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SCRUM RETROSPECTIVES: MEASURING AND IMPROVING EFFECTIVENESS

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ABSTRACT

Within Scrum, the retrospective is the principal means through which a team focuses on continuous process improvement. As such, retrospectives provide Scrum teams a method which will allow them to identify and resolve issues that impact team performance. However, it is hard to measure increased performance based on process improvements resulting from retrospectives. Through a series of semi-structured interviews with team members, Scrum Masters, Product Owners, and organizational leadership, the research will identify quantitative measures which can be used to evaluate the effectiveness of retrospectives. Subsequently, a new game-based retrospective will be developed incorporating game elements to help improve the effectiveness of retrospectives. Finally, an empirical experiment will be conducted to evaluate the quantitative measures as well as the effectiveness of the game-based retrospective.

Keywords

Agile, Scrum, Retrospective, Process Improvement, Gamification, Games

INTRODUCTION

Scrum dictates that at the end of every sprint, the team should hold a retrospective to identify and respond to both good and bad aspects of the development process (Schwaber and Sutherland, 2017). The retrospective allows the development team, Product Owner, and Scrum Master an opportunity to openly discuss any issues affecting team performance and provides the team the ability to adapt processes prior to beginning the next sprint with the goal of continuously improving team performance.

However, a method for measuring the effectiveness of a retrospective has not been established. In general, metrics for Scrum development have been long sought. Downey and Sutherland (2013) list ten measures for Scrum teams: (i) velocity, (ii) work capacity, (iii) focus factor, (iv) percentage of adopted work, (v) percentage of found work, (vi) accuracy of estimation, (vii) accuracy of forecast, (viii) targeted value increase, (ix) success at scale, and (x) win/loss record. Similarly, Schwaber and Kong (2014) look at three key value areas for measuring teams: (i) current value, (ii) time-to-market, and (iii) ability to innovate. Other organizations, such as the Project Management Institute (PMI), utilize factors such as earned value management. Regardless of the measures a team uses, none of these measures to date have been tied directly back to a team's retrospective. How then, does an organization justify the time and expense of performing retrospectives without being able to show tangible results?

Even without empirical measures for retrospectives, facilitators of retrospectives today are trying to maximize participation and involvement of team members in retrospectives; in many cases this is done through retrospective activities. Derby and Larsen (2006) stress the importance of leading teams through varying discovery processes to assist them in identifying and adapting processes to strengthen teams.

Presuming that empirical measures for retrospective effectiveness are developed, teams should strive for maximizing the effectiveness of their retrospectives. Anecdotal evidence informs us that activity-based retrospectives are more effective than non-activity-based retrospectives (Przybylek and Kotecka, 2017). Furthermore, game research informs us that game-based activities are more effective than non-game-based activities (Przybylek and Kotecka, 2017). It stands to reason therefore, that game-based retrospectives should provide the highest measures of effectiveness.

This study will attempt to provide:

1. Quantitative measures for retrospective effectiveness,
2. A game-based retrospective, and
3. Empirical evidence that game-based retrospectives are more effective than either activity-based or non-activity-based retrospectives.

Due to page limitations, only a summary of the literature reviewed is provided. The literature review is followed by an explanation of the research goals and methodology. Again, due to page limitations, the research methodology is high level to conceptually define how the research will be conducted.

LITERATURE REVIEW

Retrospectives

It is imperative that software development teams continuously work to improve their effectiveness. Retrospectives¹ to generate knowledge regarding team and project performance have been conducted for many years (Pettitway and Lyytinen, 2017). These events bring forward both positive and negative aspects of completed projects; such knowledge can subsequently be used to improve the performance of future teams and projects (Pettitway and Lyytinen, 2017). For Scrum teams, retrospectives are one means through which they can mitigate Nelson's (2010) warning that "Failure to learn from past mistakes and successes has consistently been a major obstacle to improving IT project management" (p. 1).

Within Scrum, retrospectives are one of five required events or ceremonies: (i) the sprint, (ii) sprint planning, (iii) daily scrum, (iv) sprint review, and (v) sprint retrospective (Schwaber and Sutherland, 2017). The Scrum retrospective provides the team a deliberate, recurring opportunity to "focus on inspection and adaptation" (Schwaber and Sutherland, 2017, p. 1). The retrospective not only helps the team to identify positive and negative aspects of "people, relationships, process, and tools" (Schwaber and Sutherland, 2017, p. 1) from the most recent sprint, but also provides the opportunity to plan how to implement the team's response to the aspects identified (Schwaber and Sutherland, 2017).

Derby and Larsen's (2006) book on retrospectives is cited within several of the books on effective Scrum and Agile implementation (see Adkins, 2010; Rubin 2013). Derby and Larsen (2006) codify the retrospective into five steps: (i) set the stage, (ii) gather the data, (iii) generate insight, (iv) decide what to do, and (v) close the retrospective. Within each of these steps, teams complete a series of activities designed to elicit contributions from team members. Hummel, Rosenkranz, and Holten (2015) note that "without reflection, there is no retrospective, at least not one that is useful, and you have to be interested in improving yourself" (p. 285).

Retrospective Activities

There is an abundance of retrospective activity ideas available for teams to implement. Przybylek and Kotecka (2017) report that they reviewed over 100 available retrospective activities for their study. Derby and Larsen (2006) supply a number of retrospective activities for each stage of the retrospective process; many additional activities can be found on the internet.

Derby and Larsen (2006) inform us that "activities provide structure to help your team think together and have several advantages over freewheeling discussion" (p. 21); these advantages include: encouraging equal participation, focusing the conversation, and encouraging new perspectives. In their longitudinal case study that introduced activity-based retrospectives to a team accustomed to non-activity-based retrospectives, Przybylek and Kotecka (2017) provide evidence that activity-based retrospectives are more effective than non-activity-based retrospectives.

Retrospective Effectiveness

Anecdotal evidence tells us that retrospectives have been found to help teams "maintain the sustainable pace" (Wang and Vidgen, 2007, p. 815) "take gradual steps to change and improve" (Wang and Vidgen, 2007, p. 816), and resolve communication issues (Hummel et al., 2015). Conversely, failure to conduct retrospectives has resulted in "difficulties in creating improvement on our project and without appropriate communications we are not sharing knowledge which is a critical aspect of our business" (Barata and Coyle, 2016, p. 6). Retrospectives that focus solely on specific aspects of the team such as "method, techniques and workflow" (Krautz, Johansen, and Uldahl, 2015, p. 7) may be less effective than retrospectives that are focused on more general or broader areas.

Rubin (2013) states that the output of retrospectives may include (i) "a set of concrete improvement actions that the team has agreed to perform in the next sprint" (p. 381), (ii) "a backlog of insights collected during the current retrospective that the team will not address in the upcoming sprint but might choose to address in the future" (p. 381), and (iii) "improved camaraderie" (p. 381).

¹ Pettitway and Lyytinen (2017) also include "Formal lessons learned sessions, informal lessons learned sessions, after action reviews, stakeholder analysis" (emphasis added, p. 3-4) as ways to generate knowledge.

Game-Based Retrospectives

Using games within information systems is not new. Baker, Navarro, and van der Hoeck (2005) report on their experiment using a card game to teach software engineering skills. The authors note that the key elements to their card game are to (i) teach, (ii) instill good practice, (iii) be easy to learn, and (iv) be fun (Baker et al., 2005). Przybylek and Kotecka (2017) note that games are found to improve collaboration and creativity. A distinction should be made, however, between activity-based retrospectives as discussed by Przybylek and Kotecka (2017) and game-based retrospectives. More than just academic semantics, there are nuanced, yet important, differences between activities and games. While activity-based retrospectives are more effective than non-activity-based retrospectives (Przybylek and Kotecka, 2017), game-based retrospectives may be even more effective than activity-based retrospectives and non-activity-based retrospectives.

Games

Suits (1978) summarizes that “playing a game is the voluntary attempt to overcome unnecessary obstacles” (p. 41). More academically, “To play a game is to attempt to achieve a specific state of affairs [prelusory goal], using only means permitted by rules [lusory means], where the rules prohibit use of more efficient in favour of less efficient means [constitutive rules], and where the rules are accepted just because they make possible such activity [lusory attitude]” (Suits, 1978, p. 41).

In typical activity-based retrospectives, there are prelusory goals (e.g., identified areas for improvement, proposed methods for improving performance) but there is not a lusory goal of winning a game; the team is not trying to win a retrospective. Additionally, retrospective activities are generally designed to help teams quickly and efficiently identify issues whereas a game-based retrospective would require constitutive rules requiring less efficient proceedings.

McGonigal (2011) defines games by four characteristics (i) goals, (ii) rules, (iii) feedback system, and (iv) voluntary participation. She further states that “Gamers don’t want to game the system. Gamers want to play the game. They want to explore and learn and improve. They’re volunteering for unnecessary hard work – and they genuinely care about the outcome of their effort” (McGonigal, 2011, p. 472).

Game Elements and Gamification

Suits (1978) philosophizes that humans need to play games and that games are integral to human wellbeing. In defining gamification, McGonigal (2011) looks not only to Suits but also to positive psychology (see Seligman and Csikszentmihalyi, 2000) to evaluate why games matter to humans. With its focus on personal happiness, positive psychology provides the foundation for McGonigal’s (2011) belief that “Games make us happy because they are hard work that we choose for ourselves, and it turns out that almost nothing makes us happier than good, hard work” (p. 485).

Gamification focuses on four primary aspects of game designs that make games successful: (i) urgent optimism, (ii) social fabric, (iii) blissful productivity, and (iv) epic meaning (McGonigal, 2009). These game elements do not exist in standard activity-based retrospectives. Therefore, while the activity-based retrospectives may be more effective than non-activity-based retrospectives, they do not instill the “extreme emotional activation” (McGonigal, 2011, p. 499) that McGonigal cites as the success criteria for popular games. McGonigal (2011) notes that “all of the neurological and physiological systems that underlie happiness – our attention systems, our reward center, our motivation systems, our emotion and memory centers – are fully activated by gameplay” (p. 499).

PROPOSED RESEARCH

This study proposes a multi-phase research approach. First, the study will develop measures for retrospective effectiveness. After determining measures for the effectiveness of retrospectives, the study will develop a game-based retrospective leveraging McGonigal’s (2009) aspects of good game design. The game-based retrospective will then be used within a controlled experiment to determine if game-based retrospectives are more effective than activity-based and non-activity-based retrospectives. The following sections provide a high-level overview of the planned research

Measuring the Effectiveness of Retrospectives

In a search of academic databases, quantitative measurements for retrospective effectiveness were not found. The subjective results of a team’s effort to “focus on inspection and adaptation” (Schwaber and Sutherland, 2017, p. 1) at most provide qualitative or anecdotal evidence of effectiveness. Furthermore, the lens through which retrospectives are viewed impacts what effectiveness is measured. To the Scrum team, effectiveness may be a resolved communication issue, a new process for code reviews, or even rules defining work in progress. To a Product Owner, an effective retrospective may be one that results in an improved method for transitioning user stories into a better understanding of the underlying requirements as well as improved user experiences. Similarly, organizational management may expect to see a decrease in cycle time or an improvement in team velocity as a result of retrospectives.

Semi-Structured Interviews

To develop a measure of retrospective effectiveness that can be used across the organization from the development team to management, a quantitative measure common to all interested parties must be developed. To find the common expectations for retrospective effectiveness, a series of semi-structured interviews will be conducted.² Interviews will be conducted with (i) Scrum team members, (ii) Scrum Masters, (iii) Product Owners, and (iv) managers or “C” level staff responsible for the software development efforts of the organization and all interviewees will be promised anonymity (Koh et al., 2004).

Interview questions will be developed with an emphasis on “elicit[ing] participants’ responses in a nondirective manner” (Tuli, Kohli, and Bharadwaj, 2007, p. 3). Based on interviewee responses, follow-on questions will be asked (Zhang, 2017) “requesting clarifications, examples, and more details into potentially interesting ideas” (Tuli et al., p. 3). All interviews will be recorded (Cyr et al., 2009), transcribed, and analyzed (Zhang, 2017).

Survey

Following the analysis of the semi-structured interviews, a survey instrument will be designed, tested, and administered (Sussman and Siegal, 2003). Guidelines and process for survey development and testing (Churchill, 1979; MacKenzie, Podsakoff, and Podsakoff, 2011; Straub, 1989) will be followed as the constructs identified in the semi-structured interviews are operationalized. Where practical, existing measures and scales will be used. Surveys will then be distributed to members of the Scrum Alliance, PMI, and Scrum.Org as these organizations provide a large membership across varying professional levels and industries.

Developing a Game-Based Retrospective

To help understand the conceptual definition of what constitutes a game, Suits (1978) and McGonigal (2011) both use golf as an example. In golf, the object is to get the ball into the cup, but to do so following the rules of golf (McGonigal, 2011; Suits, 1978). Both Suits (1978) and McGonigal (2011) illustrate that it would be much easier to drop the ball into the cup, but this would violate the rules of the game; therefore, one would not be playing golf if they simply dropped the ball into the cup even though that is the most effective means of getting the ball into the cup.

A game-based retrospective must include:

1. Prelusory goals – the team should focus on identifying areas for improvement;
2. Lusory means – the team should have rules for how to play the game;
3. Constitutive rules – the team should have rules which require less-than optimal solutions;
4. Lusory attitudes – the team must want to play the game; and
5. Lusory goal – the team must understand how the game is won or lost.

Following game design and development, the game will be pilot tested with Scrum teams. Semi-structured interviews (Baker et al., 2005) will follow the pilot test to evaluate what changes are necessary for the game to be successfully implemented in the research study.

Experiment on Game-Based, Activity-Based, and Non-Activity-Based Retrospectives

Citing McGonigal (2011), Marshburn and Henry (2013) propose that “game playing helps to promote positive psychological traits and create a sense of purpose while also weaving a social fabric” (p. 126) since “gamification provides that the more involved or interested people are in their tasks the better they do” (p. 126). Therefore, this research posits that:

H₁: Game-based retrospectives are more effective than activity-based retrospectives.

H₂: Game-based retrospectives are more effective than non-activity-based retrospectives.

Furthermore, based on the work of Przybylek and Kotecka (2017), this research hypothesizes that:

H₃: Activity-based retrospectives are more effective than non-activity-based retrospectives.

A controlled experiment to test the hypotheses will be conducted using the survey developed above to evaluate retrospective effectiveness.

² Semi-structured interviews are an accepted form of data gathering within the existing information systems research (see Cyr, Head, Larios, and Pan, 2009; Koh, Ang, and Straub, 2004; Sussman and Siegal, 2003; Zhang, 2017).

Experiment Procedure

Three existing Scrum software development teams will be used for the experiment. Prior to beginning the experiment, each team will be given the retrospective effectiveness survey to acclimate them to completing the survey following a retrospective. The teams will then conduct three retrospectives as identified in Table 1. A designated Scrum Master familiar with working with the teams will facilitate the nine retrospectives ensuring that for each team, the same retrospective is administered.

	Team 1	Team 2	Team 3
Non-Activity-Based	1 st	2 nd	3 rd
Activity-Based	2 nd	3 rd	1 st
Game-Based	3 rd	1 st	2 nd

Table 1. Experiment Design

CONCLUSION

As organizations look to control costs in software development, it is at times hard to justify the expense in manpower for conducting retrospectives. Although required in a Scrum software development methodology, there are limited tangible results of retrospectives seen from outside of the team. This study proposes to develop a set of quantitative measures that can be used for assessing retrospective effectiveness; measures which can then be used by software development teams to help justify the expense of retrospectives.

Without effectiveness measures, it is impossible to state whether any one type of retrospective is more or less effective than another, thereby limiting the amount of research in improving retrospective effectiveness. Once quantitative measures are established, research can begin looking at the effectiveness of retrospectives to guide organizations to conduct more impactful retrospectives.

Based on existing theory and research, this study will subsequently develop a game-based retrospective focusing on elements of games and game play to increase retrospective effectiveness. The quantitative measures developed early in the study will then be used to measure whether game-based retrospectives are more effective than activity-based and non-activity-based retrospectives. With empirical evidence showing the effectiveness of game-based retrospectives, academia, Scrum coaches, Scrum consultants, and Scrum Masters should focus on understanding and developing game-based retrospectives in order to continue improving the effectiveness of retrospectives.

While this research focuses on retrospectives within Scrum teams, the results and conclusions apply not only to Scrum, but to any of the Agile methodologies which focus on continuous process improvement and, in general, to any team, project, or program trying to facilitate process improvement and increase team performance.

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