Project Manager VS. ScrumMaster

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***Abstract*— There is a great interest shown by software industry towards scrum, and our traditional Project Managers (PM) do not have the idea how to adopt scrum and go ahead. Most of the project managers are exercising different agile practices. Due to traditional and bureaucratic knowledge, it becomes difficult for them to act as a ScrumMaster(SM). Sometimes it's not clear about the activities and duties of the PM and SM. This research is based on clear knowledge and differences among two paradigms and focuses on how to successfully migrate from Project Manager to Scrum Master. This research will be helpful for all practitioners, those willing to switch from traditional to Agile.**

***Keywords*— Project Manager, ScrumMaster, Agile Manager**

I. INTRODUCTION

Nowadays software industries are moving rapidly towards agile development. Most of Software Companies start practicing different methodology like DSDM, extreme Programming, Crystals or Scrum. But the software industry is facing problem in adopting and implementing agile methodology, because they have the project manager who do not have any clear idea or knowledge of how they can implement it. By considering scrum practice from agile methodology, how can a project manager run a project. In agile Scrum process is implemented by a Scrum Master. This is the responsibility of ScrumMaster to execute the Scrum.

Traditional Project managers are lacking in a lot of area in terms of tools, roles and responsibility to understand the agile methodology. In scrum process the role of ScrumMaster is very critical and it is also difficult to a traditional Project manager in adoption. Since software industries are moving towards Scrum and for running Scrum they need Scrum master who can run this process, unfortunately in our industry the Project manager is everywhere and their employer do not want to lay off them. This research will guides those partitions to run the scrum process by adding some ScrumMaster attribute and by removing some attributes of project manager.

In this research, a project manager lacking to implement scrum, will find out and investigate the lacking area which a project manager can adopt and made a project successful.

II. OVERVIEW

Our research is dividing in certain steps. First of all this research describe the Scrum process, then identification of the attributes of Project Manager, and next identification of attributes of Scrum Master after that this research identify what are the areas which are common in traditional project manager and ScrumMaster then at in last which are the lacking area where project suffer due to management.

As both positions serve different purposes and are typically not inclusive. There are some responsibilities that can be shared. A PM is there to manage the schedule and budget for a project. The Scrum Master is there to facilitate the team and coach them to utilize better practices. It might be that the software industry is starting realize these are two different roles and the SM is a good position to be a direct team member, while the PM is not always the best person to fill that role on a development team.

C. Scrum Process

Scrum is an ideology of collaborative team development. Its cornerstone is increment and iterative way of working. It is very difficult to plan software development completely due its complexity. This is why one has to advance in small steps planning and implementing. This is also why one cannot at the starting-point know what the result exactly looks like, even if a set of more general prerequisites are in place. This is dramatically different approach compared to ideas behind waterfall.

Scrum counts on team's self-organization and self-direction. This way the utilization of full professional skills and creativity of the whole team rather than just relying on one individual, i.e., PM [11].

Scrum is one of the well-known and very popular process in agile software development. Scrum uses statistics to keep in control development process specially software development project. Scrum has the ability to replacing large project in to small chunks of series of small projects.

In Scrum a large project is divided into the pieces of a small project and in this project we list down small piece of complete functionality which is known as "Sprint". This sprint selected from the "backlog".

After completion of a sprint team review what they have done in this sprint what are the missing items and analysing in a meeting. This meeting in scrum is known as Retrospective. In this meeting, team decided the path of new iteration.

The major advantage and significance of scrum is it does emphasize on team work [6].

Following are the key element of scrum process

- Vision
- Product Backlog
- Team
- Sprint Backlog
- Iteration of development
- Inspection
- Increment of functionality

D. Studies on Software project management

Lv Yi discuss in his paper about the agile transformation which is issued on IEEE August 13, 2011. He describes how management adopt to self-management practices. The main focus of Lv Yi in his paper on self-management and sustainability in agile development. He explains a real scenario which he faced in his organization during 2002 to 2010. He has described stability come any project from the mutual understanding of customer and development team [1]. He said confidence come in software development by the trust and mutually understanding of team, stakeholder and customer interest.

Whitty, S.J discuss in his paper project management in 21st century [3]. In this paper he discussed the principal of PM in

PMBOK. He concluded in his paper modern project management can enable an industry to make powerful human workforce and can make the balance environment.

Hu Guang-yong has discussed the practices of Scrum and its importance in agile software development. He forced in his paper implementation of Scrum finally he concluded to make a project successful and made a quality project software industry should adopt Scrum practice [5].

Jiangping Wan and Routing Wang discussed in their paper about factors to make a successful project and factors to improve software process. They analysed different process executing by company and also analysing the Organization behaviour and culture. They conclude that agile a simple process to adopt. They run a survey and found that agile method can be run smoothly if the team and product Owner have trust and understandability [7].

III. RESEARCH METHOD

These researches done by qualitative research method. In this research find out the issues faced by project Mangers in to adopt Scrum process and become a ScrumMaster. We find the solution by comparing two paradigms and diagnose the lacking area of Project Manager and how this can be remove by adopting ScrumMaster practice.

IV. TWO ROLE IN OUR STUDY

In this study we are dealing with two designation Project Manager and ScrumMaster in traditional software development industries were likely to use or keep a Project Manager in their project but time to time they observed this role is not worked as per their need and do not play an important role in software development, from the past six years industry starts moving towards Agile methodology and adopting Scrum. Since our industry has the lot of experiences Project Manager and Industry want to educate them for ScrumMaster for executing Scrum process.

In below a discussion on some vital attributes of Project Manager and ScrumMaster in detail.

E. Project Manager (PM)

Project Manager is the one of key stakeholder in a project. He or she is the person answerable for scoping, managing planning or executing of project. The project managers have full power and authority for controlling and completing a project.

Project Manager Activities

Following are the PM activities, which explain the main benefits of PM which explain how PM manages development process.

Project Planning (PP)

The "Project Planning" is the most initial phase of software development. The main purpose of planning project is to maintain and establish a relation how to execute activities of project [2].

It is the main responsibility of PM to create inappropriate Project and documented each and every thing which client can ask. PM align all the task and list down the whole requirement and schedule it properly. The Planning of Project is key of success of Project Manager spend the time with business analyst find the estimates schedule of the project as per customer requirements.

In PP, Project manager is responsible for making the whole scope of project, managing resources; identify which resource can be used for fulfilment of the list of task. To become a successful PM, he or she should manage the all resources process and align the resources as per their expertise [9].

Scheduling

Scheduling of a project is also a critical for PM, they identify and list down the base requirement and need to develop a schedule. If the team has some non-experience developers they will make the life of PM miserable, following are the some practices which a project manager should follow during scheduling projects [2].

- List down the dependencies of task
- List down the constraint in scheduling
- List down the assumption in scheduling
- List down key & primary milestone

Estimation

The estimation in software development process is done by the past experience and historic result. PM is responsible for estimating and final estimation is based on schedule and budget of project. The PMs are likely to use "Wideband Delphi estimation" process for estimation because it creates different important plan for project

The common problem in estimation is faced by PM is due to their engineers. Most of the time Engineer give estimation greater than the task, and time senior managers estimates the effort ,cost and scheduling estimation his/her self and then update their team and they trying to motivate them. However in both scenarios it will give the Burdon on the shoulder of PM [10].

Monitoring

The purpose of Monitoring define in CMMI 2010

"The purpose of Project Monitoring and Control (PMC) is to provide an understanding of the project's progress so that appropriate corrective actions can be taken when the project's performance deviates significantly from the plan."

Project Monitoring is an important responsibility of PM. The continuous monitoring of project help PM in maintain plan on track budget in control and bring a close relation with team. During Monitoring PM knows the status of project, effort applied by developer in the project. It helps in understanding the cost of project.

There are two specific goal of monitoring

- Do check and balance against every task and activity
- Must be able to take concrete action to ending

Controlling

The aim of controlling project is to keep all activities and development task on the track. PM can control the project very easily with help of historical data and analysis. Controlling is the subordinate of monitoring; in monitoring PM perform different techniques to get team behaviour and their attitude towards work and on the basis of this information OM start controlling the project. It helps PM to make decision on certain steps in calculating the variance between progress of team and the customer requirement.

Risk Management (RM)

The purpose of RM define in CMMI 2010 is to find out the hidden issues before it raised that's why all those activities which can be caused some risk should be handle early or during planning time. Risk should be mitigating to obtain the objectives of project.

In software development to make a project successful PM should consider and maintain four things to make project successful.

i. First of all in first step PM should identify the risk associated with the project or any associated risk which can be raise by some event.

ii. In second step PM should classify the risk and find out the magnitude of risk associated with each task, resources or hardware etc.

iii. In third step PM should have to play his or her role to remove the risk by using some alternative.

iv. In last step PM should manage and monitor all the risk and control the risk raise by some event.

Management

A good PM should be a "Social Architect", he or she must have good interpersonal and leadership skills. PM must have ability to identify the issues and misconceptions associated with team and project and have ability to resolve it very quickly and smartly. The PM maintains the management relevant work by moral ascendancy or power with the help of some strategy policy or approach planning.

The role of PM in gaining benefits from client should be clear, he or she must work closely, and show interest and caring team in project demo, ideas generation, removing issues branding client requirement as per its business solution to received or gain the benefits.

It is important for a PM to search out all the benefits point which is depend on another activity, once PM identified these items then management should take some action in implementing it [8].

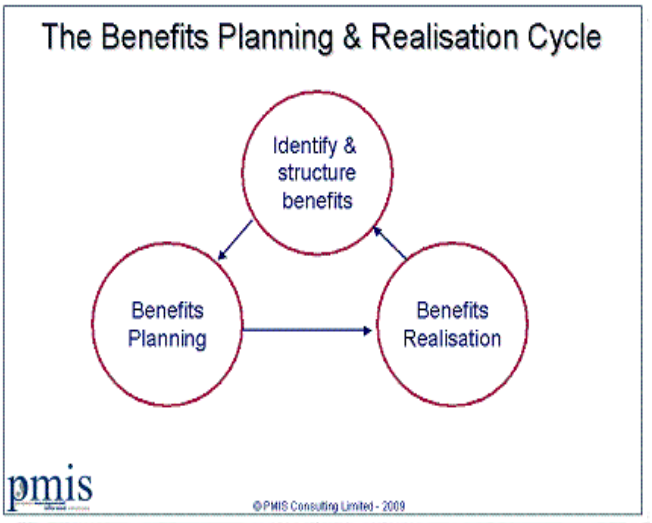

Fig. 1 Taken From Pmis Consulting Limited 2009

Scalability, Interoperability and Portability Analysis (SIPA)

Some organization considering SIPA is an overhead and there is no need to maintain by PM, but it can be work for small project and when project is going to become large then scalability issue come in the project. The PM has to prepare interpretability guideline from the customer and guides their team. Portability is also an important responsibility of project manager they should have to make their project portable if client ask any time then team should be able to provide this solution to their managers.

Project Documentation (PD)

In PD define how PM manages the project and how they can cover its all hidden area. During the development process a PM produces hundreds of different documents, these all documents are used to support and tracking of project. The documents are the series of financial plan, client review, resources' allocation and their management, contract with client or it can contain post and pre implementations detail. This is the duty of every PM to maintain the every communication with customer documented.

Closing

The last item which every PM wants is successful closing of project. On closing there is a closing meeting with team and stakeholder. The agenda of this meeting is to elaborate the issue and revising all the work, finding of issues and defining a schedule for closing the project. This meeting focuses on the following attributes and activities.

i. Project success and failure declaration

ii. Providing Support to client

iii. Review the team performance

Project closure activity should be defined by PM during the scheduling activity because any project cannot be marked complete until the project closure meeting and close of project is also verified by auditor team on the time of auditing.

F. ScrumMaster(SM)

ScrumMaster(SM) is the second role in our study. SM is the person who fills the position normally occupied by traditional PM. The key and major responsibility of SM is to execute and run the Scrum process consequently. Simply can say SM is person who makes the Scrum work. As describe in Section II-A. Scrum process deals with meeting, documentation, terminologies and practices. The SM should know all the sequence of this process and complete knowledge of every practice and they should be able to guide about this whole Scrum process to their subordinates, teams and product owner.

The SM is responsible to make a project successful, he or she guide Product Owner and the teams and help Product Owner in consulting the most important and valuable Product Backlogs which the Product Owner need. SM is the key facilitator in Scrum process.

ScrumMaster Activities

In Sprint pre-planning (SSP) SM and project architect and one or more than one project team member who have experience of the product backlog features they identified and prioritize it for the current Sprint and move some of them in next Sprint. Sometime development team can ask from PO about the features sequencing in the Product backlog. SSP is different for different project.

Sprint planning (SP)

In Scrum each iteration starts with Scrum sprint planning meeting. Normally SP meeting is divided into two phase.

Phase 1

In first phase meeting is done with SM, PO, team and the stakeholders knows as chicken in Scrum process. The purpose of this phase is to identify what features or items can be team commit. The timing of this meeting is approximately 90minutes. In this meeting team set the start and end date of Sprint. They set the schedule for next SP meeting, Sprint Review and Retrospective meeting discussion on whole team availability this Sprint period. The real purpose of this meeting is to give clear picture of each task to every resource.

At the end of this meeting SM, PO, team and stakeholder knows what they will get after some days because all of them finalize the start and end date of Sprint by their mutual understanding. Team knows what they have to do in this Sprint and when will be next Sprint start because they committed a date by mutual understanding. This phase is also known as Sprint pre-planning (SPP).

Phase 2

In Second Phase SM and teams do a meeting the duration of this meeting is 60 minutes. The purpose if this meeting is team makes a specification plan for transformation of selected items. They copy Sprint into a new spreadsheet then they identify and estimate new stories and task associated with it. In this meeting team do a discussion goals if they found any goal or task cannot be done then SM alerted to PO to make the Sprint consistent and ideal.

The goal of this meeting is defining the subtask of every story; document the new story which contains the selects tasks. At the end of meeting team is ready to start development.

Scheduling

In scrum, scheduling is done by mutual understanding of SM, PO team and stakeholders as discuss in SP during the first phase of meeting team decided the start and end date of each Sprint , also they set the next Sprint meeting and Retrospective Meeting dates.

Estimation

The SM provides the Team with the process and tools to enable them to do estimation. He is a facilitator but never a participant. For example: Setting up the Planning meetings (agenda, chairing), Highlighting issues in the Retrospective i.e. estimate v. Actual, and Adding techniques such as Planning Poker.

If SM is doing anything else than facilitating, then they are taking on another role in the Team. There is nothing that says they can't also be the Technical Lead or a very senior programmer contributing code just like anyone else - but then they are in a different role. The SM facilitates the process to make sure that relevant and specific estimation is done.

Monitoring

Burndown - Chart

The SM monitor the project in Scrum with help of Burndown chart, it is a simple way to track remaining effort of the Sprint. Once a task is done it put in to release burn down chart which is used by SM to keep track which task or functionality has been done in application.

Burnup – Chart

To view the work or tasks have been done use Burnup chart which represent the only work which has been done and ready for release.

Controlling

The idea of controlling is to be to get the status of project in which direction it is going. The Controlling technique helps us to in making suitable decision on the project activities [2].

SM controls the project and keeps it on the track by taking daily “Scrum meeting”, “Scrum review meeting”. This daily meeting and review meeting provide ability to SM in taking corrective action on identified issues and give him or her ability to maintain or manage corrective action on closure.

Risk management

In a scrum, team Risk Analysis is done by the team and PO as the product backlog is estimated, prioritized, discussed. Everybody knows as soon as the sprint starts what the 'high risk' user stories are; implicitly it is in the product backlog. Managing Risk and Issues is basically done daily during the standup meeting and impediment mitigation by the SM. If there are more teams in one project you'll see risks in the scrum of scrums and manage it from there.

The large projects, where Risk Analysis was badly misused to cover up (potential) overruns in a contingency budget. This enabled management to not be open and fair about mishaps during project execution. In an organization that embraces scrum and really understand how scrum enables stakeholders to see results (and failure is also a result) the need for in-depth Risk Analysis should diminish overtime.

Scalability, Interoperability and Portability Analysis (SIPA)

Since every sprint (and most release plans) focuses on business value - specifically, functional requirements - the Product Owner will typically prefer to ignore non-functional requirements. This is "not a good thing".

One reason for this is that the product owner may not have solid information about the real-world operational scenarios in which the software will be deployed. This is likely with "green-field" projects that have a go-live date far in the future. Another reason may be that the system is being designed for commercial distribution, where the customer's operating environment is simply unknown and the scalability requirements are just a gleam in the eye of the sponsor.

In any case , if you do have specific non-functional requirements, then these performance or stability criteria must be incorporated into the Planning and Review activities as concrete test cases, in terms of specific measurements that can be agreed to during the story design phase, and taken as measurements during testing at Review time.

The use of Story type called a "performance story" or a "security story" or an "integration story" to elicit the requirements. Get the best information about the highest-priority customer's needs in these areas, and write the story to reflect that customer's most critical concerns. These stories should be in the backlog alongside the functional stories. The Scrum master, as the "unblocker" and "cheerleader", should maintain the perspective on how functional work impacts these well-understood and firmly stated non-functional requirements with each sprint, even if those non-functional stories are not being worked on.

As the solution is realized, if the ratio of functional to non-functional stories stays high, your team runs the risk of delivering a nifty solution that fails to perform or "fit" at acceptance. As Scrum says it is up to the Product Owner to set the priority.

SM should tell the PO that non-functional requirements represent an acceptance risk. If the team fails to address them prior to "go-live", then the customer is likely to see a failed system, and either refuse it, or accept it unhappily and demand follow-on work to close the non-functional gaps that the team "should have known about".

Management

SM is a good facilitator and manager. He or She is the mirror of team; they guide team in decision making on certain points. The most important responsibility of ScrumMaster is to remove Impediments because it is the only power which gives ability to SM to do anything in resolving the issues which occur in development process.

The SM is responsible for radiating information to stakeholder to make the project progress up to date and align. Highlighting information and making project visible in front of team and stakeholders. SM uses Burndown chart, product backlog or Scrum artifices for radiating information purpose. SM also supports the PO against every activity and about the obstacles faced by the team from initial stage to last stage. To keep team organize SM have to do communication a lot with team, PO and stakeholder, SM is the person who is acting as hub in development process.

Closing

This is the phase when development is done and Sprint is ready to move in Burnup chart and ready for release. SM arranges a Sprint retrospective meeting. In this meeting PO, team and SM during this meeting team try to find the answer of three questions i.e. "What went well, what did not go well and what improvement can be done in the next Sprint"

Since in this meeting PO sits with the development team, they get the chance to discuss their issue very easily to improve the performance of team, and they find the solution for resolving any issue faced by team, SM or PO.

V. Comparison between PM and SM

From the above discussion a conclusion can be drawn on the some compassion between tradition PM and SM.

TABLE III
PROJECT MANAGER VS. SCRUM MASTER

Project Manager	Scrum Master
Facilitate Project Activities: • Project Planning Meetings • Execution of Project Tasks • Project Status Reporting	Facilitate Rituals: • Daily Scrum Meeting • Stand-ups / Scrums • Demos • Retrospectives
• Develop Team Members • Work collaboratively to resolve project issues • Work with Stakeholders to set and manage their expectations	Provide Training to Agile team
For estimation of project they are establishing a WBS.	Create project task list of standard task the name of task list is Scrum Backlog.
Develop and manage the project timeline and expense.	• In Ideal Time Scrum estimates. • Estimates and planned the feature to be shipped n in release. • Creation of Sprint Backlog. • Task board of project.
Setup the resources for developing project.	• Release Plan • Assignments • Sprint Backlog • Estimating Scrum in an ideal time
Maintaining issues list and for resolving project relevant issues	Play great role in removing Impediments
• Responsible for managing changes tracking project status • Earned Value Effort and Schedule Charts • Time, Schedule, Cost and Scope through Project Change Control • GANTT Charts	• Track the project progress and suggesting corrections • Burn-Down Chart for Sprint • Burn-Up Chart for tracking multiple Sprints that were needed for a Production Release
Estimate project using Delphi and modified Delphi method	Develop estimates using Planning Poker
Develop and manage Project Communications Plan for all key stakeholders	• Communicate with Stakeholders • Product Owner • Team • Sr. Management
Work with Stakeholders to develop: • Project Charter • Project Management Plan • Prioritize and balance project constraints of: • Scope • Time & Schedule • Cost & Budget • Resources • Risk • Quality	Work with Product Owner to: • Help prioritize • Manage Scope • Coach
• Reconcile the project plan to reflect available and estimated resources.	• Sprint planning meeting. • Daily Scrum meeting.
• Develops Human Resource Plan • Identify key Stakeholders	• Helps form Teams • Works with Customers and Management

• Identify and document project roles, responsibilities, skills, reporting relationships • Acquire, Develop and Manage Project Team to fill Project Roles	to identify and institute a Product Owner • Works with Management to form Scrum Teams
Responsible to organization to achieve Project Objectives and Success	Responsible for the success of Scrum
• Review the project time to time • Monitoring Project Progress • Monitoring Project performance • Monitoring Project Issues	• Meeting for sprint review • Daily stands up meeting • Retrospectives Meeting to analyze the gain , lose and its remedies
• Manage helpful and sensible actions to closure.	They are taking action from • Daily Scrum meeting. • Sprint review meeting.

Table I shows that SM done most of the task by daily scrum meeting on the other hand PM has different flavour for doing this activity which will be time consuming and complex sometime. So, SMs takes their team to words self-management.

VI. RESULTS

After analysing the above mentioned activities, it is easy to conclude how these two roles can be migrated or transformed. We can draw our result into following four stages as shown in Table II. In this table, Stage 1 represents that previous management role, previously for project management activities was run by the only PM. In Stage 2 that is today's scenario industry have no proper management role some time a PM do development activity and sometime they managing his or her team. In stage 3, result describes how traditional PM can be transformed and shared SM
Responsibility. In stage 4 the result explains all the PM activity is delegated to words team and SM.

TABLE II

COMMON PRACTICES ADOPTED BY PM

Stage	ScrumMaster	Project Manager	Result
1	0	1	Only PM
2	0	0	Today's Scenario
3	1	1	Transformation
4	1	0	Need Today's Strategy

How Project Manager not become ScrumMaster – Only PM

From our research the role of the PM and the SM are vastly different and they do not exclude each other. A PM is there to manage the schedule and budget for a project. The Scrum Master is there to facilitate the team and coach them to utilize better practices. So this shows that PM has a great responsibility of scheduling and budgeting which SM doesn't have. One more reason due to this a PM cannot become a SM is the decision making power of PM. A SM cannot take the decision like PM on any stage SM should have to listen to PO and team voice before making decision.

Today's Scenario

Today's scenario software industries are trying to move towards Agile methodology but due to bureaucratic knowledge they are not able to do this properly and sometime trying to act as PM and sometime act as a team leader and sometime as a SM.

How a Project Manager can transform to ScrumMaster– Transformation

It is a difficult phase for a PM to transform from tradition PM to SM. A PM wants to transfer into SM role he or she must follow the Scrum practices. He or She should have to start organizing team by meeting. PM have to give the training to their team of self-organization and self-direction. This way PMs can fully utilize the full professional skills and creativity of the whole team rather than relying on an individual person. PMs have to do daily stands-op meeting with team and play a vital role in any impediments and obstacle.

ScrumMaster can't be a Project manager– Need Today's Strategy

Finally it will be happened when a PM fully transforms his or activities as per the Scrum process requirement and shared his responsibility with PO, team and stakeholders. To switch completely on SM role, PMs will delegate his/her power to team members and act as a coach.

VII. CONCLUSION

Industries are moving towards shippable and incremental development. The traditional Project Manager and ScrumMaster responsibility and identify the how industry can adopt the new management responsibility. Successfully transformation from a management responsibility to other needs a clear vision and willingness. However the ultimate solution is distributing the responsibility towards self-management team.

Development is not changed but its handling techniques are changed. Previously it was handled by PMs. Today it is handled by complete team with coaching guidelines of SM.

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