

Student's Performance Analysis Using Scrum Practices

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Abstract— There is growing interest in applying agile practices in every aspect of technology and software development processes for better results and faster outcome. The widespread use of agile practices in professional context has encouraged their integration in education system also. Scrum is the framework used for introducing advanced technologies in traditional education system as education fields requires innovation, new ideas, new subjects to improve student's knowledge, along with that it analyzes the capacity of each student, as it is an innovative and iterative approach for getting work done and works on principle of continuous improvement, teamwork and focuses on quick and frequent deliveries provides higher productivity, adaptability, communication, high quality results, team cooperation and greater responsibility of each member participating in the process. This study includes adapting scrum for improving university placement process and proposing a method that will ease student selection process for placement and also to improve the effectiveness of student's learning that will improve their performance in placement process and other education fields.

Keywords—Agile practices, Scrum framework, Student performance.

I. INTRODUCTION

Scrum is one of the best frameworks for implementing agile. Agile is an iterative approach for software delivery that builds software incrementally from the starting of the project, instead of delivering it all at once, near the end. Scrum works on the principles of continuous improvement, teamwork and empiricism. In scrum methodology, the project is built in a series of fixed length iterations called sprints that gives team a framework for shipping software on a daily basis. The end of sprints comes frequently and it is a tangible progress, in which each cycle focuses and energizes everyone. Short iterations strengthen the importance of good estimation along with fast feedback from good estimation and fast feedback from test. Almost all the software companies are using scrum for improving their projects and quick results. Each project is different and the requirement varies continuously, the same way education field also requires innovations, new ideas and new subjects to improve student's knowledge, performance and to analyze capacity of each student. From education perspective, scrum can be useful for innovative scope of education

II. SCRUM FRAMEWORK

A. Scrum Roles

Product Owner: Product owner is the person with vision, availability and authority who is responsible for continuously communicating the vision and priorities to the development team and he must be available to answer

questions from the team, also Product backlog is maintained by product owner where Product backlog is list of things need to be done within the project. Product owner is partner with the business and he is responsible for making everyone to understand the work items in the product backlog. Product owner gives team a transparent guidance on which features to deliver next sprint and he is the one to decide when to ship the product towards more frequent delivery.

Scrum Master: Scrum master act as facilitator for team and Product owner and helps the team to understand their common objectives, also assist them to plan to achieve goal. With the help of scrum master, team remains creative and productive while making sure its successes are visible to the product owner. Scrum master advice the product owner how to maximize the investment for team, schedule the needed resources both for sprint planning, review and retrospective.

Team: Team is self-managing, self organizing to complete work. Team generally consists of seven dedicated roles that are self-governed and are responsible to meet the goals of sprint. These team members attempt to build a potentially shippable product. The team is responsible for determining that how it will accomplish the work to be completed, in each sprint. A team consists of members: Software engineers, Architects, Programmers, Analyst, QA experts, Tester, UI designers

B. Scrum Activities

- **Sprint planning meeting:** It takes place at the beginning of each sprint and focuses on what to do? And how to do?
- **Sprint:** It is a release cycle of 2-4 weeks and changes are not accepted during sprint.
- **Daily Scrum:** It is a short period of meeting of about 15 minutes in which scrum roles discuss about what they did since last meeting and what to do next. Also in daily meeting problems faced during project are discussed.
- **Sprint Review:** In the end each sprint, a sprint review is conducted in which team demos what they've built during the sprint.
- **Sprint Retrospective:** This meeting takes place after Review meeting in which development team participate to discuss about obstacles and experiences faced to improve the project further.

III. LITERATURE SURVEY

There is work done in education system using scrum. There are following some observations made and studied by researchers.

Milena Janakova(2014)*et,al* .assimilated knowledge about agile technology , scrum and e-learning that, as with increasing trend of information technology, education is also offering modern methods for learning with relation to information technology that is called e-learning which deals with providing effective and interesting education methods for students using computer technology that includes audio lectures, video lectures, online and virtual courses and many other creative methods for making students to learn easily and quickly. Scrum is merged with e-learning to reduce the errors in e-learning and information technology. It focuses on teaching the students knowledge and skills needed and reduces the errors using Scrum. Scrum method is used to improve this process of e-learning. This paper presents a combination of project education method with scrum agile method for implementation of IT that focuses on error elimination in education for better knowledge and skills in information technology. Every subtopic concludes with example from practice and exercises for individual or student work group. In this paper the proposed model defines these activities in the form of processes and transitions and provides a approach part brings a transparent method of resolving the tasks assigned to them and for attaining required knowledge and skills. The focus is on organizational work, communication with students, challenges for students and teachers, and practical use of information technology with adaptation of dynamic changes in information technology and e-learning.[1]

Eduardo Valentin, Jos'e Reginaldo Hughes Carvalho, Raimundo Barreto(2015) *et,al* .discussed in this paper, case study with students as participants of four research groups and 23 SCRUM teams of capital of the state of Amazonas in Brazil. Students and alumni for their recruitment in any company needs hard and soft skills but issues relies more on soft skills than hard skills. Soft skills is the enter barrier to job market. The objective of this research paper is to analyze the impact after introducing agile coaching to the alumni and students in higher education. It involves activity aiming to address soft skills in the academic course of students and then analyze the result of introducing scrum as academic task. In this paper for improving the soft skills of students using scrum, the students have given clear communicated project goals, where students have specific roles, with assigned accountable peers. This activity is in context of PROMOBILE. This result in increase of progress visibility by advisors, the improvement of student's communication and writing skills and qualification on SCRUM software development process tools and documentation. This process of using scrum in improving students soft skills also results in relevant improvement of student's profile. This paper concludes with implementation of SCRUM in students academic course increases their soft skills. The presented work uses SCRUM as the framework to conduct research projects within academic context that describes its applicability to any institution of higher education. [2]

Guillermo Rodríguez, Álvaro Soria, and Marcelo Campo (2016) *et,al* . in this paper present work that introduces agile coaching in the student's software engineering course. Integration of scrum in training and undergraduate courses results in increasing student's technical and non-technical skills. The work introduced in this paper is original Scrum-based training model that is enhanced with agile coaching and validated by a case study on a capstone project in scrum course which results in maximum coverage of software engineering practices. Also a survey data shows student under training gained more valuable insight into the internalization of Scrum. The model based on Scrum in this paper explains mapping of the software engineering practices by Capability Maturity Model Integration Framework and explains how to support these practices by Scrum. Students understands visual management strategies to support Scrum that includes planning cards for user estimation stories, burn-down charts for assessing team performance, a chat room for holding Daily meetings of sprint and white boards for organizing user stories in Product backlog and also Sprint Backlog. The result of the proposed work is shown in the table that shows students score in the survey that the students under agile coaching are more able tackle problems then the students who were not under the agile coaching group.[3]

Michael Hicks, Jeffrey S. Foster(2010)*et,al* . Author, in this paper works on producing high quality research result for PHD students by merging scrum as a management approach called SCORE to help students to become independent researchers while working in a group. Implementation is based on the idea that instead of fixing a slot for discussions, SCORE will hold 15 minutes STATUS meeting 3 times per week. Whenever there will be need of technical discussion then according to SCORE, students can schedule ON-DEMAND meeting for longer discussions. A survey on 21 PhD students is done, in which 8 students experienced original research method and 13 students followed SCORE method. The survey results prove SCORE a successful model. As the students who manages their research work according to SCORE get high quality result, more interaction with faculty, Enthusiasm for research.[4]

Thomas Reichlmayr(2011) *et,al* . in this paper, Author presents a report on the experience of student teams in a classroom who are developing Android applications using Scrum. He addresses what are the benefits and what are the limitations of adoption of scrum by student project team. The survey is done on students developing 3 different android applications in which one is a training app, a university bus System and a game. According to scrum at the end of each sprint number, story points are created out of these applications, helps to plan and track future release. User stories are considered to be completed when it meets the acceptance criteria that are selected by product owner. This results in continuously producing operational software in small increments. In this survey scrum helps students to produce high quality results by easy identification of work, estimation in case of time, cost and other factors, also planning and tracking of activities and deliverables. The scrum framework is flexible enough for accommodating a variety of software engineering courses and their outcomes and for supporting student teams working on different projects.[5]

Jorden Soderback, Stefan Hrastinki, Lena-Maria Oberg in this paper, author performs survey to examine how distributed scrum can support online collaborative learning along with advantages and drawbacks on distributed scrum from a student perspective. For this author performs survey, in which 20 students have taken in a 5 week online course, where they have participated in scrum projects as members in distributed teams. Tools like Visual Studio Online, HipChat, myBalsamiq, PlanninPoker were introduced to them in first week of scrum and in the last four weeks they participated in a practical software development project, then student's perceptions were captured using semi-structured interviews. The result indicates that students are satisfied with scrum and they have experienced high degree of flexibility. The transparency in scrum is perceived as a key to open communication and effective collaboration.[6]

Raoul Vallon, Stefan Strobl, Mario Bernhart, and Thomas Grechenig (2013) *et.al* discussed that distributed development of software projects for a single organization is an overhead. But if there is a second organization that joins for co-development of project, it increases the complexity to the next level. On this scenario a case study is presented in this paper to understand how to manage two different organizations in distributed environment. This paper presents case study that investigates agile approach from the perspective of real world project, which involves two unaffiliated IT organizations that collaborates in a distributed development environment. The objective of this case study is to find root causes of failure of integration of two different organizations in distributed development environment. In this case study regular scrum process are identified and evaluated over a six-month long period of time in which these two IT organizations are collaborated to develop three software products and the two organizations that develop their own sites, separated by several distance. The research method is divided into three phases that are observation, case analysis and presentation of result. An external observer is hire to participate in scrum meetings, observe the problems and the last phase of presentation and discussion of problems with team members. In observation phase, scrum teams are developed and two-tiered planning process take place in which one sprint is performed by one organization and second sprint is performed by other organization. Sprint review takes place after each sprint, i.e. joint sprint review of both organizations. The result or evaluation of this case study involves a detailed problem root cause analysis and also presents the suggestions that which issue should be handled first. Also the key lesson that is learned after this case study on two IT organizations is that team members participating in one scrum team should not be distributed over several sites and also every site should have at least one scrum master and one product owner. The result of this case study suggests single-site self-organizing teams formation is better than multi-sites. [7]

Sebastian Hanschke, Jan Ernsting, Herbert Kuchen (2015) *et.al*. In this paper focus is to answer two main questions whether and how agile methods such as scrum can be used to create architecture deliverables. How enterprise architects can collaborate with agile software development teams. This paper is based on expert interviews in a major German consultancy, a railway company and an automotive OEM an integration of the TOGAF i.e. The Open Group Architecture

Framework ADM i.e. architecture development method and scrum has been developed and evaluated following the design science research process. Both the questions in this paper are answered using two different procedure models, in which one to be used on TOGAF's enterprise strategic and segment architecture level and other on capability architecture level. On the enterprise strategic level framework architecture is created and its refinement and implementation in vertical cuts through all architecture layers, as proposed by scrum, are enabled. So the TOGAF ADM is split up into four different scrum projects, each of them consist of an Architecture Product Owner, an Architecture Scrum Master and further business, information system and technology architects as team members. The demonstration of the above integration can take several years. Therefore, the demonstration could not be completely carried out, yet. Instead, the solution was presented to the interviewers as well as in several presentation and discussions. Overall, the interviewers considered it promising to apply Scrum to areas to see, whether the integration, especially the collaboration between EA and ASD is going to work in practice. [8]

IV. PROBLEM FORMULATION

Student placement process is one of the most important aspects of any university or college. It requires a proper system for managing the whole placement process for getting accurate and high quality results i.e. for getting maximum number of students to be placed in good companies along with improving the student's knowledge and also analyzing the capacity of each student. As scrum framework is an innovative and iterative approach for getting work done and works on principle of continuous improvement, teamwork and focuses on quick and frequent deliveries provides higher productivity, adaptability, communication, high quality results, team cooperation and greater responsibility of each member participating in the process, So scrum practices can be applied on placement system for improving the number of students to be placed in companies and also improving the performance of students participating in the placement process.

This results in improvement of placement criteria in terms of accuracy, effectiveness and high quality with increase in number of student placements, also improving student's performance and adaptation of various changes during process. This will also result in improvement of overall placement process of university.

V. PROPOSED ALGORITHM

In this work, data regarding placement of the students based on some criteria on which student's selection is done is being collected. That involves data based on the selection of students without giving any inputs for placements i.e. raw data of final year students who are eligible for placements, based on certain criteria. After collection of data it involves the following step of proposed method:

Sectioning of students: Sectioning of students is based on the criteria selected i.e. ELQ (English, Logic, Quant) score is done by using k-mean clustering for generating clusters of similar and dissimilar type of data.

Classification of data: Neural network classifier is used that consists of number of units that are arranged in the form of layers, which convert an input vector into some output. In this each unit, it takes an input and then applies a function on

it and finally passes the output to the next layer. Neural network is used as it is relevant for applying scrum practices.

Iterations: After getting classified data, iterations are performed as sprints and then the output data of each sprint is

again analyzed to prepare data for next sprint i.e. the result one iteration at the end of sprint is used as input in the next iteration in next sprint for generation of final outcome at the end of sprint

Re-sectioning: Based on output of the iteration performed on classified data, re-sectioning is done until an accurate data set suitable for placement process is obtained.

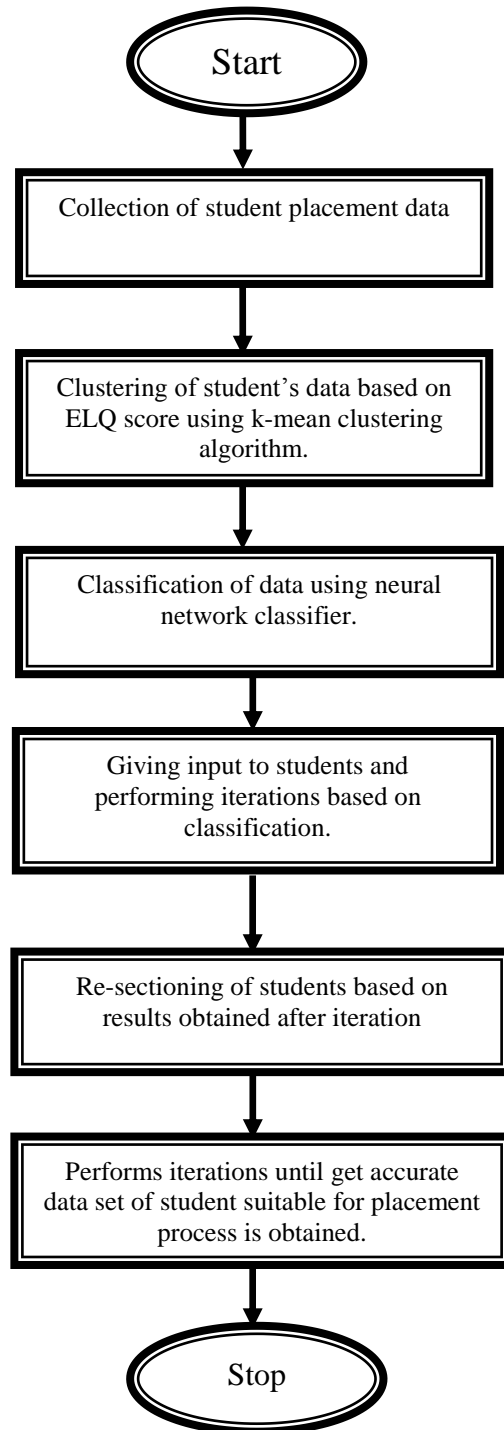


Fig 1: Flowchart of Proposed Algorithm

VI. CONCLUSION

Use of scrum technology provides a consistent framework for managing the placement process of the university. Scrum provides greater productivity, adaptability, improves quality, greater responsibility of each member who is participating in the placement process of the university. It is flexible enough to adapt the various changes that are occurring during the selection criteria of the students for placement process. The use of scrum is most effective as it completes in multiple iterations and with progress, it apply process improvement initiatives. Use of scrum technology in education, introduces modern techniques in education, such as getting quick results while working in sprints and accept changes along with that Scrum framework offers several opportunities for student exercise different skills by means of well-structured events, roles and artifacts.

REFERENCES

- [1] Eduardo Valentin, J. R. (2015). Rapid Improvement of Students' Soft-skills Based on an Agile-process Approach. Post-graduate Program in Informatics (PPGI),Institute of Computing (ICOMP),Federal University of Amazonas (UFAM)
- [2] Foster, M. H. (2010). Adapting Scrum to Managing a Research Group. University of Maryland, College Park, Department of Computer Science Technical Report.
- [3] Guillermo Rodríguez, Á. S. (2016). Measuring the Impact of Agile Coaching on Students' Performance.
- [4] Janakova, M. (2014). Errors in E-Learning: The Key is Global Approach for optimal education. Silesian University in Opava, Univerzitetni namesti 1934, Department of Informatics and Mathematics, School of Business and Administration in Karvina.
- [5] Jörgen Söderback, S. H.-M. Using Distributed Scrum for Supporting Online Collaborative Learning - A Qualitative Descriptive Study of Students Perceptions.
- [6] Paik, E. H.-y. (2009). Using Scrum in Global Software Development: A Systematic Literature Review. Wales and National ICT Australia, CSE, The University of New South Lero, University of Limerick, Sydney, Australia Limerick, Ireland.
- [7] Raoul Vallon, S. S. (2013). Inter-organizational Co-development with Scrum:Experiences and Lessons Learned from a Distributed Corporate Development Environment. Vienna University of Technology, Research Group for Industrial Software, Vienna, Austria.
- [8] Reichlmayr, T. (2011). WORKING TOWARDS THE STUDENT SCRUM - DEVELOPING AGILE ANDROID APPLICATIONS. Rochester Institute of Technology.
- [9] Sebastian Hanschke, J. E. (2015). Integrating Agile Software Development and Enterprise Architecture Management. University of M'unster, European Research Center for Information Systems (ERCIS).
- [10] Simão Filho, M., Medeiros, C., Gois, N., & Albuquerque, A. B. (2014). Using Scrum in Small Teams:Combining Case Study with Grounded Theory. Universidade de Fortaleza, Programa de Pós-Graduação em Informática Aplicada, Fortaleza, Brasil.
- [11] Tahara, S. K. (2014). Software development PBL focusing on communication using Scrum. The University of Electro-Communications, Graduate School of Information Systems, Chofu-shi, Tokyo Japan.
- [12] Matthew N. Anyanwu, Sajjan G. Shiva," Comparative Analysis of Serial Decision Tree Classification Algorithms", International Journal of Computer Science and Security, (IJCSS) Volume (3): Issue (3) page number 230
- [13] Mahendra Tiwari, Manu Bhai Jha, OmPrakash Yadav," Performance analysis of Data Mining algorithms in Weka", IOSR Journal of Computer Engineering (IOSRJCE) ISSN: 2278-0661, ISBN: 2278-8727 Volume 6, Issue 3 (Sep-Oct. 2012), PP 32-41 www.iosrjournals.org