A Qualitative Study on Off-topic Conversations in Agile Software Development Student Teams

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A Thesis Submitted to EEMCS Faculty Delft University of Technology,
In Partial Fulfillment of the Requirements
For the Bachelor of Computer Science and Engineering
June 22, 2025

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Abstract

With Agile practices being ubiquitous in the software development industry and academia alike, understanding and improving team collaboration is a key aspect of a successful project. Our specific aims with this research are to get an understanding of the circumstances and impacts of off-topic discussions during meetings within student software development teams. We have observed 3 groups of CS bachelor's students as they worked on a 10 week long project. We initially surveyed the students and then recorded and transcribed 1-3 of each team's regular planning meetings over a 4-week period. We have uncovered a number of patterns in off-topic conversations that teams can look out for in order to make better use of meeting time.

1 Introduction

Agile and its derivatives are widely employed methodologies both in the software development world [5][11] and in academia. They promote a dynamic workplace with close collaboration between teammates and customers alike, and encourage a high degree of team self-management. Communication is a key aspect of collaboration [9], so understanding its intricate mechanisms is a vital part of the teamwork improvement process. These mechanisms vary between different teams and fields of work, but what all of them have in common is that everyone needs to start somewhere, and one of such starting points is a bachelor's programme. Discovering the common Agile practices among computer science student groups can help us understand the pitfalls and hardships encountered by developing computer scientists. The results and conclusions of this study can be used by students to become more aware of their behaviours and improve them, by course organisers to adjust their guidance approach for group projects, and also by people in Scrum Master-like roles to improve their approach to conducting meetings.

This report is part of a series of five related works with the overarching goal of finding out what collaborative challenges students face when adopting Agile methodologies in software development projects. The scope of the project's main research question reaches a lot further than the limitations of the project allow us to go, so for this paper we chose to focus on the flow of conversation topics during meetings as a proxy for team collaboration. More specifically, we try to answer the following question:

To what extent do meetings go off topic and what are the reasons behind it?

Our hypothesis is that student teams which often drift away from the meeting's topics end up taking more time to share status information and make group decisions, and create more confusion among participants than groups that deviate less from topics relevant to the meeting.

There are many existing works related to the broader research topic, but we have found none that offers a detailed enough view of the off-topic discussions and their impact on meetings. Our contribution is that, through our methods, we analyse the conversation topics and the level of individual interest and attentiveness in the ongoing meeting at a very fine level. This is in opposition to studies that mainly use self-reporting, which yield results at the level of meeting phases, but not individual dialogue lines.

To answer out research question above, we have conducted a small-scale qualitative study on 4 second year computer science bachelor's student teams over the course of roughly 6 weeks. A total of 7 group meetings have been recorded, transcribed, labelled, and interpreted to better understand the flow of off-topic discussion.

The report is presented in the following structure. Chapter 2 provides background information on Agile and current understanding of collaboration. Chapter 3 goes into detail on the data collection and processing methodologies used to study our specific research question. Chapter 4 presents the final results of the study, and further discussions can be found in Chapter 6. The conclusion, key takeaways, and further research opportunities are laid out in Chapter 5. The ethical aspects of our study are discussed in Chapter 7.

2 Related Work

Since its introduction in the early 2000s, Agile and its derivatives such as Scrum have played a central role in the organisation of software development teams [5]. Agile methodologies have since spread beyond the world of software development, with hybrid approaches such as Agile-Stage-Gate finding their way even into the design and manufacturing of physical products [3].

Agile methodologies focus heavily on self-organisation, adaptability, and tight collaboration between all the stakeholders, including the development team, management, and also the customers. [9] This is evident from the existing scientific literature [3][8][7], as well as primary sources such as the Agile Manifesto [1] [2] and the official Scrum Guide [12]. What is not evident however, are the exact dynamics behind fruitful and effective collaboration.

There are many facets to this question, one of them being the financial one: how can an organisation maximise their return on the resources invested in meetings? Even though the scope of our report covers *student* teams instead, many of the same principles still hold — the collective process of sharing ideas, analysing information and making decisions should be ideally done without wasting attendees' time or other resources. In a 2012 paper, Rogelberg et al. [10] study the real cost of meetings in organisations and outline a three-stage process to maximise their potential: first assess the resources invested in meetings, then assess the return on that meeting investment, and finally formulate and implement a change strategy. The first two stages follow a bottom-up approach, starting at the team/department level and then aggregating the data to provide a company-wide picture. The improvement strategy is then devised and broken down into actionable plans for each department, taking into account their specific environments. They go into more detail on how each step should be conducted to be effective, however, their final guidelines [10, p. 241] are broad and do not mention concrete methods for keeping meeting conversations under control.

As Stray et al. [13] show in their 2013 case study, there are a couple of obstacles that seem to be shared by many teams that organise daily meetings, the four main ones they identified being:

1. The meetings often took longer than scheduled
2. Some people limited their contribution to reporting their work to the Scrum Master
3. Daily meetings created substantial interruptions in people's workflow
4. Some participants had negative attitudes towards the meetings

They performed their study on 3 teams from one software company, and their research methodology was somewhat similar to ours: they attended and took notes from a number of meetings, and conducted semi-structured interviews with some of the participants. The key difference lies in the central use of the interview data for determining the main obstacles. In our study, we opted to transcribe entire meetings, and use the dialogue lines directly in out analysis. This makes the two studies different in that the former [13] focuses on collaborative challenges as *perceived by the participants*, while ours has a narrower scope and uses a purely outside perspective. Stray et al. identified four main obstacles in their research [13, ch. III], however, none of them is related to the actual discourse, and are instead related to the context around the meetings and the assigned roles of the participants. While the environment is undoubtedly important, the information and ideas exchanged are the reason meetings are organised in the first place, and this is the knowledge gap that our research is trying to fill.

Although most of the existing related work is focused on the industry side, everyone needs to start somewhere, and that place is often in academia. These two worlds have strong ties that benefit greatly from effective Agile collaboration practices, as Sandberg et al. show in their 2017 study [11]. To have this common ground and to train future computer scientists, university courses need to provide adequate education in this sense [8]. Studies like ours provide insights into how students collaborate, which can then be used to improve the training process.

In 2018, Ernest et al. performed a case study on 16 students taking part in a geometry class, where they analysed their conversations in terms of student goals and gender. [6] Their results showed that small groups got sidetracked considerably more than larger ones, and that the presence of a discussion coordinator has a strong impact on the frequency and duration of off-topic conversations. They also identified four types of off-topic talk: intellectual, vocational, social: task related, and social: not task related. [6, p. 108] These codes served as inspiration for our own coding scheme described in Section 3.2.

3 Research Methodology

3.1 Data collection

The research reported in this paper is a multiple case study conducted over the span of 4 weeks, involving 3 teams. Each team was comprised of 5 second-year computer science bachelor's students participating in the "CSE2000 Software Project" course at TU Delft [4]. As part of the course, the students were helped to find a client (either a company or a university department) and tasked with developing software for the client over a 10 week period. Each team was assembled according to the students' preferences and assigned a client based on a team interview process. All teams used some form of Agile organisation model, but none of them adhered strictly to a formal methodology. We monitored the groups, starting from the fourth and up to the seventh week of their project.

The data we collected is limited to audio recordings and transcripts of collaborative meetings without a teacher assistant (TA) present. Overloading the monitored student groups with data collection activities and interfering with their project was avoided as much as possible. The measures we took to ensure this are presented in more detail in Chapter 7. All data collection methods we have employed had been approved by the Human Research Ethics Committee of TU Delft.

Throughout the span of the project, a total of 7 meetings have been recorded, with an average length of 52 minutes. For each of them, one member of the research group attended and made an audio recording. The recordings were then used to create tabular transcripts with dialogue lines attributed to individual speakers. The audio data was transcribed using local tools such as Microsoft Teams and Word, and then manually adjusted by the research group members. These tools were chosen because of their accessibility, ease of use and compliance with the personal data handling requirements. However, the format and quality of the transcripts proved to be inadequate, especially for the situations when multiple conversations were taking place simultaneously, or when the participants were using nonverbal vocalisations.

To address these issues, we have developed a system of annotated timestamps. The process of making these involves listening to the audio recording and marking down timestamps of the form `[time, who, code, note]`:

- The `who` field may represent a singular speaker or subgroup. This allowed us to track simultaneous conversations.
- The `code` represents one or more thematic codes. These are described in detail in Section 3.2.
- The `note` is used to provide context, describe what happened, or provide a short transcript. This allowed us to encode nonverbal cues.

The granularity of the timestamps is dynamic, based on context. Long periods of conversation without meaningful topic changes or noteworthy events have fewer timestamps compared to the transitions between different topics or events that prompted strong reactions from the participants.

3.2 Data analysis

We performed a thematic analysis on the collected data. During our first pass over the recordings and transcripts, we looked for patterns that relate to off-topic conversations. We identified five such patters and created the first iteration of thematic codes. During the subsequent passes, we have refined these codes and extracted six top-level themes as presented in Figure 1. Our choice of codes for the ”derailment” theme was influenced by the four themes described by Ernest et al. in their 2018 paper [6], as we have noticed that they characterise well this category of conversations.

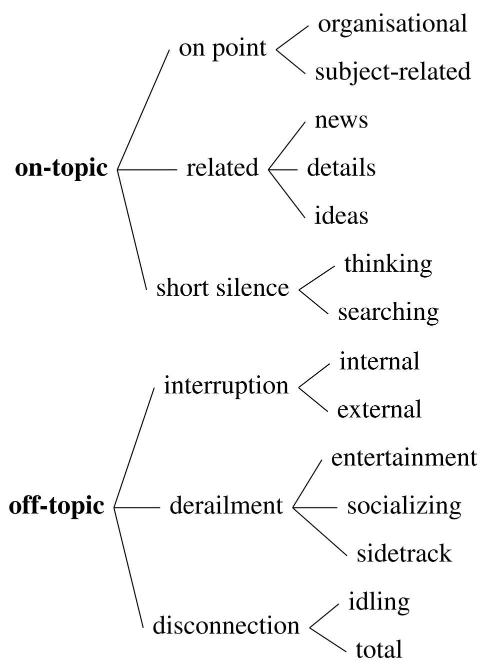

Figure 1: Thematic coding structure

On-point conversations consist of dialogue strictly related to the topic of the ongoing phase of the meeting. Both *organisational* and more *technical* discussions can be considered here, depending on the nature of the meeting. **Related** conversations consist of ideas and bits of information brought up during the meeting, which are introduced because one or more participants consider them potentially relevant. Once in discussion, they might be deemed irrelevant, cause a derailment, or be accepted as valuable points in the meeting. We categorise these as either *news* — recent events that need to be communicated to the rest of the team, *details* — more in-depth discussions about some parts of the project, or *ideas* — things that a team member envisioned and thinks is relevant to the present topic. **Short silence** intervals are periods of time during which participants try think of an answer or solution, read something together, or perform some other quick task that is needed for the discussion to continue. Some participants can easily disconnect during such moments.

Interruptions are abrupt changes in conversations caused either by some *external* factor (e.g. a startling noise, a spilled drink, etc.), or by an *internal* factor such as participant making remark that is not related to the ongoing conversation. While usually short, they often derail the conversation or cause participants to disconnect. **Derailments** occur when the conversation stops being related to the topic of the meeting. We categorise them as either: *entertainment* – the result of a verbal or practical joke that other people subsequently build upon, *socializing* – people sharing related experiences and opinions that are not useful to the meeting goals, but rather serve as bonding time, or *sidetrack* – sudden or gradual derailments due to tangents that don’t organically terminate. **Disconnections** are moments when one or more participants loose focus or interest in the meeting and no longer contribute productively.

4 Results

4.1 Team organisation

One of our first observations working on this study was that all teams used their own form of Agile, borrowing elements from frameworks like Scrum, but ultimately adapting their collaboration methodology to fit their own projects and preferences. This led 2 of the 3 teams to have a mix of both technical and organisational subjects planned for discussion during meetings.

One of the groups went a step further and employed regular 2–7 hours long in-person working sessions (including breaks). The first hour of one of these sessions was recorded and analysed, since it was in preparation for an upcoming TA meeting and consisted predominantly of organisational discussions akin to a daily Scrum meeting. This made it harder for us to interpret their recording, as many of their discussion threads had started before and ended after our observation periods.

For clarity, we label the three groups in this report A, B and C, each with some distinct characteristics:

- A — one member consistently filled the role of the meeting coordinator during weekly planning meetings
- B — the note-taker role was rotated across the team each week; they had the least amount of in-person time together
- C — this team employed long in-person working sessions that interleaved development with team coordination

Group	Meeting length (minutes)
A	49
B	43
B	45–50
B	50
C	50–55
C	58
C	63

4.2 Answer to the hypothesis

After analysing the data, we concluded that our initial hypothesis was too loosely formulated to either confirm or infirm. Instead, we uncovered that the *frequency* and *duration* of off-topic conversations during meetings play distinct roles.

The most common type of frequent but short remarks are the humorous ones. They do not seem to impede a group’s ability to conduct a productive meeting, as long as they are not followed up and result in a derailment. However, they do serve as cover for participants that have disconnected, allowing them to have an input to the conversation without actually contributing towards the goals of the meeting. This pattern was observed predominantly towards the end of each meeting, and is detailed in Section 4.7.

Long derailments and tangents without a clear conclusion prolong the meeting without providing a clear benefit. This is one of the areas that benefits the most from the presence of a capable coordinator. Group C exemplifies this well: during one of their weekly planning meetings, their coordinator was the sole person who prompted the participants engaged in tangential discussions to return back on topic a total of 9 times in 52 minutes.

4.3 On-point discussions

Organisational discussions were some of the most commonly observed ones, also accounting for the majority of the topics planned by the students to be discussed in the recorded meetings. This was expected given the sprint planning format of most meetings. Discussing subject-specific details related to the projects was less often planned, but often emerged from other conversations on related topics or task allocation.

4.4 Related discussions

The ”news” subcategory of related topics consisted mostly of people sharing information from the clients and course coordinators, or matters related to circumstances that may affect team members' future work availability.

The ”details” subcategory was found as the middle ground between subject-related on-topic discussions and implementation details tangents. These were observed to be frequent but short, usually consisting of up to six dialogue lines exchanged between two to three participants, while the coordinator or note taker had a short period of silence for writing down tasks and notes.

New ideas were often introduced through *”What if ...?”* and *”How about ...?”* questions during decision-making situations. They were almost always addressed by the groups, occasionally leading to a tangent.

4.5 Short periods of silence

Short periods of silence were most prevalent in note-takers, which is to be expected given the nature of their role. We have observed that the other participants regularly took time to look over their assigned tasks during the meeting when asked about their status. During these periods, other participants disconnected, especially when faced with external distractions such as shared snacks. The status update part of the meeting was completed comparatively faster when the participants needed to check their project management program to a lesser extent in order to report their progress.

4.6 Interruptions

Internal interruptions were more common than external ones. They consisted of nonverbal reactions that grabbed the attention of the other participants. Since many of the monitored group meetings involved shared snacks, the source of many interruptions can be traced back to the act of consuming them.

4.7 Derailments

The three main causes of derailments we have identified coincide with the respective 3 bottom-level thematic codes:

- Verbal and practical jokes that gained traction among team members were found to be an indicator of derailments. This is especially visible towards the end of the meeting, when derailments make up the majority of conversation time in some cases.
- People sharing their experiences with little relation to the current topic is another indicator of a derailment. These situations create bonding time for the team, but block the meeting from going forward. They are often initiated when a participant has a strong feeling about a subject that was brought into discussion.
- Sidetracking occurred through the repeated initiation of tangential discussion. This was most prevalent in teams with highly technical discussion topics that did not allocate enough time to addressing technical details in dedicated meetings. The discussion were productive, but were outside the scope of the meeting, and interleaving technical conversations with planning caused participants to often ask each other what else needs to be discussed.

All of the phenomena described above are more intense when the meeting does not have a moderator. We observed that people tend to moderate the discussion that they regard as most relevant to themselves, but do so to a lesser degree for the topics that they are not directly involved with.

4.8 Loosing attention and disconnecting

The degree of attention of the participants, judged by their inputs in conversations, tended to overall diminish as time passed. Mentioning that the end of the meeting is near also seems to have an effect on people: some try to pick up the pace and finis discussions, others loose focus and inadvertently stall and derail the conversation. The moments when a participant was asked to present their progress increased their attention, however led to other participants lowering theirs if the topic was not relevant to their tasks. Because of the limitation of the data collection format (audio recordings), we were not able to accurately determine the moments when team members disconnected from the meetings, or when they started to follow again.

One particular phenomenon we observed is that, in meetings moderated by one team member, the other people start relying on the moderator to advance the conversation. When the moderator fails to do so for various reasons, it takes a longer time for someone else to stand up and get the conversation back on track compared to meetings where, due to the lack of a dedicated moderator, most participants are more involved in setting the direction of the discussion.

5 Conclusions and Future Work

The field of Agile collaboration between inexperienced peers is still in need for more research. The patterns we have identified in our results provide a good starting point for future studies. An interesting starting point might be the extent and influence of informal behaviour on team collaboration, as this has proven to be prevalent in the student group projects we monitored. We encourage future studies on this topic to use larger sample sizes, as this would overcome the limitations that affected this study the most.

For the students that are taking part in group projects and the course coordinators of those courses, this report provides an insight into the behaviours at work during organisational meetings, and serves as a starting point for future improvements.

6 Discussion

6.1 Limitations of data collection

The data analysed in this research have been collected by a group of five student researchers who each aimed to answer a different question related to the broader topic of collaboration in computer science. As a result, a significant proportion of the data collected was not relevant and some of the methods used to collect them were deficient for our particular use case.

This study only benefited from an observation window of 4 weeks, and only 3 teams gave their consent for their meetings to be recorded, resulting in a smaller sample size compared to some of the other existing works. Furthermore, while each team had a different project and client, everything happened as part of one single course (CSE2000 - Software Project).

Another factor we could not eliminate was the participants' awareness that their words were being recorded and their subsequent changes in behaviour. An example where this was observed was the use of profanities quickly followed by an apology addressed not to a person but rather to the audio recorder. The behaviour described above occurred only with two participants, but we cannot exclude the possibility that others also altered their behaviour. This phenomenon could have led people to feel less free to start tangential conversations, which directly influences our study.

6.2 Recordings and transcripts

In preparation for future research, better transcription methods should be searched for as this can drastically improve the speed and/or quality of the resulting textual data.

7 Responsible Research

All data collection methods that we employed have been approved by the faculty's Human Research Ethics Committee. We have obtained the written consent of all the students involved prior to any data collection. Precautions were taken as to not interfere with the projects of the monitored groups:

- All the data presented in the research paper is anonymised.
- Audio recordings were short-lived files stored on TU Delft servers and used only for the purpose of transcribing and timestamping.
- All data derived from the recordings never left the researchers' computers or the TU Delft servers.
- Internal and external communications were carried over secure channels in MS Teams.
- Only one member of the research group was present at the meetings as to inhibit the groups as little as possible.
- Study results are released after the end of the Software Project course, and cannot influence the grading of the monitored groups in any way.

Due to the personal nature of the data we collected, it is not publicly available, making the study not fully reproducible. We have, however, provided our reasoning and motivation behind our interpretations of the data in section 3.2.

Some of the limitations we have outlined in section 6.1 are innate to the CSE 2000 course and are hard to replicate in other circumstances. However, our methodology is described clearly and in detail in section 3 for anyone to follow.

We have made use of LLMs to rephrase portions of this report. Their use was exclusively for readability and conciseness purposes, and we have excluded any sensitive information from our explicit prompts to non-local AI models. We have used the limited free trial of Writeful integrated in Overleaf to adjust short snippets (1–5 words). Other uses of LLMs are listed in Appendix A, including the model, prompt and response.

A LLM usage listing

- **MODEL:** ChatGPT4o
  PROMPT: rephrase this paragraph: The research reported in this paper is a multiple case study performed on 3 student teams over a period of roughly 4 weeks. The teams consisted of 5 second year computer science bachelor's students working on the "Software Project". As part of the course, the students were given a client (either a company or a university department), and for a 10 week period they were tasked with working on a client-provided software development project.
  RESPONSE: This paper presents a multiple case study conducted over approximately four weeks, involving three student teams. Each team comprised five second-year computer science bachelor's students participating in the "Software Project" course. As part of the course, the students were assigned a client—either a company or a university department—and tasked with developing a software project provided by the client over a ten-week period.
- **MODEL:** ChatGPT4o
  PROMPT: rephrase the following sentence: Ideas were commonly introduced with "What if ...?" questions during decision-making conversations.
  RESPONSE: During decision-making conversations, ideas were often introduced through questions beginning with "What if...?"

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