WIP: Improving Individual Productivity Utilizing SCRUM-For-One

Massood Towhidnejad, Zackary Hagerty-Posell
Electrical Engineering & Computer Science
Embry-Riddle Aeronautical University
Daytona Beach, FL 32114
towhid@erau,edu, hagertyz@my.erau.edu

Abstract— **This innovative practice WIP paper describe the use of Scrum by an individual (team of one). In a software development environment, SCRUM is an agile project management framework that emphasizes collaboration, iterative progress, and customer-centricity. It involves breaking work into short, fixed-length iterations called sprints, usually lasting two to four weeks. During each sprint, a cross- functional team collaborates to deliver a potentially shippable product increment, with regular reviews and adaptations to improve the product and process. SCRUM has often been utilized as a cornerstone of productivity in engineering to maintain product validity and meet stakeholder needs. Most research regarding SCRUM assesses its value in a scalable team environment in the industry and education (i.e. capstone design); however, SCRUM practices have extremely useful applications when carried out by the individual. The framework "SCRUM-For-One" involves maintaining the aspects of an individual's actions through the execution of common SCRUM practices such as sprint planning, daily standups, and sprint retrospectives. This process can be utilized in both the context of an individual's professional development or his or her own personal life. This paper first describes how the SCRUM process has been modified to be used by an individual, followed by the discussion of initial use of the process by number of students and faculty over the course of last couple of year.**

Key words - Agile methodology; SCRUM; SCRUM-For-One

I. INTRODUCTION

SCRUM management is a flexible and holistic product development approach for businesses and was named after a rugby strategy in which an entire team uses the mass of their bodies to collectively transport the ball towards the goal while avoiding environmental opposition [1]. SCRUM provides a framework for the development team to adapt to changes in the development environment while meeting stakeholder demands upon product delivery.

SCRUM is an agile development and adopts several principles of lean thinking [2]. The first principle is eliminating waste by focusing on objectives that add value to the project without bloating the overall scope of the project. The second principal is constant repetition to reinforce learning through the execution of sprint planning, standups, and retrospectives. The third principle is to delegate planning until the last minute as to focus on the objectives right in front of you and their contribution to your long-term goals.

The fourth principle is to achieve your objectives as quickly as you possibly can. This allows you to achieve more throughout the week while delivering products as competently as possible. The fifth principle is to empower the development team through constant reinforcement, training, and leadership from behind. The sixth principle is to utilize your SCRUM management process to build perceived integrity in yourself and your product to your stakeholder. Meeting deadlines, carrying out competent sprint planning, succeeding in sprint execution, and utilizing consistent standups and retrospectives build integrity in your team and product. The final principle is to avoid focusing too much on one aspect of a project, instead

work iteratively towards aspects of your project goal. These principles are undeniably useful throughout the lifespan of a SCRUM project with the goal of delivering a product.

The purpose of this paper is to explore the application of SCRUM management and the seven principles of lean thinking to the self-management and improvement process through the process of SCRUM-For-One. Individuals can utilize common structures of SCRUM process, such as sprint planning, stand-ups, and retrospectives, to carry out their life in a way that purposefully assists them in pursuing their ambition. This paper will explore the components of SCRUM, their beneficial applications in SCRUM-For-One, and the disadvantages of SCRUM-For-One identified. Finally, the paper describes some of the initial results of how SCRUM-For-One has been used by number of students and faculty, and the corresponding efficiency that was gained by using this process.

SCRUM-For-One differs from Personal Software Process (PSP), which is a framework that provides a measurement and analysis framework at individual level to characterize and manage personal work within a professional environment [3]. SCRUM-For-One is intended for personal use outside of a work environment but could be utilized for professional work as well if the user would like to do so.

II. SCRUM FRAMEWORK

SCRUM is an agile software development method that manages software development in iterations, called sprints [4]. The agile process focuses less on the heavyweight and formalized processes [5] and more on daily progress and process improvement through retrospective meetings after each sprint and planning before the next sprint. The SCRUM framework consists of number of events and artifacts. Figure 1 represents an overview of the SCRUM framework [6].
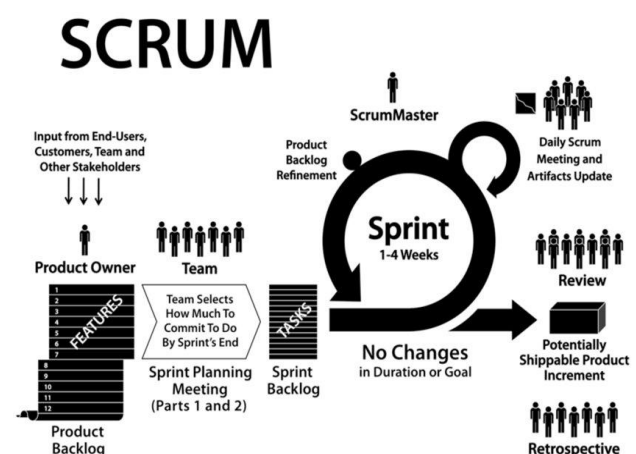

Fig. 1. SCRUM Framework

The SCRUM framework consists of number of events that include a **Planning Meeting** that is conducted at the beginning of each sprint, where the team identify what would be delivered during the upcoming sprint. Major activities during the planning

meeting include prioritization of the deliverable, estimation of the effort, and identification of the team's availability during the upcoming sprint. A **Sprint** represents a fixed time (typically 2–4 weeks) that the team will participate in development of the product. The **Daily SCRUM** is a 15-minute time slot, at the beginning of each day where team members discuss their accomplishments during the previous day, and what they plan to work on during the current day. At the completion of each sprint, the **Sprint Review** is the gathering of the development team and the stakeholders to review the sprint deliverable. In addition to the spring review, at the completion of the sprint, the team conducts a **Sprint Retrospective**, which the team reviews the process used during the sprint and look for opportunities to improve the process.

SCRUM artifacts include the **Product Backlog** representing what the customer needs, **Sprint Backlog** representing what the team plans to deliver during the current sprint, and **Burndown Chart** representing the team's accomplishments during the sprint in real time.

There are three roles in the SCRUM framework. These are, the **Product Owner** serves as the main interface between the customer and the team, and is responsible for the product backlog, and the prioritization of its content. The **Development Team** is responsible for the delivery of the product during the sprint, and the **SCRUM Master** who is also part of the Development team, has the responsibility of the mentoring the team throughout the process, and support the development team by removing impediments the team would face.

III. APPLICATIONS OF SCRUM CONCEPTS IN SCRUM-FOR-ONE

This section describes how the major principles of SCRUM framework is modified to be used by an individual for managing their own life/projects. Of course, there has been a number of efforts to individualize the SCRUM principles, and some have described their effort [7,8,9]. In this paper, we attempt to describe a more formalized attempt of this adaptation and go beyond its application in software development. We call this "SCRUM-For-One".

A. Team Roles

The nature of SCRUM-For-One demands that SCRUM team roles become far more malleable. Because the product(s) that are being developed are the individual's product; there is no need for the traditional responsibilities of a product owner, nor are there multiple team members to constitute a development team. Instead, the user of SCRUM-For-One embodies traditional SCRUM team roles at certain intervals of each sprint. During a sprint, constant reflection on the sprint backlog mirrors the behavior of a development team member, while the need to constantly plan what's next after the current sprint, and re-plan each sprint as life presents obstacles, is reminiscent of a combination of SCRUM master and product owner responsibility. This malleability reflects the response nature incorporated into even the basic infrastructure of SCRUM principles. Team roles are not defined by the necessity of certain responsibilities, but by niches of behavior that arise because of carrying out SCRUM procedures in a project.

B. Product Backlog

In the context of SCRUM-For-One, the product backlog is generated from a list of predefined requirements into a fluid body of goals, responsibilities, and activities that constantly morph to the user's needs and wants (in a non-Scum world, we refer to these as to-do-list).Unlike a typical SCRUM, in SCRUM-For-One the facets of everyday life drive project. Therefore, the backlogs are very fluid and is the combination of pre-identified backlogs such as those that are driven by the outside stakeholders such as assignments, paper, etc., and those that happen and are unplanned, such as going to doctor, car breaks down, running out of groceries, or the department chair requires you to do something immediately.

In the academic setting, to accommodate for the absence of project deadlines, product backlog planning takes place every semester in advance, to mirror the major milestones in faculty and students. However, this could be modified to match the individual's need.

C. Sprints

In SCRUM-For-One, there is a notable difference in the pace of sprints compared to a standard SCRUM project. Due to the dynamic constraints of real life, and less controlled environment of the individual's day-to-day activities, we chose the sprint duration of one week, this provides an opportunity for short-term planning, thereby reducing the possibility of unintended interruptions and tasks.

SCRUM-For-One's short, rapid pace is meant to acknowledge the dynamic nature of real-world scenarios and focuses on completing specific features within each sprint; The shorter period of sprint and the smaller size of the team (one person), requires that the work items (backlogs) that are assigned to a sprint have to be small enough that could be completed in a one-week period. Of course, as in SCRUM, it is not completed in a sprint, then it will be assigned to future sprints. This encourages a high rate of work item completion, thereby giving a sense of accomplishment to individuals.

D. Sprint Backlog

The sprint backlog in a SCRUM-For-One project is utilized almost identically to a traditional SCRUM Project, with the exception that backlogs should be defined in a way that there is a chance to be completed in a one-week period. If the work item cannot be completed in one week, then the work item needs to be broken down farther. For example, if the backlog item is to write a technical paper for a class or conference, then perhaps that can be broken down to multiple work items, such as developing a rough draft, writing the introduction and background section, writing the main section, writing the conclusion and final formatting, etc. Figure 2 represents a sample of sprint backlog for one faculty. As shown, there are three major activities in this sprint. There are four tasks associated with teaching assignment, two tasks associated with home activities, and two tasks associated with a contract/grant. Of course, there were number of other tasks that were performed by the faculty, but they were not included on sprint, since they were not initially planned, and was the result of pop-up activities, which are usually handled as part of the built-in buffer in the sprint.
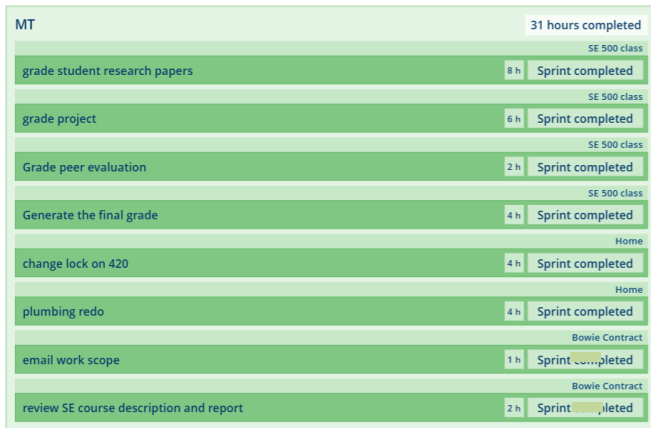
Figure 2. Sample Sprint Backlog

Figure 3 represents the effort tracking which represents the sprint progress for the corresponding sprint presented in Figure 2. The green line represents actual progress, where the dashed line represents ideal progress toward the sprint accomplishments. This figure is referred to as a burndown chart and is a very powerful tool to show if the tasks are being completed on time, or perhaps an adjustment is needed to make sure the task will be completed before the end of the sprint. As it is shown in this figure, sprint starts on Sunday and ends on Monday. In this specific period, the faculty got behind the ideal work distribution on Thursday, however he was able to catch up during Thursday, Friday and the weekend.
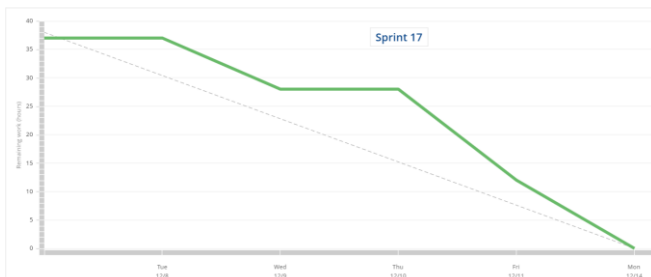

Figure 3. Sample Burndown Chart

The backlogs listed in this sprint is a combination of things that must be completed in one week by the individual. It is also important to notice that some of the activities are associated with his/her work, and others are related to activities outside of the work.

As previously mentioned, it is important to define backlog items in a way that they can be completed in one sprint. This requires a good sense of dividing the work items to several smaller items, thereby using the advantage of divide and concur approach. However, given the fact that the sprint duration is only one week, it is best to define the major work items at least two sprints at the time. This allows the user to replicate the scope of a two-week sprint while reducing the obligation a user must work items within the second sprint until that sprint begins. This process allows for greater efficiency in the sprint planning strategy detailed in the next subsection.

The sprint backlog is handled very carefully in a SCRUM-For-One environment. Because life is unpredictable, there is a good chance that unexpected events happen during sprint that need to be attended to, therefore it is important to build up a buffer as you plan for the sprint, therefore as new work pops up, the high priority items can be added to the sprint in progress. A good rule to follow is to build up 30% buffer in every sprint, this means if you think you plan to work about

60 hours (combination of your work, and things to do for day-to-day life), then you plan for 40 hours, and then have an additional 20 hours for unexpected/unplanned tasks.

E. Sprint Planning

Sprint planning is the most involved aspect of SCRUM-For-One. Like a normal SCRUM project, SCRUM-For-One's sprint planning are carried out at the end of every sprint before a new sprint begins. Unlike traditional SCRUM strategies, sprints planning involves planning two sprints ahead at any given time. This process often includes identifying what work items have the highest priority and estimation of the effort needed to complete the work item. The rationale behind the two-week sprint planning is to have a longer view of activities that need to be completed in the next two weeks, while leaving the flexibility to modify the plan for the upcoming sprint as new higher priority tasks are identified. Therefore, there are two ways that one can address high priority tasks within two weeks window. One way is through the built-in buffer, during the current sprint, and the second is through continuous replanning for the upcoming sprint.

Therefore, unlike a typical SCRUM project, SCRUM-For-One sprint planning is a process that can take place throughout the duration of an entire sprint. The existence of large buffer built into each sprint allows the user to introduce additional backlog items into the current sprint backlog, thereby filling up the buffer. However, the new backlogs need to go through the same process of prioritization and estimation, to make sure the current sprint backlogs are still manageable and results into high quality deliverables for the overall success of the project (i.e., semester accomplishments). As we get closer to the end of the current sprint, if there is still some room to fill in the buffer, then the highest priority task in the upcoming sprint will be brought in, to fill the gap. Figure 4 represents a two-consecutive sprints view. In this case, if a new task is identified, then its priority is assessed against task K. If this new task has a higher priority than task K, then it will be entered in the buffer for sprint 1, else, it will be added to all that remaining task, and at the beginning of next sprint, its priority will be evaluated to see if it needs to be included in sprint two or later sprints. In addition, as we get closer to the end of sprint one, and all the tasks for sprint one is completed, and there is still some time (buffer) left, then a task from sprint two will be brought in to be included in sprint one tasks.

Figure 4. Two-sprint sequence

One of the major contributors of sprint planning is the backlog estimation, this is where the team decides how much effort is needed to complete a backlog item. In Scrum, since the multiple team members work on a project, and each team member has different rates of productivity, it is highly recommended that the amount of effort assigned to a backlog item is not based on the number of hours. Therefore, effort is assigned based on what is the value of the backlog item in the overall completion of the product. For example, in coding, the measure of effort may be based on function point. The reason behind this recommendation is the fact that one member of the team may produce codes at a much higher rate than another member of the team. However, in Scrum-For-One, since all the products are produced by a single individual, it is highly recommended to use hours as the unit for estimation. Another advantage of using hours is the fact that it better suits our day-

of historical data that we have based on our previous experience. For example, if we have a doctor's appointment for 30 minutes, we know that typically means driving about thirty minutes each way to the doctor's office, and typically you must wait at least 30 minutes to be called to the examination room. Therefore, for a 30-minute doctor appointment, you should schedule at least 2 hours, which provides much more accurate planning for your sprint.

F. Standups

Standups serve as short reflections on a user's SCRUM-For-One activity. Like normal SCRUM standup, daily SCRUM-For-One standups allow the user to briefly reflect on their sprint's progress, identify any issues blocking sprint progress, and assess the need for sprint backlog changes.

The SCRUM-For-One standup serves to reflect on three things. First, the user identifies what they are currently working on from the sprint backlog. This allows the user to maintain an engineering notebook of sorts that tracks a user's self-management strategy over time. The second is to identify what the user is working on next. This, when combined with the first reflection, helps the user maintain consistency throughout the process of the sprint. In addition, this is the time when the user evaluates the list of additional backlogs that have popped up during the previous day, and evaluates, prioritizes, and estimates the effort required to complete the backlog. This is the time that the user decides on whether to include the new popped up backlog in the existing sprint or postpone it to the next sprint (next week). The third is to identify any obstacles that are keeping sprint development from progressing. The intention of this reflection is to provide a backlog of blockers to reflect upon during the sprint retrospective at the end of each week.

G. Sprint Retrospectives

Sprint retrospectives, along with sprint planning, are the most involved aspects of SCRUM-For-One. Sprint retrospectives allow the SCRUM-For-One user to analyze their sprint planning and performance while enabling the user to identify what would work better in subsequent sprints.

The SCRUM-For-One sprint retrospective serves to reflect three things. The first is what went well during the previous sprint. This allows the user to identify and congratulate themselves on their success during the previous week. The second is to identify what went wrong during the sprint. This allows the user to reflect on their failures and identify their causes for the sake of future process improvement. The third is to identify what the user is doing to ensure the identified failures do not happen again. These three reflections encourage a constant feedback loop of self-improvement and self-management to benefit the user's ability to carry out SCRUM-For-One overtime.

A good practice is the use of video recorders for sprint retrospectives and storing them for the end of the semester reflections. This means we are proposing an end of the semester retrospective, to collectively assess how well the SCRUM-For-One process has been implemented, and what adjustments are needed to make the process better for the individual, as people work differently, and as such constant customization of the process results in a higher performance.

IV. ADVATAGES AND DISADVANTAGES OF SCRUM-FOR-ONE

Over the past couple of years, the number of students and faculty have used the variety of the SCRUM-For-One, for their day-to-day activities. As previously mentioned, to have the best use of Scum-For-One, there is a need for individual customizations.

Initial data reveals that people who have used Scrum-For-One, have improved their productivity and time management. Although these data are anecdotal, there is a consistent pattern in the users' report. Some of the common comment points to

- *Reduction in the mad dash to get tasks completed*: The framework, provided an opportunity for the user to identify deliverables throughout the project, and the backlogs are constant reminder of the tasks that need to be completed. The daily standups force the user to conduct prioritization of tasks.

- *Data Collection helps future planning*: One of the major advantages of the Scrum-For-One is the continuous data collection. Throughout the project, not only you collect data associated with the tasks you have completed, but also how long it took you to complete the task. This data serves as a historical data for future activities. For example, knowing how long it took you to write a five-page paper, and keeping track of that data for two or three different papers, will provide you a very good baseline for future papers that you plan to write.

- *Increased Productivity*: The built-in buffer in the sprint backlog, are used for unexpected events as they come up throughout the project. As the project become more stable, the constant reminder of the buffer, will encourage the user to either work on future tasks, or identify tasks that were not typically was not initially part of the overall project plan. For example, in the context of academic semester, the beginning of the semester is typically a very chaotic. Therefore, the existence of the buffer will help with managing the issues that pops up. However, as the semester proceed, the amount of disruption will decrease. Typically, the buffer at the beginning of the semester is much larger than the middle of semester, however even with the decreased buffer, there still may be time that additional tasks can be taken up. The combination of buffer management and the data collection mentioned in the previous bullet will result in increased productivity.

The following is the list of disadvantages, which have been reported by different users.

- *Susceptibility to Interference: P*erhaps the greatest weakness of SCRUM-For-One is its susceptibility to interference from influences outside a user's own sphere of control. In a professional environment, interference typically comes in the form of request from higher authorities, such as instructors in the case of students, or colleagues, chair and/or other administrators in the case of faculty. Managing these interruptions requires a higher set of skills in prioritization of the work order, and better negotiation skills. In addition, a busy schedule, personal tragedy, or even an individual's own forgetfulness will completely stop a successful SCRUM process in its tracks until the developer can resume his self-management. This downfall betrays SCRUM's underlying agile principles of continuous development and can only be corrected by the efforts of the individual.

- *Knowledge Barrier:* Unlike other self-management techniques, SCRUM-For-One requires a high degree of pre-existing knowledge regarding the SCRUM process to be a truly effective tool in self-regulation. Sprints, stand-ups, and retrospectives have relatively strict

structures that take time to understand and apply. People who are not familiar with SCRUM terminology or practices may find the technical jargon surrounding the process too overwhelming to be able to immerse themselves in a discipline that requires total understanding and commitment. This knowledge barrier can be amended through the simplification of resources regarding SCRUM-For-One.

- *Dependence on Software:* Another issue with adopting SCRUM-For-One as a self- management strategy is its dependence on pre-existing SCRUM software designed with team-based software development in mind. Not only these tools often needlessly complex when compared to the scope of SCRUM-For-One, but also more difficult to utilize during a busy day. Other self-management strategies, such as to-do lists, have the advantage of being available to the individual at any given time. However, SCRUM-For-One a simple excel spreadsheet with appropriate macros will be sufficient for a person to get started with the process.

V. CONCLUSIONS

As established in this paper, SCRUM-For-One is the simple application of SCRUM principles to the management of an individual's life. Consistent daily stand-ups, sprint planning, and retrospectives helped the individual track and maintain his/her goals over larger periods of time than a simple to-do list would have. Initial data from the use of SCRUM-For-One over the last couple of years has helped the faculty and students, by producing better product, in a timely manner, and more efficiently. Individuals who have adopted Scrum-For-One framework, turned in their backlogs and burndown charts to the lead investigator, and this data was evaluated to identify any potential improvements in the individual performance. Factors considered included completion rate, estimation effort, efficiency of completion, etc. In addition, through an end of the project survey, we ask participants for their opinion about their overall experience. Almost all individuals have reported a reduction in the number of last-minute mad dashes to completion of a task, and some reported a major reduction on missed opportunities and deadlines. In addition, number of challenges have been reported by these users, which these are summarized in section IV of this paper. Another observation of the use of SCRUM-For-One, is that the longer the individual continue to use the process, and make the appropriate customization, the individual gains more confidence and expertise in the use of the process, and they produce a higher quality product more efficiently. However, these are all preliminary results, and more data is needed to make a more informed evaluation of the process effectiveness. We believe, with Scrum-For-One, we can improve the students' overall performance, and success rate. There are number of studies, which have shown a direct relationship between student performance, retention, and college success with time management [10,11,12,13]. In future, we plan to have a more organized adaptation of the Scrum-For-One framework by group of students, where we compare their performance against a comparable set of students who are not using the framework.

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