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Applying Effective Risk Management Process in Agile Scrum Methodology

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ABSTRACT

Risk management plays important role in traditional development methodology. With the recent advancement in software development methodologies, Agile-Scrum model becomes very prominent and widely used across software industries today. Most agile project ignores the explicit way of handling risk management process because of it's inherit nature of managing risk during development process. Adding simple, comprehensive and agile friendly explicit risk management techniques improves high success rate. This research article illustrates how to integrate standard risk management process in agile scrum model.

INTRODUCTION

A risk is an uncertain event that could impact your chosen path when it occurs. Risks are events that are not currently affecting the project or they haven't happened yet. Once a risk is realized, it has the potential to become an issue. The primary objective of the risk management techniques is to prevent the realization of a risk, or minimize or manage or neutralize the impact of this risk once it has been realized. The traditional risk management techniques are broadly categorized as risk identification, risk assessment, risk response & finally risk review. Agile development methodology needs a modified approach of managing risks explicitly. Integrating risk management process as part of Agile Scrum should give better success for the project.

II. Software Risk:

The main risk areas in software projects are

- Productivity variation (difference between planned and actual performance)
- Scope creep (considerable additional requirements beyond initial agreement)
- Specification breakdown (lack of stakeholder consensus on requirements)
- Intrinsic schedule flaw (poor estimates of task durations)
- Personnel loss (the loss of human resources)

III. Risk Management steps:

- The traditional risk management steps are as follows
- Risk identification - This step identifies the list of risk that can potential threaten the project deliverables.
- Risk analysis - This step involves analysis of risk to assess the likelihood and impact of each risk.

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- Risk prioritization - This step involves prioritization of risk based on its significance such as likelihood and impact.
- Risk-management planning - This step involves planning to manage significant risk.
- Risk resolution - This step involves execution of the plan to deal with the significant risk.
- Risk monitoring - This step involves monitoring the execution of the plans to deal with each significant risk and continue with risk identification

IV. Risk Categorization:

Risk can be categorized into the following:

Business - Any risk that affect the business value which is the core of all project development.

Technical -Technical challenges and lack of skill sets that affects project deliverables.

Logistic - Lack of budget, infrastructure or equipments or software's, staffing etc that affects the project.

Others - Political, Environmental, Societal, Technological, Legal or Economic (PESTLE) related issues that affect projects

V. Agile Scrum:

Scrum is an agile process that allows us to focus on delivering customer request in the shortest time. The Agile Scrum is one of the processes widely followed across companies. In Agile Scrum, the business team prioritizes the requirement needed in an Iterative model. Product progresses in a series of month-long "sprints" Requirements are captured as items in a list of "product backlog"

Scrum development methodology has the following three phase

5.1. Planning phase:

Planning is the first phase in agile process. This phase involves activities related to Requirement analysis & elicitation, preparation of stories for Product Backlog. Product Backlog will always evolve during enhancement or change of requirement.

Steps involved in Planning Phase

- Contract between the customer and vendor (if required)
- Stakeholder identification
- Kick off meeting with all stakeholders
- Story preparation for product backlog
- Each Story will be planned to deliver individual functionality that can be tested and delivered independently.
- Appropriate tools identification for development and process, hardware and software identification, technical feasibility, infrastructure, communication plan preparation, Resource identification, training plan preparation.
- Plan for each Iteration and Release
- Risk Analysis & Identification
- Appropriate metrics identification

5.2. Development phase:

The key phase is the Development phase, also known as the Sprint. Sprint is an iterative cycle – that stops when requirements are completed. The scrum is Iterative and Incremental software development methodology. The Scrum will range from 1 to 6 weeks in duration. In each sprint, the product owner prioritizes the stories which are in backlog and bring them into Iteration.

Steps involved in Development Phase

- Daily Stand-up meeting
- Planning Prioritized Stories for an Iteration and setting up acceptance criteria
- Coding and Unit Testing
- Reviews
- Implementation in appropriate environment
- System Testing and User Acceptance Testing
- Demonstration of Software developed
- Retrospective meeting

5.3. Closure phase:

Last phase of this process is called Closure. Closure occurs when all requirements are met. This is the last phase before releasing the product with all documentation. Final tests are done at this point and at the end - the release itself is final

- Integration/ Release Testing

- Defect Fixes if any
- User Acceptance Testing
- Implementation Plan Preparation
- Implementation
- Post implementation support

VI. Agile risk management:

Agile risk management is about integrating traditional risk management process such as risk identification, analysis, prioritization, planning, resolution and monitoring in agile phases of software development.

6.1. Risk identification:

The Risk identification is the foundation of whole risk management process. Risks identification should involve the customer, project team and all relevant stakeholders. The identification of a risk can happen during Project Kick off meeting & Daily Stand up Meeting. High collaboration and brainstorming is needed to identify hidden risk in the project. A checklist can be prepared to ensure that the team has discussed about the probable risk and verified. The input from retrospective meeting will also play major role in identifying risk from past experience in scrum.

6.2. Risk analysis:

The scrum master in the team will be responsible for analyzing the risk. The risk impact and probability of occurrence can be brainstormed within the team. All stakeholders should also be involved if required.

6.3. Risk impact:

The Impact of a Risk can be measured ranges from Minimal (1) at the low end where the consequences would be very small up to Extreme (5) at the high end. The basic guideline to determine risk impact in given table – 1.

6.4. Risk probability:

The chart that provides a suggested scale for assessing the probability of Risk manifestation is given in table – 2.

6.5. Risk exposure matrix:

The Risk exposure is derived by multiplying the risk impact with the risk probability of occurrence. The impact and probability matrix is shown in Fig - 1

6.6. Risk register:

The risk register should have the following key columns.

- Rank
- Risk Description
- Risk Probability
- Risk Impact
- Risk Exposure (Risk Impact X Risk Probability
- Mitigation Plan
- Contingency Plan
- Lesson Learned (for improving effective risk mitigation strategy)
- Add to checklist (for future identification)

6.7. Risk prioritization:

Any risk that is identified should be immediately analyzed and entered in risk register. The Risk exposure helps to prioritizing the risk. The scrum master has to prioritize the risk for executing either the mitigation plan or contingency plan.

6.8. Risk planning:

Risk management plans helps to manage risk pro-actively. These actions are documented in the mitigation plan and contingency plan in Risk Register. This should happen during the planning phase of Agile Project during the sprint planning.

6.9. Risk resolution:

The team develops strategies to reduce the possibility or the loss impact of a risk. Risk mitigation produces a situation in which the risk items are eliminated or otherwise resolved.

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6.10. Risk avoidance:

The team can opt to eliminate the risk.

6.11. Risk protection:

The team executes steps to protect the risk could happen or to minimize its impact.

6.12. Risk monitoring:

After risks are identified, analyzed, and prioritized, and actions are established, it is essential that the team regularly monitor the progress of the product and the resolution of the risk items, taking corrective action when necessary. Risk review and monitoring is an importance process and in agile project this should happen during the retrospective meeting.

VII. Agile risk management matrix:

The risk management process in each phase of agile scrum methodology is best explained in Table – 3. The owner column indicates the agile role who is responsible for risk management process.

VIII. Figures and tables:

Table 1: Impact

Impact	Impact Type	Description
5	Extreme	This could impact the final delivery of whole project itself. More than 50% of re-work effort may require resolving the risk in the project.
4	High	This could impact certain features or functionality or module of a project. However it may not affect the final product. 25% to 50% of rework may require resolving the risk in the project.
3	Moderate	Significant effects on the project are unlikely. Rework effort required is between 10% and 25%
2	Nominal	Does not require monitoring or review. Rework effort required is between 5% and 10%
1	Minimal	Little or no impact on any aspect of the project

Table 2: Probability description

Probability	Probability Description
5	91 – 100% or Very likely to occur
4	61 – 90% or Likely to occur
3	41 – 60% or May occur about half of the time
2	11 – 40% or Unlikely to occur
1	0 – 10% or Very unlikely to occur

Table 3: Risk management process

Agile Phase	Agile Process	Owner	Risk Management Process
Planning Phase	Establishing Contract (if required)	Scrum Master and Stake holders	Risk identification – To evaluate risk in contract with the vendor (Vendor Risk Identification)
Planning Phase	Kick off meeting	All Stake holders	Risk identification – To evaluate high level risk before starting the Project.
Planning Phase	Story Preparation	Product Owner	Risk identification – To find risk related to each story when the requirement is not clear or not achievable.
Planning Phase	Tool Identification	Scrum Master	Risk identification – To identify the risk in usage of tool and its familiarity among the team members
Planning Phase	Iteration and Release Plan	Scrum Master	Risk identification – To find the risk in each iterations and releases.
Planning Phase	Metrics identification	Scrum Master	Risk identification – To find the appropriate risk in usage of metrics that waste time in the project.
Development Phase	Daily Stand up Meeting	All stake holders	Risk identification – During each daily scrum, scrum team members identifies the risk due to issues, roadblocks or impediments in the project. Risk Planning - Appropriate mitigation plan is also developed during this process.
Development Phase	Story Prioritization	Product Owner	Risk Planning – The stories are prioritized such a way that identified risks are properly mitigated or avoided

Development Phase	Coding and Testing	Development Team	Risk Identification – The development risks are identified in this process. Risk planning – Appropriate mitigation plan is prepared in conjunction with the scrum master and product owner. Risk response – When the risk is about to happen, mitigation plan is executed.
Development Phase	Review	All stake holders	Risk Monitoring - The scrum team regularly ensures that the product meets stakeholders' expectations. The sprint review also provides opportunities for stakeholders to discuss changes to the product to accommodate changing business needs.
Development Phase	Sprint Retrospective	All stake holders	Risk Monitoring - The scrum team discusses issues encountered in the current sprint by elaborating what happened well, what went wrong and what could be done better. The issues identified will be as good input to avoid in future sprints.

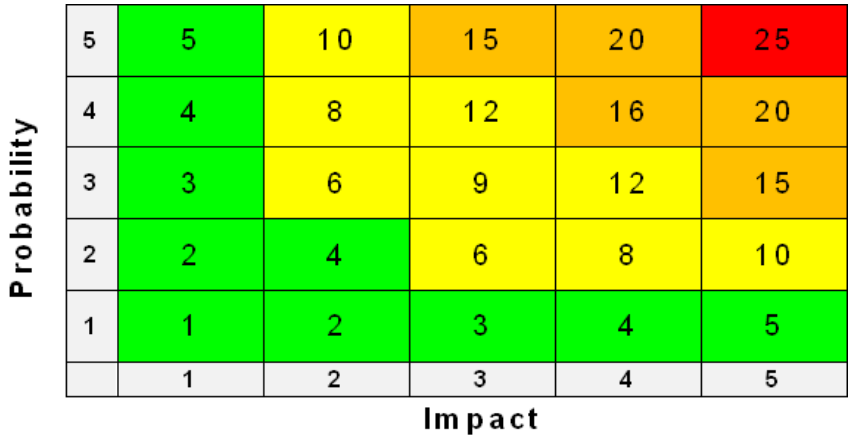

Fig. 1: Probability

Conclusion:

Risk management process is not usually followed explicitly in agile methodology. By implementing appropriate risk management process in each phase of agile methodology handles risk effectively and improves the quality and timely delivery of product. The risk management matrix provides a guideline of applying risk management process in agile scrum methodology for the scrum master. Risk management checklist and tools are to be developed as future scope.

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