Scaling a Standardized Procedure to Conceptualizing and Completing User Stories across Scrum Teams and Industries

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Abstract: Agile Software Development (ASD) is a user-centric approach to executing software development projects in continuous iterations. This approach focuses on collaboration and communication among self-organizing, cross-functional teams. Over the last two decades, ASD has been viewed as the answer to the pitfalls of the Waterfall Software Development approach. As such, large organizations have embraced this methodology and its scaling frameworks to produce faster to-market software. It is important to note that the agile methodology does not guarantee that all organizational and project problems related to software development are solved. This paper aims to contribute to the agile community by testing an existing procedure that has proven successful within a scrum team of a single company and applying it across multiple scrum teams within different domains in a large organization.

1 INTRODUCTION

1.1 Background

Kingston, Jamaica is home to one of the largest organizational groups in the Caribbean. With nearly a dozen subsidiaries falling under their ambit, their portfolio includes pension, health and assets insurance, wealth and asset management/brokering and banking industries.

The organization has maintained productivity of its core business while exploring inorganic opportunities for growth, as an essential component of its growth strategy. Over the last fifteen years, the organization has grown and expanded their offerings (products and services) to deliver a first-class experience to over a million customers. This focus strategy has awarded them increased profits year after year, peaking in the last 3 years with record profits of over $10 billion JMD at the end of each successive financial year. Having such a diverse portfolio, the organization's compliance framework and governance structure over the varying industries hold significant weight in project execution of new and enhanced offerings: banking regulations, Payment Card Industry Data Security Standard (PCI-DSS) and securing of personally identifiable information (PII)

data are just a few of the various compliance regulations and security measures observed.

In pursuit of delivering top-quality offerings to their customers, the project management arm of the organization has traditionally applied the waterfall methodology in project execution. However, the organization has experienced issues delivering projects using this methodology. These issues have resulted in projects being delivered years later than intended at which point, most of the business value has already been eroded. Taking such experiences into consideration, the organization began exploring ASD.

Within the last decade, there has been a technology boom that has given rise to an increase in the rate at which products are launched to market. A result of the more-iterative approach that ASD offers along with faster time to market, higher user-acquisition and user-retention has emerged. Kisielnicki and Misiak concluded that businesses today cannot wait an extended period for projects to conclude (2017). They further concluded that ASD can give fast return on investment, frequent functionalities delivery, easy adaptability to changes when required and cost-effective maintenance.

1.2 Paradigm Shift

The organization assessed incorporating ASD with their development methodology. Initial reviews of ASD showed promise to their key performance indicators. Consequently, the decision was made to transition the organization from utilization of the waterfall methodology to agile. The objective at the end of the transition was to revolutionize the culture within the organization in hopes of achieving faster time-to-market offerings, increased engagement of staff, higher user retention and overall, increased profit. Mahadevan, Kettinger and Meservy's study highlights the many challenges that exist when integrating Agile in organizations (2015) and Brizard posits that transparency is critical to the successful implementation of ASD (2015). Transparency was not found to be a traditional strength of the organization. As such, the transition to ASD would not be straightforward as it would require a drastic change in the organization's culture. They subsequently mobilized Agile consultants to assist with this transition in the hopes of achieving optimal results. Besides the banking sector, other sectors have similar compliance frameworks and regulations to adhere to that can make innovation a challenge. Bhargava highlights several regulations that pharmaceutical software development needs to adhere to by demonstrating how Agile permitted their 5-sprint project to be delivered on time, within budget and proper documentation and logs of changes that were needed for FDA submission (2017). They conclude that the Agile methodology has positively impacted the pharmaceutical sector. Agile can be positively applied to other sectors that are heavily regulated, such as the banking sector. Kraft concludes that ASD can benefit federals projects to "deliver increased value, reduced risk, enhanced visibility and greater adaptability" (2018).

One of the initial key decisions in the transitional stage was to identify which Agile methodology would be the ideal fit for the organization. After careful consideration, training and consultation, it was determined that the Scrum framework would provide the best organizational fit. Consultants, contractors and newly hired staff were brought in to assist with the integration of the framework within the organization. These steps taken by the organization are important as Kraft highlights that agencies who are "looking to implement or expand the use of agile should evaluate their specific circumstances to determine what approach will work best". One of the most important concepts of Agile is the use of co-located teams. Structures were therefore built and

furnished to accommodate these teams. A large subset of the current workforce was identified and trained in the Agile methodology and the Scrum framework. While this undertaking was aimed at ensuring the organization effectively integrated Agile into its core operations, it was also necessary to ensure that the scaling of this methodology would not serve as a negative disruptor to its overall operations.

1.3 Scaling Agile

The term, "Agile at Scale" was coined by Agile industry professionals. It represents an efficient framework that can be followed when transitioning to Agile. Spotify and Netflix are two organizations which have been highly successful at transitioning to become Agile organizations via the utilization of Agile at Scale. They have been case studied and the steps taken at Spotify to transition to Agile have subsequently been mirrored by thousands of small, medium and large organizations throughout the world.

Despite the strong global support for Scaled Agile Framework® (SAFe)® as highlighted in VersionOne's (2018) 12th Annual State of Agile Report, the organization, in collaboration with consultants, sought to implement their own Agile at Scale framework. They contemporaneously took heed of the failures and successes of other organizations which had attempted likewise. The report conveyed the following as the top five (5) challenges Agile organizations have experienced in both adopting and scaling Agile:

1. Organizational culture at odds with Agile values
2. General organization resistance to change
3. Inadequate management support and sponsorship
4. Insufficient training and education
5. Inconsistent processes and practices across teams

These challenges are highlighted in a study conducted by Ashmore et al. that demonstrates "there are important adaptations and cultural differences that should be considered when an organization starts leveraging agile methods" (2018).

Armed with this knowledge, the organization embarked on a transformative journey to become an Agile organization. Notably, one of the challenges the organization experienced early in the transformation process was that the co-located teams were isolating themselves from the rest of the organization. This gave rise to an issue of process standardization across each team. On closer inspection of one of the

processes, the definitions of done in user story completion in ASD, it was determined that the issue did not lie with the definitions but in the procedure used by each team to achieve it.

1.4 Problem Statement

In response to the procedural problem identified, our study proposes an investigation to determine the lacunae in the process and apply Ormsby and Busby-Earle's (2018) procedure to four (4) of the scrum teams within the organization.

The objectives of this study were:

1. To standardize the procedure that was executed by each team;
2. Verify if Ormsby and Busby-Earle's procedure could be successful in scrum teams of different sizes tackling different domain problems;
3. Increase each team's percentage of story points and the net promoter score for the solutions that they were each building.

A limitation of Ormsby and Busby-Earle's study is that it was executed on one scrum team. The next step that arose from their study was to have the procedure incorporated in other technology companies across teams with varying compositions, development tasks and levels of skill.

2 EXPERIMENTAL APPROACH AND COMPUTATIONAL DETAILS

Ormsby and Busby-Earle referred to lacunae within the steps of conceptualizing and completing a user story, and put forth a generic procedure to address these gaps. This procedure resulted in an average increase in velocity of 2.81%, as well as, morale boosts from all stakeholders as their procedure produced more user-centric user stories and continuous feedback between the scrum team and clients. This helped to address Rothman's concern that teams do not fully understand what done means at different levels in the life cycle of a user story as well as increased the transparency needed for success (2017).

2.1 Experimental Approach

The following data points on each team were tracked and recorded: number of story points committed to at the beginning of a sprint; number of story points completed at the end of a sprint; and survey completed by customers in which they rated (on a scale of 0 – 10) how likely they would recommend the product to friends or family.

Table 1: Team composition and assigned projects.

	Team 1	Team 2	Team 3	Team 4
Description of solution being built by team	A product to alleviate the account opening process. By alleviating this process, they hoped to increase the number of accounts that were being opened thus increasing the available number of customers that the entire organization can engage in cross selling activities.	A solution to digitally transform the auto insurance experience for current and prospective customers. This transformation would take the form of both redefining the process to be more efficient and utilize technology to produce a convenient and satisfying experience to customers.	A platform to deliver a revamp of the organization digital solutions. This revamp will take the many digital application currently offered to customers and bring them under one platform. This platform will be data driven to give the organization a holistic view of its customers and the products that will better fit their needs.	A product to drive the investment market in a new direction. This drive will seek to revolutionize investment in the region by empowering existing and prospective customers.
Team size	13	9	17	8
Core competencies	Web & Mobile Development, Banking, Document Management, Testing, User Experience and Marketing.	Mobile Development, Auto Insurance, Payment, Testing, User Experience, Marketing and Legal & Compliance.	Web & Mobile Development, Auto and Life Insurance, Banking, Data Analytics, testing, User Experience, Marketing and Legal & Compliance.	Web Development, Investment, Data Analytics, Testing, User Experience and Marketing.
Age range of team members	19 - 51 years old	22 - 37 years old	21 - 45 years old	18 - 36 years old
Nationality of team members	American, Antiguan, Indian and Jamaican.	Barbadian, British and Jamaican	American, Antiguan, Barbadian, Canadian, Indian, Jamaican and Trinidadian.	American, Indian, and Jamaican.

From these data points, we derived two main statistics:

1. Percentage of story points completed – number of story points completed at the end of a sprint divided by number of story points committed to at the beginning of that corresponding sprint multiplied by 100

2. Net promoter score (NPS) – subtract the percentage of detractors (customers who gave a rating of 0 through 6) from the percentage of promoters (customers who gave a rating of 9 or 10)

Teams used one-week sprints. Each team was also assigned a designated product owner and scrum master and all teams were collocated

2.2 Prior Execution of User Stories

Upon the genesis of an Agile team, one of the necessary action items was that the team was required to create a definition of done for a user story. The definition of done detailed the criteria that would indicate that a user story was completed (a checklist) and was expected to aid each team in understanding, accepting and agreeing the point at which a user story was complete. A team then began sprinting with their newly-formed definition of done.

Table 2 illustrates the percentage of story points completed and the NPS score of the solution following each sprint for the four Agile teams in their last five sprints prior to the implementation of our procedure. Two points can be observed from Table 2:

1. The teams were not stable – the percentage of story points completed and the NPSs never consistently increased;

2. Only one (1) team, in one (1) sprint was able to exceed the 80% mark.

Table 2: Percentage of story points completed and the NPSs for the last five (5) sprints before introduction of the procedure.

# of Sprint Before	Team 1		Team 2		Team 3		Team 4	
	%	NPS	%	NPS	%	NPS	%	NPS
5	27.3	18	72.1	31	72.7	23	68.5	23
4	46.7	18	69.2	31	45.0	27	82.1	19
3	58.8	19	63.6	31	63.3	23	76.2	18
2	67.3	23	76.7	30	65.5	25	60.8	24
1	76.4	24	78.3	31	76.7	25	56.6	22

2.3 Introduction of Ormsby and Busby-Earle's (2018) Procedure

In the first sprint, following the introduction of the procedure, there was a drop in the percentage of story points completed for all four teams. The teams committed to approximately the same number of points as they did in their previous sprint. In the sprints that followed, the percentage of story points completed steadily and consistently increased. There was a positive impact with the introduction of the procedure as the percentages for the teams were able to surpass the 80% mark. This solved one of the problems that was previously observed when the teams used other procedures. However, this did not solve for the issue of team stabilization. As seen in Table 3, the percentage of story points completed was inconsistent. Our procedure did however aid in customer satisfaction as NPSs improved for all four solutions that were built by the teams.

Table 3: Percentage of story points completed and the NPSs after implementation of our procedure.

Sprint #	Team 1		Team 2		Team 3		Team 4	
	%	NPS	%	NPS	%	NPS	%	NPS
1	53.5	24	58.0	30	43.5	28	51.7	23
2	70.7	24	68.5	31	72.7	28	70.1	23
3	80.3	25	84.7	33	79.1	29	82.2	26
4	81.3	28	87.4	38	80.6	29	86.7	31
5	84.1	30	85.4	45	85.7	31	83.3	34
6	86.0	33	88.2	46	85.9	37	84.6	34

2.4 Adjustment to Ormsby and Busby-Earle's (2018) Procedure

To stabilize the percentage of story points completed and the NPS of the teams, adjustments were made to the procedure.

In the first sprint following the adjustment (sprint 1), there was an anticipated drop in the performance of the teams. In sprint 2, there was a notable increase in percentages of story points completed and the NPSs. This continued and resulted in the desired team stabilization in the subsequent sprints.

Table 4: Percentage of story points completed and the NPSs after adjustment to the procedure.

Sprint #	Team 1		Team 2		Team 3		Team 4	
	%	NPS	%	NPS	%	NPS	%	NPS
1	68.1	28	73.2	45	71.1	38	75.6	35
2	88.3	32	87.4	43	87.1	41	87.7	38
3	90.1	35	98.4	61	93.8	43	89.3	39
4	90.1	36	98.9	62	94.6	43	88.9	41
5	91.6	38	97.1	64	93.1	42	87.9	44
6	91.2	38	98.2	64	95.1	44	89.2	46
7	90.9	39	100.0	67	95.2	44	87.1	46
8	92.7	39	98.1	67	98.5	46	90.7	48

3 ANALYSIS OF ADJUSTMENTS

It can be observed in Table 2 that the percentage of story points completed of the four teams was very inconsistent. This was due to the teams learning from their mistakes and applying corrective measures. The teams, however, isolated themselves from the rest of the organization and as such, the lessons learned by each team were not shared with the other teams. This engendered within teams a practice of developing solutions for problems that were already solved by another team.

It is to be noted that the introduction of our procedure came at a cost, as depicted in Table 3. There was an initial drop in the percentage of story points completed. A steady increase was however observed in the subsequent sprints. Further, all the teams were able to surpass the 80% mark and remained above that mark until the completion of their respective development projects.

There was also an increase in the NPS after the introduction of our procedure. Members of the teams indicated that the new procedure helped them to coordinate the opportune times to obtain feedback, i.e. receiving the feedback without distracting the teams.

There was insufficient stability in the percentage of story points completed. The organization sought more stability to be able to more efficiently forecast the amount of work the teams could manage. Taking this issue into consideration in addition to the feedback from the respective teams, we further investigated our procedure and made the requisite adjustments. This culminated in the creation of a new

procedure which we have named the 'Scaled Steps of Doneness' (SSOD).

As seen in Figure 1, we took the technical design step which was included in step 10 of Ormsby and Busby-Earle's procedure, within the Technology grouping, and moved it to an earlier stage in the procedure within the User Experience group, Step 9. Moreover, an additional step was added to the procedure: Step 8 – User Feedback Session. Embracing these steps in the User Experience group allowed for earlier feedback from both end-users and the rest of the Scrum teams. This adjustment encouraged more collaboration and a superior understanding of the goal of each user story. There were also some minor changes in the latter stages of the procedure. The Agile teams in the organization had decided that there was no need to gain business analyst approval. It was determined that with so many "touchpoints" earlier in the procedure, it was an unnecessary step and, in some cases, resulted in user stories not being completed.

Each of the Agile teams implemented the SSOD and predictably, there was a drop in the percentages of story points completed during the initial sprint, as seen in Table 4. This was due to team members needing time to become familiar with the new method of working imposed by the SSOD. However, the drop in the story points completed was not considered drastic as the Agile teams were already familiar with most of the steps of the new procedure. In the proceeding sprints, the percentage of story points continued to increase and quickly stabilized. In the case of teams 1, 2 and 3, they exceeded the 90% mark. Team 4 stabilized in the high 80% but it can be observed that they broke the 90% mark in sprint 14. Additionally, the NPSs increased and showed signs of high success for the teams. This can be observed in Table 4 where all teams increased their net promoter scores, three of the teams surpassed the 40 mark and one of the teams scored a high 67 in the last two sprints of this study. These scores reflect the satisfaction by end-users.

4 CONCLUSION

In summary, we have provided empirical evidence that our SSOD procedure helps to solve one of the key problems of working in an Agile environment as stated by the 12th Annual State of Agile report: inconsistent agile practices and processes. This is seen in Table 4, whereby having had the teams understand and implement the procedure, they were
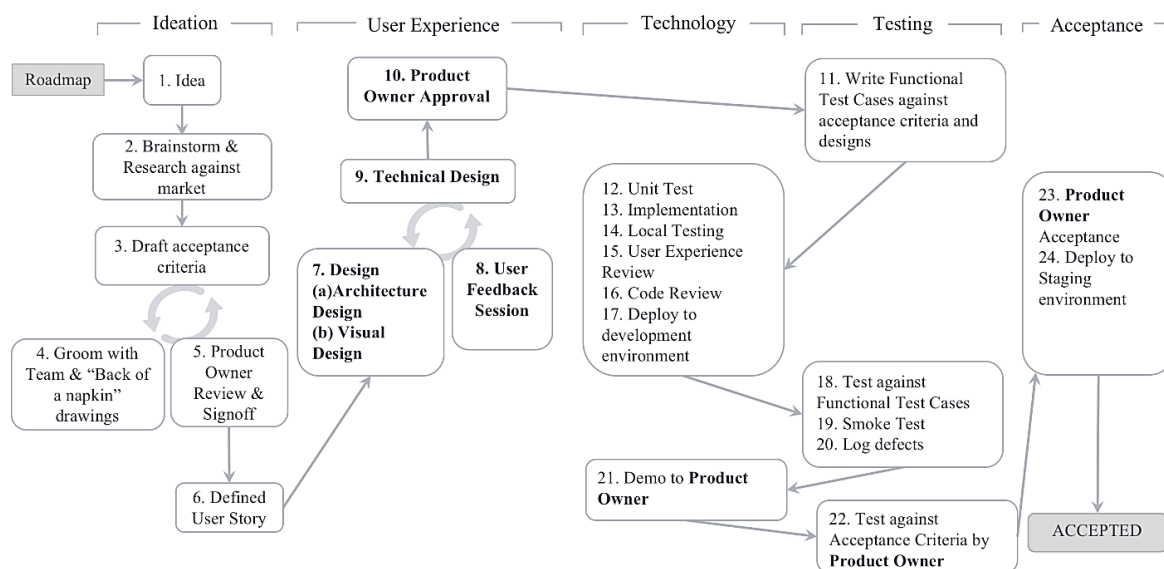
Figure 1: Scaled Steps of Doneness (SSOD) Procedure – changes to the procedure are highlighted in bold.

able to experience increased percentage of story points completed and net promoter scores. Moreover, it was observed that team morale improved as a result. Further our SSOD procedure can adapt to teams of varying skillsets, age and nationality. It should be noted that the majority of the nationalities was represented by North America and The Caribbean. The procedure requires communication among all team members. A next step would be to apply the procedure to teams composed of persons speaking multiple languages.

Ormsby and Busby-Earle's procedure did not succour in stabilizing the velocities of the teams. This lacuna was due to lack of a clear understanding of the end-users wants as well as the way technology can facilitate the realization of those wants. The designing steps in the User Experience group needed to encompass more feedback steps to truly understand the feasible wants of the end-users. This would have resulted in a clear acceptance of the goal of the user story.

The results observed in Table 4, indicate the successful impact of the adjustments to the procedure. As the teams continued to settle into the new process, they were able to stabilize their percentage of story points completed and net promoter scores. A product owner was able to produce more accurate forecasts of the amount of work a team could complete when armed with a stabilized percentage of story points completed. This is important as this enables the organization to deduce whether their timelines are on track at an early stage of a project. Earlier feedback leads to more success.

An observation from the experiment was that the cost of change is expensive. This was illustrated in both Tables 3 and 4. At introduction of a new procedure, there was a corresponding descent in the percentage of story points completed. Changes are expensive and should be both deliberate and strategic. Moreover, communication of a guiding procedure initially would have also contributed to higher collaboration among team members and overall, stronger team health in the long run.

The research of Silva et al. concluded that there is a need for more and better empirical studies documenting and evaluating the use of the definition of done (2017). These results greatly contribute to further assisting in documenting the definition of done. The goal of the Agile methodology is to create and deliver business value expeditiously. Therefore, if a user story that is done has resulted in bugs within the production environment, that user story can be considered incomplete.

The organization has adopted the SSOD procedure within their culture and have had all subsequent teams incorporate this procedure before they begin sprinting. It should also be noted that the organization has eleven (11) Agile teams that have integrated our SSOD procedure into their ASD.

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organization. The results have not only benefitted their organization but yields an outstanding contribution to the community. Regrettably, due to Non-Disclosure Agreements, the organization cannot be named.

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