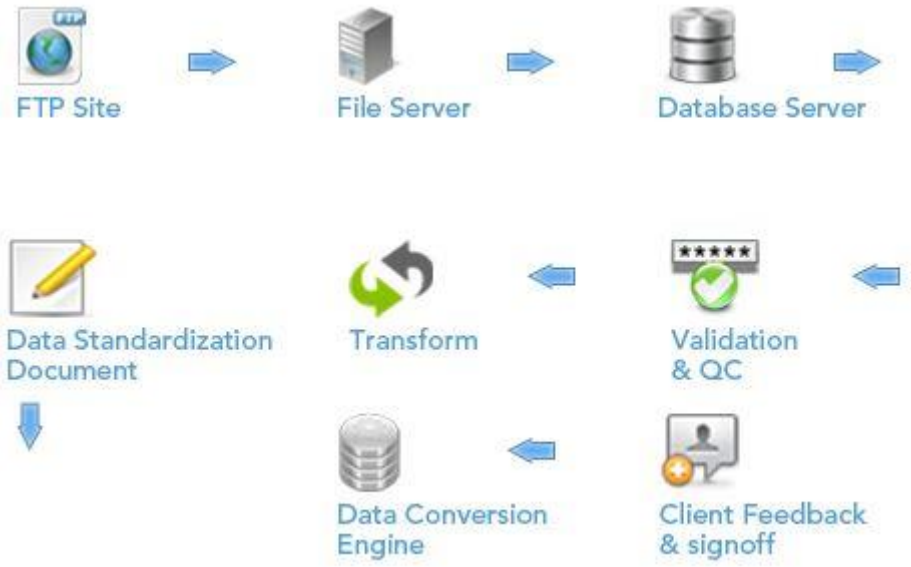

Figure 1 Data conversion workflow at Deerwalk

Based on the motto of "Result. Reflect. Repeat" they provide the data conversion service. The Data conversion service in Deerwalk has following driving rules:

- Never change the client data and never surprise them.
- Perform extensive QC at every phase.
- Document the exception list at every step, and share with the client.

IT Services

Though they are primarily focused on providing solutions to the healthcare Industry of US, they also provide various IT solutions using different technologies. Having understood the speed of business and technology change, and the dynamics to the industry they provide various IT solutions for the small and large organizations. Their capabilities in the IT sector includes following:

- Desktop Application Development
- Mobile Application Development
- Web Application Development
- Data Conversion, Analysis and Reporting
- Database Architecture and Administration
- Big Data
- Cloud Computing

- Email Management
- Backup Service
- Network Security
- SharePoint Development and Administration
- Salesforce Customization
- Graphics Design
- Web design and Hosting
- Search Engine Optimization
- Search Engine Marketing
- Social Media Optimization

3. ORGANIZATIONAL STRUCTURE

Deerwalk Inc is dedicated in providing quantitative services to its clients. The organization is properly managed and structured so that all the activities can be carried out much more efficiently and effectively. The organization is a multinational company with its headquarter based on the United States. The organization is a partnership based organization. It's customer are primarily the health service clients in the United States. In Nepal, its client includes the Kathmandu Model hospital and Maiti Nepal.

The Organization has a hybrid type of structure. Though it can be summed up to be a hierarchical structure. The CEO can be reached within 2-3 layers. The purchasing and advertisement decision are made by the management meeting. The decision to purchase a highly costly products includes the involvement of CEO itself. The customers are attracted by the reference marketing. Very few amount is spent on the advertisements on media. The Board of directors are responsible for implementing all the strategies that are imposed by the manager. All the management activities are controlled and coordinated by the manager. Since Deerwalk is a very big offshore company so only senior manager can't handle all the management activities so in order to assist senior manager, engineering manager and project managers are employed. Below these managers, senior developers work who are basically developers who have more experience in software development process. All the software developers are coordinated and under the supervision of the senior developer. Deerwalk has currently more than 160 employees. It plans to hire more than 500 employees in coming 5 years.

Functional Structure of Deerwalk

The functional structure comprises of units that are necessary for the organization to operate fully. The company divides its employees on mainly 4 types of jobs as listed below. Besides the management and admin section the employees on the product Development, Data and Services

are frequently changed departments so that the employees do not get bored doing the same job again and again.

It has following divisions:

Product
Around 60 employees work on the product development part in the Deerwalk. They develop various products such as Everest, Yala, Makalu.

Services
Around 60 people are employed for providing the services to the clients. They provide various services such as data Analysis, data Conversion Services.

Data
There are around 35 staffs working in the data Section.

Management and Admin
Rest of the employees are working in the administration and the management section.

Block Diagram of Structure of the Organization

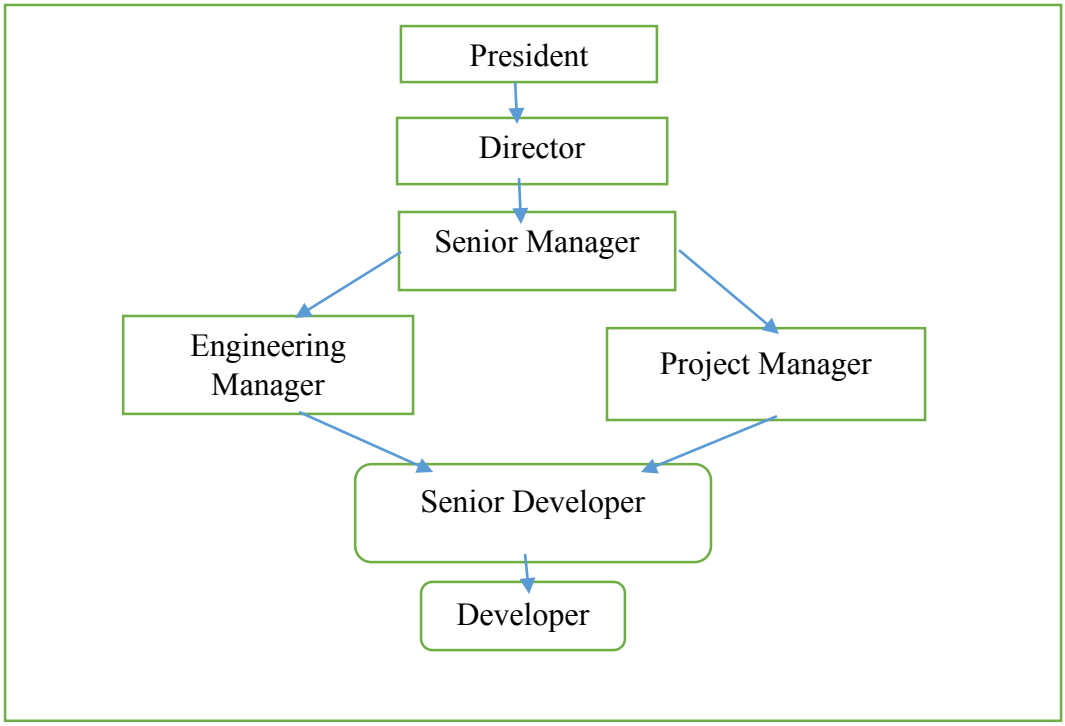

Figure 2Block diagram of structure of organization

4. SOFTWARE ENGINEERING PROCEDURE

A company will be successful if it can handle the resources and the real project successfully and efficiently. A successful software project is one in which the deliverables satisfy and possibly exceed the customer's expectations, the development occurred in a timely and economical fashion, and the result is resilient to change and adaptation. And this can be achieved the use implementation of standard process of management.

In the software development community today, there is a plethora of software development processes to choose from- the Rational Unified Process (RUP), XP, SCRUM, Crystal, and so on. The software development process is described from two perspectives- the overall software development lifecycle (the macro process) and the analysis and design process (the micro process). The choice of lifecycle style (e.g., waterfall, iterative, agile, plan-driven, and so on) affects the macro process, and the choice of analysis and design techniques (e.g., structured, object-oriented, and so on) affects the micro process.

Unlike other software company that follows or employs Capability Maturity Model Integration (CMMI) approach to improve their performance, Deer Walk Services Pvt. Ltd. has employed Agile Software Development technique to manage their project properly. With agile processes, the

primary goal is to deliver a system to the customer that meets their current needs in the shortest amount of time. The process is just a means to an end. Thus, agile processes tend to have the following characteristics:

1. Lightweight and sparse, less ceremony (do only what is absolutely necessary and no more)
2. Reliant on the tacit knowledge of the team members (rather than on well documented processes)
3.Tactically focused rather than strategic (don't build for the future as that future is unknown)
4.Iterative and incremental (deliver parts of the system in several cycles)
5.Heavily reliant on customer collaboration (customers are active participants in requirements definition and validation)
6. Self-organizing and managing (the teams figure out the best way to work)

Agile processes release the software development teams from following a strict set of steps and allow developers to concentrate their creative energies on the system under development. Agile processes are designed to rapidly handle changes to both the application being developed and the process itself. The macro process involves the following disciplines, executed in the following relative order.

Requirements:

Establish and maintain agreement with customers and other stakeholders on what the system should do. Define the boundaries of the system.

Analysis and Design:

Transform the requirements into a design of the system, which serves as a specification of the implementation in the selected implementation environment. This includes evolving a robust architecture for the system and establishing the common mechanisms that must be used by disparate elements of the system.

Implementation:

Implement, unit test, and integrate the design, resulting in an executable system.

Test:

Test the implementation to make sure that is fulfills the requirements (i.e, the requirements have been implemented appropriately). Validate through concrete demonstration that the software product functions as designed.

Deployment:

Ensure that the software product (including the tested implementation) is available for its end users. The following disciplines are executed throughout the lifecycle.

Project Management:

Manage the software development project, including planning, staffing, and monitoring the project, as well as managing the risks.

Configuration and change Management:

Identify the configuration items, control changes to those items, and manage configurations of those items.

Environment:

Provide the software development environment, including both processes and tools that support the development team.

5. FINANCE

Deerwalk Inc., headquarter, situated at Lexington, Massachusetts, US is takes the full control in finance. The developers and staffs are paid their salaries by headquarter. The company does every financial activities very systematically following legal procedures. They set out the terms and conditionals in an agreement with clients before starting any project. The payment is made by the clients as per the agreement by the client after the completion of their project.

Deerwalk Inc. sends the salary to their developer at the offshore companies at the end of every month. The employees have the option of taking direct money or there is an option known as stock option where the employees are provided with the US based stock equivalent to their salary.

Thus, we can say that Deerwalk Inc. has full financial control to its offshore companies.

6. MOTIVATION

Motivation is a set of forces that directs an individual to the behavior that results in better job performance. A motivated employee might work harder the expected to complete the task, proactively find ways to mprove the qulity and efficienty of the work environment.

Deerwalk has also tried its best to motivated its employees through building silent and cool environment which helps to work in peaceful mind. They have formed different departments and owes their own working space and work in a team. The employees are provided with sports

facilities like basketball, table tennis, badminton etc. Company has set up a canteen for the staffs so they can have hygienic food within the territory. For some employees working late night, company offers transportation service and drop them to their home.

One of the most interesting strategies of Deerwalk is "Rotation in Working" principle. They rotate their employees from one department to another so that they feel always fresh for that work and don't feel bored to continue their work in that field. They also organize training and seminars from time to time to sharpen the skills among the employees. Also, Deerwalk motivated its employee by rewarding their good working employees by increasing salary and promotion.

Deerwalk also encourages its employees by giving them chances to visit its headquarter and attend training programs so that they can get some broad knowledge and take a break from the usual work.

The company organizes hiking and excursion visits in a periodic way to build strong teams among the employees and get relief from the day to day work.

So, we found that company was aware of need of motivation for the employees and they are successful in motivating their employees through different techniques.

7. PROJECT MANAGEMENT

Project Management plays an important role in the planning, staffing and monitoring the project, as well as managing the risks.

In case of Deerwalk Services Pvt. Ltd, they follows Agile Development techniques to manage their project in a systematic way. Agile processes tend to deemphasize the importance of establishing the architecture up front. Instead, they describe concepts such as simple design, emergent design, refactoring, and “serendipitous” architecture. In such processes, the architecture evolves over time.

In any case, when in the lifecycle the architecture is developed and how it is developed does not downplay the importance of having an architectural vision. Without such a vision, the system is harder to evolve and maintain over time.

The agile methodology have different varieties and Deerwalk Services uses Scrum methodology for project management. Scrum is an iterative and incremental agile software framework for managing projects. Scrum focuses on project management institutions where it is difficult to plan ahead. Mechanisms of empirical process control, where feedback loops that constitute the core management technique are used as opposed to traditional command and control.

There are three core roles and a range of ancillary roles – core roles are often referred to as pigs and ancillary roles as chickens.

Product Owner

It is the person who represents the stakeholders and is the voice of the customer. They are the clients of Deerwalk

Development Team

Development Team is responsible for delivering potentially shippable product increments at the end of each Sprint. This is the Developer's team of Deerwalk Services at Kathmandu, Nepal.

ScrumMaster

Scrum is facilitated by a ScrumMaster, who is accountable for removing impediments to the ability of the team to deliver the sprint goal/deliveries. Deerwalk Inc. Lexigton, Us plays the role as ScrumMaster.

8. MANAGEMENT INFORMATION SYSTEM

The use and importance of data is growing exponentially at the current time. Every organizations have huge amount of data to process. These data may be the information about the organization or the information needed for the organization. The information adds value to organizations, as well as, it helps organizations to survive among intensive competition. Therefore, organizations need information for management.
Management Information System, commonly referred as MIS is basically computer systems in an enterprise that provide information about its business operations. It's also used to refer to the people who manage these systems. Typically, in a large corporation, "MIS" or the "MIS department" refers to a central or centrally-coordinated system of computer expertise and management, also including, by extension the corporation's entire network of computer resources. Today, the term is used broadly in a number of contexts and includes (but is not limited to): decision support systems, resource and people management applications, project management, and database retrieval applications. MIS compound of theories of computer science and management science. These theories build system and program utilization. Normally, MIS are integrated systems of users and machines (computers) with aiming to provide organizations' information for operation, management and decision-making. These systems use computer hardware and software. Furthermore, MIS are used to collect and cumulate data from several sources both internal and external organization for processing and arranging information. Therefore, executives or users can apply it for making decision and other management.

MIS in Deerwalk

We asked the Senior Project Manager about the management of information in Deerwalk and he gave us the brief idea about it and its implementation in the organization. Deerwalk works on sensitive data so they have to assure that the security of information is maintained. Also, it records each information through software system and updates the record on time intervals. None of the employee is allowed to take the information to their home and also the information is not stored in the personal computers. For attendance, a time recording machine is set-up at the entrance. But Deerwalk is less concerned about how much time an employee spends in the office. Rather the concern is more on the completion of the work. They have their own HR management tool. It tracks how many days employee worked, went to leave, his/her educational details, trainings conducted and so on.

9. ACTIVITIES

Deerwalk has maintained a logical hierarchy of management committee. The Executive Committee manage the organization as a whole. The operating groups have substantial discretion in the way they manage their business activities. Their activities can be described as follows:

Purchasing Decisions

Any purchase in an area is first discussed in management meeting and the passed. Purchase decision depends highly on the type of product. If a costly equipment like generator is to be purchased, it may involve people at higher level like CEO and longer time to take decision.

Marketing and Advertisements

Deerwalk doesn't do much advertisements. Main advertising media is social media (Facebook). A few newspapers write about the company and conduct interviews which helps in attracting clients. Talk programs are also sometimes organized in some institutes like IOE, Pulchowk which in turn increases PR.

Training

There are different training committees at Deerwalk. The committees assess the requirement for a training as per requirement. Training are scheduled and taken at different times. Deerwalk is not a strict company. Employees work five days per week and working hour is from 9:00 AM to 5:00PM. But anyone can come late to the office and work till late night. The company does not make hard and fast rules regarding to office time. Instead there is an assignment defined for each developers per day and one should complete the given assignment within the day. The working performance of individuals is evaluated via continuous integration application. Besides the business, the executive committee also motivate their employers in terms of salary, holidays, indoor and outdoor entertainment. The company manages weekly hiking program to each alternate project groups.

Staffing/requirement procedure

Deerwalk Inc. Nepal has currently about 160 employees working for the organization and it does have the aim of expanding the organization so that it can provide employment to more than 1000 staff. There are different levels of employees in this organization. The level 1 are interns. For the intake of interns in the organization, written exams for the internship applicants is conducted. Additionally, the candidates have to appear in two interviews of which the best ones are selected. After 2 month of internship at Deerwalk, based on the performance of selected candidates, some are hired as trainees. These are 2nd level of employees. Again, they are promoted to associate software engineers, senior software engineers and so on. Besides this, the organization has established an institute named “Deerwalk Institute of Technology” where it provides Computer Science education in the bachelor level and aims to provide the best students of the batch with job at the institute itself. The students thus chosen are taken in as trainee for the 3 months period. They are closely watched by the senior staffs in this training period and they are evaluated. If the organization feels that they are suitable for the task, they are taken in as regular employees.

Another process of hiring is requirement based hiring which is done through vacancy announcement. The organization issues vacancy announcement giving the required expertise of the applicants through different media and the desired are asked to submit their CVs. For e.g. if .NET developers are required, the organization calls vacancy for .Net developers with certain experience. Then different level of interview are conducted first a general interview is taken and then experts of the organization in the field of the requirement take a specific interview and among them the most qualified candidates are chosen. The organization then sends these employees for the HIPPA law training by which the organization is bound. After completion of the training the employees are made to sign a contract of confidentiality of works of the organization and that they will follow the HIPPA law. Besides this, if the organization feels like the staffs requires some other sorts of trainings then the organization holds the training program.

10. IMPLEMENTATION OF AGILE SOFTWARE DEVELOPMENT AT DEERWALK

Deerwalk though not officially certified, uses the Agile (Scrum) software development methodology. The company is focused on Customer satisfaction by rapid delivery of useful software. Project

Managers make sprint for each task in which each sprint can be of 1 week - 2 weeks. The scrum methodology at Deerwalk can be explained under these headings:

Roles:

There are three core roles and a range of ancillary roles—core roles are often referred to as pigs and ancillary roles as chickens (after the story The Chicken and the Pig).

Core roles

The core roles are those committed to the project in the Scrum process—they are the ones producing the product (objective of the project). They represent the scrum team.

Product Owner

The Product Owner represents the stakeholders and is the voice of the customer. He or she is Accountable for ensuring that the team delivers value to the business. The Product Owner writes customer-centric items (typically user stories), prioritizes them, and adds them to the product backlog. Scrum teams should have one Product Owner, and while they may also be a member of the development team, it is recommended that this role not be combined with that of Scrum Master.

Development Team
The Development Team is responsible for delivering potentially shippable product increments at the end of each Sprint. A Development Team is made up of 3–9 people with cross-functional skills who do the actual work (analyses, design, develop, test, technical communication, document, etc.).The Development Team in Scrum is self-organizing, even though they may interface with project management organizations (PMOs).Scrum Master Scrum is facilitated by a Scrum Master, who is accountable for removing impediments to the ability of the team to deliver the sprint goal/deliverables. The Scrum Master is not the team leader, but acts as a buffer between the team and any distracting influences. The Scrum Master ensures that the Scrum Process is used as intended. The Scrum Master is the enforcer of rules. A key part of the Scrum Master's role is to protect the Development Team and keep it focused on the tasks at hand. The role has also been referred to as a servant-leader to reinforce these dual perspectives. The Scrum Master differs from a Project Manager in that the latter may have people management responsibilities unrelated to the role of Scrum Master. The Scrum Master role excludes any such

Additional people responsibilities.

Test and Evaluation Team:
In some cases the team may have the developers find, document, and report all bugs or defects found within the program. In some cases the team may have a specific Test and Evaluation Team. This team is responsible for finding, documenting, and reporting all bugs or defects to the rest of the team. The team may also be in charge of testing the newly implemented code that the developers write.

Meetings:
The different meetings in the scrum methodology at Deerwalk can be explained as:

Daily Scrum
At Deerwalk, a daily scrum meeting of all the teams is held at the field. Each day during the sprint, a project team communication meeting occurs. This is called a daily scrum, or the daily standup. The meeting has specific guidelines:

1. All members of the development Team come prepared with the updates for the meeting.

2. The meeting starts precisely on time even if some development team members are missing.

3. The meeting should happen at the same location and same time every day.

4. The meeting length is set (time boxed) to around 15 minutes

All are welcome, but normally only the core roles speak during the meeting, each team member answers three questions:

1. What have you done since yesterday?

2. What are you planning to do today?

3. Any impediments/stumbling blocks?

Any impediment/stumbling block identified in this meeting is documented by the Scrum Master and worked towards resolution outside of this meeting. No detailed discussions shall happen in this meeting

Backlog grooming: Storytime
The team should spend time during a sprint doing product backlog grooming. This is the process of estimating the existing backlog using effort/points, refining the acceptance criteria for individual stories, and breaking larger stories into smaller stories. Meetings are not longer than an hour. Meeting does not include breaking stories into tasks. The team can decide how many meetings are needed per week depending upon the task they are doing. The method used at Deerwalk is the planning poker.

Scrum of Scrums:
This is held each day normally after the Daily Scrum. These meetings allow clusters of teams to discuss their work, focusing especially on areas of overlap and integration. A designated person from each team attends. The agenda will be the same as the Daily Scrum, plus the following four questions:

1. What has your team done since we last met?

2. What will your team do before we meet again?

3. Is anything slowing your team down or getting in their way?

4. Are you about to put something in another team's way?

Sprint planning meeting:
At the beginning of the sprint cycle (every 7–30 days), a "Sprint planning meeting" is held. What work to be done is first selected. Then the Sprint Backlog is prepared that details the time it will take to do that work, with the entire team. Identification of how much of the work is likely to be done during the current sprint is done.

At the end of a sprint cycle, two meetings are held: the “Sprint Review Meeting” and the “Sprint Retrospective”

Sprint review meeting:
In this meeting the work that was completed and not completed are reviewed. The completed work is presented to the stakeholders (a.k.a. “the demo”). But incomplete work are not demonstrated. Four-hour time limit is set up for this meeting.

Sprint retrospective:
All team members reflect on the past sprint. Make continuous process improvements. Two main questions are asked in the sprint retrospective:

1. What went well during the sprint?

2. What could be improved in the next sprint? Three-hour time limit.

This meeting is facilitated by the ScrumMaster. The no. of sprints depends on the type of project that is being developed. The length of the project can range from a no. of days days, weeks to months.

Project Environments:

A project has 4 environments – Development, Testing, UAT and Production.

Development Environment:
This is where the software is developed. Deerwalk works on a sensitive data. So, data is hosted on the US server and cannot be downloaded by developers on their computer. Environment is set-up in such a way that the software would never act differently on production.

Testing Environment:
After the application was developed to an agreed stage it is released to the testing environment. This is where the testers ensures the quality of the application, open bugs and review bug fixes. This environment must resemble the production environment accurately, because this is the last safe place to find and fix environment-related bugs.

User Acceptance Test Environment (UAT):
The software is then moved from internal testing to client testing. This is where the client-testers verify the quality of the application and send issues if there are any this is also where the client assesses the application and can request changes to better fit his requirements.

Production Environment:
This is where the application goes out to the world and become production.

Agile Testing at Deerwalk:

Testing is not considered a separate phase, but an integral part of software development, along with coding. Agile teams use a "whole-team" approach to "baking quality in" to the software product. Testers on agile teams lend their expertise in eliciting examples of desired behavior from customers, collaborating with the development team to turn those into executable specifications that guide coding. Testing and coding are done incrementally and iteratively, building up each feature until it provides enough value to release to production. Quality of Software very important. A product goes thorough various phases of quality tests. If any software doesn't pass the quality check, it is then returned backed to the development environment and the quality is ensured.

11. CONCLUSION

From our case study, we have concluded that software development in Nepal is in a progressive phase. Deerwalk as a leading software company has been providing a lot of contribution in the development of software in Nepal. The partially flat organizational structure has been effective in managing the employees. It has become a role model for other organizations of Nepal. The personnel management at Deerwalk is of top class which has helped in recruiting talented employees as well as sharpening the talents of employees at Deerwalk. With the motivational activities, Deerwalk has been proving that the employees are a very integral part of the organization.

Being a software company, it has always updated itself with latest technologies available in the market. To address the changes and effectively work on the customer’s requirements, it has adopted Agile software Development methodology. The method has been considered as one of the best software engineering processes in the world.

Deerwalk has been outsourcing its products to USA and only few products are being developed for Nepal. It would be better if they focus more on the Nepali market as well.