The Know-How of Agile Retrospectives in Software Startups

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Abstract. Software startups are responsible for fast product delivery to the market. To aid this process, a retrospective inside a startup team can be very fruitful for software development. The traditional way of conducting agile retrospectives involves discussion based on what went well, what did not go well, and how to improve the software development cycle helps to save resources, get directed toward the startup vision, and overcome several challenges. To attain insights about the agile retrospective approach in startups, we studied the following question: How are software startups performing agile retrospectives? Hence, we conducted seven multiple case studies with 19 semi-structured interviews that lasted 30–65 min. The results outline that all software startups prefer a reflection through agile retrospectives but not in the traditional manner. Due to the startup's casual and less restricted working environment, teams prefer informal agile retrospectives, which involve no confined boundaries of time, venue, and participants.

Keywords: Traditional Retrospective · Informal Retrospective · Team Retrospective · Agile Retrospective · Continuous Retrospective

1 Introduction

Software startups tend to be known for their casual and less restricted working environment than large organizations. Teams intended to work within a startup are less confined to working hours than 9:00 am–5:00 pm. The co-founders prefer to work at their own pace [8]. In the early days of a startup, often, co-founders are not fully-time devoted to the business idea. Partially they might be involved outside the startup life cycle [16].

Startups following agile practices to run the business idea go for agile retrospectives to improve the software development life cycle. The traditional way that encouraged startup teams involves basic questions; what went well in the group? What did not go well? Moreover, what to improve during the agile retrospectives [1,2]. It involves five stages in agile retrospectives; set the stage, gather data, generate insights, decide what to do, and close the retrospectives [2]. Despite that, agile retrospectives lack crucial components such as; which

team members should be involved during the practice. Where should the retrospective be conducted? Moreover, What could be the correct duration of the retrospective session? Several studies have mentioned the benefits of agile retrospectives, such as saving startup resources, enlarging teams, obtaining and getting directed toward the vision, and overcoming many challenges [3]. However, still, the startup failure stories weigh higher than successful ones. Hence, we feel that other studies need the view of agile retrospectives that contribute to assisting the software startup journey. Many startup teams no doubt ask if we are doing the retrospective correctly [4]. Could it be done in another manner? Is it finished with this iteration, or should it be continued? Moreover, if so, to what extent? Considering the various open venues, we formulate the following research question (RQ) that this study seeks to tackle: **How are software startups performing agile retrospectives?**.

The rest study is as follows. The literature review section discusses the existing literature and theoretical framework related to the agile retrospective. Presented in Sect. 3 is the research methodology, which describes the multiple case study conducted with seven software startups. Then we describe the findings of the study in the next section. Section 5 discusses these results from existing literature, and finally, Sect. 6 concludes the paper.

2   Literature Review

"Retrospective" is a practice that deals with reflection thoughts that emerge in the brain [5] of team participants. Retrospectives originated from the Latin word "retrospectare" meaning looking back in the past to the thoughts. Retrospectives occur on experiences with tentative dates or periods to trace back the event [6]. A common retrospective practice is called "Agile retrospectives" [6]. Agile retrospectives come under the roof of agile methods such as programming, daily stand-up meeting, and short iteration. These meetings occur at the regular onset of timely sprints [7]. A team does an agile retrospective at the beginning of iterations. A study defines an agile retrospective as a lessons-learned meeting [1]. As a team-driven practice, the team reflects on how the iteration went and how team members can improve future iterations. It also leads to various changes in the software development cycle [8]. The commonly applied method involves the five stages, which take nearly 35–45 min to complete the agile retrospective. The below list describes the five stages [2].

1. Set the stage - preparing the team with warm-up or ice-breaking activities.
2. Gather Data - sharing the experience of the topic that has to discuss in the retrospective.
3. Generate Insights - Collecting problems, success stories and failures
4. Decide what to do - Based on the previous step, prioritize the things to do for the next iteration.
5. Close the retrospective - Appreciate the team for accomplishments and interactions that help them reflect during the retrospective.

Often startups alter retrospectives practices. For example, in a startup case study, the team conducted a retrospective after a two-week sprint. After the end of the bi-weekly sprint, the team followed a specific activity addressing the problems in the previous retrospective. To identify the problems, the team structured an interview with the scrum master [9]. In another example, the student startup team reflects through agile retrospective practice after sixteen weeks. The startup team performed the retrospective in the seventeenth week, where the discussion yielded what the team learned. [10]. Hence, if we compare these two mentioned cases, we observe different time gaps that teams used to conduct the retrospective. Also, we observe from the case maturity level that the startup is, as the student teams were involved in the last startup. The teams had several iterations before they conducted the agile retrospectives. The retrospective should include a reflection on the experience that the participant earned during the startup development cycle. A team should conduct an agile retrospective to improve the overall startup system so the members involved can work easily and benefit the startup [3].

2.1   Theoretical Framework

HOW and WHAT? Verbal communication, writing notes, asking questions and discussions	WHO ? Two or more than two people
WHEN ? Working hours, spontaneous time	WHERE ? Office and outside the office

Fig. 1. Four theoretical blocks that leads to retrospective

A team could practice various techniques to reflect on experience [11] during the retrospectives [12]. Figure 1 shows four theoretical blocks from the literature mentioned below that constitute the framework. **How & What**: Talking and writing are some of the techniques used by various verbal and written reflection notes during the meeting. Teams could discuss and ask questions with each other to enhance the learning involved in the retrospective [11]. **Who**: Two or more than two members exist in the team during the retrospective session. When two team members are involved, each other often tends to help with reflection on the experience. More than two members, usually participants outside the team, could participate in the reflection approach [13] to do the retrospective [12]. **When**: Team members can perform reflection spontaneous time. This particular way of reflection gets encouraged without being specific to time boundaries [11,14]. Teams can also be formally conducted during working hours [13,14]. **Where**:

A team can perform informally or formally a reflection session. For example, formal is in the office, whereas informal sessions, team members can conduct outside the office [13,14].

3   Research Methodology

In this section, we represent the case description of 7 software startup cases. We conducted a multiple-case study with seven software startups. Multiple cases are selected to explore and diversify the breadth of the research question, and it allows making cross-comparison [15]. All the cases were founded in Italy that involved software development, either an application, web platform, or web-service provider. The startup's age range is between 2–5 years, with 3–5 members constituting the startup. We mainly involved the co-founders and managers during the interview because they were on the entire startup's journey. Most co-founders and managers have been interviewed twice. We conducted 19 semi-structured interviews. The duration of interview lasted between 30–65 min. We asked many background questions to ensure that startups have involved software development as the core that supports the business model. We transcribed all the interviews & later used Nvivo (a qualitative data analysis software package) to code. The team is the unit of analysis.

– **Case A** Startup is a mobile platform that enables the execution of crowd-sourcing campaigns with users carrying mobile devices.
– **Case B** is a software development kit provider. A customized platform offering marketing services to companies that wish to reach customers.
– **Case C** is a security and commercial device provider to customers. It operates in intelligent mobility and has developed a georeferenced digital communication system.
– **Case D** is a platform connecting different outdoor experiences. It helps to connect people who like outdoor experiences and certified guides.
– **Case E** is an intelligence application for indoor spaces. It specializes in delivering value-added services starting from tracking indoor objects.
– **Case F** is a sports platform. It provides services created to enhance synergies among work colleagues if they lack social relations that well-being services could complete.
– **Case G** focuses on designing and developing data analytic solutions for various industries. The startup helps other industries manage the data and make it more straightforward with immediate reports.

4   Findings

Table 1 highlights how the startup teams prefer to do retrospectives. We found that software startups are highly inclined towards an informal agile retrospective approach involving participant reflection. The teams participating in the retrospective do not have (time or office working) space boundaries. It could

Table 1. How are software startups performing agile retrospectives?

How and What teams do?	Who are involved in the team?	What is the usual duration?	Where does the team do the retrospectives?
Talking	All members	5–20 min	Coffee machine, meeting or empty room in office
Writing	Customer	30–45 min	Walking in nature
Multimedia	Shareholders	2 h	Walking next to river
Asking questions	Only co-founders	Half day	Hiking on mountains
Feedbacks		Several hours	Sitting in park with team
Discussion			Taking team for Ski
Guidance			Taking team for Cycling
Reporting			Restaurant or bar
Storytelling			Empty apartment

be spontaneous or planned but not 100% round tables with whiteboards. Agile retrospectives do not occur systematically and linearly as startups proceed in their entrepreneurial journey with various transitory phases such as the early idea stage, team formation, hypothesis testing, and creating the minimum viable product. Crucial is to perform retrospectives in these phases rather than in the proposed or structured manner. The understanding of retrospectives to all the startups is inclined towards reflection and sharing the experiences to learn and improve, irrespective of time and venue.

4.1 How and What Do Startup Teams Do During the Retrospectives?

To understand how & what, we found out that startups prefer techniques such as talking, writing, and sometimes the use of multimedia during the retrospective. Talking is the desired method that helps exchange the mind's reflection thoughts. Participants are reflecting on the experiences and events that occurred exchange by sharing the communication *"We discussed. How to know the customer? (**case A**), We share our thoughts and discuss. Then speak out together and again think about it. What could we do differently? What was the cause? Only by speaking out others will hear it (**case B**)"*. The startup teams commonly practice feedback & discussions during the retrospectives sessions, which also helps to give a better future perspective for the startup journey *"Ask for feedback and share the product, business model, and business pitches. We discussed the feedback about the software development during the retrospective (**case B**)"*. Further, we also found that writing is another way of exchanging reflection thoughts. Teams do report and often prefer to write the experiences and share them in the form of stories with other participants during the retrospective. Handwritten notes such as Post-it notes guide participants to design better future workflow *"How did it*

*happen with our team, good? Bad? What happened? Yes, through notes (**case C**), Think and let us write it down. It should be personal and face-to-face, where the team writes down (**case E**). If a team member does not want to talk about his story and hears everyone is telling their story, he opens up (**case F**)"*. Startups also mentioned using multimedia, such as presentation slides and videos, that moderates the reflection and sharing of experiences during the retrospective sessions *"We have people, and not everyone is in the same place, and some work from home. So, we do a video call and present (**case C**). We also use a personal chat or web chat (**case F**)"*.

4.2   Who Is Involved from the Team During the Retrospectives?

Startups mentioned it is majorly the team *"We started to think and discuss among the team. Everyone must share (**case A**)"* or in another scenario it is just the core team which is just the co-founders who are involved during the retrospective sessions *"Just in the founding team and we agree, so founders let us meet and discuss the issue (**case G**)"*. Depending on how critical the agenda is, participants are involved. Shareholders also participate during retrospectives *"Startup's shareholders sitting. Yes, we have shareholders in the meeting (**case A**)"*. On the other hand, one Startup did mention that in their early idea stage, twice they involved customers to get a better understanding of the problem *"With the core people and the other people. Sometimes when we discuss with our customers or partners, we do retrospective (**case C**)"*.

4.3   What Is the Usual Duration of the Retrospectives?

Startups mentioned different time duration depending on the importance and criticality of the topic. In difficult situations, the retrospective extends to an extensive period. The CEO even said that it took them half-day, and the shareholders repeated two times on different days because it was a point where a startup was about to get shut down *"When at some point, the startup was closing down. It was a retrospective, psychology speaking very hard, where all stakes in or not, black or white. We were asking What are we doing next? Are we closing down? Should we give it another try? That particular retrospective lasted one whole afternoon (**case A**)"*. Later after the critical retrospective, the startup involved the entire team in the upcoming session. Whereas some startups immediately discuss when problems come during the startup journey. This method could solve things quickly and last less than 20 min *"We are a small team and just 2 in the office. Our other members are working remotely. Whenever we get a problem, we turn our chairs around and talk. We do not wait for the end of the week" (**case B**)*. Talking with the teams as the problem exists could lead to multiple or continuous times of retrospectives. The problem can be the trigger for the continuous session. Some startups also mentioned teams were motivated by a prolonged session ranging from 30 min to 2 h *"Everyone from the team spends 5–20 min. Then we also discuss it again (**case F**). We do it for 30–45 min (**case D**). Two hours of reflection (**case B**)"*.

4.4 Where Does the Team Do the Retrospectives?

Mostly the startup prefers an informal venue that is outside the working space. They often conduct in the office, but being in the meeting room is not mandatory. Some teams prefer to go out and walk in nature, such as a mountain, river, or a park and reflect *"We do offsite. It would be best to sit somewhere outside the workplace. We try to do it most informally. We go to the mountains, and do some sports like cycling. Doing this offsite retrospective help **(case E)**"*. Also, startups like to switch places depending on the team's preferences. Some members prefer to reflect while enjoying their hobby or sports such as jogging, skiing, or cycling *"We go to the mountains for reflection and doing hobby which the team would like **(case G)**"*. One startup at a critical stage conducted the retrospective at the apartment. It was a space that was not in use. The co-founders also mentioned that they were all sitting at some point, where they made prolonged eye contact too *"In a cold empty apartment. We needed a kind of safe house. We could cut from the rest of the world and discuss among ourselves. There was a tough retrospective meeting where we sat in a quiet apartment **(case A)**"*. Sometimes when team members meet at the coffee machine, do a small duration retrospective session *"Randomly when we meet at the coffee machine, and then we start discussing the long hold issues which turn into good reflection period **(case G)**"*. Young startup entrepreneurs also prefer to go to the bar after work and do the retrospective session *"Yes, go to a bar with the other co-founder, and we do some reflection or retrospective to discuss the startup problems **(case D)**"*. Finally, when the team works remotely, they prefer online retrospective meetings *We do retrospectives through video calls and without meeting up **(case D)**. We do both, with meet up and doing some online with other team members. When issues can be severe **(case B)**"*.

5 Discussion

Software startups come across entrepreneurial experiences every day and many thoughts emerge in mind *"There are different things to do every day, which leads to experience **(case E)**. Thoughts that need to be discussed during the retrospective **(case F)**"*. Figure 2 is the word cloud of the most repeated ways of doing the retrospective. Asking questions and discussing is also mentioned in the literature as a common way that enhances reflection in retrospectives [11]. The topic is the source to initiate retrospectives and lead a discussion *"Everyone can share the experience. Sometimes with co-founders and other colleagues **(case F)**"*. Compared to findings in the literature, an important thing to discuss is the criticality of the topic or problem conducted during the retrospective. Depending upon the case, the duration, the venue, and team members play the role during the retrospective session. The topic is the one for software startups that could moderate the reflection session during the retrospectives. The topic could make a startup retrospective very informal or formal. At the same time, the literature highlights a traditional approach of agile retrospective [1] with the 5-stage process, completed on average in 35–45 min [2]. From the case of [10] mentioned in

Fig. 2. Word cloud of techniques that startup teams do to conduct retrospective

the literature, the study was conducted only once in the retrospective without saying the time duration. This case is more corresponding to point *(case D)* where young startup entrepreneurs are more inclined to perform informal retrospectives. We can deduce from here that the more youthful a startup is, the more casual the retrospective approach is without any time duration, members involved, and venue to perform. Whereas with the startup life cycle, the more mature it gets the teams to start getting into boundaries of the time limit and people involvement. From Fig. 2, we can see the startup members are primarily involved, which could lead to various time duration. However, for the venue to conduct retrospectives, even mature startups mentioned in Sect. 3 prefer to do informal places and outside offices. The reason might be because reflection during retrospectives is susceptible outside a daily working environment [16].

6   Conclusion

The agile retrospective is a fruitful practice that helps software startups in many aspects and saves them from many dangerous situations. The traditional way involves five stages with three basic questions. Still, it lacks the know-how with various outlooks, such as the team member involvement, where it should be conducted. Hence, to understand better agile retrospectives regarding software startups, we formulated the questions: How are software startups performing agile retrospectives? We conducted multiple case studies with seven software startups, with 19 semi-structured interviews. We discovered that majorly startups do not prefer to work agile retrospectives formally. As startups are young institutions with starting points of the business idea [8], the approach is inclined to informal

agile retrospective. The practice does occur in the startup journey with a more flexible time duration and venue for the retrospective. Team members also vary depending on the criticality of the topic. At first, a retrospective involves the co-founders when the issue is censorious and, later, with the team. However, it is crucial to perform retrospectives continuously to obtain team learning which helps to grow a startup.

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