Assignment-2

Process Improvement (APIM & GQM+)

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Abstract— **This report describes about the experiences of author in the field of software engineering and describes about the improvements in projects through APIM (Accelerating Process Improvement methodology) and GQM+ methods.**

Keywords— Improvement,GQM+

I. EXPERIENCE OF SOFTWARE ENGINEERING DEVELOPMENT PROJECTS

The author of this paper has no industrial experience in his career but has experience in his academic career in developing some of the projects related to software development. In his bachelors career the author has completed the project related to network security which helps to improve software without having any issues related to security. The author of this paper is currently pursuing his masters in Blekinge Institute of Technology. In his Masters Career the author has developed some of the projects related to Verification and Validation and Applied software project Management courses. The brief explanation of these projects are described in the next section of this paper.

II. PROCESS IMPROVEMENT RELATED TO PROJECT EXAMPLES

The examples of development projects related to experience of author are as follows:

- **P1**-Detecting Targeted Malicious Email
- **P2**-Static Analysis and Dynamic Analysis of Spaxe Hilk system
- **P3**-Development of Web based application

Detecting Targeted Malicious Email:

The author of this paper has involved in this developing project. This project is developed by a team of 3 members. The above project is developed by author in his Bachelor's degree with the help of supervisor.

The Abstract of this project is as follows:

Using new detection and filtering techniques we started the detection of phishing and spam emails. Every mail verified with probability distribution characteristics. Once all the characteristics are satisfied in Meta data structure then we allowed them to inbox. In inbox all the mails are placed if they are trust worthy with their content. The total number of mails after performing the pre-processing operation has to apply these classification techniques. These Classification techniques give the results whether the mail is recipient or persistent mails.

The improvement in our project is to find out the phishing and spam mails without entering them in to the users inbox which helps the users to use their mails without any issues related to security.

Hindrances related to above project:

- Lack of skill for conducting SPI:
  As this project is developed in bachelor's level the team members may have lack of experience in conducting software process improvement to the project. This can be mitigated by approaching the supervisor and have more discussion about the improvement.
- Lack of Training:
  As there is no experience to any member of the group regarding development of project. Lack of training hindrance may occur.
- Fear Factor:
  The members of this project may have some fear whether the project can be completed on time or it may be late to develop the project. The fear factor may be one of the hindrance to this project due to lack of experience.

Static Analysis and Dynamic Analysis of Spaxe Hilk System:

The author of this paper has involved in this project in his Verification and Validation course at Masters Level. This project is developed by a team of 6 members. The purpose of this project is to use any one of the static automated code analysis tool to find the defects in the code and while using the tool they provide with a list of warnings

that need to be reviewed by the team and have to decide whether the warnings are false positive or true positive. As part of this project we have conducted an automated static analysis using the open source PMD tool. In the later stage of the project, we have to write a test plan for system Spaxe Hilk which focuses on level of test planning.
The task allocated to me in this project is to decide on the inspection goals, identify static analysis tool which suits the situation and also to develop a test plan for the given product.

Hindrances related to the above project:

Hindrances related to this project success are lack of team management and also lack of experience. There was also lack of motivation from the development team about knowledge transfer.

Development of web-based Application

The author of this paper has involved in this project in his Applied Software Project Management course. This project is developed by a team of 8 members. The purpose of this course is to develop any software application in a given time period. The team has decided to develop a web based application related to restaurants so that the people may get an easy access to know about their near restaurants from their places.

The scope of this project is to develop and deliver a new website named "Karlskrona Restaurant Network" (KRN). This website is aiming to collect and exhibit information about restaurants in Karlskrona, which want to join the network and put their products on display to hook the attention of viewers. Restaurants will register to the website and add/ update information about their popular dishes, menu and special offers. Visitors will be able to be the members of website by registration and can search and add ranking and reviews for their favourite food and restaurants. Certainly the customers will be able to log on to KRN anywhere, but the location of participating restaurants information is restricted to Karlskrona. The time allocated to this project is 1600 hours and each individual has to allocate 200 hours to this project and the project is under developing stage as of now. The process model used to develop our project is Scrum methodology. The main reason behind selecting the Scrum development model is that it allows the development team to review each sprint before moving to the next, so testing is conducted throughout the process, which allows the team to change the scope or direction of the project at any point. Scrum also provides flexibility for scrum teams to distribute the tasks of sprint backlog according to their capabilities.

Hindrances related to the above project:

- Lack of skill for conducting SPI:
  As this project is developed by people who does not have any industrial experience about improvement, this type of hindrance may occur in the project for the team while developing the required product.
- Lack of Communication:
  As this project is developed in a team of 8 members and all members of team are from different backgrounds so lack of communication may be one of the hindrance occurred in the project while developing it.
- Lack of Training:
  As there is no experience to any member of the group regarding development of project. Lack of training hindrance may occur.

III. PROCESS IMPROVEMENT- APPLICATION OF APIM MODEL

As mentioned in the section 2 about the examples of projects. The author has selected two projects from the three to perform improvement through APIM (Accelerating Process Improvement Methodology). The projects taken into consideration for improvement are as follows:

- **P3**-Development of web based application
- **P2**-Static Analysis and Dynamic Analysis of Spaxe Hilk system

The scenarios from both these projects regarding improvement are taken in to consideration. In APIM model there are different phases and each phase consists of different activities. To conduct the improvement process for the selected scenarios different activities from each phase of model are taken into consideration and activities which are relevant to the scenario are selected to improve the process. The phases involved in the APIM [1] for the process improvement are as follows:

P2-Static Analysis and Dynamic Analysis of Spaxe Hilk system

The Phases involved in the improvement process of above project are as follows:

Prematurity phase:

The activities involved in this phase are:

Launch:

In this phase, the goals for the process improvement of the project should be finalized by the members. In this project the main goal is to test the given source code and find the defects with the help of any open source tool. In this activity the team members can take any help from the previous studies which have been conducted in the same field.

Planning:

The overall plan to develop the project is maintained by the project leader. The leader is responsible to develop communication plan and he plans to communicate with the help of skype or through google hangouts among the team members. The meetings should be conducted every week to know the status of the project.

Maturity Phase:

The activities involved in this phase are:

Awareness:

In this phase an assessment is conducted about the project to improve the gaps and weakness of the project. The technique used to assess the strengths and weakness of both team members and project is SWOT analysis.

Triage:

This phase is used to prioritize the improvements based upon the level of improvements. The level of improvements are categorized in to important, more important, and less important. Based upon the prioritization of improving the project we may come across some challenges and these challenges of the project are prioritized based upon their severity. These challenges are identified based upon the meetings and these are improved based upon their severity level.

Resolution:

In this phase, the team members decide about the formation of action team so that they are responsible for identification of challenges related to project development. The main task of action team is to implement some of the action plan on challenges and status about the activity should be reported.

Training:

In this phase training is given to the project team members by the member of the group who has industrial experience so that they can learn about the tools which they are going to use in their project.

Trail:

In this activity the quality of the project is tested based upon the requirements given to develop the project.

Post maturity phase:

The activities involved in this phase are:

Appraise:

As soon as we complete the project, the formal assessment is undertaken by referring to some of the academic findings. The team members also decide to have a review meeting with the supervisor of the project at the end of development phase of project.

Improve:

The final product is shown to the supervisor to make him aware of improvements done in the total project. The total project code and documentation is stored in cloud storage for future reference.

P3-Development of web based application

The phases involved in the improvement of above project are as follows:

Prematurity phase:

The activities involved in this phase are:

Launch:

In this phase, the goals for the process improvement of the project should be finalized by the members. In this project the main goal is to improve communication between the members of the group and also to provide training to the inexperienced people in the group by the experienced members. The resources should be allocated carefully to complete the project on time. The schedule of the project should be tracked whether the projects reaches the required milestones according to plan. The Gantt chart tool is used to control the schedule of the project. The main task in this phase is to select the appropriate process model to develop the project.

Planning:

The overall plan to develop the project is maintained by the scrum master (because scrum model is followed in this project to develop). The scrum master is responsible to develop communication plan and he plans to communicate with the help of skype or through google hangouts. The sprint meetings should be conducted every week to know the status of the project and also helps us to know about the quality of product at each sprint.

Maturity Phase:

The activities involved in this phase are:

Awareness:

In this phase an assessment is conducted about the project regarding type of processes followed. The technique used to assess the strengths and weakness of both team members and project status is SWOT analysis. Hence swot analysis is used to know the present status of the project.

Triage:

In this phase challenges of the current project are identified and are prioritized based upon their severity. These challenges are identified based upon the sprint meetings and these are improved based upon their severity level.

Resolution:

In this phase, the team members decide about the formation of action team so that they are responsible for identification of challenges related to project development. The main task of action team is to implement some of the action plan on challenges and status about the activity should be reported.

Training:

In this phase training is given to the project team members by the experienced member of the group so that they can learn about the tools which they are going to use in their project.

Trail:

The quality of project is tested at the end of each sprint and test plan is also created to define test cases. The quality of project at each sprint is assessed by performing group meetings about the output. At the end of development phase the total project is again tested by testers to know final quality of the product.

Post maturity phase:

The activities involved in this phase are:

Appraise:

As soon as we complete the project, the formal assessment is undertaken by referring to some of the academic findings. The team members also decide to have a review meeting with the supervisor of the project at the end of development phase of project.

Improve:

The final product is shown to the supervisor to make him aware of improvements done in the total project. The total project code and documentation is stored in cloud storage for future reference.

IV. PROCESS IMPROVEMENT- APPLICATION OF GQM$^+$ STRATEGIES

GQM+ Strategy approach is used to align our organizational goals and strategy. This approach uses some metrics to identity the status of any organization. GQM+ approach process consist of seven phases. Let us use this model to improve the web based application (**P3**).

The seven phases in this approach are Initialize, Characterize environment, define goals, strategies and measurement, Plan grid implementation, execute plans, analyze outcomes and package improvements.

Initialize:

The project team members are committed to improve the organizational strategies. The project manager (scrum master in our project) is responsible to assign tasks to each individuals and is also responsible to define project scope and also about the quality of the product.

Characterize environment:

In this phase the environment of the team members are identified. The strategies required to develop the product are discussed in this phase. These are identified by conducting meetings with the members of the group. In this phase the members also decide about the meeting places and also required resources for meeting related to project development.

Define goals, strategies and measurement:

In this phase, the scrum master of the project defines the goal of the project and also tries to know about the availability of hardware's and software's required to develop the project. In this selected project the process improvement can be considered as the main goal by the scrum master. In this phase the metrics required to measure our product are also identified.

Plan grid implementation:

The scrum master in our project has explained about the project characteristics and also about the updates with the help of open source tools provided in internet. Some of the websites are useful in improvement of individual participation as it helps everyone to update their individual contribution.

Execute Plans:

The strategies discussed in initial phase are executed. In this phase data is also collected and analyzed. The action plans of this project is implemented with the help of time log sheets in which every persons amount of work is maintained so that it helps to track the present status of project.

Analyze outcomes:

All the required data is analyzed to check whether the strategies and process implemented to develop the product are able to satisfy to get the required product as output.

Package Improvements:

We created an online repository called "GitHub" to develop the product and all the code documents are stored in this repository. The team members can improve the documents based upon the reviews and improvements are detailed in these documents so that they can be implemented in next meetings.

V. SIMILARITIES AND DIFFERENCES BETWEEN THE TWO APPROACHES

Similarities:

- Both approaches are iterative in nature
- Both approaches focus on current status
- Both approaches describe about action plan to implement in particular project
- Both approaches helps us to improve the quality of process
- Both approaches involve in supervision of each and every activity related to development project
- Both approaches focus on training phase

Differences:

- GQM$^+$ strategies uses GQM concept, whereas APIM uses agile methodologies.

- In APIM model process activities are classified in to three phases where as in GQM$^+$ strategy the project has several iterations to finish the project

VI. TOOLS USED IN PROCESS IMPROVEMENT

There are several tools described in the Jacobs book so that these tools help us to monitor and helpful to assess our project status. Some of the tools which are useful to improve our process in my example projects are given below:

Goose story:

Based up on my experience in projects which I involved in groups, I found that motivation plays an important role in work we performed for our project. Hence Goose story tool would be extremely useful in formation of groups.

Work Break Down structure:

It provides an overview to define the actual work that needs to be accomplished. It helps further to define the schedule estimation, cost estimation, resource allocation, etc. The work Breakdown structure for any project is in a hierarchical structure.

Gantt chart:

The mile stones and the required activities of any project is described in the Gantt chart. The project's progress and current standing are often assessed with the assistance of this chart.

Estimation:

ISBSG is one of the systems used to estimate the effort carried out by any of the project [2].The purpose of this technique to use in our project is that it utilizes the past information of finished projects as input data for current projects

Minutes of meeting:

This tool is used to track the important decision made during the meeting related to project development.

REFERENCES

[1] D. Jacobs, *Accelerating process improvement using agile techniques*. CRC Press, 2005.

[2] http://www.isbsg.org/