

Evaluating Strengths and Weaknesses of Agile Scrum Framework using Knowledge Management

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ABSTRACT

This paper exploits strengths and weaknesses of agile Scrum framework using knowledge management. An agile framework Scrum widely used as agile manufacturing process. Many organizations prefer Scrum to complete their work in time. It is hugely beneficial if Scrum get improvised or enhanced with new features so that projects get better results, the frequency of the failed projects in an organization will become less. To carry this research, here Knowledge Management (KM) framework phases used to analyse, identify the absent phases in Scrum framework. In order to introduce the absent phases, strengthen the Scrum framework KM transferring has considered. Knowledge transferring gives attention of the best practices suitable to the current Scrum framework such as RUP, SSM. These practices elected as the best methods for Scrum and again analysed the influence of the KM transferring. To improve the Scrum framework in the perspective of the building new knowledge, it considered the core capabilities of the KM building, checked the activities of Scrum framework as result identified the existed and absent activities in the Scrum. This paper also proves that knowledge management quiet useful to evaluate the strengths and weaknesses of any development methodology.

General Terms

Agile methodologies, Knowledge Management, Software Development Methodologies

Keywords

Agile Scrum framework, Knowledge Management framework, Rational Unified Process, Soft System Methodology, Evaluation Matrix

1. INTRODUCTION

Scrum is a project management process, widely used to achieve the agility and iterative development in software field. This framework mostly preferred by the organizations which follow time bounded, iterations and specific target for defined product in their projects. Collaboration and the visible working piece of software instead of the manual documentation have higher priority. As so many organizations are using Scrum as the project management process, it is quiet beneficial to find out the weaknesses of the framework and suggesting the guidelines to overcome those problems. This section explains an agile Scrum framework and evaluation matrix, knowledge management framework respectively as following.

1.1.Scrum Framework

Scrum is an iterative and incremental agile framework for agile product or application development designed by Dr. Jeff Sutherland and Ken Schwaber in the year 1992, for working

on complex projects. Scrum follows a planned strategy as rugby players moves with a good plan. The process of beginning Scrum involves Scrum master and Product owner and core team. First Scrum starts with the preparing of product backlog, by prioritizing the features the release backlog can prepare, it is subset of product backlog. Scrum has the phases of sprint planning meeting, daily Scrums, sprint review and shipping product and finally sprint retrospective and follows the same process for the next sprint [1][5]. Today Scrum has become the leading agile methodology used by the companies globally. The process of agile scrum is shown in below figure 1. In the figure the working process and the roles were clearly explained.

1.2.Evaluation Matrix

An Evaluation Matrix can be defined as a simple way of conducting an evaluation for a set of options or choices against a list of criteria. An Evaluation Matrix has drawn to conduct an evaluation for a group of the phases or stages of methodologies against the phases of Knowledge Management frameworks. It is a decision making and a creative problem solving approach. This Evaluation Matrix helps in identifying the strengths and weaknesses of the present framework for Scrum.

1.3.Knowledge Management Frameworks

This section describes three types of KM frameworks; these frameworks had different phases with appropriate activities.

1.3.1. KM Framework Stages

This framework developed by Van Der Spek and Spijkervet in 1997, recognizes a cycle of four KM stages or phases which are as following.

- **Conceptualise:** This phase concentrates on attaining an understanding of knowledge resources. This can be done by researching, classifying and modelling the present knowledge [8].
- **Reflect:** This phase of Reflection carries out an evaluation on the conceptualised knowledge with the help of different types of criteria. Required improvements recognized and a plan for an improvement process made [8].
- **Act:** This stage involves taking actions to improve the knowledge. This contains activities such as developing new knowledge, distributing knowledge, combining new knowledge, holding new knowledge
- **Retrospect:** This is the last phase of the framework. It associated with recognising the effects of its previous stage, evaluating the results achieved and comparison between the old and new situation [8].

These four phases govern the basic actions taking place on knowledge. These KM stages focus towards a problem-solving cycle.

1.3.2. Model of Knowledge Transfer Framework

This framework designed by Szulanski in 1996 is a model for studying internal stickiness of knowledge transfer giving

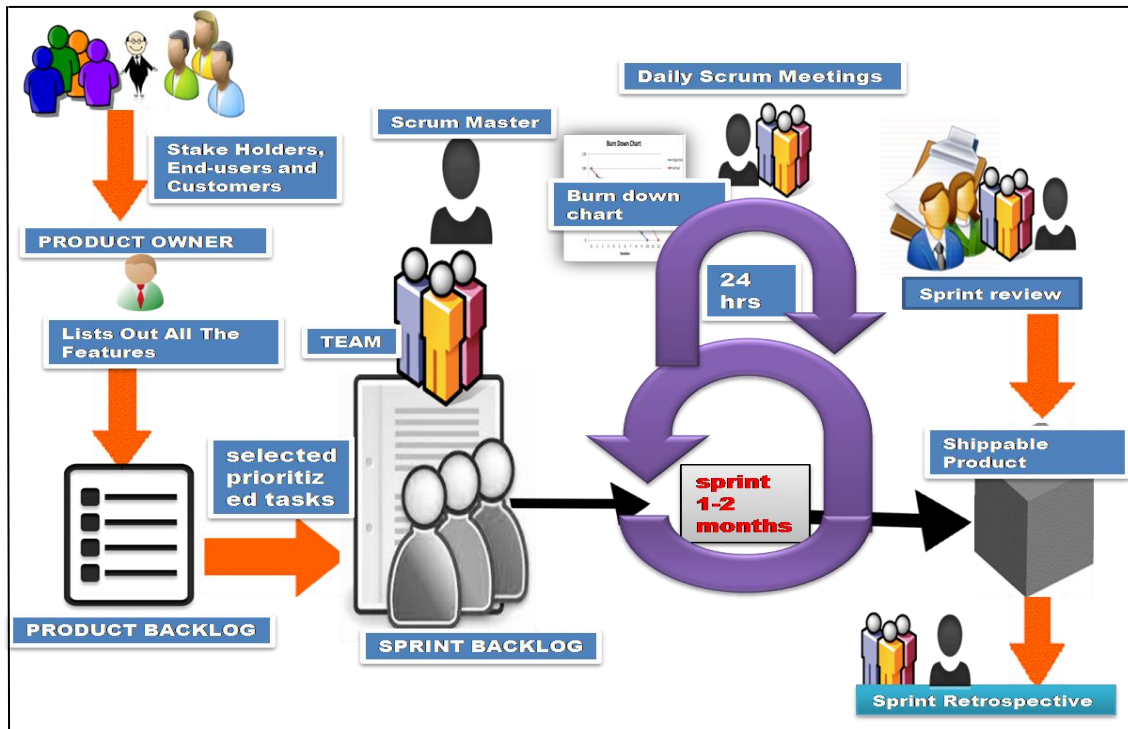


Fig 1: The process of agile Scrum [5]

attention to transfer of best practices. Here, internal stickiness denotes the effort of transmitting knowledge in an organisation [6] [7] [8]. This framework recognizes four stages. These stages associate with knowledge transfer.

- Initiation
- Implementation
- Ramp-up
- Integration

2. RESEARCH METHODOLOGY

Evaluation matrix evaluates Strengths and weaknesses of Scrum using KM. Here, Evaluation matrix considered RUP, SSM methods.

2.1. Reasons Behind Choosing Soft Systems Methodology (SSM) For Drawing An Evaluation Matrix With Scrum

- SSM is a creative complex problem solving process done with the help of rich pictures.
- It is a good learning and meaning development tool [16].

2.2. Reasons Behind Choosing RUP For Drawing An Evaluation Matrix With Scrum

- RUP is an exceptionally prescriptive development methodology i.e. it has a set of rules for every phase in it.
- It is easy to streamline.
- It is highly suitable for large-scale complex projects [12].

2.3. Evaluation Matrix Between Three Chosen Methodologies And Three Knowledge Management Frameworks

This evaluation matrix clearly exploits Scrum strengths and weaknesses, at the same time it shows RUP, SSM have the ability to improve the existed Scrum in the name of Knowledge transferring. This evaluation matrix shows that Scrum does not has the ability to analyse the strong and weak points in the manufacturing phases, improvement planning process of current methodology is absent. Scrum cannot handle Shared and creative problem solving but it can cover by incorporating the SSM. Importing and absorbing knowledge from outside of firm and Experimenting and prototyping are some more weaknesses of the agile Scrum. By incorporating the RUP the agile Scrum can do experimenting and prototyping.

2.3.1. Weak points or limitations present in the Agile Scrum

- Unstructured process of working
- Unsuitability for large-scale organisations
- Lack of accurate documentation and artefacts
- Absence of problem solving phase
- Not architecture-based
- No activity of building prototypes or conceptual model of the product.

Table 1: Evaluation matrix for Scrum, SSM and RUP with KM Frameworks

DEVELOPMENT METHODOLOGIES→		SCRUM	RUP	SSM
KM FRAMEWORKS↓	PHASES AND SUB-PHASES IN KM FRAMEWORK ↓	PHASES IN THE METHODOLOGY IN WHICH PHASES OF KM TAKE PLACE ↓		
Framework of KM (Van Der Spek and Spijkervet, 1997)	Conceptualise phase: 1.Draw up inventory (i.e. to prepare a list)	Sprint Planning Meeting	Elaboration (list of requirements is made)	Expressing the problem situation. (Phase 2 in SSM)
	2. Analyse strong and weak points	NO	NO	NO
	Reflect phase : 1. Establish required improvement	Sprint Retrospective (mostly neglected)	NO	Take action to improve real world systems (Phase 7)
	2. Plan the improvement process	NO	NO	Take action to improve real world systems (Phase 7)
	Act phase: 1.Developing new knowledge	Sprint Planning Meeting, Sprint, Daily Scrum	Inception, Elaboration, Construction, Transition	Phase 1. Entering the problem situation. Phase 2. Expressing the problem situation. Phase 3. Formulating root definitions of relevant systems.
	2.Distributing knowledge	Sprint Planning Meeting, Sprint, Daily Scrum	About 70 artefacts developed during Inception, Elaboration, Construction and Transition phases	NO
	3. Combining new knowledge	Sprint, Sprint Planning Meeting	NO	MAY BE
	4. Holding new knowledge	Sprint Retrospective, Sprint Review	NO	MAY BE
	Retrospect phase: 1.Evaluate results achieved	Sprint Retrospective (BUT NEGLECTED PHASE)	NO	Phase 7:Take action to improve real world systems
	2. Compare old and new situation	NO	NO	NO

Influences on the Conduct of KM (Szulanski, 1996)	Initiation (recognize knowledge need and satisfy that need)	Sprint Planning Meeting, Sprint, Daily Scrum	Inception phase Elaboration phase	Phase 1: Entering the problem situation. Phase 2: Expressing the problem situation. Phase 3: Formulating root definitions of relevant systems.
	Implementation (knowledge transfer takes place)	Sprint, Daily Scrum, Sprint Retrospective, Sprint Review	Construction phase	Phase 6: Define changes i.e. develop solutions
	Ramp-up (use the transferred knowledge)	Sprint	Inception, Elaboration, Construction, Transition	MAY BE
	Integration (internalize the knowledge i.e. To incorporate within oneself (values, attitudes, etc.) through learning or socialization)	Sprint Planning Meeting, Sprint, Daily Scrum, Sprint Review, Sprint Retrospective	Inception, Elaboration, Construction, Transition	Phase 1: Entering the problem situation. Phase 2: Expressing the problem situation. Phase 3: Formulating root definitions of relevant systems. Phase 6: Define Changes Phase 7: Take action to improve real world systems
Core Capabilities and Knowledge Building Activities	shared and creative problem solving	NO	NO	All 7 Phases are about problem solving
	Implementing and integrating new methodologies and tools	Sprint	Construction	NO
	Experimenting and prototyping	NO	YES	Phase 4: Build conceptual model of human activity system. Phase 5: Compare models with real world.
	Importing and absorbing knowledge from outside of firm	NO	NO	MAY BE

2.3.2. Strengths or merits of the Agile Scrum

- Adaptive nature, Scrum is very flexible to adapt or combine the new knowledge and can give better performance.
- Scrum can evaluate the all iterative deliverables by using the sprint retrospective phase.
- Scrum is simple framework and follows the required agile principles and became a famous methodology.

3. SCOPE OF EVALUATION WITH DIFFERENT AREAS

This section discussed the scope of the evaluating the Scrum strengths and weakness and how it strengthened by incorporating the RUP and SSM.

3.1. Advantages Of Embedding RUP Phases Into Scrum

- Conducting the Sprints (each lasting for 1- 4 weeks) by incorporating the activities or main tasks of the four cycles in RUP makes Scrum a structured process.
- RUP to follow the practise of developing accurate documentation and artefacts associated with the four phases in RUP enables the new team members or less experienced ones in the Scrum team to gain knowledge about the working of the project.
- It will enable the release of the product to the client on time as RUP has definite project milestones and interim deliverables.
- This will make Scrum well architecture-centric like RUP. It makes Scrum suitable for large-scale projects.

3.2. Advantages Of Incorporating SSM Process Into Above Modified Framework Of Scrum

- This approach is helpful to improve or solve the messy problems occurring in the Scrum process, higher human involvement is the major cause to this problem.
- This approach can help to capture potential opportunities in the organisations.
- It will reduce the problems arising due to the organisation structure and process.
- The practice of building a conceptual model of the relevant system and comparing that conceptual model to the real world (which is step number 4 and 5 of the 7 step process of SSM) can enhance the working of Scrum as it helps to gain a lot of practical knowledge. It helps in learning a lot more about the system and its associated actors.

4. CONCLUSION AND FUTURE WORK

This paper explained how to evaluate the agile software development methodology (methods like agile Scrum and Extreme Programming (XP)), creating evaluation matrix, evaluating the strengths and weaknesses. Here, this paper considered the Scrum and evaluated strengths and weaknesses. It clearly suggested the way of identifying the weaknesses; choose the best practices (RUP, SSM) which can overcome and suits to the current methodology. Finally, it discussed incorporating the best practices to strengthen the existed methodology in proper phases by overcoming its limitations.

As future work, the framework can be designed by analysing the core capabilities of the KM and can introduce these phases in the agile Scrum framework. Scrum framework can be designed by incorporating the RUP, SSM and KM phases in appropriate phases without disturbing the functionalities and able to maintain its simplicity is challenging one. The improvising design should overcome existed Scrum limitations and should satisfy all the phases of KM frameworks.

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