



Challenges in video game development

- What does Agile management have to do with it?

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Abstract

The video game industry has gone through a dramatic change over the last few decades, yet several reports show that there are currently many challenges that developers face in their daily work. A major challenge includes difficulties of getting projects to close within set time and resource restraints. This is something that indicates a connection to the management methods being used, among which Agile management is a popular framework that many turn to. This thesis searches for connections between challenges in video game development and the usage of agile methods like Scrum and Kanban. For this, a qualitative research strategy was used in order to look into the experiences of video game developers. Five semi-structured interviews with a total of eleven respondents were conducted. As a complement, a quantitative web-based survey was made where 23 people participated. The results of this study show that challenges previously defined within the video game industry, including feature creep, crunch periods and a stressful work pace can also be identified in the industry in southern Sweden to some extent. Underlying patterns indicate the industrial culture as an explanation for an incorrect implementation of agile methods, which could eventually lead to issues surrounding risk management in projects.

Key words

Video games, video game development, agile management, scrum, pct, project contingency theory, feature creep, crunch

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Glossary

Agile management An approach to software development with focus on flexibility, incremental processes and continual improvement. Also refers to a framework of methods based on a manifesto and set of principles, the Agile manifesto. (Agile Alliance, 2015a)

Scrum An agile method where requirements are broken down into a list of tasks, a “backlog”, which are then set to be completed within a determined period of time, a “sprint”. (Godoy & Barbosa, 2010)

Kanban An agile method which focuses heavily on visualization as well as perfecting and improving the current work flow. This is done by keeping track of the tasks in progress. (Agile Alliance, 2015b)

XP Stands for “Extreme Programming” and is similar to Scrum in several aspects, but with a bigger focus on programming and functioning software. (Abrahamsson, Oza & Siponen, 2010)

DSDM Dynamic System Development Method is an agile method that pays attention to the entire project lifecycle. Puts focus on hitting deadlines while remaining flexible and collaborative. (Agile Business Consortium, n.d.)

Crunch An industrial term referring to excessive and sometimes mandatory overtime work, usually close to an important milestone or deadline. (Weststar & Legault, 2017)

Feature creep A phenomenon within video game development where features are added until the project grows out of proportion in relation available resources. (Kanode & Haddad, 2009)

Preface

This is an undergraduate thesis within Media Technology at Malmö University. The study is about challenges within video game development and how these may be connected to usage of agile methods. This later leads to a discussion about what features within Agile management methods could be improved for a sustained use within the video game industry.

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1 Introduction

The video game industry has gone through some dramatic changes since consoles were moved from the arcades into the homes of people during the 1980's. (Deuze, Martin & Allen, 2007). In 2017 the industry was measured at a worth of 138 billion dollars globally. Even in Sweden, video games have found a strong foothold and its industry grew by 17% between 2016 and 2017, exceeding the global average of 13%. (Dataspelsbranschen, 2018) Thanks to digitalization, video game development is a highly global market (Deuze et al., 2007), which in theory lets a single developer release a game from their bedroom and compete with billion-dollar corporations on the other side of the world.

Creating video games today, however, is a complex process which requires a large set of skills from many different disciplines. It is the unique combination of technological and artistic specialties that in part makes the video game production different than other software engineering industries. (Hodgson & Briand, 2013) As the companies behind the games grow larger, the demand for an effective management method increases. This is needed in order to accurately direct the work flow connected to the intricate technological assets involved in the production process. (Kanode & Haddad, 2009)

The increasing complexity of the technology involved in game production could be seen as a challenge on its own, but it also runs side by side with a fierce global competition. During the production process, video game companies must account for the technological development of hardware (for example video cards) and software, that their clients wish to include in a project, while being aware of the strategic moves of their competitors in order to keep their businesses successful (Kanode & Haddad, 2009). This while constantly adapting the game process in order to find “fun” element, which is what finally decides if the game is ready for release. All of this puts forward a high demand for an effective management method within game production. (Hodgson & Briand, 2013; Godoy & Barbosa, 2010)

Considering these factors and the industry's rapid growth, some authors have pointed out symptoms of “growing pains” that might hold companies back. Production procedures and management techniques that were practical a few decades ago are no longer effective. In some instances, they may even have a harmful impact on the work environment and health of individual game developers (Deuze et al., 2007; Peticca-Harris, Weststar & McKenna, 2015). While new project models such as methods within the Agile management framework have begun to spread and found a strong foothold among many companies (Shahir, Daneshpajouh & Ramsin, 2008; Howell, Windahl & Seidel, 2010; Politowski, Fontoura, Petrillo & Guéhéneuc,

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2016), several authors still point out the need for further insights into the work challenges that game developers face and their relation to the methods they use on a daily basis.

1.1 Background and problematization

Despite the apparent fascination of the video game industry and its production process, there is little literature to be found in this area at the moment, according to several research papers (McDaniel, 2015; Petrillo, Pimenta, Trindade & Dietrich, 2008; Deuze et al., 2007; Weststar, 2015; Schmalz, Finn & Taylor, 2014). A larger portion of existing research instead turns its focus to for example the usage of video games in an educational setting (McDaniel, 2015). Some authors, such as Petrillo et al. (2008), Ahimbisibwe, Cavana & Daellenbach (2014) and Kanode & Haddad (2009), claim that the lack of attention in the academic field is troublesome as the software engineering industry is currently facing many challenges that need to be addressed. As a major part of the software engineering arena, this also has implications for the video game industry.

A widely reported problem is the difficulty of closing projects in time and within budget. Precious research has shown that nearly two-thirds of software projects, which includes video game development projects, do not finish on time or within budget and that they are often unable to meet their business objectives (Ahimbisibwe et al, 2014; Petrillo et al., 2008). Petrillo et al. (2008) and Kanode & Haddad (2009) list various reasons to why projects frequently fail. These reasons include; schedule problems, budget problems, quality issues and organizational issues, the latter of which management can sometimes be a contributing factor. Ahimbisibwe et al. (2014) however claim that game project challenges can be attributed to an inappropriate deployment of management methods. In their study, they draw from the research of PCT, Project Contingency Theory, in order to develop a contingency fit model for contrasting plan-based traditional management methods and agile methodologies. They argue that there are many factors that need to be identified in a project for it to be successful, so called critical success factors, and that managers need to be aware of these when choosing a method for their project.

At the same time, there has been some attention directed towards the occasionally draining work environment that video game developers may find themselves in. This discussion was sparked in 2004 after the publication of a blog post under the user name of “EA Spouse”. The writer of the blog post was the wife of an exhausted game developer who was at the time employed by Electronic Arts Games, one of the world’s largest video game companies. She wrote in detail about how her husband was reaching the point of burn-out towards the end of a project as a result of the extreme working hours he was forced to undertake. (Dyer-Witherford & de Puter,

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2006) As a result, some studies have focused on the so called “crunch culture” of the video game industry, where game developers may sometimes face working 80 or even 100 hours per week in order to reach a deadline. This is a problem which remains even today, according to research made by Peticca-Harris et al. (2015) and Weststar & Legault (2017).

While some authors partly attribute this to the professional culture of the industry, where the line between work and private life may sometimes appear blurry (Dyer-Witherford & de Puter, 2006; Weststar, 2015), others argue that there are factors in the production process which may lead to an unsustainable work load for the employees (Deuze et al., 2007). An example of this is the common occurrence of adding new features to a game even at a late stage in the project, something which has come to be known as “feature creep”. Feature creep has been mentioned as a common cause for stress and missed deadlines within game production (Peticca-Harris et al., 2015; Kanode & Haddad, 2009; Godoy & Barbosa, 2010). Some researchers who participate in this discussion argue that there needs to be more focus on the methods and routines within the video game industry in order to avoid situations of extreme working conditions (Peticca-Harris et al., 2015)

1.1.1 Agile management

Among the methods that are currently used within video game development, Agile management has grown to become one of the more popular practices (Shahir et al., 2008; Politowski et al., 2016). As the methods have grown increasingly popular, scholars signal the need for further research in this area. Godoy & Barbosa (2010) claim that there is currently little focus on the agile methods tailored specifically for game development. Similarly, Senapathi & Drury-Grogan (2017) find that most research on Agile management centers around its implementation into existing organizations and that more focus is needed on a sustained use in a longer perspective in order to improve these methods.

The need for a wider perspective on agile methods can also be illustrated through some of the weaknesses scholars have previously identified through their use in software projects. Some of these weaknesses concern the clash between agile principles like team equality and the traditional structures within companies (Hodgson & Briand, 2013), or the struggle of maintaining flexibility throughout the entire project, adding new features even right before a deadline (Huda & Murugesan, 2016).

Additionally, Petrillo et al. (2008) and Kanode & Haddad (2009) point out that project managers within game development often lack the right competence. They claim that more knowledge and understanding is needed surrounding the methods that the projects use, as well

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as the current challenges within game production in order to accurately determine the requirements for each setting.

In other words, a deeper understanding is needed into the daily use of Agile methods in game production. By looking at the perceptions and experiences that game developers have of Agile methods, current challenges may be more clearly defined, which may help in future attempts of improving the methods.

1.2 Aims and focus

This study will combine literature on the working methods in the video game industry with literature on Agile management methods like Scrum, in order to develop a better picture of how these two may connect in certain challenges for game developers.

The focus of this study will be on the experiences of game developer regarding challenging situations when working with agile methods; in terms of for example heavy workloads, long work hours and communication with team members. The aim is to identify potential connections between the challenges already discussed within the video game industry and the work methods being used. This may help in future research for the improvement of work processes within video game development, which could potentially be applied to a broader setting within software engineering.

1.3 Research question

The aims of the study have led to the following research question:

- What challenges do video game developers perceive when working with Agile management methods?

This question will lead to the following sub-question in the discussion:

- What concepts need more attention within the video game industry and related research in the pursuit of improving agile methods?

1.4 Limitations

Previous studies that have attempted to identify challenges within the software industry, and more specifically the video game industry, have presented similar results although under different labels. This study will include three of the most frequently occurring ones; “Project scope”, “Project schedule” and “Team communication”. These three categories can be

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connected to the management methods within a project. That is why other categories, which are also frequently mentioned, like “Technology”, is not included in this particular study. All categories are however slightly connected, which is why other subjects may also be touched upon in the theory- and discussion chapters.

The empirical data collection focuses on the region of southern Sweden, which excludes larger game studios found in for example Stockholm or Copenhagen. Southern Sweden is however a rapidly growing center for game production both in Sweden and in Europe, which makes it a fitting setting for this study.

As previously mentioned, there is a wide range of roles found within game production today. This study will focus on the ones involved in the core production of game development as defined by Weststar (2015), which includes programmers, game designers, visual artists, quality assurance testers and producers. This excludes for example staff within administration and marketing - however some exceptions have been made for the smaller studios as the responsibilities of the employees here are often fleeting and multi-disciplinary.

Agile management includes a wide range of different methods. In game production, Scrum, XP, DSDM and Kanban have been mentioned as some of the more popular ones (Shahir et al., 2008; Godoy & Barbosa, 2010). In order to narrow down the literature research and specify the empirical data collection, this study will focus mostly on Scrum. Some comparisons are however made with the traditional plan-driven project model, which is necessary as video game companies rarely use purely agile methods, but rather combine them with other tools and more traditional methods (Schmalz et al., 2014).

Finally, while the contents of this thesis could potentially be generalized to a wider context concerning all areas of software development, the author has decided to only include the video game industry in specific terms. The literature study and empirical data collection was limited to this area and therefore any parallels drawn to other parts of the industry might not be as easily justifiable. While there are some similarities to the processes within video game development and that of for example web development, there can also be aspects which may set them apart. One such aspect may be the industrial culture, which has implications for the results of this study (See chapter 5. Discussion).

1.5 Target audience

This study is primarily aimed at people with occupations within the video game industry (students, game developers, producers, publishers, stakeholders and similar) for whom the

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author hopes that the conclusions presented will be insightful. As the study strives to add to existing research within the area, it is also aimed at an academic audience of researchers and scholars within software engineering development and video game development specifically. Finally, the study is aimed to students within Media Technology who may wish to further their knowledge within agile project management methods, one of the most popular frameworks within the media technology field today, and their application on select industries.

2 Theoretical background

This chapter explains the results of the literature study and explains the concepts which lay out the theoretical framework of this study. First is an explanation of Agile management and a discussion about its strengths and weaknesses. This is followed an account of the video game industry and a section which details the challenge categories which were chosen for the empirical data collection. The chapter is ended by a section on Project Contingency Theory.

2.1 Agile management

In order to understand what challenges that video game developers may perceive when working with agile methods, it is first necessary to look into what Agile management refers to, as well as some of its most commonly mentioned strengths and weaknesses.

Among the methods that are currently used within video game development, Agile management has grown to become one of the more popular practices (Shahir et al., 2008). Agile management, or Agile software development, is a term used to describe a larger set of methods and practices. This framework first started to take shape during the 1990's, where there was an increasing focus on methods that prioritized close collaboration between small, self-organizing teams and their customers, together with a frequent delivery of business value. (Agile Alliance, 2015a) In the beginning of the 2000's, a group of software developers published what would later be known as the Agile Manifesto: (Godoy & Barbosa, 2010)

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

Hodgson & Briand, 2013

The manifesto also contains a set of 12 principles, which serves as a foundation for the framework of management methods such as Scrum, XP and Kanban.

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1. Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity--the art of maximizing the amount of work not done--is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Agile Alliance, 2015c

Some of the main characteristics of agile methods have been described as cooperation, simplicity, adaptiveness and being incremental (Godoy & Barbosa, 2010). This together with a strive to upkeep a sustainable work pace (Gren, Torkar & Feldt, 2014), reduce unnecessary documentation and improve a project organization's ability to react to change (Cohn & Ford, 2003). The managerial style of agile has in turn been said to focus on trust, commitment, teamwork, equality and fair treatment (Gren et al., 2014).

2.1.1 Examples of agile methods

Scrum has been said to be one of the most popular agile methods (Hodgson & Briand, 2013). When applying Scrum, the project organization is divided into several small, self-organizing teams. The Scrum teams agree on a backlog, which is essentially a list of all tasks that need to be prioritized and completed within a certain deadline. The tasks are then broken down and placed in short iterative periods called “sprints”. (Gren et al., 2014; Godoy & Barbosa, 2010) At the end of each sprint, a version of the product is delivered to the customer and the progress is reviewed. The team also hold short, daily stand-up meetings where they share the progress on each task and what obstacles they have encountered. (Cohn & Ford, 2003).

Kanban is a method where one of the primary goals is to optimize the time used on each task. There is a limit on how many tasks can be in progress at once and an objective is to reduce all unnecessary activities. (Agile Alliance, 2015b) Unlike Scrum, Kanban allows for unfinished tasks at the end of a sprint (Godoy & Barbosa, 2010).

Another popular method is XP, which is similar to Scrum in several aspects - with the difference that XP places more focus on effective programming while Scrum is more oriented towards productivity in general. (Abrahamsson et al., 2010, Oza & Siponen, 2010)

Godoy & Barbosa (2010) claim that while the iterative approach in agile methods is suitable for game development, there are certain aspects of methods like Scrum, XP and Kanban that may sometimes be challenging for the project. They argue that there has not been enough focus so far on a development of methods specifically for game production. Considering the challenges video game developers often find themselves facing, Godoy & Barbosa (2010) present a method they call “Game Scrum”.

In explaining Game Scrum, the authors divide a game development project into three parts: Pre-Production, Production and Post-Production. In the Pre-Production phase, the focus lies on brainstorming and creativity. The objective is to define the ideal game concept which is later put into a “game document”. The purpose of the game document is to clarify the contents, and thereby the scope, of the project. (Godoy & Barbosa, 2010)

In the production phase, the contents of the game document are translated into the backlog which is used for the sprints. One of the main challenges that Godoy & Barbosa (2010) identify during the production process of a video game, is the difference in working process between for example programmers and artists. They suggest that artists should be allowed to leave certain tasks unfinished at the end of a sprint, which would mean an incorporation of some Kanban features (Godoy & Barbosa, 2010).

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The post-production phase usually contains a “post-mortem”-meeting, where the project team gathers to discuss what can be learned from the finished project. (Godoy & Barbosa, 2010)

2.1.2 Strengths and weaknesses

Many organizations within software development turn to agile methods because of frustrations regarding useless documentation, customer dissatisfaction and late releases (Gandomani & Nafchi, 2016). Some of the strengths that are frequently mentioned of agile methods seem to be targeting just this: a focus on reducing unnecessary documentation, simplicity and frequent deliveries (Shahir et al., 2008; Godoy & Barbosa, 2010). Frequent deliveries can also bring forward positive effects such as improved risk management and quality assurance (Shahir et al., 2008).

There are certain aspects of agile methods which are described as especially beneficial for the dynamics of the project team. Shahir et al. (2008) mention the focus on teamwork and collaborative decision-making, which means the intention is to let everybody in the team be influential when making a decision. Similarly, Hodgson & Briand (2013) describe a perceived strength which is to incorporate suggestions from every part of the team, which places responsibility not only on the management but also on the developers themselves. Their study showed that some developers also felt that they had more control over their own time since they were able to work within sprints that they themselves had helped to define (Hodgson & Briand, 2013). Gren et al. (2014) also found that people within teams that worked within agile teams seemed to feel more motivated than in comparison to when they were working in projects that did not use agile methods. Another feature of Agile that facilitates the team’s work flow, is that it removes the dependencies on specific developers, which reduces potential obstacles that may arise if a team member is unable to be present for a certain task (Shahir et al., 2008).

Agile methods like Scrum breaks down large teams into smaller components where developers from different disciplines, such as programmers and artists, work closely together in their daily task. According to Kanode & Haddad (2009), this seems to strengthen and enhance communication across disciplines. There are also examples of software developed especially for teams working in agile projects, that let developers keep track of what tasks are in progress and what their team members are currently working with. These types of tools are said to facilitate team communication when working with Agile. (McDaniel, 2015)

Authors have found that agile methods generally seem to be more fitting in projects that are intended to be creative, innovative and that are uncertain and may be subject to change (Špundak, 2014; Abrahamsson et al., 2010).

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Paradoxically, some of the perceived strengths of Agile can also be turned into weaknesses. For example, Shahir et al. (2008) mention the lack of documentation as an occasional obstacle within projects as it prevents the team from learning from past mistakes by looking at discarded ideas. They also discuss the difficulties of accurately estimating how much time or resources should be spent on a project or certain tasks, as a result of the frequent changes. Allowing for constant change in requirements is also something that Huda & Murugesan (2016) find to be an obstacle in their study; where software developers would sometimes abandon a task in order to finish a new one in the middle of an on-going sprint.

Concerning the decision-making process, Hodgson & Briand (2013) find that the opinions of managers often end up influencing the rest of the team. Although one of the main principles of Agile is equality, the hierarchal structures of the organization are not easily removed and the demands from higher levels may sometimes limit the autonomy of the teams. Such demands can concern for example the decision whether a feature is finished or not or changed priorities which affect the planned sprints for the team. These types of situations can in other words be said to work against the idea of having self-organized teams when working with Scrum.

Additionally, several authors agree that Agile methods are not suitable for all types of projects (Špundak, 2014; Abrahamsson et al., 2010; Shahir et al., 2008). Some features of Agile, such as the lack of documentation, daily stand-up meetings and allowing for constant change, are more difficult to handle the larger the organization or project gets (Shahir et al., 2008). In large and complex projects that may also be accompanied by many risks, it could be more suitable with traditional plan-oriented management methods (Špundak, 2014). Gren et al. (2014) also find that some organizations may be reluctant to fully incorporate an agile way of thinking when it comes to flexibility around the budget and deadlines of the project. Shahir et al. (2008) suggest that in order to cope with difficulties of time and budget estimations, organizations could combine their projects with some traditional management methods and risk analysis.

2.2 The video game industry

Considering the rapid growth and changes that the video game industry has gone through over the past few decades, some authors have pointed out symptoms of “growing pains” that might hold companies back. Some of these symptoms have previously been connected to the management practices and organizational structures among companies. (Deuze et al., 2007; Peticca-Harris, Weststar & McKenna, 2015). A further look into the industry’s background and culture could help in gaining an understanding of the current challenges that arise when working with certain management practices.

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Video game development was initially something which was done by a small team of a few passionate spirits but has since transformed into a billion-dollar industry. Smaller studios are still the norm (Dyer-Witherford & de Puter, 2006) but there is intense competition against the large so-called AAA-companies who stand behind the most expensively produced and highest-quality games (Toftedahl, Backlund & Engström, 2018). Some authors depict a contrast in the industry culture, between the passionate game developers who enter the business to work at their dream job, and the increasingly hierarchal and profit-driven forces that drive the companies forward (Peticca-Harris et al., 2015; Deuze et al., 2007).

Deuze et al. (2007) point out a tension between game developers and producers on a team. Where the game designers might be more focused on creating the best and most fun game possible, the producer's task is to get the project to deliver on set milestones, within budget, and getting the game a good status once it's released to the publisher. Departments within game companies can additionally turn out to be quite hierarchal in their structure, ranging from 'junior' to 'senior' roles within each discipline. The dynamics between these roles can however differ depending on the national culture.

There is a wide range of roles involved in producing video games. Weststar (2015) names the roles involved in the core of game production as engineers, programmers, visual artists, audio engineers, animators, game designers, writers, quality assurance testers and producers. In smaller companies these roles might be fleeting and one person can act both as a programmer and designer, for example. In larger companies however, the team consists of many different, narrowly defined roles (Deuze et al., 2007).

The growing complexity and required teamwork within the industry has underscored a need for "soft skills" such as good communication skills and interpersonal relationship management. (Deuze et al., 2007) Kanode & Haddad (2009) point out that there is a lack of proper management skills within the industry in general, which may be a cause for some of the challenges currently experienced. Previously the norm has been for developers to advance their careers internally by climbing the ranks over the years. In 2005, IGDA (the International Game Developer's Association) reported that several projects were led by managers with only a few years of experience from the industry. This trend has however started to change, as more institutions of higher education all over the world have begun to offer programs in game development (Deuze et al., 2007).

2.3 Challenges in video game development

Many of the current challenges facing video game developers also concern software development in general. Reports have shown that nearly two-thirds of software projects are unable to finish on time and within budget, often failing to reach their business objectives as a result. (Ahimbisibwe et al., 2014) A general explanation for this problem seems to fall on an inappropriate choice of project management or a poorly adopted project methodology (Kanode & Haddad, 2009; Ahimbisibwe et al., 2014). The following section examines some of the most commonly mentioned challenges within video game development that can also have a connection to the methods being used. **Examining these challenges could help in finding patterns when comparing to the experiences of video game developers in the empirical data collection.**

2.3.1 Project scope

Having a well-defined project scope at the onset of a new project will help in averting problems of for example scheduling and budget. Kanode & Haddad (2009) point out that the project scope should not however, be defined in a way that it obstructs creativity for the developers nor should it be followed dogmatically. The nature of game production means that requirements will always change, therefore a change in project scope is also to be expected. Despite this, a properly defined project scope is necessary in order to guide the project to its conclusion without any dramatic or detrimental effects on the results.

A common issue in game development projects is that the project scope is not properly defined. During the production process, new features are often added which can significantly alter the size and complexity of the project. This phenomenon is known within the industry as “feature creep” (Al-Azawi, Ayesh & Obaidy, 2014; Kanode & Haddad, 2009). Reasons for feature creep may for example be that developers discover a new interesting element that they wish to include in order to make the best game possible, or that a piece of code is included without planning with the intention of saving time, but rather it has the opposite effect. In other words, technology is also a factor to consider here (Petrillo et al., 2008). Despite the negative effects that feature creep may have on a project, some authors point that there are examples of games where the features that were added at a late stage were ultimately what made the game successful (Petrillo, Pimenta, Trindade & Dietrich, 2009; Al-Azawi et al., 2014).

However, in order to avoid the negative effects that may be caused by feature creep, a careful evaluation and risk analysis is recommended before adding any new elements to the project. Any unplanned features should be analyzed based on expense in the form of time and other

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resources, against how much value they add to the game. (Kanode & Haddad, 2009) According to Schmalz et al. (2014), it is rare that game project organizations conduct a thorough risk analysis. It is more common to test the way forward and evaluate as you go. This is one of the reasons to why agile practices seem to fit into the game developing process. (Schmalz et al., 2014)

2.3.2 Time management

Problems with schedules and missed deadlines is a major challenge within software development projects. Petrillo et al. (2008) found in their study that 65% of game development projects report delay or optimistic schedule as a problem.

As previously mentioned, issues with schedules can also in some cases be connected to the project scope. If the requirements are well-defined in the pre-production stage, it will be easier to estimate how much time each part of the process should take. (Kanode & Haddad, 2009) Problems with scheduling can additionally be related to issues that might arise with team communication. This is especially relevant in larger companies, where there are many different disciplines involved in the production process. Disciplines may sometimes be left waiting on other units to finish their tasks before the work can continue. (Petrillo et al., 2009) Other factors such as technological difficulties, lack of proper documentation or emerging requirements can also contribute to this. This also makes it more difficult to create a realistic time estimate for each task, which in turn makes it harder to define a realistic deadline for the project. (Al-Azawi et al., 2014)

Schedule problems can be connected to the phenomenon known as “crunch time” which is common in the video game industry. Dyer-Witthford & de Puter (2006) discuss the reasons to why crunch time seems to be widely accepted among game developers. They found that many times large game companies are able to take advantage of the newly hired, young employees who show a great deal of passion and rigor in their work. As the line between work and private life becomes blurry, employers could convince their employees to extend their work days to 12 hours, 6 or 7 days a week. (Dyer-Witthford & de Puter, 2006; Peticca-Harris et al., 2015)

While surprisingly few companies reported crunch time as an issue according to Petrillo's et al (2008) study, it can still be regarded as a significant concern because of the effects it has on developers. Extreme working hours not only cause stress and fatigue but may result in burn-out or even depression (Peticca-Harris et al., 2015). While these effects primarily concern extreme

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cases, crunch time is a wide-spread occurrence in the industry which is why authors point it out as a major challenge.

2.3.3 Team organization and communication

Game development is a complex process that often requires intense collaboration between different disciplines, involving people from diverse backgrounds that all have different prioritizations (McDaniel, 2015). Challenges with team communication may, as previously mentioned, be connected to challenges with a project's schedule since reaching an understanding between different units can turn out to be a time-consuming task. This is especially true in large companies where units may not even be placed in the same building, city or country. Transferring materials back and forth, while maintaining a clear dialogue can become problematic if not handled correctly. (Petrillo et al., 2008) Kanode & Haddad (2009) describe the difficulties of managing a multi-disciplinary team and relates this to the complexity of the assets involved in the production; not only must the different disciplines handle their own tasks which are complicated on their own - but also try to explain and translate their needs regarding the assets to the other units.

Lack of communication between different disciplines is mentioned as a recurring issue in game development projects. In some cases, the divide goes as far as creating a sense of “us” and “them” between for example programmers and artists (Kanode & Haddad, 2009). Even the project managers are affected by communicational challenges, which has an effect on decision-making, team training and estimations regarding time and resources (Petrillo et al., 2009).

2.4 PCT – Project contingency theory

Some authors have pointed out the lack of attention in previous research towards the management methods that are currently used within the video game industry (Peticca-Harris et al., 2015; Godoy & Barbosa, 2010). At the same time, some of the previously defined challenges within video game development could potentially be attributed to an inappropriate deployment of project management methods, according to Ahimbisibwe et al. (2014). By looking closer at the model which they put forward, based on the Project Contingency Theory (PCT), we may gain a better understanding of some of the underlying patterns which might serve as a cause for frustration in projects.

PCT is based on the organizational contingency theory, which argues that the effectiveness of an organization depends on how well it “fits” with its environment. This means an organization must adapt certain characteristics to fit into different external conditions. External conditions

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that may have an impact on the organizational structure are called “contingency factors”. (Howell, Windahl & Daellenbach, 2010; Ahimbisibwe et al., 2014) Similarly, PCT argues that since not all projects are the same, there is no “one size fits all” when it comes to choosing a project model. Instead, the context of the project must be taken into consideration. (Ahimbisibwe et al., 2014)

Howell et al. (2010) stated the need for developing a framework model for helping project managers choose the right model for their project. This is a need that has grown stronger with the spread of alternative project models such as Agile, Lean or soft systems methods. They point out that the spread of agile methods in particular has led to a discussion to when these methods are really suitable.

The framework that they develop takes two factors into consideration; Uncertainty (U) and Consequence (C). Uncertainty includes external changes in for example the market, technology, or internal such as project requirements or goals. Consequence refers to how much is at stake, that is, the urgency or criticality of the project. With support from the framework they later argue that plan-driven models are not suitable for projects which are characterized by a high degree of uncertainty (Howell et al., 2010), something which corresponds to previous research by for example Ahimbisibwe et al. (2014). The reason for this is that uncertainty will most likely drive the project towards decisions outside of the initial plan. If the plan is not followed this will only lead to further changes which may ultimately harm project objectives. The better option would then be to prepare for a changing plan by using flexible methods. Further, so-called “emergent” project models, to which agile methods can be classified, should not be used in projects where there is much at stake. When there is a high risk involved, careful planning becomes more important and sudden consequences may be hard to deal with. (Howell et al., 2010)

Following this framework, Howell et al. (2010) suggest a few process selection applications to help managers decide which model better suits their project. One of these involves tracking a project over time and adapt the model to these changes. It is argued that since both U and C can change over time, if these are tracked correctly, the project manager can decide to adjust their chosen model or switch it out completely as the project progresses further.

3 Method chapter

This chapter describes and motivates the choices behind the research strategy for this study. First follows an account of the research strategy. After this the data collection process is described. The chapter is concluded with a critical discussion about the methods and their implications for the results.

3.1 Research strategy

Before choosing a research method for this study, the author considered the research question and what tools might be the most suitable in order to answer it. First, one can choose between quantitative and qualitative methods.

Since the aim of this study is to uncover experiences and perspectives of game developers in relation to challenges within the video game industry, a qualitative research strategy was chosen. Qualitative methods are common in studies that focus on people's perceptions, attitudes, opinions and experiences. The scientific approach behind these methods is constructivist, meaning that science must always be understood within a certain context, as all social phenomenon have been socially constructed. (Bryman, 2016) Given that the context of the study is of large importance, reliability is not sought after in the same extent as in quantitative research. By asking the same research questions to a wide collection of data however, a high validity can be achieved, meaning there is a strong connection between the questions asked, the methods used and the conclusions that they lead towards. (Wisker, 2009) Common methods within qualitative studies are semi-structured interviews and focus groups (Bryman, 2016). Semi-structured interviews were chosen as the most appropriate tool, as these allow for insights into the perspectives and attitudes of individual respondents (Robson & McCartan, 2016).

A wider aim of the study is to point towards the prevalence of the discussed challenges within the industry, as is perceived by its employees, which is why a quantitative method was chosen to complement the empirical data collection. Quantitative methods use a positivist perspective, in which science is assumed to be based on objective and hard facts that are available for observation (Robson & McCartan, 2016). The aim is to present generalizable results by using precise and quantifiable measurements in order to achieve a high level of reliability. This indicates that the results will be the same no matter who conducts the study and where. (Wisker, 2009) For this study, an internet-based questionnaire was used, which is a common method within quantitative research (Robson & McCartan, 2016).

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While the interviews and questionnaire were conducted separately, the question guides for both methods derived from the research question with the literature study as a background. The question guide for the survey were however more aimed towards investigating perceived strengths and weaknesses of working with agile methods, in order to try to generalize the experiences. For the interviews, the questions were intended to try and go more into depth of the reasoning behind the attitudes the respondents had.

3.1.1 Sampling method

How the sample of respondents is chosen will have an effect on the results of the study. While one should always strive for a sample with a high representativeness, this may in many cases be difficult to achieve. One commonly separates probability sampling methods and non-probability sampling methods, which refers to whether all units in a population stand a chance of being selected or not. (Østbye, Knapskog, Helland & Larsen, 2004)

For this study, a combination of the non-probability sampling methods convenience method and the snowball method were used. The author first used prior contacts to find a small group of participants, some of which were later asked to pass on information regarding the study and the link to the internet-based survey study. Further, information was gathered using the report by Dataspelebranschen (2018) which lists all registered video game companies in Sweden 2017. The author then used this information to send out information and interview requests for the study to studios in the region of Skåne, using the snowball method to let the responses be passed on to as many participants as possible. The only criteria that was involved in the sample process, besides the physical proximity of the studios, was that the participants had an occupation within the video game industry (including both employees, employers and students). These non-probability sampling methods were chosen as they were appropriate considering the time- and resource restraints of the study.

3.2 Data collection

The questions from the interviews and the survey are attached in Appendix 1 and 2.

3.2.1 Qualitative interviews

Five interviews were made with a total of 11 respondents, using a semi-structured interview guide. The last and fifth interview was a group interview with seven respondents. The other four were made separately with individual respondents.

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Semi-structured interviews follow a pre-defined question guide that helps make sure that enough data is gathered on the matter at hand. Unlike completely structured interviews, that may be compared to a questionnaire study, the semi-structured format allows the respondent to speak relatively freely in response to the questions. By doing this, the personal beliefs and attitudes of the participants may be identified. Another benefit of the semi-structured interview is that researcher can use probes so to get more elaborative answers (Robson & McCartan, 2016).

3.2.2 About the respondents

The first three interviews were conducted the 10th of October 2018 at “Studio X”, a small studio located in southern Sweden with less than 10 employees. The respondents had roles as programmer and producer, visual artist and marketing respectively. As is common in smaller companies, many responsibilities are fleeting and shared between employees, which explains why one respondent identified both as producer and programmer, while the respondent who mainly worked with marketing also had insights into the core production of the company. Studio X does not actively work with agile methods. They do however use a software program called Trello which could be explained as a virtual Scrum board where tasks for each sprint are uploaded and can be shared within the team. They do not hold daily stand ups as it is often unnecessary in a small team that works in a shared space, and do not work after strict deadlines. However, two of the respondents had previous experiences of working with agile methods like Scrum and Kanban and could relate certain features to the production process at their current workplace. The interviews were done separately and were all about 30 minutes long each.

The fourth interview was made on the 30th of October over the phone with an agile coach, “AC”. AC has worked within the video game industry for more than ten years and has had various roles ranging from visual artist, designer, producer and project manager in both large and small companies. As an agile coach, AC has experiences with methods like Scrum, Kanban and Crystal, to name a few. The interview with AC lasted approximately 40 minutes.

The fifth and final interview was a group interview conducted at a seat of education for video game production in southern Sweden. A total of seven respondents, all students, were present; three visual artists and four level designers. Two of the level designers had to leave the interview about half-way in due to other obligations. The students were all in their second and final year of education and therefore had experienced a few game projects where an applied method of Scrum was used. The group interview lasted just over 40 minutes.

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All interviews were recorded and later transcribed. The author also made notes by hand during the interviews to prevent loss of information and gather spontaneous thoughts that arose during the discussions. The questions followed a similar pattern and focused on among else what strengths and weaknesses that were perceived surrounding agile methods. Between the different interviews, some of the questions were revised to guarantee they would generate as much relevant data as possible.

3.2.3 Quantitative survey study

Surveys are suitable for studies where the subject is already known to the researcher and the questions can be phrased in a way so that they are not easily misunderstood by the population. When the surveys are filled out by respondents themselves without a researcher present, it is even more important that the questions are phrased in a way that is easy to understand so as to avoid misunderstandings. It is also important to ensure that the fixed alternatives for answers are easily understood and relevant to the question. (Robson & McCartan, 2016) Some authors, such as Robson & McCartan (2016) and Bryman (2016) recommend caution when including open questions in surveys as they will mean extra work compiling the results. However, open questions are also useful as they let the respondents elaborate on their own interpretations and provide the researcher with new angles to the data (Bryman, 2016). This survey used open questions in order to provide the possibility of elaboration from the respondents, which was advantageous in deepening the understanding of game developers' experiences.

To ensure that the questions were not easily misunderstood and followed a logical pattern, the author asked two acquaintances with knowledge within the subject area to test out the survey before it was sent to the respondents. Necessary revisions were then made and the survey was sent out using the snowball method. This included the use of the social media platforms Facebook and LinkedIn. The survey was made and the results were compiled using the Forms-function on Google Docs. A total of 28 people answered the survey. Five out of these answered that they had not previously worked with agile methods. They were led on to a different section of the survey which is not included in the results because it did not carry relevance to the research question.

3.3 Ethical aspects

This study follows the guidelines specified by Vetenskapsrådet (2017) regarding ethical issues in a scientific context. These guidelines focus on the importance of informed consent for the

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participants in the study as well as a clear and structured documentation throughout the research process.

Informed consent means that the participants in a study shall be informed of the purpose and aim of the study as well as what their participation will result in. Enough information must be given so that the person can decide whether they want to participate or not. (Bryman, 2016) It should also be clear to the respondents that their participation is voluntary and that they may withdraw at any point if they wish to do so (Robson & McCartan, 2016).

Upon reaching out to potential participants in the study, the author explained the topic and aims of the study. This information was retold and further explained before each interview and the start of the survey. For the interviews, the respondents were also asked if they consented to being recorded.

Anonymization and a confidential processing of data was guaranteed. This was done both in order to comply with the regulations of GDPR but also to make the respondents feel more comfortable in participating and sharing personal experiences.

Considering the regulations of the recently introduced GDPR, General Data Protection Regulation, the collection and processing of un-anonymized data has been conducted with caution. The audio files from the interviews were the only files which contained un-anonymized data and these were encrypted after the transcriptions were made. Further, the author decided not to ask for information regarding gender or age in the survey study, as this information was not considered relevant for the research questions. Even though the entire survey was anonymous, this decision was made in order to limit the amount of information the author had access to regarding the respondents.

3.4 Methodological discussion

This study was made with a multi-strategy methodology; a combination of qualitative interviews and a quantitative survey. Such a combination is favorable when the aim is to increase the validity of the results and diminish the weaknesses of the respective methods. One disadvantage of the multi-strategy research design, according to Robson & McCartan (2016), is that sometimes it is difficult to integrate the results of each method. For this study however, the results of the interviews and the survey are pointing in the same direction in many aspects - but not all (See 5. Discussion).

Qualitative interviews were chosen as an appropriate method as the aim was to investigate perspectives and experiences of game developers. Some disadvantages of interviews must be

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taken into consideration; for example, it is not unlikely that the respondents are affected by the presence of the researcher or their colleagues. Most people will want to portray themselves in a favorable way or may sometimes adapt their answers to what they might think the other person wants to hear. The answers must therefore be studied critically, also judging factors such as environment and body language – which was all taken into consideration for this study.

It is possible that a deeper qualitative approach, such as observations, could have been favorable for the results and the understanding of how game developers perceive working with agile methods. As is often the case, time and other resources are often a deciding factor in this (Bryman, 2016). The focus of this study was however mainly on the perspectives and attitudes of game developers, while observational techniques concentrate more on the actions and behavior of the respondents.

The quantitative survey study was chosen with the aim of completing the qualitative results and contributing to a slightly more generalizable picture. One disadvantage of conducting surveys over the internet is that the data collector cannot know the real identities of the respondents, whether they answer truthfully or whether they have fully understood the questions (Robson & McCartan, 2016). This is something that must be taken into consideration for this study. Another aim of the survey was also to increase the reliability of the results, meaning that the results should be reproducible by other researchers. The reliability, as well as the validity, of this study can however be critically discussed considering a range of other factors.

One of these factors is the sampling process. Bryman (2016) states that the selection of samples in a study have a significant meaning for the generalizability of the results. This study used a non-probability sampling method, which induces a higher rate of sampling bias. This means certain groups have a higher chance of being selected than others (Bryman, 2016). In this case, the author reached out only to companies and individuals that are based in the region of Skåne in southern Sweden. This was necessary for the interviews for practical reasons. For the survey, the author decided that this would limit the population being studied and create a higher generalizability. It could however be argued that the survey should have been sent out to companies in other parts of the country as well, as this would have generated a bigger sample (although this would have needed to be compared to a much larger population as well). Further factors affecting sampling bias are discussed below.

3.4.1 Respondents

The author has considered certain factors that may indicate a sampling bias for the results of this study. One such factor concerns the backgrounds of the respondents - such as how many years

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they have been active in the industry or what they have done before. In this case, there seems to be a relative diverse sample of respondents, including both students and long-term employees.

When it comes to the representation of disciplines however, some are more often occurring than others. The visual art discipline was underrepresented in the survey (3,6%) and no respondents in either study identified as quality assurance tester. This means some perspectives are given bigger space than others in this study. Further, the survey showed that 50% of the respondents were employed at a company of micro size (1-20 employees) and 39,3% were employed at a medium sized company (101-500 employees). Among the interview respondents, only Studio X represents an actual company - which falls under the micro category. This sample does not fully correspond with the report by Dataspelebranschen (2018), which shows that approximately 58% of people who work within the Swedish video game industry are employed at a big company (500+ employees). In other words, generalizability could be problematized from this.

The table below (Table 1) presents an overview of all the respondents that participated in the empirical data collection of this study.

Table 1. Presentation of participating respondents in empirical data collection

Number of respondents	Who	When	How
3	Producer + visual artist + external communication at Studio X	10th of October 2018	Individual semi-structured interviews
1	AC (Agile Coach)	30th of October 2018	Telephone interview
7	Game development students (3 visual artists, 4 level designers)	31st of October 2018	Group interview
23	Game developers from various companies and disciplines	17th of October - 9th of November 2018	Quantitative survey study

3.4.2 Questions

A study with high validity implies that there is a strong correlation between the questions asked and the answers given - in other words, the results are accurately derived from the empirical data. The way that the questions are asked and how the respondents interpret those questions have a significance for the validity of the study. (Wisker, 2009)

Some of the interview questions were revised between each session. This was done partly in order to adapt to the background and context of each interview. The author also saw a need for

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adjusting and refining questions so that they would generate more and relevant data - a step which is necessary in both qualitative and quantitative studies, according to Bryman (2016).

In one way, this could be said to lower the validity of the results as not all respondents received the same questions. On the other hand, the questions had been broken down from the research questions and the theoretical background, meaning they all pointed towards the same aspects. The changes that were made were often adaptations to the context of the respondent, to help them better understand what was sought after. This could be said to increase the validity.

How the questions were received and answered by the respondents could also have been affected by the interview format. For example, in the separate interviews there was more space for the respondent to ask for clarifications and take time to think about their answers. In the group interview, the direction of the discussion could have been influenced by whoever spoke first.

The personal interpretation of the respondents regarding the subject has been a challenge for this study. When the term “Agile management” is mentioned, many will have different understandings of what this means. Some might associate it mostly with the Agile manifesto and see it primarily as a way of thinking - while others connect “Agile” with the methods that they use on a daily basis, such as Scrum or Kanban. This seems to have been mainly a problem in the survey study, as the respondents had no way of asking for clarifications. Some of the respondents commented that they did not understand the question and therefore often chose the “Other”-option. This occurred despite the fact that the author had the survey tested two times before it was sent out. As a consequence, the attitudes which can be interpreted from the survey might come off as vaguer than they would have with different questions.

4 Empirical data

This chapter contains the results of the empirical data collection. The first section details the findings of the qualitative interviews, which is then followed by a compilation of the quantitative results from the survey study.

4.1 Interviews

The following section recounts the findings from the qualitative interviews. The findings are presented into four categories. The first category retells the attitudes and general experiences that the respondents have regarding agile methods. The remaining results are grouped into the categories used in the theoretical chapter.

4.1.1 Attitudes and general experiences concerning agile methods

While all respondents have different experiences and knowledge regarding agile methods, the attitudes were overwhelmingly positive. Among the students, the level designers described the agile way of working as “structured” and “facilitating a complex process by dividing it into smaller tasks”. The students all agreed that working with Scrum was good in helping make prioritizations based on what is best for the product, frequently using the phrase “kill your darlings”. The employees at Studio X were all agreeing that working with the virtual Scrum board Trello was easy once it had been learned and was effective in providing an oversight of the work progress in the team. This perception was also held by the students, who found that transparency was perhaps one of the greatest strengths of working with Scrum.

When asked what key words AC identified with Agile, the words had a strong correlation to the basic principles of the Agile framework, such as “empowerment of the team”, “sustainable working pace”, “iteration” and “human interaction”. Transparency was also mentioned as a key principle by AC, similar to the other respondents, and was described as something crucial for companies to relate to in implementing agile methods. AC also found that one of the strengths of the Agile principles is that they work well regardless of the size of the company but added that this depends largely on the context and maturity of the organizations.

One thing that AC stressed repeatedly was that Agile methods should not be applied directly by-the-book, but that every situation must be analyzed and taken into context. According to AC, there is an overconfidence of implementing agile methods directly without first looking into the current situation of the company, which would be necessary in order to let the principles guide

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the process forward. A consequence of this is that the agile methods do not work as effectively as they could.

“I think I have seen agile methods being implemented rather badly many times. And I don’t really know why that is. And it’s a shame. Because when it works it works really well.” - AC

The students initially found it difficult to name something they would identify as a weakness of working with agile methods. The level designers later agreed however that knowing that something they had built could always be scrapped and needed to be rebuilt was something they found frustrating and always needed to keep in mind when working on a task. One of the visual artists agreed that it could be frustrating but once again related this to the phrase “kill your darlings”, explaining that knowing that things could always change let you really focus on what was good for the product, no matter if it corresponded with the vision you originally had or not.

At Studio X, a shared perception seemed to be that their work methods were mostly positive - on the condition that they were used correctly. The producer found that, according to their experience, working with agile methods like Scrum is challenging as it requires people to own up to their mistakes regarding for example time estimation, which is quite difficult for some to do.

“... If that estimation is wrong you can either learn from it or refuse to learn from it. It’s, well, alright, the disadvantage is that you’re working with people. [...] If you’ve said that it’s going to take two hours and it takes eight, then you need to explain why you were wrong. And that can be hard for some people.” – Producer at Studio X

The employees at Studio X all seemed to agree that the efficiency of a method really relies on that everybody in the team actively used their project tools, in this case Trello, or it would turn out to be useless. One of the respondents found that agile methods have the potential of becoming anarchistic and therefore preferred to have some structured elements to complement this. This can be contrasted to the perception from the level design students, who found that a strength of working with agile is that it actually provides more structure.

Similar to the opinions at Studio X, AC argued that the benefits of agile methods rely on a rightful implementation. This is partly left in the hands of the management who need to decide on certain issues, such as transparency, meeting frequencies, decision-making processes and work pace in order for the rest of the team to accurately adapt to the methods. AC especially stressed that there needs to be a clear purpose behind these decisions and that these purposes need to be communicated to the team. One example of this is the large number of meetings that

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agile teams might be involved in, which can lead to frustration if the purpose is unclear, according to AC.

4.1.2 Project scope

All respondents agree that the optimal scenario would be if no changes were made to the project plan towards the closing phase of a project - this is however rarely the case. Project plans can always change. AC points out that this is not a problem as long as it is done responsibly, which means that before making any changes, the pre-set restraints of the project method (such as a time box for Scrum or volume limits for Kanban) need to be respected. An analysis needs to be made regarding potential risks and how prior tasks will be affected. In some cases, pre-planned tasks might need to be scrapped in order to make room for a new feature - but the analysis should always be made, according to AC.

The employees at Studio X and the developer students share a similar view. They all feel that a risk analysis should be involved in the process of changing project plans. The producer at Studio X points out that during a set sprint, no changes are allowed to be made, which eases the pressure on the developers.

The visual artist at Studio X agreed with the others in that changes can always be made and that is something positive when working with Agile, as it allows for constantly adding improvements. However, they also argue that the process of a visual artist is quite different than that of other disciplines, which means that they are affected by changing requirements in a different way. They would rather see some sort of a waterfall-model, or at least a limit in the project after which no changes are allowed.

“It’s hard to say when the task is really done. I can finish the entire project in one day but it’s going to look horrible.”

“I think there should be period when you’re allowed to [make changes]. You get to evaluate. ’Now there’s a gap where I can think things through and add, but after this period it’s done.’” - Visual artist at Studio X

AC explains that in their experience, feature creep arises as a consequence of inadequate requirements in the initial phase of the project. Without this, it will be difficult for the developers to know when a product or task is really done. First, the developers need to ask themselves why something needs to be added, what purpose it has and how it will affect remaining tasks.

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At Studio X, the shared view seems to be that new features should not be added if they are not preceded by an analysis. The person who is responsible for external communication expressed that adding new features is easily done, and that it sometimes happens, but that it is not a good idea since it means averting from what is initially decided in a project. Similarly, the producer finds that changing or adding requirements means deviating from a set contract and without it, it is difficult to know if everybody in the team is still on the same level regarding what needs to be done. However, at Studio X the projects do not follow a strict deadline, which means that if a project scope expands remarkably, the release is simply postponed.

For the game developer students, things look different. As their projects tend to be quite short, generally around eight weeks, there is little time to add and change things once the tasks are in progress. It is more common that features are discarded rather than added. When something is added, there is first a discussion between the disciplines regarding how much work would be involved and if it is realistic to finish on time. In some cases, the foundation for a new feature might already be in place. If more work is needed, disciplines have learned to deny requests for new features unless they are really necessary.

There is however a stakeholder perspective that might interfere with the views held by the team. For the students, their teachers act as product owners, and if they ask for something or want something redone, the finished work might sometimes need to be rebuilt from scratch. According to AC, when changes are made, somebody needs to be held responsible for that decision and its consequences in order to prevent the damaging effects of feature creep.

4.1.3 Time management

One of the difficulties of working with agile methods, according to one of the visual artist students, is estimating how much time a task is going to take. Time estimations are based on preconceptions which are often mistaken. The students agree however that this is something they have become better at during their education. The producer at Studio X mentions getting better at time estimations as one of the strengths of working with agile methods; in their opinion, the disadvantage comes in when the developer who made an incorrect estimation is not able to own up to that mistake. This is similar to the view held by AC, who argued that it is important to know who is in charge of the decisions in order to know how prioritizations are affected when mistakes occur. If an estimation is wrong, prioritizations may need to change or deadlines pushed forward.

AC and the producer at Studio X also hold similar views regarding work pace. AC points out that the fundamental principles of Agile contain a strive towards a sustainable work pace and

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that this is an issue left to the management. The producer at Studio X, who is also a co-founder of the company, explains that their work pace is relatively slow since their game projects are also combined with other external work. They have never forced or asked anybody to work overtime, and as previously mentioned, they have the possibility of extending a project if needed.

“I’ve heard that there’s a lot of [overtime hours] in this industry. But that wasn’t the type of company I wanted to build.” - Producer at Studio X

Several of the students feel that the work pace in their education is too stressful and that they would not be able to keep up with it in the longer run. One reason for this is that their game projects are combined with other school assignments and short deadlines which requires them to work faster. One of the visual artist students explain that they perceive their current work tempo to be abnormally fast and expect things to be slower once they get out into the industry. The students have a few experiences of crunch hours during their projects but one of them also point out that they have become better at letting things go in comparison to when they started.

AC does not relate crunch periods to agile management, but rather sees it as an effect of peer pressure and organizational culture - which is yet another reason to why managers should be held accountable in this issue. AC and the visual artist at Studio X both relate the issue of overtime work to national culture as well. In AC’s experiences, overtime work is an accepted norm within the industry that is gradually fading - at least in Sweden. The visual artist at Studio X reflects that in Sweden people tend to value their private life highly which is why overtime work is not as widely accepted.

4.1.4 Team communication

Human interactions and transparency are both fundamental principles of Agile, which according to AC can be seen in how close and interrelated agile teams are. In their experience, communication is rarely a problem if the team is able to work closely together. The game developer students similarly emphasize that without solid communication agile methods quickly become useless. They all point out the importance of the daily stand-ups which are essential in creating transparency and making sure everyone in the team are participating. In their experience, problems quickly arise if someone in the team does not contribute to the team transparency by for example not uploading their work progress to their shared server in case of absence.

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At Studio X, meetings are held with the entire team twice a week. The producer admits that since they, together with the other co-founder, are absent from the office a few days every week to focus on their other work, communication is not always fully effective. The person responsible for external communication and the visual artist support this view and both feel that their team would benefit from more meetings in order to make the work more transparent. Apart from this, the employees at Studio X experience the communication in their office as relatively organic, which is much thanks to the small size of the company.

Two of the employees at Studio X and two visual artist students all point out the use of the Scrum board may sometimes lead to misunderstandings within the team. If the tasks which are written down on the virtual cards, as is the case in Trello, or physical post-its, which is the case for the students, are unclear, the transparency is further weakened. One of the visual artist students point out that as post-its are added to the Scrum board, it is sometimes discovered that some notes essentially describe the same task which leads to confusion within the group.

Communication between the different disciplines does not seem to be a major issue in the experience of any respondents. AC reflects that this is again much thanks to the transparency of the team-work. The students experience communication differs mostly depending on their team or the individual rather than the discipline. Only the person responsible for external communication at Studio X admits that disciplines may sometimes speak in their own language which could lead to misunderstandings, but that this rarely happens. AC further reflects that visual artists are the one discipline that they feel generally find it difficult adjusting to the communication process, but is not sure what may be behind this.

In the game developer students' projects, there are not any explicit leaders. Some people may be more vocal than others, especially during the daily stand-ups, but an emphasis is placed on the participation of everybody in the team during the decision-making. At Studio X, the producer describes the company as an "unofficial hierarchy", in which responsibilities are divided between the employees around different areas. The discussion surrounding these areas are described as humble by the producer.

AC argues that team-equality is not part of the agile decision-making process. While everybody in the team can participate in the discussion and make their views heard, ultimately the decisions are left in the hands of the stakeholders and product owners. Issues surrounding who has the first or final say during the team discussions is, once again, mostly connected to organizational culture according to AC.

4.2 Internet-based survey

4.2.1 Introducing questions and general attitudes towards agile methods

The survey was answered by 28 people in total. First, the respondents were asked to what professional discipline they mainly identified (See Table 2). Programmer was the most common discipline among the respondents, which was followed by game designers.

Table 2. Which game development discipline do you (mainly) identify with?

Answer choices	Percentage	Quantity	Comment
Design	25 %	7	
Visual art	3,6 %	1	
Programmer	53,6 %	15	
Producer	14,3 %	4	
Tester	0 %	0	
Other	3,6 %	1	Marketing/planning
Total: 28 respondents			

The second question regarded the size of the current workplace of the respondent (See Table 3) Half of the respondents are currently employed at a company of micro-size in regard to the number of employees (1-20). The medium-sized companies, of 101-500 employees, was the second most common with 39,3% of the responses.

Table 3. How big is the company you currently work at (number of employees)?

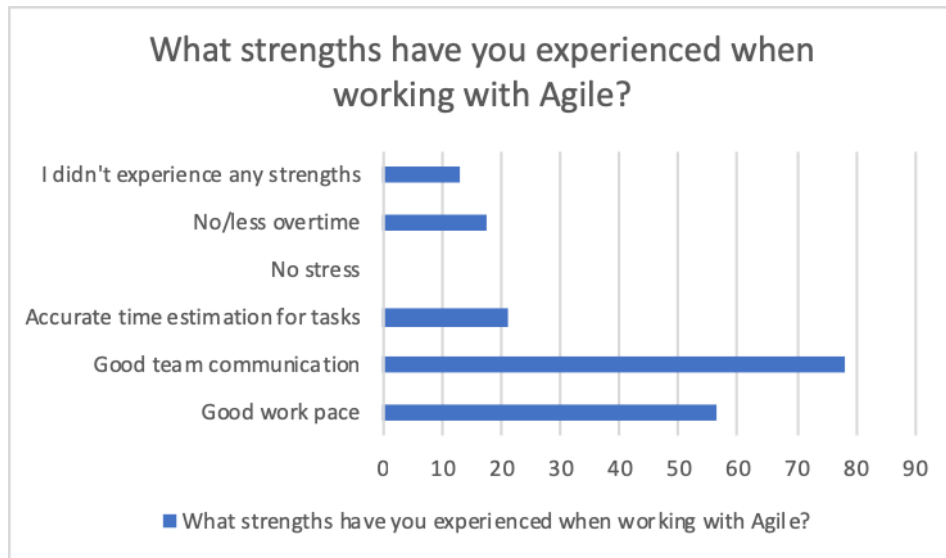
Answer choices	Percentage	Quantity
Micro (1-20)	50 %	14
Small (21-100)	3,6 %	1
Medium (101-500)	39,3 %	11
Big (500+)	3,6 %	1
I am not currently employed at any company	3,6 %	1
Total: 28 respondents		

Next the respondents were asked what agile methods they had worked with, of which Scrum, Kanban and XP were mentioned. A majority of the respondents rated their overall experiences of the methods as positive, with 5 at “Very positive” and 9 at “Positive”. Five respondents were neutral, three were negative and one was very negative.

Respondents were asked about what strengths and weaknesses they had experienced in projects that employ agile methods. Among the strengths, “Good team communication” and “Good work pace” were mentioned by 78,3% and 56,5% respectively. Other strengths that were mentioned were “Accurate time estimation” and “No/less overtime”.

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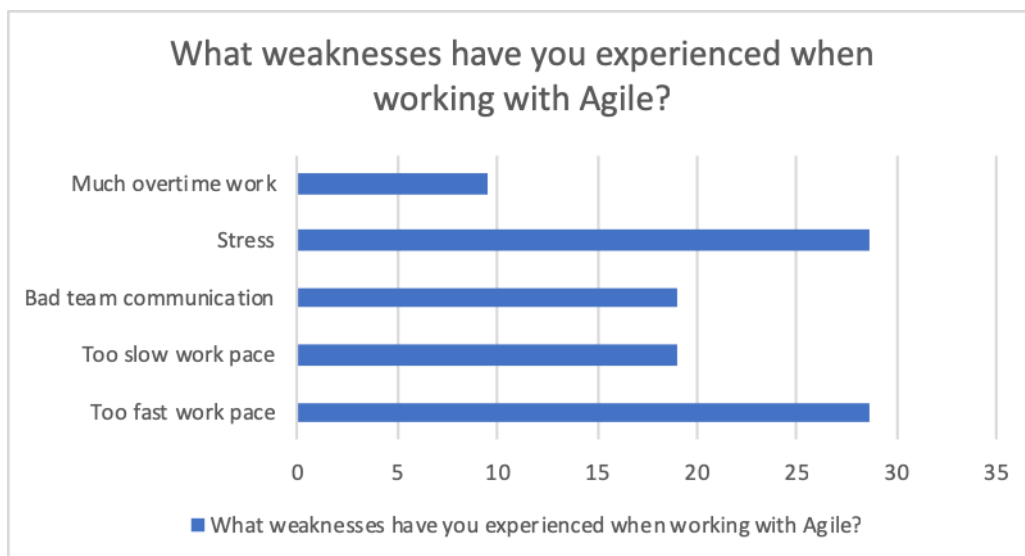
Figure 1 What strengths have you experienced when working with Agile? (Shown in %)



A few respondents used the open-answer function and one wrote; *“Higher redundancies, meaning we are less sensitive to one person being sick / busy or even leaving the company.”* Other open answers pointed out the strengths of transparency in the planning tools, both short and long term.

For the weaknesses, many had answered similarly. Both “Too fast work pace” and “Stress” had been checked by 28,6% respectively. “Too slow work pace” and “Bad team communication” had also been checked by 19% respectively. 19%, four respondents, had also answered that they had not experienced any weaknesses.

Figure 2 What weaknesses have you experienced when working with Agile? (Shown in %)



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Out of the open answers, respondents mentioned that much time had been spent planning and following up goals, or that projects were sometimes difficult to plan and manage.

A majority, 17 out of 23 respondents, answered that they experienced these weaknesses even when not working with agile methods, of which 3 (13,6% of respondents) said they experienced them very often.

4.2.2 Team communication

A weak majority (52,1%) found that communicating with disciplines other than their own could be difficult. Out of these, 11 respondents found it only to be “sometimes difficult”, while one said it was “difficult”. In contrast, 34,8% of the respondents found it easy to communicate with other disciplines. 43,5% found that working with Agile improves the team communication, while 39,1% found it did not change anything. No respondents found that agile methods changed the team communication for the worse. Further, 65,2% of the respondents felt that they were able to make their own opinion heard when working with agile methods.

Figure 3 Have you experienced that the communication changes when working with agile methods?

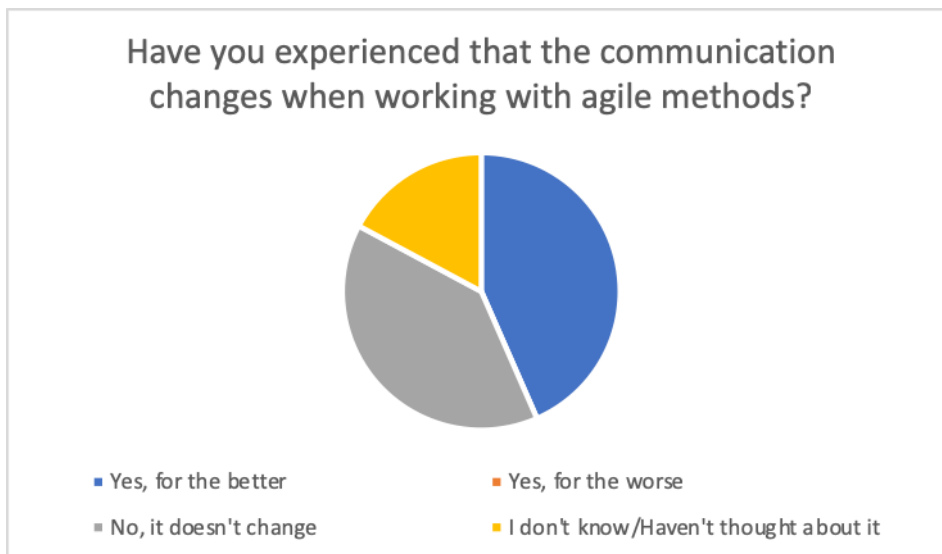
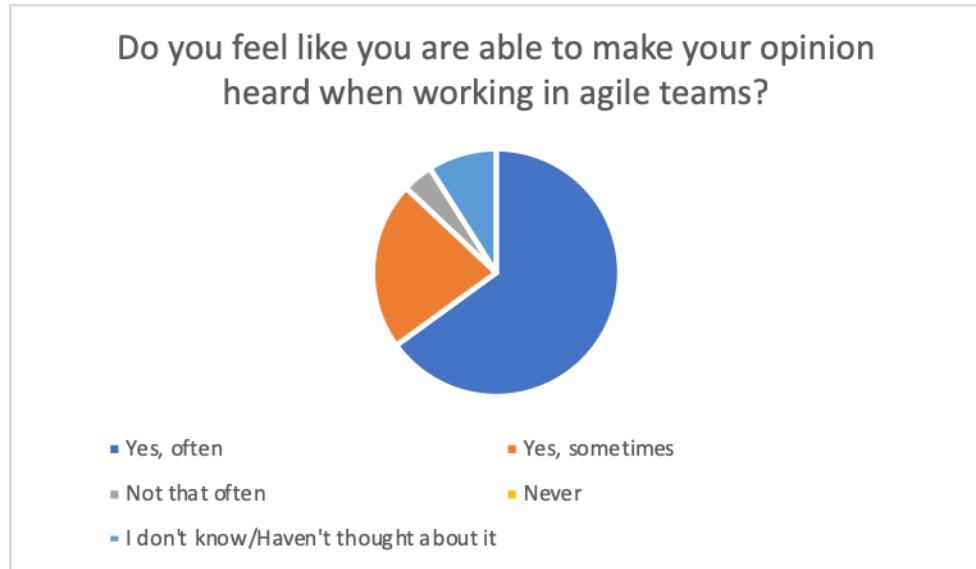


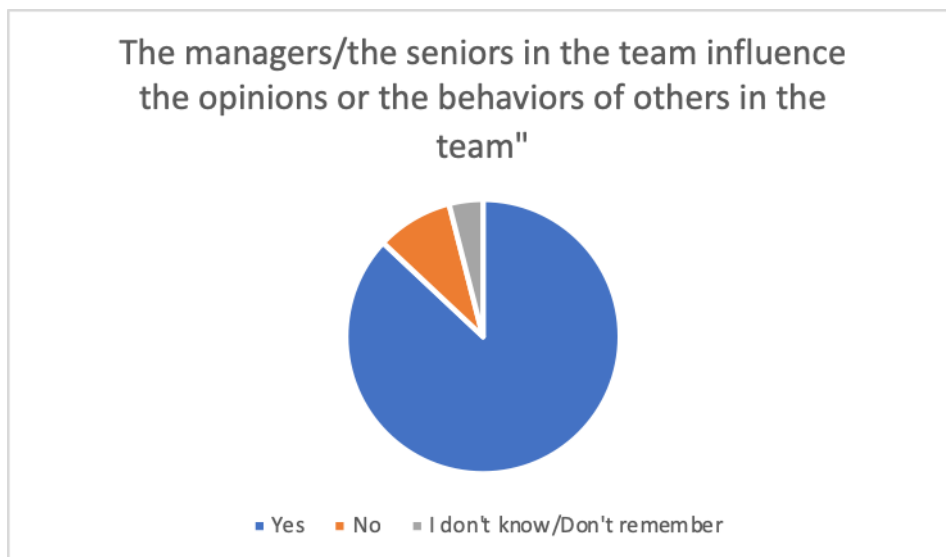
Figure 4 Do you feel you are able to make your opinion heard when working in agile teams?

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However, 78,3% also felt that agile methods do not change the hierarchy in the team communication, meaning managers still have the final say. 87% experienced that their managers or seniors in the team had an influence on the opinions or behavior of the rest of the team. While 82,6% felt that they were able to speak freely in the process of agile projects, there was a slight divide regarding whether the developers felt they had an actual influence on the team's decision. A weak majority, 56,5%, felt that they had an influence on the team's decision, while other respondents claimed that they had no influence or were unsure - 21,7% respectively.

Figure 5 "The managers/the seniors in the team influence the opinions or behaviors of others in the team."



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Ten respondents chose to put in their own answers. From this information, communication issues seemed to derive from frustrations regarding the lack of proper understanding or enthusiasm for the methods;

“nobody knows what they're talking about regarding these buzzwords”

“It was never properly adopted since no one on the teams really believed in it, etc”

One respondent pointed out that communication issues often arise between Scrum teams rather than within;

“Often the Communication issues are between scrum teams and not within. In larger Project you Always need to draw the team lines somewhere and there usually is a problem domain in between the teams where there are problems...”

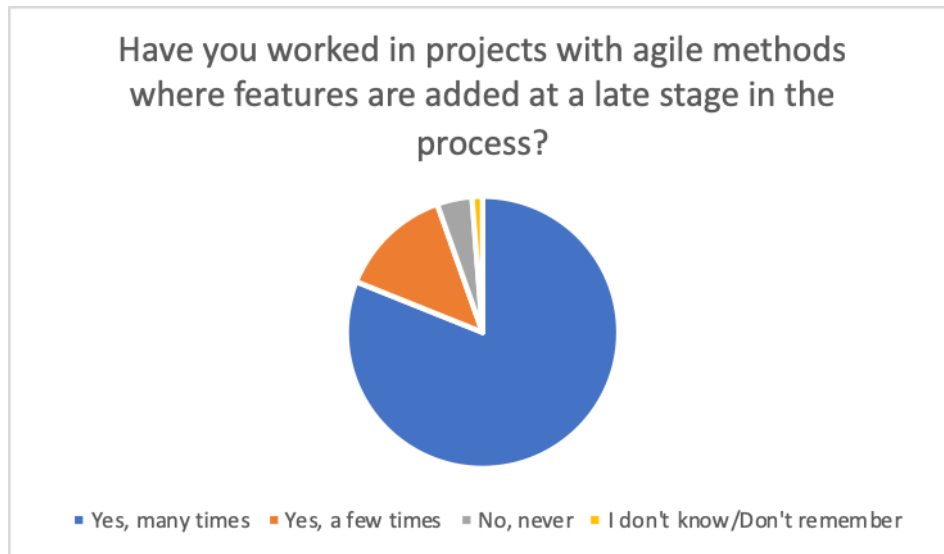
Others were positive and named ways that agile methods might help improve communication, such as planning for specific times that allowed for questions between units and having a clear definition of when a task is done.

4.2.3 Project scope & flexibility

Adding features at a late stage in the project seemed to be a common experience, with 78,3% answering they had experienced it “many times”, and 13% said “a few times”. The results were however similar for the question if the developers had experienced this even when not working with agile methods. No respondents found that agile methods made it more difficult to handle these new additions, while 47,8% found that it was easier. However, the majority (52,2%) said that they were unsure in this question.

Figure 6 Have you worked in projects with agile methods where features are added at a late stage in the process?

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Ten respondents used the open-answer function. Patterns in these responses showed that some developers find that the agile mindset, or the basic principles of agile methods such as the prioritizations made in Scrum and Kanban, facilitated the process of adding new features in an ongoing project:

“Using agile methods meaning something else on the backlog has to go.”

“Agile puts everyone in a flexible mindset to begin with.”

Other responses indicated again, similarly to the responses on team communication, that agile methods are not always understood or handled correctly which has consequences on the workload of developers:

“I think it depends on the feature, and the necessity of getting it in -- sometimes the business intervenes with a "you need to do this" and the team don't really get a say. I think Agile means that you can continue to add things in when you need them to. [...] but I think games suffer from last-second business requirements.”

12 respondents answered that their experiences of the principle of flexibility in agile methods were mostly positive. Three respondents answered that these experiences were mostly negative, while eight were neutral. Once again, a few respondents put in their own answers to elaborate:

“It's great to be able to pivot fast, but there is a process to follow for change as well which producers and other similar functions can easily forget resulting in a lot of change outside of the process.”

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“I would like to focus on deliovering [sic!] the best possible product, and constant changes does not (always) equal iteration.”

4.2.4 Time management

No respondents answered that time estimations were mostly easy. 39,1% were neutral, while 21,7% found it to be somewhat easy or difficult respectively. 17,4% found time estimations to be very difficult. The reasons given for these difficulties were relatively spread out (See Table 4).

Table 4. If you find it difficult to plan ahead when working with Agile, what would you say is the main reason for this?

Answer choices	Percentage	Number of respondents	Comments
Uncertain requirements	34,8 %	8	
Changing requirements	13 %	3	
Inexperience	4,3 %	1	
Team factors	8,7 %	2	
Technological factors	21,7 %	5	
I don't find it difficult to plan ahead when working with agile	8,7 %	2	
Other	8,7 %	2	Remaining respondents put in open answers, combining "Changing requirements", "Uncertain requirements" and "Technological factors"

Uncertain requirements were named as the primary reason for difficulties in time estimation by 34,8% of the respondents. Similarly, “Changing requirements” was mentioned by 13%.

Technological factors were the second most mentioned with 21,7%.

A majority of the respondents had experiences of crunch periods in projects; 56,5% answered that had experienced crunch periods many times and 36% answered that they had experienced crunch periods on rare occasions. “Inaccurate time management” and “Changing requirements” was named as the primary cause of crunch periods by 35% respectively.

4.2.5 Final remarks about working agile methods

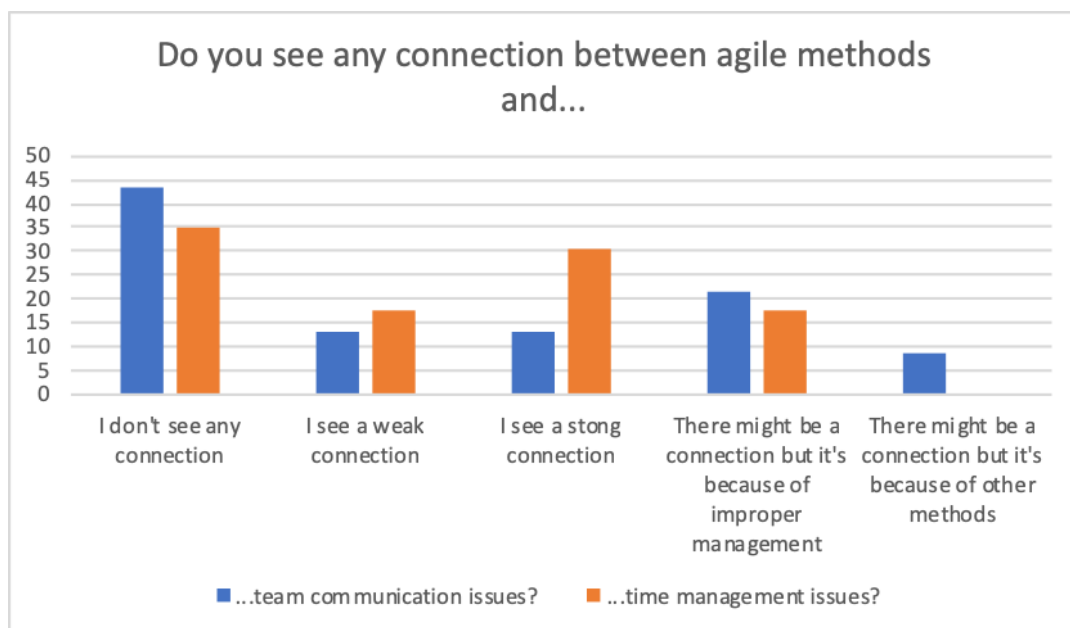
The final section included a number of questions about whether the respondents themselves saw a connection between agile and their work challenges. For questions regarding both connections

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between agile and team communication as well as management, there was a relative divide in answers.

For communication issues, 10 out of 23 did not see any connection. 21,7% answered that there might be a connection which could be due to an inaccurate management of the methods. For the time management issues, 34,7% did not see any connection while 30% of respondents saw a strong connection. 17% saw a weak connection and the remaining 17% saw a connection that might be due to an inaccurate management of the methods.

Figure 7 Perceived connections between agile methods and challenges



Nine respondents chose to elaborate in the “Final remarks”-section. Some of these open answers further support the lack of proper management of agile methods as a cause for potential issues.

“I think there is a connection between agile methodologies [sic!] and crunch because producers/manager take focus on the changing requirements parts but not the other parts of the methodology (including the empowered teams aspect which is super crucial [sic!])”

“Agile methods depend on management actually understanding them and using them correctly. Often agile is used as code for “let's get another feature in”.”

“... Yes, I see a very strong connection. If you just made a plan at the start and stuck to it I think overtime and stress would be a rare phenomenon in game development. However I don't believe one could do a decent game in that way.”

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Another respondent pointed out that problems in game development could rather be connected to the overarching communication between teams and their senior developers.

5 Discussion

This chapter examines the findings from the theoretical and empirical data collections of this study. The discussion is divided according to the categories used in previous chapters; Project scope & flexibility, Time management and Team communication. This eventually leads to a final discussion which answers the research questions of the study.

Challenges which have previously been identified within the video game industry include difficulties of closing a project within time and budget, reaching project objectives and communicating between disciplines in complex teams. Previous literature has pointed this partly to the “growing pains” of this industry, which has expanded drastically over just a few decades. In addition to this, some authors have suggested an inaccurate employment and implementation of management methods as a cause for these challenges.

This study has searched for patterns connecting challenges in video game development to the usage of agile methods. The results partially support such a connection but also find that there are other underlying issues which might explain these patterns.

5.1 Project scope & flexibility

A common issue within video game projects is that the requirements of the project are not clearly defined, causing difficulties in deciding when a task is done. The phenomenon known as feature creep arises when features are constantly added to the project, until the project scope grows out of proportion and causes problems such as missed deadlines. Looking at the results, this could potentially be connected to the principle of flexibility in agile methods.

The empirical results support findings in previous research by showing that changes in an on-going project are very common in the video game industry. This is largely seen as a strength by the respondents and according to authors like Kanode & Haddad (2009) and Špundak (2014) flexibility can be good for boosting creativity, among else. Problems arise first when the changes are not preceded by an appropriate risk analysis - something which Schmalz et al. (2014) find to be a common occurrence. Several of the respondents agree that changes should not be made without prior analysis and putting the value of changes against their cost in terms of time and resources. Studio X and the students claim that they tend to follow this and therefore are rarely affected by a changing project scope - they either make adjustments to the project plan or scrap the new features, something which AC sees as a necessity in order to follow through with this type of behavior.

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Looking at the results from the survey however, it can be interpreted that new features are not only regularly added during ongoing projects, but that this is often made without the appropriate analysis. This suggests that issues linked to feature creep are a common occurrence among medium-sized companies, which was the most common size of workplace among the survey respondents.

Previous research points out causes for feature creep as last-minute changes that are added in the hope of improving the game, but rather resulting in added work. According to AC, agile flexibility means re-thinking prioritizations in order to make room for new changes - something which other respondents both in the interviews and survey agree with. However, looking at some of the open answers in the survey, it appears the last-minute changes may sometimes come at the instruction of managers who are focusing on the business-aspect of the project. AC argued that this issue is tightly bound to the culture of the organization, but the frustration expressed by some of the respondents could also indicate a conflict between the developer side and manager side of video game development projects.

These two sides have also been described as two polarized sides of interests by for example Deuze et al. (2007). On one side, there are developers who are driven by their passion for making great games, inclining them to add features based on their own enthusiasm - and on the other, there are managers and external stakeholders whose task is to drive the project towards maximizing profit. Without adding any value, both stances could result in prematurely made changes which have the risk of making the project avert more or less drastically from its set objectives. This also means that the agile methods are not properly followed, resulting in higher consequence for the project organization.

5.2 Time management

As was found in the literature study, issues surrounding time management and schedule problems can in many cases be connected to the maintenance of a project's scope. In the survey, one of the most reported causes of crunch periods was "uncertain-" and "changing requirements", supporting Kanode & Haddad's (2009) assertion that a well-defined project scope facilitates time estimations. There can however be many other causes for difficulties in time estimation; issues surrounding technology was another factor which was given as an example by Petrillo et al. (2009) and which was also supported from the findings in the survey. The results of the survey also showed that a total of 39,1% perceived time estimations as difficult or very difficult, while 39,1% were neutral, indicating that this is a common cause for frustration within video game development.

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It could be argued that these numbers are an indication of need for stronger management support as many agile methods such as Scrum rely heavily on these estimations. If the estimations are incorrect, they may cause further delays and even conflicts within the developer team, as was an experience mentioned by the producer at Studio X. However, allowing the team to control and manage their own time has been described as yet another strength within agile methods in previous research by Hodgson & Briand (2013) and the general attitude surrounding this freedom came out as positive in the interviews. In order to improve the usage of time estimations in agile methods, there ought to be deeper analysis into the underlying difficulties in this case.

The results further indicate that these difficulties sprout from human factors; some of the students as well as the producer at Studio X experienced that time estimations are built on individual preconceptions which are often mistaken and lead to consequences within the rest of the team. While this is something that the respondents agree that developers get better at with time, it could be a concept which deserves more awareness when investigating how to improve agile methods.

One could argue that the importance of improvement in this area lies on the prevalence of crunch periods. Crunch time has been pointed out as a major challenge in previous research made by several authors such as Peticca-Harris et al. (2015), Petrillo et al. (2008) and Dyer-Witherford & de Puter (2006), regarding its negative effects on the effectiveness of the production team but also because of work environmental factors such as stress and burn-out rates among employees. While this study has not examined the presence of such effects within the Swedish game industry, the results of the empirical study does show that crunch periods occur to a large extent. One could reason that with a more effective management of project models, crunch periods could be avoided more often.

The occurrence of crunch can also be connected to organizational culture, according to AC, which is something that also seems to resonate with the producer at Studio X, whose statement could be interpreted as an active move away from a negative norm they have previously experienced within the industry. Both AC and the visual artist at Studio X also pointed out that the acceptance around crunch seems to be decreasing. They also linked it to national culture, where they pointed out the differences between Swedish working culture and that of for example the United States. This could be a valid point, considering many of the reports regarding crunch culture in the game industry that have been used for this study have their origins in North America.

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Similar to the previous discussion about project scope, there could also be reason to consider the industrial culture as a reason for acceptance around crunch periods. Dyer-Witherford & de Puter (2006) found that young employees often are relied on among large video game corporations when it comes to working extensive hours since they are eager to prove themselves. As this has been noted to sometimes lead to extreme and harmful working conditions (Peticca-Harris et al., 2015; Weststar, 2015, Dyer-Witherford & de Puter, 2007) it could be seen as promising that companies like Studio X show awareness of the negative effects of crunch.

Another aspect of time management in working with agile methods that merit more attention is working pace. One of the principles of agile methods is to maintain a sustainable working pace (Gren et al., 2014) which is also another reason to why the presence of crunch periods within agile projects deserves more attention. Regarding the working pace in general, the respondents in the empirical study depict a rather diverse view. In the survey, 28,6% answered that their experience with agile methods included a “stressful work pace”, but the same amount had responded that it was “too slow”. Paradoxically, 78,6% had also marked “good work pace” as a strength in working with agile methods. Among the interview respondents, answers were equally diverse. At Studio X, the developers described their own work pace as relatively slow, which was possible thanks to other assignments. For the students, their work pace was described as “too stressful” for the same reason.

The differences in these answers indicate that the work pace within agile projects is linked to the context of each organization. Whether developers increase their work pace closer to a deadline or can afford slowing down and focus on details is most likely an issue left in the hands of the management. However, as pointed out by AC, many organizations appear willing to leave out important principles such as this in order to make room for more features. This line of reasoning is also mirrored by some of the open answers in the survey. Similar to how the analysis is sometimes seemingly left out of the equation when applying flexibility, the principle of sustainable work pace also appears to be sometimes overlooked in video game development projects.

5.3 Team communication

Several challenges within video game development, including both previously discussed categories, could in several aspects be linked to communication within a team and organizations. Communication is also an important factor in working with agile methods - it was even expressed by the students that without communication agile methods quickly become useless. Similar views were also held by other respondents at for example Studio X, where

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communication was seen as one of few areas where all employees agreed that more could be done. The importance of communication within agile methods also seems to resonate with many of the respondents in the survey. This is not surprising considering the agile manifesto emphasizes human interactions (Hodgson & Briand, 2013).

The students and AC both experience that communication in teams and between units is relatively easy thanks to the focus on transparency and active participation during meetings. Similar views were presented by the employees at Studio X to a large extent - however, their communication was not always seen as fully effective because of absent co-workers, lack of meetings and an inefficient use of the virtual Scrum board. This last example could be seen as a situation where the agile method has not been fully applied, explaining the disappointment in communication quality. For the use of the Scrum board, a similar problem was experienced among the students, indicating that this is an issue where Scrum could be improved or used more efficiently.

Authors like McDaniel (2015), Kanode & Haddad (2009) and Petrillo et al. (2009) have all found that communication between disciplines is a recurring challenge within video game development, as these often encompass large and complex teams where developers come from many different backgrounds. The results of this study did not fully support these findings. While some respondents, such as the person working with external communication at Studio X and around 50% of the respondents in the survey found multi-disciplinary communication to be sometimes difficult - there were also many who considered it to be not only easy but also described it in overwhelmingly positive terms. The survey also showed that agile methods were found by 43,5 % to improve team communication and 39,1% found that it did not change anything. This could indicate that when used properly, agile methods have a beneficial effect on team communication. In cases where no changes are found, it is possible that the methods are either improperly used or that there are other underlying issues in the organizational climate which causes problems in communication.

One should also consider that most of the respondents from this study are located at smaller organizations where communication and transparency might be more easily achieved. It is possible that the results would appear differently when looking at larger organizations. However, AC, who has experiences from organizations of various sizes, also expressed a positive view regarding multi-disciplinary communication and did not perceive this to be an issue.

Once again, AC connected issues with communication to organizational culture, which could be noted in for example the decision-making process. Deuze et al. (2007) discuss the strict

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hierarchical culture that surrounds the video game industry which, as previously mentioned, may sometimes serve as a basis for conflict between the management- and developer sides of a project team. Further, the industry is said to be lacking in “soft skills” (Deuze et al., 2007) and sufficient training among managers (Kanode & Haddad, 2009).

None of the respondents in the interviews referred to any hierarchical structures within the industry. The survey however showed that even if many respondents felt that they were able to express their views in agile projects, their managers and senior team colleagues had an influence on the opinions and behavior of the rest of the team. This is similar to Hodgson & Briand’s (2013) findings, which pointed out that the agile principle of shared decision-making was not fully incorporated in teams as the managers and lead developers often had a large influence on the other developers.

As projects are governed by external stakeholders and the managers of an organization such influence should not come as a surprise. The question remains to which extent agile keywords such as equality and empowerment of the team are implemented. It is possible that this is a challenge especially within an industry which is strongly characterized by hierarchical structures. This reflection is also supported by one of the open answers in the survey, where a respondent claimed that their managers often left out the aspect of “empowerment of the team” in favor of changing requirements.

Considering the need for improvements within manager communication that is requested by authors Deuze et al. (2007) and Kanode & Haddad (2009) one could argue that interpersonal relationship management is an area where managers within video game development need to focus in order to become better at handling communication processes in agile projects.

5.4 Final discussion

This aim of this study was to identify what challenges that video game developers perceive when working with agile management methods. These challenges have been discussed in the sections above. Another aim was, with these challenges as a foundation, to point out concepts that may need more focus from scholars and project managers within the video game industry in order to improve the usage of agile methods. These concepts are presented together with the identified challenges in the table below (Table 5) and discussed further in this final section.

Table 5 depicts the lessons learned and clarifies the concepts that have been identified as part of the research questions.

Table 5. Lessons learned – identified challenges, issues and concepts

Challenges in video game development – What does agile management have to do with it?

Challenges	Issues	Concepts to be improved
Project scope	Feature creep, lack of risk analysis	Risk analysis weighing in costs of changes to added value, adjustments according to said analysis, following through proper process before making changes
Time management	Crunch periods, difficulties in time estimation, unsustainable work pace	See concepts above and below; also focusing on the learning process of making time estimations
Team communication	Hierarchical structures affecting agile principles, communication between disciplines, inefficient use of Scrum board	Soft skills in management, focusing on empowerment of the team

All of the issues can be said to be more or less related to one another which means that in order to fully implement agile methods, all principles need to be respected. This can be noticed especially when looking at the issues which arise within time management and project scope; if flexibility is not handled correctly, this will have implications on the time restraints of the project as well. Communication is somewhat of a foundation for all of these projects and for time estimations and risk analysis to be handled correctly, this requires a transparent communication process in the team.

It should be mentioned that there are a few limitations to the results of this study because of methodological factors. Both reliability and validity can be problematized considering the sample of respondents and the structure of the questions (See 3.4 Methodological discussion). The latter concerns primarily the survey study. Therefore, the results might not easily be generalized. Nevertheless, the conclusions of this study might provide an initial understanding for common issues within the Swedish game industry as well as a starting point for further research in this area.

There are many reasons to why agile management methods could be said to fit perfectly within video game development. Such reasons include its focus on flexibility and iteration which is beneficial in projects that do not follow a linear process and which are characterized by a high degree of uncertainty. The overwhelming majority of the respondents in this study have presented positive experiences of working with agile methods, supporting findings in previous research.

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However, in each category there have been aspects where the methods could be argued to not be fully or correctly implemented, which sometimes leaves causes for frustration among developers. AC argued that while it is not appropriate to apply Agile strictly by-the-book (one should always look at the organizational context), they have also seen that some managers choose to pick out the parts of the methods that they feel correspond most to what their teams are missing – one might say it is a way of cherry-picking principles. This means that significant parts of the methods are left out, thus decreasing the efficiency of the methods and in some cases even causing further problems for the team. An example of this include crunch periods as a result of feature creep, which can arise when changes are made without appropriate analysis.

Looking at the empirical data for this study, it appears that situations where methods are implemented fully, problems appear smaller. For example, the employees at Studio X followed through with their analysis on changed requirements, meaning they pushed their deadlines forward rather than adding more work within existing project constraints. On the other hand, they do not fully implement Scrum in for example the part about daily stand-ups, possibly explaining why team communication was pointed out as an area of improvement by the respondents.

These conclusions may be contradicted by some of the results from the survey, which also showed that many problems were experienced by developers even in projects that did not implement agile methods. However, the respondents also connected problems such as feature creep to the management of methods and more specifically, how their managers handle the process of change. In other words, perceived challenges within video game development cannot be said to be strictly connected to agile methods per se, but rather how they are used. Once again, this points towards the cultural dimensions as a major factor behind the prevalence of industrial challenges.

Looking at AC's line of reasoning, a common issue also seems to be that there is not always somebody who is clearly taking on responsibility for the consequences of decisions made in projects where agile methods are not properly followed. Connecting this to PCT theory, the higher the consequence within a project, the more reason is there to apply a stricter plan-driven model where risks are reviewed and accommodated (Howell et al., 2010). If the consequences in projects that can be noted include stress and burn-out among employees, as well as the negative effect this has on the quality of the product, there are reasons to look for other options to avert this. Howell et al. (2010) state that projects may start with an emerging project model, like agile methods, and later switch to a more plan-driven variant if there is a need for better risk management. The results of this study indicate that this may sometimes be necessary within

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video game development if risks within work environmental health and quality checks arise as an effect of issues with previous methods.

Such an adaptation also corresponds to some of the wishes presented in the empirical results. The visual artist at Studio X in particular expressed a desire to limit flexibility within a project towards the closing phase, as this would help avoid stressful situations and allow for better focus on quality.

The video game industry is still a relatively new arena for companies and continues to evolve rapidly together with new emerging technology. Especially in Sweden, the industry has started to grow rapidly in the last few years with many new additions in the field. This speaks for the fact that some of the issues which arise may be a cause of so called “growing pains” as Deuze et al. (2007) described it. By becoming aware of issues the industry is facing today and pointing towards what concepts need to be further developed, it is possible to think out new strategies to improve the process within video game development. As there previously has been little focus on education available within this field, it is promising that new opportunities for training become increasingly available for future developers. The statements collected from the students in this study regarding their learning process in working with agile methods indicate that current challenges may potentially be handled better with such an education to lean on. Finding the right balance between the demands from a business stand-point and the passion of creating games can be a delicate matter. But in order to deal with this it is also important to know what tools are available in order to handle a project as complex as producing a video game.

6 Conclusion

The results show that many of the challenges defined in previous research can also be identified in the Swedish game industry 2018. These challenges include dealing with flexibility without proper adjustments to the project plan and difficulties in maintaining a sustainable work pace when dealing with the consequences of a growing project scope. In the communication area, the challenges were not as clearly identified but some issues seem to arise when agile methods are not fully harnessed.

The study also sought to determine whether these challenges could be connected to the usage of agile methods in projects and found a slight connection in some areas. The connections seem to mostly derive from the culture which can be found within the industry, which includes a hierarchal structure and strong profit drive that potentially sparks conflict when in contact with a great passion for making good games. This can lead to an incomplete application of agile methods where important principles are sometimes put aside. When this happens, the results indicate that common challenges such as feature creep and crunch periods may more easily arise, which according to previous literature may lead to further consequences like stress, burn-outs and loss of quality.

In order to better implement agile methods within game development and hopefully avoid these consequences, there are a few concepts which managers may want to focus on. Managers should look at the context of their team and its surrounding organization and reflect on what areas the agile principles are not fully supported. To do this, there needs to be a bigger prioritization on execution of risk analysis and implementation of appropriate measures. Further, with a development of interpersonal relationship management and so called “soft skills” within the industry, managers and developers may find an easier way of communicating their concerns regarding areas where they find that project models are not correctly used.

6.1 Suggestions for future research

As previously stated, this study pointed out a few concepts which could need more focus in order to improve the usage of agile methods; including the improvement of team communication, risk analysis within projects and a full understanding for the reason behind agile principles. How an application of these concepts may be achieved could serve as a suggestion for further research within this field of study.

Considering the methodological limitations to this thesis, suggestions for future research could also include a polished version of the interview- and survey guides, which could also be sent out

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to a larger network of video game companies in Sweden. This might bring a larger and more generalizable range of respondents, which would provide a higher reliability to the results. For the survey, one particular suggestion is to clarify the meaning behind terms such as “agile management” and offering a wider and more refined range of answering alternatives, in order to improve the validity.

This is one of few current studies regarding video game development in Sweden. Future research could also focus on the culture of the Swedish industry in comparison to other countries, in terms of attitudes towards for example crunch culture. Further, more focus is needed on a sustained use of agile methods in a video game development environment in order to uncover what consequences an improper use of methods may have on employees and the quality of a game. A look into the prevalence of stress and burn-out symptoms among Swedish game designers in relation to their work environment could be a good place to start.

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Appendix 1 – Qualitative interview guide

1. Vill du börja med att berätta hur länge du har jobbat här, hur länge du har jobbat inom branschen vad du arbetar med här?
2. Hur ser er arbetsprocess ut här?
3. Hur ofta har ni möten med hela teamet?
4. Hur lång tid brukar ett projekt ta?
5. Berätta om metoden ni använder här.
6. Vad tycker du att den har för styrkor och svagheter?
7. Har du någon erfarenhet av att arbeta med Agile management eller agila metoder?
8. Vilka metoder var det då som användes? (Kombination av flera?)
9. Hur såg arbetsflödet ut? (Förklara uppdelningar/sprints)
10. Hur arbetade de olika disciplinerna ihop? Sammankopplat eller isolerat från varandra?
11. Hur ofta hade ni möten tillsammans?
12. Finns det något med detta som påminner om de metoder som ni använder här?
13. Vad tycker du själv att det fanns för styrkor med att jobba agilt?
14. Fanns det något som gjorde arbetet svårare vid användningen av agila metoder?
15. Hur tycker du till exempelvis att arbetsflödet fungerade med tanke på de olika disciplinernas arbete ihop?
16. Vad hände om det uppstod missförstånd?
17. Hur brukar ni lösa missförstånd inom teamet idag?
18. Det är ju vanligt inom spelbranschen att nya features läggs in i spelet i ett sent stadie av projektet, vad har du för erfarenheter kring det?
19. Hur brukar du tänka om det blir så att en ny feature läggs till i ett sent stadie?
20. Hur brukar förändringar i projektplanen hanteras inom teamet här?
21. Hur skulle du jämföra det med hur det brukade hanteras inom team du har varit med i tidigare?
22. Vad har du för erfarenheter av övertidsarbete inom spelbranschen?
Vad tror du att det beror på?
23. Finns det något problemområde eller något utmanande i spelproduktion som du tycker är återkommande?
 - Om ja, vad ligger bakom det tror du?
24. Har du stött på några specifika problem under processen med spelet som ni jobbar på nu?

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25. Avslutningsvis vill jag fråga om det finns något mer i detta ämne som du har kommit att tänka på under intervjun?

Om ej erfarenhet av Agile:

26. Har du erfarenhet av några andra typer av metoder än de som du använder idag?

27. Hur fungerade de?

28. Hur skulle du jämföra dem med [programmet ni använder]?

29. Vad har du för erfarenheter av kommunikation i spelteam? Till exempel kommunikation mellan programmerare och artists.

30. Hur brukar ni lösa missförstånd inom teamet idag?

31. Vad har du för erfarenheter från andra team kring missförstånd och hur de brukar lösas?

32. Vilken typ av organisering är du van vid från spelbranschen? Brukar det kännas som en platt och organisk organisation eller känns det mer hierarkiskt?

33. Hur påverkar det spelproduktionen?

34. Det är ju vanligt inom spelbranschen att nya features läggs in i spelet i ett sent stadie av projektet, vad har du för erfarenheter kring det?

35. Hur brukar du tänka om det blir så att en ny feature läggs till i ett sent stadie?

36. Hur brukar förändringar i projektplanen hanteras inom teamet här?

37. Hur skulle du jämföra det med hur det brukade hanteras inom team du har varit med i tidigare?

38. Vad har du för erfarenheter av övertidsarbete inom spelbranschen?

○ Vad tror du att det beror på?

39. Finns det något problemområde eller något utmanande i spelproduktion som du tycker är återkommande?

○ Om ja, vad ligger bakom det tror du?

40. Har du stött på några specifika problem under processen med spelet som ni jobbar på nu?

41. Avslutningsvis vill jag fråga om det finns något mer i detta ämne som du har kommit att tänka på under intervjun?

Uppdaterad intervjuguide:

42. Vad tänker du på när du hör Agile management? Vilka nyckelord förknippar du med de metoderna?

43. Var kommer dessa idéer ifrån?

44. Upplever du att dessa ord stämmer in på hur teamen du jobbar med arbetar?

○ Varför/varför inte?

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45. Vilka styrkor tycker du att det finns med att arbeta agilt?
 - Märker du ofta av dem i projekt?
 - Utnyttjas dessa tillräckligt?
46. Finns det några svagheter med metoderna som du har upplevt eller har försökt undvika?
47. Hur gör du då?
48. Är dessa återkommande?
49. Vad tror du isåfall att det beror på?
50. Från dina erfarenheter inom spelbranschen, hur brukar det gå till när personer från olika discipliner ska kommunicera med varandra?
 - Svårt/enkelt?
 - Olika på olika företag?
51. Hur hanteras missförstånd?
52. Vad tror du att det beror på?
53. Har du upplevt att Agile har någon påverkan på hur kommunikationen inom team går till?
 - Mellan discipliner?
 - Mellan seniors och juniors?
 - Mellan agila team och resten av organisationen?
54. Det är ju vanligt inom spelbranschen att nya features läggs in i spelet i ett sent stadie av projektet, vad har du för erfarenheter kring det?
55. Hur ser du på att det läggs in nya features sent i ett projekt?
 - Om positivt - finns det något som skulle kunna vara negativt med det?
 - Om negativt - finns det något som skulle kunna vara positivt med det?
56. Hur upplever du att sena tillägg hanteras av teamen? Hur påverkas stämningen?
57. Gör Agile det enklare eller svårare att hantera nya förändringar sent i produktionen?
 - Hur då?
58. Finns det någon situation där du tycker att man inte ska ändra på en satta planen?
59. Vad har du för erfarenheter av övertidsarbete inom spelbranschen?
60. Vad tror du att det beror på, att övertidsarbete är vanligt förekommande?
61. Tror du att det finns någon koppling mellan de saker vi har diskuterat, som kommunikation, feature creep, övertidsarbete och Agile?
62. Finns det någon annan faktor som påverkar?
63. Vad behöver spelutvecklare bli bättre på när det kommer till att jobba med agile?
64. Finns det något problem i spelproduktion som du tycker är återkommande?

Challenges in video game development – What does agile management have to do with it?

65. Avslutningsvis vill jag fråga om det finns något mer i detta ämne som du har kommit att tänka på under intervjun?

Appendix 2 – Questions for quantitative survey

Hello!

This survey is a part of a undergraduate thesis study within Media Technology at Malmö University. The study focuses on the individual game developer and their experiences regarding the usage of agile methods (and similar tools) in their daily work, and how these experiences may be seen in connection to the challenges that are currently discussed within the video game industry.

The answers are completely anonymous and the results of the study will be treated confidentially in accordance with the regulations of GDPR. For any questions, please contact me at [author's e-mail].

As the study is focusing primarily on the region of southern Sweden I kindly ask any developers from other parts of the country (or the world) not to submit their answers in this survey. If you do however have some views on the subject that you would like to share, you can contact me at the e-mail stated above.

The survey is estimated to take around 5 minutes to complete.

Thank you for your participation!

Introduction

Which game development discipline do you (mainly) identify with?

- Design (narrative, level design, audio design, user interface, world design etc)
- Visual art
- Programming
- Tester
- Producer
- Other: [Open answer]

How big is the company you currently work at (number of employees)?

- Micro (1-20)
- Small (21-100)
- Medium (101-500)
- Big 500+
- I am not currently employed at any company

Do you have any experience of working with Agile methods like Scrum, XP, DSDM, Kanban etc?

Challenges in video game development – What does agile management have to do with it?

- Yes
- No

If the respondent answered "Yes", they were led to the following section:

Agile methods experiences

Which of the following methods have you worked with? (Multiple-choice)

- Scrum
- XP
- DSDM
- Kanban
- Other (please name): [Open answer]

How would you rate your overall experience of working with agile methods?

- (Scale from 1-5, 1 being Very good, 5 being Very bad)

What strengths have you experienced when working with Agile? (Multiple choice)

- Good work pace
- Good team communication
- No stress
- No/less overtime
- Accurate time/effort estimation for tasks
- I didn't experience any strengths
- Other: [Open answer]

What weaknesses have you experienced when working with Agile?

- Too fast work pace
- Too slow work pace
- Bad team communication
- Stress
- Much overtime work
- I didn't experience any weaknesses

Do you experience these strengths and weaknesses even when not working with Agile methods?

- Yes, often
- Yes, sometimes
- I don't know/don't remember
- Not that often

Challenges in video game development – What does agile management have to do with it?

- Never

Team communication

How do you find it communicating your needs and opinions regarding work to team members in other disciplines than your own?

- Easy
- Sometimes difficult
- Difficult
- Don't know/haven't thought about it

Does the team communication change when working with agile methods?

- Yes, for the better
- Yes, for the worse
- No/Don't know

Would you like to elaborate? [Open question]

Does working with Agile methods change the frequency or quality of communication between different disciplines in your team?

- Yes, for the better
- Yes, for the worse
- No, it doesn't change
- I don't know/haven't thought about it

Do you feel you are able to make your opinion heard when working in agile teams?

- Yes, often
- Yes, sometimes
- I don't know/haven't thought about it
- Not that often
- Never

Team communication (cont)

For the following four questions, please consider if you have experienced the following situations or if you relate to the statements.

"Working with agile doesn't change the hierarchy in the team - the managers still have the final say."

- Yes
- No
- I don't know

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"The managers/the seniors in the team influence the opinions or behaviors of others in the team."

- Yes
- No
- I don't know

"Working with agile allows for the team to speak more freely and lets everybody influence the process."

- Yes
- No
- I don't know

"Working with agile makes me feel more influential in the team's decision"

- Yes
- No
- I don't know

Flexibility

Have you worked in projects with agile methods where features are added at a late stage in the process?

- Yes, many times
- Yes, a few times
- Don't know/don't remember
- No, never

Have you experienced that feature are added at a late stage in projects that does not use agile methods?

- Yes, many times
- Yes, a few times
- Don't know/don't remember
- No, never

Do you think that agile methods make it easier or harder to handle new features at a late stage in the process?

- Easier
- Harder
- I don't know

Would you like to elaborate? [Open answer]

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One of the major components of Agile is allowing for constant change in a project. Have your experiences regarding this been (mainly)...

- Positive
- Negative
- Neutral

Would you like to elaborate? [Open answer]

Time management

How do you find it estimating how much time a task is going to take when working with Agile?

- (Scale from 1-5; 1 being Very easy and 5 being Very difficult)

If you find it difficult to plan ahead when working with Agile, what would you say is the main reason for this?

- Changing requirements
- Uncertain requirements
- Inexperience
- Team factors
- Technological factors
- I don't find it difficult to plan ahead when working with Agile
- Other: [Open answer]

Have you experienced "crunch periods" in projects (overtime work at the end phase of a milestone/project)?

- Yes, many times
- Yes, but rarely
- No, never

In your experience, what would you say is the main contributing factor to crunch time?

- Changing requirements/Feature creep
- Technological factors
- Inaccurate time management
- Team factors
- I don't know/I don't have any experience with crunch

Final remarks

Do you personally believe there is a connection between team communication problems and agile methods?

- I don't see any connection

Challenges in video game development – What does agile management have to do with it?

- I see a weak connection
- I see a strong connection
- There might be a connection but it's because the method is not managed correctly
- There might be a connection but it's because the method is combined with other methods

Do you personally believe there is a connection between time management issues (new tasks at the end of the project, work pace, crunch hours) and agile methods?

- I don't see any connection
- I see a weak connection
- I see a strong connection
- There might be a connection but it's because the method is not managed correctly
- There might be a connection but it's because the method is combined with other methods

Anything else you would like to add? [Open answer]

If the respondent answered "No" to the question if they had worked with Agile, they were led to the following section:

No experience with Agile

How do you find it communicating your needs and opinions regarding work to team members in other disciplines than your own?

- Easy
- Sometimes difficult
- Difficult
- Don't know/haven't thought about it

Have you worked in projects where features are added at a late stage in the process?

- Yes, many times
- Yes, a few times
- Don't know/don't remember
- No, never

To what extent do you feel that projects you have worked on (generally) have been able to stick to the time plan defined at the beginning of a project?

- They mostly stick to the time plan
- They don't avert significantly
- They never follow the time plan
- I don't know/haven't thought about it

Challenges in video game development – What does agile management have to do with it?

What do you think about projects that avert drastically from the pre-defined time plan?

- It's stressful
- I don't mind it as long as it's handled in a good way
- It's sometimes necessary
- It's never necessary
- Other

Have you experienced "crunch periods" in projects (overtime work at the end phase of a milestone/project)?

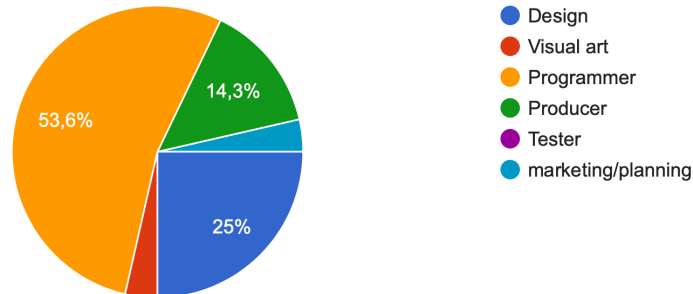
- Yes, many times
- Yes, but rarely
- No, never

Anything else you would like to add?

Appendix 3 – Survey diagrams

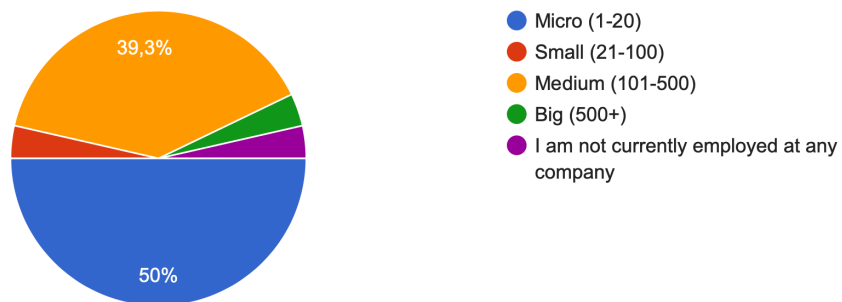
Which game development discipline do you (mainly) identify with?

28 svar



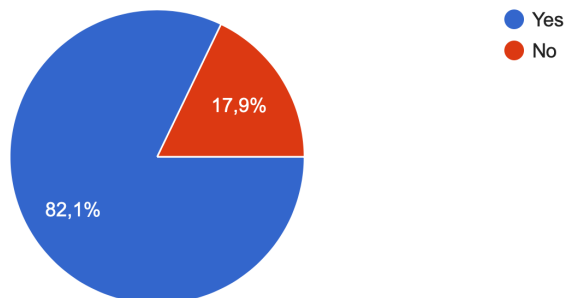
How big is the company you currently work at (number of employees)?

28 svar



Do you have any experience in working with Agile methods like Scrum, XP, DSDM, Kanban etc?

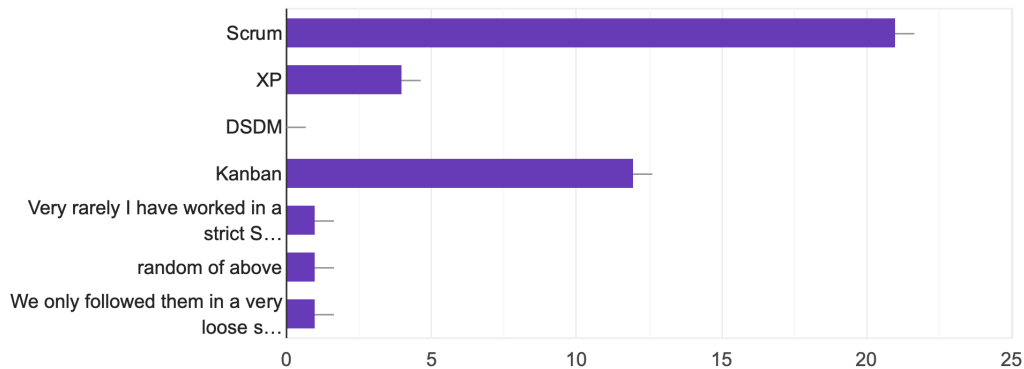
28 svar



Challenges in video game development – What does agile management have to do with it?

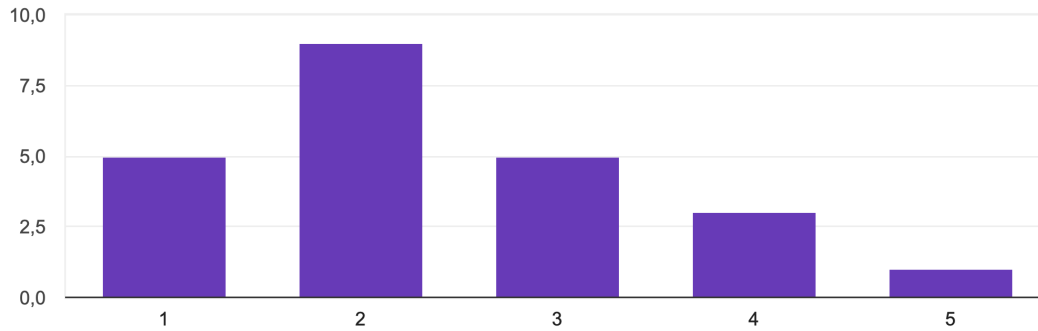
Which of the following methods have you worked with?

23 svar



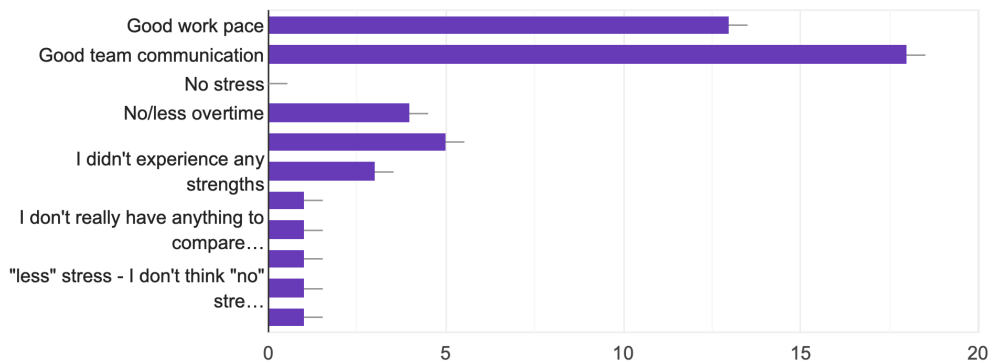
How would you rate your overall experience of working with agile methods?

23 svar



What strengths have you experienced when working with Agile?

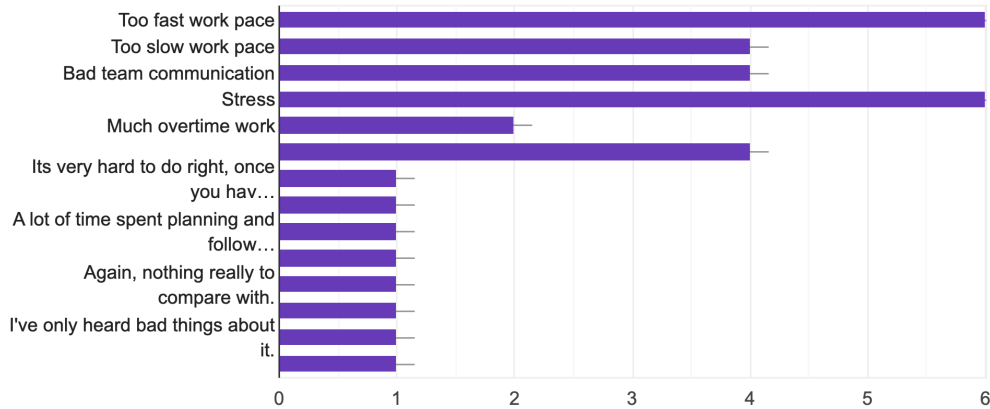
23 svar



Challenges in video game development – What does agile management have to do with it?

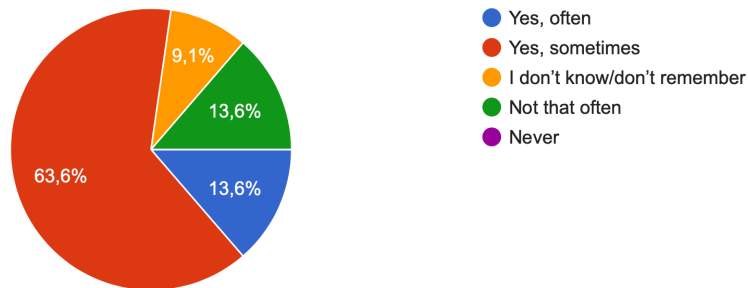
What weaknesses have you experienced when working with Agile?

21 svar



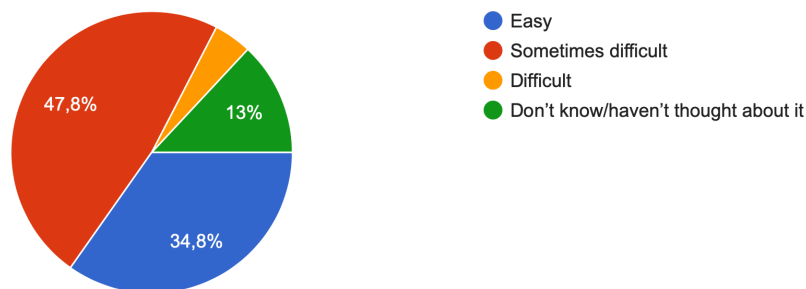
Do you experience these strengths and weaknesses even when not working with Agile methods?

22 svar



How do you find it communicating your needs and opinions regarding work to team members in other disciplines than your own?

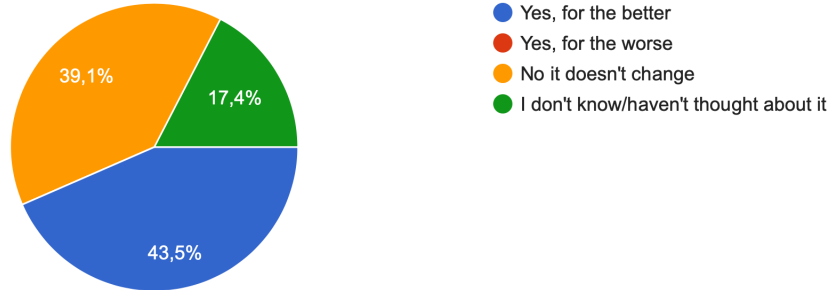
23 svar



Challenges in video game development – What does agile management have to do with it?

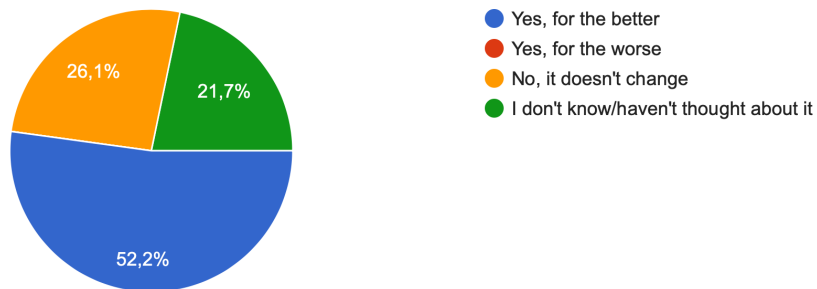
Have you experienced that the communication changes when working with agile methods?

23 svar



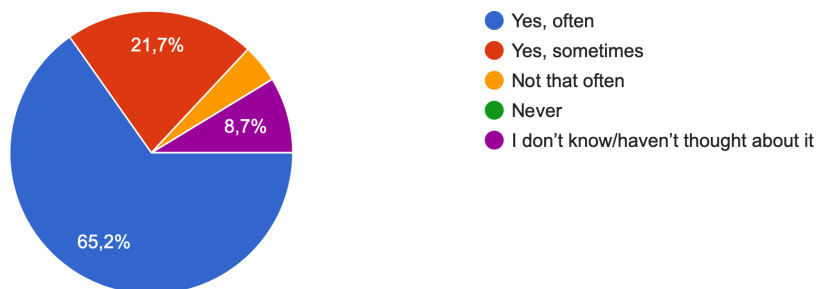
Does working with Agile methods change the frequency or quality of communication between different disciplines in your team?

23 svar



Do you feel you are able to make your opinion heard when working in agile teams?

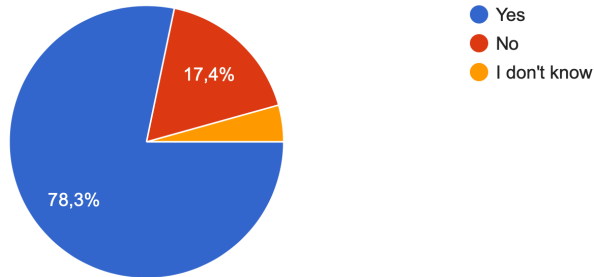
23 svar



Challenges in video game development – What does agile management have to do with it?

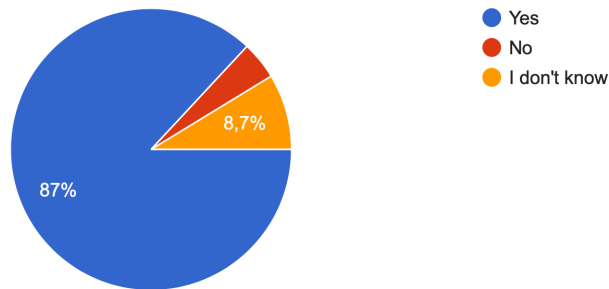
"Working with agile doesn't change the hierarchy in the team - the managers still have the final say."

23 svar



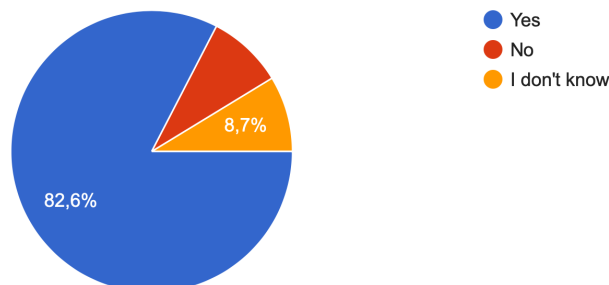
"The managers/the seniors in the team influence the opinions or behaviors of others in the team."

23 svar



"Working with agile allows for the team to speak more freely and lets everybody influence the process."

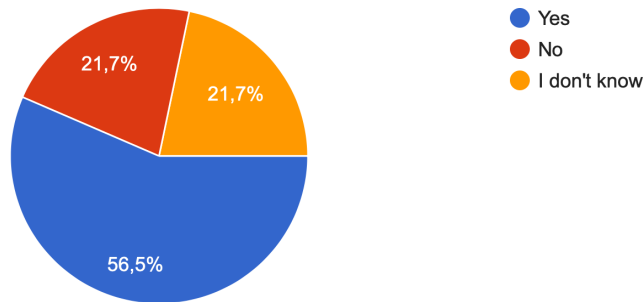
23 svar



Challenges in video game development – What does agile management have to do with it?

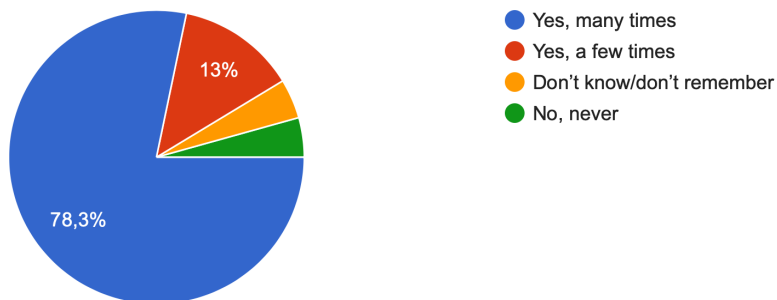
"Working with agile makes me feel more influential in the team's decision"

23 svar



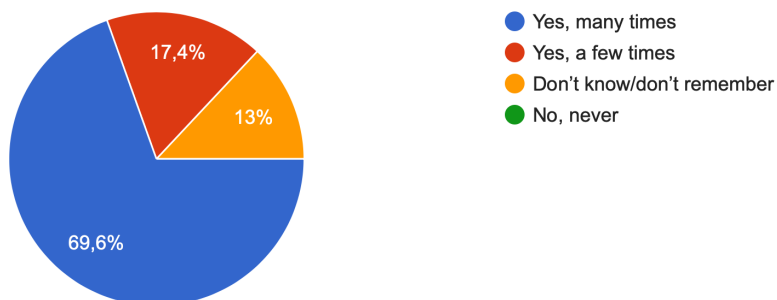
Have you worked in projects with agile methods where features are added at a late stage in the process?

23 svar



Have you experienced that feature are added at a late stage in projects that does not use agile methods?

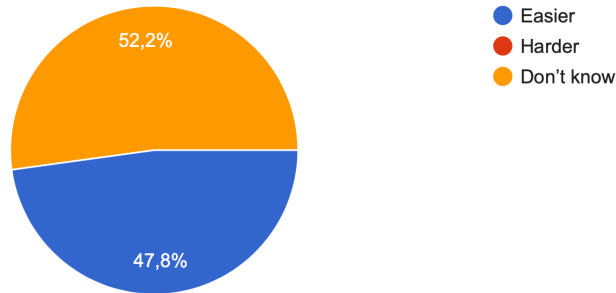
23 svar



Challenges in video game development – What does agile management have to do with it?

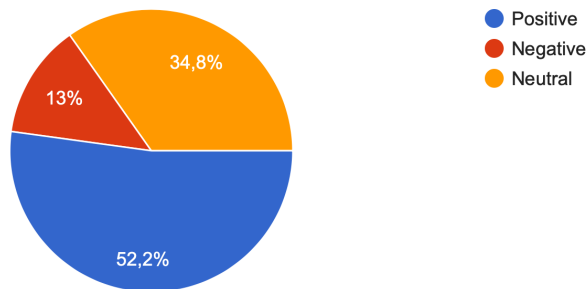
Do you think that agile methods make it easier or harder to handle new features at a late stage in the process?

23 svar



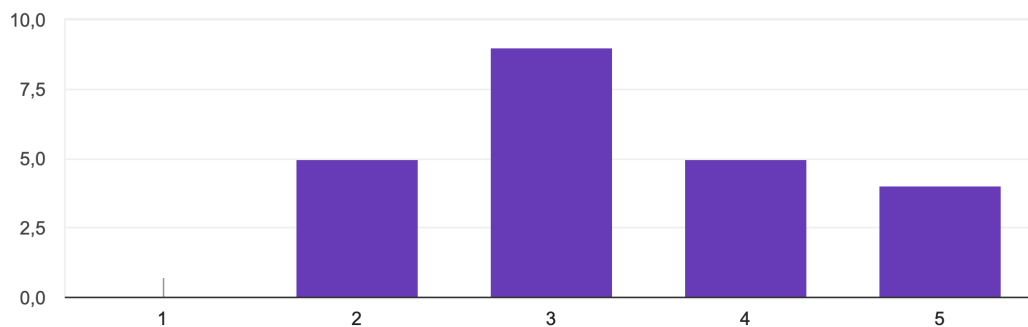
One of the major components of Agile is allowing for constant change in a project. Have your experiences regarding this been (mainly)...

23 svar



How do you find it estimating how much time a task is going to take when working with Agile?

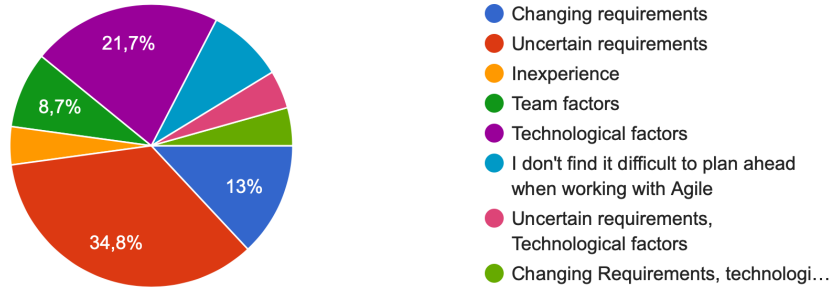
23 svar



Challenges in video game development – What does agile management have to do with it?

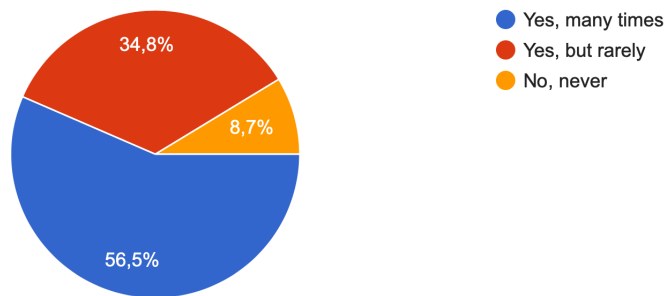
If you find it difficult to plan ahead when working with Agile, what would you say is the main reason for this?

23 svar



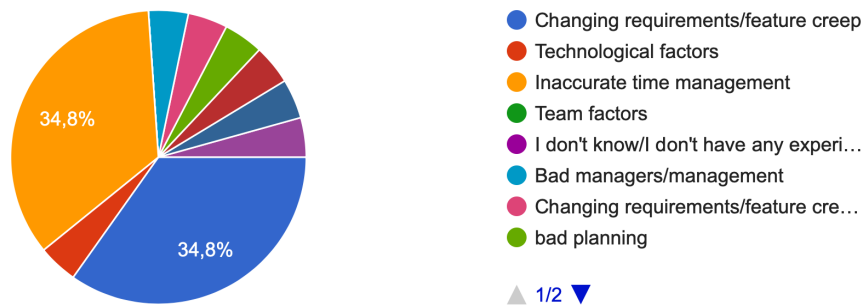
Have you experienced "crunch periods" in projects (overtime work at the end phase of a milestone/project)?

23 svar



In your experience, what would you say is the main contributing factor to crunch time?

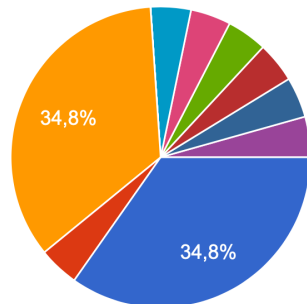
23 svar



Challenges in video game development – What does agile management have to do with it?

In your experience, what would you say is the main contributing factor to crunch time?

23 svar

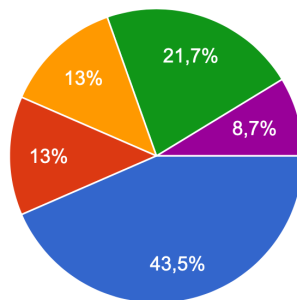


- All of the above, plus business decisions from the business, natural disasters, inexperience form leadership, sociopaths in leadership, a belief of "pressure makes diamonds" so crunch is a necessity...
- bad planning. no scalable scoping
- Highly variable, usually a mix of all the above, and then some.

▲ 2/2 ▼

Do you personally believe there is a connection between team communication problems and agile methods?

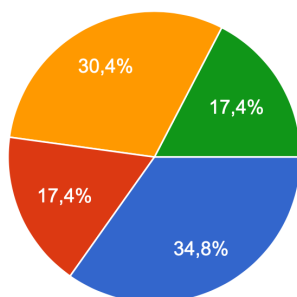
23 svar



- I don't see any connection
- I see a weak connection
- I see a strong connection
- There might be a connection but it's because the method is not managed correctly
- There might be a connection but it's because the method is combined with other methods

Do you personally believe there is a connection between time management issues (new tasks at the end of the pr...ace, crunch hours) and agile methods?

23 svar



- I don't see any connection
- I see a weak connection
- I see a strong connection
- There might be a connection but it's because the method is not managed correctly
- There might be a connection but it's because the method is combined with other methods